

1.1.2 Percentage of programmes where syllabus revision was carried out during the last five years (20)

1.2.2 Percentage of programs in which Choice Based Credit System (CBCS)/elective course system has been implemented (20)

DEPARTMENT OF TAMIL 2017-2018			
TAMIL			
Year	Curricular Revision		
	Revision in the existing courses	% of Revision	Introduction of new courses
I YEAR	U1LT21FL	80%	
	U2LT21FL	75%	
II YEAR	U3LT21FL	50%	
	U4LT21FL	80%	

Department of English

DEPARTMENT OF ENGLISH 2020-2021			
ENGLISH			
Year	Curricular Revision		
	Revision in the existing courses	% of Revision	Introduction of new courses
I YEAR	U1CE21SL	100%	
	U2CE21SL	100%	
II YEAR	U3LE21SL	100%	
	U4LE21SL	100%	

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DEPARTMENT OF BUSINESS ADMINISTRATION 2017- 2018			
BBA (BACHULAR OF BUSINESS ADMINISTRATION)			
Year	Curricular Revision		
	Revision in the existing courses	% of Revision	Introduction of new courses
I YEAR	U1BA11MT Principles of Management as U1BA21MT Principles of Management		
	U1BA02MT Business Mathematics and Statistics-I as U1BA22MT Business Statistics-I		
	U1BA01AT Business Organization as U1BA21AT Business Organization	40%	
	U2BA01MT Business Communication as U2BA21MT Business Communication	40%	
	U2BA02MT Business Mathematics and Statistics-II as U2BA22MT Business Statistics-II		
	U2BA11AT Organizational Behaviour as U2BA21AT Organizational Behaviour		
II YEAR	U3BA11MT Production Management as U3BA21MT Production Management		
	U3BA02MT Financial Accounting as U3BA22MT Financial Accounting	40%	
	U3BA03MT Strategic Management as U3BA23MT Strategic Management		
	U3BA04MT Managerial Economics as U3BA24MT Managerial Economics		
	U3BA11AT Office Management as U3BA21AT Office Management		
	U3BA01ST Customer Relationship Management as U3BA21ST Customer Relationship Management		
	U4BA01MT Materials Management as U4BA21MT Materials Management		

	U4BA02MT Management Accounting as U4BA22MT Management Accounting		
	U4BA03MT Business Environment as U4BA23MT Business Environment		
	U4BA04MT Operations Research as U4BA24MT Operations Research		
	U4BA01AT Financial Management as U4BA21AT Financial Management	50%	
	U4BA01ST Total Quality Management as U4BA21ST Total Quality Management	40%	
	U5BA01MT Business Law as U5BA21MT Business Law		
III YEAR	U5BA05ST E-Business as U5BA25ST E-Business		
	U5BA02MT Marketing Management as U5BA22MT Marketing Management		
	U5BA03MT Human Resources Management as U5BA23MT Human Resources Management		
	U5BA04ET Entrepreneurial Development as U5BA24ET ELECTIVE-I- INTERNATIONAL BUSINESS and U5BA25ET ELECTIVE-II- BANKING AND INSURANCE		U5BA04ET Entrepreneurial Development elective paper has changed as skill based paper for 6th semester. Two elective papers are included.
	U6BA01MT Industrial Relations as U6BA21MT Industrial Relations		
	U6BA02MT Computer Applications In Business as Computer Applications In Business		
	U6BA03ET Marketing research as U6BA23ET ELECTIVE-I- RESEARCH METHODOLOGY and U6BA24ET ELECTIVE-II- MARKETING RESEARCH		.
	U6BA01PV Project Work with Viva voce as U6BA21PV Project Work with Viva voce		

	U6BA05ST Creativity and Innovation Management as U6BA25ST Entrepreneurial Development		U6BA05ST Creativity and Innovation Management removed and U6BA25ST Entrepreneurial Development added
Other Department Course Revision			
III Year (B.C.A/CS /MATHS)	U3BA01NM Management Concepts as U3BA21NM Management Concepts		
IV Year (B.C.A/CS /MATHS)	U4BA01NM General Commercial Knowledge as U4BA21NM General Commercial Knowledge		

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DEPARTMENT OF BIOCHEMISTRY (2017-2018)			
B.Sc. Biochemistry			
I YEAR	U1BC01MT Cell biology as U1BC21MT Cell biology	10%	
	U1CH01AT Chemistry – I as U1CH21AT Chemistry – I	20 %	
	U1ES01GS Environmental studies as U1ES21GS Environmental studies	40 %	
	U2BC01MT Biomolecules as U2BC21MT Biomolecules	30 %	
	U2BC01MP Volumetric and Qualitative analysis as U2BC21MP Volumetric and Qualitative analysis	10 %	
	U2CH01AT Chemistry – II as U2CH21AT Chemistry – II	20 %	
	U2CH01AP Allied – I Practical as U2CH21AP Allied – I Practical	10 %	
	U2VE11GS value education (general awareness) as U2VE21GS value education (general awareness)	-	
II YEAR	U3BC01MT Analytical Biochemistry as U3BC21MT Biophysics And Analytical Biochemistry	40 %	
	U3MB11AT Microbiology - I as U3MB21AT Microbiology - I	-	
	U3BC02ST Fundamentals of Computer as U3BC22ST Fundamentals of Computer	20 %	
	U3BC01NM Diagnostic Biochemistry - I as U3BC21NM Diagnostic Biochemistry - I	50 %	
	U4BC11MT Medical Laboratory Technology as U4BC21MT Medical Laboratory Technology	40 %	

	U4BC11MP Practical - II Medical Laboratory Technology as U4BC21MP Practical - II Medical Laboratory Technology	80%	
	U4MB11AT Microbiology - II as U4MB21AT Microbiology - II	-	
	U4MB01AP Allied - II Practical as U4MB21AP Allied - II Practical	-	
	U4BC02ST Computer Applications as U4BC22ST Computer Applications	10 %	
	U4BC01NM Diagnostic Biochemistry - II as U4BC21NM Diagnostic Biochemistry - II	40 %	
III YEAR	U5BC01MT Enzymology as U5BC21MT Basic Enzymology	30 %	
	U5BC02MT Intermediary Metabolism as U5BC22MT Intermediary Metabolism	-	
	U5BC03MT Genetics And Molecular Biology as U5BC23MT Genetics And Molecular Biology	-	
	U5BC14ET Hormonal Biochemistry as U5BC24ET Hormonal And Nutritional Biochemistry	60 %	The paper Nutritional Biochemistry has been shifted from VI Semester to V Semester
	U5BC05ET Biochemical and Environmental Toxicology as U5BC25ET Biochemical and Environmental Toxicology	-	
	U5BC06ST Bio Statistics as U5BC26ST Bio Statistics	40 %	
	U6BC01MT Human Physiology and Nutritional Biochemistry as U6BC21MT Human Anatomy and Physiology	60 %	New paper Human anatomy and physiology has been introduced
	U6BC02MT Clinical Biochemistry as U6BC22MT Clinical Biochemistry	30 %	
	U6BC03ET Biotechnology as U6BC23ET Biotechnology	-	

	U6BC04ET Plant Biochemistry and Plant Molecular Biology as U6BC24ET Plant Biochemistry and Plant Molecular Biology	-	
	U6BC15ET Immunology as U6BC25ET Immunology	30 %	
	U6BC06ET Bionanotechnology as U6BC26ET Bionanotechnology	-	
	U6BC11MP Blood Analysis and Enzymology as U6BC21MP Blood Analysis and Enzymology	10 %	
	U6BC12EP Food Analysis, Microbiology and Separation Techniques as U6BC22EP Food Analysis, Microbiology and Separation Techniques	30 %	
	U6BC07ST Pharmacology and Pharmaceutical Biochemistry as U6BC27ST Pharmacology and Pharmaceutical Biochemistry	-	
M.Sc. Biochemistry			
I YEAR	P1BC01MT Chemistry of Macromolecules as P1BC21MT Chemistry of Macromolecules	20 %	
	P1BC02MT Cell Biology & Genetics as P1BC22MT Cell Biology & Genetics	50 %	
	P1BC03MT Biophysical and Analytical Techniques as P1BC23MT Biophysical and Biochemical Techniques	30 %	
	P1BC04ET Chemistry and Nanoscience for Biologists as P1BC24ET Chemistry and Nanoscience for Biologists	40 %	
	P2BC01MT Bioenergetics Intermediary Metabolism as P2BC21MT Bioenergetics & Intermediary Metabolism	20 %	
	P2BC02MT Advanced Enzymology as P2BC22MT Enzyme & Enzyme technology	20 %	
	P2BC03MT Biotechnology as P2BC23MT Advanced Biotechnology.	20 %	

	P2BC11MP Isolation and Characterization studies and Quantitative Analysis as P2BC21MP Isolation and characterization studies and Quantitative Analysis	10 %	
	P2BC04ET Plant Biochemistry & microbial technology as P2BC24ET Plant Biochemistry & Plant Ecology	40 %	Ecology portion has been introduced
	P2HR01GS Human Rights as P2HR21GS Human Rights	80 %	
II YEAR	P3BC01MT Advanced endocrinology as P3BC21MT Hormones & Signal transduction	20 %	
	P3BC02MT Research Methodology as P3BC22MT Research Methodology	20 %	
	P3BC03MT Molecular Biology and Bioethics as P3BC23MT Molecular Biology and Bioethics	30 %	
	P3BC06ET Phytochemistry and phytotherapy as P3BC24ET Phytochemistry and phytotherapy	40 %	
	P3BC04ET Immunology and Stem Cell Technology as P3BC25ET Immunology and Stem Cell Technology	20 %	
	P3BC05ET Pharmaceutical Biochemistry as P3BC26ET Pharmaceutical Biochemistry	-	
	P4BC01MT Human Physiology and Nutrition as P4BC21MT Human Physiology and Nutrition	10 %	
	P4BC02MT Advanced Clinical Biochemistry as P4BC22MT Advanced Clinical Biochemistry	20 %	
	P4BC11MP Biochemical Analysis of Blood, Marker enzymes and antioxidant studies as P4BC21MP Biochemical Analysis of Blood, Antioxidant and Immunological Studies	40 %	
	P4BC12MP Haematological Methods, Urine Analysis as P4BC22MP Haematological Methods, Urine Analysis and Microbial Biochemistry	40 %	

	P4BC01PV Project work with Viva-Voce as P4BC21PV Project work with Viva-Voce	-	
M.Phil BIOCHEMISTRY			
	Curricular Revision		
Year	Revision in the existing courses	% of Revision	Introduction of new courses
I Year	M1RM21SM Research Methodology	20%	
I Year	M1BC21MT Analytical Methods	100%	

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DEPARTMENT OF COMMERCE (2017-2018)			
B.Com			
I YEAR	U1CM01MT Principles Of Accountancy as U1CM21MT Principles Of Accountancy	--	
	U1CM02MT Business Communication – I as U1CM22MT Business Communication	--	
	U1ES01GS Environmental studies as U1ES21GS Environmental studies	40 %	
	U2CM01MT Financial Accounting as U2CM21MT Financial Accounting	--	
	U2CM02MT Business Organization as U2CM22MT Business Organization	--	
	U2VE11GS value education (general awareness) as U2VE21GS value education (general awareness)	--	
II YEAR	U3CM01MT Corporate Accounting as U3CM21MT Corporate Accounting	--	
	U3CM02MT Business Laws as U3CM22MT Business Laws	--	
	U3CM03MT Modern Banking as U3CM03MT Modern Banking	--	
	U3CM04MT Business Economics I as U3CM24MT Business Economics I	--	
	U3CM06ST Development Of Small Business asU3CM26ST Development Of Small Business	--	
	U4CM01MT Advanced Corporate Accounting as U4CM21MT Advanced Corporate Accounting	--	
	U4CM02MT Company Law as U4CM22MT Company Law	--	
	U4CM03MT Banking Law and Practice as U4CM23MT Banking Law and Practice	--	
	U4CM04MT Business Economics II as U4CM24MT Business Economics II	--	

	U4CM06ST Industrial Organisation as U4CM06ST Industrial Organisation	--	
III YEAR	U5CM01MT Cost Accounting I as U5CM21MT Cost Accounting I	--	
	U5CM02MT Practical Auditing as U5CM22MT Practical Auditing	--	
	U5CM03MT Business Management as U5CM23MT Business Management	--	
	U5CM04MT Income Tax Law & Practice I as U5CM24MT Income Tax Law & Practice I	--	
	U5CM05MT Income Tax Law & Practice I as U5CM25MT Income Tax Law & Practice I	--	
	U5CM09ST Merchant Banking as U5CM27ST Merchant Banking	--	
	U6CM01MT Cost Accounting II as U6CM21MT Cost Accounting II	--	
	U6CM02MT Financial Management as U6CM22MT Financial Management	--	
	U6CM03MT Entrepreneurial Development as U6CM23MT Biotechnology	--	
	U6CM04MT Income Tax Law & Practice –II as U6CM24MT Income Tax Law & Practice –II	--	
	U6CM08ET Human Resource Management as U6CM26ET Human Resource Management	--	
	U6CM12ST public Enterprises In India as U6CM28ST Public Enterprises In India	--	
M.COM (COM)			
I YEAR	P1CM01MT Advanced Financial Management as P1CM21MT Advanced Financial Management	--	

P1CM02MT Accounting for Managerial Decision as P1CM22MT Accounting for Managerial Decision	--	
P1CM03MT Global marketing as P1CM23MT Global marketing	--	
P1CM06ET Managerial Economics as P1CM245ET Industrial and Labour Laws	--	
P2CM01MT B Corporate Laws as P2CM21MT Project Management	--	
P2CM02MT Human Resource Management as P2CM22MT Human Resource Management	--	
P2CM03MT Advanced Accounts as P2CM23MT Advanced Accounts.	40%	
P2HR21GS Human Rights AS P2HR01GS Human Rights	--	
P3CM21MT Organizational Behaviour as P3CM21MT Organizational Behaviour	--	
P3BC03MT Advanced cost Accounting as P3BC23MT Advanced cost Accounting	--	
P3CM04MT Research Methodology as P3CM04MT Research Methodology	--	
P3CM05ET Services Marketing as P3CM25ET Services Marketing	--	
P3CM07ET Financial Services as P3CM27ET Financial Services	--	
P4CM01MT Direct as P4CM21MT Direct Taxes	--	
P4CM02MT Investment management as P4CM022MT Investment management	--	
P4CM03ET Sales & Advertising Management as P4CM23ET Sales & Advertising Management	--	
P4CM01PV Project work with Viva-Voce as P4CM21PV Project work with Viva-Voce	--	

DEPARTMENT OF COMPUTER SCIENCE AND APPLICATIONS			
B.Sc. Computer Science			
Year	Revision in the existing courses	% of revision	Introduction of new courses
I YEAR	U1CS01MT Digital Logic and Design as U1CS21MT Digital Logic and Design	10 %	U1CS21MP Multimedia Lab Instead of U1CS01MP PC Software lab
	U2CS01MT Programming in C as U2CS21MT Programming in C	10 %	U3CS22MP Data Structures and Computer Algorithms Lab (Newly Introduced)
	U2CS11MP Programming in C Lab as U2CS21MP Programming in C Lab	10 %	U5CS22MT Open Source Programming Instead of U5CS02MT Operating System
II YEAR	U3CS01MT Object Oriented Programming Using C++ as U3CS21MT Object Oriented Programming Using C++		U5CS22MP Open Source Programming Lab Instead of U5CS02MP Operating System Lab
	U3CS01MP C++ and Data Structure Lab as U3CS21MP Object Oriented Programming Using C++ Lab	50 %	U6CS23ET Artificial Intelligence Instead of U6CS03ET Client Server Technology
	U3CS02AT Statistical Methods and their applications I as U3CS22AT Statistical Methods and their applications I	10 %	U6CS25ET Multimedia Systems Instead of U6CS 05ET Network Security
	U3CS03ST Data Structures and Algorithms, as U3CS23ST Data Structures and Computer Algorithms	75 %	U6CS26ST Cloud Computing Instead of U6CS06ST Animation Techniques
	U3CS01NM Introduction to Information Technology as U3CS21NM Introduction to Information Technology	10 %	
	U3BA01NM Management Concepts as U3BA21NM Management Concepts	10 %	

Year	Revision in the existing courses	% of revision	Introduction of new courses
	U4CS01MT Java Programming as U4CS21MTJava Programming	10 %	
	U4CS01MP Java Programming Labas U4CS21MP Java Programming Lab	10 %	
	U4CS02AT Statistical Methods andtheir applications II as U4CS22AT Statistical Methods and their applications II	10 %	
	U4CS02AP Statistical Methods and their applications I & II as U4CS22AP StatisticalMethods and their applications I & II	10 %	
	U4CS03ST Microprocessors and MicroControllers as U4CS23ST Microprocessorsand Microcontrollers	10 %	
	U4CS01NM Internet and its Applications as U4CS21NM Internet and its Applications	10 %	
III YEAR	U5CS01MT Database Management System asU5CS21MT Relational Database Management System	10 %	
	U5CS02MT Operating System as U5CS25STOperating System	10 %	
	U5CS01MP RDBMS Lab as U5CS21MPRDBMS Lab		
	U5CS03ET Data and Communication Networksas U5CS23ET Data and Communication Networks	10 %	
	U5CS04ET Computer Graphics as U5CS24ETComputer Graphics	10 %	
	U6CS01MT Visual Programming as U6CS21MT Visual Programming	10 %	
	U6CS01MP Web Technology Lab as U6CS22MP Web Technology Lab	10 %	
	U6CS02MP Visual Programming Lab as U6CS21MP Visual Programming Lab	10 %	

Year	Revision in the existing courses	% of revision	Introduction of new courses
	U6CS08MT Software Project Management as U6CS22ET Software Project Management	10 %	
	U6CS02ET Web Technology as U6CS22MT Web Technology	10 %	
	U6CS04ET Data mining and Warehousing as U6CS24ET Data mining and Warehousing	10 %	
	U6CS07EA Extension Activities as U6CS27EA Extension Activities	10 %	
B.C.A.			
I YEAR	U1CA01MT Digital Logic and Design as U1CA21MT Digital Logic and Design	10 %	U1CA21MP Multimedia Lab Instead of U1CA01MP PC Software lab
	U2CA01MT Programming in C as U2CA21MT Programming in C	10 %	U3CA22MP Data Structures and Computer Algorithms Lab (Newly Introduced)
	U2CA11MP Programming in C Lab as U2CA21MP Programming in C Lab	10 %	U5CA22MT Open Source Programming Instead of U5CA02MT COBOL Programming
	U3CA01MT Object Oriented Programming Using C++ as U3CA21MT Object Oriented Programming Using C++	-	U5CA22MP Open Source Programming Lab Instead of U5CA02MP COBOL Lab
	U3CA02MT Data Structures and Algorithms, as U3CA22MT Data Structures and Computer Algorithms	75 %	U6CA27ST Cloud Computing Instead of U6CA07ST Animation Techniques
	U3CA03MT Computer Architecture as U3CA23MT Computer Architecture	10 %	

Year	Revision in the existing courses	% of revision	Introduction of new courses
II YEAR	U3CA01MP C++ and Data Structures Lab asU3CA21MP Object Oriented ProgrammingUsing C++ Lab	50 %	
	U3CM11AT Financial Accounting I as U3BA21AT Financial Accounting I	10 %	
	U3CA04ST Enterprise Resource Planning asU3CA24ST Enterprise Resource Planning	10 %	
	U3BA01NM Management Concepts as U3BA21NM Management Concepts	10 %	
	U4CA01MT Computer Networks asU4CA21MT Computer Networks	10 %	
	U4CA02MT Operating System as U4CA22MTOperating System	10 %	
	U4CA03MT Visual Programming as U4CA23MT Visual Programming	10 %	
	U4CA01MP Visual Programming Labas U4CA21MP Visual Programming Lab	10 %	
	U4CM11AT Financial Accounting II as U4BA21AT Financial Accounting II	10 %	
	U4CA04ST E-Commerce as U4CA24ST E-Commerce	10 %	
III YEAR	U5CA01MT Database Management System as U5CA21MT Relational Database ManagementSystem	10 %	
	U5CA01MP RDBMS(Oracle Lab) asU5CA21MP RDBMS Lab	-	
	U5CA03ET Data Mining &Warehousing as U5CA23ET Data Miningand Warehousing	10 %	
	U5CA14ET Microprocessors and Microcontrollers as U5CA24ET Microprocessors and Microcontrollers	10 %	
	U5CA04ST Mobile Computing as U5CA25STMobile Computing	10 %	

Year	Revision in the existing courses	% of revision	Introduction of new courses
	U6CA01MT Java Programming as U6CA21MT Java Programming	10 %	
	U6CA05ET Web Technology as U6CA22MTWeb Technology	10 %	
	U6CA01MP Java Lab as U6CA21MP Java Lab	10 %	
	U6CA02MP Web Technology Lab asU6CA22MP Web Technology Lab	10 %	
	U6CA03ET Computer Graphics as U6CA23ETComputer Graphics	10 %	
	U6CA06ET Management Information Systems.as U6CA26ET Management Information Systems.	10 %	
	U6CA02MT Software Project Management as U6CA25ET Software Project Management	10 %	
	U6CA08EA Extension Activities as U6CA21EA Extension Activities	10 %	
M.C.A.			
	P1CA01MT Programming in C as P1CA21MTProgramming in C	10 %	P5CA21MT Big Data Analytics Instead of P5CA11MT Cloud Computing
	P1CA02MT Digital logic and Computer Organization as P1CA22MT Digitallogic and Computer Organization	10 %	
	P1CA03MT Principles of Information Technology as P1CA23MT Principles of Information Technology	10 %	P5CA26ET Decision Support System Instead of P5CA05ET Embedded Systems
	P1CA04MT Data Structures as P1CA24MT Data Structures	10 %	
	P1CA05MT Discrete Mathematics as P1CA25MT Discrete Mathematics	10 %	P5CA25ET Internet of Things Instead of P5CA06ET Network Security

Year	Revision in the existing courses	% of revision	Introduction of new courses
I YEAR	P1CA01MP C and Data Structures –Lab as P1CA21MP C and Data Structures –Lab	10 %	
	P1CA02MP Office Automation –Lab as P1CA22MP Office Automation – Lab	10 %	P5CA24MT Network Security Instead of P5CA04 MT Data Mining
	P2CA01MT Object Oriented Programming in C++ as P2CA21MT Object Oriented Programming in C++	10 %	
	P2CA02MT Design and Analysis of Algorithms, as P2CA22MT Design and Analysis of Algorithms	10 %	P5HR21GS Human Rights Shifted from VI semester
	P2CA03MT Computer Graphics as P2CA23MT Computer Graphics	10 %	
	P2CA04MT Accounting and Financial Management as P2CA24MT Accounting and Financial Management	10 %	
	P2CA01MP C++ and Algorithms – Lab as P2CA21MP C++ and Algorithms – Lab	10 %	
	P2CA02MP Computer Graphics – Lab as P2CA22MP Computer Graphics – Lab	10 %	
	P3CA11MT Advanced Operating System as P3CA21MT Advanced Operating System	10 %	
	P3CA12MT Advanced Database Systems as P3CA22MT Advanced Database Systems	10 %	
	P3CA23MT Software Engineering as P3CA23MT Software Engineering	10 %	
	P3CA06ET Object Oriented Analysis and Design as P3CA24MT Object Oriented Analysis and Design	10 %	
	P3CA04ET Soft Computing as P3CA25ET Soft Computing	10 %	

Year	Revision in the existing courses	% of revision	Introduction of new courses
II YEAR	P3CA05ET Digital Image Processing as P3CA26ET Digital Image Processing	10 %	
	P3CA11MP RDBMS (Oracle) – Labas P3CA21MP RDBMS (Oracle) – Lab	10 %	
	P3CA12MP Advanced Operating System Lab asP3CA22MP Advanced Operating System Lab	10 %	
	P4CA01MT Principles of Compiler Design asP4CA21MT Principles of Compiler Design	10 %	
	P4CA12MT Advanced Java Programming asP4CA22MT Advanced Java Programming	10 %	
	P4CA03MT Resource Management Techniquesas P4CA23MT Resource Management Techniques	10 %	
	P4CA14MT C# and .Net Framework asP4CA24MT C# and .Net Framework	10 %	
	P4CA11MP Advanced Java Programming Labas P4CA21MP Advanced Java Programming Lab	10 %	
	P4CA12MP C# and .Net Lab as P4CA22MP C# and .Net Lab	10 %	
	P4CA05ET E-Commerce as P4CA25ET E-Commerce	10 %	
	P4CA16ET Software Testing as P4CA26ETSoftware Testing	10 %	
III YEAR	P5CA02MT WAP & XML asP5CA22MT WAP & XML	10 %	
	P5CA13MT VB.NET & ASP.NET Programming as P5CA23MT VB.NET & ASP.NET Programming	10 %	

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS [2020-2021]				
M.C.A				
Year	Name of the Course		% of Revision	Introduction of New Course
I Year	P1CA31MT	Data Structure and Algorithms	100	New Paper Introduced
	P1CA32MT	Problem Solving using python	100	New Paper Introduced
	P1CA33MT	Java Programming	100	New Paper Introduced
	P1CA34MT	Computer Organization	100	New Paper Introduced
	P1HR31GS	Human Rights	50	-----
	P1CA31ET	Principles of Programming Languages	100	New Paper Introduced
	P1CA32ET	Software Project Management	100	New Paper Introduced
	P1CA33ET	Object Oriented Analysis Design	90	-----
	P1CA31MP	Data Structure and Algorithms Lab	100	New Paper Introduced
	P1CA32MP	Problem Solving using python Lab	100	New Paper Introduced
	P1CA33MP	Java Programming Lab	100	New Paper Introduced
	P2CA31MT	Relational Database Management System	100	New Paper Introduced
	P2CA32MT	Web Programming (PHP, MySQL)	100	New Paper Introduced
	P2CA33MT	Linux Operating System	100	New Paper Introduced
	P2CA34MT	Accounting Financial Management	100	New Paper Introduced
	P2CA31ET	Cloud Computing	100	New Paper Introduced
	P2CA32ET	Mobile Commerce	100	New Paper Introduced
	P2CA33ET	Cryptography and Network Security	100	New Paper Introduced
	P2CA34ET	Business Statistics	100	New Paper Introduced
	P2CA35ET	Internet of Things	40	-----
	P2CA36ET	Artificial Intelligence	100	New Paper Introduced
	P2CA31MP	Relational Database Management System Lab	100	New Paper Introduced
	P2CA32MP	Web Programming (PHP, MySQL) Lab	100	New Paper Introduced
	P2CA33MP	Linux Operating System Lab	100	New Paper Introduced
II Year	P3CA31MT	Big data analytics	---	-----
	P3CA32MT	Net Programming	100	New Paper Introduced
	P3CA33MT	Mobile Application Development	100	New Paper Introduced
	P3CA34MT	Resource Management Techniques	---	-----
	P3CA31ET	Compiler Design	100	New Paper Introduced
	P3CA32ET	Decision support system	90	-----
	P3CA33ET	Parallel Processing	100	New Paper Introduced
	P3CA34ET	Digital Image Processing	90	-----
	P3CA35ET	Machine Learning	100	New Paper Introduced
	P3CA36ET	Enterprise Resource Planning	100	New Paper Introduced
	P3CA31MP	Net Programming Lab	100	New Paper Introduced
	P3CA32MP	Mobile Application Development Lab	100	New Paper Introduced
	P3CA33MP	Mini project	---	-----
	P4CA31PV	Project Work with Viva Voce	---	-----

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DEPARTMENT OF MICROBIOLOGY 2017- 2018			
B.Sc. Microbiology			
Year	Curricular Revision		
	Revision in the existing courses	% of Revision	Introduction of new courses
	U1MB21MT General Microbiology	-	
	U1BC21AT Biochemistry I	-	
	U1ES21GS Environmental Studies	50	
	U2MB21MT Microbial Physiology	-	
	U2MB22MP General Microbiology and Microbial Physiology	-	
	U2VE21GS Value Education	-	
II YEAR	U3MB21MT Immunology	-	
	U3MB24ST Medical Laboratory Technology	80	
	U3MB21AT Principles of Microbiology	15	
	U3MB21NM Diagnostic Bacteriology and Mycology	20	
	U4MB21MT Microbial Genetics	-	
	U4MB21MP Immunology	-	
	U4MB23ST Computer Applications in Biology	-	
	U4MB21AT Microbial technology - II	15	
	U4MB21NM Diagnostic Virology and Parasitology - I	20	
III YEAR	U5MB21MT Molecular Biology and Genetic Engineering		
	U5MB22MT Medical Bacteriology	30	
	U5MB23MT Medical Virology	80	
	U5MB24ET Medical Mycology, Parasitology and Entomology	35	

	U5MB25ET Human Physiology	-	
	U5MB26ST Mushroom and Vermiculture Techniques	-	
	U6MB21MT Food and Dairy Microbiology	15	
	U6MB22MT Industrial Microbiology	-	
	U6MB23ET Pharmaceutical Microbiology	-	
	U6MB24ET Tannery Technology	-	
	U6MB25ET Environmental Microbiology	-	
	U6MB27ST Agriculture and Biofertilizer Technology	-	
	U6MB21MP Medical Microbiology	-	
	U6MB22MP Food, Environmental and Agricultural Microbiology	-	
M.Sc. Microbiology			
	Curricular Revision		
Year	Revision in the existing courses	% of Revision	Introduction of new courses
I YEAR	P1AM21MT General Microbiology	75	
	P1AM22MT Food and Environmental Microbiology	-	
	P1AM23MT Immunotechnology	-	
	P1AM24ET Soil and Agricultural Microbiology	-	
	P1AM25ET Bioprocess Technology	-	
	P1AM21MP General, Food, Environmental Microbiology and Immunotechnology	-	
	P2AM21MT Medical Bacteriology and Virology	-	
	P2AM22MT Medical Mycology and Parasitology	-	
	P2AM23MT Microbial Physiology and Genetics	-	
	P2AM24ET Hematology and Clinical Techniques	-	
	P2AM25ET Bioinformatics and Bioinstrumentation	-	
	P2HR21GS Human Rights	-	
	P2AM21MP Medical Microbiology, Haematology and Microbial Physiology	-	
II YEAR	P3AM21MT Cell Biology and Molecular Biology	-	
	P3AM22MT Microbial Gene Technology and Bioinformatics	-	
	P3AM23MT Industrial Biotechnology and its Applications	-	
	P3AM24MT Research Methodology	-	
	P3AM25ET Herbal Technology	-	
	P3AM26ET Clinical Microbiology	-	
	P3AM21MP Cell Biology, Microbial Gene Technology and Industrial Biotechnology	-	

	P4AM21MT Biological Techniques	-	
	P4AM22ET Nanobiotechnology and Bioremediation	-	
	P4AM23ET Genetic Engineering	-	
	P4AM21MP Biological Techniques	-	
M.Phil., Microbiology			
Year	Curricular Revision		
	Revision in the existing courses	Revision in the existing courses	Revision in the existing courses
	M1RM21SM Research Methodology	-	
	M1MB21MT Advanced Microbiology	-	
	M1MB21GS Research & Publication ethics	-	YES
	M1MB22MT Guide paper	-	

1.1.2 Percentage of programmes where syllabus revision was carried out during the last five years (20)

1.2.2 Percentage of programs in which Choice Based Credit System (CBCS)/elective course system has been implemented (20)

DEPARTMENT OF MATHEMATICS (2017-2018)			
B.Sc. Mathematics			
Year	Curricular Revision		
	Revision in the existing courses	% of Revision	Introduction of new courses
I YEAR	U1MA21MT Algebra	5%	
	U1MA22MT Trigonometry	15%	
	U1MA22AT Numerical Methods- I	10%	
	U2MA21MT Calculus	10%	
	U2MA22MT Analytical Geometry of Three dimensions	50%	
	U2MA22AT Numerical Methods- II	5%	
II YEAR	U3MA21MT Differential equations	12%	
	U3MA22AT Mathematical statistics-I	15%	
	U3MA23ST Mathematics for Competitive Examinations	20%	
	U4MA21MT Vector Analysis and Fourier Analysis	12%	
	U4MA22AT Mathematical Statistics-II	15%	
	U4MA23ST Linear Programming	5%	

	U4MA21AP Allied-II Practical Mathematical Statistics	-	
III YEAR	U5MA21MT Abstract Algebra	10%	
	U5MA22MT Real Analysis – I	15%	
	U5MA23MT Complex Analysis – I	20%	
	U5MA24MT Statics	12%	
	U5MA25MT Operation Research	5%	
	U5MA26ET Graph Theory	10%	
	U5MA27ET Astronomy	-	
	U5MA28ST Quantitative Techniques	20%	
	U6MA21MT Linear Algebra	25%	
	U6MA22MT Real Analysis-II	15%	
	U6MA23MT Complex Analysis-II	10%	
	U6MA24MT Dynamics	5%	
	U6MA25ET Programming in C	-	
	U6MA26ET Mat lab Programming	-	
	U6MA21EP Programming in C Lab	-	

	U6MA22EP Mat lab	-	
	U6MA27ET Special Functions	-	
	U6MA28ET Fuzzy Mathematics	12%	
	U6MA29ST Fundamentals of Applied Mathematics	10%	
	U6EA21GS Extension Activities	-	
M.Sc. Mathematics			
Year	Curricular Revision		
	Revision in the existing courses	% of Revision	Introduction of new courses
I YEAR	P1MA21MT Algebra I	10%	
	P1MA22MT Mathematical Analysis I	10%	
	P1MA23MT Ordinary Differential Equations	15%	
	P1MA24MT Mechanics	10%	
	P1MA25ET Probability Theory	-	
	P1MA26ET Mathematical Programming	5%	
	P1MA27ET Reliability and Queuing Theory	-	
	P2MA21MT Algebra II	10%	
	P2MA22MT Mathematical Analysis II	12%	
	P2MA23MT Partial Differential Equations	15%	
	P2MA24MT Calculus of Variations and Integral Equations	40%	
	P2MA25ET Programming in C++ With Practical	-	

	P2MA26ET Algebraic Number Theory	-	
	P2MA27ET Optimization Techniques	5%	
II YEAR	P3MA21MT Complex Analysis I	10%	
	P3MA22MT Topology	15%	
	P3MA23MT Differential Geometry	10%	
	P3MA24MT Discrete Mathematics	5%	
	P3MA25ET Tensor Analysis and Relativity Theory	10%	
	P3MA26ET Analytic Number Theory	-	
	P3MA27ET Fluid Dynamics	-	
	P4MA21MT Complex Analysis II	12%	
	P4MA22MT Functional Analysis	5%	
	P4MA23MT Mathematical Statistics	10%	
	P4MA24MT Difference Equations	15%	
	P4MA25ET Number Theory and Cryptography	12%	
	P4MA26ET Fuzzy Mathematics	-	
	P4MA27ET Stochastic Processes	-	

M.Phil., Mathematics			
Year	Curricular Revision		
	Revision in the existing courses	% of Revision	Introduction of new courses
I YEAR	M1MA21MT Algebra and Analysis		100%
	M1MA22MT Topology and Differential Equations		100%
	M1RE21GS Research and Publication Ethics		100%
	M1MA23MT Guide paper		100%

	M2MA21DV Dissertation with Viva Voce		100%

Allied Mathematics for Other Departments			
Year	Curricular Revision		
	Revision in the existing courses	% of Revision	Introduction of new courses
I YEAR B.Sc (CS) & BCA	U1MA11AT Mathematical Foundations -I as U1MA21AT Mathematics -I	40%	
	U1MA12AT Mathematical Foundations -II as U1MA22AT Mathematics -II	20%	

ஆதிபராசக்தி கலை மற்றும் அறிவியல் கல்லூரி

தமிழ்த்துறை

முதலாமாண்டு – முதற்பருவம்

பகுதி – 1 தமிழ்

இக்கால இலக்கியம் மொழித்திறன் இலக்கிய வரலாறு

(2014-2015) (U1LT11FL)

L	T	P	C
5	0	0	3

அலகு -1 கவிதை

மொத்த பாடவேளை=64

பாரதியார்

பாரத நாடு

பாரதிதாசன்

பத்திரிகை

தேசிய விநாயகம் பிள்ளை

ஆசிய ஜோதி

கண்ணதாசன்

சித்தார்த்தன் கேட்ட தேவகீதம்

கவிஞர் கண்ணதாசன் கவிதைகள்

(7 ஆம் தொகுதி)

புதியன பொலிவதாக

பிரபஞ்சன்

ஈரோடு தமிழர் உயிரோடு

சுயமரியாதைக் கும்பாபிஷேகம்

அப்துல் ரகுமான்

(ஆலாபனை) ஆறாத அறிவு

மு.மேத்தா

கனவுக் குதிரைகள்-கிரீடமே கேள்

என் பிள்ளைத் தமிழ்- என் தாய்

வைரமுத்து

இன்னொரு தேசிய கீதம்

இராமர்களுக்கு இன்று இரத்தம் இல்லை

மழைக்கும்மி

அன்னகாமு

அலகு – 2 உரைநடை

ரா.பி.சேதுப்பிள்ளை

தமிழ் விருந்து

வாழ்க்கையும் வைராக்கியமும்

மு.வரதராசன்

நல்வாழ்வு

மனவலிமை வேண்டும்

அலகு – 3 சிறுகதை

மேலாண்மை பொன்னுசாமி

சிறுகதை தொகுதி-அன்பு வாசம்

ந.பிச்சமூர்த்தி

சிறுகதை தொகுதி-மாங்காய்த் தலை

அலகு – 4 நாடகம்

பாரதி தாசன்

சேரதாண்டவம்

அலகு – 5 மொழித்திறன் இலக்கிய

வரலாறு

மொழித்திறன்

கலைச்சொல்லாக்கம்

மரபுத் தொடர்கள்

இலக்கிய வரலாறு

மரபுக்கவிதை புதுக்கவிதை சிறுகதை

நாடகம் உரைநடை நாட்டுப்புறப்பாடல்

முதலாமாண்டு - இரண்டாம் பருவம்

பகுதி - I தமிழ் தாள்-2

பக்தி இலக்கியங்களும் சிற்றிலக்கியங்களும்

(2014-2015) (U2LT11FL)

L	T	P	C
5	0	0	3

மொத்த பாடவேளை=64

அலகு- I பக்தி இலக்கியம்

1. இராமலிங்க அடிகள் - சிறு விண்ணப்பம் 1-10 பாடல்கள்
2. குணங்குடி மஸ்தான் சாகிபு - பராபரக் கண்ணி 1-20 கண்ணிகள்
3. வீரமாமுனிவர் - திருக்காவலூர்க் கலம்பகம் 5 பாடல்கள்

அலகு-II சிற்றிலக்கியம்

1. குமரகுருபரர் - மீனாட்சியம்மை பிள்ளைத் தமிழ் 1-5 பாடல்கள்
- தாலப்பருவம் (23-27)
2. - தமிழ்விடுதாது 1-20 கண்ணிகள்(101-120)

அலகு-III சிற்றிலக்கியம் மற்றும் தனிப்புவலவர்கள்

1. ஓளவையார் - தனிப்பாடல்கள் 5 பாடல்கள் (43,46,54,79,113)
2. திரிகூடராசப்பக்கவிராயர் -குற்றாலக் குறவஞ்சி 5 பாடல்கள் (78-82)
3. காளமேகப் புலவர் - தனிப்பாடல்கள் 4 பாடல்கள் (54,55,60,75)

அலகு- IV பக்தி இலக்கியம் மற்றும் தனிப்புவலவர்கள்

1. சுந்தரர் தேவாரம் - திருமழபாடி (7ஆம் திருமுறை) 1-10 பாடல்கள்
2. ஸ்ரீ ஆண்டாள் - திருப்பாவை 5 பாடல்கள் (2,3,4,5,6)
3. ... - முத்தொள்ளாயிரம் 9 பாடல்கள்
(62,67,71,73,75,76,77,7)

அலகு- V இலக்கிய வரலாறு மற்றும் மொழித்திறன்

1. சிற்றிலக்கியம் பக்தி இலக்கியம் (இலக்கிய வரலாறு)
2. பொதுக் கட்டுரை எழுதுதல்
3. நேர்காணல்

இரண்டாமாண்டு-புதிய பாடத்திட்டம்

பகுதி – I தமிழ் தாள்-3

மூன்றாம் பருவம் 2014 - 2015

U3LT11FL

(அற இலக்கியம் காப்பிய இலக்கியம் மொழித்திறன் இலக்கிய வரலாறு)

L	T	P	C
5	0	0	3

மொத்த பாடவேளை=64

அலகு-1

திருக்குறள்-அறத்துப்பால் -இனியவை கூறல்
நாலடியார்-பொருட்பால்-கல்வி
பழமொழி நானூறு-நட்பின் இயல்பு

அலகு-2

சிலப்பதிகாரம்-வழக்குரை காதை
மணிமேகலை-ஆதிரை பிச்சையிட்ட காதை

அலகு-3

சீவக சிந்தாமணி-மண்மகள் இலம்பகம்
கம்பராமாயணம்-கும்பகர்ணன் வதைப் படலம்

அலகு-4

பெரியபுராணம்- குங்குலியக் கலய நாயனார் புராணம்
சீறாப்புராணம்-ஈத்தங்குலை வரவழைத்த படலம்
இரட்சண்ய யாத்திரிகம்-குமார பருவம்

அலகு-5

இலக்கிய வரலாறு
அற இலக்கியங்கள்(பதினெண்கீழ்க்கணக்கு)
காப்பிய இலக்கியங்கள்
மொழித்திறன்
நூல் மதிப்புரை அறிக்கை தயாரித்தல்
கடிதம் வரைதல்
விண்ணப்பம் எழுதுதல்

இரண்டாமாண்டு-புதிய பாடத்திட்டம்
பகுதி – I தமிழ் தாள்-4
நான்காம் பருவம் 2014-2015

U4LT11FL

L	T	P	C
5	0	0	3

மொத்த பாடவேளை=64

அலகு-1

புறநானூறு பாடல்கள் - (91,135,157,189,191)
பதிற்றுப்பத்து பாடல்கள் - (41,42)

அலகு-2

ஐங்குறுநூறு-மஞ்ஞைப்பத்து பாடல்கள் - (291-300)
குறுந்தொகை பாடல்கள் - (31,103,161,190,384)
அகநானூறு பாடல்கள் - (254,318,36)

அலகு-3

நற்றிணை பாடல்கள் - (207,221,232,255,279)
கலித்தொகை பாடல்கள் - (9,51,80,115,133)

அலகு-4

பத்துப்பாட்டு –முல்லைப்பாட்டு முழுவதும்

அலகு-5

இலக்கிய வரலாறு

எட்டுத்தொகை, பத்துப்பாட்டு நூல்கள்

மொழித்திறன்

ஆங்கிலப் பகுதியைத் தமிழில் மொழிபெயர்த்தல்

அலுவலகக் கடிதம்

Om sakthi

ADHIPARASAKTHI COLLEGE OF ARTS & SCIENCE (AUTONOMOUS)

G.B. NAGAR- KALAVAI, VELLORE- DT- 632 506

PART II

ENGLISH I

SEMESTER I

Subject Code: U1LE0ISL

UNIT – I: PREPARATORY LANGUAGE SKILLS

- 1.1 Monotony of Work.
- 1.2 Polluting the World.
- 1.3 My Muscles Froze.
- 1.4 What Do Parents Need to Know?
- 1.5 Empathy to Animals.

UNIT -II: PROSE

- 2.1 The $x=x+1$ Syndrome – R.K. Narayan.
- 2.2 I Have the Dream – Martin Luther King Jr.

UNIT-III: POETRY

- 3.1 Satan's Speech – John Milton.
- 3.2 Ode to Solitude- Alexander Pope.

UNIT- IV: SHORT STORY

- 4.1. After Twenty Years – O' Henry.
- 4.2 A Telephonic Conversation – Samuel Langhorne Clemens.

Authors:

S. Bala Subramaniam, B. Shoba Rao, R.Nilavu & Board of Editors.

SEMESTER II

Subject Code: U2LE0ISL

UNIT – I: PROSE

- 1.1 Words of Wisdom –Chetan Bhagat
- 1.2 On the Philosophy of Hats- A.G. Gardiner.

UNIT-II: POETRY

- 2.1. The Highway Man - Alfred Noyes
- 2.2. Mending Wall- Robert Frost

UNIT- III: SHORT STORY

- 3.1. Am I Blue-Alice Walker

UNIT-IV: ON ACT PLAY

- 4.1. Soul Gone Home- Langston Hughes.

Authors:

S. Bala Subramaniam, B. Shoba Rao, R.Nilavu & Board of Editors.

SEMESTER III

Subject Code: U3LE0ISL

UNIT - I PROSE

1.1 My Vision for India- A.P.J. Abdul Kalam.

1.2 Computeracy- Peter Laurie.

1.3 Are the Rich Happy? – Stephen Leacock.

UNIT-II POETRY

2.1 I Know Why the Caged Bird Sings – Maya Angelou.

2.2 Night of the Scorpion – Nissim Ezekiel.

2.3 If – Rudyard Kipling.

UNIT- III SHORT STORY

3.1. The Face on the Wall – E. V. Lucas.

3.2. One of these Days – Gabriel Garcia Marquez.

UNIT- IV ONE ACT PLAY

4.1 The Deah Trap – Hector Hugh Munro.

Authors:

S. Bala Subramaniam, B. Shoba Rao, R.Nilavu & Board of Editors.

SEMESTER IV

Subject Code: U4LE0ISL

UNIT - I PROSE

1.1 Mobile and Mixed Up- Anil Dharker

1.2 Common Sense- Hazlitt

1.3 A Piece of Chalk – G.K.Chesterton.

UNIT-II POETRY

2.1. On Killing a Tree – Gieve Patel

2.2. Essay on Man – Alexander Pope

2.3. A Noiseless Patient Spider – Walt Whitman

UNIT- III SHORT STORY

3.1. A Room 10 X 8 – S.K. Duggal.

3.2. A Dead Woman's Secret – Guy de Maupassant

UNIT- IV ONE ACT PLAY

4.1 The Never Never Nest – Cedric Mount

Authors:

S. Bala Subramaniam, B. Shoba Rao, R.Nilavu & Board of Editors.

ADHIPARASAKTHI COLLEGE OF ARTS & SCIENCE,
(Autonomous)
Permanently Affiliated to Thiruvalluvar University, Vellore
Accredited by NAAC with B⁺⁺ Grade
B.Sc BIOCHEMISTRY
Under CBCS
(Effective from the Academic Year 2016-2018)

Regulations

CBCS

Choice-Based Credit System is a flexible system of learning. 'Credit' defines the quantum of contents / syllabi prescribed for a course, and determines the number of hours of instruction required. The distinguishing features of CBCS are the following:

It permits the students to:

- ❖ Learn at their own pace
- ❖ Choose electives from a wide range of elective courses offered by the departments of the college.
- ❖ Undergo additional courses and acquire more than the required number of credits
- ❖ Adopt an inter – disciplinary approach in learning
- ❖ Make best use of the expertise of available faculty

1. Eligibility for Admission:

Candidates seeking admission to the first year of the Degree of Bachelor of Science Courses, shall be required to have passed the Higher Secondary Examinations [Academic or Vocational Stream] conducted by the Government of Tamil Nadu or an Examination accepted as equivalent thereto by the Syndicate of the Thiruvalluvar University.

The Upper age limit for admission to UG Degree Courses will be 21 (twenty one) years as on 1st July of the year of admission. For SC/ST/BC/MBC/DNC candidates and women candidates the age limit is relaxed by 3 years. For other communities, the Principals can relax up to three years based on merit. A relaxation of 5 years is permitted for Physically Handicapped as per G.O. Ms No.239, dated 03.09.1993.

Provided that candidates for admission into the specific main subject of study shall also possess such other qualifying conditions as may be prescribed by the University in the Regulations governing respective courses of study.

ELIGIBILITY FOR ADMISSION TO

B.Sc. BIOCHEMISTRY

Candidate for the Degree of Bachelor of Science in Biochemistry shall be required to have passed the Higher Secondary Examination [10 + 2 year] conducted by the Government of Tamil Nadu, or an Examination accepted as equivalent there to by the Academic Council, subject to conditions as may be prescribed. Candidates should have studied one of the following Subjects at the +2 level.

- 1) Biochemistry
- 2) Biology [Zoology + Botany]
- 3) Zoology
- 4) Botany
- 5) Chemistry
- 6) Biotechnology
- 7) Nutrition and Dietetics
- 8) Nutritional Biochemistry
- 9) Or Any other subject related to Bioscience

2. Eligibility for the Award of Degree:

A Candidate shall be eligible for the award of the Degree only if he/she has undergone the prescribed course of study in the college for a period of not less than three academic year and passed the examinations of all the Six Semesters prescribed earning 140 credits [in parts - I, II, III, IV and V].

3. Duration:

- a. Each academic year shall be divided into two semesters. The first academic year shall comprise the first and second semesters, the second academic year, the third semester and fourth semesters and the third academic year, the fifth and sixth semesters respectively.
- b. The odd semesters shall consist of the period from June to November of each year and the even semesters from December to April of each year. There shall be not less than 90 working days for each semester.

4. Course of Study:

The main subject of study for Bachelor Degree Courses shall consist of the following:

PART – I TAMIL / OTHER LANGUAGES

PART – II ENGLISH

PART – III CORE SUBJECTS

ALLIED SUBJECTS

PROJECT / ELECTIVES WITH THREE COURSES

PART – IV

1. [a]. Those who have not studied Tamil up to XII Std. and taken a Non-Tamil Language under Part – I shall take Tamil comprising of two courses [level will be at 6th standard].
[b]. Those who have studied Tamil up to XII Std. and taken a Non-Tamil Language under Part – I shall take Advanced Tamil comprising of two courses.

[c]. others who do not come under a/b can choose non-major elective comprising of two courses.

2. SKILL BASED SUBJECTS [ELECTIVE]:

Four courses are to be offered. The papers are to be accommodated in the second / third year of study for UG courses.

3. ENVIRONMENTAL STUDIES

4. VALUE EDUCATION

PART – V EXTENSION ACTIVITIES

Extension Activities:

A Candidate shall be awarded a maximum of 1 credit for Compulsory Extension Service.

All the students shall have to enroll for NSS / NCC / NSO [Sports and Games] Rotract / Youth Red Cross or any other service organization in the college and shall have to put in compulsory minimum attendance of 40 hours which shall be duly certified by the principal of the college before 31st Mach in a year. If a student LACKS 40 hours attendance in the First year, he/she shall have to compensate the same during the subsequent years.

Students those who complete minimum of attendance of 40 hours in one year will get Half Credit and those who complete the attendance of 80 or more hours in two years will get ONE CREDIT.

Literacy and population Education Field Work shall be compulsory components in the above Extensions service activities.

The following assessment procedure will be followed for Internal Marks:

Continuous Internal Assessment [CIA] Test

S.No	Reg. No	Name	Test I Marks For 75	Test II Marks For 75	Marks For 150	Marks Converted to 15/20	Assignments /Seminars [10] Records [05]	Marks For 25 / 25	Total Rounded to Marks for 25 / 25

Test I : Three hour duration for 75 marks

Test II : Three hours duration for 75 marks

Total marks	150		
Test marks to be converted to	:	Theory 15 marks	Practical 20 marks
Assignments / Seminars	:	10 marks	-
Records	:	-	05 marks
Total	:	25 marks	25 marks

In the column Rounded to 25 / 25, any fraction may be rounded to the next number.

6. Requirements for proceeding to Subsequent Semester:

- i. Candidates shall register their names for the First Semester Examination after the admission in the UG Courses.
- ii. Candidates shall be permitted to proceed from the First Semester up to Final Semester irrespective of their failure in any of the Semester Examination subject to the condition that the candidates should register for all the arrear subject of earlier semesters along the current [subsequent] Semester subjects.
- iii. Candidates shall be eligible to go to subsequent semester, only if they earn sufficient attendance as prescribed therefore by the Academic Council from time to time. Provided in case of a candidate earning less than 65% of attendance in any one of the Semesters due to any extraordinary circumstances such as medical grounds, such candidate who shall produce Medical Certificate issued by the Authorised Medical Attendant [AMA], duly certified by the Principal of the College, shall be permitted to proceed to the next semester and to complete the course of study. Such candidates shall have to repeat the missed Semester by rejoining after completion of Final Semester of the course, after paying the fee for the break of study as prescribed by the College from time to time.

7. Requirements to take the Semester Examinations

- a] A candidate will be permitted to take the Examination of any Semester, if
- i] He/She secures not less than 75% of attendance out of the 90 instructional days during the semester. [In the case of married women students the minimum attendance requirement shall be 55% of total instructional days].
 - ii] He / She earns a Progress Certificate from the Head of the Institution, of having satisfactorily completed the prescribed course of study in the subject as required by these Regulations, and
 - iii] His / Her conduct has been satisfactory.

Provided that it shall be open to the Academic Council or any authority delegated with such powers by the Academic council to grant exemption to a candidate who has fail to earn 75% of the attendance prescribed for any valid reason[s] subject to the usual conditions.

- b] A candidate who has secured attendance less than 75% but 65% and above shall be permitted to take the Examination on the recommendation of the Head of the Institution to condone the lack of attendance as well as on the payment of the prescribed fees to the College.

8. Passing Minimum:

A Candidate shall be declared to have passed the whole examination, if he/she passes in all the papers and practicals wherever prescribed / as per the scheme of examinations by earning 140 CREDITS in parts – I, II, III, IV and V. He / She shall also fulfill the extension activities prescribed earning one credit to qualify for the Degree.

In fixing the passing minimum marks, the following will be observed:

- [a]. There shall be no Passing Minimum For Internal
- [b]. For External Examinations, Passing Minimum shall be of 40% [Forty Percentage] of the maximum marks prescribed for the paper.
- [c]. In the aggregate [External + Internal] the Passing Minimum shall be 40% for each paper / practical.
- [d]. Grading shall be based on overall marks obtained [Internal + External].

Grading:

Once the marks of the CIA and end-semester examinations for each of the course are available, they will be added. The mark thus obtained will then be graded as per details given below:

Marks	Grade Point	Letter Grade	Class
100	7.00	H	First Class with Distinction
90-99	6.00	O	First Class with Distinction
75-89	5.50	D	First Class with Distinction
60-74	4.75	A	First Class
50-59	4.00	B	Second Class
40-49	3.50	C	Third
Below 40	3.00	F	Fail

From the second semester onwards the total performance within a semester and continuous performance starting from the first semester are indicated respectively by **Grade Point Average [GPA]** and **Cumulative Grade Point Average [CGPA]**. These two are calculated by the following formulae:

$$\text{GPA} = \frac{\sum_{i=1}^n C_i G_i}{\sum_{i=1}^n C_i}$$

Where 'C_i' is the credit earned for the course 'i' in any semester; 'G_i' is the Grade Point obtained by the student for the course 'i' and 'n' is the number of courses passed in that semester.

CGPA=GPA of all the courses starting from the first semester to the current semester.

Note: The GPA and CGPA shall be calculated separately for the following three parts:

For purpose of declaring a candidate to have qualified for the Degree of Bachelor of Arts / Science / Commerce / Management / Literature in the First Class / Second Class / Third Class or First Class with Distinction, the marks and the corresponding CGPA earned by the candidate in part III alone will be the criterion, provided he / she has secured the prescribed passing minimum in LCs and ELCs.

Grade in Parts IV and V be shown separately and it shall not be taken into account for classification.

9. Classification of Successful Candidates:

PART – I TAMIL / OTHER LANGUAGES:

Successful candidates passing Examinations for the Language and securing the marks [i] 60 percent and above and [ii] 50 percent and above, but below 60 percent in the aggregate shall be declared to have passed the examination in the First and Second Class, respectively. All other successful candidates shall be declared to have passed the examination in the Third Class.

PART – II ENGLISH:

Successful candidates passing Examinations for English and securing the marks [i] 60 percent and above and [ii] 50 percent and above, but below 60 percent in the aggregate shall be declared to have passed the examination in the First and Second Class, respectively. All other successful candidates shall be declared to have passed the examination in the Third Class.

PART – III consisting of CORE SUBJECTS, ALLIED SUBJECTS, PROJECT / ELECTIVES

Successful candidates passing Examinations for Core Courses together and securing the marks [i] 60 percent and above and [ii] 50 percent and above but below 60 percent in the aggregate of the marks prescribed for the Core Courses together shall be declared to have passed the examination in the First and Second Class, respectively. All other successful candidates shall be declared to have passed the examination in the Third Class.

PART – IV: [Consisting of sub items 1 (a), (b) and (c), 2, 3, 4 and 5] as furnished in the Regulations 4 part – IV supra.

PART – V EXTENSION ACTIVITIES:

The only credit earned for Part V Extension activities of a Successful Candidate SHALL NOT BE taken into consideration for Classification / Ranking / Distinction.

10. RANKING

Candidates who pass all the examinations prescribed for the course in the First Appearance itself alone are eligible for Ranking;

Provided in the case of Candidates who pass all the examinations prescribed for the course with a break in the First Appearance due to the reasons as furnished in the Regulation 7.[iii] Supra are eligible for Classification / Distinction.

The marks obtained in improvement examination will not be taken into consideration for Ranking.

11. The Medium of Instruction and Examinations

The medium of Instruction and Examinations for the papers under part I and II shall be in language concerned. For Parts III and IV, the medium of Instruction and Examinations shall be English.

12. Submission of Record Notebooks for Practical Examinations

Candidates taking the Practical Examinations should submit bonafide Record Notebook prescribed for the Practical Examinations. Otherwise the candidate will not be permitted to take the practical Examinations. However, in genuine case where the students could

not submit the record notebook may be permitted to take the Practical Examinations provided the Head of the Department concerned certifies that the candidate has performed the experiments prescribed for the Course. For such of those candidates who do not submit Record Books, zero [0] marks will be awarded for record notebooks.

In case a candidate fails in the Practical Examination the marks awarded for the record at the time of first appearance for the Practical Examination should be made available by the University to the Examiners at the subsequent appearance by the candidate.

13. Improvement of marks in the subjects already passed

Candidates who have passed in theory paper / papers are allowed to appear again for theory paper / papers only once in order to improve his/her marks, by paying the fee prescribed from time to time. Such candidates are allowed to improve within a maximum period of 10 semesters counting from his/her first semester of his/her admission. If candidate improves his marks, then his improved mark will be taken into consideration for the award of Classification and Distinction only. Such improved marks will not be counted for the award of Prize / Medals and Rank. If the Candidate does not show improvement in the marks, his previous marks will be taken into consideration.

No candidate will be allowed to improve marks in the Practical and Field work.

14. Checklist for Inspection

- a. Qualification for
 - i. Teaching Faculty : as Prescribed by the UGC and the University
 - ii. Technical Faculty : as Prescribed by the UGC and the University
 - iii. Laboratory Staff : as Prescribed by the UGC and the University
- b. Infrastructure Facilities
 - i. Building : Number of Classrooms with specifications: 3 rooms measuring 20'X 25'. If the class strength is above 50, the space shall increase by 10 sq.ft per student.
Number of Staff rooms: One measuring 20' X 20'
 - ii. Furniture : One pair of table / chair per student
 - iii. Laboratory @ 10 Sq. ft. per student

PATTERN OF QUESTION PAPER

Part – A [50 words]	
To Answer 10 questions	10 X 2 marks = 20 marks
Part – B [200 words]	
To Answer 5 questions (either / or pattern)	5 X 5 marks = 25 marks
Part – C [500 words]	
To Answer 3 questions out of 5 questions	3 X 10 marks = 30 marks
	Total = 75 marks

ADHIPARASAKTHI COLLEGE OF ARTS & SCIENCE (AUTONOMOUS)
G.B.NAGAR, KALAVAI-632506
AFFILIATED TO THIRUVALLUVAR UNIVERSITY, VELLORE
DEGREE COURSES
B.Sc. Biochemistry
(With effect from 2015-2016)
The course of study and the scheme of examination.

Year/ Semester	Part	Subject	Paper	Subject code	Title of the paper	Ins. Hrs/ week	Credit	Exam Hrs.	Max. Mark		
									CIA	ESE	Total
I Year I Semester	I	Language	Paper I	U1LT11FL	TAMIL – I	6	3	3	25	75	100
	II	English	Paper I	U1LE01SL	ENGLISH – I	6	3	3	25	75	100
	III	Core	Paper I	U1BC01MT	CELL BIOLOGY	5	5	3	25	75	100
	III	Core Practical				3	--	--	--	--	--
	III	Allied I	Paper I	U1CH01AT	CHEMISTRY – I	5	5	3	25	75	100
	III	Allied I Practical				3	--	--	--	--	--
	IV			U1ES01GS	ENVIRONMENTA L STUDIES	2	2	3	25	75	100
						30	18		125	375	500
I Year II Semester	I	Language	Paper II	U2LT11FL	TAMIL – II	6	3	3	25	75	100
	II	English	Paper II	U2LE01SL	ENGLISH – II	6	3	3	25	75	100
	III	Core	Paper II	U2BC01MT	BIOMOLECULES	5	5	3	25	75	100
	III	Core Practical	Practical-I	U2BC11MP	VOLUMETRIC AND QUALITATIVE ANALYSIS	3	5	6	40	60	100
	III	Allied I	Paper II	U2CH01AT	CHEMISTRY – II	5	5	3	25	75	100
	III	Allied I Practical		U2CH01AP	ALLIED – I PRACTICAL	3	2	3	20	30	50
	IV			U2VE01GS	VALUE EDUCATION (GENERAL AWARENESS)	2	2	2	0	50	50
						30	25		160	440	600
TOTAL HOURS & CREDITS						60	43		285	815	1100

Year/ Semester	Part	Subject	Paper	Subject code	Title of the paper	Ins. Hrs/ week	Credit	Exam Hrs.	Max. Mark		
									CIA	ESE	Total
II Year III Semester	I	Language	Paper III	U3LT11FL	TAMIL – III	6	3	3	25	75	100
	II	English	Paper III	U3LE01SL	ENGLISH – III	6	3	3	25	75	100
	III	Core	Paper III	U3BC01MT	ANALYTICAL BIOCHEMISTRY	4	4	3	25	75	100
	III	Core Practical				3	--	--	--	--	--
	III	Allied II	Paper I	U3MB01AT	MICROBIOLOGY – I	4	4	3	25	75	100
	III	Allied II Practical				3	--	--	--	--	--
	IV	Skill Based Subject I		U3BC02ST	FUNDAMENTALS OF COMPUTER	2	2	3	25	75	100
	IV	Non- Major Elective I		U3BC01NM	DIAGNOSTIC BIOCHEMISTRY– I	2	2	2	25	75	100
						30	18		150	450	600
II Year IV Semester	I	Language	Paper IV	U4LT11FL	TAMIL – IV	6	3	3	25	75	100
	II	English	Paper IV	U4LE01SL	ENGLISH – IV	6	3	3	25	75	100
	III	Core	Paper IV	U4BC11MT	MEDICAL LABORATORY TECHNOLOGY	4	4	3	25	75	100
	III	Core Practical	Practical- II	U4BC11MP	MEDICAL LABORATORY TECHNOLOGY	3	5	6	40	60	100
	III	Allied II	Paper II	U4MB01AT	MICROBIOLOGY – II	4	4	3	25	75	100
	III	Allied II Practical		U4MB01AP	ALLIED – II PRACTICAL	3	2	3	20	30	50
	IV	Skill Based Subject II		U4BC02ST	COMPUTER APPLICATIONS	2	2	2	25	75	100
	IV	Non- Major Elective II		U4BC01NM	DIAGNOSTIC BIOCHEMISTRY-II	2	2	2	25	75	100
						30	25		210	540	750
TOTAL HOURS & CREDITS						60	43		360	990	1350

Year/ Semester	Part	Subject	Paper	Subject code	Title of the paper	Ins. Hrs/ week	Credit	Exam Hrs.	Max. Mark		
									CIA	ESE	Total
III Year V Semester	III	Core	Paper V	U5BC01MT	ENZYMOLGY	5	5	3	25	75	100
	III	Core	Paper VI	U5BC02MT	INTERMEDIARY METABOLISM	5	5	3	25	75	100
	III	Core	Paper VII	U5BC03MT	GENETICS AND MOLECULAR BIOLOGY	5	5	3	25	75	100
	III	Elective I (to choose 1 out of 2)	Paper I	U5BC14ET	HORMONAL BIOCHEMISTRY	5	5	3	25	75	100
				U5BC05ET	BIOCHEMICAL AND ENVIRONMENTAL TOXICOLOGY						
	III	Core Practical	Practical III			4	--	--	--	--	--
	III	Elective Practical	Practical III			3	--	--	--	--	--
	IV	Skill Based Subject	Paper III	U5BC06ST	BIO STATISTICS	3	2	3	25	75	100
						30	22		125	375	500
III Year VI Semester	III	Core	Paper VIII	U6BC01MT	HUMAN PHYSIOLOGY AND NUTRITIONAL BIOCHEMISTRY	5	5	3	25	75	100
	III	Core	Paper IX	U6BC02MT	CLINICAL BIOCHEMISTRY	5	5	3	25	75	100
	III	Elective II (to choose 1 out of 2)	Paper II	U6BC03ET	BIOTECHNOLOGY	5	5	3	25	75	100
				U6BC04ET	PLANT BIOCHEMISTRY AND PLANT MOLECULAR BIOLOGY						
	III	Elective III (to choose 1 out of 2)	Paper III	U6BC15ET	IMMUNOLOGY	5	5	3	25	75	100
				U6BC06ET	BIONANOTECHNOLOGY						
	III	Core Practical	Practical III	U6BC11MP	BLOOD ANALYSIS AND ENZYMOLOGY	4	5	6	40	60	100
	III	Elective Practical	Practical IV	U6BC12EP	FOOD ANALYSIS, MICROBIOLOGY AND SEPARATION TECHNIQUES	3	4	6	40	60	100
	IV	Skill Based Subject II	Paper IV	U6BC07ST	PHARMACOLOGY AND PHARMACEUTICAL BIOCHEMISTRY	3	2	3	25	75	100
				V	Extension Activities		1	-	50		50
						30	32		255	495	750
TOTAL HOURS & CREDITS						60	54		380	870	1250
GRAND TOTAL HOURS & CREDIT						180	140		1025	2675	3700

SEMESTER – I

CELL BIOLOGY

L	T	P	C
5	0	0	5

Total Hours: 65

SUBJECT CODE: U1BC01MT

UNIT – I: AN OVERALL VIEW OF CELLS

Origin and evolution of cells. Cell theory. Classifications of cells – prokaryotic and eukaryotic cells. Composition of prokaryotic and eukaryotic cells. Molecular composition of cells – water, carbohydrates, lipids, nucleic acids and proteins.

UNIT – II: CELL MEMBRANE

Fluid mosaic model of membrane structure. Membrane proteins and their properties. Membrane carbohydrates and their role. Transport across membranes – diffusion, active and passive transport.

UNIT – III: CYTOPLASMIC ORGANELLES

Endoplasmic reticulum – types, structure and functions. Golgi apparatus – structure and functions. Lysosome – structure and functions, Morphology and functions of Peroxisomes and Glyoxisomes, Ribosomes – types, structure and functions.

UNIT – IV: MITOCHONDRIA

Structure and functions, Cytoskeleton - types of filaments and their functions. Microtubules - chemistry and functions (especially cilia and flagella).

UNIT – V: NUCLEOLUS

Structure and functions. Chromosome – chromatin structure, the cell cycles – phases of cell cycle. Meiotic and mitotic cell divisions, cell – cell communications, cell recognition, cell adhesion and cell functions.

Text Books:

1. P.S. Verma and V.K. Agarwal, Cytology., S.Chand & Co., 8th Edition 1978.
2. N. Arumugam. Cell Biology. Saras publications, 1993.

Reference Books:

1. David and Sadava. Cell Biology Structure and Functions, Jones Bartlett publishers.
2. Lodish, Berk, Zipursky, Baltimore and Darnell, Molecular Cell Biology, 4th Edition, Freeman, 2000.
3. D.L. Nelson and M.M. Cox. Lehninger's Principles of Biochemistry. Macmillan Worth Publishers, 4th Edition, 2000.
4. Garrett and Grisham. Biochemistry. Saunders College Publishing, 2nd Edition. 1999.
5. L. Veerakumari. Biochemistry. MJP Publishers, 2004.

SEMESTER – I**ALLIED – I****CHEMISTRY – I**

L	T	P	C
5	0	0	5

Total Hours: 65**SUBJECT CODE: U1CH01AT****UNIT – I****1.1 Extraction of Metals**

Minerals and ore – difference. Minerals of Iron, Aluminium and copper – Ore dressing (Concentration of ore) – Types of ore Dressing – Froth Floatation and Magnetic Separation.

1.2 Refining of Metals

Types of Refining – Electrolytic, Van Arkel and Zone Refining.

1.3 Extraction of uranium and Thorium.**UNIT – II****2.1 Cycloalkanes**

Preparation, Properties of Cyclohexane – Baeyer's Strain Theory.

2.2 Polarization

Inductive effect, Mesomeric effect and steric effect (Acid and Base Strength)

2.3 Stereo isomerism

Stereo isomerism – Types, Causes of optical activity of lactic and Tartaric acid – Racemisation – Resolution- Geometrical isomerism – maleic and fumaric acid,

UNIT – III**3.1 Chemical kinetics**

Distinction between order and molecularity – derivation of first order rate equation – half life period of First order reaction –determination of rate constant of hydrolysis of ester.

3.2 Catalysis

Catalyst – Autocatalyst – Enzyme catalyst – promoters – Catalytic poisoning – Active center, Distinction between homogeneous and heterogeneous catalysts – Industrial application of catalysts.

3.3 Photochemistry

Grothus Draper's law, stark Einsteins law – Quantum yield – Phosphorescence – fluorescence – chemiluminescence – Photosensitization – definitions with examples.

UNIT – IV**4.1 VSEPR theory**

Postulates of VSEPR theory – shapes of simple molecules BF_3 , PCl_5 , SF_6 and XeF_6 .

4.2 Fuels

Calorific value of fuels – Non Conventional fuels – need of Solar Energy – applications.

4.3 Osmosis

Osmosis, Osmotic pressure, Reverse osmosis – Definition, Desalinisation of sea water.

UNIT – V

5.1 Nuclear Chemistry

Definition of Half life period – Group displacement law, Nuclear fission and fusion – Application of Nuclear Chemistry in Medicine, Agriculture, Industries – ^{14}C dating.

5.2 Crude oil

Petroleum – Petroleum Refining – Cracking – Application of cracking.

Naphthalene – Preparations, properties, structure, and uses.

5.3 Elements of Symmetry

Definition – crystal Lattice – types of cubic lattice – one example for each.

Text Books:

1. G. Chatwal. Organic Chemistry of Natural Products. Vol. I, Himalaya Publishing House, 1997.
2. V.M. Khanna and M.M. Kapoor. Physical Chemistry, 3rd Edition. Narosa.
3. P.L. Soni and O.P. Dharmarha. Textbook of Physical Chemistry. Sultan Chand & Sons, 21st Edition, 1999.

Reference Books:

1. V. Thiagarajan. Pharmaceutical Chemistry. KCS Desikan & Co Educational Publishers, 1986.
2. S.M. Mukherji, S.P. Singh, R.P. Kapoor, Organic Chemistry. Vols. I & II, Wiley Eastern Limited, 1982.
3. I.L. Finar. Organic Chemistry. Vols. I & II, Longman Singapore Publishers, 6th edition, 1986.
4. R.T. Morrison and R.N. Boyd, Organic Chemistry. Prentice Hall India, 6th Edition, 1992

SEMESTER – I
ENVIRONMENTAL STUDIES
SUBJECT CODE: U1ES01GS

L	T	P	C
2	0	0	2

Total Hours: 26

UNIT – I: INTRODUCTION TO ENVIRONMENTAL SCIENCES: NATURAL RESOURCES

Environmental Sciences – Significance – Public awareness – Forest resources – Water resources – Mineral resources – Food resources - Environmental impact – fertilizer – Pesticide Problems – case studies.

UNIT – II: ECOSYSTEM, BIODIVERSITY AND ITS CONSERVATION

Ecosystem – concept – structure and function – producers, consumers and decomposers – Food chain – Food web – Forest, Grassland, desert and aquatic ecosystem.

Biodiversity – Definition – genetic, species and ecosystem diversity – Values and uses of biodiversity – biodiversity at global, national (India) and local levels – Hotspots, threats to biodiversity – conservation of biodiversity – In-situ & Ex-situ.

UNIT – III: ENVIRONMENTAL POLLUTION AND MANAGEMENT

Environmental Pollution – Causes – Effects and control measures of Air, Water, Marine, soil, solid waste, Thermal, Nuclear pollution and Disaster Management – Floods, Earth quake, Cyclone and Land slides. Role of individuals in prevention of pollution – pollution case studies.

UNIT – IV: SOCIAL ISSUES – HUMAN POPULATION

Urban issues – Energy – water conservation – Environmental Ethics – Global warming – Resettlement and Rehabilitation issues – Environmental legislations – Environmental protection Act. 1986 – Air, Water, Wildlife and forest conservation Act – population growth and Explosion – Human rights and Value Education – Environmental Health – HIV/AIDS – Role of IT in Environment and Human Health – Women and child welfare – Public awareness – Case studies.

UNIT – V: FIELD WORK

Visit to a local area / local polluted site / local simple ecosystem – Report submission

Text Books:

1. Kumarasamy, K., A. Alagappa Moses and M.Vasanthi, Environmental Studies, Bharathidasan University Publishers, Trichy. 2004.
2. Rajamannar. Environmental Studies, EVR College Pub, Trichy. 2004.
3. Kalavathy, S. Environmental Studies, Bishop Heber College Pub., Trichy. 2004.

L	T	P	C
5	0	0	5

SEMESTER – II

BIOMOLECULES

Total Hours: 65

SUBJECT CODE: U2BC01MT

UNIT – I: CARBOHYDRATES

Classification of carbohydrates, stereo isomerism and optical isomerism of sugars, anomeric form and mutarotation. Occurrence, structure and biological importance of mono, di, polysaccharides (especially starch, glycogen and cellulose). An introduction to mucopolysaccharide (proteoglycon). Reaction of carbohydrates due to the presence of hydroxyl, aldehyde and ketone groups. (Structural elucidation is not necessary).

UNIT – II: AMINO ACIDS

Classification of amino acids based on structure, polarity and nutritional requirement. Stereo and optical isomerism. Non protein amino acids, zwitter ion and isoelectric point. Properties of amino acids.

UNIT – III: PROTEINS

Introduction, classification based on solubility, shape, size, composition and functions. Structure of proteins – primary, secondary, tertiary and quaternary. Chemical synthesis of polypeptide chain - Solid phase polypeptide synthesis. Biologically important peptides – structure and functions (insulin, glutathione, vasopressin).

UNIT – IV: LIPIDS

Introduction and classification of lipids. Free fatty acids - Classification, nomenclatures, structures and properties. structure and function of prostaglandins, triacylglycerol. Structure and functions of phospholipids (lecithin, cephalin, Phosphotidyl inositol, phosphotidyl serine) spingomyelin, plasmalogens. Structure and function of glycolipids, cholesterol. Bile salt and Bile acids.

UNIT – V: NUCLEIC ACIDS

Nature of genetic material, structure of purine and pyrimidine nucleotides. Composition of DNA and RNA, Watson crick model of DNA. Types of DNA (A, B, Z) and types of RNA – mRNA, tRNA and rRNA. Properties of nucleic acids including T_m, denaturation, renaturation, cot value, hypo- and hyperchromicity.

Text Books:

1. J.L. Jain, S. Jain and N. Jain. Fundamentals of Biochemistry. S. Chand & Co, 1997.
2. A.K. De. Biochemistry. S. Chand & Co. Ltd., 1993.
3. Ambika Shanmugam. Biochemistry. Published by author, 7th Edition, 1998.

Reference Books:

1. D.L. Nelson and M.M. Cox. Lehninger's Principles of Biochemistry. Macmillan Worth Publishers, 4th Edition, 2000.
2. R.K. Murray and D.K. Granner. Harper's Illustrated Biochemistry. 26th Edition, 2002.
3. C.Kannan. Biomolecules. MJP Publishers, Chennai – 5.

SEMESTER – II**Allied – I****CHEMISTRY – II****SUBJECT CODE: U2CH01AT**

L	T	P	C
5	0	0	5

Total Hours: 65**UNIT – I****1.1 Co-ordination chemistry**

Nomenclature of co-ordination compounds – Werner Theory of Co-ordination compound – Chelation – functions and Structure of Haemoglobin and chlorophyll.

1.2 Industrial Chemistry

Contents in Match Sticks and Match box, Preparation and uses of CHCl_3 , DDT, Gamhexane and Freons

1.3 Fertilizers

Fertilizers and Manures – Definition – Biofertilizers – organic manures and their importance – Role of NPK in plants – preparation and uses of urea, Ammonium Sulphate, Potassium Nitrate and Super Phosphate of lime

UNIT – II**2.1 Heterocyclic Compounds**

Heterocyclic Compounds – Definition, Heterocyclic rings – Nitrogen containing compounds eg. pyridine, pyrimidine, sulphur containing compounds – eg. Thiazole, oxygen containing compounds. Eg. Furan.

2.2 Environmental Chemistry

Pollution of air, water and soil by chemicals, chemical industries – sources, Consequences and controlling methods.

2.3 Organic Chemistry

Preparation of Organic Compounds (Aromatic acids) – Salicylic acid Lactic acid. Benzoic acid, - Preparation by Grignard reagent, Kolbe's synthesis, Properties, and uses.

UNIT – III**3.1 Electro Chemistry**

Specific and Equivalent conductivity – their determination. Effect of dilution on conductance.

3.2 Conductance

Kohlrausch law – Determination of dissociation constant of weak Electrolyte using conductance Measurement – conductometric Titrations.

3.3 pH

Determination of pH by Indicator Method – Buffer With eg – Importance of buffer in the living system – derivation of Henderson equation

UNIT – IV

4.1 Paints

Components of Paint, Requisites of a good Paint – Pigments – definition food colour – Definition with eg. Dyes – Classification and uses.

4.2 Chemicals in food

Preservatives, artificial sweetening agents – definition with one eg. Antioxidants (Chemical) – Vit ‘C’, ‘E’, Selenium and its importance.

4.3 Colloids

Preparation of colloids – Properties – Emulsions. Of Colloids.

UNIT – V

5.1 Sulpha Drugs

Uses and mode of action of sulpha durgs – sulpha pyridine, sulphadiazine – Antibiotics – uses of penicillin, chloramphenicol Streptomycin, Drug abuse and Lethal dose of Drugs,

5.2 Drugs

Definition and one example Each for Analgesics, Antipyretics, Tranquilisers, Sedatives, Anaesthetics – Local & General, Causes for diabetes, cancer and AIDS.

5.3 Corrosion

Electrochemical corrosion and its prevention – lead storage Battery,

Text Books:

1. A. Ramachandra Sastry. Allied Chemistry – Vols. I & II, Desikan & Co Educational Publishers, 1981.
2. G. Chatwal. Organic Chemistry of Natural Products, Vols. I & II, Himalaya Publishing House, 1997.
3. P.L. Soni and O.P. Dharmarha. Textbook of Physical Chemistry, 21st Edition, Sultan Chand & Sons, 1999.

Reference Books:

1. R.Gopalan. Allied Chemistry. Sultan Chand & Sons, 1988.
2. Palsokar Patki. Modern Inorganic Chemistry – Part – II. 3rd Edition, S. Chand & Co., 1984.
3. I.L. Finar. Organic Chemistry, Vols. I & II, Longman Singapore Publishers, 6th edition, 1986.

I B.Sc. BIOCHEMISTRY

MAJOR PRACTICALS

L	T	P	C
0	0	3	2

Total Hours: 78

VOLUMETRIC AND QUALITATIVE ANALYSIS

SUBJECT CODE: U2BC11MP

VOLUMETRIC ANALYSIS

1. Estimation of Glycine by Sorenson's method.
2. Estimation of fructose from fruit juice by Benedict's method.
2. Estimation of Ascorbic acid from lemon by Dye method.
3. Determination of Saponification number of edible oil.
4. Determination of Acid number of oil.
5. Determination of Iodine number of oil.
6. Estimation of Hydrogen peroxide by Permanganate method.
7. Estimation of calcium in milk.

QUALITATIVE ANALYSIS

- a) Reactions of simple sugar – Glucose, Fructose, Galactose, Maltose, Pentose, Sucrose, Lactose, Starch and Dextrin.
- b) Reactions of proteins – Solubility, Biuret, Xanthoproteic, Denaturation by heat, pH change & precipitation by acidic reagent, colour reactions of aminoacids like Tryptophan, Tyrosine, Cystiene, Methionine, Arginine, Proline and Histidine.
- c) Reactions of lipids -Solubility, Iodine No. for unsaturation, and Libermann-Burchard test.

BIOCHEMICAL PREPARATION

1. Preparation of Starch from Potato.
2. Preparation of Casein from Milk.
3. Extraction of fat from animal source.
4. Collection of blood

Reference Books (Practical Manuals):

1. D.T. Plummer. An Introduction to Practical Biochemistry. Tata McGraw-Hill, 3rd Edition, 1987.
2. J. Jayaraman. Laboratory Manual in Biochemistry. Wiley Eastern, 1981.
3. T.N. Pattabiraman. Laboratory Manual in Biochemistry. All India Publishers & Distributors, 3rd Edition, 1998.

L	T	P	C
0	0	3	2

I B.Sc. BIOCHEMISTRY

ALLIED PRACTICAL-I

CHEMISTRY

Total Hours: 78

SUBJECT CODE: U2CH01AP

I VOLUMETRIC ANALYSIS

1. Estimation of HCl using NaOH.
2. Estimation of NaOH using Na₂CO₃.
3. Estimation of Iron using KMnO₄.
4. Estimation of Oxalic acid using NaOH.
5. Estimation of Borax using Na₂CO₃.
6. Estimation of hardness of water

II. ANALYSIS OF ORGANIC COMPOUNDS

Qualitative analysis of organic acids, amides, aldehydes, carbohydrates, amines, phenols, diamide.

III ADULTERATION IN FOOD - ANALYSIS

Qualitative test for adulterants present in foods such as Turmeric, Pepper, Milk, Tea and Butter.

Reference (Practical Manuals):

1. V. Venkateswaran and R. Veeraswamy. Practical Chemistry. S. Chand & Sons, 2nd Edition, 1997.
2. S. Sahay. Quantitative Chemical Analysis. S. Chand & Co., 8th Edition, 1965.

SEMESTER - II

VALUE EDUCATION

SUBJECT CODE: U2VE01GS

L	T	P	C
2	0	0	2

Total Hours: 26

Unit – I

Value Education - Definition - relevance to present Day- Concept of Human Values –self Introspection-self esteem.

Unit – II

Family values - Components, structure and responsibilities of family –Neutralization of anger- Adjustability-Threats of family life-Status of Women's in family and society- caring for needy and elderly –Time allotment for sharing ideas and concerns.

Unit – III

Ethical values-Professional Ethics-Mass Media Ethics-Advertising Ethics-Influence of Ethics on family life-Psychology of children and youth-leadership qualities-personality development.

Unit – IV

Social values-faith, service and secularism-social and secularism-social sense and commitment-students and politics-social awareness, consumer awareness, consumer rights and responsibilities – redressal mechanisms.

Unit – V

Effect of international affairs on values of life/issue of Globalization-Modern Warfare-Terrorism, Environmental issues-Mutual respect of different cultures, religions and their beliefs.

Reference Books:

1. T. Anchukandam and J. Kuttainimathathil (ED) Grow Free Live Free, Krisitu Jyoti Publications, Bangalore, 1995.
2. Mani Jacob, E.D. Resource Book for Value Education, Institute for Value Education, New Delhi, 2002
3. DBNI, NCERT, SCERT, Dharma Bharti National Institute of Peace and Value Education, Secunderabad, 2002
4. Daniel and Selvamony. Value Education Today, Madras Christian College, Tambaram and ALACHI, New Delhi, 1990.
5. S. Ignachimuthu. Values for Life.–Better Yourself Books, Mumbai, 2007.
6. M.M.M. Mascaronhas Centre for Research Education Science and Training for Family. Life Promotion –Family Life Education, Bangalore, 1993.

L	T	P	C
4	0	0	4

SEMESTER – I

Allied – I

Total Hours: 52

BIOCHEMISTRY – I

SUBJECT CODE: U1BC01AT

UNIT – I: CARBOHYDRATES

Definition and classification of carbohydrates, linear and ring forms (Haworth's formula) for all monosaccharide (glucose, fructose, mannose) and disaccharides (maltose, lactose, sucrose) physical properties-mutarotation, chemical properties of glucose and four reaction of fructose (oxidation, reduction, osazone formation, Seliwanoff's reaction), Disaccharides - maltose, lactose, sucrose - structure, occurrence, physical and chemical properties.

UNIT – II: POLYSACCHARIDES AND METABOLISM OF CARBOHYDRATES

Polysaccharides - starch, glycogen, cellulose - structure and properties. Glycolysis, TCA cycle, HMP pathway. Electron Transport Chain and Oxidative Phosphorylation (only flow pathway).

UNIT – III: AMINO ACIDS

Amino acids, various classifications, non-protein amino acids-structure, essential and non essential amino acids, amphoteric nature, isoelectric point. Reactions due to carboxyl, amino acid and both the groups.

UNIT – IV: PROTEINS

Proteins: classification - shape, solubility and composition, biological functions. Physical properties - ampholytes, isoionic point, salting in and salting out, denaturation, peptide bond. Structure of proteins – primary, secondary, tertiary and quaternary structure. Deamination, transamination and urea cycle.

UNIT – V: LIPIDS

Fat - function, classification, simple lipids, fatty acid (saturated and unsaturated) compound lipids, derived lipids, properties - saponification, rancidity, reduction, oxidation, halogenations. Function of phospholipids. Cholesterol structure - biological importance, chemical properties. Bile salts - function.

Text Books:

1. J.L. Jain, S. Jain and N. Jain. Fundamentals of Biochemistry. S. Chand & Co, 1997.
2. Ambika Shanmugam. Biochemistry. Published by author, 7th Edition, 1998.
3. A.V.S. Rama Rao. Text book of Biochemistry. L.K.& S. Publishers, 5th Edition.
4. A.C. Deb. Fundamental of Biochemistry. New Central Book Agency, 2006.

Reference Books:

1. D.L. Nelson and M.M. Cox. Lehninger's Principles of Biochemistry. Macmillan Worth Publishers, 4th Edition, 2000.
2. R.K. Murray and D.K. Granner. Harper's Illustrated Biochemistry. 26th Edition, 2002.

SEMESTER – II

Allied – I

L	T	P	C
4	0	0	4
Total Hours: 90			

BIOCHEMISTRY – II

SUBJECT CODE: U2BC01AT

UNIT – I: NUCLEIC ACIDS

Purine and pyrimidine base, nucleosides, nucleotides, polynucleotides, DNA structure, various types, properties-absorbance, effect of temperature. Different types of RNA, structure and functions, genetic code.

UNIT – II: ENZYMES

Enzyme definition, units, various classifications, nomenclature, specificity, isoenzymes, factors affecting enzyme activity - substrate, pH and temperature. Michaelis-Menten equation, Lineweaver-Burk plot, enzyme inhibition, competitive, non-competitive and un-competitive.

UNIT – III: VITAMINS

Vitamins, definition, classification and daily requirement, biological roles and deficiency diseases of water-soluble and fat-soluble vitamins (Structure not necessary). Micro and macro nutrients - biological functions of calcium, iron, iodine, sodium and phosphorous.

UNIT – IV: ANALYTICAL BIOCHEMISTRY

Osmotic pressure, surface tension, viscosity, pH, determination of pH by hydrogen electrode and Henderson-Hasselbach equation, Colloids, Brief outline of Paper, Column and Partition Chromatography.

UNIT – V: HORMONES

Definition and classification and hormones of endocrine glands. Biological functions and disorders of pancreatic, thyroid, adrenal medullary hormones.

Text Books:

1. J.L. Jain, S. Jain and N. Jain. Fundamentals of Biochemistry. S. Chand & Co, 1997.
2. Ambika Shanmugam. Biochemistry. Published by author, 7th Edition, 1998.
3. A.V.S. Rama Rao. Text book of Biochemistry. L.K. & S. Publishers, 5th Edition.
4. A.C. Deb. Fundamental of Biochemistry. New Central Book Agency, 2006.

Reference Books:

1. D.L. Nelson and M.M. Cox. Lehninger's Principles of Biochemistry. Macmillan Worth Publishers, 4th Edition, 2000.
2. R.K. Murray and D.K. Granner. Harper's Illustrated Biochemistry. 26th Edition, 2002.

I B.Sc. BIOCHEMISTRY

ALLIED PRACTICAL-I

BIOCHEMISTRY

SUBJECT CODE: U2BC11AP

L	T	P	C
0	0	3	2

Total Hours: 78

VOLUMETRIC ANALYSIS

- Estimation of HCl using suitable bases
- Determination of Saponification number of oil
- Estimation of Iron using potassium permanganates as link solution and ferrous ammonium sulphate as standard
- Estimation of glycine by formal titration method
- Estimation of glucose by Benedict's method
- Estimation of ascorbic acid using 2,6-dichlorophenol indophenol as link solution

QUALITATIVE ANALYSIS

- Qualitative analysis of carbohydrates: Glucose, fructose, galactose, lactose, maltose and sucrose.
- Qualitative analysis of amino acids, arginine, cysteine, tryptophan and tyrosine
- Qualitative analysis of Abnormal constituent in urine-Glucose,Protein,Bilesalt Bilepigment, and Ketonebodies

QUANTITATIVE ANALYSIS (only for demonstration; with single standard method)

- Colorimetric estimation of protein by Biuret method.
- Colorimetric estimation of Glucose by OT method
- Colorimetric estimation of Creatinine by Jaffe's method
- Colorimetric estimation of Urea by DAM Method

Reference Books (Practical Manuals):

- D.T. Plummer. An Introduction to Practical Biochemistry. Tata McGraw-Hill, 3rd Edition, 1987.
- J. Jayaraman. Laboratory Manual in Biochemistry. Wiley Eastern, 1981.
- T.N. Pattabiraman. Laboratory Manual in Biochemistry. All India Publishers & Distributors, 3rd Edition, 1998.

L	T	P	C
5	0	0	5

ANALYTICAL BIOCHEMISTRY**SUBJECT CODE: U3BC01MT****Total Hours: 52****UNIT – I: SOLUTIONS AND ELECTROCHEMICAL TECHNIQUES**

Properties of solutions: Colloids - types and properties, Surface tension, adsorption, viscosity and osmotic pressure.

Electrochemical techniques - Measurement of pH, Standard hydrogen electrode, Principle and applications of oxygen electrode.

UNIT – II: CHROMATOGRAPHY

Chromatography - Adsorption, partition chromatography - Principle, methods and applications of paper chromatography, Thin layer chromatography, column chromatography, Gas-liquid chromatography and Ion exchange Chromatography. High performance liquid chromatography and molecular sieve Chromatography.

UNIT – III: ELECTROPHORESIS AND CENTRIFUGATION

Electrophoresis - Principles, Instrumentation and applications of paper electrophoresis, cellulose acetate electrophoresis, Agarose gel electrophoresis, native and SDS - PAGE, Isoelectric focusing and molecular weight determination.

Principles of centrifugation, Low speed and high speed centrifugation, Preparative, Analytical ultra centrifuge - Instrumentation and applications. Basic principle and technique of subcellular fractionation by differential centrifugation.

UNIT – IV: SPECTROSCOPY

Spectroscopy: Colorimetry, Beer-Lambert's law, measurement of extinction, calibration curve. Spectrophotometer, absorption spectra, components of instrument, principle and applications of spectrofluorimetry, Principle, Instrumentation and applications of flame photometer and atomic absorption spectrophotometry.

UNIT – V: RADIOISOTOPES

Radioisotopes- Radioactive decay, units of radioactivity. Measurement of Radioactivity - Geiger - Muller counter, Scintillation counter and Autoradiography. Applications of radioisotopes in Biology.

Text Books:

1. Upadhyaya and Upadhyaya nath, Biophysical Chemistry, 3rd Edition. Himalayan publications, 2002.
2. S. Ramakrishnan. Textbook of Medical biochemistry, 2nd Edition, Orient Longman Limited.
3. Chatwal and Anand. Instrumental Methods of Analysis. Himalayan publications.
4. P. Asokan. Analytical Biochemistry. Chinnaa Publications, 2003.
5. M.N. Chatterjea, Textbook of Medical Biochemistry, 7th Edition, Jaypee Brothers Medical Publishers (P) ltd.

Reference Books :

1. Wilson and Walker. A Biologist's guide to principles and techniques of practical Biochemistry, 5th Edition. Cambridge University Press, 2000.
2. David Frifelder. Physical Biochemistry, 2nd Edition. W.H.Freeman, 1982.

SEMESTER III
ALLIED II – PAPER III

L	T	P	C
4	0	0	4

MICROBIOLOGY- I

TOTAL HOURS : 52

SUBJECT CODE: U3MB11AT

UNIT I : HISTORY OF MICROBIOLOGY AND MICROSCOPY

Definition & Scope of Microbiology, Spontaneous generation, Biogenesis, contribution of Louis Pasteur, Leewenhock, Lazzaro Spallanzani, John Tyndall, Joseph Lister, Robert Koch. Microscopy – Simple, Compound, Light microscopy, Dark ground, Phase contrast, Fluorescence & Electron microscopy.

UNIT II: NOMENCLATURE AND ANATOMY OF ORGANISMS

Five kingdom concept, cell theory, Binomial nomenclature of microbes, species concept, classical approach. Anatomy of prokaryotes & eukaryotes, ultra structure & function of cell wall & cell organelles.

UNIT III: CULTURE METHODS AND STAINING

Culture techniques, media preparation, preservation of cultures, aerobic & anaerobic culture techniques.

Staining methods – Simple, Differential – Gram's Staining & Acid fast staining, Special staining Spore stain, Capsule stain, metachromatic granules.

UNIT IV: ANTIMICROBIAL CHEMOTHERAPY

Antimicrobial chemotherapy – Antibiotics – source, classification, mode of action – Antimicrobial resistance – Tests for sensitivity to antimicrobial agents – Kirby Bauer disc diffusion method.

UNIT V: MICROBIAL GROWTH AND STRUCTURAL CHARACTERISTICS

Measurement of microbial growth. batch & continuous culture, Growth determination, growth curve. Structure characteristics of Algae – Chlorella, Fungi – Mucor & Protozoa – Entamoeba.

Text Books:

1. Dubey, R.C and Maheswari, D.K. A Text book of Microbiology. S. Chand & Company Ltd. New Delhi, 4th Edition, (2005).
2. Stainer, R.Y., Ingraham, J.L., Wheelis, M.L. and Painter, P.R. "General Microbiology" – Mac Milan Education Ltd., London, 3rd Edition, (1986).
3. Michael J. Pelczar. "Microbiology", Tata McGraw Hill Publishing Co. Ltd., New Delhi, 5th Edition, (2006).

Reference Books.

1. Prescott. M, Microbiology, Tata McGraw Hill Publishing Co. Ltd., New Delhi, 6th Edition, (1962).
2. Sale, A.J. "Fundamentals Principles of Bacteriology", McGraw Hill Publishing Co. Ltd.,
New York, 7th Edition, (1992).

SEMESTER – III

L	T	P	C
2	0	0	2

SKILL BASED SUBJECT – I**Total Hours: 26****FUNDAMENTALS OF COMPUTER****SUBJECT CODE: U3BC02ST****UNIT – I**

Introduction-Input/output Processing-CPU-Memory Device-Types of Computers-Characteristics of Computer-History and Generation-Application of Computers.

UNIT – II

MS-WORD: Introduction-Understanding Microsoft Word Screen-Creating a Document-Saving the file-Spellchecking-Appling fonts-Borders and Shading-Closing of the file-Save as option-Printing your Document-Auto Format-Auto text-Bullets and Numbers-Change case-Editing Tools-Find and Replace-Header and Footer-Mail Merge-Page Numbering-Paragraph.

UNIT – III

MS-EXCEL: Understanding Excel Screen-Naming Conversion-Sheets-Entering information-Editing the Entered Data-Selecting Cells-Moving Data-Copying Data-Drag and Drop Method-Inserting and Deleting Cells-Changing Width of a Column-Formatting Text-Creating a Worksheet-Copying Formula-Changing the Values-Excel Commands-Working with Workbooks

UNIT – IV

MS-POWER POINT: Introduction- Creating Slide- Working with a Presentation- Using the Quick Access Toolbar- Other Formatting Tools - Saving your Files- Using Templates- Navigating the Slide Show - ClipArt -. Formatting a Slide - Managing Slides

UNIT – V

E-MAIL AND INTERNET: Introduction-E-mail account and its functions-Search Engine-Surfing web pages-Basics of Social Networking site.

Text Books

1. V.Rajaraman, Fundamentals of Computers, TMH Publications,2003

Reference Books :

2. Raghunathan Balachandran, PC Software Step By Step. Cyber Tech Publications,2003
3. Dietel, Dietel, Gold Berg. Internet & World Wide Web, 3rd Edition,
Pearson Education 2006.

MEDICAL LABORATORY TECHNOLOGY**Total Hours: 52****SUBJECT CODE: U4BC11MT****UNIT – I: GOOD LABORATORY PRACTICE AND LABORATORY INSTRUMENTS**

Code of conduct for laboratory personnel. Good laboratory procedure. Safety precautions in laboratory. Concepts of Accuracy, Precision, Reliability and Reproducibility. Normality, Molarity and Molality. Specimen - collection techniques, transport, processing and labeling.

Principles of Microscopy, Colorimetry, Balance and Centrifuge. General approaches to quality control.

UNIT – II: CLINICAL PATHOLOGY

Collection and preservation of urine. Physical examination; Chemical examination of urine for abnormal constituents (sugar, protein, ketone bodies, bile pigments) and their clinical significance. Microscopic examination of urine.

Collection, gross, physical, chemical and microscopic examination of cerebrospinal fluid, stool, sputum and seminal fluid.

UNIT – III: HISTOPATHOLOGY

Fixation of tissues – classification, choice and functions of fixatives. Tissue processing – impregnation, paraffin blocks, paraplast, tissue mat, ester wax, water-soluble wax, celloidin. Section cutting – types and principles of microtomes; knives, cutting and mounting of sections.

Staining – theory and types of staining: vital, histochemical, histological and fat-staining. Stains – Basic, PAS, Van Geison and Von Kossa silver nitrate stains. Selection of stains. Decalcification method. Mounting of stained slides with Canada Balsam and DPX.

UNIT- IV: HAEMATOLOGY AND BLOOD BANKING

Anticoagulants. Collection of blood (Capillary and Venous) and preservation. Estimation, normal values and interpretation of Haemoglobin, ESR, PCV, WBC, RBC, Platelets, bleeding time, clotting time and prothrombin time. Preparation of thick, thin and wet films. Examination of blood smear for malaria and microfilaria.

ABO and Rh blood group systems. Blood grouping. Coombs test, compatibility, cross matching – major and minor cross matching, clinical significance. Donor selection and screening. Complications of blood transfusion.

UNIT- V: MICROBIOLOGY AND SEROLOGY

Methods of collection, storage and transportation of specimens – urine, sputum, throat swab, pus swab, faecal samples. Commonly used acidic, basic and neutral stains. Simple staining. Differential staining – Gram staining, Ziehl-Neelsen staining. Motility of bacteria – hanging drop. Media for biochemical characterization and identification of bacteria.

Methods used in serology – precipitation, flocculation, haemagglutination and complement fixation test. Principle & procedure for VDRL, RPR, TPHA & Widal Tests.

Text Books:

1. Kanai L. Mukherjee, Medical Laboratory Technology, Vols. I, II and III. Tata McGraw Hill Publishing Company Ltd., 1988.

Reference Books:

1. Alan H. Lowenclock. Varley's Practical Clinical Biochemistry, 6th Edition. CBS Publishers and Distributors, 1988.
2. Ramnik Sood. Medical Laboratory Technology: Methods and Interpretations. Jaypee Brother Medical Publishers (P) Ltd., 1999.
3. N. Pattabiraman. Laboratory Manual in Biochemistry, 4th Edition. All India Publishers & Distributors, 2004.
4. Namita Jaggi. Microbiology Theory for MLT. Jaypee Brothers Medical Publishers (P) Ltd., 2003.

SEMESTER IV
ALLIED II – PAPER IV

MICROBIOLOGY- II

SUBJECT CODE: U4MB11AT

L	T	P	C
4	0	0	4

Total hours 52

UNIT I: SOIL MICROBIOLOGY

Characteristics and classification of soil, Soil Microorganisms; Interaction between microorganisms with plants. Biofertilisers - Biopesticides.

UNIT II: AQUATIC AND AIR MICROBIOLOGY

Aquatic Microbiology, Sewage Treatment – Physical and Biological. Microbes in air, distribution and source of airborne organisms.

UNIT III: FOOD MICROBIOLOGY

Food Microbiology, Microbial spoilage of food, food preservation – High temperature, low temperature and food additives, Microbes in milk and their source. Industrial production – Yoghurt and Cheese.

UNIT IV: IMMUNOLOGY

Antigen – Definition. Antibody – Definition – Types. Ag – Ab reactions – Agglutination – Precipitation – RIA – ELISA – Immunofluorescence.

UNIT V: BIOTECHNOLOGY

Biotechnology – Definition of a Gene, structure, cloning techniques, Genomic Library, cDNA Library – Screening of recombinants. Gene Therapy methods.

Text books:

1. Alexander. (1997). Introduction to Soil Microbiology. John Wiley and Sons. N.Y. Subba Rao, N.S. 3rd Edition, (1995).
2. Subba Rao, N.S. Biofertilizers in Agriculture and Forestry, Oxford and IBH publication Co. Pvt. Ltd., New Delhi, 3rd Edition, (1997).
3. Kubly, J, Immunology, W.H. Freeman and Company, New York, 2nd Edition, (1994).
4. Frazier W.C. and Westhoff D.C. Food Microbiology, Tata Mc Graw Hill Publishing Company Ltd., New Delhi, 4th Edition, (1998).

Reference books:

1. Old, R.S. and Primrose, S.B. Principles of Gene manipulation. An introduction to genetic Engineering.. Blackwell Scientific Publication, London, 5th Edition, (1995).
2. T.A. Brown. Gene cloning – an introduction – Chapman & hall London, 3rd Edition, (1995).

L	T	P	C
0	0	3	2

TOTAL HOURS 78

SEMESTER IV

ALLIED PRACTICAL - PRACTICAL II

MICROBIOLOGY

SUBJECT CODE: U4MB01AP

1. Cleaning of Glasswares, Sterilisation techniques.
2. Gram's Staining, Motility (Hanging Drop Preparation)
3. Acid Fast Staining for Tuberculosis pathogen identification
4. Wet Mount Preparation of Fungal Material – LPCB Staining
5. Preparation of Media.
6. Slant Preparation
7. Serial Dilution Techniques
8. Pure Culture Techniques -Streak Plate, Pour Plate and Spread Plate Techniques.
9. Enumeration of Soil Microorganisms.
10. Enumeration of Sewage Microorganisms.
11. Assessment of Milk Quality by MBRT Method.
12. Assessment of Air Quality
13. Root Nodules – Rhizobium Isolation and Identification methods.
14. Microbial Products – Microbial Enzyme Production – Demonstration.
15. Medically Important Pathogens – Microphotographs demonstration.

Reference Books:

1. Mackie and McCartney Practical Medical Microbiology, Elsevier; 14th Edition, (2007)
2. Dev, N.C., Dev, T.C. Practical Microbiology Protozoology and Parasitology: Including Bacteriology, Virology, Mycology, Immunology, Serology, and Automated Methods. New Book Agency, 2nd Edition, (2011).

SEMESTER - IV

L	T	P	C
6	0	0	5

CORE PRACTICAL – II

Total Hours: 78

MEDICAL LABORATORY TECHNOLOGY

SUBJECT CODE: U4BC11MP

I. HAEMATOLOGY

1. Collection and Storage of Blood
2. Total and differential WBC Count
3. Total RBC Count
4. Platelet Count
5. PCV and ESR
6. ABO system, Rh System
7. Determination of Bleeding Time and Clotting time

II. SEROLOGY

1. RA
2. Pregnancy test

III. URINE ANALYSIS

1. Collection of Urine samples
2. Qualitative analysis of Urine for Normal and pathological conditions

IV. MICROBIOLOGY

1. Sterilization by Autoclave, red heat method, Media preparation, Inoculation, Streaking method

V. BIOCHEMISTRY (with single standard method)

1. Estimation of Glucose by Folin WU Method
2. Estimation of Urea By DAM Method
3. Estimation of Creatinine by Jaffe's method
4. Estimation of Protein by Biuret method

Reference Books (Practical Manuals):

1. Kanai L. Mukherjee, Medical Laboratory Technology, Vols. I, II and III. Tata McGraw Hill Publishing Company Ltd., 1988.

SEMESTER – IV

L	T	P	C
2	0	0	2

SKILL BASED SUBJECT – II**Total Hours: 26****COMPUTER APPLICATIONS****SUBJECT CODE: U4BC02ST****UNIT – I**

Operating system - MS DOS, DOS Features, MS DOS opening and closing, DOS commands, Batch Files. Windows XP- opening and closing, background setting, date and time adjustment, note pad, word pad, painting. Unix features & commands.

UNIT – II

Computer Language - Types, Introduction to C and Importance, constants, variables, data types, declaration of variables. Operators - Arithmetic, relational, logic, assignment and conditional operators. Introduction to Arrays and pointers.

UNIT – III

HTML: Introduction- history – basic tags- tables- frames- images- anchor tags- hyperlinking documents- web browsers.

UNIT – IV

Internet - introduction, importance, requirements for internet. Multimedia - introduction, applications, components and its uses. Multimedia design, multimedia concept.

UNIT – V

Computer application in banking, industries, educational institutions, hospitals, Research institutions - ISRO, BARC. Network - local area network, wide area network. Introduction to telecommunication. Downloading software and files, copying CD/DVD.

Text Books:

1. Computer fundamental, V.K. Jain Publications, 1980.
2. Ron Mansfield. Working in Microsoft office. Tata McGraw-Hill Education, 2001

Reference Books

- 1 .Prabhat K. Andleigh, Kiran Thakrar. Multimedia System design.
- 2 DietDietel, Goldberg. Internet & World Wide Web, 3rd Edition, Pearson Education, 2006.
- 3 V.Rajaraman. Fundamentals of Computers. TMH Publications, 2003
- 4 Raghunathan Balachandran. PC Software Step By Step. Cyber Tech Publications, 2003.

UNIT – I: INTRODUCTION TO ENZYMOLGY

Enzyme Introduction – Chemical nature and general characterization. Nomenclature and IUB System of enzyme classification. Properties of enzymes – Specificity and its types, Active site – Salient features of active site. Enzyme units – IU, Katal, and Turnover number. Mechanism of action of enzyme – Lock and Key hypothesis and Induced fit theory. Isolation and purification of enzyme. Criteria of purity of enzymes.

UNIT – II: COENZYMES AND COFACTORS

Apoenzyme, Holoenzyme, Cofactor, Coenzymes, Structure and function of Coenzymes reaction involving nucleotide TPP, $\text{NAD}^+/\text{NADP}^+$, FMN/FAD, PLP, Coenzyme – A. Multienzyme complex – Pyruvate dehydrogenase and Fatty acid synthase complex.

UNIT – III: ENZYME KINETICS

Introduction to chemical kinetics – Reaction rate, Energy of activation, Progress curve of enzyme catalyzed reaction. Factors influencing velocity of enzyme reaction. Kinetics of serial substrate enzyme catalyzed reaction - Michaelis – Menton equation, Lineweaver - Burk Plot, Eadie- Hofstee Plot - Kinetics of Bisubstrate enzyme catalysed reaction – Ping Pong mechanism.

UNIT – IV: INHIBITION AND REGULATION OF ENZYMES

Enzyme inhibition – Competitive inhibition, Non competitive, Uncompetitive and Irreversible inhibitions, Substrate inhibition. Examples - Malonate, Allopurinol, Aspirin, Iodoacetate, Disulfiram, (Kinetics and derivations not required).

Enzyme Regulation - Allosteric enzymes (Aspartate transcarbamylase), Feedback inhibition (HMG CoA reductase). Feed forward stimulation, Enzyme repression.

UNIT – V: MECHANISM OF ACTION AND APPLICATIONS OF ENZYMES

Mechanism of enzyme activity - Covalent catalysis, Proximity, Acid- base catalysis, Electronic strains. Mechanism of Chymotrypsin.

Industrial application of enzymes – Immobilized enzymes - various methods of immobilization, applications of immobilized enzymes. Therapeutic uses of Enzymes. Definitions and applications of Abzyme, Ribozymes, Biosensor enzymes.

Text Books:

1. Trevor Palmer. Understanding Enzymes, 4th Edition, EWP Pvt. Ltd., New Delhi, 2004.

Reference Books:

1. Dixon and Webb. Enzymes, 2nd Edition. Longmans Green and Co Ltd., 1979.

2. Irwin H. Segel. Enzyme Kinetics, 1st Edition. Wiley Publisher, 1994.
3. D.L. Nelson and M.M. Cox. Lehninger's Principles of Biochemistry, 4th Edition. Macmillan Worth Publishers, 2000.
4. P.C. Champe. Lippincott's Biochemistry, 2nd Edition. Raven Publishers, 1994.
5. Robert K. Murray and Daryl K. Granner. Harper's Biochemistry, 26th Edition. McGrawHill, Lange Medical Books, 2003.
6. D. Voet and J.G. Voet. Fundamentals of Biochemistry, 2nd Edition. John Wiley, 1999.

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INTERMEDIARY METABOLISM**SUBJECT CODE: U5BC02MT****Total Hours: 65****UNIT – I: ELECTRON TRANSPORT CHAIN AND PHOTOSYNTHESIS**

The Electron Transport Chain – Components and reactions of ETC. Role of ETC – Oxidative phosphorylation – Chemiosmotic hypothesis. P/O ratio, Uncouplers of oxidative phosphorylation. Photosynthesis – Hill reaction, Light reaction, Cyclic and Non-Cyclic photo phosphorylation, Dark reaction – Calvin cycle.

UNIT – II: CARBOHYDRATE METABOLISM

The Glycolysis – Aerobic and Anaerobic, Energetics, action of Pyruvate dehydrogenase complex. Glycogenesis, Glycogenolysis, Citric acid cycle, Energetics. Pentose phosphate pathway, Gluconeogenesis, Glyoxylate cycle. Metabolism of Galactose and Fructose.

UNIT – III: LIPID METABOLISM

Introduction, Fate of absorbed dietary lipids. Oxidation of fatty acids – α , β , ω - oxidations. Metabolism of Ketone bodies. Biosynthesis of fatty acids, Triacylglycerol, Cholesterol and Phospholipids. Degradation of Cholesterol.

UNIT – IV: PROTEIN METABOLISM

Introduction, fate of dietary proteins, catabolism of Amino acids – Transamination, Oxidative and non- oxidative deamination, Decarboxylation – Urea cycle. Detoxification – Conjugation, Hydrolysis, Reduction and oxidation.

UNIT – V: NUCLEIC ACID METABOLISM

Biosynthesis and degradation of Purine and Pyrimidines – De novo synthesis and Salvage pathway. Nucleotide inhibitors.

Text Books:

1. Robert K. Murray and Daryl K. Granner. Harper's Biochemistry, 26th Edition. McGrawHill, Lange Medical Books, 2003.

Reference Books:

1. U. Satynarayana and U. Chakrapani. Biochemistry, 3rd Edition. New Central Book Agency (P) Ltd., 2006.
2. D.L. Nelson and M.M. Cox. Lehninger's Principles of Biochemistry, 4th Edition. Macmillan Worth Publishers, 2000.
3. P.C. Champe. Lippincott's Biochemistry, 2nd Edition. Raven Publishers, 1994.
4. D. Voet and J.G. Voet, Fundamentals of Biochemistry, 2nd Edition. . John Wiley, 1999.

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SEMESTER – V

GENETICS AND MOLECULAR BIOLOGY

SUBJECT CODE: U5BC03MT

Total Hours: 65

UNIT – I: GENETICS

Mendelian principles: Dominance, segregation, Independence assortment. Concept of gene: Allele, Multiple alleles. Complete dominance, Incomplete dominance and Codominance. Recombination: Homologous. Transposons in Bacteria.

UNIT – II: REPLICATION

Central dogma of Molecular Biology. DNA as genetic material, Evidence for semi conservative replication. Replication in prokaryotes: Unit of replication, Enzymes involved - Nucleases, Helicases, SSB, Primase, DNA polymerase I, II and III. Topoisomerases, Reverse transcriptase. Stages of replication – Initiation, Elongation and Termination. Fidelity of replication. Inhibitors of replication.

UNIT – III: TRANSCRIPTION

Transcription in prokaryotes: Sense strand and anti-sense strand, Promoters, Transcription bubble, RNA polymerases. Significance of sigma factor. Stages of Transcription - Initiation, Elongation and Termination (Rho-dependent and Rho independent). Post-transcriptional modification. Inhibitors of replication.

UNIT – IV: GENETIC CODE AND TRANSLATION

Genetic code: Definition, characteristics of genetic code. Ribosomes - composition of prokaryotic and eukaryotic ribosomes. Structure of tRNA. Stages of Translation – Activation of amino acids, aminoacylation of tRNA, Initiation, Elongation and Termination. Post-Translational modifications. Inhibitors of Translation.

UNIT – V: GENE REGULATION, MUTATION AND REPAIR MECHANISM

Regulation of gene expression in prokaryotes: Principles, Operon concept – lac operon, trp operon. Mutation – causes and its types – Point mutation, Gene mutation, Frame-shift mutation, Chromosomal aberrations – causative agents and types. DNA Repair mechanism – Mismatch repair, Excision repair (Base and Nucleotide), and Direct repair.

Text books:

1. D. Frifelder and M. Malacinski. Essentials of Molecular Biology, 4th Edition. Panima Publishing, 2008.
2. P.S. Verma and V.K. Agarwal. Cell biology and Genetics, 14th Edition, S. Chand & Co. Ltd., 2004.
3. Manju Yadav. Genetics, 1st Edition. Discovery publishing House, 2003.

Reference Books:

1. B. Lewin. Genes IX, 9th Edition. . Jones and Bartlett Publishers, 2007.
2. G. Karp. Cell and Molecular Biology, 7th Edition. Wiley International, 2013.
3. D.L. Nelson and M.M. Cox. Lehninger's Principles of Biochemistry, 5th Edition, Macmillan Worth Publishers, 2008.
4. S.C. Rastogi. Molecular biology, 2nd Edition. CBS publishing, 2011.
5. RM. Twyman. Advanced Molecular Biology, 3rd Edition. . Viva Book, 1998.

SEMESTER – V

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(ELECTIVE-I) – PAPER – I**HORMONAL BIOCHEMISTRY****SUBJECT CODE: U5BC14ET****Total Hours: 65****UNIT – I: HORMONES OF HYPOTHALAMUS AND PITUITARY**

Introduction, Classification of hormones, Role of second messengers in hormonal action. Hormones of the hypothalamus and pituitary - Chemical nature, Secretion, release and their biological functions. Disorders – Gigantism and Dwarfism, Diabetic insipidus.

UNIT – II: HORMONES OF THYROID AND PARATHYROID

Chemical nature, secretion, function and disorder of thyroid & parathyroid hormones. Disorders- Grave's disease, Rickets and Osteomalacia.

UNIT – III: HORMONES OF PANCREAS AND G.I. TRACT

Chemical nature and functions of Insulin, Glucagon. Secretion, release, chemical nature and functions of Gastrin, Enterogastrin, Secretin & Cholecystokinin. Disorders – Gastritis, Diabetes mellitus.

UNIT – IV: HORMONES OF ADRENAL GLAND

Chemical nature and Functions of Adrenal Medullary and Cortex hormones. Disorders - Cushing's syndrome and Pheochromocytoma

UNIT – V HORMONES OF TESTES AND OVARIES

Chemical nature and functions of Androgens, Estrogens, Progesterone. Disorders – Cryptorchidism and Amenorrhea

Text books:

1. Prakash S. Lohar. Endocrinology. MJP Publications, 2005.

Reference Books:

1. Devlin, TM. Textbook of Biochemistry with Clinical correlations. Willey Liss, 2006.
2. J.L. Jain. Fundamentals of Biochemistry. S. Chand & Co Ltd., 2004.
3. Edward Staunton West , Wilbert R. Todd, Howard S. Mason and John T. Van Bruggen. Textbook of Biochemistry, 4th edition. Oxford & IBH publishing Co. Pvt.Ltd, 1996.
4. D.L. Nelson and M.M. Cox. Lehninger's Principles of Biochemistry, 4th Edition. Macmillan Worth Publishers, 2000.
5. D. Voet and J.G. Voet. Fundamentals of Biochemistry, 2nd Edition. John Wiley, 1999.
6. Lubert Stryer. Biochemistry, 4th edition. W.H. Freeman & Co, 1995.
7. White, Handler and Smith. Mammalian Biochemistry. McGraw Hill publications, 2006.

BIOCHEMICAL AND ENVIRONMENTAL TOXICOLOGY**UNIT – I: TOXICOLOGY**

Definition and scope of toxicology: Eco-toxicology and its environment significance toxic effects. Basis for general classification & nature, dose - response relationship. Synergism and Antagonism, Determination of ED₅₀ and LD₅₀.

Acute and chronic exposures. Factors influencing toxicity. Pharmacodynamics and Chemodynamics.

UNIT – II: BIOCHEMICAL BASIS OF TESTING

Principles and procedures of testing for acute toxic effects. Regulators guidelines, mammalian systems affected and the clinical signs of systemic toxicity. Factors affecting acute toxicity studies. Biochemical basis of toxicity. Mechanism of toxicity: disturbance of excitable membrane function altered calcium homeostasis. Covalent binding to cellular macromolecules. Genotoxicity. Tissue specific toxicity.

UNIT – III: TOXICITY TESTING

Test Protocol, Genetic Toxicity Testing and Mutagenesis Assays: Invivo test systems- Bacterial Mutation Tests: Reversion Tests, Ames test, Fluctuation Tests & Eukaryote Mutation Tests In Vivo Mammalian Mutation Tests – host mediated assay & dominant lethal test. Use of drosophila in toxicity testing. DNA repair assays. Chromosome damage test. Toxicological Evaluation Of Recombinant DNA –Derived Proteins.

UNIT – IV: FOOD TOXICOLOGY

Food toxicology: Role Of Diet In Cardio-Vascular Disease And Cancer. Toxicology of food additives. Metal toxicity: Toxicology Of Arsenic, Mercury, Lead And Cadmium. Environmental Factors Affecting Metal Toxicity- Effect Of Light, Temperature & PH. Diagnosis of toxic changes in liver and kidneys: Metabolism Of Haloalkanes. Haloalkenes & Paracetamol With Their Toxic Effects On Tissues.

UNIT – V: AIR POLLUTION

Common air pollutants and their sources. Air pollution and ozone. Air pollution due to chlorofluorocarbons (CFCs) and asbestos. Occupational toxicology and assessment of occupational hazards: industrial effluent toxicology and environmental health. An overview of regulatory agencies: responsibilities of regulatory agencies. Management of toxicological risk. Regulatory approaches. Regulatory systems and organizations.

Text Books:

1. Hayes, A.W. Principles and methods of toxicology, 2nd edition. Raven press, New York. 1988

Reference Books:

1. Klaassen CD, Amdur MO and Doull J. Casarett and Doull's Toxicology, 3rd Edition, Macmillan publishing company, New York, 1986.
2. Williams PL and Burson JL. Industrial Toxicology, Van-Nostrand Reinhold, New York, 1985.
3. Stewart CP and Stolman A. Toxicology, Vol I, Academic press, New York, 1960

SEMESTER – V
(SKILL BASED SUBJECT – III)

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3	0	0	2

BIOSTATISTICS

SUBJECT CODE: U5BC06ST

Total Hours: 39

UNIT – I

Nature and scope of statistical methods and their limitations. Collection, classification, tabulation of statistical data. Organization of data-Individual series, discrete series, continuous series (class interval). Diagrammatic and graphical representation of statistical data (bar diagram, line diagram, pictogram, histogram & horizontal and vertical bar diagram).

UNIT-II

Measure of central tendency- Introduction, Characteristics of a good average, Mean, Median, Mode (Raw, Discrete& Continuous data) Merits and demerits.

UNIT- III

Measure of Dispersion – Introduction, definition, classification & properties. Range- Introduction, definition, location of range in individual, discrete, continuous series, merits and demerits of Range. Standard deviation, Variance, Coefficient of Variation.

UNIT – IV

Chi-Square test – Introduction, Characteristics of Chi-Square test, Assumption, degree of freedom, application of chi-square test, t-test – Application and its uses.

UNIT – V

F-test and its applications-Analysis of Variance – Introduction, techniques of Analysis of variance(ANOVA)- One way and two way classification, steps involved in analysis.

Text Book:

1. P. Ramakrishnan. Biostatistics. Saras Publications, Nagaercoil, 2005.

Reference Books:

1. P.S.S. Sundar Rao and J. Richard. Introduction to Biostatistics and Research Methods, 5th Edition, . Prentice Hall India, 2006.
2. Wayne, N. Daniel. Biostatistics: Basic Concepts and Methodology for the Health Sciences, John wiley & sons, 2010.

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HUMAN PHYSIOLOGY AND NUTRITIONAL BIOCHEMISTRY

SUBJECT CODE: U6BC01MT

Total Hours: 65

UNIT – I: DIGESTIVE AND EXCRETORY SYSTEM

Structure and function of digestive tract organs. Digestion, Absorption & defecation of food. Mechanism of HCl production. Role of digestive enzymes involved in Carbohydrates, Lipids & Protein digestion. Structure and function of kidney, GFR, Mechanism of urine formation, Role of ADH hormone, Diabetes insipidus, Acute & Chronic Nephritis.

UNIT – II : RESPIRATORY AND CIRCULATORY SYSTEM

Structure and function of Lungs, Mechanism of respiration, transport of O₂ and CO₂, Oxygen Dissociation Curve, Role of hemoglobin in respiratory gas transport, Chloride shift, Hypoxia and respiratory Acidosis and Alkalosis.

Structure and function of Heart, Pulmonary and Systemic Circulations, Blood and Lymph cells - composition and functions, Blood vessels, blood pressure & Ischemic heart diseases.

UNIT – III: NERVOUS, MUSCULAR AND SKELETAL SYSTEM

Structure and function of Nerve cell and Nerve fibres, Synapses - Electrical and Chemical, Neurotransmitters, Resting and Action Potential, Transmission of Nerve impulses.

Types of muscles and Structure and function of Muscle fibres, Mechanism of muscle contraction, Muscular Dystrophy. Structure of Bone, Formation of Bone – Role of PTH and Vitamin D in bone formation.

UNIT – IV: FOOD AND NUTRITION

Definition of Nutrition, unit of energy, measurement of energy in food stuff by Bomb Calorimeter. BMR and factors affecting it, RQ of food stuff, SDA, water and electrolytes.

Composition of food, physiological role and nutritional significance of Carbohydrates, Lipids, Proteins and Probiotics. Nutritive value of proteins, Nitrogen balance, Essential and Non-Essential Amino Acids.

UNIT – V: DIET IN HUMAN NUTRITION

Definition of Macronutrients and micronutrients, Nutritional significance of dietary Calcium, Phosphorus, Sodium, Potassium, Copper, Zinc, Iron and Iodine, Anti-nutrients. Definition of Vitamins - Fat soluble and Water soluble vitamins, RDA, toxicity of vitamins. Protein calorie malnutrition (Kwashiorkor and Marasmus). Diet requirement for infants, children, Pregnancy, Lactating Women and Geriatric nutrition.

Text books:

1. N. Arumugam and A. Marimuthu, Animal Physiology. Saras Publications, 2003.

2. M. Swaminathan, Hand Book of Food & Nutrition, 5th Edition, The Bangalore printing and publishing Co., Ltd., 2014.

Reference books:

1. Sarada Subramanyam and K. Madhyavankutty. Text Book of Human Physiology, 6th Edition, S Chand & Co Ltd., 2006.
2. Vidya Ratan, Hand Book of Human Physiology, 7th edition. Jaypee Brothers Medical publishers Ltd., 2010.
3. William. F. Ganong. Review of Medical Physiology, 24th Edition. Prentice – Hall International Inc., 2012.
4. K. Sembulingam, Essential of Medical Physiology, 6th Edition, Jaypee Brothers Medical publishers Ltd., 2013.
5. Davidson and R. Passmore. Human Nutrition and Dietetics, ELBS, 8th Edition. ELBS, 1986.

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CLINICAL BIOCHEMISTRY**SUBJECT CODE: U6BC02MT****Total Hours: 65****UNIT – I: DISEASES RELATED TO CARBOHYDRATE METABOLISM**

Regulation of blood Glucose, Renal threshold, Glycosuria - types of glycosuria. Glucose tolerance test (GTT – Oral and IV). Diabetes mellitus diagnosis - acute and chronic complications and treatment. Galactosemia, Glycogen storage diseases, Fructosuria, Lactose intolerance.

UNIT – II: INBORN ERRORS OF METABOLISM AND TUMOR MARKERS

Metabolic disorder, symptoms and diagnosis of Phenyl ketonuria, Cystinuria, Alkaptonuria, Albinism, Tyrosinemia.

Tumor markers - Definition, Role of Carcinoembryonic antigen (CEA), Alpha Fetoprotein (AFP), human chorionic gonadotropin (hCG) as tumor markers.

UNIT – III: DISEASES RELATED TO LIPID METABOLISM AND DIAGNOSTIC ENZYMOLOGY

Hypercholesterolemia, Familial hyper and hypolipoproteinemia, Atherosclerosis, Fatty liver.

Functional and Non - functional plasma enzymes, enzyme patterns in acute pancreatitis, liver damage, bone disorder and myocardial infarction. Isoenzymes - LDH, ALP and CK

UNIT – IV: BLOOD CLOTTING AND LIVER FUNCTION TESTS

Blood clotting mechanism, disorders of clotting mechanism, Anemia and its types.

Metabolism of bilirubin, jaundice-types and differential diagnosis. Liver function tests – Icteric index, Vander Bergh test, Hippuric acid test, BSP excretion test and PT.

UNIT – V: RENAL FUNCTION TESTS AND GASTRIC FUNCTION TESTS

Clearance test - Urea, Creatinine, Inulin, PAH test, Concentration and dilution test.

Collection of gastric contents, examination of gastric residuum, FTM, Stimulation test, Tubeless gastric analysis.

Text Books:

1. M.N. Chatterjee and Rana Shinde, Text book of Medical Biochemistry, 6th Edition. Jaypee Brothers publications, 2005.
2. Vasudevan and Sreekumari S. Text book of Medical Biochemistry, 3rd Edition, 2004.

Reference books:

1. Carl A. Burdis and Edward R. Ashwood. Text book of Medical Biochemistry Jaypee brothers Medical publishers (p) Ltd., New Delhi.

2. Philip D. Mayne. Clinical Chemistry in diagnosis and treatment. Oxford University Press Publications, 1994.
3. TM.Devlin. Text Book of Biochemistry with clinical correlation, 7th Edition. Wiley Publications, 2010.
4. J.F. Zilva and P.R.Pannall. Clinical Chemistry in Diagnosis and Treatment, 3rd Edition. Year Book Medical Publishers, 1979.

BIOTECHNOLOGY**UNIT – I: GENETIC ENGINEERING TOOLS**

Biotechnology: Definition and scope. Genetic engineering tools - Restriction endonucleases, SI nucleases, DNA ligases, Alkaline phosphatase, Reverse transcriptase, DNA polymerase, Polynucleotide kinase, Terminal transferase. Use of Linkers and Adapters. Cloning vectors: Plasmid, Cosmid, Phage, YAC, Shuttle vector, T-DNA based vector and Expression vectors.

UNIT – II: DNA CLONING

Methods of gene transfer - Transformation, Electroporation, Liposome-mediated gene transfer, Microinjection and particle bombardment. Gene libraries – Creation of genomic DNA and cDNA libraries. Recombinant selection and screening methods - Insertional inactivation. Techniques of cloning - Southern, Northern and Western blotting techniques. Gene amplification – PCR, RT PCR, Principle of DNA sequencing Methods – Maxam and Gilbert sequencing.

UNIT – III: PLANT TISSUE CULTURE

Plant tissue culture - Media composition, growth regulators. Types of Culture, initiation and differentiation. Callus and Suspension culture. Micro propagation, Somatic embryogenesis and Somoclonal variation. Protoplast isolation, Protoplast fusion and regeneration of plants.

UNIT – IV: ANIMAL CELL CULTURE

Equipment and requirements for animal cell culture, Application of Animal cell culture. Media for Animal cell culture - Natural media, synthetic media, Serum free media. Establishment of cell culture. Primary culture, cell line and Stem cell culture.

UNIT – V: APPLICATIONS OF BIOTECHNOLOGY

Transgenic plants - Insect (Pest) resistance, Herbicide resistance, Stress tolerant. Transgenic animals – Transgenic mice, Gene knock out mice, Transgenic sheep - Dolly, and Transgenic pig. Molecular pharming - Tissue plasminogen activator (TPA). GM food and GMO, Ethics in GM Food processing. Introduction to SCP. Production of edible Mushrooms. Microbial production of Foods.

Text books:

1. A.K. Srivastava, R.K. Singh and M.P. Yadav. Animal Biotechnology. Oxford & IBH, 2005.
2. H.D. Kumar. Molecular Biology and Biotechnology, Vivas publishing house (P) Ltd., 1997.
3. U. Satyanarayana, Biotechnology, 3rd Edition. Books and Allied (p) Limited, 2012.

Reference books:

1. D. Balasubraniam. Concepts in Biotechnology. Universal Press India, 2004.
2. M.K.Razdan, Introduction to Plant tissue culture. Oxford IBH Publisher, 2003.
3. Freshney. Animal cell culture - A practical approach. IRL Press, Oxford. 1986.
4. Channarayappa. Molecular Biotechnology. Univ. Press, 2006.
5. R. C. Dubey. A text book of Biotechnology, 4th Edition, S. Chand & Co, 2010.

SEMESTER – VI
(ELECTIVE-III) – PAPER – III

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IMMUNOLOGY

SUBJECT CODE: U6BC15ET

Total Hours: 65

UNIT – I: BASIC CONCEPTS INVOLVED IN IMMUNOLOGY

Immunity, classification of immunity, Innate immunity - physical, biochemical and genetic factors involved. Acquired immunity - Classification. Immune response - Humoral and Cell – mediated response tolerance. Lymphoid organ; primary and secondary lymphoid organ structure and function - Neutrophil, Eosinophil, Basophil, NK cell, Macrophage, Dendritic cells , Monocyte, T and B lymphocyte.

UNIT – II: ANTIGEN, ANTIBODY AND VACCINE

Antigen - definition, types, Properties - specificity, cross reactivities, antigenic determinants. Haptens. adjuvant Antibodies - General structure, properties, classes and subclasses.

Vaccination-; active and passive immunization, Immunity to bacteria and virus, Vaccine- definition, preparation, significance and types - rDNA vaccine, and DNA vaccine.

UNIT – III: ANTIGEN – ANTIBODY REACTION AND IMMUNODIAGNOSIS

Complement - properties, Activation pathways,. Antigen and Antibody interaction - Precipitation, Agglutination, Complement fixation, Opsonization, Phagocytosis, cytolysis, Flocculation. Assay of Ag and Ab reaction - Ouchterlony procedure, radial immunodiffusion, immuno electrophoresis, RIA and ELISA.

UNIT – IV: TRANSPLANTATION, IMMUNODEFICIENCY DISORDERS

MHC - Structure and types. Transplantation - basic, classification, graft acceptance and graft rejection. Immunodeficiency disorders - classification agammaglobulinaemia, SCID - out line of tumour cell - Diagnosis and treatment.

UNIT – V: HYPERSENSITIVITY, AUTOIMMUNE DISORDERS

Hypersensitivity and Allergy - Classification, Mechanism, Diagnosis and treatment. Autoimmune diseases - Definition, classification, mechanism of action - RA, Myasthenia gravis, Pernicious anemia, Type – I Diabetes Mellitus

Text Books:

1. I. Kannan. Immunology. MJP Publishers, Chennai-5, 2007.
2. Nandhini Shethy, Immunology, 2nd Edition, New Age international Private Ltd., 2006.
3. Tizarrd. Immunology- An introduction, 4th Edition, Saunders College Publishing, 1994.

Reference Books:

1. Ivan Roitt and Jonathan Brastoff. Immunology, 3rd Edition, David Male, 1993.
2. Richard A. Goldsby, Thomas J. Kindt, Janis Kuby and Barbara A. Osborne, Immunology, 5th Edition. W.H, Freeman and Company, New York, 2002.
3. Geoffrey Zubay. Immunology, 4th Edition. W.M.C, Brown publishers, 1992.
4. Ivan M. Roitt and Peter J. Delves. Essential Immunology, 10th Edition. Blackwell Publisihing, 2001.
5. Catherine Sheeham. Clinical Immunology Principles and Laboratory Diagnosis, 2nd Edition. Lippincott Williams and Wilkins Publisher, 1997.

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PLANT BIOCHEMISTRY AND PLANT MOLECULAR BIOLOGY

SUBJECT CODE: U6BC04ET

Total Hours: 65

UNIT – I: PHOTOSYNTHESIS

Energy Generating Mechanism - Photosynthetic Pigment, Light and Dark reactions of photosynthesis, proton gradient and ATP synthesis of chloroplast. Bacterium and mitochondria, Mode of action of DCMU, Regulation of photosynthesis, bacterio rhodopsin, CAM metabolism, RUBISCO, photorespiration and crop productivity.

UNIT – II: NITROGEN METABOLISM AND PLANT HORMONES

Nitrogen cycle Disotropes biochemistry of symbiotic and nonsymbiotic nitrogen fixation. Assimilation of ammonium.- carbon nitrogen ratio, uride metabolism, nitrate metabolism, genetics of nitrogen fixation, genetic manipulation of Nif genes, biosynthesis, mode of action, transport, distribution and physiological effect of auxin, gibberlin, cytokinin, Aba and ethylene.

UNIT – III: PLANT DISEASE AND SECONDARY METABOLITE

Biochemistry of plant disease, defence mechanism of plants, biosynthesis, distribution and biological functions of industrially important secondary metabolite,(any 10) principles of plant diseased control.

UNIT – IV: PLANT PHYSIOLOGY

Water relations of plant, mechanism of water absorption. Aquaporin symplast-apoplast concept. Ascent of sap, transpiration and stomatal mechanism. Source and sink relationship, translocation of inorganic and organic substances, bud and seed dormancy. Senescence, stress response in plant, phytochromes- properties, photochemicals, transformation, mode of action and physiological effect

UNIT – V: PLANT MOLECULAR BIOLOGY AND BIOTECHNOLOGY

DNA polymorphism – importance of rflp and rapd in plant breeding management aspects of plant genetic engineering. Tacking, mapping and cloning of plant genes, selectable markers. Reporter genes and promoters used in plant vectors. Ti plasmids and crown gall tumor, genetic engineering of plant for disease resistance, cytoplasmic male sterility, edible oil, biodegradable plastics. Delay of fruits ripening. Methods and application of plant tissue culture.

Text Books:

1. R.K. Sinha. Modern Plant Physiology. Narosa Publishing House, 2004.
2. M.J. Pelczar, E.C.S. Chan and N.R. Kreig. Microbiology, 5th Edition. Tata McGraw Hill Publishing Co., 1986.

3. L.M. Prescott, J.P. Harley and D.A. Klein, Microbiology, 6th Edition, McGraw Hill, 2004.

Reference Books:

1. T.W. Goodwin. Introduction to Plant Biochemistry. Pergamon Press, 1986.
2. P.J. Lea, L.L. Castle and Lea. Plant Biochemistry and Molecular Biology, 2nd Edition. John Wiley & Sons, 1999.
3. B.D. Davis, R. Dulbecco, H.N. Eisen and H.S. Ginsberg. Microbiology, 3rd Edition. Harper & Row, 1980.

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BIONANOTECHNOLOGY**UNIT – I: NANOBIMATERIALS**

Introduction-biocompatibility – anti-bacterial activity - principles involved-applications. Biomaterial nanocircuitry: protein based nanocircuitry: neurons for network formation. DNA nanostructures for mechanics and computing and DNA based computation: DNA based nanomechanical devices.

UNIT – II: NANOBIO TECHNOLOGY

Interaction between biomolecules and nanoparticle surface, different types of inorganic materials used for the synthesis of hybrid nano-bio assemblies, application of nano in biology, nanoprobe for analytical applications- a new methodology in medical diagnostics and biotechnology, current status of nanobiotechnology, future perspectives of nanobiology, nanosensors.

UNIT – III: NANOMEDICINES

Developing of nanomedicines nanosystems in use, protocols for nanodrug administration, nanotechnology in diagnostics applications, materials used in diagnostics and therapeutic applications- molecular nanomechanics, molecular devices, nanotribology, studying tribology at nanoscale, nanotribology applications.

UNIT – IV: MOLECULAR AND CELLULAR BIOLOGY

Molecular and cellular biology applications, 2-D electrophoresis and mass spectrometry of proteins, Protein Microarrays (Fabrication – Fluorescence detection) - Binding Assays And Immunosensors- Integrated Nanobiotechnology Systems.

UNIT – V: BIOLOGICAL METHODS OF SYNTHESIS

Use of Bacteria, Fungi, Actinomycetes for Nanoparticle Synthesis, Magnetotactic Bacteria for Natural Synthesis of Magnetic Nanoparticles: Mechanism Of Formation: Viruses As Components for the Formation of Nanostructured materials: Synthesis Process and application, Role of Plants in Nanoparticle Synthesis.

Text Books:

1. Bharat Bhusha, Springer Handbook of Nanotechnology.
2. A.K.Bandyopadhyay. Nanomaterials. New Age International Publishers.

Reference Books:

1. Mark Ratner and Daniel Ratner. Nanotechnology. Pearson education.
2. David S.Goodsell. Bionanotechnology: Lessons From Nature.

3. ROBERT A. FREITAS. Nanomedicine, Vol IIA: Biocompatibility.
4. Harisingh Nalwa. Handbook of Nanostructured Biomaterials and their applications in nanobiotechnology.
5. C.M.Niemeyer, C.A.Mirkin. Nanobiotechnology
6. Ajayan, Schadler and Braun. Nanocomposite Science And Technology.
7. Gerald A. Urban. BioMEMS (Microsystems).
8. Massimiliano Diventra. Introduction to Nanoscale Science And Technology (Nanostructure Science And Technology).
9. K. Eric Drexler. Nanosystems: molecular : Molecular Machinery, Manufacturing And Composition-
10. C.M. Niemeyer, C.A.Mirkin. Nanobiotechnology

PHARMACOLOGY AND PHARMACEUTICAL BIOCHEMISTRY**SUBJECT CODE: U6BC07ST****Total Hours: 39****UNIT – I: GENERAL PHARMACOLOGY**

Introduction and definitions; The sources of drugs; Dosage forms; Routes of drug administration; Pharmacodynamics and biological mechanism of drug action – receptors (channel-linked, G protein-coupled, kinase-linked and receptors that regulate gene transcription), agonist, antagonist, partial agonists, inverse agonist.

UNIT – II: DRUG METABOLISM AND EXCRETION

Drug metabolism – Phase I reactions; P₄₅₀ monooxygenase system; Phase II reactions; First-pass metabolism; Pharmacologically active drug metabolites.

Renal excretion of drugs and drug metabolites; tubular excretion and reabsorption.

UNIT – III: DRUGS ACTING ON CENTRAL AND AUTONOMOUS NERVOUS SYSTEM

Classification and mechanism of analgesics-antipyretics–nonsteroidal anti-inflammatory drugs. Structure, pharmacological actions and therapeutic uses of: Analgesics – salicylates (aspirin); Antipyretics – paracetamol; Nonsteroidal anti-inflammatory drugs – indomethacin.

Classification of adrenergic drugs and adrenergic blocking drugs, Structure, pharmacological actions and therapeutic uses of: Adrenergic drugs – Catecholamines (adrenaline), noncatecholamines (ephedrine); Adrenergic blocking drugs – α -blockers (ergot alkaloids); β -blockers (propranolol).

UNIT – IV: CARDIOVASCULAR DRUGS AND CHEMOTHERAPY

Classification of antihypertensives. Structure, pharmacological actions and therapeutic uses of: β -adrenergic blockers (atenolol); Vasodilators (hydralazine); ACE inhibitors (captopril).

Chemotherapy of Malaria, Bacterial infections, Tuberculosis and Malignancy – Structure, pharmacological actions and therapeutic uses of Primaquine, Ampicillin. Isonicotinic acid hydrazide (Isoniazid) and Methotrexate.

UNIT – V: NOVEL THERAPEUTICS

Enzymes in therapy: Hyaluronidase, Streptokinase, Chymotrypsin and Serratiopeptidase. Vitamins and Antioxidants in therapy: Retinol, Thiamine, Ascorbic acid, Selenium.

Methods of prolonging the duration of action of a drug. Special drug delivery systems – liposomes.

Text books:

1. Satoskar, R.S., Bhandarkar S.D. and Rege, Nirmala N. Pharmacology and Pharmacotherapeutics. Revised 20th Ed., Popular Prakashan, Mumbai, 2007.

2. Seth, S.D. Text Book of Pharmacology. 2nd Ed., B.I. Churchill Livingstone, New Delhi, 1999.

Reference Books:

1. Rang, H.P., Dale, M.M. and Ritter, J.M. Pharmacology. 5th Ed., Churchill Livingstone, Edinburgh, 2003.
2. Brunton, L.B., Lazo, J.S. and Parker, K.L. Goodman and Gilman's the Pharmacological Basis of Therapeutics. 11th Ed., McGraw-Hill, New York, 2006.
3. Kasper, D., Braunwald, E. and Fauci, A.S. Harrison's Principles of Internal Medicine. 16th Ed., McGraw-Hill, New York, 2004.

CORE PRACTICAL – III
BLOOD ANALYSIS AND ENZYMOLOGY
SUBJECT CODE: U6BC11MP

L	T	P	C
0	0	4	5

Total Hours: 104

I. COLORIMETRIC ESTIMATIONS

1. Estimation of Glucose by O-T Method
2. Estimation of Creatinine by Jaffe's method
3. Estimation of Uric acid by Caraway method
4. Estimation of Cholesterol by Zak's Method
5. Estimation of Bilirubin by Malloy-Evelyn Method
6. Estimation of Haemoglobin by Drabkin's Method
7. Estimation of Albumin and A/G ratio in Serum
8. Estimation of DNA by UV-spectrophotometric method
9. Estimation of Fibrinogen

II. ENZYME ASSAY

1. Effect of pH, Temperature and Substrate concentration for Amylase and Urease
2. Assay of Activity of Serum Transaminases – SGOT, SGPT

III. SEPARATION TECHNIQUES

1. Separation DNA by Agarose Gel Electrophoresis
2. Separation of Proteins by SDS – PAGE

Reference Books:

1. H. Varley. Practical Clinical Biochemistry. CBS Publishers, 4th Edition, 1988.
2. T. N. Pattabiraman. Laboratory Manual in Practical Biochemistry. All India Publishers, New Delhi, 2006.
3. J. Jayaraman, Laboratory Manual in Biochemistry. Wiley Eastern, 1981.

ELECTIVE PRACTICAL – IV
FOOD ANALYSIS, MICROBIOLOGY AND SEPARATION
TECHNIQUES

L	T	P	C
0	0	3	4

SUBJECT CODE: U6BC12EP

Total Hours: 78

FOOD ANALYSIS

1. Determination of ash and moisture content.
2. Estimation of Carbohydrate by Anthrone method.
3. Estimation of Protein by Biuret method.
4. Estimation of Ascorbic acid.
5. Estimation of Iron.
6. Estimation of Inorganic Phosphorous from Ash.
7. Estimation of pyruvate.
8. Titrable acidity of Urine.

CLINICAL MICROBIOLOGY

1. Isolation of pure culture.
2. Serial dilution.
3. Staining techniques – simple, gram's staining, capsule and fungal staining.

SEPARATION OF BIOLOGICAL COMPOUND

1. Separation of Carbohydrate and Aminoacid by Paper Chromatography.
2. Separation of Lipid by TLC.

ISOLATION OF BIOCHEMICAL COMPOUND

1. Isolation of DNA.
2. Isolation of RNA.
3. Isolation of Fat.

DEMONSTRATION

1. ELISA.
2. Denaturation of nucleic acid by UV absorption method.

Reference Books:

1. H. Varley. Practical Clinical Biochemistry. CBS Publishers, 4th Edition, 1988.
2. T. N. Pattabiraman. Laboratory Manual in Practical Biochemistry. All India Publishers, New Delhi, 2006.
3. J. Jayaraman,
4. Laboratory Manual in Biochemistry. Wiley Eastern, 1981.

ADHIPARASAKTHI COLLEGE OF ARTS & SCIENCE,

(Autonomous)

Permanently Affiliated to Thiruvalluvar University, Vellore

Accredited by NAAC with B⁺⁺ Grade

M.Sc BIOCHEMISTRY

Under CBCS

(Effective from the Academic Year 2015-2016)

Regulations

CBCS

Choice-Based Credit System is a flexible system of learning. 'Credit' defines the quantum of contents / syllabi prescribed for a course, and determines the number of hours of instruction required. The distinguishing features of CBCS are the following:

It permits the students to:

- ❖ Learn at their own pace
- ❖ Choose electives from a wide range of elective courses offered by the departments of the college.
- ❖ Undergo additional courses and acquire more than the required number of credits
- ❖ Adopt an inter – disciplinary approach in learning
- ❖ Make best use of the expertise of available faculty

1 Eligibility for Admission:

No student shall be eligible for admission to a Master's degree programme in any of the faculties unless he/she has successfully completed a three year undergraduate degree or earned prescribed number of credits for an undergraduate degree through the examinations conducted by a University / autonomous institutions or possesses such qualifications recognized by Thiruvalluvar University as equivalent to an undergraduate degree.

Provided that candidates for admission into the specific main subject of study shall also possess such other qualifying conditions as may be prescribed by the University in the Regulations governing respective courses of study.

ELIGIBILITY FOR ADMISSION TO M.Sc. BIOCHEMISTRY

Admission to the M.Sc. Biochemistry Degree Course shall be made as follows:

I Preference

A student who has passed B.Sc. Degree with 50% either with Biochemistry or Chemistry as Major Subject. 5% relaxation shall be given to SC /ST applicants.

II Preference

A student who has passed B.Sc. Degree with 50% and having Chemistry or Biochemistry at the Allied level and any of the Main Subject as mentioned below:

- 1) Biology
- 2) Zoology
- 3) Botany
- 4) Biotechnology
- 5) Nutrition and Dietetics
- 6) Microbiology
- 7) Any Biology related subject.

2 Eligibility for the Award of Degree:

A Candidate shall be eligible for the award of the Degree only if he/she has undergone the prescribed course of study in the college for a period of not less than two academic years and passed the examinations of all the Four Semesters prescribed earning 90 credits and fulfilled such conditions as have been prescribed therefore.

3 Duration of the Course:

The course duration shall be consisting of two years of four semesters.

4 Examination:

There shall be four semester examinations: The first semester examination at the middle of the first academic year and the second semester examination at the end of the first academic year. Similarly the third and fourth semester examinations shall be held at the middle and the end of the second academic year, respectively.

A candidate who does not pass the examination in any subject or subjects in one semester will be permitted to appear in such failed subject or subject along with the papers of following

semesters.

The following assessment procedure will be followed for Internal Marks:

Continuous Internal Assessment [CIA] Test

S. No	Reg. No	Name	Test I Marks For 75	Test II Marks For 75	Marks For 150	Marks Converted to 15/20	Assignments /Seminars [10] Records [05]	Marks For 25 / 25	Total Rounded to Marks for 25 / 25

Test I : Three hours duration for 75 marks

Test II : Three hours duration for 75 marks

Total marks	150	Theory	Practical
Test marks to be converted to	:	15 marks	/ 20 marks
Assignments / Seminars	:	10 marks	/ -
Records	:	-	/ 05 marks
Total	:	25 marks	/ 25 marks

In the column Rounded to 25 / 25, any fraction may be rounded to the next number.

5 Requirements for proceeding to Subsequent Semester

- Candidates shall register their names for the First Semester Examination after admission in the PG Courses.
- Candidates shall be permitted to proceed from the First Semester up to Final Semester irrespective of their failure in any of the Semester Examination subject to the condition that the candidates should register for all the arrear subject of earlier semesters along the current [subject] Semester subjects.
- Candidates shall be eligible to go to subsequent semester, only if they earn sufficient attendance as prescribed therefore by the Academic council from time to time. Provided in case of a candidate earning less than 65% of attendance in any one of the Semesters due to any

extraordinary circumstances such as medical grounds, such candidate who shall produce Medical Certificate issued by the Authorised Medical Attendant [AMA], duly certified by the Principal of the College, shall be permitted to proceed to the next semester and to complete the course of study. Such candidates shall have to repeat the missed Semester by rejoining after completion of Final Semester of the course, after paying the fee for the break of study as prescribed by the College from time to time.

6 Passing Minimum:

A Candidate shall be declared to have passed the whole examination, if he/she passes in all the papers and practical wherever prescribed / as per the scheme of examinations by earning 90 CREDITS.

In fixing the passing minimum marks, the following will be observed:

- [a]. There shall be no Passing Minimum For Internal
- [b]. For External Examinations, Passing Minimum shall be of 50% [Fifty Percentage] of the maximum marks prescribed for the paper.
- [c]. In the aggregate [External + Internal] the Passing Minimum shall be 50% for each paper / practical / project and viva-voce.
- [d]. Grading shall be based on overall marks obtained [Internal + External].

7 Classification of Successful Candidates:

Candidates who secured not less than 60% of aggregate marks [Internal + External] in the whole examination shall be declared to have passed the examination in the First Class.

All other successful candidates shall be declared to have passed in Second Class. Candidates who obtain 75% of the marks in the aggregate [Internal + External] shall be deemed to have passed the examination in First Class with Distinction, provided they pass all the examinations [theory papers, practical, project and Viva-voce] prescribed for the course in the First appearance.

8 Requirements to take the Semester Examinations

- a] A candidate will be permitted to take the Examination of any Semester, if
 - i] He/She secures not less than 75% of attendance out of the 90 instructional days during the semester. [In the case of married women students the minimum attendance requirement shall be 55% of total instructional days].
 - ii] He / She earns a Progress Certificate from the Head of the Institution, of having satisfactorily completed the prescribed course of study in the subject as required by these Regulations, and
 - iii] His/ Her conduct has been satisfactory.

Provided that it shall be open to the Academic council or any authority delegated with such powers by the Academic council to grant exemption to a candidate who has fail to earn 75% of the attendance prescribed for any valid reason[s] subject to the usual conditions.

b] A candidate who has secured attendance less than 75% but 65% and above shall be permitted to take the Examination on the recommendation of the Head of the Institution to condone the lack of attendance as well as on the payment of the prescribed fees to the College.

c] A candidate who has secured attendance less than 65%, but 55% and above in any semester, has to compensate the shortage of attendance in the subsequent semester, besides earning the required percentage of attendance in that semester and take the exam of both the semester papers together at the end of the latter semester.

d] A candidate, who secured less than 55% of attendance in any semester, will not be permitted to take the regular examinations. He / She has to re-do the course after the completion of the final semester by rejoining the semester, in which the attendance is less than 55%

e] A candidate who secured less than 65% of attendance in the final semester has to compensate his / her attendance shortage in a manner to be decided by the Head of the Department concerned after rejoining the course.

9 Grading System:

In addition to the above marking system, grading system is also adopted as detailed below. The marks (Sum of Internal + External) in each course is assigned with a letter grade on a Seven [7] point scale using the following letter grade points and a range of marks.

SEVEN POINT SCALE [As per UGC notification 1998]

Marks	Grade Point	Letter Grade	Class
95-100	7.00	H	First Class with Distinction
90-94	6.00	O	First Class with Distinction
75-89	5.50	D	First Class with Distinction
60-74	4.75	A	First Class
54-59	4.00	B	Second Class
50-54	3.50	C	Second Class
Below 50	3.00	F	Fail

From the second semester onwards the total performance within a semester and continuous performance starting from the first semester are indicated respectively by **Grade Point Average [GPA]** and **Cumulative Grade Point Average [CGPA]**. These two are calculated by the following formulae:

$$\text{GPA} = \frac{\sum_{i=1}^n C_i G_i}{\sum_{i=1}^n C_i}$$

Where 'C_i' is the credit earned for the course 'i' in any semester; 'G_i' is the Grade Point obtained by the student for the course 'i' and 'n' is the number of courses passed in that semester.

CGPA=GPA of all the courses starting from the first semester to the last semester.

10 RANKING

Candidate who pass all the examinations prescribed for the course in the First Appearance Itself alone are eligible for Ranking.

Provided in the case of Candidates who pass all the examinations prescribed for the course with a break in the First Appearance due to the reasons as furnished in the Regulation 7.[iii] Supra are eligible for Classification / Distinction.

The mark obtained in improvement examination will not be taken into consideration for Ranking.

11 The Medium of Instruction and Examinations

The medium of Instruction and Examinations shall be in English.

12. Submission of Record Notebooks for Practical Examinations

Candidates taking the Practical Examinations should submit bona fide Record Notebook prescribed for the Practical Examinations. Otherwise the candidate will not be permitted to take the practical Examinations. However, in genuine case where the students could not submit the record notebook may be permitted to take the Practical Examinations provided the Head of the Department concerned certifies that the candidate has performed the experiments prescribed for the Course. For such of those candidates who do not submit Record Books, zero [0] marks will be awarded for record notebooks.

In case a candidate fails in the Practical Examination the marks awarded for the record at the time of fist appearance for the Practical Examination should be made available by the college to the Examiners at the subsequent appearance by the candidate

13. Improvement of marks in the subjects already passed

Candidate who have passed in theory paper / papers are allowed to appear again for theory paper / papers only once in order to improve his/her marks, by paying the fee prescribed from time to time. Such candidates are allowed to improve within a maximum period of 10 semesters counting from his/her first semester of his/her admission. If candidate improves his marks, then his improved mark will be taken into consideration for the award of Classification and Distinction only. Such improved marks will not be counted for the award of Prize / Medals and Rank. If the Candidate does not show improvement in the marks, his previous marks will be taken into consideration.

No candidate will be allowed to improve marks in the Practical, Project and Viva-voce.

14. Checklist for Inspection

- a. Qualification for
 - i. Teaching Faculty : as Prescribed by the UGC and the University
 - ii. Technical Faculty : as Prescribed by the UGC and the University
 - iii. Laboratory Staff : as Prescribed by the UGC and the University
- b. Infrastructure Facilities
 - i. Building : Number of Classrooms with specifications: 3 rooms measuring 20'X 25' Number of Staff rooms: One measuring 20' X 20'
 - ii. Furniture : One pair of table / chair per student
 - iii. Laboratory @ 10 Sq. ft. per student

PATTERN OF QUESTION PAPER

Section – A (300 word)	
To Answer 5 questions (either / or pattern)	5 X 6 marks = 30 marks
Section – B (900 words)	
To Answer 3 questions out of 5 questions	3 X 15 marks = 45 marks
	Total = 75 marks

ADHIPARASAKTHI COLLEGE OF ARTS & SCIENCE
G.B.NAGAR, KALAVAI-632506 (AUTONOMOUS STATUS)
AFFILIATED TO THIRUVALLUVAR UNIVERSITY, VELLORE
DEGREE COURSES

M.Sc. Biochemistry
(With effect from 2015-2016)

The course of study and the scheme of examination

Year/ Semester	Subject	Paper	Subject code	Title of the paper	Ins. Hrs/ week	Credit	Exam Hrs.	Max. Mark		
								CIA	ESE	Total
I Year I Semester	Core	Paper I	P1BC01MT	Chemistry of Macromolecules	5	4	3	25	75	100
	Core	Paper II	P1BC02MT	Cell Biology & Genetics	5	4	3	25	75	100
	Core	Paper III	P1BC03MT	Biophysical and Biochemical Techniques	5	4	3	25	75	100
	Core Practical	Practical – I			5	--	--	--	--	--
	Core Practical	Practical – II			5	--	--	--	--	--
	Elective I (to choose 1 out of 2)	Paper I	P1BC04ET	Chemistry and Nanoscience for Biologists	5	4	3	25	75	100
			P1BC05ET	Genetic Engineering						
					30	16		100	300	400
I Year II Semester	Core	Paper IV	P2BC01MT	Bioenergetics & Intermediary Metabolism	5	5	3	25	75	100
	Core	Paper V	P2BC02MT	Advanced Enzymology.	4	4	3	25	75	100
	Core	Paper VI	P2BC03MT	Biotechnology.	5	4	3	25	75	100
	Core Practical	Practical – I	P2BC11MP	Isolation and Characterization studies, Quantitative Analysis.	5	5	6	40	60	100
	Core Practical	Practical – II	P2BC12MP	Enzymology – Purification and Kinetic Studies and Microbial Biochemistry	5	5	6	40	60	100
	Elective II (to choose 1 out of 2)	Paper II	P2BC04ET	Plant Biochemistry & Microbial Technology	4	4	3	25	75	100
			P2BC05ET	Bioinformatics						
			P2HR01GS	Human Rights	2	2	3	25	75	100
					30	29		205	495	700
TOTAL					60	45		305	795	1100

Year/ Semester	Subject	Paper	Subject code	Title of the paper	Ins. Hrs/ week	Credit	Exam Hrs.	Max. Mark		
								CIA	ESE	Total
II Year III Semester	Core	Paper VII	P3BC01MT	Advanced Endocrinology	5	4	3	25	75	100
	Core	Paper VIII	P3BC02MT	Research Methodology	5	4	3	25	75	100
	Core	Paper IX	P3BC03MT	Molecular Biology and Bioethics	5	4	3	25	75	100
	Core Practical	Practical – III			4	--	--	--	--	--
	Core Practical	Practical – IV			4	--	--	--	--	--
	Elective III (to choose 1 out of 2)	Paper III	P3BC04ET	Immunology and Stem Cell Technology	4	4	3	25	75	100
			P3BC05ET	Pharmaceutical Biochemistry						
		Paper I	P3BC06ET	Phytochemistry and phytotherapy	3	3	3	25	75	100
					30	19		125	375	500
II Year IV Semester	Core	Paper X	P4BC01MT	Human Physiology and Nutrition	5	4	3	25	75	100
	Core	Paper XI	P4BC02MT	Advanced Clinical Biochemistry	5	4	3	25	75	100
	Core Practical	Practical – III	P4BC11MP	Biochemical Analysis of Blood, Marker Enzymes and Antioxidant Studies	5	5	6	40	60	100
	Core Practical	Practical – IV	P4BC12MP	Haematological Methods and Urine Analysis	5	5	6	40	60	100
	Core		P4BC01PV	Project work with Viva-Voce	10	8	3	50	150	200
					30	26		180	420	600
Total					60	45		305	795	1100
Grand total hours & credit					180	90		610	1590	2200

SEMESTER - I

CHEMISTRY OF MACROMOLECULES

L	T	P	C
5	0	0	4

Total Hours: 65

SUBJECT CODE: P1BC01MT

UNIT – I: HOMO AND HETEROGLYCANS

Polysaccharides – occurrence, structure, isolation, properties and functions of homoglycans – starch, glycogen, cellulose, dextrin, inulin, chitins, xylans, arabinans, galactans. Occurrence, structure, properties and functions of heteroglycans – bacterial cell wall polysaccharides, glycosaminoglycans, agar, alginic acid, pectins, aminosugars and deoxy sugars, Blood group substances and sialic acids. Glycoprotein and their biological applications. Lectin structure and functions.

UNIT – II: PROTEINS

Classification of proteins on the basis of solubility and shape, structure and biological functions. Isolation, fractionation and purification of proteins. Denaturation and renaturation of proteins. Primary structure – determination of amino acid sequence of proteins. The peptide bond - Ramachandran plot. Secondary structure – weak interactions involved – α - helix and β sheets and β turns structure. Pauling and Corey model for fibrous proteins. Collagen triple helix. Super secondary structures – helix – loop – helix. Tertiary structure – alpha and beta domains. Quaternary structure - structure of hemoglobin. Solid state synthesis of peptides.

UNIT – III: NUCLEIC ACIDS

Watson – crick model of DNA structure. A, B and Z – DNA Cruciform structure in DNA, formation and stability of cruciforms, miscellaneous alternative conformation of DNA, slipped mispaired DNA, parallel stranded, anisomorphic DNA, palindrome, secondary and tertiary structure of RNA, hnRNA, denaturation, strand separation, fractionation, isolation and purification of DNA, mRNA, molecular hybridization, cot value curve, hypochromic effect, DNA – protein interactions (Histone)

UNIT – IV: LIPIDS

Lipids – classification, saturated and unsaturated fatty acids, phospholipids – classification, structure and functions of Ceramides and sphingomyelins. Eicosanoids - structure and functions of prostaglandins, thromboxanes, leukotrienes, types and functions of plasma lipoproteins. Amphipathic lipids – membranes, micelles, emulsions and liposomes. Steroids – cholesterol structure and its biological role.

UNIT – V: VITAMINS AND PORPHYRINS:

Vitamins – Water soluble – thiamine, riboflavin, niacin, pyridoxine, folic acid, ascorbic acid – sources, structure, biochemical functions, deficiency diseases, daily requirements; fat soluble – vitamin A, vitamin D, vitamin E and vitamin K –sources, structure, biochemical functions, deficiency diseases, daily requirements. Porphyrin ring system - Chlorophyll , hemoglobin, myoglobin and cytochrome.

Text Books:

1. D.L. Nelson and M.M. Cox. Lehninger's Principles of Biochemistry, Macmillan Worth Publishers, 4th Edition. 2000.
2. T.M. Devlin. Textbook of Biochemistry with clinical correlation. John Wiley Liss, Hoboken NJ publishers, 2006.

Reference Books:

1. L. Stryer. W.H. Freeman, Biochemistry, 6th Edition. 2006.
2. D. Voet and J.G. Voet. Fundamentals of Biochemistry, John Wiley, 2nd Edition. 1999.
3. G.L. Zubey. Biochemistry, WCB Publishers / Wm.C. Braun Publishers, 4th Edition. 1996.
4. Conn and Stumpf, Biochemistry, Wiley publishers, 5th Edition. 2006.

SEMESTER – I

CELL BIOLOGY AND GENETICS

L	T	P	C
5	0	0	4

Total Hours: 65

SUBJECT CODE: P1BC02MT

UNIT – I: CELLULAR ORGANISATION, DIVISION AND CYTOSKELETONS

Cell organelles and their functions. Cell types – organization of prokaryotic and eukaryotic cells, cell division – mitosis and meiosis, cell cycle – phases of cell cycle and regulation of cell cycle, cell motility – molecular motors, microtubules, structure and composition, microtubular associated proteins – role in intracellular motility.

UNIT – II: METHODS IN CELL BIOLOGY

Introduction and definition of tissues and cells, Methods for disrupting tissues and cells, organ and tissue slice techniques, fixation, fixatives – types, preparation and functions, tissue processing, microtome and its types, staining – Haematoxylin and Eosin stain, Vangeson's stain, P.A.S stain, Gomori's reticulum, Popanicolaou stain, Giemsa stain, Mounting, identification of morphological changes related to pathology (ex. Hepatitis, glomerulonephritis and myocardial infarction)

UNIT – III: CELLULAR COMMUNICATION AND TRANSPORT

Differentiation of cell membrane – microvilli, tight junctions, epithelia, cell and spot desmosomes – mechanical function, cell – cell interaction, cell adhesion proteins, cell surface of plant cells and cancer cells. Overview of membrane transport – peripheral and integral, molecular model of cell membrane – fluid mosaic model and membrane fluidity, solute transport across membrane – passive transport, active transport by ATP powered pumps, types of transport systems.

UNIT – IV: MOLECULAR GENETICS

Mendelian genetics – alleles, dominance, phenotype, linkage, cross – over, non – mendelian inheritance. chromosome structure, histones, nucleosome organization, DNA as a genetic material(classical experiments), the C- value paradox, repetitive sequences, organelle genomes – mitochondrial genome.

UNIT – V: DNA MUTATION, REPAIR, RECOMBINATION AND TRANSPOSON

Mutations and molecular mechanisms of mutations, effects of mutations in proto – oncogenes, Karyotyping. DNA repair mechanisms – direct repair, excision repair, mismatch repair,

recombination repair, SOS response, eukaryotic repair systems. Recombination – the Holliday model, site – specific recombination, transposons and retroposons.

Text Books:

1. G. Karp. Cell and Molecular Biology,. Wiley International, 7th Edition ,2013.
2. D. Frifelder and M. Malacinski. Essentials of Molecular Biology,. Panima Publishing, 4th Edition 2008.

Reference Books:

1. G.M. Cooper. The Cell: A Molecular approach,. ASM Press, 4th Edition 2007.
2. H. Lodish. Molecular Cell Biology,. W.H. Freeman, 6th Edition 2007.
3. B. Lewin. Genes IX,. Jones and Bartlett Publishers, 9th Edition 2007.
4. D. Voet and J.G. Voet. Fundamentals of Biochemistry,. John Wiley, , 4th Edition 2013.
5. W.H. Elliot and D.C. Elliot, Biochemistry and Molecular Biology, ,. Oxford University Press, 4th Edition, 2009.
6. RM. Twyman. Advanced Molecular Biology, , Viva Book, 4th Edition, 1998.

SEMESTER – I

BIOPHYSICAL AND BIOCHEMICAL TECHNIQUES

L	T	P	C
5	0	0	4

SUBJECT CODE: P1BC03MT

Total Hours: 65

UNIT – I: ELECTROCHEMICAL TECHNIQUES

Redox reactions. Electrochemical techniques – principles, electrochemical cells – pH, Henderson Hasselbalch equation, buffer capacity, pH measurement, glass electrode.

Ion sensitive and gas sensing electrodes, oxygen electrode – principle and applications. Biosensors – Principles and applications of calorimetric, potentiometric and amperometric biosensors.

UNIT –II: ULTRACENTRIFUGATION AND RADIOACTIVITY

Ultracentrifugation – basic principles. Preparative ultracentrifugation - differential centrifugation and density gradient centrifugation. Analytical centrifugation – schlieren optical system – applications – determination of molecular mass and purity of macromolecules.

Nature of radioactivity - stable and radioactive isotopes – units and interaction of radioactivity with matter. Detection and measurement of radioactivity – GM counter, solid and liquid scintillation counter – tissue stabilizers, counting efficiency, primary and secondary flours, quenching – Cerenkov counting, autoradiography. Safety aspects of radiation hazards. Applications of radioisotopes in biological sciences.

UNIT – III: ELECTROPHORESIS

Electrophoresis: General principle. Support media. Electrophoresis of proteins – SDS – PAGE, 2D – PAGE, native gels, gradient gels, isoelectric focusing. Cellulose acetate electrophoresis. Detection, estimation and recovery of proteins in gels. Protein blotting.

Electrophoresis of nucleic acids – agarose gel electrophoresis, DNA sequencing gels, pulse field gel electrophoresis, Capillary electrophoresis, Nucleic acid blotting.

UNIT – IV: CHROMATOGRAPHY

Chromatographic techniques – general principles of partition and adsorption chromatography, Ion exchange, molecular exclusion and gas liquid Chromatography,

Chromatofocusing, immuno affinity, capillary electrochromatography. HPLC, HPTLC, Affinity chromatography.

UNIT – V: SPECTROSCOPY

Basic principles of electromagnetic radiation, energy, wavelength, wave number and frequency. Absorption and Emission spectra. Beer – Lambert law, Light absorption and its transmittance.

Principle and Biological Applications of spectroscopy. Colorimetry, UV, Visible, IR, ESR, NMR, Raman and Mass spectroscopy. ORD, CD, X- ray diffraction. Spectrofluorimetry and flame photometry. Introduction to Turbidometry, Nephelometry, and Luminometry.

Text Books:

1. K. Wilson and I. Walker. Practical Biochemistry,. Cambridge University Press, 5th Edition 2000.
2. Shawney. Practical Biochemistry. Narosa Publishing, 1995.
3. K. Wilson and K. Goulding. A Biochemical Guide to Principles and the Techniques of Practical Biochemistry,. Cambridge Press, 3rd Edition ,1986.

Reference Books:

1. D. Frifelder. W.H. Freeman. Physical Biochemistry, 2nd Edition, 1982.
2. Galen Wood Ewing McGraw. Instrumentation Methods of Chemical Analysis, Hill College 5th Edition., 1985.
3. R.D. Braun. Introduction to Instrumental Analysis. Pharma Book Syndicate, 2006.
4. Chatwal and Anand. Instrumental Methods of Analysis,. Himalayan publication, 5th Edition 2007.
5. Upadhyay and Upadhyay Nath. Biophysical Chemistry. Himalayan Publication, 1993.
6. Jag Mohan. Organic Spectroscopy, Principles and Application,. Narosa Publishing House, 2nd Edition ,2004.

SEMESTER - I

(ELECTIVE – I) - PAPER - I

L	T	P	C
5	0	0	4

Total Hours: 65

CHEMISTRY AND NANOSCIENCE FOR BIOLOGISTS

SUBJECT CODE: P1BC04ET

Unit I: ATOMIC STRUCTURE AND CHEMICAL BONDS.

Atomic orbitals, Quantum numbers, Shapes of s, p and d orbitals. Aufbau principle, Pauli exclusion principle, Octet rule and Hund's rule. Electronic configuration of atoms.

Formation of chemical bonds – ionic bond, covalent bond and co-ordinate bond with examples.

Unit – II. FUNCTIONAL GROUPS AND REACTIONS.

Classification of organic compounds based on functional groups and their nomenclature. Biologically important organic compounds (names and structures – Haem, Vitamin D, Indole acetic acid, NAD, FAD).

Hemolytic and heterolytic cleavage of covalent bonds. Reactive species: electrophiles, nucleophiles and free radicals. Types of organic reactions with examples. Inductive effect and resonance.

Unit – III. ISOMERISM.

Isomerism in organic compounds. Types of isomerism. Tautomerism with special reference to purines. Stereoisomerism. Geometric isomerism with special reference to fumaric and maleic acids and unsaturated fatty acids. Partial double bond character of C-N bonds in amides; Geometrical isomerism in such compounds.

Optical isomerism, optical activity, enantiomers, diastereomers; meso and dl-forms. R-S and D-L notations in amino acids and sugars. Conformational analysis; Conformations of ethane, butane and cyclohexane. Relative stability of various conformations. Elementary idea of conformation of amino acids and peptides.

Unit IV: NANOMATERIALS – INTRODUCTION, SYNTHESIS AND CHARACTERIZATION

An overview of Nanoscience and Nanotechnology; Nanoparticle synthesis techniques: solid-state; vapour-phase (flame-based, spray pyrolysis). Solution processing: water-oil microemulsion (reverse micelle) method. Plants and microbes as nanofactories; Various Bacteria, Yeast and fungi used for nanoparticle synthesis.

Characterization of Nanoparticles - Use of Fourier-Transform Infra-Red Spectroscopy and Atomic force microscope in characterization of nanomaterials.

Unit V: BIOLOGICAL AND BIOMEDICAL APPLICATIONS OF NANOMATERIALS.

Applications of metallic Nanoparticles – Biological Applications of Silver nanoparticles and Gold nanoparticles. Manufacturing, Types and Applications of Biosensors in Nanotechnology. Quantum Dot technology and its use in cancer treatment. Nanotechnology in Advanced drug delivery systems. DNA-based nanostructures and nanomaterials and their applications.

Biomedical applications of chitosan nanoparticles, Dendrimers as drug carriers. Cardiovascular and orthopedic applications of nanomaterials.

Text Books:

1. P.L. Soni and O.P. Dharmarha. Text book of Physical Chemistry, Sultan Chand & Sons, 21st Edition. 1999.
2. P.L. Soni and H.M. Chawla. Text book of Organic Chemistry, Sultan Chand & Sons, 20th Revised Edition. 1987
3. Subbiah Balaji. Nanobiotechnology, MJP Publishers, 2010.

Reference Books:

1. W.J. Moore. Physical Chemistry, Longman, 5th Edition. 1972.
2. R.T. Morrison and R.N. Boyd, Organic Chemistry, Prentice Hall India, 6th Edition. 1992.
3. G. Chatwal, Organic Chemistry of Natural Products, Vol. I. Himalaya Publishing House, 1997.
4. David E. Newton. Recent Advances and Issues in Molecular Nanotechnology. Greenworth Publishing Group, 2002.

SEMESTER - I
(ELECTIVE – I) - PAPER – I

L	T	P	C
5	0	0	4

Total Hours: 65

GENETIC ENGINEERING

SUBJECT CODE: P1BC05ET

UNIT – I: INTRODUCTION TO GENE CLONING AND IPR

Introduction to gene cloning: early development of genetics-gene cloning-specialized tools and techniques-importance of gene cloning

Intellectual property rights and types, patenting, isolation and purification of DNA; preparation of total cell DNA, plasmid DNA, bacteriophage DNA, plant cell DNA.

UNIT – II: CLONING AND EXPRESSION VECTORS

Plasmids- Bacteriophages (M13 and λ) PUC vectors yeast vectors, agrobacterium, mediated gene transfer, YAC, BAC, Human artificial chromosomes, Ti plasmid, SV40, baculoviruses, adenoviruses, papilloma viruses and retroviruses.

UNIT – III: DNA MANIPULATIVE ENZYMES

Manipulation of purified DNA: DNA manipulative enzymes – nucleases, ligases, polymerases, topoisomerases, restriction enzymes – performing restriction digests, ligation- joining DNA molecules together – random labeling nick translation and end filling.

UNIT – IV: INTRODUCTION TO DNA INTO LIVING CELLS

Biolistics, electroporation, microinjection, liposome – mediated method and calcium phosphate method.

UNIT – V: CONSTRUCTION OF LIBRARIES

Studying gene and genome structure – blotting techniques, PCR, in situ hybridization, DNA sequencing, chromosome walking and jumping, DNA foot printing, HR and HART, restriction analysis of DNA, RFLP, RAPD – principles, procedures and applications.

Text Books:

1. S. B. Primrose. Molecular Biotechnology, 2nd Ed. Blackwell Scientific publishers, Oxford, 1994.

Reference Books:

1. Sambrook J, Fritsch E. F. and Maniatis. Molecular cloning, Vols. I, II, III, Cold spring harbor laboratory press, New York, 2nd Edition, 1989.
2. D.M. Glover and D.B. Hames. DNA Cloning : A practical approach. RL Press, Oxford, 1995.
3. P.B. Kaufman, W. Wu , D. Kim and L.J. Cseke. Molecular and cellular methods in Biology and Medicine. CRC Press, Florida, 1995.
4. S.L. Berger and A. R. Kimmel. Methods in Enzymology Guide to Molecular Cloning Techniques, Academic Press Inc, San Diego, Vol. 152. 1996.
5. V. Goedel. Methods in Enzymology Gene Expression Technology, Academic Press Inc, San Diego, Vol. 185D. 1990.
6. D. A. Mickloss and G. A Freyer. DNA Science: A First Course in Recombinant Technology. Cold Spring Harbor Laboratory Press, New York, 1990.
7. J. A. Davis and W. S. Reznikoff. Milestones in Biotechnology, Classic Papers on Genetic Engineering. Butterworth-Heinemann, Boston, 1992.
8. M.R. Walker and R. Rapley. Route Maps in Gene Technology. Blakwell Science, Oxford, 1997.
9. S. M. Kingsman. Genetic Engineering: An Introduction to Gene Analysis and Exploitation in Eukaryotes. Blackwell Scientific Publications, Oxford, 1998.

SEMESTER - 2

L	T	P	C
5	0	0	5

BIOENERGETICS & INTERMEDIARY METABOLISM

Total Hours: 65

SUBJECT CODE: P2BC01MT

UNIT – I: BIOENERGETICS AND BIOLOGICAL OXIDATION

Thermodynamics - basic concepts - First, Second and Third law of thermodynamics. Free energy and entropy. Phosphoryl group transfers and ATP. Enzymes involved in redox reactions. The electron transport chain – organization and role in electron capture.

Oxidative phosphorylation – electron transfer reactions in mitochondria. F_1F_0 ATPase – structure and mechanism of action. The chemiosmotic theory. Inhibitors of respiratory chain and oxidative phosphorylation – uncouplers and ionophores. Regulation of oxidative phosphorylation.

Mitochondrial transport system – ATP/ADP exchange, malate - glycerophosphate shuttle, creatine – phosphate shuttle.

UNIT – II: CARBOHYDRATE METABOLISM

Glycolysis and gluconeogenesis – pathway, key enzymes and coordinate regulation. Citric acid cycle and regulation, Pentose phosphate pathway. Metabolism of glycogen and regulation. Metabolism of galactose and fructose, Glyoxylate cycle, Cori cycle. Futile cycles and Anaplerotic reactions.

UNIT – III: LIPID METABOLISM

Oxidation of fatty acids – α , β and ω . Metabolism of ketone bodies – formation, utilization, excretion and clinical significance. Biosynthesis of fattyacids. Metabolism of triglycerides, phospholipids and sphingolipids. Cholesterol – biosynthesis, regulation, transport and excretion. Metabolism of lipoproteins. Eicosanoid metabolism.

UNIT – IV: AMINOACID METABOLISM

Overview of biosynthesis of Nonessential aminoacids. Catabolism of aminoacid nitrogen – transamination, deamination, ammonia formation and urea cycle. Disorders of urea cycle. Catabolism of carbon skeletons of aminoacids,. Conversion of aminoacids to specialized products (melatonin, serotonin, epinephrine, norepinephrine, hippuric acid)

UNIT – V: NUCLEIC ACID METABOLISM

Metabolism of purines – De novo and salvage pathways for biosynthesis and Purine catabolism. Biosynthesis and catabolism of pyrimidines, Xenobiotics.

Integration of metabolism.

Text Books:

1. R.K. Murray and D.K. Granner. Harper's Illustrated Biochemistry, 26th Edition, 2002.
2. D.L. Nelson and M.M. Cox, Lehninger's Principles of Biochemistry, 4th Edition. Macmillan Worth Publishers, 2000.
3. L. Stryer. W.H. Freeman, Biochemistry, 6th Edition. 2006.

Reference Books:

1. Campbell and Farrell. Biochemistry, Brooks/Cole Pub Co., 4th Edition. 2002.
2. Davidson and Sittman. Biochemistry, Lippincott, Williams and Wilkins, 4th Edition. 1999.
3. D. Voet and J.G. Voet. Fundamentals of Biochemistry, John Wiley, 2nd Edition. 1999.
4. Kuchel and Ralston. Schaum's outlines of Biochemistry, McGraw Hill, 2nd Edition. 1998.

SEMESTER – II

ADVANCED ENZYMOLOGY

SUBJECT CODE: P2BC02MT

L	T	P	C
4	0	0	4

Total Hours: 52

UNIT – I: CLASSIFICATION, PURIFICATION AND ACTIVE SITE OF ENZYMES

Nomenclature and classification of enzymes, isolation and purification of enzymes, membrane-bound enzymes. Criteria of purity – specific activity. Enzyme units – katal, IU, turn over number. Measurement of enzyme activity – two point assay, kinetic & relaxation assay.

Determination of active site amino acids – chemical probe, affinity label and site directed mutagenesis, intrinsic and extrinsic regulations. Investigation of 3-D structure of active site. A brief account of non protein enzymes – ribozymes and DNA enzymes.

UNIT – II: ENZYME KINETICS

Introduction to Enzyme Kinetics, Kinetics of single substrate enzyme-catalyzed reaction, MM equation, Lineweaver-Burk plot, Eadie-Hofstee plot, Hanes plot & Eisenthal-Cornish-Bowden plot.

Pre-steady-state kinetics & Relaxation kinetics of allosteric enzymes. MWC & KNF Models, Hill's equation co-efficient. Kinetics of multisubstrate enzyme-catalyzed reactions, Ping Pong bi-bi, random order, compulsory order mechanism.

UNIT – III: ENZYME CATALYSIS AND INHIBITION

Mechanism of enzyme action, General acid-base catalyst, Covalent catalyst, Role of metal ion in enzyme catalyst. Mechanism of Serine Proteases – Chymotrypsin, lysozyme & ribonuclease.

Enzyme Inhibition: Reversible, Competitive, uncompetitive and noncompetitive inhibition with substrate as allosteric inhibition, Irreversible inhibition.

UNIT – IV: COENZYMES

Coenzymes – Prosthetic group, Classification, vitamin & non vitamin coenzyme- Structure and biological importance of TPP, FMN, FAD, NAD⁺ & NADP⁺, PLP, Biotin, THF, Lipoic acid and Coenzyme A, Vitamin B₁₂ & Vitamin C, Coenzyme Q. Mechanism of action - TPP, PLP & Biotin.

UNIT – V: INDUSTRIAL AND CLINICAL USES OF ENZYMES

Industrial uses of enzymes – sources of industrial enzymes, thermophilic enzymes, amylases, glucose isomerases, cellulose degrading enzymes, lipases, proteolytic enzymes in meat and leather industry, detergents and cheese production.

Clinical enzymology – enzymes as thrombolytic agents, anti-inflammatory agents, digestive aids. Therapeutic use of asparaginase. Immobilization of enzymes and their applications.

Text Books:

1. T. Palmer. Understanding Enzymes, Horward Series in Chemical Science, Prentice hall, 4th Edition. 2001.
2. Conn and Stumpf. Biochemistry, Wiley publishers, 5th Edition. 2006.

Reference Books:

1. M. Dixon and E.C. Webb. Enzymes, Longmans, Academic Press, 2nd Edition.1964.
2. Boyer. Enzymes, Academic Press, 3rd Edition. 1983.
3. Metzler. Biochemistry, Academic Press, 2nd Edition.2003.
4. L. Stryer. W.H.Freeman, Biochemistry, 6th Edition. 2006.

SEMESTER - II
BIOTECHNOLOGY
SUBJECT CODE: P2BC03MT

L	T	P	C
5	0	0	4

Total Hours: 65

UNIT – I: TOOLS IN GENETIC ENGINEERING

Restriction enzymes, their types and target site, S1 nuclease, DNA ligase, alkaline phosphatase, reverse transcriptase, DNA Polymerase, polynucleotide kinase, terminal transferase. Use of linkers and adapters. Cloning vehicle and their properties- plasmid, phage, cosmid YAC, binary vector, T DNA based vector, Mammalian vector, expression vector.

UNIT – II: DNA CLONING AND SEQUENCING

Cloning strategies, DNA and cDNA cloning and gene libraries, Recombinant selection and screening methods, Insertional inactivation. Techniques of cloning - southern, northern and western blotting, PCR and its types.

DNA sequencing strategies – Sangers and Maxam – Gilberts methods.

UNIT – III: TISSUE CULTURE TECHNIQUES

Plant tissue culture – media, growth regulators, callus culture and suspension culture, micropropagation, somatic embryogenesis, protoplast fusion, artificial seed.

Animal tissue culture- media - natural and synthetic media, substrate used for cell culture, primary culture, secondary culture and cell line.

UNIT – IV: GENE TRANSFER AND APPLICATIONS

General gene transfer method, Methods of gene transfer to plants- agro bacterium mediated gene transfer, method of gene transfer to animal-micro projectile method. Transgenic plants – herbicide resistant, stress tolerant, pesticide resistant. Transgenic animals – dolly, transgenic fish, transgenic sheep, knockout mice. Molecular pharming – monoclonal antibody and vaccine. GM Food and GMO.

UNIT – V: INDUSTRIAL BIOTECHNOLOGY AND GENE THERAPY

Principle, fermentors Types, recovery and purification of ethanol, citric acid, vitamin B12, streptomycin. Enzymes used in wine production. Biogas production, Gene therapy (somatic) the principle and approaches.

Text Books:

1. T.A. Brown. Gene cloning and DNA Analysis: An Introduction, Blackwell Science. 4th Edition.
2. S.N . Jogdand. Gene Biotechnology, Himalaya Publishing House, 3rd Edition. 2000.
3. U. Sathyanarayana. Biotechnology. Books and Allied Publication.
4. A.H. Patel. Industrial Microbiology. MacMillan, 2008.

Reference Books:

1. B. Lewin. Genes IX. Jones and Bartlett Publishers, 2006.
2. B.R. Glick and J.J. Pasternak. Molecular Biotechnology, CBS Publishers, 3rd Edition. 1996.
3. H. Kreuzer. Recombinant DNA and Biotechnology: A guide for teachers and students, Carolina Biological Supply Co., 2nd Edition. 1996.
4. S.B. Primrose. Molecular Biotechnology, Blackwell Scientific Publishers, 2nd Edition. 1992.
5. A.L. Demain and J.E. Davies. Manual of Industrial Microbiology and Biotechnology, ASM Press. 2nd Edition.
6. P.F. Stanbury, A. Whitaker and S.J. Hall. Principles of Fermentation Technology. Adity Books, 1997.

SEMESTER – II

(ELECTIVE – II) – PAPER – II

L	T	P	C
4	0	0	4

PLANT BIOCHEMISTRY AND MICROBIAL TECHNOLOGY

SUBJECT CODE: P2BC04ET

Total Hours: 52

UNIT – I: PLANT PHYSIOLOGY

Water relation of plants, mechanism of water absorption, aquaporins, symplast-apoplast concept, ascent of sap, transpiration and stomatal mechanism, source and sink relationship. Translocation of inorganic and organic substances.

Plant hormones – biosynthesis, mode of action, transport distribution and physiologic effects of auxins, gibberlins, ABA and ethylene.

UNIT – II: ENERGY GENERATING MECHANISMS AND NITROGEN METABOLISM

Photosynthetic pigments, light and dark reactions of photosynthesis. Proton gradient and ATP synthesis of chloroplast. Regulation of photosynthesis.

Nitrogen metabolism, nitrogen cycle, symbiotic and non-symbiotic nitrogen fixation, genetics of nitrogen fixation, genetic manipulation of *nif* gene. Biosynthesis, distribution and functions of industrially important secondary metabolites – Hyoscyamine, Atropine, Saponins, Resveratrol, Quercetin.

UNIT – III: MICROBIOLOGY AND MICROBIAL TECHNIQUES

Ultrastructure of bacteria, fungi, algae and protozoa. Principles of microbial nutrition, construction of culture media. Growth curve and factors affecting growth.

Current methods in microbial identification. Pure culture techniques. Theory and practice of sterilization.

UNIT – IV: APPLICATIONS OF MICROBIAL TECHNIQUES

Isolation and screening of industrially important microbes, strain improvement for better yield, primary and secondary detection and assay of fermentation products.

Microbes in mineral recovery, microbial degradation of xenobiotics; sewage biodegradation.

UNIT – V: PHYTOCHEMICAL AND MICROBIAL TECHNIQUES

Phytochemical Techniques: Preparation of extracts, Separation of compounds using chromatography (column, thin layer, HPLC, HPTLC). Phytochemical analysis.

Microbial Techniques : Microscopy – bright field, darkfield, fluorescence and phase contrast microscope. Scanning and transmission electron microscopy. Determination of antimicrobial activity of plant extracts.

Text Books:

1. R.K. Sinha. Modern Plant Physiology. Narosa Publishing House, 2004.
2. M.J. Pelczar, E.C.S. Chan and N.R. Kreig. Microbiology, Tata McGraw Hill Publishing Co., 5th Edition. 1986.
3. L.M. Prescott, J.P. Harley and D.A. Klein. Microbiology, McGraw Hill, 6th Edition. 2004.

Reference Books:

1. T.W. Goodwin. Introduction to Plant Biochemistry. Pergamon Press, 1986.
2. P.J. Lea, L.L. Castle and Lea. Plant Biochemistry and Molecular Biology, John Wiley & Sons, 2nd Edition. 1999.
3. B.D. Davis, R. Dulbecco, H.N. Eisen and H.S. Ginsberg. Microbiology, Harper & Row, 3rd Edition. 1980.

SEMESTER – II
(ELECTIVE – II) – PAPER – II

L	T	P	C
4	0	0	4

Total Hours: 52

BIOINFORMATICS

SUBJECT CODE: P2BC05ET

UNIT – I: COMPUTER PERIPHERALS AND HARDWARE DESCRIPTION

Computer system design. Recognition and Structure of Different Components of a Computer System and Their Respective Usage. I/O and Storage Devices with Data Communication with Introduction of Internet. Connections to the internet, internet service requirements and applications – e-mail - World Wide Web, URL, HTML, TCP/IP

UNIT – II: OPERATING SYSTEMS

System and applications software, evolution of operating systems, layered structure of operating system, CUI and GUI's DOS internet and external commands, batch files: WIN 95/98: Anatomy of windows and features, multitasking.

Office applications : MS-Office 95/97/2000/2003 including MS-Word, MS-Excel, MS Powerpoint.

Logic developments: generation of programming languages, emulation of common DOS commands using C and C++, data structures in C objects and classes, pointers arravasion and two dimensional) normal string and file handling in C.

UNIT – III: INTRODUCTION TO BIOINFORMATICS

Biological data bases- sequence analysis-need and importance- pajirwise alignments – dot plot, dynamic programming – global(needle man- Wunsch) and local (smith-waterman) alignment algorithms- scoring and substitution matrix – data base searching. Basics of Entrez, BLAST, and FASTA search procedures- multiple alignment. CLUSTAL – Njplot- Phylogenetic trees.

UNIT – IV: SECONDARY STRUCTURE PREDICTION

Secondary structure prediction of RNA and protein – detecting ORFs- restriction maps, algorithm for Tm calculations, primer design and probe synthesis – structural classification of proteins (SCOP and CATH) – structural genomics-functional genomics and proteomics – DNA microarrays – present status and future prospects.

UNIT – V: 3-D STRUCTURAL ANALYSIS OF BIOMOLECULES

Molecular Visualization Tools – rasmol, Chime, weblab Viewer, Deep View, ISIS Draw, chemdraw, molmol, etc – computer modeling of proteins. Simulation studies and virtual reality –

Simulation Of ES Complex Interaction and stereodynamic concept- structural studies of substrate – Ligand Binding – Drug Designing- introduction to PERL and BIOPERL to facilitate Biological Analysis.

Text Books:

1. Lesk, A.M. Introduction to Bioinformatics. Oxford, 2002.

Reference Books:

1. Campbell and Heyer. Discovering Genomics, Proteomics and Bioinformatics. Cold Spring Harbour Laboratory Press & Benjamin Cummings, 2002.
2. Gibas and Per Jambeck. Developing Bioinformatics Computer Skills. O'Reilly & Associates, 2001.
3. Krane et al. Fundamental concepts of bioinformatics. Benjamin Cummings, 2002.
4. Bergeron BP. Bioinformatics computing, Printice Hall, 1st Edition.2002.
5. Baxevanis & Ouellette. Bioinformatics: A practical guide to analysis of genes and proteins. Wiley-Inter Sci., 2nd Edition. 2001.

I M.Sc. BIOCHEMISTRY

Isolation and characterization studies and Quantitative

L	T	P	C
5	0	0	5

A

analysis.

M.Sc CORE PRACTICAL – I

SUBJECT CODE: P2BC11MP

Total Hours: 130

A. ISOLATION AND CHARACTERIZATION STUDIES:

1. Isolation and estimation of Glycogen from liver
2. Isolation and estimation of DNA from liver
3. Isolation and estimation of RNA from yeast
4. Denaturation of DNA and UV absorption studies

B. QUANTITATIVE AND QUALITATIVE ANALYSIS:

1. Determination of proteins by Lowry's method
2. Determination of Tryptophan
3. Estimation of sodium and potassium by flame photometry
4. Estimation of vitamin C
5. Estimation of calcium from ash
6. Estimation of phosphorous from ash
7. Estimation of iron from ash
8. Detection of adulterants in milk

C. TECHNIQUES:

1. Preparation of buffers, measurement of pH and titration curve
2. Preparation of Silver Nanoparticles using plant extract and Determination of λ_{max}
3. Separation of Sugars by Paper chromatography
4. Separation of Aminoacids by Thin Layer Chromatography
5. Separation of plant pigments by column chromatography

6. Separation of serum proteins by SDS-PAGE
7. Separation of DNA by Agarose Gel Electrophoresis.
8. Section cutting by Microtome.

References (Practical Manuals):

1. A. Sadasivam and A. Manickam. Biochemical Techniques, New Age International Publishers, 2nd Edition.2003.
2. J. Jayaraman. Laboratory Manual in Biochemistry. Wiley Eastern, 1981.
3. H. Varley. Practical Clinical Biochemistry, CBS Publishers, 4th Edition.2008.
4. R. Boyer. Modern Experimental Biochemistry, Benjamin Cummings, 3rd Edition. 2000.

University examination for practical I will be held at the end of the first year.

I M.Sc. BIOCHEMISTRY

Enzymology – Purification and Kinetic Studies and Microbial Biochemistry

L	T	P	C
5	0	0	5

M.Sc CORE PRACTICAL –II

SUBJECT CODE: P2BC12MP

Total Hours: 130

A. ENZYMOLOGY – PURIFICATION AND KINETIC STUDIES

1. Subcellular fractionation of organelles from liver cells and identification by marker enzymes – Succinate dehydrogenase
2. a. Purification of acid phosphatase from potato
b. Effect of activator and inhibitor of acid phosphatase activity by EDTA
c. Effect of substrate concentration and acid phosphatase activity
d. Determination of optimum temperature
e. Determination of optimum pH
3. Activity of Salivary Amylase
a. Determination of optimum pH
b. Determination of optimum temperature
c. Determination of substrate concentration
d. Determination of Specific activity
4. Determination of Enzyme activity of total ATPase

B. MICROBIAL BIOCHEMISTRY AND MOLECULAR BIOLOGY

1. Isolation and identification of bacteria from effluent water
 - a. Sterilization technique - principle, methods, moist heat, dry heat, safety levels.
 - b. Preparation of media – liquid, solid, agar deep, slant and plate.
 - c. Pure culture technique – streak plate, pour plate.
 - d. Staining techniques – simple, differential and special staining

2. Extraction of DNA from bacteria and Separation by Agarose Gel Electrophoresis
3. PCR techniques – demonstration

C. PLANT BIOCHEMISTRY APPLICATIONS

1. Herbal extraction
2. Qualitative analysis of phytochemicals in Herbal plants.
3. Extraction of carotene and chlorophyll
4. In vitro antioxidant studies of plant extract by Hydroxyl radical and Hydrogen peroxide scavenging activity.
5. Determination of Antimicrobial activity of plant extract by disc Diffusion method

References (Practical Manuals):

1. A. Sadasivam and A. Manickam. Biochemical Techniques, New Age International Publishers, 2nd Edition. 2003.
2. J. Jayaraman. Laboratory Manual in Biochemistry. Wiley Eastern, 1981.
3. H. Varley. Practical Clinical Biochemistry, CBS Publishers, 4th Edition. 2008.
4. N. Kannan. Laboratory Manual in General Microbiology. Panima Publishing Corporation, 2002.

University examination for practical II will be held at the end of the year.

SEMESTER – III
ADVANCED ENDOCRINOLOGY

SUBJECT CODE: P3BC01MT

L	T	P	C
5	0	0	4

Total Hours: 65

UNIT – I: HORMONES

Hormones – Definition, Classification, biosynthesis, circulation in blood and feedback regulation. Mechanism of hormone action - Fundamental concept and definition of signals, ligands and receptor. Endocrine, Paracrine and Autocrine signaling. G protein as cellular transducer- Second messenger, Adenylate cyclase, Protein kinase A, Atrial natriuretic factor, Protein kinase G, Inositol triphosphate - Diacylglycerol - Protein kinase C, Calcium and Calmodulin and Insulin receptor - Tyrosine kinase.

UNIT – II: HYPOTHALAMIC AND PITUITARY HORMONES.

Hypothalamic releasing factors and anterior pituitary hormones: Biological actions, regulation and disorders of growth hormones, ACTH, gonadotrophins and prolactin. Leptin. Posterior pituitary hormones – Biological actions and regulation of vasopressin. Diabetes insipidus and SIADH Secretion. Oxytocin. Melatonin. Hypopituitarism.

UNIT – III: THYROID AND PARATHYROID HORMONES

Thyroid hormones – Synthesis, secretion, regulation, transport, metabolic fate and biological actions. Antithyroid agents. Thyroid functions tests. Hyper and hypothyroidism. Hormonal regulation of Calcium and Phosphate metabolism. Secretion and biological actions of PTH, calcitonin and calcitriol. Hypercalcemia and hypocalcemia. Rickets and Osteomalacia.

UNIT – IV: ADRENAL AND PANCREATIC HORMONES

Adrenal cortical hormones. Synthesis, regulation, transport, metabolism and biological effects. Adrenal function tests. Cushing's syndrome, aldosteronism, congenital adrenal hyperplasia, adrenal cortical insufficiency. Adrenal medullary hormones – Synthesis, secretion, metabolism, regulation and biological effects of catecholamine. Pheochromocytoma. Pancreatic hormones – synthesis, regulation, biological effects and mechanism of action of glucagon, somatostatin and insulin. Brief account of gastrointestinal hormones.

UNIT – V: GONADAL HORMONES:

Biosynthesis, regulation, transport, metabolism and biological actions of androgens. Hypogonadism and gynecomastia. Biosynthesis, regulation, transport, metabolism and biological effects of estrogen and progesterone. The Menstrual cycle. Amenorrhoea.

Steroid hormonal mechanism: Steroid hormone receptors, intracellular protein receptors, structural organization of receptor protein, hormone binding domain, antigenic domain and DNA binding domain, organizations of functional elements - hormone response elements.

Text books:

1. Smith et al. Principles of Biochemistry – Mammalian Biochemistry, McGraw Hill, 7th Edition. 2006.
2. Prakash S. Lohar. Endocrinology. MJP Publications, 2005.

Reference Books:

1. Devlin, TM. Textbook of Biochemistry (with clinical correlation). Wiley-Liss., 6th Edition. 2005.
2. Wilson and Foster, Textbook of Endocrinology, W.B. Saunders Co., 10th Edition. 2002.
3. R.K. Murray et al. Harper's Biochemistry, McGraw-Hill Medical, 27th Edition. 2006.

SEMESTER – III

L	T	P	C
5	0	0	4

RESEARCH METHODOLOGY

Total Hours: 65

SUBJECT CODE: P3BC02MT

UNIT – I: INTRODUCTION TO RESEARCH METHODOLOGY

Identification of research problems, survey of literature- Use of Search Engines, Boolean Searching, Finding Scientific Articles – Google, PUBMED, DELNET, INFLIBNET.

Role of Computers in Biology. Internet. World Wide Web. Internet Addresses, Protocols and Browsers. Computer Operating Systems.

UNIT – II: BIOSTATISTICS

Collection, Classification and Tabulation of Data: Diagrammatic and Graphic Representation of Data: Measures of Central Tendency – Averages (Mean, Median, Mode) and Dispersion (Range, Quartile Deviation, Decile Range, Mean Deviation, Standard Deviation).

Normal Distribution, Chi-Square Test, Student's t-Test. One way ANOVA. Use of SPSS Software in research.

UNIT – III: BIOINFORMATICS AND DATABASES

Introduction and Scope of Bioinformatics. Biological databases – types: Sequence and Structure Databases, Genome and Organism-Specific Databases.

Information Search and Data Retrieval; Tools for Similarity Search and Sequence Alignment – FASTA, BLAST.

UNIT – IV: ANIMAL EXPERIMENTATION AND INTELLECTUAL PROPERTY RIGHTS

Ethics in Animal Experimentation. Composition of Institutional Ethical Committee (IEC). CPCSEA Guidelines – Animal Care, Technical Personnel, Environment, Animal Husbandary, Feed, Bedding, Water, Sanitation and Cleanliness, Waste Disposal, Anesthesia and Euthanasia.

Biosafety - Guidelines and Regulations and their Operation. Intellectual Property Rights (IPR) and Protection (IPP). Forms of Protection – Patents, Copyrights, Trade Secrets and Plant Variety Protection. World Intellectual Property Organization (WIPO). General Agreement of Tariffs and Trade (GATT) and Trade Related IPR's (TRIPs). International Scenario of Patent Status. Patenting of Biological Materials. Significance of Patents in India.

UNIT – V: RESEARCH REPORTS

Components of a research report - Title, Authors, Abstract, Synopsis, Keywords, Introduction, Materials and Methods, Results, Discussion, Acknowledgement, Summary or Conclusions, References. Plagiarism.

Literature Citation: Name-Year System (Harvard System), Citation-Sequence System, Alphabet Number System; Journal Abbreviations. Format and use of Tables and figures in a research report.

Text books:

1. Gurumani, N. Research Methodology for Biological Sciences. MJP Publishers, Chennai 2006.
2. Gurumani, N. An Introduction to Biostatistics. MJP Publishers, Chennai 2004.
3. Ignaciamuthu, S. Basic Bioinformatics. Narosa Publishing House, New Delhi, 2005.
4. Rastogi, S.C., Mendiratta, N. and Rastogi, P. Bioinformatics - Methods and Applications. Prentice Hall of India Private Limited. New Delhi, 2006.
5. CPCSEA Guidelines for Laboratory Animal Facility, CPCSEA, Chennai.

Reference Books:

1. Day, R.A. How to Write a Scientific Paper, Cambridge University Press, 5th Edition. 1998.
2. Gupta, S.P. Fundamentals of Statistics. S.Chand & Co. New Delhi, 1997.
3. Lesk, A.M. Introduction to Bioinformatics. Oxford University Press. 2002.

SEMESTER – III

L	T	P	C
5	0	0	4

MOLECULAR BIOLOGY AND BIOETHICS

Total Hours: 65

SUBJECT CODE: P3BC03MT

UNIT – I: DNA REPLICATION AND GENE EXPRESSION

Types of replication, Evidence for Semiconservative replication - Meselson and Stahl experiment, Replication in prokaryotes- Role of topoisomerase, helicase, SSB, primase and DNA polymerase I, II, and III. Eukaryotic replication- Role of ARS, α , β , γ , δ , ϵ polymerase, role of telomere, regulation of replication (Both prokaryote and eukaryote). Inhibitors of replication, Lagging strand synthesis, leading strand synthesis and Okazaki fragments, Gene expression-repetitive DNA, C value paradox, and gene amplification.

UNIT – II: TRANSCRIPTION AND TRANSCRIPTIONAL LEVEL OF GENE EXPRESSION

Transcription - Definition, Sense strand and Antisense strand, Promoter and enhancers, Footprinting experiment, DNA - dependent RNA polymerase, Role of Pribnow box, Prokaryotic transcription, Rho - dependent and Independent termination, Post-transcriptional modifications In Prokaryotes and Eukaryotes, RNA splicing, introns (split genes) and splicing reactions, Self-splicing Introns - Group I and Group II, Exons, Spacer sequences, Biosynthesis of rRNA, mRNA and tRNA. Inhibitors of transcription. Mechanism of Reverse Transcription (retrovirus). Gene expression- Operon Mechanism

UNIT – III: GENETIC CODE, TRANSLATION AND TRANSLATIONAL LEVEL OF GENE EXPRESSION

Genetic code - Definition, Deciphering of the Genetic code, Codon dictionary, Salient features of genetic code. Structure of tRNA and aminoacyl tRNA synthetase. Binding of amino acids to tRNA, Wobble mechanism and its Significance, Composition of Prokaryotic and Eukaryotic ribosomes, Shine-Dalgarno sequence, Merlyn Kozak Sequence, Prokaryotic and Eukaryotic protein biosynthesis - Initiation, elongation, translocation and termination, Polysomes, Post-translational modifications in prokaryotes and eukaryotes, Role of endoplasmic reticulum, Role of signal peptide, Signal hypothesis, Inhibitors of protein synthesis. Gene expression-globin synthesis in mammalian reticulocytes, and protein folding by chaperons proteins.

UNIT – IV: MUTATION AND REPAIR MECHANISM

Mutation and its types- Spontaneous mutation, point mutation, Ts mutation, Frameshift mutation, hot spot, Mutagenesis and replication fidelity, Chromosome mutations - balanced and

unbalanced - Karyotype mixing. DNA repair - Excision repair, Mismatch repair, Recombination repair, SOS repair.

UNIT – V: BIOSAFETY AND BIOETHICS

Potential hazards, Biosafety of GM foods and GMOs - Substantial equivalence and Safety testing, Environmental release of microorganism and Genetically engineered organism (GMO). Ethical issues in human gene therapy and Ethical issues in human cloning, Gene drain, and Tangled genes, Ethics in Drug Safety.

Text books:

1. W.H. Elliot and D.C. Elliot, Biochemistry and Molecular Biology, Oxford University Press, 2nd Edition. 2001.
2. David Friefelder. Molecular biology. Narosa publishers, 2006.

Reference Books:

1. Robert F. Weaver. Molecular biology, McGraw-Hill, 4th Edition. 2007.
2. R. M. Twyman. Advanced Molecular Biology. 1998.
3. B. Lewin. Genes VII. Oxford University Press, Cell Press, London, 2000.
4. G. Karp. Cell and Molecular Biology. John Wiley & Sons Inc., 2002.
5. D.Voet and J. Voet. Biochemistry. John Wiley and Sons Ltd., 1990.
6. Tom, L. Beauchamp and Childress, F. Principles of biomedical ethics, Oxford University Press, 5th Edition, 2000.

SEMESTER – III

L	T	P	C
4	0	0	4

(ELECTIVE III) – PAPER – III

Total Hours: 52

IMMUNOLOGY AND STEM CELL TECHNOLOGY

SUBJECT CODE: P3BC04ET

UNIT – I: IMMUNE SYSTEM AND IMMUNIZATION

Immune System – Central and Peripheral Lymphoid Organs, Thymus, Bone marrow, Spleen, Lymph nodes and Other Peripheral lymphoid tissues - GALT. Cells of the Immune system – Lymphocytes, Mononuclear phagocytes, Dendritic cells, Granulocytes, NK cells and Mast cells. Antigen, Haptens, Adjuvants, Antigenicity, Antigenic determinants and Epitopes. Immunoglobulins: Structure, Classification, Functions, Allotypes and Idiotypes. Theories of antibody formation – Side chain and Clonal selection theory. Antibody diversity – Mechanisms contributing to diversity – Somatic recombination, Rearrangement and generation of antibody diversity. Immunization practices- Active and Passive immunization. Vaccines – Killed, Attenuated – Toxoids. Recombinant Vector vaccines – DNA vaccines, Synthetic peptide vaccines– Antiidiotype vaccines.

UNIT – II: IMMUNITY AND COMPLEMENT SYSTEM

Types of Immunity- Innate and Acquired Immunity, Antitoxic, Antibacterial and Antiviral immunity. Immune response – Primary and Secondary – Humoral and Cell mediated Immunity. Antigen recognition – T cell and B cell receptor complexes, Antigen processing and presentation. Interaction of T and B cells, Cytokines. Immunological memory, Cytotoxicity- Immunotolerance and Immunosuppression.

Complement system – Components, Nomenclature, Activation of Complement – classical and alternative pathway, Complement receptors and Complement fixation test.

UNIT – III: GENETIC BASIS OF IMMUNOLOGY, TRANSPLANTATION AND HYPERSENSITIVITY

MHC Complex - MHC genes and product; HLA genes Class I and II antigens –Structure and function. Histocompatibility testing – Cross matching. MHC and disease association. Role of MHC antigens in Immune response, MHC antigens in transplantation.

Transplantation – Types, Genetics of transplantation – Graft versus Host reactions. Hypersensitivity – Definition, Classification, Mechanism, diagnosis and treatment.

UNIT – IV: AUTOIMMUNE, IMMUNODEFICIENCY DISEASES AND IMMUNOLOGICAL TECHNIQUES

Autoimmunity and Autoimmune diseases - Mechanism, Diagnosis and Treatment. Immunodeficiency disorders – B cell , T cell and complement deficiencies, AIDS- pathogenesis, diagnosis and treatment.

Immunological techniques – Production of Polyclonal and Monoclonal antibodies. Immunoprecipitation, RIA, ELISA, Fluorescent immunoassay, Avidin-Biotin mediated assay, Immunohistochemistry, Immunoelectrophoresis, Immunoblotting.

UNIT – V: STEM CELL TECHNOLOGY

Stem cells – Introduction, Definition and Basics of Stem cells. Classification of Stem cells- Different types of stem cells, Adult stem cells. Sources of stem cells fetus and various adult tissues. Properties of Stem cells - self renewal, Clonality, Plasticity and Pluripotent nature. Characteristics - Transdifferentiation, applications of Stem cells in Regenerative medicine and Human beings.

Text books:

1. Kuby. Immunology. Saras Tenney publishers, 2007.
2. Teitz. Immunology. Balaji Book House, 1997.
3. Nandhini Shetty. Immunology. New Age International Ltd, 2006.

Reference Books:

1. Abul. K. Abbas. Cellular and Molecular Immunology, Andrew Lichtman, Saunders, 5th Edition. 2005.
2. D.M.Weir. Immunological techniques. ELBS Churchill, 1994.
3. Robert Lanza, Handbook of Stem cells, Academic Press publishers, 2nd Edition, 2004.
4. Yanhong Shi, Stem cell research and Therapeutics. Dennis Co, 2008.

SEMESTER – 3

L	T	P	C
4	0	0	4

(ELECTIVE III) – PAPER - III

Total Hours: 52

PHARMACEUTICAL BIOCHEMISTRY

SUBJECT CODE: P3BC05ET

UNIT – I: INTRODUCTION

Drug-Structural feature and pharmacology activity, prodrug concept. Absorption-first –pass effect. Distribution, metabolism - phase I,II reactions, action of cytochrome P₄₅₀ and elimination of drug receptor- localization, type and subtypes, models and their drug – receptor interaction, agonist & antagonist.

UNIT – II: ADVERSE REACTIONS OF DRUGS

Adverse response to drugs, drug tolerance, drug intolerance, idio syneracy (pharmacogenesis), drug allergy. Tachyphylaxis, drug abuse, vaccination against infection, factor that modifies the effect of drug. Assay of drug potency- bioassay and immunoassay.

UNIT – III: BIOTECHNOLOGY AND PHARMACY

Genetically engineered protein and peptide agents. Novel drug delivery systems – non conventional routes of administration. Anti-AIDS drug development, oncogenes ras target for drugs, multi-drug resistance.

UNIT – IV: MECHANISM OF ACTION OF DRUGS

Mechanism of action of drugs used in therapy of: Respiratory system – cough, bronchial – asthma, pulmonary tuberculosis. GIT – Digestants, appetite suppressants. Hypolipidemia agents, vomiting, constipation and pepticulcer. Antimicrobial drugs – sulfonamides, trimethoprim, cotrimoxazole, penicillin, and macrolides. Aminoglycosides, cephalosporin and bacterial resistance. Insulin and oral diabetic drugs, antifertility and ovulation inducing drugs.

UNIT – V: DRUGS OF PLANT ORIGIN

Drug dependence and abuse – management of self poisoning cancer. Chemotherapy – cytotoxic drug. Immuno suppressive drug therapy. New Biological Targets for Drug Development. Novel Drug Screening Strategies

Text books:

1. R.S. Satoskar. S.D. Bhandhakar and S.S. Anilapure Pharmacology and Pharmacotherapeutics. Popular Prakashan, Bombay.

Reference Books:

1. Goodman and Gillman. The pharmacology. Vols. I and II. Mc Graw Hill.
2. Foxtercox. Basic Pharmacology. Bulter Worth's, 1980.
3. William O. Foye. Principles of Medicinal Chemistry. B.I. Waverks Pvt. Ltd., New Delhi.

SEMESTER – III**ELECTIVE – IV**

L	T	P	C
3	0	0	3

PHYTOCHEMISTRY AND PHYTOTHERAPY**Total Hours: 39****SUBJECT CODE: P3BC06ET****UNIT – I : INDIAN SYSTEM OF MEDICINE**

Herbal medicines: History and scope – definition of medical terms, Indian system of medicines – Siddha, Ayurvedha and Unani systems: cultivation – harvesting – processing – storage – marketing and utilization of medicinal plants.

UNIT – II: STANDARDISATION AND CONSERVATION OF HERBAL DRUGS

Importance of standardization – problems involved in the standardization of herbs – standardization of single drugs and compound formulations – WHO guidelines for quality standardized herbal formulations.

UNIT – III: SEPARATION AND CHARACTERIZATION OF PLANT DRUGS

Purification of extracts – Use of chromatographic techniques in separation of active principles (column, TLC, HPLC, HPTLC, GLC). Applications of UV – VIS, IR, NMR, GC - MS and Mass spectroscopic techniques in the characterization of bioactive principles.

UNIT – IV: ANIMAL STUDIES IN PHYTO THERAPY

Acute toxicity studies, induction of diseases in animal models and the mechanism of action of inducing agents: diabetes (streptozotocin), liver (paracetamol), heart (isoproterenol) and kidney (ethylene glycol) diseases and the standard drug used in these models (glibenclamide, silymarin, verapamil, cystone).

UNIT – V: ANTIOXIDANTS IN PHYTOTHERAPY

Assay of Free radical scavenging activity using plant extracts – DPPH, H₂O₂, OH, nitric oxide, lipid peroxide scavenging activity. Role of antioxidants in phytotherapy – Medicinal plants used for the treatment of diabetes, liver, heart and kidney diseases and the role of antioxidants in the treatment.

Text books:

1. Kokate, C.K., Durohit, A.P and Gokhale, S.R. Pharmacognosy, Nirali Prakasham Publishers, Pune 12th Edition, 2004.

Reference Books:

1. G.E. Trease and W.C. Evans. Pharmacognosy, English Language Books Society, 16th Edition. 2009.
2. Handa, S.S. and Kapoor, V.K. Pharmacognosy, Vallabh Prakashan Publishers, New Delhi, 2nd Edition. 2003.
3. Jain, S.K. Indian Medicinal Plants, National Book Trust, New. Delhi, 5th Edition. 1985.

SEMESTER – IV

HUMAN PHYSIOLOGY AND NUTRITION

SUBJECT CODE: P4BC01MT

L	T	P	C
5	0	0	4

Total Hours: 65

UNIT – I: DIGESTIVE & EXCRETORY SYSTEM:

Outline structure of components of Digestive system. Digestion, Absorption, Hormonal control & Secretion of GI tract. Mechanism of HCL production. Role of digestive enzymes involved in carbohydrates, Lipids & protein processing.

Structure & function of kidney, types of Nephrons, GFR, Mechanism of urine formation, Role of ADH hormone in reabsorption of water, Diabetes insipidus.

UNIT – II: RESPIRATORY & CIRCULATORY SYSTEM

Structure & function of Lungs, transport of O₂ & CO₂ exchange of gases at alveoli & tissues, Role of haemoglobin in respiratory gas transport, Mechanism of Respiration, Chloride shift, Bohr's effect. Acidosis & Alkalosis - metabolic and respiratory.

Structure & function of Heart, Design of circulatory system-Pulmonary, Systemic & coronary Circulations, Blood cells composition & functions, Blood vessels, blood flow, blood pressure, Cardiac Cycle, Cardiac Output, Pacemaker, Ischemic heart diseases.

UNIT – III: NERVOUS & MUSCULAR SYSTEM

Structure & function of Brain & Spinal Cord, Nerve cell & Nerve fibres, Resting & Action Potential, Transmission of Nerve impulses. Synapses-electrical and chemical, Neurotransmitters

Types of Muscles & their functions, Sources of energy for muscular work-Collagen, Elastin, Mechanism of muscle contraction, Muscular Dystrophy.

UNIT – IV: NUTRITIVE & CALORIFIC VALUE OF FOOD

Definition of food Nutrition, unit of energy measurement-Calorie, Calorific value BMR its measurement by Bomb Calorimeter., Factors affecting BMR. SDA, RQ of food stuff. Water and electrolytes. Water - an essential nutrient.

Basic food groups, physiological role and nutritional significance of carbohydrates, proteins and lipids. Macronutrients and micronutrients, Fat and water soluble vitamins, toxicity of vitamins.

UNIT – V: DIETARY HABITS IN HUMAN NUTRITION

Composition of human body, body weight and its control - endomorph and ectomorph, overweight, obesity and weight reduction. BMI, Protein reserves of human body, Nitrogen,

essential and non - essential Amino Acids, Essential Fattyacids, Nutritive value of proteins, protein energy malnutrition- Kwashiorkor & Marasmus - their preventive & curative measures.

Balanced diet in infants, childhood, adolescent, pregnancy and lactating women, geriatric nutrition (old age).

Text books:

1. K. Saradha Subramanyam. A Hand Book of Basic Human Physiology. S Chand & Co Ltd, 2006.

Reference Books:

1. Chatterjea.C.C. Human Physiology, 11th Edition, 1992.
2. William. F. Ganong. Review of Medical Physiology, MC Graw-Hill Medical, 22nd Edition.2005.
3. Davidson and Passmore. Human Nutrition & Dietetics, ELBS, 8th Edition. 1982.
4. Frances Sizer Eleanor Whitney. Nutrition – Concepts and Controversies, Wadsworth, 8th Edition. 2000.
5. Cataldo, DeBruyne, and Whitney West. Nutrition and diet therapy, Wadsworth Publishing Company, 5th Edition. 1999.

SEMESTER – IV

ADVANCED CLINICAL BIOCHEMISTRY

SUBJECT CODE: P4BC02MT

L	T	P	C
5	0	0	4

Total Hours: 65

UNIT – I: SPECIMEN COLLECTION, ANALYSIS AND RADIOISOTOPES

Concepts of accuracy, precision, reproducibility, reliability, and other factors in quality control. Specimen collection and Processing: Collection of blood - Vein puncture, skin puncture, arterial puncture. Anticoagulants. Collection and analysis of normal and abnormal urine - timed urine specimens, preservatives. Clinical significance of sugars, proteins, ketone bodies, bilirubin and porphyrins. CSF - collection, composition and analysis. Amniotic fluid - Origin, collection, and composition.

Radioisotopes in diagnosis and therapy.

UNIT – II: DISORDERS OF CARBOHYDRATE AND LIPID METABOLISM

Disorders of carbohydrate metabolism - blood sugar levels, hyper-and hypoglycemia, regulation of blood glucose, renal threshold, diabetes mellitus - etiologic classification and diagnostic criteria, glucose tolerance test, metabolic complications - acute and late complications. Hypoglycemic agents. Glycogen storage diseases, galactosemia, fructose intolerance and fructosuria.

Disorders of lipid metabolism - plasma lipids and lipoprotein abnormalities, lipidosis, Xanthomatoses, hypocholesteremic agents, fatty liver, obesity. Atherosclerosis and risk factors.

UNIT – III: DISORDERS OF PROTEIN METABOLISM AND CLINICAL ENZYMOLOGY

Disorders of protein metabolism - non-protein nitrogenous constituents in blood - urea, uric acid and creatinine. Plasma protein abnormalities - deficiency, agammaglobulinemia, multiple myeloma, proteinuria, Haemoglobinopathies - sickle cell anaemia and thalassemia. Tyrosinosis, Alkaptonuria, Maple syrup urine disease, Hartnup disease and Albinism.

Serum enzyme activities in diseases - Principle and assay of aspartate aminotransferase, alanine aminotransferase, alkaline phosphatase, acid phosphatase, streptokinase, asparaginase, α - hydroxybutyrate dehydrogenase, ceruloplasmin, γ -glutamyl transpeptidase, creatine kinase and lactate dehydrogenase.

UNIT – IV: ORGAN FUNCTIONAL TESTS

Functions of liver, diseases of the liver- Hepatitis types, cirrhosis, alcoholic liver disease, hepatic tumor and biliary tract diseases, liver function tests, disorders of bilirubin metabolism, Gall stones.

Renal function tests and related disorders - acute and chronic renal failure, urinary tract obstruction and nephrolithiasis, glomerulonephritis, nephrotic syndrome.

UNIT – V: FREE RADICALS, CANCER AND HORMONAL TESTS

Free radicals in health and disease - Endogenous and exogenous free radicals. Oxidative damages to lipids, proteins and DNA. Role of enzymatic and non-enzymatic antioxidants. Cancer: morphology and growth characteristics. Morphological and metabolic changes in tumor cells. Differences between benign and malignant tumors. Multistep carcinogenesis – initiation, propagation, progression. Oncogenes and proto-oncogenes – mechanisms of proto-oncogene activation. Tumor markers - AFP, CEA, HCG.

Dexamethasone test, Metyrapone test, Insulin stimulation test, Water deprivation test, C-peptide assay, Estimation of 17-ketosteroid, Diagnosis of SIADH, Stimulation and suppression test for adrenal cortex.

Text books:

1. M.N.Chatterjea, Clinical Biochemistry. JayPee Brothers, 2006.
2. P.K. Rambabu, Textbook of Biochemistry. A.I.T.B.S. Publishers & Distributors, 2007.

Reference Books:

1. T.M. Devlin. Text book of Biochemistry with clinical correlation. John Wiley and Sons, 1994
2. P.D.Mayne. Clinical chemistry in diagnosis and treatment, A Hodder Arnold Publication; 6th Revised Edition. 1994.
3. W.J. Marshall and S.K. Bangeit. Clinical Biochemistry - Metabolic concepts and clinical aspects. Churchill Livingstone, 1995.
4. K.V. Krishna Das. Text Book of Medicine. Jaypee Brothers, 1996.
5. A.C. Guyton and J.E. Hall. Text Book of Medical Physiology. Harcourt Asia, 2000.
6. Teitz. Clinical Biochemistry. Balaji Book House, 1997.

SEMESTER – IV

L	T	P	C
9	0	0	5

CORE PRACTICAL – III

Total Hours: 117

Biochemical Analysis of Blood, Marker Enzymes and Antioxidant Studies

SUBJECT CODE: P4BC11MP

A.BIOCHEMICAL ANALYSIS OF BLOOD

1. Estimation of blood glucose by O-toluidine method and GTT.
2. Estimation of blood glucose by GOD-POD method and using Semiautoanalyser.
3. Estimation of serum proteins by Lowry's Method.
4. Estimation of plasma fibrinogen.
5. Estimation of A.G. Ratio in serum.
6. Estimation of blood urea and urea clearance test by DAM method.
7. Estimation of serum uric acid by phosphotungstate method.
8. Estimation of serum creatinine by alkaline picrate method.
9. Estimation of serum cholesterol by Zak's method.
10. Estimation of serum phospholipids.
11. Estimation of serum calcium.
12. Estimation of serum bilirubin by Evelyn and Malloy method.

B.ASSAY OF ANTIOXIDANTS

1. Tocopherol
2. Ascorbic acid
3. Catalase
4. Superoxide Dismutase (SOD)
5. Lipid peroxide

C.ENZYMATIC ASSAY

1. Assay of SGOT
2. Assay of SGPT.
3. Assay of LDH

4. Assay of CPK
5. Assay of Alkaline phosphatase

D.SEPARATION TECHNIQUES

1. Activity Staining of SOD and Catalase by Native PAGE

References (Practical Manuals):

1. A. Sadasivam and A. Manickam. Biochemical Techniques, New Age International Publishers, 2nd Edition. 2003.
2. J. Jayaraman. Laboratory Manual in Biochemistry. Wiley Eastern, 1981.
3. H. Varley. Practical Clinical Biochemistry, CBS Publishers, 4th Edition. 2008.

SEMESTER – IV

L	T	P	C
9	0	0	5

CORE PRACTICAL – IV

Haematological Methods and Urine Analysis

Total Hours: 117

SUBJECT CODE: P4BC12MP

A. HAEMATOLOGICAL METHODS

1. Collection and storage of blood
2. Total RBC count
3. Total WBC count
4. Total platelet count
5. Differential WBC count
6. Absolute eosinophil count
7. Determination of hemoglobin content
8. Determination of clotting time.
9. Determination of prothrombin time
10. Determination of ESR.
11. Pathological examination of blood film.
12. Estimation of hemoglobin by cyanomethhemoglobin method

B. URINE ANALYSIS

1. Qualitative analysis of normal and pathological constituents in urine.
2. Microscopic analysis of urine
3. Estimation of titrable acidity of urine.
4. Analysis of urinary calculi.
5. Estimation of protein in urine by biuret method
6. Estimation Urea in urine and urea clearance test

7. Estimation uric acid in urine.
8. Estimation of calcium in urine
9. Estimation of creatinine in urine

C.IMMUNOLOGICAL TECHNIQUES

1. Blood grouping and RH Typing
2. Latex agglutination test for rheumatoid factor
3. Widal test
4. ELISA demonstration

References (Practical Manuals):

- 1 A. Sadasivam and A. Manickam. Biochemical Techniques, New Age International Publishers, 2nd Edition. 2003.
- 2 J. Jayaraman. Laboratory Manual in Biochemistry. Wiley Eastern, 1981.
- 3 H. Varley. Practical Clinical Biochemistry, CBS Publishers, 4th Edition. 2008.
4. N. Kannan. Laboratory Manual in General Microbiology, Panima Publishing Corporation, 2002.

SEMESTER – IV

L	T	P	C
10	0	0	8

PROJECT / DISSERTATION WITH VIVA-VOCE

Total Hours: 130

SUBJECT CODE: P4BC01PV

ADHIPARASAKTHI COLLEGE OF ARTS & SCIENCE,

(Autonomous)

Permanently Affiliated to Thiruvalluvar University, Vellore

Accredited by NAAC with B⁺⁺ Grade

M. Phil., BIOCHEMISTRY

Under CBCS

(Effective from the Academic Year 2011-2012)

Regulations

CBCS

Choice-Based Credit System is a flexible system of learning. 'Credit' defines the quantum of contents / syllabi prescribed for a course, and determines the number of hours of instruction required. The distinguishing features of CBCS are the following:

It permits the students to:

- ❖ Learn at their own pace
- ❖ Choose electives from a wide range of elective courses offered by the departments of the college.
- ❖ Undergo additional courses and acquire more than the required number of credits
- ❖ Adopt an inter – disciplinary approach in learning
- ❖ Make best use of the expertise of available faculty

1. ELIGIBILITY FOR ADMISSION

Admission to the M.Phil. Biochemistry Degree Course shall be made as follows:

I Preference

A student who has passed M.Sc. Degree with 50% either with Biochemistry or Chemistry as Major Subject.

II Preference

A student who has passed M.Sc. Degree with 50% and having Chemistry or Biochemistry at the Allied level and any of the Main Subject as mentioned below:

1. Biology

2. Zoology
 3. Botany
 4. Biotechnology
 5. Nutrition and Dietetics
 6. Microbiology
 7. Any discipline in Life Sciences.
2. The minimum duration for completion of M. Phil., in a discipline is two semesters and the maximum duration is four semesters.
 3. The M.Phil., Degree is awarded if a student has
 - Registered, undergone and secured the required minimum number of credits for the core and elective courses including dissertation specified in the corresponding programme within the stipulated time;
 - Secured the required attendance;
 - No dues to the College, Hostel or Library;
 - No disciplinary action pending against him/her

4. Structure of the Programme

The M.Phil., Programme consists of :

Core courses are mandatory for all students.

Elective courses which students can choose from amongst the courses offered within the department of the College.

Dissertation (Mandatory)

5. The distribution of credits will be as below:

- i. Core Courses – Minimum two courses carrying 5 Credits each (10 or more credits)
- ii. Elective carrying 5 Credits each – No minimum.
- iii. Dissertation 21 Credits.

The total number of credits for core and electives shall be 15, consisting of

- 2 Core courses (10 Credits) plus one elective (5 Credits)

The research topic for the dissertation may be finalized even at the beginning of the M.Phil Programme, so that the collection of relevant literature and research design could be completed in the first semester leaving the entire Second Semester for the research work. The course registration for dissertation shall be in the First semester and a separate registration form shall be used for Registration.

6. Evaluation of the dissertation

6.1. The dissertation shall be jointly valued by the supervisor and one external examiner. The external examiner is to be drawn from:

- i. University department or affiliated college within the Thiruvalluvar University, Vellore; or
- ii. Any accredited institution of higher education and/or research within Tamilnadu.

The viva-voce examination on the dissertation shall be jointly conducted by the supervisor and the external examiner. The distribution of marks shall be as under

- 20% marks for Periodical presentation (to be evaluated and awarded by the supervisor)
- 60% marks for the Dissertation
- 20% marks for viva-voce

6.2. The last date for submission of Dissertation shall be 31st August every year without penalty. Those who do not submit the dissertation in time may be given an extension of a maximum of two months with a penal fee prescribed by the college (i.e. up to 31st October). There shall be no further extension of time beyond this period. Any student failing to submit the dissertation within this period will be permitted to submit the dissertation only in the next academic year along with the subsequent batch of students.

7. Regulations of M.Phil., Programme

The rules and regulation governing course registration, attendance and discipline of students for M.Phil. Programme shall be the same as for the Master's Programme.

8. Evaluation

The process of evaluation, examination, grading, etc for the M.Phil. programme shall be the same as for Master's programme except for the dissertation; However, Final semester students of the M.Phil. should be allowed to appear for examinations in any arrears papers in the month of September/October each year.

Illustration: M.Phil., CUMULATIVE GRADE STATEMENT

Semester and Course	Course Number/ Code	Credits Earned	Marks Secured (Max. 100)	Grade Point	Letter Grade	Result
First Semester						
Core	Research Methodology/ M1RM01SM	5	70	5.05	A+	PASS
Core	Analytical Method/ M1BC01MT	5	60	4.00	A	PASS
Elective	Guide Paper/ M1BC02MT	5	75	5.50	O	PASS
Grade Point Average (GPA) / Weighted Average Marks (WAM)		15	68.33	4.85		
Second Semester						
Dissertation and Viva-voce	M2BC01DV	21	64	4.49	A	PASS
Grade Point Average (GPA) / Weighted Average Marks (WAM)		21	64	4.49		
Cumulative Grade Point Average (CGPA) 36 Overall Weighted Percentage Marks (OWPM)			65.81	4.64	A+	First Class

PATTERN OF QUESTION PAPER

Section – A (300 word)

To Answer 5 questions (either / or pattern)

5 X 6 marks = 30 marks

Section – B (900 words)

To Answer 3 questions out of 5 questions

3 X 15 marks = 45 marks

Total = 75 marks

SEMESTER - 1

RESEARCH METHODOLOGY

SUBJECT CODE: M1RM01SM

L	T	P	C
5	0	0	5

Total Hours: 65

UNIT 1: RESEARCH METHODOLOGY

Meaning of research – Objectives of research – motivation of research – Types, approaches and significance – Methods versus methodology – Research in scientific methods – Research process – Criteria for good research – Problem encountered by research in India – Funding agencies.

UNIT II: RESEARCH DESIGN

Research Problem: Selecting the problem – Necessity of defining the problem – Techniques involved in defining the problem – Research design – Needs and features of good design – Different research design – Basic principles of experimental designs.

UNIT III: DATA COLLECTION AND DOCUMENTATION

Data Collection methods – Data types – processing and presentation of data – Techniques of ordering data – Meaning of primary and secondary data – The uses of computers in research – The library and internet – Uses of search engines – virtual libraries – common software for documentation and presentation.

UNIT IV: DATA AND ERROR ANALYSIS

Statistical analysis of data – Standard deviation – Correlation – Comparison of sets of data – Chi squared analysis of data – Characteristics of probability distribution – Binomial, Poisson and normal distribution – Principle of least square fittings – Curve fitting – Measurement of errors – Types and sources of errors – Determination and control of errors.

UNIT V: RESEARCH COMMUNICATION

Meaning of research report – Logical format for writing thesis and paper – Essential of scientific report: abstract, introduction, review of literature, materials and methods and discussion – Write up steps in drafting report – Effective illustrations: tables and figures – Reference styles: Harvard and Vancouver systems.

REFERENCE BOOKS

1. Research Methodology, Methods and Techniques – C.R. Kothari – Wishwa Prakasam Publications, II Edition.
2. Research: An Introduction – Robert Ross – Harper and Row Publications.
3. Research Methodology – P. Saravanavel – Kitlab Mahal, Sixth Edition.
4. A Hand book of Methodology of Research – Rajammal P.A. Devadass – Vidyalaya Press.
5. Introduction to Computers – N. Subramanian.
6. Statistical methods – G.W. Snedecor and W. Cochran – Oxford and IBH, New Delhi.
7. Research Methodology Methods and Statistical Techniques – Santosh Gupta.
8. Statistical Methods – S.P. Gupta
9. Scientific social surveys and research – P. Young – Asia Publishers, Bombay.
10. How to write and publish a scientific paper – R.A. Day – Cambridge Univeristy Press.
11. Thesis and Assignment Writing – Anderson – Wiley Eastern Ltd.

SEMESTER - 1

L	T	P	C
5	0	0	5

ANALYTICAL METHODS

Total Hours: 65

SUBJECT CODE: M1BC01MT

SEPARATION TECHNIQUES

Centrifugation techniques
Preparative Centrifugation
Density gradient
Analysis of subcellular fractions
Determination of molecular weight of macromolecules
Analytical ultra centrifugation

CHROMATOGRAPHIC TECHNIQUE

Absorption chromatography
Partition chromatography
Ion exchange chromatography
Exclusion chromatography
Affinity chromatography
HPLC, Application of these techniques

ELECTROPHORETIC TECHNIQUES

General techniques
High voltage electrophoresis
Disc electrophoresis
Isoelectric focusing
Application of these techniques

SPECTROSCOPIC TECHNIQUES

Basic principle
Spectrophotometry
Flurometry
Flame photometry
ESR
NMR
Mass spectroscopy & Application of these techniques

RADIO ISOTOPE TECHNIQUE

Nature of radio activity

Detection and measurements of radioactivity

Applications in biological science

Safety aspects

MANOMETRIC TECHNIQUES

Types of manometry

Warburg's constant volume

Oxygen electrode

Applications

IMMUNOLOGICAL TECHNIQUES

Introduction

Production of antisera and precipitation reaction

Precipitation in free solution

RIA

ELISA

Immunofluorescence

MIRCOBIAL ASSAY TECHNIQUE FOR VITAMINS

Thiamin, Niacin, Riboflavin, Mutant Methodology and its applications.

STATISTICAL METHODS

Basic concepts, Law of Chance. Probability, Mean, SD, binomial expression, Hardy-Weinberg law, Test analysis of variance, co-efficient of correlation.

REFERENCES:

1. A Biochemical guide to principles and
2. The techniques of practical biochemistry – Keith Wilson and Kenneth Goulding
3. Principles and techniques of practical biochemistry – Keith Wilson and John Walker
4. Electrophoresis - Dr.Anbalaghan
5. Biophysical chemistry – Upathyay and Upadhyay nath

ADHIPARASAKTHI COLLEGE OF ARTS & SCIENCE
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Re – accredited by NAAC with ‘B’ Grade (CGPA – 2.83)

B.Sc., MICROBIOLOGY
Under CBCS

SYLLABUS

(Effective from the Academic Year 2014-2015)

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(Autonomous)
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B.Sc., MICROBIOLOGY
Under CBCS
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It permits the students to:

- ❖ Learn at their own pace
- ❖ Choose electives from a wide range of elective courses offered by the departments of the college.
- ❖ Undergo additional courses and acquire more than the required number of credits
- ❖ Adopt an inter – disciplinary approach in learning
- ❖ Make best use of the expertise of available faculty

1. Eligibility for Admission:

Candidates seeking admission to the first year of the Degree of Bachelor of Science Courses, shall be required to have passed the Higher Secondary Examinations [Academic or Vocational Stream] conducted by the Government of Tamil Nadu or an Examination accepted as equivalent thereto by the Syndicate of the Thiruvalluvar University.

The upper age limit for admission to UG Degree courses will be 21 (Twenty one) years as on 1st July of the year of admission. For SC/ST/BC/MBC/DNC candidates and women candidates the age limit is relaxed by 3 years. For other communities the Principals can relax upto 3 years based on merit. A relaxation of 5 years is permitted for Physically Handicapped as per G.O.Ms. No. 239, dated 03.09.1993.

Provided that candidates for admission into the specific main subject of study shall also possess such other qualifying conditions as may be prescribed by the University in the Regulations governing respective courses of study.

Candidate for the Degree of Bachelor of Science in Microbiology shall be required to have passed the Higher Secondary Examination [10 + 2 year] conducted by the Government of Tamil Nadu, or an Examination accepted as equivalent there to by the Academic Council, subject to conditions as may be prescribed. Candidates should have studied one of the following Subjects at the +2 level.

- 1) Microbiology
- 2) Biology [Zoology + Botany]
- 3) Zoology
- 4) Botany
- 5) Chemistry
- 6) Biotechnology
- 7) Nutrition and Dietetics
- 8) Or Any other subject related to Bioscience

2. Eligibility for the Award of Degree:

A Candidate shall be eligible for the award of the Degree only if he/she has undergone the prescribed course of study in the college for a period of not less than three academic year and passed the examinations of all the Six Semesters prescribed earning 140 credits [in part- I, II, III, IV and V].

3. Duration:

- a. Each academic year shall be divided into two semesters. The first academic year shall comprise the first and second semesters, the second academic year the third semester and fourth semesters and the third academic year the fifth and sixth semesters respectively.
- b. The odd semesters shall consist of the period from June to November of each year and the even semesters form December to April of each year. There shall be not less than 90 working days for each semester.

4. Course of Study:

The main subject of study for Bachelor Degree Courses shall consist of the following:

PART – I TAMIL / OTHER LANGUAGES

PART – II ENGLISH

PART – III CORE SUBJECTS

ALLIED SUBJECTS

PROJECT / ELECTIVES WITH THREE COURSES

PART – IV

1. [a]. Those who have not studied Tamil up to XII Std and taken a Non-Tamil Language under Part – I shall take Tamil comprising of two courses [level will be at 6th standard].

[b]. Those who have studied Tamil up to XII Std and taken a Non-Tamil Language under Part – I shall take Advanced Tamil comprising of two courses.

[c]. Those who do not come under a/b can choose non-major elective comprising of two courses.

2. SKILL BASED SUBJECTS [ELECTIVE]:

Four courses are to be offered. The papers are to be accommodated in the second / third year of study for UG courses.

3. ENVIRONMENTAL STUDIES

4. VALUE EDUCATION

5. SOFT SKILL

PART – V EXTENSION ACTIVITIES

5. Extension Activities:

A Candidate shall be awarded a maximum of 1 credit for Compulsory Extension Service.

All the students shall have to enroll for NSS / NCC/ NSO [Sports and Games] Rotract / Youth Red Cross or any other service organization in the college and shall have to put in compulsory minimum attendance of 40 hours which shall be duly certified by the principal of the college before 31st Mach in a year. If a student LACKS 40 hours attendance in the First year, he/she shall have to compensate the same during the subsequent years.

Students those who complete minimum of attendance of 40 hours in One year will get Half Credit and those who complete the attendance of 80 or more hours in two years will get ONE CREDIT.

Literacy and population Education Field Work shall be compulsory components in the above Extensions service activities.

The following assessment procedure will be followed for Internal Marks:
Continuous Internal Assessment [CIA] Test

S. No	Reg. No	Name	Test I Marks For 50	Test II Marks For 75	Test III Marks For 75	Marks For 200	Marks Converted to 20/20	Assignments /Seminars [5] Records [5]	Marks For 25/25	Total Rounded to Marks for 25 /25

Test I : One hour duration for 50 marks [Two Units of the Syllabus]

Test II : Two hours duration for 75 marks [Four Units of the Syllabus]

Test III: Three hours model test for 75 marks [Total Syllabus]

Total marks	200		Theory		Practical
Test marks to be converted to	:	20 marks	/	20 marks	
Assignments / Seminars	:	5 marks	/	-	
Records	:	-	/	5 marks	
Total	:	25 marks	/	25 marks	

In the column Rounded to 25 / 25, any fraction may be rounded to the next number.

6. Requirements for proceeding to Subsequent Semester:

- Candidates shall register their names for the First Semester Examination after admission in the UG Courses.
- Candidates shall be permitted to proceed from the First Semester up to Final Semester irrespective of their failure in any of the Semester Examination subject to the condition that the candidates should register for all the arrear subject of earlier semesters along the current [subsequent] Semester subjects.
- Candidates shall be eligible to go to subsequent semester, only if they earn sufficient attendance as prescribed therefore by the Academic Council from time to time. Provided in case of a candidate earning less than 65% of attendance in any one of the Semesters due to any extraordinary circumstances such as medical grounds, such candidate who shall produce Medical Certificate issued by the Authorised Medical Attendant [AMA], duly certified by the Principal of the college, shall be permitted to proceed to the next semester and to complete the course of study. Such candidates shall have to repeat the missed Semester by rejoining after completion of Final

Semester of the course, after paying the fee for the break of study as prescribed by the College from time to time.

7. Requirements to take the Semester Examinations

- a] A candidate will be permitted to take the Examination of any Semester, if
 - i] He/She secures not less than 75% of attendance out of the 90 instructional days during the semester. [In the case of married women students the minimum attendance requirement shall be 55% of total instructional days].
 - ii] He / She earns a Progress Certificate from the Head of the Institution, of having satisfactorily completed the prescribed course of study in the subject as required by these Regulations, and
 - iii] His/ Her conduct has been satisfactory.

Provided that it shall be open to the Academic Council or any authority delegated with such powers by the Academic council to grant exemption to a candidate who has fail to earn 75% of the attendance prescribed for any valid reason[s] subject to the usual conditions.

- b] A candidate who has secured attendance less than 75% but 65% and above shall be permitted to take the Examination on the recommendation of the Head of the Institution to condone the lack of attendance as well as on the payment of the prescribed fees to the College.

8. Passing Minimum:

A Candidate shall be declared to have passed the whole examination, if he/she passes in all the papers and practicals wherever prescribed / as per the scheme of examinations by earning 140 CREDITS in parts – I, II, III, IV and V. He / She shall also fulfill the extension activities prescribed earning one credit to qualify for the Degree.

In fixing the passing minimum marks, the following will be observed:

- [a]. There shall be no Passing Minimum for Internal.
- [b]. For External Examinations, Passing Minimum shall be of 50% [Fifty Percentage] of the minimum marks prescribed for the paper.
- [c]. In the aggregate (External + Internal) the Passing Minimum shall be of 50% for each Paper/Practical/Project and Viva-voce.
- [d]. Grading shall be based on overall marks obtained (Internal + External)

Grading:

Once the marks of the CIA and end-semester examinations for each of the course are available, they will be added. The mark thus obtained will then be graded as per details given below:

Marks	Grade Point	Letter Grade	Class
100	7.00	H	First Class with Distinction
90-99	6.00	O	First Class with Distinction
75-89	5.50	D	First Class with Distinction
60-74	4.75	A	First Class
50-59	4.00	B	Second Class
40-49	3.50	C	Third
Below 40	3.00	F	Fail

From the second semester onwards the total performance within a semester and continuous performance starting from the first semester are indicated respectively by **Grade Point Average [GPA]** and **Cumulative Grade Point Average [CGPA]**. These two are calculated by the following formulae:

$$\text{GPA} = \frac{\sum_{i=1}^n C_i G_i}{\sum_{i=1}^n C_i}$$

Where 'C_i' is the credit earned for the course 'i' in any semester; 'G_i' is the Grade Point obtained by the student for the course 'i' and 'n' is the number of courses passed in that semester.

CGPA=GPA of all the courses starting from the first semester to the current semester.

Note: The GPA and CGPA shall be calculated separately for the following three parts:

For purpose of declaring a candidate to have qualified for the Degree of Bachelor of Arts / Science / Commerce / Management / Literature in the First Class / Second Class / Third Class or First Class with Distinction, the marks and the corresponding CGPA earned by the candidate in part III alone will be the criterion, provided he / she has secured the prescribed passing minimum in LCs and ELCs.

Grade in Parts IV & V shall be shown separately and it shall not be taken into account for classification.

9. Classification of Successful Candidates:

PART – I TAMIL / OTHER LANGUAGES:

Successful candidates passing Examinations for the Language and securing the marks [i] 60 percent and above and [ii] 50 percent and above but below 60 percent in the aggregate shall be declared to have passed the examination in the First and Second Class, respectively. All other successful candidates shall be declared to have passed the examination in the Third Class.

PART – II ENGLISH :

Successful candidates passing Examinations for English and securing the marks [i] 60 percent and above and [ii] 50 percent and above but below 60 percent in the aggregate shall be declared to have passed the examination in the First and Second Class, respectively. All other successful candidates shall be declared to have passed the examination in the Third Class.

PART – III consisting of CORE SUBJECTS, ALLIED SUBJECTS, PROJECT / ELECTIVES

Successful candidates passing Examinations for Core Courses together and securing the marks [i] 60 percent and above and [ii] 50 percent and above but below 60 percent in the aggregate of the marks prescribed for the Core Courses together shall be declared to have passed the examination in the First and Second Class, respectively. All other successful candidates shall be declared to have passed the examination in the Third Class.

PART – IV: [Consisting of sub items 1 (a), (b) and (c), 2, 3,4 and 5] as furnished in the Regulations 4 part – IV supra.

PART – V EXTENSION ACTIVITIES:

The only credit earned for Part V Extension activities of a Successful Candidate SHALL NOT BE taken into consideration for Classification / Ranking / Distinction.

10. RANKING

Candidates who pass all the examinations prescribed for the course in the First Appearance itself alone are eligible for Ranking;

Provided in the case of Candidates who pass all the examinations prescribed for the course with a break in the First Appearance due to the reasons as furnished in the Regulation 7.[iii] Supra are eligible for Classification / Distinction.

The marks obtained in improvement examination will not be taken into consideration for Ranking.

11. The Medium of Instruction and Examinations

The medium of Instruction and Examinations for the papers under part I and II shall be in language concerned. For parts III & IV, the medium of Instruction and Examinations shall be English.

12. Submission of Record Notebooks for Practical Examinations

Candidates taking the Practical Examinations should submit bonafide Record Notebook prescribed for the Practical Examinations. Otherwise the candidate will not be permitted to take the practical Examinations. However, in genuine case where the students could not submit the record notebook may be permitted to take the Practical Examinations provided the Head of the Department concerned certifies that the candidate has performed the experiments prescribed for the Course. For such of those candidates who do not submit Record Books, zero [0] marks will be awarded for record notebooks.

In case a candidate fails in the Practical Examination the marks awarded for the record at the time of first appearance for the Practical Examination should be made available by the University to the Examiners at the subsequent appearance by the candidate.

13. Improvement of marks in the subjects already passed

Candidates who have passed in theory paper/papers are allowed to appear again for theory paper/papers only once in order to improve his/her marks, by paying the fee prescribed from time to time. Such candidates are allowed to improve within a maximum period of 10 semesters counting from his/her first semester of his/her admission. If candidate improves his/her marks, then his/her improved mark will be taken into consideration for the award of Classification and Distinction only. Such improved marks will not be counted for the award of Prize/Medals and Rank. If the candidate does not show improvement in the marks, his/her previous marks will be taken into consideration.

No candidate will be allowed to improve marks in the Practical and Field work.

14. Checklist for Inspection

- a. Qualification for
 - i. Teaching Faculty : as Prescribed by the UGC and the University
 - ii. Technical Faculty : as Prescribed by the UGC and the University
 - iii. Laboratory Staff : as Prescribed by the UGC and the University
- b. Infrastructure Facilities

- i. Building : Number of Classrooms with specifications: 3 rooms measuring 20' X 25'.
If the class strength is above 50, the space shall increase by 10 square feet /student.
Number of Staff rooms: One measuring 20' X 20'
- ii. Furniture : One pair of table / chair per student
- iii. Laboratory @ 10 Sq. ft. per student

PATTERN OF QUESTION PAPER

Part – A [50 words]

To Answer 10 questions

10 X 2 marks = 20 marks

Part – B [200 words]

To Answer 5 questions (either / or pattern)

5 X 5 marks = 25 marks

Part – C [500 words]

To Answer 3 questions out of 5 questions

3 X 10 marks = 30 marks

Total = 75 marks

MISSION & GOALS OF MICROBIOLOGY

We aim to provide a learning environment that excites and informs undergraduate majors and non-majors about microbiology and the many ways that it is relevant to everyday life. Through our Microbiology department is committed to providing a transformative education through the following elements:

1. Provide compelling and relevant undergraduate courses that teach science literacy and provide the fundamental knowledge for our majors to succeed in their careers.
2. Provide training through innovative, non-conventional coursework that stresses inquiry-based learning.
3. Engage and provide opportunities for students to participate in research.
4. Prepare our majors for future careers or further educational opportunities by providing a capstone experience.
5. Equalize opportunities for under-represented minorities and for students with diverse life experiences.
6. Improve the timely progression to graduation for majors of all backgrounds.

Om Sakthi
ADHIPARASAKTHI COLLEGE OF ARTS & SCIENCE (AUTONOMOUS)
G.B.NAGAR, KALAVAI-632506
AFFILIATED TO THIRUVALLUVAR UNIVERSITY, VELLORE
DEGREE COURSES

B.Sc. Microbiology
(With effect from 2014-2015)
The course of study and the scheme of examination

Year/ Semester	Part	Subject	Paper	Subject Code	Title of the Paper	Ins. Hrs/ Week	Credit	Exam Hrs	Marks		
									IA	Sem. Exam	Total
I Year/ I Semester	I	Language	Paper I	U1LT21FL	Tamil I	6	3	3	25	75	100
	II	English	Paper I	U1LE21SL	English I	6	3	3	25	75	100
	III	Core	Paper I	U1MB21MT	General Microbiology	6	4	3	25	75	100
	III	Core Practical	Practical I	-	-	3	-	-	-	-	-
	III	Allied I	Paper I	U1BC21AT	Biochemistry I	4	4	3	25	75	100
	III	Allied Practical	Practical I	-	-	3	-	-	-	-	-
	IV	-	-	U1ES21GS	Environmental Studies	2	2	3	25	75	100
TOTAL						30	16	15	125	375	500
I Year/ II Semester	I	Language	Paper II	U2LT21FL	Tamil II	6	3	3	25	75	100
	II	English	Paper II	U2LE21SL	English II	6	3	3	25	75	100
	III	Core	Paper II	U2MB21MT	Microbial Physiology	6	5	3	25	75	100
	III	Core Practical	Practical I	U2MB22MP	General Microbiology and Microbial Physiology	3	2	6	25	75	100
	III	Allied I	Paper II	U2BC21AT	Biochemistry II	4	4	3	25	75	100
	III	Allied Practical	Practical I	U2BC21AP	Biochemistry	3	2	3	10	40	50
	IV	-	-	U2VE21GS	Value Education	2	2	2	-	50	50
TOTAL						30	21	23	135	465	600

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DEGREE COURSES

B.Sc. Microbiology
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Year/ Semester	Part	Subject	Paper	Subject Code	Title of the Paper	Ins. Hrs/ Week	Credit	Exam Hrs	Marks		
									IA	Sem. Exam	Total
II Year/ III Semester	I	Language	Paper III	U3LT21FL	Tamil III	6	3	3	25	75	100
	II	English	Paper III	U3LE21SL	English III	6	3	3	25	75	100
	III	Core	Paper III	U3MB21MT	Immunology	4	4	3	25	75	100
	III	Core Practical	-	-	-	2	-	-	-	-	-
	III	Allied II	Paper III	U3MB22AT	Bio-Statistics I	4	4	3	25	75	100
	III	Allied Practical	-	-	-	3	-	-	-	-	-
	IV	Skill Based Subject I	Paper I	U3MB24ST	Medical Laboratory Technology	3	3	3	25	75	100
	IV	Non-Major Elective I	Paper I	U3MB21NM	Diagnostic Biochemistry I	2	2	3	25	75	100
TOTAL						30	19	18	150	450	600
II Year/ IV Semester	I	Language	Paper IV	U4LT21FL	Tamil IV	6	3	3	25	75	100
	II	English	Paper IV	U4LE21SL	English IV	6	3	3	25	75	100
	III	Core	Paper IV	U4MB21MT	Microbial Genetics	4	4	3	25	75	100
	III	Core Practical	Practical II	U4MB21MP	Immunology	2	2	6	25	75	100
	III	Allied II	Paper IV	U4MB22AT	Bio-Statistics II	4	4	3	25	75	100
	III	Allied Practical	Practical II	U4MB22AP	Bio-Statistics	3	2	3	20	30	50
	IV	Skill Based Subject II	Paper II	U4MB23ST	Computer Applications in Biology	3	3	3	25	75	100
	IV	Non-Major Elective II	Paper II	U4MB21NM	Diagnostic Biochemistry II	2	2	3	25	75	100
TOTAL						30	23	27	195	555	750

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DEGREE COURSES

B.Sc. Microbiology
(With effect from 2014-2015)

The course of study and the scheme of examination.

Year/ Semester	Part	Subject	Paper	Subject Code	Title of the Paper	Ins. Hrs/ Week	Credit	Exam Hrs	Marks		
									IA	Sem. Exam	Total
III Year/ V Semester	III	Core	Paper V	U5MB21MT	Molecular Biology and Genetic Engineering	6	6	3	25	75	100
	III	Core	Paper VI	U5MB22MT	Medical Bacteriology	6	6	3	25	75	100
	III	Core	Paper VII	U5MB23MT	Medical Virology	6	6	3	25	75	100
	III	Elective I	Paper I	U5MB24ET	Medical mycology, Parasitology and entomology	5	5	3	25	75	100
			Paper II	U5MB25ET	Human Physiology						
	IV	Skill Based Subject III	Paper III	U5MB26ST	Mushroom and Vermiculture Techniques	3	3	3	25	75	100
	IV	Core Practical	Practical III	-	Medical Microbiology	4	-	-	-	-	-
TOTAL						30	26	15	125	375	500
III Year/ VI Semester	III	Core	Paper VIII	U6MB21MT	Food and Dairy Microbiology	6	6	3	25	75	100
	III	Core	Paper IX	U6MB22MT	Industrial Microbiology	6	6	3	25	75	100
	III	Elective II	Paper III	U6MB23ET	Pharmaceutical Microbiology	5	5	3	25	75	100
			Paper IV	U6MB24ET	Tannery Technology						
	III	Elective III	Paper V	U6MB25ET	Environmental Microbiology	5	5	3	25	75	100
			Paper VI	U6MB26ET	Biochemical Methodology						
	IV	Skill Based Subject IV	Paper IV	U6MB27ST	Agriculture and Biofertilizer Technology	3	3	3	25	75	100
	IV	Core Practical	Practical III	U6MB21MP	Medical Microbiology	-	4	6	25	75	100
	III	Core Practical	Practical IV	U6MB22MP	Food, Environmental and Agricultural Microbiology	5	5	6	25	75	100
	V	Extension Activities	-	U6MB21EA	-	-	1	-	50	-	-
TOTAL						30	35	27	225	525	700
GRAND TOTAL						180	140	125	955	2745	3650

**SEMESTER-I
MAJOR PAPER - I**

L	T	P	C
6	0	0	4

GENERAL MICROBIOLOGY

Total Hours : 78

SUBJECT CODE – U1MB21MT

OBJECTIVE:

The subject aims to understand the scope & history of the microbiology, to understand the basic concept of Microscope, microbial staining techniques & to control the contaminants.

UNIT I: SCOPE AND HISTORY OF MICROBIOLOGY (15)

Definition and scope of Microbiology – History of Microbiology – Louis Pasteur, Joseph Lister, John Tyndal, Robert Koch, Leevenhoek and Winogradsky – Difference between the Prokaryotic and Eukaryotic microorganisms.

UNIT II: MICROSCOPY (17)

Microscope – Bright field, Dark field, Phase contrast, Fluorescent, Atomic Force Microscope (AFM) and Electron Microscope - SEM & TEM.

UNIT III: TAXONOMY (16)

Classification of microorganisms – General principles and nomenclature – Haeckel's three kingdom concept, Whittaker's five kingdom concept - General characteristic features of Bacteria, Fungi, Algae, Viruses.

UNIT IV: STAINING TECHNIQUES (15)

Stains and staining methods – Simple, Differential staining. Special staining – Acid fast staining, Capsule staining, Metachromatic granule staining, Flagella staining, Endospore staining

UNIT V: STERILIZATION, DISINFECTION AND ANTIMICROBIAL CHEMOTHERAPY (15)

Sterilization: Principles and methods – Physical and chemical – Antimicrobial chemotherapy - Antimicrobial drugs - Antibiotic sensitivity test (MIC, Kirby Bauer method). Antimicrobial drug resistance.

OUTCOME:

This will lead the beginners rightly exposed to the foundation of microbiology.

RECOMMENDED TEXT

1. Sale, A.J. "Fundamental Principles of Bacteriology". McGraw Hill Publishing Co. Ltd., New York. 7th Edition. (1992).
2. Dubey, R.C and Maheswari, D.K. A Text book of Microbiology. S. Chand & Company Ltd. New Delhi. 3rd Edition. (2005).
3. Stainer, R.Y., Ingraham, J.L., Wheelis, M.L. and Painter, P.R. "General Microbiology" – Mac Milan Education Ltd. London. 2nd Edition. (1986).
4. Michael J. Pelczar. "Microbiology", Tata McGraw Hill Publishing Co. Ltd., New Delhi. 6th Edition. (2006).
5. General Microbiology, Textbook by Hans Günter Schlegel, 7th Edition.
6. Michael J. Pelczar. "Microbiology", Tata McGraw Hill Publishing Co. Ltd., New Delhi. 7th Edition. (2017).

REFERENCE BOOKS

1. Bergey, D.H., Harrison, F.C., Breed, R.S., Hammer, B.W. & Huntoon, F.M. Bergey's Manual of Determinative Bacteriology, Lippincott Williams and Wilkins Publishers. 9th Edition, (1963).
2. Prescott M, Microbiology, Tata McGraw Hill Publishing Co. Ltd., New Delhi. 6th Edition, (1962)
3. Prescott M, Microbiology, Tata McGraw Hill Publishing Co. Ltd., New Delhi. 10th Edition, (2017)

SEMESTER-I
ENVIRONMENTAL STUDIES
SUBJECT CODE – U1ES21GS

L	T	P	C
2	0	0	2

Total Hours : 26

OBJECTIVE:

Students in Environmental Studies are motivated by concern for welfare of the many human and non-human communities that shape this planet.

1. Recognize the interconnectedness of multiple factors in environmental challenges
2. Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.

UNIT – I: INTRODUCTION TO ENVIRONMENTAL SCIENCES: NATURAL RESOURCES (05)

Environmental Sciences – Significance – Public awareness – Forest resources – Water resources – Mineral resources – Food resources - Environmental impact – fertilizer – Pesticide Problems.

UNIT – II: ECOSYSTEM, BIODIVERSITY AND ITS CONSERVATION (06)

Ecosystem – concept – structure and function – producers, consumers and decomposers – Food chain – Food web – Forest, Grassland, desert and aquatic ecosystem.

Biodiversity – Definition – genetic, species and ecosystem diversity – Values and uses of biodiversity – biodiversity at global, national (India) and local levels – Hotspots, threats to biodiversity – conservation of biodiversity – In-situ & Ex-situ.

UNIT – III: ENVIRONMENTAL POLLUTION AND MANAGEMENT (05)

Environmental Pollution – Causes – Effects and control measures of Air, Water, Marine, soil, solid waste, Thermal, Nuclear pollution and Disaster Management – Floods, Earth quake, Cyclone and Landslides. Role of individuals in prevention of pollution – pollution, Case studies - – Bhopal gas tragedy, Minamata disease, Mercury factory (Kodaikanal), London fog.

UNIT – IV: SOCIAL ISSUES & ENVIRONMENT (05)

Urban issues – Energy – water conservation – Environmental Ethics – Global warming – Resettlement and Rehabilitation issues – Environmental legislations – Environmental protection Act. 1986 – Air, Water, Wildlife and forest conservation Act.

UNIT – V: HUMAN POPULATION & ENVIRONMENT (05)

Population growth and Explosion – Human rights and Value Education – Environmental Health – HIV/AIDS – Role of IT in Environment and Human Health – Women and child welfare – Public awareness – Case studies. Visit to a local area / local polluted site / local simple ecosystem – Report submission

OUTCOMES:

- Critical Thinking: demonstrate critical thinking skills in relation to environmental affairs.
- Communication: demonstrate knowledge and application of communication skills and the ability to write effectively in a variety of contexts.
- Interdisciplinary Synthesis: demonstrate an ability to integrate the many disciplines and fields that intersect with environmental concerns.
- Ecological Literacy: demonstrate an awareness, knowledge, and appreciation of the intrinsic values of ecological processes and communities.
- Sustainability: demonstrate an integrative approach to environmental issues with a focus on sustainability.

Text Books:

1. Kumaraswamy, K. Alagappa Moses, A and M. Vasanthy, (2005), Environmental Studies, Publication Division, Bharathidasan University, Tiruchirappalli. (in Tamil), pp. 1-282.
2. Kumaraswamy, K. (Ed) (2008) GIS for Natural Resources and Disaster Management, Department of Geography, Bharathidasan University, Tiruchirappalli.
3. Rajamannar. Environmental Studies, EVR College Pub, Trichy. 2004.
Kalavathy, S. Environmental Studies, Bishop Heber College Pub., Trichy. 2004.
4. Textbook of Environmental Studies, 2013 by Erach Bharucha.

SEMESTER-II

MAJOR PAPER - II

MICROBIAL PHYSIOLOGY

SUBJECT CODE – U2MB21MT

L	T	P	C
6	0	0	5

Total Hours : 78

OBJECTIVE:

The aim of the subject is to gain the knowledge on anatomy, nutrition, cultivation, microbial growth & metabolism of the microorganisms.

UNIT I: ANATOMY OF BACTERIA (16)

Anatomy of Bacteria – Ultra structure and function of cell wall, flagella, capsule, pili, cytoplasmic inclusion, sporulation.

UNIT II: NUTRITION (16)

Nutritional types of microorganisms. Nutritional requirements. Uptake of nutrients into the cell. Transport of nutrients by Active and Passive ways.

UNIT III: CULTIVATION AND PRESERVATION (15)

Cultivation of microbes – Bacteria, Viruses. Culture techniques. Media preparation – Types of media - Pure Culture techniques – Anaerobic cultivation - Preservation of cultures.

UNIT IV: MICROBIAL GROWTH (15)

Growth curve – Growth kinetics - Measurement of cell number – Measurement of cell mass. Factors influencing the growth of microorganisms – Solutes and Water activity, Temperature, pH, Oxygen concentration, Osmotic pressure, Moisture, Radiation.

UNIT V: METABOLISM (16)

Carbohydrate metabolism - Embden Meyerhoff pathway, Pentose Phosphate Pathway, Entner Doudroff Pathway, Kreb's cycle – Electron transport and Oxidative phosphorylation and photophosphorylation. Fermentation – Homo – Hetero lactic acid fermentation.

OUTCOME:

The students are well versed on cultivating the microorganisms.

RECOMMENDED TEXT

1. Sale, A.J. “Fundamentals Principles of Bacteriology”, McGraw Hill Publishing Co. Ltd., New York. 7th Edition, (1992).
2. Dubey, R.C and Maheswari, D.K. A Text book of Microbiology. S. Chand & Company Ltd. New Delhi. 3rd Edition. (2005).
3. Stainer, R.Y., Ingraham, J.L., Wheelis, M.L. and Painter, P.R. “General Microbiology” – Mac Milan Education Ltd. London. 3rd Edition. (1986).
4. Michael J. Pelczar. “Microbiology”, Tata McGraw Hill Publishing Co. Ltd., New Delhi. 5th Edition. (2006).
5. Michael J. Pelczar. “Microbiology”, Tata McGraw Hill Publishing Co. Ltd., New Delhi. 6th Edition. (2017).

REFERENCE BOOKS

1. Bergey, D.H., Harrison, F.C., Breed, R.S., Hammer, B.W. & Huntoon, F.M. Bergeys Manual of Determinative Bacteriology, Lippincott Williams and Wilkins Publishers. 9th Edition. (1963).
2. Prescott. M, Microbiology, Tata Mc Graw Hill Publishing Co. Ltd., New Delhi. 6th Edition, (1962).
3. Prescott M, Microbiology, Tata McGraw Hill Publishing Co. Ltd., New Delhi. 10th Edition, (2017)

**SEMESTER-II
VALUE EDUCATION**

L	T	P	C
2	0	0	2

SUBJECT CODE – U2VE21GS

Total Hours : 26

OBJECTIVE:

The aim of the subject is to educate the values of family, society, cultivate the personal skills & to motivate on positive thinking.

UNIT –I: INTRODUCTION AND OUTLINE OF VALUE EDUCATION (05)

Value Education – Definition and Scope. Family values – Responsibility of family, Status of Women in family & society, Caring for needy and elders. Ethical Values – Mass media Ethics, Influence of Ethics in family. Issue of Globalization - Modern warfare, Terrorism, Mutual respect of different Cultures and religions.

UNIT – II: PERSONAL SKILLS (05)

Self Esteem – Definition, Factors Influencing Self Esteem, Qualities of High and low self esteem. Self Concept – Definition, Characteristics of self concept. Role of self concept in Personal growth. Self acceptance – Definition, Benefits and obstacles of self acceptance.

UNIT – III: POSITIVE THINKING, MOTIVATION AND PERSONALITY DEVELOPMENT (06)

Positive thinking – Definition, Positive and Negative Attitude, Power of Positive thinking, Positive Imaging. Motivation – Definition, Difference between Inspiration and Motivation, Internal and External Motivation. Demotivation, Demotivating factors. Personality Development – Definition, characteristic and elements of personality, Development of Personality.

UNIT – IV : COPING AND DEVELOPING COPING MECHANISMS (05)

Coping – Definition, Positive and Negative Coping, kinds of coping, Typical responses to Coping. Shyness - Definition, Types and symptoms of shyness. How to overcome shyness. Depression – Definition, Symptoms, Causes and Impact of Depression, How to Overcome depression. Failure – Definition, Coping with failure, Developing Competence.

UNIT – V: LEADERSHIP TEAMWORK AND WORK ENVIRONMENT (05)

Leadership – Definition, Characteristics of leadership, Various kinds of leaders, Factors Influencing leadership styles. Characteristics of successful leader. Teamwork – Definition, Characteristic of Team work, Team learning. Life skills required for work environment and ways to built a better work environment.

OUTCOME:

To make the students as the perfect citizen for the society.

Reference Books:

1. We shall overcome - A textbook on life coping skills. 6th Edition - 2012 By Dr.S.Xavier Alphonse, S.J. ICRDCE Publication, Chennai – 8.
2. T. Anchukandam and J. Kuttainimathathil (ED) Grow Free Live Free, Krisitu Jyoti Publications, Bangalore (1995).
3. Mani Jacob (ED) Resource Book for Value Education, institute for Value Education, New Delhi 2002
4. DBNI ,NCERT, SCERT, Dharma Bharti National Institute of Peace and Value Education, Secunderabad ,2002
5. Daniel and Selvamony-Value Education Today,(Madras Christian College, Tambaram and ALACHI, New Delhi, 1990)
6. S. Ignachimuthu-Values for Life –Better Yourself Books, Mumbai, 1991.
7. M.M.M. Mascaronhas Centre for Research Education Science and Training for Family. Life Promotion –Family Life Education, Bangalore, 1993.

SEMESTER-II

CORE PRACTICAL – I

GENERAL MICROBIOLOGY AND MICROBIAL PHYSIOLOGY

SUBJECT CODE – U2MB22MP

L	T	P	C
0	0	3	2

Total Hours : 39

1. Sterilization methods - Moist heat and dry heat sterilization and filtration.
2. Staining methods – Simple and Gram's staining.
3. Special staining – Capsule, AFB, Spore staining.
4. Motility Study - Hanging drop and wet mount.
5. Culture techniques – Streak plate, Pour plate and Spread plate Technique.
6. Media preparation – Liquid and solid media preparation.
7. Biochemical characterization – IMViC, Catalase, Oxidase, TSI.
8. Identification of fungi – Lacto Phenol Cotton Blue staining.
9. Antibiotic sensitivity testing.
10. Micrometry.
11. Preservation and maintenance of culture.

REFERENCE BOOKS

1. Mackie and McCartney, Practical Medical Microbiology, Elsevier; 14th Edition, (2007).
2. Subhash Chandra Parija. Textbook of Practical Microbiology, Ahuja Publishing House, 5th Edition, (2007).

**SEMESTER-II
ALLIED PRACTICAL - I
BIOCHEMISTRY
SUBJECT CODE – U2BC21AP**

L	T	P	C
0	0	3	2

Total Hours : 78

VOLUMETRIC ANALYSIS

- a. Estimation of HCl using suitable bases
- b. Determination of Saponification number of oil
- c. Estimation of Iron using potassium permanganates as link solution and ferrous ammonium sulphate as standard
- d. Estimation of glycine by formal titration method
- e. Estimation of glucose by Benedict's method
- f. Estimation of ascorbic acid using 2,6-dichlorophenol indophenol as link solution

QUALITATIVE ANALYSIS

- A. Qualitative analysis of carbohydrates: Glucose, fructose, galactose, lactose, maltose and sucrose.
- B. Qualitative analysis of amino acids, arginine, cysteine, tryptophan and tyrosine
- C. Qualitative analysis of Abnormal constituent in urine-Glucose,Protein,Bilesalt Bilepigment, and Ketonebodies

QUANTITATIVE ANALYSIS (only for demonstration; with single standard method)

1. Colorimetric estimation of protein by Biuret method.
2. Colorimetric estimation of Glucose by OT method
3. Colorimetric estimation of Creatinine by Jaffe's method
4. Colorimetric estimation of Urea by DAM Method

REFERENCE BOOKS (Practical Manual):

1. D.T. Plummer. An Introduction to Practical Biochemistry. Tata McGraw-Hill, 3rd Edition, 1987.
2. J. Jayaraman. Laboratory Manual in Biochemistry. Wiley Eastern, 1981.
3. T.N. Pattabiraman. Laboratory Manual in Biochemistry. All India Publishers & Distributors, 3rd Edition, 1998.

SEMESTER–III
MAJOR PAPER – III
IMMUNOLOGY

L	T	P	C
4	0	0	4

Total Hours : 52

SUBJECT CODE – U3MB21MT

OBJECTIVE:

The aim of the subject is to study the history of Immunology, importance of human immune system, antigen antibody reaction & schedule for vaccine.

UNIT I: HISTORY AND IMMUNOHAEMATOLOGY (10)

History of Immunology, Types of immunity. Blood groups and Blood transfusions, Host parasite relationships, Microbial infections.

UNIT II: IMMUNE SYSTEM (11)

Structure and function of the cells, tissues and organs of immune system. Complement system-function and pathways.

UNIT III: ANTIGEN AND ANTIBODY (10)

Antigen - types, properties, Hapten, Adjuvants. Immunoglobulins: Structure, types, properties and their functions - Theory of antibody production.

UNIT IV: IMMUNIZATION AND CYTOKINES (11)

Vaccines and immunization - Types and characteristics. Monoclonal antibody - Hybridoma technology. Cell mediated immune response - Lymphokines, Cytokines.

UNIT V: ANTIGEN-ANTIBODY REACTIONS (10)

Antigen and Antibody interaction, invitro agglutination, complement fixation, precipitation, ELISA, RIA, Flow cytometry and immunofluorescence – Hypersensitivity and its types - Skin test (Invivo).

OUTCOME:

The students know the basic functions of immune system & their reactions towards the antigens.

RECOMMENDED TEXT

1. Roitt, I.M. Essentials of Immunology, Blackwell Scientific Publishers. 2nd Edition. (1998).
2. Kuby, J. Immunology, Freeman and Company, New York. 2nd Edition. (1994).
3. Leffell, Donnenberg, A: and Rose, W. Handbook of human immunology, Boca Raton Fla: C.R.C. Press. 2nd Edition. (1997).
4. Cellular & Molecular immunology 2012 - Immunology, 8th Edition
5. Review of Medical Microbiology and Immunology, Warren E. Levinson
Publisher: McGraw-Hill Medical; 11th edition 2010

REFERENCE BOOKS

1. Abbas, A.K. Lichtman, A.M. and Pober, J.S. Cellular and Molecular immunology, Philadelphia : W.B. Saunders. 3rd Edition. (1997).

SEMESTER–III

SKILL BASED PAPER - I

MEDICAL LABORATORY TECHNOLOGY

SUBJECT CODE – U3MB24ST

L	T	P	C
3	0	0	3

Total Hours : 39

OBJECTIVE:

The aim of the course is to introduce basic concepts of medical laboratory works. The content of this course will help the students to collect the blood, staining and processing of blood sample.

UNIT I: BLOOD COLLECTION (07)

Blood: Definition, Characters and composition. Collection of Blood: Capillary blood and venous blood, preservation/storage of blood. Anticoagulants: Definition- Types: Wintrob's /EDTA/ Heparin/Citrate.

UNIT II: COUNTING OF BLOOD CELLS (08)

Counting of Blood cells: Neubauer Counting Chamber – Total RBC Count and WBC count, Diluting fluids, macrodilution/Microdilution technique, False low and High counts, normal values – correction for TWBC – Absolute Eosinophil count – Differential Leucocyte count, Platelet count, Reticulocyte count.

UNIT III: COAGULATION MECHANISM & COUNTING OF BLOOD CELLS (08)

Haemoglobin: Composition, estimation. Coagulation mechanism, Coagulation factors, bleeding time and clotting time. PCV & ESR.

UNIT IV: STAINING METHODS (08)

Preparations of stains and staining techniques – Wright stain, Leishman stain, Giemsa stain, Jaswanth Singh – Bhattacharji stain, Fields stain – Peroxidase stain. Examination of blood smear – peripheral smear report: size/colour/shapes/inclusions/immature cells for leukemia. Blood parasites: Malarial parasites/Microfilaria. Microscopic Examination of Urine. Collection ,

Physical, Chemical and microscopic examination of CSF, Stool, Sputum and seminal fluid.

UNIT V: HAEMATOLOGICAL TECHNIQUES (08)

ABO-Grouping: History/Discovery – slide / Tube Technique – Rh Typing: Slide Tube Technique, Bovine Replacement technique – Coombs Test: Direct, Indirect – Donar screening – Cross matching: Major/Minor.

OUT COME

Thus the students are rightly reported to proceed with hematological techniques.

RECOMMENDED TEXT BOOKS

1. Manogharan, A., Sethuraman. S., Essentials of clinical haematology. Jaypee Brothers, Medical Publisher Pvt, Ltd., New Delhi. 3rd Edition, (2003).
2. Christoper. A. Ludlam. Clinical Haematology. Longman Singapore Publisher Pvt. Ltd., 2nd Edition, (1990).
3. Linch, D.C., Yats, A.P., Watts, M.J., Guide of Haematology. Tomothi Home Publisher. 2nd Edition, (1986).

REFERENCE BOOKS

1. Mukerjee, K. Medical laboratory Technoglogy, Tata McGraw Hill Publishing Company Limited, New Delhi. 2nd Edition, (2003).
2. Sood, R. Medical Laboratory Technology Methods and Interpretations. Jaypee Brothers Medical Publishers (P) Ltd., New Delhi. 2nd Edition, (2004).
3. Mukerjee, K. Medical laboratory Technoglogy, Tata McGraw Hill Publishing Company Limited, New Delhi. 2nd Edition, (2010).

SEMESTER III

NON MAJOR ELECTIVE-I

DIAGNOSTIC BACTERIOLOGY AND MYCOLOGY –I

SUBJECT CODE –U3MB21NM

L	T	P	C
2	0	0	2

Total Hours : 26

OBJECTIVE:

The aim of the subject is to know the human bacterial pathogens and their role in causing human diseases.

UNIT – I: SPECIMEN COLLECTION AND PROCESSING (05)

Common laboratory procedures in diagnosis of microbial diseases: Collection and transport of specimen – direct isolation and identification of pathogens from clinical samples – serological tests – antibiotic sensitivity test. Collection of data and maintenance of laboratory records.

UNIT – II: MEDICALLY IMPORTANT BACTERIA – I (05)

Morphological and cultural characteristics, Laboratory diagnosis, Prevention and control of Bacteria: *Staphylococcus aureus*, *Streptococci pyogens*, and *Streptococcus pneumoniae*.

UNIT – III: MEDICALLY IMPORTANT BACTERIA – II (06)

Morphological and cultural characteristics, Laboratory diagnosis, Prevention and control of Bacteria: *Haemophilus influenzae*, *Clostridium tetani* and *Mycobacterium tuberculosis*.

UNIT – IV: MEDICALLY IMPORTANT BACTERIA – III (05)

Morphological and cultural characteristics, Laboratory diagnosis, Prevention and control of Bacteria: Enterobacteriaceae: *Escherichia coli*, *Salmonella typhi*, *Shigella dysenteriae* and *Vibrio cholerae*.

UNIT – V: MEDICALLY IMPORTANT FUNGI (05)

Morphology, detection and recovery of fungi from clinical specimens: Dermatophytes: *Trichophyton*, *Epidermophyton*, *Candida albicans* and *Aspergillus*.

OUT COME

The students are well versed in knowing the bacterial pathogens and processing of clinical samples in hospitals.

Text Books:

1. Anathanarayanan, R. and Jayaram Panicker C.K. (1994). Text Book of Microbiology. Orient Longman.
2. Baron, E.J. and Tenenbaum F.C. (1995). Scientific Company. Diagnostic Microbiology. Blackwell Scientific Company.
3. Text Book of Microbiology, Ananthanarayan & Paniker's, 9th Edition (2017).
4. Textbook of medical mycology by, Jagdish chander, 4th Edition (2017)
5. Textbook of medical Microbiology, Jawawettes, 9th Edition (2017).

Reference Book:

1. Microbiology Presscott. Tata McGraw Hill Publishing Co Ltd – New Delhi. 6th Edition (1962)
2. Salle, A.J. (1992). Fundamentals Principles of Bacteriology. 7th Edition, McGraw Hill Publishing Co. Ltd., New York.

SEMESTER –III

ALLIED PAPER - III

L	T	P	C
4	0	0	4

Total Hours : 52

PRINCIPLES OF MICROBIOLOGY

SUBJECT CODE – U3MB21AT

OBJECTIVE:

The aim of the subject is to understand the scope and history of microbiology, basic concept of microscope, staining techniques and control the contamination.

UNIT I: HISTORY OF MICROBIOLOGY AND MICROSCOPY (10)

Definition & Scope of Microbiology, Spontaneous generation, Biogenesis, contribution of Louis Pasteur, Leewenhock, John Tyndall and Robert Koch. Microscopy – Simple, Compound, Light microscopy, Dark field, Phase contrast, Fluorescence & Electron microscopy.

UNIT II: NOMENCLATURE AND ANATOMY OF ORGANISMS (11)

Five kingdom concept, Binomial nomenclature of microbes, species concept and classical approach. Anatomy of prokaryotes & eukaryotes, ultra structure & function of cell wall & cell organelles.

UNIT III: CULTURE METHODS AND STAINING (10)

Culture techniques, media preparation, preservation of cultures, aerobic & anaerobic culture techniques. Staining methods – Simple, Differential – Gram's Staining & Acid fast staining, Special staining - Spore stain, Capsule stain and Metachromatic granules.

UNIT IV: ANTIMICROBIAL CHEMOTHERAPY (11)

Antimicrobial chemotherapy – Antibiotics – source, classification, mode of action – Antimicrobial resistance – Antimicrobial susceptibility tests– Kirby Bauer disc diffusion method.

UNIT V: MICROBIAL GROWTH AND STRUCTURAL CHARACTERISTICS (10)

Measurement of microbial growth. Batch & continuous culture, Growth determination and growth curve. Structure characteristics of Algae – *Chlorella vulgaris*, Fungi – *Mucor* & Protozoa – *Entamoeba histolytica*.

OUTCOME

This will lead the beginners rightly exposed to foundation of microbiology.

RECOMMENDED TEXT

1. Dubey, R.C and Maheswari, D.K. A Text book of Microbiology. S. Chand & Company Ltd. New Delhi, 4th Edition, (2005).
2. Stainer, R.Y., Ingraham, J.L., Wheelis, M.L. and Painter, P.R. “General Microbiology” – Mac Milan Education Ltd., London, 5th Edition, (1992).
3. Michael J. Pelczar. “Microbiology”, Tata McGraw Hill Publishing Co. Ltd., New Delhi, 5th Edition, (2006).
4. General Microbiology, Hans G. Schlegel, 7th Edition, (2018).
5. General Microbiology, Pelczar, 5th Edition, (2018).

REFERENCE BOOKS

1. Prescott. M, Microbiology, Tata McGraw Hill Publishing Co. Ltd., New Delhi, 8th Edition, (2010).
2. Sale, A.J. “Fundamentals Principles of Bacteriology”, McGraw Hill Publishing Co. Ltd., New York, 7th Edition, (1992).
3. General Microbiology, Prescott, 9th Edition (2017).
4. A Textbook of Microbiology, S. Chand, 5th Edition (2017).

SEMESTER-IV

MAJOR PAPER - IV

MICROBIAL GENETICS

SUBJECT CODE – U4MB21MT

L	T	P	C
4	0	0	4

Total Hours : 52

OBJECTIVE:

The aim of the subject is to know the history of microbial genetics, importance of plasmids, DNA replications & their repair mechanisms, mutations, gene transfer & synthesis of proteins.

UNIT I: HISTORY, DNA AND RNA (10)

Genetics - Historical introduction - Discovery of DNA structure, Watson and Crick model of DNA – Forms of DNA - DNA and RNA as genetic material - Genetic code - Wobble hypothesis.

UNIT II: PLASMID AND DNA REPLICATION (10)

Organization and functioning of prokaryotic genome - Plasmids – Characters of plasmid – Conjugative, Mobilizable, Control of copy number, Incompatibility. Types – F plasmid, Col plasmid, R plasmid - Replication of DNA in Prokaryotes.

UNIT III: GENE TRANSFER MECHANISMS (10)

Gene transfer mechanisms - Transformation, Griffith experiment, Competence, General process transduction; Transduction - Generalized and Specialized; Conjugation - $F^+ \times F^-$, $Hfr \times F^-$, $F' \times F^-$.

UNIT IV: TRANSPOSONS, MUTATION AND DNA REPAIR (11)

Transposon - Discovery, Insertion sequences, Complex and compound transposons. Mutations - Types of Mutations – Spontaneous and induced mutations – Isolation of mutants - Carcinogenicity testing – DNA repair mechanism.

UNIT V: TRANSCRIPTION, TRANSLATION AND OPERON (11)

Transcription and Translation in Prokaryotes and Eukaryotes. Operon concepts – Lac Operon – Positive control and catabolite repression - Trp operon – Attenuation.

OUTCOME:

To know the basics of a gene & their replications.

RECOMMENDED TEXT

1. Lodish, H. Baltimore Daerk . A. Zipsury, S.L. Marsudaisa. P. Darnel. J. Molecular cell biology, 3rd Edition, (1995).
2. Gardner –Simon Snustad. Principles of genetics, John Wiley & Sons. Inc. New York, 8th Edition, (1985).

REFERENCE BOOKS

1. Maloy S.R, Cronan J.E, Freifelder D, Microbial genetics. Jones & Barlett publishers, 4th Edition, (1994).
2. Lewin B. Genes VII. Oxford University press, 4th Edition, (2000).

SEMESTER-IV

SKILL BASED PAPER – II

COMPUTER APPLICATIONS IN BIOLOGY

SUBJECT CODE – U4MB23ST

L	T	P	C
3	0	0	3

Total Hours : 39

OBJECTIVE:

The aim of the subject is to know the basic concept of history, C language & applications in microbiology.

UNIT I: COMPUTER – HISTORY, ANATOMY (07)

Introduction to Computer. History of Computer, Basic Anatomy of Computer.

UNIT II: HARDWARE AND SOFTWARE, OPERATING SYSTEM (08)

Input and Output devices, hardware and software. Operating system. MS Windows, Desktop publishing: MS Word, Data bases and graph generation: MS-Excel, project presentation: MS-Powerpoint.

UNIT III: C LANGUAGE (08)

Programming in C (Basic) Introduction, simple programs, Decision making and looping, functions, structures, input and output filling system.

UNIT IV: WEB DESIGN (08)

Basic of WEB Design using HTML: Basic HTML, text styles, list and special characters, adding pointers and links, adding pictures, backgrounds and music, tables and frames.

UNIT V: APPLICATIONS IN MICROBIOLOGY (08)

Computers in Taxonomy and Systemic Data Analysis in Microbiology. Computer applications in fermentation technology, Computers in Drug designing.

OUTCOME:

The student are well versed in basic concept of Computer science.

RECOMMENDED TEXT

1. Dave Taylor. HTML. Tata McGraw – Hill Publishing Company Ltd, New Delhi, 3rd Edition, (1995).
2. Paul MCFedries. Microsoft Office 97. Sams publishing techmedia, New Delhi, 4th Edition, (1997).
3. Rajagopalan. Understanding Computers Tata McGraw – Hill Publishing Company Ltd, New Delhi, 3rd Edition, (1987).

REFERENCE BOOKS

1. Sharon Crawford. Windows 98 No Experience Required. BPB publications, New Delhi, 4th Edition, (1998).
2. Yashwant Canetrar, Let us C. BPP Publishers, New Delhi, 3rd Edition, (1980).

SEMESTER-IV
NON MAJOR ELECTIVE - II
DIAGNOSTIC VIROLOGY AND PARASITOLOGY –I
SUBJECT CODE –U4MB21NM

L	T	P	C
2	0	0	2

Total Hours : 26

OBJECTIVE:

The aim of the subject is to introduce general properties of medically important viruses, fungi and parasite.

UNIT 1: PROPERTIES AND DIAGNOSIS OF VIRUSES (05)

General properties of virus. Detection of viral antigens from clinical sample – serological diagnosis of viral infections.

UNIT II: MEDICALLY IMPORTANT VIRUSES I (05)

Morphology and laboratory diagnosis of Pox virus, Adeno virus, Herpes simplex virus, Paramyxo virus (Chicken pox and Mumps) and Orthomyxo virus (Influenza)

UNIT III: MEDICALLY IMPORTANT VIRUSES II (06)

Morphology and laboratory diagnosis of Picorna virus, Hepatitis B virus, Rabies virus, HIV virus.

UNIT IV: MEDICALLY IMPORTANT PARASITES I (05)

Life cycle and Laboratory diagnosis of Parasitic diseases like *Giardia lamblia*, *Leishmania donovani* and *Plasmodium vivax*.

UNIT V: MEDICALLY IMPORTANT PARASITES II (05)

Life cycle and laboratory diagnosis of parasitic diseases like *Taenia solium*, *Ascaris lumbricoides*, *Echinococcus granulosus* and *Wuchereria bancrofti*.

OUTCOME

The students are exposed to know about different types viruses, fungi, parasites and their role in causing human diseases.

Text books:

1. Morag C. and Timbury M.C. (1994). Medical Virology, 10th Edition. Churchill Livingstone London.
2. Dimmock. N. J., Primrose S.B. (1994). Introduction to Modern Virology 4th Edition. Blackwell Scientific Publications. Oxford.
3. Parija, S.C. (1996). Textbook of Medical parasitology. Orient Longman.
4. Jagdish Chandra (2003). Test Book of Medical Mycology. Orient Longman.
5. Text Book of Microbiology, Ananthanarayan & Paniker's, 9th Edition (2017).

Reference Book:

1. Baker, F.J. and Breach, Medical microbiological techniques. Butter worths, London, 2nd Edition, (1990).
2. Parasitology, Protozoology & Helminthology 13th Edition (Hardcover, K D Chatterjee) (2009).
3. Textbook of Medical Parasitology : Protozoology & Helminthology, 4th Edition (2013), by Subhash Chandra parija.

**SEMESTER-IV
ALLIED PAPER - II
MICROBIOLOGY II
SUBJECT CODE – U4MB21AT**

L	T	P	C
4	0	0	4

Total Hours : 52

OBJECTIVE:

The aim of the subject is to know the basic knowledge of different fields in microbiology.

UNIT I: SOIL MICROBIOLOGY (10)

Characteristics and classification of soil. Soil Microorganisms; interaction between microorganisms with plants. Biofertilisers - Biopesticides.

UNIT II: AQUATIC AND AIR MICROBIOLOGY (10)

Aquatic Microbiology, Sewage Treatment – Physical and Biological. Microbes in air, distribution and source of airborne organisms.

UNIT III: FOOD MICROBIOLOGY (11)

Food Microbiology, Microbial spoilage of food, food preservation – high temperature, low temperature and food additives. Microbes in milk and their source. Industrial production – Yoghurt and Cheese.

UNIT IV: IMMUNOLOGY (11)

Antigen and its types, Antibody and its types. Ag –Ab reactions – Agglutination – Precipitation – Western Blot – ELISA.

UNIT V: MOLECULAR BIOLOGY (10)

Molecular Biology – Definition of a Gene, structure, cloning techniques, Genomic Library and Screening of recombinants. Gene Therapy methods.

OUT COME

The students gains the knowledge on various filed of microbiology.

RECOMMENDED TEXT

1. Alexander. (1997). Introduction to Soil Microbiology. John Wiley and Sons. N. Y. Subba Rao, N.S. 3rd Edition, (1995).
2. Subba Rao, N.S. Biofertilizers in Agriculture and Forestry, Oxford and IBH publication Co. Pvt. Ltd., New Delhi, 3rd Edition, (1997).
3. Kuby. J, Immunology, W.H. Freeman and Company, Newyork, 2nd Edition, (1994).
4. Frazier W.C. and Westhoff D.C. Food Microbiology, Tata Mc Graw Hill Publishing Company Ltd., New Delhi, 4th Edition, (1998).
5. Frazier W.C. and Westhoff D.C. Food Microbiology, Tata Mc Graw Hill Publishing Company Ltd., New Delhi, 5th Edition, (2013).
5. Soil & Environmental Microbiology, N. S. Subba Rao, 5th Edition (2016).

REFERENCE BOOKS

1. Old, R.S. and Primrose, S.B. Principles of Gene manipulation. An introduction to genetic Engineering. Blackwell Scientific Publication, London, 5th Edition, (1995).
2. T.A. Brown. Gene cloning – an introduction – Wiley-Blackwell, 7th Edition, (2016).
3. T.A. Brown. Gene cloning – an introduction – Chapman & hall London, 3rd Edition, (1995).
4. Text Book of Microbiology, Ananthanarayan & Paniker's, 9th Edition (2017).
5. A text book of Biotechnology, R. C. Dubay, 5th Edition (2014).

SEMESTER-IV
CORE PRACTICAL - II
IMMUNOLOGY
SUBJECT CODE – U4MB21MP

L	T	P	C
0	0	2	2

Total Hours : 26

1. Blood Grouping and Rh Typing.
2. Coomb's Test.
3. Rheumatoid Arthritis Test.
4. Rapid Plasma Reagin Test.
5. C-Reactive protein Test.
6. Anti streptolysin 'O' Test.
7. Treponema pallidum Heamagglutination.
8. Pregnancy Test.
9. WIDAL Test
10. VDRL Test.
11. Single Radial Immuno Diffusion.
12. Ouchterlony Double Diffusion.
13. Immunoelectrophoresis.
14. Counter Current Immunoelectrophoresis.
15. Rocket Immunoelectrophoresis.
16. Total WBC Count.
17. Total RBC Count.
18. Platelet Count.
19. Differential Leucocyte Count.
20. ELISA – Demo.

REFERENCE BOOKS

1. Mackie and McCartney Practical Medical Microbiology, Elsevier; 14th Edition, (2007).
2. Dev, N.C., Dev, T.C. Practical Microbiology Protozoology and Parasitology: Including Bacteriology, Virology, Mycology, Immunology, Serology, and Automated Methods. New Book Agency, 2nd Edition, (2011).

SEMESTER-IV
ALLIED PRACTICAL - II
MICROBIOLOGY
SUBJECT CODE – U4MB21AP

L	T	P	C
0	0	3	2

Total Hours : 39

1. Cleaning of Glasswares, Sterilization techniques.
2. Gram's Staining, Motility (Hanging Drop Preparation)
3. Acid Fast Staining for Tuberculosis pathogen identification
4. Wet Mount Preparation of Fungal Material – LPCB Staining
5. Preparation of Media.
6. Slant Preparation
7. Serial Dilution Techniques
8. Pure Culture Techniques -Streak Plate, Pour Plate and Spread Plate Techniques.
9. Enumeration of Soil Microorganisms.
10. Enumeration of Sewage Microorganisms.
11. Assessment of Milk Quality by MBRT Method.
12. Assessment of Air Quality
13. Root Nodules – Rhizobium Isolation and Identification methods.
14. Microbial Products – Microbial Enzyme Production – Demonstration.
15. Medically Important Pathogens – Microphotographs demonstration.

REFERENCE BOOKS

1. Mackie and Mc Cartney Practical Medical Microbiology, Elsevier; 14th Edition, (2007).
2. Dev, N.C., Dev, T.C. Practical Microbiology Protozoology and Parasitology: Including Bacteriology, Virology, Mycology, Immunology, Serology, and Automated Methods. New Book Agency, 2nd Edition, (2011).

SEMESTER-V
MAJOR PAPER - V
MOLECULAR BIOLOGY AND GENETIC ENGINEERING
SUBJECT CODE – U5MB21MT

L	T	P	C
6	0	0	6

Total Hours : 78

OBJECTIVE:

The aim of the subject is to gain the knowledge on genetic materials, cloning systems, basic techniques of Molecular biology & their applications in various fields.

UNIT I : INTRODUCTION TO MOLECULAR BIOLOGY (15)

Nucleic acids: Structure of DNA and RNA, Types and forms – DNA, t-RNA, r-RNA, m-RNA – Definition and functions.

UNIT II: GENE CLONING SYSTEM (16)

Gene cloning system – Cloning strategies - Vectors – Plasmid (Ti-plasmid, pBR322, pSC101, pUC), Bacteriophage (M13 Bacteriophage vectors & Lambda DNA) & Cosmid - Enzymes (Restriction Endonuclease, Ligase & DNA Polymerases). Preparation of Genomic library & cDNA library.

UNIT III: APPLICATION OF GENETIC ENGINEERING IN MEDICAL & AGRICULTURAL FIELD (16)

Gene therapy – Gene therapy methods, Gene therapy for cancer. Methods of gene drug delivery, Genetic counseling. Application in agricultural field – Biopesticides. Monoclonal antibody (Hybridoma technology)

UNIT IV: HYBRIDIZATION & AMPLIFICATION TECHNOLOGY (16)

Nucleic acid and protein hybridization technique – Southern, Northern and Western methods of hybridization. DNA amplification techniques – PCR.

UNIT V: APPLICATION OF GENETIC ENGINEERING IN PHARMACEUTICALS (15)

Application in Pharmaceuticals - Interferons, Insulin, Growth hormones. Social impact of recombinant DNA technology.

OUTCOME:

The students gain the knowledge on Genetic Engineering.

RECOMMENDED TEXT

1. Old, R.S. and Primrose, S.B. Principles of Gene manipulation. An introduction to Genetic Engineering. Blackwell Scientific Publication, London, 5th Edition, (1995).
2. Brown. T.A., Gene cloning – an introduction – Chapman & Hall, London, 3rd Edition, (1995).
3. Mukesh Pasupuleti, Molecular Biotechnology. MJB publishers, Chennai, 3rd Edition, (2005)
4. Molecular Biology 2004. by ... David Freifelder

REFERENCE BOOKS

1. Glick, B.R. and Pasternat, J.J. Molecular Biotechnology, ASM press. Washington DC, 2nd Edition, (1994).
2. Benjamin Lewin, Genes VI, Oxford University Press, 2nd Edition, (1997).

SEMESTER-V
MAJOR PAPER - VI
MEDICAL BACTERIOLOGY
SUBJECT CODE – U5MB22MT

L	T	P	C
6	0	0	6

Total Hours : 78

OBJECTIVE:

The aim of the subject is to know the human and animal bacterial pathogens, their role in causing diseases and to control them.

UNIT- I: NORMAL FLORA AND VIRULANCE FACTOR (15)

Normal flora of human body. Collection and transport of clinical samples laboratory diagnosis of bacterial infections, virulence factors of bacteria, Hospital waste disposal. Host parasite relationship. Probiotics.

UNIT II: HUMAN BACTERIAL PATHOGENS I (16)

Gram positive bacteria: Classification, morphology, cultural characteristics, pathogenicity, epidemiology, laboratory diagnosis, treatment, prevention and control of diseases caused by: *Staphylococcus aureus*, *Streptococcus pyogens*, *Streptococcus pneumoniae*, *Corynebacterium diphtheriae*, *Mycobacterium (tuberculosis, leprae)*, *Clostridium (perfringens, tetani, botulinum)* , *Bacillus anthracis*, *Listeria monocytogenes*.

UNIT III: HUMAN BACTERIAL PATHOGENS II (16)

Gram negative bacteria: *Escherichia coli*, *Salmonella typhi*, *Shigella*, *Vibrio cholerae*, *Klebsiella pneumoniae*, *Neisseria* [Gonococci and Meningococci], *Pseudomonas aeruginosa*.

UNIT IV: HUMAN BACTERIAL PATHOGENS III (16)

Gram negative bacteria: Human pathogens - *Haemophilus influenzae*, *Treponema pallidum*, *Rickettsia*, *Chlamydiae*. Pleomorphic - *Mycoplasma pneumoniae*.

UNIT V : ZOONOSSES AND NOSOCOMIAL INFECTIONS (15)

Zoonotic diseases and their control; Hospital acquired infections and their control; Pyrexia of unknown origin. Ethical committee and their functions.

OUTCOME:

The students are rightly exposed to medically important microorganisms which would lead them towards progressive advancement of this subject.

Text Books

RECOMMENDED TEXT

1. Salle, A.J. Fundamental Principles of Bacteriology. Mc. Graw Hill Publishing Co. Ltd., New York, 7th Edition, (1992).
2. Ananthanarayanan R. and Jayaram Panicker C.K. Text book of Microbiology., 10th Edition, (2017) Universities press.
3. Baron, E.J. and Finegold S.M. Scientific Company. Diagnostic Microbiology. Blackwell Scientific Company, 9th Edition, (1995).
4. Jawatz, Medical Microbiology 19th Edition 2017

REFERENCE BOOKS

1. *Bergey*, D.H., Harrison, F.C., Breed, R.S., Hammer, B.W. & Huntoon, F.M. *Bergeys Manual of Determinative Bacteriology*, Lippincott Williams and Wilkins Publishers, 9th Edition, (1963).
2. Stewart, F.S. & T.S.L. Beswick, *Bacteriology, Virology and Immunity for students of Medicine*. Churchill Livingstone, London, 18th Edition, (2012).

SEMESTER- V
MAJOR PAPER VII
MEDICAL VIROLOGY
SUBJECT CODE –U5MB23MT

L	T	P	C
6	0	0	6

Total Hours : 65

OBJECTIVE: The aim of the subject is to introduce the general properties of viruses their cultivations, human viral diseases and their life cycle inside the host. This course will help the students to understand bacterial viruses and miscellaneous viruses.

UNIT I: PROPERTIES AND CULTIVATION OF VIRUSES (12)

General properties of viruses- Morphology, viral replication, cultivation of viruses, viral assay, Classification and nomenclature of Viruses. Laboratory diagnosis of viral infection.

UNIT II: BACTERIAL VIRUSES (13)

Bacteriophages- Morphology, Life cycles, uses of bacteriophages.

UNIT III: HUMAN VIRAL DISEASES I (14)

Influenza, Adenovirus, Rhinovirus Chicken pox (Varicella), Herpes simplex, Measles (Rubella), Mumps, Small pox (Variola).

UNIT IV: HUMAN VIRAL DISEASES II (13)

Dengue fever, Rabies, Polio, Viral hepatitis. Emerging viral hemorrhagic fever, SARS (Severe Aero Respiratory Syndrome), Papova virus, Parvo virus, Corona Virus, Arena, Filo, Reo, Rota viruses.

UNIT V: MISCELLANEOUS VIRUSES (13)

HIV, Oncogenic virus, Zika virus, Slow viruses, Nipah virus Ebola virus. Avian / Bird/ Chicken flu, Chickungunya, Swine Flu, Mad Cow Diseases, COVID-19.

OUTCOME

Students are exposed towards different viruses and role in causing human diseases

Text Books

4. Ananthanarayanan R. and Jayaram Panicker C.K. (1994). Text book of Microbiology. Orient Longman
5. Ananthanarayanan R. and Jayaram Panicker C.K. (2013). Text book of Microbiology. Orient BlackSwan.
6. Jayaram Panicker C.K. (1994). Text book of Microbiology. Orient Longman.
7. Baron, E.J. and Finegold S.M. (1995). Scientific company. Diagnostic Microbiology. Blackwell Scientific Company.

8. Dimmock. N.J., Primrose S.B. Introduction to Modern
9. Virology. Blackwell Scientific Publications. Oxford, 4th Edition. (1994).
10. Vasanthakumari . R. Text Book of Microbiology, BI Publication Pvt Ltd.
11. Jawatz, Medical Microbiology 19th Editions (2017).
12. Ananthanarayanan R. and Jayaram Panicker C.K. (2015). Text book of Microbiology. Orient Longman.

Reference Book

1. David Greenwood 18th edition. Medical microbiology. A guide to microbial infections
2. John G. Holt and David Hendricks Bergey, (1993). Bergeys Manual of determinative Bacteriology, 9th Edition, Lippincott Williams and Wilkins Publisher.
3. Fenner and White's Medical Virology, 5th Edition, Christopher J. Burrell and Colin R. Howard. (2017).

L	T	P	C
6	0	0	6

Total Hours:65

SEMESTER- V
ELECTIVE PAPER –I
MEDICAL MYCOLOGY, PARASITOLOGY& ENTOMOLOGY
SUBJECT CODE –U5MB24ET

OBJECTIVE:

The aim of the subject is to introduce the general properties of fungi, parasite and insect vectors in causing human diseases.

UNIT I: GENERAL PROPERTIES OF FUNGI (13)

General properties of fungi - Morphology, Fungal reproduction, Taxonomy and Nomenclature, Laboratory diagnosis of fungal infection.

UNIT II: FUNGAL PATHOGENS (14)

Superficial mycoses - *Tinea Versicolor*, *Tinea nigra*, *Piedra*, Cutaneous –Dermatophytoses, Sub cutaneous mycosis- Mycetoma, Systemic mycoses – *Blastomycosis*, *Paracoccidiomycosis*, *Histoplasmosis*, *Coccidiomycosis*, Opportunistic mycoses-Aspergillosis, Candidiasis, Cryptococcosis.

UNIT III: PROTOZOAN PATHOGENS (13)

Giardia lamblia, *Balantidium coli*, *Trypanosoma cruzi*, *Trichomonas vaginalis*, *Entamoeba histolytica*, and *Leishmania donovani*, *Plasmodium vivax* and *Plasmodium falciparum*

UNIT IV HELMINTHIC PATHOGENS (13)

Pinworm, Round worm, Hookworm, Beef and Pork tape worm and Liver fluke disease (*Fasciola hepatica*), *Wuchereria bancrofti*

UNIT V VECTORS OF MEDICAL IMPORTANCE (12)

Vectors - life cycle – diseases- epidemiology and management of Mosquitoes, House flies, Sand flies, Human lice, Tsetse flies and Reduviid bugs.

OUTCOME

The students are rightly exposed to know the general outline of fungi, parasite and insect vector.

TEXT BOOKS

1. Presscott M, Microbiology, Tata McGraw Hill Publishing Co. Ltd., New Delhi, 6th Edition, (1962).
3. Anathanarayanan, R. and Jayaram panicker C.K. Text Book of Microbiology, Orient Longman, 8th Edition, (1994).
4. Parija, S.C. Textbook of Medical Parasitology. Orient Longman, 3rd Edition, (1996).
5. Jagdish Chandra, Text Book of Medical Mycology. Orient Longman, 4th Edition, (1996).
6. Vasanthakumari . R. Text Book Of Microbiology, BI Publication Pvt Ltd.
7. John Thorne Crissey, Manual of medical Mycology (1995) by Black well science.
8. Jawatz, Medical Microbiology 19th Edition.
9. Jagdish Chandra (2003). Text Book of Medical Mycology. Orient Longman.
10. Mani M S (1982) General Entomology. Oxford & IBH publishing Co.
11. Singh H S and Rastogi P 2016. Text book of Parasitology .Rastogi publication, New Delhi.
12. Manoharachary and Tilak Kubr 2016 Mycology and Microbiology Scientific Publication, New Delhi

REFERENCE BOOKS

1. Baker, F.J. and Brech, Medical Microbiological techniques. Butter worths, London, 2nd Edition, (1990).
2. Chatterjee, M.D. Parasitology. Chatter Joe Medias Publishers, Culcutta, 12th Edition, 3rd Edition, (1980)
3. Textbook of Medical Parasitology : Protozoology & Helminthology, 4th Edition (2013), by Subhash Chandra pariya.
4. IMMS .A.D (1994) A General text book of Entomology. Asia publishing house.

SEMESTER-V
ELECTIVE PAPER - II
HUMAN PHYSIOLOGY
SUBJECT CODE – U5MB25ET

L	T	P	C
5	0	0	5

Total Hours : 65

OBJECTIVE:

The aim of the subject is to know about the anatomy and physiology of human system.

UNIT 1: CARDIO-VASCULAR SYSTEM (13)

Human Cardio-vascular system – Heart – circulatory system – cardiovascular pathway – cardiac cycle – Blood Pressure.

UNIT II: GASTRO-INTESTINAL SYSTEM (13)

Human Gastro-intestinal system – digestive system - esophagus – stomach – small intestine - large intestine - pancreas – liver and gall bladder.

UNIT III: RESPIRATORY SYSTEM (13)

Human Respiratory system. Upper respiratory tract – Lower respiratory tract – Breathing and lung mechanics.

UNIT IV: NERVOUS SYSTEM (13)

Human Nervous system. Neurons – Brain – Central Nervous System – Peripheral Nervous System – Autonomic Nervous system – Spinal Cord.

UNIT V: GENITO-URINARY SYSTEM (13)

Human Genito-urinary system. Urinary system – organs – formation of urine – Male reproductive system – female reproductive system –female reproductive cycle.

OUTCOME:

The students gain the knowledge on metabolic activity of human system.

RECOMMENDED TEXT

1. Text Book of Medical physiology, Arthur C. Gyton and John E. Hall, Har Court Asia Pvt. Ltd., W.B. Saunders Company, Singapore, 10th Edition, (2000).
2. Singh H S and Rastogi P 2016. Text book of Parasitology .Rastogi publication, NewDelhi.
3. Manoharachary and Tilak Kubr 2016 Mycology and Microbiology Scientific Publication, NewDelhi

REFERENCE BOOKS

1. Kuttly, K.M., Subrahmanvam, S. and Singh, H.D. A Textbook of Human Physiology. S. Chand & Co Ltd., 2nd Edition, (2010).
4. Sreekumar, S. Basic Physiology. S. Chand & Co. Ltd., 1st Edition, (2010).

SEMESTER-V
SKILL BASED PAPER - III
MUSHROOM AND VERMICULTURE TECHNIQUES
SUBJECT CODE – U5MB26ST

L	T	P	C
3	0	0	3

Total Hours : 39

OBJECTIVE:

The aim of the subject is to cultivate the edible mushrooms, to know the mushroom diseases and role of earthworms in soil.

UNIT I: EDIBLE AND NONEDIBLE MUSHROOM (07)

Morphology of common edible mushroom, nutritional, medicinal value of mushroom, spawn, types of spawn, spawning. Edible and non-edible mushrooms.

UNIT II: CULTIVATION OF MUSHROOM (08)

Mass cultivation of *Agaricus bisporous*, *Volvariella volvaceae*, Preparation of substrates (compost), casing, harvesting, storage.

UNIT III: DISEASES AND RECIPES OF MUSHROOM (08)

Diseases (Bacterial, fungal, viral and pests) and recipes of mushrooms – soup, omlette, samosa, pickles, curry.

UNIT IV: ROLE OF EARTHWORM IN SOIL (08)

Soil biota, ecological classification of earthworms, physical and chemical effects of earthworms on soils, role of earthworms in soil, Drilospheres, microorganisms and their relationship with earthworms.

UNIT V: VERMICOMPOSTING (08)

Vermicomposting: types – vermiculture in India. Vermicompost and preparation, vermiwash – preparation and use.

OUTCOME:

The subject will motivate the students on small scale production of mushrooms and vermicomposting.

RECOMMENDED TEXT

1. Kannian, “Handbook of Edible Mushrooms” TNAU Publication, 4th Edition, (2001).
2. Kale Radha, D, Earthworm: Cinderella of organic farming. Prism Books Pvt. Ltd., Bangalore, 4th Edition, (1998).

REFERENCE BOOKS

1. Chang, T. & W.A. Haynes, "Biology and cultivation of mushrooms" Acad Press, New York, 5th Edition, (1978).
2. Edwards, C.A. & Bohlen, P.J, "Biology and Ecology and Earthworms, Chapman and Hall, London, 3rd Edition, (1996).
3. Ismail.S.A., Vermicology: The Biology Earthworm Orient Longman, 5th Edition, (1997).

SEMESTER–VI
MAJOR PAPER - VIII
FOOD AND DAIRY MICROBIOLOGY
SUBJECT CODE – U6MB21MT

L	T	P	C
6	0	0	6

Total Hours : 78

OBJECTIVE:

The aim of the subject is to know the basic concept of food and dairy microbiology, preservation, contamination of food and production of fermented food products.

**UNIT I: CHARACTERISTICS OF MICROBES IN FOOD & PRESERVATION
METHODS (15)**

Food as a substrate for microorganisms. Important microorganisms in food microbiology; Mold, Yeasts and Bacteria - general characteristics – classification and importance. Principles of food preservation – Asepsis – Removal of microorganisms, anaerobic conditions – high temperature – low temperature – drying and food additives.

UNIT II: CONTAMINATION & SPOILAGE OF FOOD (16)

Contamination and spoilage – vegetables and fruits – meat and meat products – fish and sea foods – poultry, Spoilage of canned foods.

UNIT III: FOOD BORNE INFECTIONS & ITS PREVENTIVE MEASURES (16)

Food borne infections and intoxications: Bacterial - *Staphylococcus*, *Clostridium*, *Escherichia coli* and *Salmonella* infections, Non-bacterial - Hepatitis, Amoebiasis and Mycotoxins. Preventive measures and food sanitation. HACCP.

UNIT IV: DAIRY MICROBIOLOGY(16)

Microbiology of milk. Contamination, spoilage and preservation of milk and milk products. Microbiological analysis of milk and milk products.

UNIT V: FERMENTED FOODS (15)

Fermented foods – Bread, pickles and sauerkraut, fermented dairy products – cheese and yoghurt. Oriented fermented foods – Soy sauce, Tempeh and Idli.

OUTCOME:

The students gain the knowledge to work in the field of food and dairy industries.

RECOMMENDED TEXT

1. Adams, M.R. and Moss. M.O. Food Microbiology. New International (P) Ltd. Publishers, 3rd Edition, (1995).
2. Frazier, W.C. and Westhoff, D.C. Food Microbiology. Mc Graw Hill NY, 4th Edition, (1988)
3. Reddy S.M and Girisham 2017 Applied Microbiology, scientific Publishers , NewDelhi

REFERENCE BOOKS

1. Robinson R.K. Dairy Microbiology. Elsevier Applied Science, London, 3rd Edition, (1990)
2. Banwart. G.J. Basic Food Microbiology, Chapman & Hall, New York, 4th Edition, (1988).
3. Hobbs. B.C. & Roberts. D. Food Poisoning & Food Hygiene, Edward Arnold, London, 5th Edition, (1993).

**SEMESTER-VI
MAJOR PAPER - IX
INDUSTRIAL MICROBIOLOGY
SUBJECT CODE – U6MB22MT**

L	T	P	C
6	0	0	6

Total Hours : 78

OBJECTIVE:

The aim of the subject is to know the industrially important microbes & their role in the production of various fermented products.

UNIT I: INDUSTRIAL STRAINS AND ITS DEVELOPMENT (15)

Historical development of Industrial Microbiology. Screening Techniques – Primary and secondary screening methods. Strain Development strategies - Mutation. Preservation of Microorganisms. Preparation of inoculum.

UNIT II: MICROBIAL BIOCONVERSIONS, PRODUCTION MEDIA AND FERMENTOR (16)

Microbial transformation – Types of bioconversions. Production media – characteristics, raw materials and screening. Fermentor – configurations, characteristics and its types. Types of fermentation – Solid and Submerged.

UNIT III: STERILIZATION & DOWNSTREAM PROCESSING (15)

Industrial sterilization – Principle, equipments, sterilization of fermentor, production media and air. Recovery and purification of intracellular and extracellular fermentation products – Downstream processing.

UNIT IV: FERMENTATION PRODUCTS AND ITS APPLICATIONS (16)

Microbial production of alcoholic beverages – Ethanol, Beer and Wine, Organic acids – Citric acid, Lactic acid and Acetic acid, Aminoacids – Lysine and Glutamic acid, Enzymes – Amylase and Protease. Application of enzymes in various industries – Food, leather, textile, detergent and paper industries.

UNIT V: ALGAL BIOTECHNOLOGY AND WASTE MANAGEMENT (16)

Production of SCP – Yeast, Algae and Bacteria, Biofuel – Methane and hydrogen. Industrial effluent treatment.

OUTCOME:

The students gain the knowledge to work in various industries.

RECOMMENDED TEXT

1. Patel, A.H. Industrial Microbiology. Macmillan India Limited, 4th Edition, (2000).
2. Dubey, R.C and Maheswari, D.K. A Text book of Biotechnology. S. Chand & Company Ltd. New Delhi, 3rd Edition, (2005).

REFERENCE BOOKS

1. Demain, A.L. and Davies, J.E. Manual of Industrial Microbiology and Biotechnology. ASM Press, 3rd Edition, (1999).
2. Stanbury, P.F., Whitaker, A. and Hall, S.J. Principles of Fermentation Technology, Pergamon Press, 4th Edition, (1995).
3. Glick BR, Pasternak. J. Molecular Biotechnology, ASM Press, Washington DC, 3rd Edition, (1994).

**SEMESTER-VI
ELECTIVE PAPER - III
PHARMACEUTICAL MICROBIOLOGY
SUBJECT CODE – U6MB23ET**

L	T	P	C
5	0	0	5

Total Hours : 65

OBJECTIVE:

The aim of the subject is know the industrially important strains, fermentors, production of drugs, recombinant vaccines & growth hormones.

UNIT I: INDUSTRIAL STRAINS & FERMENTATION MEDIA (12)

Pharmaceutical strains of microorganism – Screening methods – Inoculum development methods – Fermentation media.

UNIT II : FERMENTOR & ITS TYPES (13)

Fermentation – Equipments – Laboratory pilot plant fermentors – Fermentation processes – Aerobic and anaerobic processes, surface and submerged fermentations – Batch and Continuous fermentations.

UNIT III: INDUSTRIAL PRODUCTS FROM MICROBES (14)

Production of antibiotics – Penicillin, Streptomycin – Assay methods. Antiseptics & Disinfectants – standardization. Production of vitamins – Riboflavin, Ascorbic acid, Cyanocobalamine – Assay methods.

UNIT IV: RECOMBINANT PROTEIN FROM MICROBES (13)

Production of Human replacement protein – Insulin, Interferon, TPA & Growth Hormones. Production of Vaccines, toxoids and antisera against common infectious disease – Standardisation and quality control.

UNIT V: STERILITY TESTING PROCEDURE (13)

Sterility testing of pharmaceutical products – Injectables, IV fluids, etc. – Pyrogen testing.

OUTCOME:

The students gain the knowledge about antibiotic production in pharmaceutical industries.

RECOMMENDED TEXT

1. Hugo, W.B., Russell, A.D., Pharmaceutical Microbiology, Blackwell Scientific Publications/Oxford, 4th Edition, (1992).
2. Patel, A.H. Industrial Microbiology. Macmillan India Limited, 4th Edition, (2000).

REFERENCE BOOKS

1. Russell and Ayliffe, G.A.J. Principles in practice of disinfection, preservation and Sterilization, Oxford, 3rd Edition, (1982).
2. Gregory, P.H., Microbiology of the Atmosphere, Leonard Hill, 2nd Edition, (1961).

SEMESTER-VI ELECTIVE PAPER - IV TANNERY TECHNOLOGY

SUBJECT CODE – U6MB24ET

L	T	P	C
5	0	0	5

Total Hours : 65

OBJECTIVE:

The aim of the subject is to know the knowledge about tanning of leathers & treating of effluents.

UNIT I: NATURE AND COMPOSITION OF TANNERY (13)

Types of tannery available in India. Their nature and composition. Present methods of collection and utilization.

UNIT II: RECOVERY FROM TANNERY EFFLUENT (13)

Recovery of salt from tannery effluent. Its treatment and re use. Theoretical and practical aspects of recovery of chrome. Protein and biogas from tannery effluent. Recovery of fat, proteins, chemical and glue and their use. Pet treats, finished splits, gloves, washers etc.

UNIT III: VEGETABLE TANNINS (13)

Chemistry of vegetable tannins, extraction criteria for vegetable tannis, Solid – liquid ratio for extraction, chemical modification and blending of vegetable tannis.

UNIT IV: TANNING SALTS (13)

Types of mineral tanning salts, chemistry of Basic chromium sulphate preparation, basicity and masking system, factors influenzing exhaustion of chromium (III) during tanning.

UNIT V: TREATMENT OF TANNERY EFFLUENTS (13)

Treatment of Tannery effluents by Microbes.

OUTCOME:

The students gain the knowledge on working in the field of leather industries.

RECOMMENDED TEXT

1. Scaria. K.J., Mahendrakumar, M and Divakaran, S. “ Animal by products – Their bioprocessing and utilization” CLRI, Madras, 2nd Edition, (1961).
2. Taiganides, E.P. “Animal Wasters”. Applied Science Publishers Ltd., Essex., 3rd Edition, (1977).

REFERENCE BOOKS

1. Mann, I. “Process of utilization of Animal by products” /FAO Rome, 3rd Edition, (1962).
2. “Low Cost Waste Treatment”, NEERI, Nagpur, (1972).
3. Cawe, M.C. et al., Tannery Center Technique der Cuir, Lyon, France

**SEMESTER–VI
ELECTIVE PAPER - V
ENVIRONMENTAL MICROBIOLOGY
SUBJECT CODE – U6MB25ET**

L	T	P	C
5	0	0	5

Total Hours : 65

OBJECTIVE:

The aim of the subject is to know the interaction of microorganisms in environment, biogeochemical cycle and degradation of pollutant by microorganisms

UNIT I: MICROBIAL INTERACTIONS (13)

Habitat and Microorganisms in air, soil, terrestrial, freshwater, marine and extreme environments. Microbial interactions : Symbiosis, Commensalism, Synergism, Mutualism, Antagonism and Parasitism. Rumen flora.

UNIT II: AIR MICROBIOLOGY (13)

Microbes in air - sources and distribution - Air pollutants - Assessment of air quality - Air borne diseases, prevention and control. Green House Effect- Global Warming.

UNIT III: AQUATIC MICROBIOLOGY (13)

Aquatic Microbiology - Ecosystem – Freshwater (Ponds, Lakes, Streams) - Marine (Estuaries, Mangrooves, Deep sea) - Eutrophication.- Microbiological assessment of water quality - Water

Purification - Water borne diseases, prevention and control - Waste treatment (solid and liquid waste).

UNIT IV: BIOGEOCHEMICAL CYCLES (14)

Biogeochemical cycles: Carbon, Nitrogen, Phosphorus, Sulfur and Iron cycles.

UNIT V: BIODEGRADATION (12)

Biodegradation of organic matter, Xenobiotic compounds, Genetically Engineered Microorganisms (GEM) and its role in bioremediation. Phytoremediation.

OUTCOME:

The student gain the knowledge on pollution free environment by using microbes

RECOMMENDED TEXT

1. Atlas Ronald, M., Bartha and Richard Microbial Ecology. Benjamin/Cummings Publishing Company, California, 2nd Edition, (1987).
2. Prescott L.M. Harley J.P. and Klein D.A. Microbiology, McGraw Hill, New York, 5th edition, (2003).
3. Daniel C. Environmental Aspects of Microbiology, Brightsun Publications, Chennai. 2nd Edition, (1997).
4. Sharma P.D 2017, Environmental Microbiology, Rastogi Publishers ,New Delhi

REFERENCE BOOKS

1. Dirk, J. Elsas, V., Trevors, J.T., Wellington, E.M.H. Modern Soil Microbiology, Marcel Dekker INC., New York, Hong Kong, 2nd Edition, (1997).
2. Ec Eldowney S, Hardman D.J., Waite D.J., Waite S. Pollution: Ecology and Biotreatment – Longman Scientific Technical, 3rd Edition, (1993).
3. Grant W.D and Long, P.L. Environmental Microbiology. Blackie Glasglow and London, 2nd Edition, (1981).
4. Alexander M. Introduction to soil microbiology. John Wiley & Sons, Inc., New York, 2nd Edition, (1997)

SEMESTER–VI ELECTIVE PAPER - VI

L	T	P	C
5	0	0	5

Total Hours : 65

BIOCHEMICAL METHODOLOGY
SUBJECT CODE – U6MB26ET

OBJECTIVE:

The aim of the subject is to handle the basic instruments and techniques in the field of applied microbiology.

UNIT I: COLORIMETRY AND SPECTROMETRY (13)

Colorimetry and Spectrometry: Principles, Instrumentation –Beer Lambert's law – Analysis – Qualitative and Quantitative – Uses.

UNIT II: CENTRIFUGATION (13)

Centrifugation: Principles – Instrumentation – Types – Methods and Applications.

UNIT III: CHROMATOGRAPHY (13)

Chromatography: Principles – Types (Paper, TLC, HPLC, GC, Column – Affinity) and methods – Qualitative and Quantitative – Applications.

UNIT IV: ELECTROPHORESIS (13)

Electrophoresis – Principles, Types. Staining and detection methods – Isoelectrophoresis – isoelectric focusing – Applications.

UNIT V: MACROMOLECULES (13)

Fundamental building blocks – Atoms – Bonds and molecules. Macromolecules – Chemical nature and functions of Carbohydrate, Lipids, Proteins and Nucleic acids.

OUT COME:

The student are well versed handling the instruments in various fields of microbiology

RECOMMENDED TEXT

1. Keith Wilson and John Walker, Practical Biochemistry, Cambridge University Press, 4th Edition, (1994).
2. David Freifelder. Physical Biochemistry, W. H. Freeman and Company, San Francisco, 2nd Edition, (1983).

REFERENCE BOOKS

1. Boyer. Practical Biochemistry, Cambridge Univ. Press, New York, 4th Edition, (1992).
2. Kathleen Talaro and Arthur Talaro, Foundation in Microbiology, WCB Publishers, 2nd Edition, (1993)

**SEMESTER-VI
SKILL BASED PAPER - IV
AGRICULTURE AND BIOFERTILIZER TECHNOLOGY
SUBJECT CODE – U6MB27ST**

L	T	P	C
3	0	0	3

Total Hours : 39

OBJECTIVE:

The aim of the subject is to gain the knowledge about the biofertilizers and biopesticides that are applied in the field of agricultural microbiology.

UNIT I: BIOFERTILIZER (08)

General account on the microbes used as biofertilizers for crop plants and their advantages. Symbiotic nitrogen fixers – *Rhizobium*, *Frankia*, *Azolla*, BGA and *Lichens* – Isolation, characterization, mass production, field application and crop response.

UNIT II: NITROGEN FIXERS & CROP RESPONSE (08)

Non-symbiotic Nitrogen fixers – *Azotobacter* and *Azospirillum* - Isolation, characterization, mass production, field application and crop response.

UNIT III: PHOSPHATE SOLUBILIZERS (07)

Phosphate solubilizers – phosphate solubilizing microbes – Isolation, characterization, mass production and field application. Phosphate solubilization mechanisms.

UNIT IV: MYCORRHIZAE (08)

Mycorrhizal bioinoculants – Classification – Ectomycorrhizae – Endomycorrhizae – Ectendomycorrhizae. Isolation of VAM. Mass Inoculum production of VAM. Field application of Ectomycorrhizae and VAM.

UNIT V: BIOPESTICIDES (08)

Biopesticides – Bacteria, Virus and Fungi. Soil Microorganisms - Phyllosphere, Rhizosphere.

OUTCOME:

The subject will motivate the student on small scale production of biofertilizers.

RECOMMENDED TEXT

1. Alexander. Introduction to Soil Microbiology. John Wiley and Sons. 3rd Edition, (1997).
2. Sharma, P.D. Microbiology & Plant Pathology. Rastogi Publications, 3rd Edition, (2012).

REFERENCE BOOKS

1. Subba Rao, N.S. Biofertilizers in Agriculture and Forestry. 3rd Edition. Oxford and IBH publication Co. Pvt. Ltd., New Delhi. 3rd Edition, (1995).
2. Paul, E.A. and Clark. F.E. Soil Microbiology and Biochemistry. Academic press, New York. 2nd Edition, (1989).

**SEMESTER-VI
CORE PRACTICAL - III
MEDICAL MICROBIOLOGY
SUBJECT CODE – U6MB21MP**

L	T	P	C
0	0	4	4

Total Hours : 52

1. Simple Staining Technique.
2. Gram's Staining Technique.
3. Acid Fast Staining Technique.

4. Capsule Staining Technique.
5. Endospore Staining Technique.
6. Wet Mount Technique.
7. Motility demonstration by Hanging drop technique.
8. Wet mount examination of stool.
9. Methods of Enriched and Enrichment culture technique.
10. Biochemical tests – IMViC test, Catalase, Oxidase & Urease test, TSI test.
11. Enumeration of bacteria in urine.
12. Collection, Transport & Processing of Clinical Specimens – Throat swab.
13. Collection, Transport & Processing of Clinical Specimens – Ear discharge, Pus.
14. Collection, Transport & Processing of Clinical Specimens – Urine, Sputum.
15. Antimicrobial Sensitivity Test.
16. LPCB Staining of Fungi.
17. Germ Tube Test for Yeast.
18. Sugar Fermentation Test for Yeast.

REFERENCE BOOKS

1. Mackie and McCartney Practical Medical Microbiology, Elsevier; 14th Edition, (2007).
2. Dev, N.C., Dev, T.C. Practical Microbiology Protozoology and Parasitology: Including Bacteriology, Virology, Mycology, Immunology, Serology, and Automated Methods. New Book Agency, 2nd Edition, (2011).
3. Bailey & Scott's. Diagnostic Microbiology, MacMillon Publishers, 13th Edition, (2013).

SEMESTER–VI
CORE PRACTICAL - IV
FOOD, AGRICULTURAL & ENVIRONMENTAL MICROBIOLOGY
SUBJECT CODE – U6MB22MP

L	T	P	C
0	0	5	5

Total Hours :65

1. Water Analysis by MPN method – Presumptive coliform test
2. Confirmed coliform test
3. Completed coliform test
4. Isolation of bacteria from air by air sampler technique
5. Isolation of fungi from air by air sampler technique
6. Enumeration of bacteria from air by settle plate method
7. Enumeration of fungi from air by settle plate method
8. Enumeration of bacteria in milk by SPC method
9. Methylene Blue Reduction Test (MBRT)
10. Litmus Milk Reduction
11. Isolation of *Lactobacillus* from curd
12. Gram staining of curd
13. Morphological study of *Azolla*
14. Enumeration of bacteria from soil
15. Isolation of *Rhizobium* from soil
16. Isolation of bacteria from spoiled food
17. Isolation of fungi from spoiled food
18. Isolation of fungi from molting leaves

REFERENCE BOOKS

1. Mackie and Mc Cartney. Practical Medical Microbiology, Elsevier; 14th Edition, (2007).
2. Dev, N.C., Dev, T.C. Practical Microbiology. Protozoology and Parasitology: Including Bacteriology, Virology, Mycology, Immunology, Serology, and Automated Methods. New Book Agency, 2nd Edition, (2011).
3. Bailey & Scott's. Diagnostic Microbiology. Macmillon Publishers, 13th Edition, (2013).

ADHIPARASAKTHI COLLEGE OF ARTS & SCIENCE
(Autonomous)

Permanently Affiliated to Thiruvalluvar University, Vellore
Re – accredited by NAAC with ‘B’ Grade (CGPA – 2.83)

M.Sc., APPLIED MICROBIOLOGY
Under CBCS

SYLLABUS

(Effective from the Academic Year 2018-2019)

ADHIPARASAKTHI COLLEGE OF ARTS & SCIENCE
(Autonomous)
Permanently Affiliated to Thiruvalluvar University, Vellore
Accredited by NAAC with B⁺⁺ Grade

M.Sc., APPLIED MICROBIOLOGY

Under CBCS

(Effective from the Academic Year 2018-2019)

REGULATIONS

CBCS

Choice-Based Credit System is a flexible system of learning. ‘Credit’ defines the quantum of contents / syllabi prescribed for a course, and determines the number of hours of instruction required. The distinguishing features of CBCS are the following:

It permits the students to:

- ❖ Learn at their own pace
- ❖ Choose electives from a wide range of elective courses offered by the departments of the college.
- ❖ Undergo additional courses and acquire more than the required number of credits
- ❖ Adopt an inter – disciplinary approach in learning
- ❖ Make best use of the expertise of available faculty

5. Eligibility for Admission:

No student shall be eligible for admission to a Master’s degree programme in any of the faculties unless he/she has successfully completed a three year undergraduate degree or earned prescribed number of credits for an undergraduate degree through the examinations conducted by a University / autonomous institutions or possesses such qualifications recognized by Thiruvalluvar University as equivalent to an undergraduate degree.

Provided that candidates for admission into the specific main subject of study shall also possess such other qualifying conditions as may be prescribed by the University in the Regulations governing respective courses of study.

Admission to the M.Sc. Applied Microbiology Degree Course shall be made as follows:

I Preference

A student who has passed B.Sc. Degree with 50% either with Microbiology or Biology/Botany/Zoology as Major Subject 5% relaxation shall be given to SC /ST applicants.

II Preference

A student who has passed B.Sc. Degree with 50% and having Microbiology or Biology at the Allied level and any of the Main Subject as mentioned below:

- 9) Industrial Microbiology
- 10) Biotechnology
- 11) Biochemistry
- 12) Bioinformatics
- 13) Life science
- 14) Nutrition and Dietetics
- 15) Home Science
- 16) Chemistry with botany/zoology as allied subjects
- 17) Any Biology related subject.

6. Eligibility for the Award of Degree:

A Candidate shall be eligible for the award of the Degree only if he/she has undergone the prescribed course of study in the college for a period of not less than two academic year and passed the examinations of all the Four Semesters prescribed earning 90 credits and fulfilled such conditions as have been prescribed therefore.

7. Duration of the course:

The duration of course shall be two years consisting of four semesters.

4. Examination:

There shall be four semester examinations: The first semester examination at the middle of the first academic year and the second semester examination at the end of the first academic year. Similarly the third and fourth semester examinations shall be held at the middle and the end of the second academic year, respectively.

A candidate who does not pass the examination in any subject or subjects in one semester will be permitted to appear in such failed subject or subject along with the papers of following

semesters.

The following assessment procedure will be followed for Internal Marks:

Continuous Internal Assessment [CIA] Test

S. No	Reg. No	Name	Test I Marks For 50	Test II Marks For 75	Test III Marks For 75	Marks For 200	Marks Converted to 20/20	Assignments /Seminars [5] Records [5]	Marks For 25/25	Total Rounded to Marks for 25 /25

Test I : One hour duration for 50 marks [Two Units of the Syllabus]

Test II : Two hours duration for 75 marks [Four Units of the Syllabus]

Test III: Three hours model test for 75 marks [Total Syllabus]

Total marks 200

Theory

Practical

Test marks to be converted to : 20 marks / 20 marks

Assignments / Seminars : 5 marks / -

Records : - / 5 marks

Total : 25 marks / 25 marks

In the column Rounded to 25 / 25, any fraction may be rounded to the next number.

a. Requirements for proceeding to Subsequent Semester

i. Candidates shall register their names for the First Semester Examination after admission in the PG Courses.

ii. Candidates shall be permitted to proceed from the First Semester up to Final Semester irrespective of their failure in any of the Semester Examination subject to the condition that the candidates should register for all the arrear subject of earlier semesters along the current [subject] Semester subjects.

iii. Candidates shall be eligible to go to subsequent semester, only if they earn sufficient attendance as prescribed therefore by the Academic council from time to time. Provided in case of a candidate earning less than 65% of attendance in any one of the Semesters due to any extraordinary circumstances such as medical grounds, such candidate who shall produce Medical Certificate issued by the Authorised Medical Attendant [AMA], duly certified by the Principal of the college shall be permitted to proceed to the next semester and to complete the course of

study. Such candidates shall have to repeat the missed Semester by rejoining after completion of Final Semester of the course, after paying the fee for the break of study as prescribed by the College from time to time.

6. Passing Minimum:

A candidate shall be declared to have passed the whole examination, if he/she passes in all the papers and practical wherever prescribed/as per the scheme of examinations by earning 90 CREDITS.

In fixing the passing minimum marks the following will be observed.

[a]. There shall be no Passing Minimum for Internal.

[b]. For External Examinations, Passing Minimum shall be of 50% [Fifty Percentage] of the minimum marks prescribed for the paper.

[c]. In the aggregate (External + Internal) the Passing Minimum shall be of 50% for each Paper/Practical/Project and Viva-voce.

[d]. Grading shall be based on overall marks obtained (Internal + External).

7. Classification of Successful Candidates:

Candidates who secured not less than 60% of aggregate marks [Internal + External] in the whole examination shall be declared to have passed the examination in the First Class.

All other successful candidates shall be declared to have passed in Second Class. Candidates who obtain 75% of the marks in the aggregate [Internal + External] shall be deemed to have passed the examination in First Class with Distinction, provided they pass all the examinations [theory papers, practical, project and Viva-voce] prescribed for the course in the First appearance.

8. Requirements to take the Semester Examinations

a] A candidate will be permitted to take the Examination of any Semester, if

i] He/She secures not less than 75% of attendance out of the 90 instructional days during the semester. [In the case of married women students the minimum attendance requirement shall be 55% of total instructional days].

ii] He / She earns a Progress Certificate from the Head of the Institution, of having satisfactorily completed the prescribed course of study in the subject as required by these Regulations, and

iii] His/ Her conduct has been satisfactory.

Provided that it shall be open to the Academic council or any authority delegated with such powers by the Academic council to grant exemption to a candidate who has failed to earn 75% of the attendance prescribed for any valid reason[s] subject to the usual conditions.

b] A candidate who has secured attendance less than 75% but 65% and above shall be permitted to take the Examination on the recommendation of the Head of the Department to condone the lack of attendance as well as on the payment of the prescribed fees to the College.

c] A candidate who has secured attendance less than 65% but 55% and above in every semester, as to compensate the shortage of attendance in the subsequent semester besides, earning the required percentage of attendance in that semester and take the examinations of both the semester papers together at the end of the later semester.

d] A candidate who has secured less than 55% of attendance in any semester will not be permitted to take the regular examinations. He/She has to re-do the course after the completion of the final semesters by rejoining the semester in which the attendance is less than 55%.

e] A candidate who has secured less than 65% of attendance in the final semester as to compensate his/her attendance shortage in a manner to be decided by the Head of the Department concerned after rejoining the course.

9. Grading System:

In addition to the above marking system grading system is also adopted as detailed below.

The marks (sum of IA and UE marks) in each course are assigned with a letter grade on a five points scale using the following letter grade points and a range of marks.

SEVEN POINT SCALE [As per UGC notification 1998]

Marks	Grade Point	Letter Grade	Class
95-100	7.00	H	First Class with Distinction
90-94	6.00	O	First Class with Distinction
75-89	5.50	D	First Class with Distinction
60-74	4.75	A	First Class
54-59	4.00	B	Second Class
50-54	3.50	C	Second Class
Below 50	3.00	F	Fail

From the second semester onwards the total performance within a semester and continuous performance starting from the first semester are indicated respectively by **Grade Point Average**

[GPA] and **Cumulative Grade Point Average [CGPA]**. These two are calculated by the following formulae:

$$\text{GPA} = \frac{\sum_{i=1}^n C_i G_i}{\sum_{i=1}^n C_i}$$

Where 'C_i' is the credit earned for the course 'i' in any semester; 'G_i' is the Grade Point obtained by the student for the course 'i' and 'n' is the number of courses passed in that semester.

CGPA=GPA of all the courses starting from the first semester to the last semester.

10. RANKING

Candidate who pass all the examinations prescribed for the course in the First Appearance itself alone are eligible for Ranking.

Provided in the case of Candidates who pass all the examinations prescribed for the course with a break in the First Appearance due to the reasons as furnished in the Regulation 7.[iii] Supra are eligible for Classification / Distinction.

The mark obtained in improvement examination will not be taken into consideration for Ranking.

11. The Medium of Instruction and Examinations

The medium of Instruction and Examinations shall be in English.

15. Submission of Record Notebooks for Practical Examinations

Candidates taking the Practical Examinations should submit bonafide Record Notebook prescribed for the Practical Examinations. Otherwise the candidate will not be permitted to take the practical Examinations. However, in genuine case where the students could not submit the record notebook may be permitted to take the Practical Examinations provided the Head of the Department concerned certifies that the candidate has performed the experiments prescribed for the Course. For such of those candidates who do not submit Record Books, zero [0] marks will be awarded for record notebooks.

In case a candidate fails in the Practical Examination the marks awarded for the record at the time of first appearance for the Practical Examination should be made available by the College to the Examiners at the subsequent appearance by the candidate.

16. Improvement of marks in the subjects already passed

Candidates who have passed in theory paper/papers are allowed to appear again for theory paper/papers only once in order to improve his/her marks, by paying the fee prescribed from time to time. Such candidates are allowed to improve within a maximum period of 10 semesters counting from his/her first semester of his/her admission. If candidate improves his/her marks, then his/her improved mark will be taken into consideration for the award of Classification and Distinction only. Such improved marks will not be counted for the award of Prize/Medals and Rank. If the candidate does not show improvement in the marks, his/her previous marks will be taken into consideration.

No candidate will be allowed to improve marks in the Practical and Field work.

17. Checklist for Inspection

- c. Qualification for
- iv. Teaching Faculty : as Prescribed by the UGC and the University
- v. Technical Faculty : as Prescribed by the UGC and the University
- vi. Laboratory Staff : as Prescribed by the UGC and the University
- d. Infrastructure Facilities
- iv. Building : Number of Classrooms with specifications: 3 rooms measuring 20' X 25'
Number of Staff rooms: One measuring 20' X 20'
- v. Furniture : One pair of table / chair per student
- vi. Laboratory @ 10 Sq. ft. per student

PATTERN OF QUESTION PAPER

Section – A (300 words)

To Answer 5 questions (either / or pattern) 5 X 6 marks = 30 marks

Section – B (900 words)

To Answer 3 questions out of 5 questions 3 X 15 marks = 45 marks

Total = 75 marks

ANNEXURE – I

ELIGIBILITY FOR ADMISSION TO M.Sc. APPLIED MICROBIOLOGY

Admission to the M.Sc. Applied Microbiology Degree Course shall be made as follows:

I Preference

A student who has passed B.Sc. Degree with 50% either with Microbiology or Biology/Botany/Zoology as Major Subject 5% relaxation shall be given to SC /ST applicants.

II Preference

A student who has passed B.Sc. Degree with 50% and having Microbiology or Biology at the Allied level and any of the Main Subject as mentioned below:

12. Industrial Microbiology
13. Biotechnology
14. Biochemistry
15. Bioinformatics
16. Life science
17. Nutrition and Dietetics
18. Home Science
19. Chemistry with botany/zoology as allied subjects
20. Any Biology related subject.

MISSION & GOALS OF MICROBIOLOGY

We aim to provide a learning environment that excites and informs undergraduate majors and non-majors about microbiology and the many ways that it is relevant to everyday life. Through our Microbiology Department is committed to providing a transformative education through the following elements:

1. Provide compelling and relevant undergraduate courses that teach science literacy and provide the fundamental knowledge for our majors to succeed in their careers.
2. Provide training through innovative, non-conventional coursework that stresses inquiry-based learning.
3. Courage and provide opportunities for students to participate in research.
4. Prepare our majors for future careers or further educational opportunities by providing a capstone experience.
5. Equalize opportunities for under-represented minorities and for students with diverse life experiences.
6. Improve the timely progression to graduation for majors of all backgrounds.

GENERAL CAREER OPPORTUNITIES FOR MICROBIOLOGISTS:

1. Microbiologists can work in the area of food, pharmacy, agrochemistry biotechnology, biorefinery, environment, pollution control and bioremediation.
2. In the field of agriculture, microbiologists act as environmental and health specialists to study the role of microbes in plant disease, pest control, nutrition and soil fertility.
3. In the field of medicine and health care, the work is usually associated with diagnosis, prevention and treatment of illnesses associated with microbes.
4. Universities and colleges employ microbiologists as researchers and teachers.

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G.B.NAGAR, KALAVAI-632506
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DEGREE COURSES

M.Sc. Applied Microbiology
(With effect from 2014-2015)

Year/ Semester	Subject	Paper	Subject Code	Title of the Paper	Ins. Hrs/ Week	Credit	Exa m Hrs	Marks		
								IA	Sem. Exam	Total
I Year/ I Semester	Core	Paper I	P1AM01MT	General Microbiology & Microbial Diversity	5	5	3	25	75	100
	Core	Paper II	P1AM02MT	Food and Environmental Microbiology	5	5	3	25	75	100
	Core	Paper III	P1AM03MT	Immunotechnology	5	5	3	25	75	100
	Core practical	Practical I	-	General, Food, Environmental Microbiology and Immunotechnology	12	-	-	-	-	-
	Elective I	Paper I	P1AM04ET	Soil & Agricultural Microbiology	3	3	3	25	75	100
		Paper II	P1AM05ET	Bioprocess Technology	3	3	3	25	75	100
TOTAL					30	18	12	100	300	400
I Year / II Semester	Core	Paper IV	P2AM01MT	Medical Bacteriology & Virology	5	5	3	25	75	100
	Core	Paper V	P2AM02MT	Medical Mycology & Parasitology	5	5	3	25	75	100
	Core	Paper VI	P2AM03MT	Microbial Physiology & Genetics	5	4	3	25	75	100
	Core practical	Practical I	P2AM01MP	General, Food, Environmental Microbiology and Immunotechnology	-	4	6hrs /day for 2 days	40	60	100
	Core practical	Practical II	P2AM02MP	Medical Microbiology, Haematology and Microbial Physiology	10	4	6hrs /day for 2 days	40	60	100
	-	-	P2HR01GS	Human Rights	2	2	3	25	75	100
	Elective II	Paper III	P2AM04ET	Haematology and Clinical Techniques	3	3	3	25	75	100
		Paper IV	P2AM05ET	Bioinformatics and Bioinstrumentation	3	3	3	25	75	100
TOTAL					30	27	27	205	495	700
GRANT TOTAL					60	45	39	305	795	1100

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AFFILIATED TO THIRUVALLUVAR UNIVERSITY, VELLORE
DEGREE COURSES

M.Sc. Applied Microbiology

(With effect from 2014-2015)

The course of study and the scheme of examination.

Year/ Semester	Subject	Paper	Subject Code	Title of the Paper	Ins. Hrs/ Week	Cre dit	Exa m Hrs	Marks		
								IA	Sem. Exam	Total
II Year/ III Semester	Core	Paper VII	P3AM01MT	Cell Biology and Molecular Biology	5	5	3	25	75	100
	Core	Paper VIII	P3AM02MT	Microbial Gene Technology	5	5	3	25	75	100
	Core	Paper IX	P3AM03MT	Industrial Biotechnology	5	5	3	25	75	100
	Core practical	Practical III	-	Cell Biology, Microbial Gene Technology and Industrial Biotechnology	9	-	-	-	-	-
	Elective III	Paper V	P3AM04ET	Research Methodology	3	3	3	25	75	100
		Paper VI	P3AM05ET	IPR, Biosafety	3	3	3	25	75	100
	Elective IV	Paper VII	P3AM06ET	Herbal Technology	3	3	3	25	75	100
		Paper VIII	P3AM07ET	Clinical Microbiology	3	3	3	25	75	100
TOTAL					30	21	15	125	375	500
II Year / IV Semester	Core	Paper X	P4AM01MT	Biological Techniques	5	4	3	25	75	100
	Core Practical	Practical III	P4AM01MP	Cell Biology, Microbial Gene Technology and Industrial Biotechnology	-	4	6hrs /day 2 days	40	60	100
	Core Practical	Practical IV	P4AM02MP	Biological Techniques	10	3	6hrs /day 2 days	40	60	100
	Elective V	Paper IX	P4AM02ET	Bioremediation	3	3	3	25	75	100
		Paper X	P4AM03ET	Genetic Engineering	3	3	3	25	75	100
	-	-	P4AM01PV	Project/Dissertation with Viva Voce	12	10	-	50	150	200
TOTAL					30	24	18	180	420	600
GRANT TOTAL					60	45	33	305	795	1100
OVER ALL TOTAL					120	90	72	610	1590	2200

SEMESTER I

MAJOR PAPER I

GENERAL MICROBIOLOGY

SUBJECT CODE: P1AM21MT

L	T	P	C
5	0	0	5

Total Hours : 65

OBJECTIVE:

The subject aims to understand the scope, history of microbiology, basic concept of microscope, microbial nutrition, anatomy and physiology of prokaryotes and Eukaryotes.

UNIT I: DISCOVERY AND EVOLUTION OF MICROORGANISMS (13)

Basic concepts - Spontaneous generation - Germ theory of diseases- Cell theory – Contributions of Antony van leuwenhoek – Joseph Lister – Robert Koch – Louis Pasteur – Edward Jenner – John Tyndall – Sergei N. Winogradsky – Salmon Awakeman – Alexander Flemming – Paul Erlich – Fannie Hessie – Elie Metchnikoff – Kary Mullis. Development of pure culture methods.

UNIT II: INSTRUMENTATION (13)

Microscopy – its principle and application. Simple, compound, dark field, phase contrast, fluorescent and electron microscope – SEM & TEM. Principles, operation and maintenance of autoclave, oven, centrifuge – refrigerated, ultraspeed, spectrophotometry, lyophilizer and deep freezer.

UNIT III: MICROBIAL PHYSIOLOGY (14)

Microbial nutrition – Nutritional groups, Common nutrient requirements, Growth factors – Microbial growth – Growth curve – Measurement of microbial growth. Growth kinetics – Batch, Continuous and Synchronous cultures. Factors influencing the growth of microorganisms.

UNIT IV: BACTERIAL MORPHOLOGY (12)

Microbial cell – Ultra structure of Prokaryotic and Eukaryotic cell. Sub cellular structures and Cell envelope, Slime layer, Capsules, Cell wall, Pili, Flagells, Cell – inclusions, Endospores, Cell membrane, Liposomes.

UNIT V: OVERVIEW OF ALGAE & ARCHAEA (13)

Distribution of Algae – Thallus structure – Reproduction in algae – Life cycle patterns in Algae. Archaeobacteria – Adaptations to extreme environment.

OUTCOME:

This will lead the beginners rightly exposed to the foundation of microbiology.

Text Books:

1. Sale, A.J. (1992) “Fundamentals Principles of Bacteriology”, 7th Edition. McGraw Hill Publishing Co. Ltd., New York.
2. Dubey, R.C and Maheswari, D.K. (2005) A Text book of Microbiology. S. Chand & Company Ltd. New Delhi.
3. Stainer, R.Y., Ingraham, J.L., Wheelis, M.L. and Painter, P.R. (1986). “General Microbiology” – Mac Milan Education Ltd. London.
4. Michael J. Pelczar. (2006). “Microbiology”, Tata McGraw Hill Publishing Co. Ltd., New Delhi.
5. Bold, H.D and wyne, M.J(1978).Introduction to the algae: Structure and Reproduction. Prentice Hall, New jersey.
6. General Microbiology, Hans G. Schlegel, 7th Edition, (2018).
7. General Microbiology, Pelczar, 5th Edition, (2018).

Reference Books:

1. John G. Holt and David Hendricks Bergey, (1993). Bergeys Manual of Determinative Bacteriology, 9th Edition, Lippincott Williams and Wilkins Publishers.
2. Joanne Willey and Linda Sherwood. (2011). Prescott M, Microbiology, 6th Edition, Tata McGraw Hill Publishing Co. Ltd., New Delhi.
3. General Microbiology, Prescott, 9th Edition (2017).
4. A Textbook of Microbiology, S. Chand, 5th Edition (2017).

SEMESTER-I
MAJOR PAPER - II
FOOD AND ENVIRONMENTAL MICROBIOLOGY
SUBJECT CODE – P1AM22MT

L	T	P	C
5	0	0	5

Total Hours : 65

OBJECTIVE:

The aim of the subject is to know the basic concept in preservation of food, production of fermented food and food borne infection, presence of microorganism in air and water and to treat the waste water effluent

UNIT I: SPOILAGE AND PRESERVATION OF FOOD (12)

Microorganism and food. Intrinsic and extrinsic factors. Microbial spoilage of milk, meat, poultry, fish, fruits, vegetables, cereals, pulses. Preservation of food by physical and chemical methods.

UNIT II: FOOD BORNE DISEASES AND FERMENTED FOODS (14)

Food borne diseases (Bacterial and non bacterial agents) and preventive measures. Fermented milk products – lactic acid bacteria, fermented vegetables (Sauerkraut, cucumber pickles). Fermented meat – fermented fish – fermented beverages – beer and wine. Mold fermentation.

UNIT III: AEROBIOLOGY (12)

Aerobiology – A brief introduction – droplet nuclei – aerosols – airborne transmission of microbes and diseases. Assessment of air quality. Air pollution and preventive methods.

UNIT IV: AQUATIC MICROBIOLOGY (14)

Aquatic microbiology – Aquatic habitats – Freshwater – lakes, ponds and streams: marine habitats – estuaries, deep seas, hydrothermal vents, salt pans, coral reefs and mangroves and their microbial communities, zonation. Food chains and food web.

UNIT V: WASTE TREATMENT (13)

Waste treatment – types of waste, characterization of solid and liquid waste – treatment of solid waste – composting – vermiform composting, Saccharification. Treatment of liquid waste – primary, secondary and tertiary.

OUTCOME:

To gain the knowledge about food and environmental microbiology.

RECOMMENDED TEXT

1. Adams M.R., and Moss M.O. Food Microbiology, The royal Society of Chemistry, Cambridge, 5th Edition, (1995).
2. Frazier, W.C. and Westhoff, D.C. Food Microbiology, Tata Mc Graw Hill publishing Company Ltd., New Delhi. 3rd Edition, (1998).
3. Robinson R.K. The Microbiology of Milk, Elsevier Applied Science, London. 2nd Edition, (1990).
4. May J.M. Modern Food Microbiology, CBS publishers and distributors, New Delhi, 2nd Edition, (1987).
5. Reddy S.M and Girisham 2017 Applied Microbiology, scientific Publishers , NewDelhi
6. Sharma P.D 2017, Environmental Microbiology, Rastogi Publishers ,New Delhi

REFERENCE BOOKS

1. Banwart. G.J. Basic Food Microbiology, Chapman & Hall, New York, 2nd Edition, (1988).
2. Hobbs. B.C. & Roberts. D. Food Poisoning & Food Hygiene, Edward Arnold, London. 3rd Edition, (1993).

**SEMESTER-I
MAJOR PAPER - III
IMMUNOTECHNOLOGY
SUBJECT CODE – P1AM23MT**

L	T	P	C
5	0	0	5

Total Hours : 65

OBJECTIVE:

The aim of the subject is to study the history of Immunology, importance of human immune system, antigen antibody reaction & schedule for vaccine.

UNIT I: CELLS AND ORGANS OF IMMUNE SYSTEM (12)

Introduction to immune system - History of immunology – Infection, immunity, types of immunity - Innate and adaptive. Lymphoid organs - primary and secondary lymphoid organs. Cells of immune system.

UNIT II: STRUCTURE AND FUNCTION OF ANTIGENS AND ANTIBODIES (13)

Structure and function of antigens - epitopes, haptens and adjuvants. Receptors - MHC - Class I, II. T-cell receptor complex (TCR). Structure and functions of antibodies - Types of immunoglobulins. Antibody synthesis and diversity - Monoclonal antibody production.

UNIT III: COMPLEMENT, CYTOKINES AND ANTIGEN ANTIBODY REACTIONS (14)

Complement system - pathways - classical and alternative. Cytokines - types, functions. Interleukin and Interferon. Antigen antibody reactions – Agglutination, Precipitation, Complement fixation test, RIA, IFT, ELISA.

UNIT IV: IMMUNE RESPONSE (13)

Immune response - Cell mediated immune response - Antigen processing and presentation - Humoral immune response. Antigen Auto immune diseases, immuno deficiency diseases, hypersensitivity reactions – types.

UNIT V: IMMUNOPROPHYLAXIS (13)

Prophylaxis - Active immunization - Vaccine and toxoid - bacterial, viral. Vaccines - Heat killed, attenuated, rDNA and DNA vaccine, synthetic peptide vaccine, anti-idiotypic vaccine – Vaccination schedule. Passive immunization.

OUTCOME:

The students know the basic functions of immune system & their reactions towards the antigens.

RECOMMENDED TEXT

1. Roit, Essential immunology, Blackwell scientific publications, Oxford, 2nd Edition, (1994).
2. Kuby. J. Immunology, W.H. Freeman and Company, Newyork, 2nd Edition, (1994).
3. Leffel, Donnen Barg, A & Rose. W. Handbook of Immunology, Boca Raton, Fla, C.R.C. Press, 3rd Edition, (1997).
4. Cellular & Molecular immunology 2012 - Immunology, 8th Edition
5. Review of Medical Microbiology and Immunology, Eleventh Edition 2010 by Warren E. Levinson Publisher: McGraw-Hill Medical; 11 edition

REFERENCE BOOKS

1. Paul, Fundamental immunology, 3rd Edition. (1998).
2. Chapel, H. & Halbey, M. Essentials of Clinical immunology, ELBS, 2nd Edition, (1986).
3. Richard M, Hyde. Immunology 3rd edition. National medical series, Williams & Wilkins, Harward publishing company, 3rd Edition, (1995).
4. Clark, W.R., The experimental foundations of modern immunology, John Wiley and Sons, Newyork, 3rd Edition, (1991).
5. Text Book of Immunology and immunotechnology January 2008 First Editionm. Publisher: S.Chand& Co, New Delhi, Annadurai Pillai at ...

SEMESTER-I
ELECTIVE PAPER - I
SOIL AND AGRICULTURAL MICROBIOLOGY
SUBJECT CODE – P1AM24ET

L	T	P	C
3	0	0	3

Total Hours : 39

OBJECTIVE:

The aim of the subject to study the properties of soil, mechanism of nitrogen fixation, biofertilizers and to deal with plant pathogens.

UNIT I: PROPERTIES OF SOIL AND MICROBIAL INTERACTION (08)

Soil – Physical, chemical properties of soil, soil water, soil atmosphere, soil pH, soil structure. Soil microflora. Microbial interaction – interaction between microbes – plants, animals. Phyllosphere, Rhizosphere .

UNIT II: BIOGEOCHEMICAL CYCLES AND COMPOSTING (08)

Biogeochemical cycle – carbon, nitrogen, sulphur, phosphorus, iron, silicon, calcium. Organic matter decomposition. Composting – vermicomposting.

UNIT III: BIOLOGICAL NITROGEN FIXATION (07)

Nitrogen fixation by free living and associated symbiotic bacteria, mechanism of nitrogen fixation. Nitrogen fixation by free living BGA, symbiotic BGA. Lichens and Mycorrhizae – endo, ecto, VAM; Phosphate solubilizer.

UNIT IV: BIOFERTILIZERS AND BIOPESTICIDES (08)

Biofertilizers – Isolation, Identification, Classification, Physiology and function, cultivation and mass production, Inoculum preparation and Agronomic importance of *Rhizobium*, *Azotobacter*, *Azospirillum*, and BGA. Biopesticides – Bacteria, virus, protozoa and fungi.

UNIT V: PLANT PATHOGENS (08)

Plant Diseases: Fungal- (Powdery mildew of pea, Leaf spot and Blast of rice, Tikka of groundnut and Red rot of sugarcane), Bacterial - (Citrus canker, Leaf blight of rice , and Little leaf of brinjal), Viral- (Tobacco mosaic, Yellow Vein mosaic of bhendi, Tungro of rice and Potato spindle tuber), Nematode –(Root knot of vegetables).

OUTCOME:

The student gains the knowledge on the biofertilizers, biopesticides and to eradicate plant pathogens.



**OM SAKTHI
ADHIPARASAKTHI COLLEGE OF ARTS &
SCIENCE
(AUTONOMOUS)**

G.B Nagar, Kalavai – 632 506. Vellore District

Affiliated to Thiruvalluvar University,

Approved by AICTE, New Delhi

Accredited by NAAC B⁺⁺ Grade.



**DEPARTMENT OF COMPUTER SCIENCE
AND
APPLICATIONS**

B.Sc(CS)-SYLLABUS

(Effective from 2015-2016)

ADHIPARASAKTHI COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS)

Permanently Affiliated to Thiruvalluvar University, Vellore

Accredited by NAAC with B⁺⁺ Grade(CGPA-2.83)

B.SC - COMPUTER SCIENCE

Under CBCS

[Effective from the Academic year 2015-2016]

REGULATIONS

CBCS:

Choice –Based Credit System is a flexible system of learning. ‘Credit’ defines the quantum of contents / syllabi prescribed for a course and determine the number of hours of instruction required. The distinguished features of CBCS are the following:

It permits the students to:

- ❖ Learn at their own pace
- ❖ Choose electives from a wide range of elective courses offered by the departments of the colleges
- ❖ Undergo additional courses and acquire more than the required number of credits
- ❖ Adopt an inter – disciplinary approach in learning
- ❖ Make best use of the expertise of available faculty.

1. Eligibility for Admission:

Candidates seeking admission to the first year of the UG Degree Course should have passed the Higher Secondary Course Examination [Academic or Vocationals] conducted by the Govt. of Tamilnadu with Mathematics / Business Mathematics/ Statistics/ Computer Science as a subject or an Examination of any other University accepted as Equivalent thereto by the Syndicate subject to such candidates shall be permitted to take the B.Sc Degree Examination of this University after the Completion of the Course of Three academic years in the University/ Colleges affiliated to this University and shall Qualify for the B.Sc Degree.

2. Eligibility for the Award of Degree:

A candidate shall be eligible for the award of the degree only if he/she has undergone the prescribed course of study in the college for a period of not less than three academic year and passed the examinations of all the six semesters prescribed earning 140 credits [in Parts-I,II,III,IV and V] .

The Upper age limit for admission to UG Degree Courses will be 21 (twenty one) years as on 1st July of the year of admission. For SC/ST/BC/MBC/DNC candidates and women candidates the age limit is relaxed by 3 years. For other communities, the Principals can relax up to three years based on merit. A relaxation of 5 years is permitted for Physically Handicapped as per G.O. Ms No.239, dated 03.09.1993.

3. Duration:

- a. Each academic year shall be divided into two semesters. The first academic year shall comprise the first and second semesters, the second academic year the third semester and fourth semesters and the third academic year the fifth and sixth semesters respectively.
- b. The odd semesters shall consist of the period from June to November of each year and the even semesters from December to April of each year. There shall be not less than 90 working days for each semester

4. The Course of Study:

The main subject of study for Bachelor Degree Courses shall consist of the following:

PART – I TAMIL / OTHER LANGUAGES

PART – II ENGLISH

PART – III CORE SUBJECTS

ALLIED SUBJECTS

PROJECT / ELECTIVES WITH THREE COURSES

PART – IV

1. [a]. Those who have not studied Tamil up to XII Std. and taken a Non-Tamil Language under Part – I shall take Tamil comprising of two courses [level will be at 6th standard].
[b]. Those who have studied Tamil up to XII Std. and taken a Non-Tamil Language under Part – I shall take Advanced Tamil comprising of two courses.
[c]. others who do not come under a/b can choose non-major elective comprising of two courses.

2. SKILL BASED SUBJECTS [ELECTIVE]:

Four courses are to be offered. The papers are to be accommodated in the second / third year of study for UG courses

3. ENVIRONMENTAL STUDIES

4. VALUE EDUCATION

5. SOFT SKILLS

PART – V EXTENSION ACTIVITIES

5. Extension Activities:

A Candidate shall be awarded a maximum of 1 credit for compulsory Extension Service.

All the students shall have to enroll for NSS/ NCC [Sports and Games] Rotract/Youth Red Cross or any other service organization in the College and shall have to put in compulsory minimum attendance of 40 hours which shall be duly certified by the principal of the college before 31st march in a year. If a student LACKS 40 hours attendance in the first year he/she shall have to compensate the same during the subsequent years.

Students those who complete minimum of attendance of 40 hours in one year get half Credit and those who complete the attendance of 80 or more hours in two years will ONE CREDIT.

Literacy and population Eductaion field Work shall be compulsory components in the above Extensions service Activites.

**The following assessment procedure will be followed for Internal Marks:
Continuous Internal Assessment (CIA) Test**

S. No	Reg. No	Name	<u>Test I</u> Marks for 50	<u>Test II</u> Marks for 75	<u>Test III</u> Marks for 75	Marks for 200	Marks converted to 20/30	<u>Assignments/; Seminars [5]</u> <u>Records [10]</u>	Marks for 25/40	Total Rounded to Marks for 25/40

Test I : One hour duration for 50 marks (Two Units of the Syllabus)

Test II : Two hours duration for 75 marks (Four Units of the Syllabus)

Test III : Three hours model test for 75 marks (Total Syllabus)

Total marks 200	Theory	Practical
Test marks to be converted to	: 20 marks /	30 marks
Assignments / Seminars	: 5 marks /	----
Records	: ---- /	10 marks
Total	: 25 marks /	40 marks

In the column rounded to 25/40, any fraction may be rounded to the next number.

6. Requirements for proceeding to Subsequent Semesters:

(i). Candidates shall register their name for the first semester Examination after the admission in the U.G. Courses.

(ii) Candidates shall be permitted to proceed from the first semester up to the final semester irrespective of their failure in any of the semester examinations subject to the condition that the candidates should register for all the arrear subject of earlier semesters along the current (subsequent) semester subjects.

(iii). Candidates shall be eligible to go to subsequent semester, only if they earn, sufficient attendance as prescribed there for by the Academic Council from time to time. provided in case of a candidate earning less than 65 % of attendance in any one of the semester due to any extraordinary circumstances such as medical grounds, such candidates who shall produce Medical Certificate issued by the Authorized Medical Attendant (AMA), duly certified by principal of the college, shall be permitted to proceed to the next semester and to complete the

course of study. Such candidates shall have to repeat the missed semester by rejoining after completion of final semester of the course, after paying the fee for the break of study as prescribed by the college from time to time.

7. Requirement to take the Semester Examinations:

a). A candidate will be permitted to take the Examination for any Semester, if

i). he / she secures not less than 75% of attendance out of the 90 instructional days during the semester.

[In the case of married women students the minimum attendance requirement shall be 55% of the total instructional days].

ii). he / she earns a progress Certificate from the Head of the Institution of having satisfactorily completed the Course of Study prescribed in the subjects as required by the regulations. and

iii). his / her conduct has been satisfactory.

Provided that it shall be open to the Academic Council, or any authority delegated with such powers by the Academic Council to grant exemption to a candidate who has failed to earn 75% of the attendance prescribed for any valid reason(s) subject to the usual conditions.

4

b). A candidates who has secured attendance less than 75% but 65% and above shall be permitted to take the Examination on the recommendation of the Head of the Institution to condone the lack of attendance as well as on the payment of the prescribed fees to the College.

8. Passing Minimum:

A Candidate shall be declared to have passed the whole Examination, if he/she passes in all the papers and practical wherever prescribed / as per the scheme of examinations by earnings by earning 140 credit in Parts – I, II, III, IV and V. He / She shall also fulfill the extension activities prescribed earning one credit to qualify for the Degree.

In fixing the passing minimum marks, the following will be observed:

- (a). There shall be no passing Minimum for Internal.
- (b) For External Examination, Passing Minimum shall be of 40 % (Forty percentages) of the maximum marks prescribed for the paper .
- (c) In the aggregate (External + Internal), the passing minimum shall be of 40 % for each paper/Practical/Project and Viva-Voce.
- (d) Grading shall be based on overall marks obtained [Internal +External]

Grading:

Once the marks of the CIA and end-semester examinations for each of the course are available, they will be added. The mark thus obtained will then be graded as per details given below

Marks	Grade Point	Letter Grade	Class
100	7.00	H	First Class with Distinction
90-99	6.00	O	First Class with Distinction
75-89	5.50	D	First Class with Distinction
60-74	4.75	A	First Class
50-59	4.00	B	Second Class

40-49	3.50	C	Third Class
Below 40	3.00	F	Fail

From the second semester onwards, the total performance within a semester and continuous performance starting from the first semester are indicated respectively by **Grade Point Average [GPA]** and **Cumulative Grade Point Average [CGPA]**. These two are calculated by the following formulae:

$$\text{GPA} = \frac{\sum_{i=1}^n C_i G_i}{\sum_{i=1}^n C_i}$$

Where ‘C_i’ is the Credit earned for the Course i in any semester; ‘G_i’ is the Grade point obtained by the student for the course i and ‘n’ is the number of courses passed in that semester.

CGPA = GPA of all the courses starting from the first semester to the current semester.

Note: The GPA and CGPA shall be calculated separately for the following three parts:

For purposes of declaring a candidate to have qualified for the Degree of Bachelor of Arts/Science/Commerce/Management/ Literature in the First Class / Second Class / Third Class or First Class with Distinction, the marks and the Corresponding CGPA earned by the candidate in part III alone will be the criterion, provided he / she has secured the prescribed passing minimum in LCs and ELs.

Grade in Part IV & V shall be shown separately and it shall not be taken into account for classification.

9. Classification of successful candidates:

Part-I TAMIL/ OTHER LANGUAGES:

Successful candidates passing Examination for the Language and securing the marks (i) 60 percent and above and (ii) 50 percent and above but below 60 percent in the aggregate shall be declared to have passed the examination in the First and Second class, respectively. All other successful candidates shall declare to have passed the examination in the Third Class.

PART –II ENGLISH;

Successful candidates passing examinations for English and securing the marks (I) 60 percent and above and (ii) 50 percent and above but below 60 percent in the aggregate shall be declared to have passed the examination in the First and Second class respectively. All other successful candidates shall be declared to have passed the examination in Third class

PART – III Consisting of CORE SUBJECTS, ALLIED SUBJECTS, PROJECT/ELECTIVES

Successful candidates passing examination for core courses together and securing the marks (i) 60 percent and above and (ii) 50 percent and above but below 60 percent in the aggregate of the marks prescribed for the core courses together shall be declared to have passed the examination in the first and second class, respectively. All other successful candidates shall be declared to have passed the examination in the third class.

Part -IV: [Consisting of sub items 1 (a), (b) and (c), 2, 3, 4 and 5] as furnished in the regulations 4 Part –IV supra.

Part –V Extension Activities

The Only Credit earned for Part V Extension activities of a successful candidate shall not be taken into consideration for Classification/ Ranking and Distinction.

10. Ranking:

Candidates who pass all the examinations prescribed for the course in the first appearance itself alone are eligible for Ranking

Provided in the case of candidates who pass all the examinations prescribed for the course with a break in the First Appearance due to the reasons as furnished in the Regulations 7.[iii] supra are eligible for Classification / Distinction.

The marks obtained in improvement examinations will not be taken into consideration for ranking.

11. The Medium of Instruction and Examinations:

The medium of instruction and Examinations for the papers under part I and II shall be in the language concerned. For Part III and Part IV the medium of instruction and examination shall be English..

12. Submission of Record Notebooks for Practical Examinations:

Candidates taking the Practical Examinations should submit bonafide Record Notebook prescribed for the Practical Examinations. Otherwise the candidate will not be permitted to take the practical Examinations. However, in genuine case where the students could not submit the record notebook may be permitted to take the Practical Examinations provided the Head of the Department concerned certifies that the candidate has performed the experiments prescribed for the Course. For such of those candidates who do not submit Record Books, zero [0] marks will be awarded for record notebooks.

In case a candidate fails in the Practical Examination the marks awarded for the record at the time of first appearance for the Practical Examination should be made available by the University to the Examiners at the subsequent appearance by the candidate.

13. Improvement of marks in the subjects already passed:

Candidates who have passed in theory paper / papers are allowed to appear again for theory paper / papers only once in order to improve his/her marks, by paying the fee prescribed from time to time. Such candidates are allowed to improve within a maximum period of 10 semesters counting from his/her first semester of his/her admission. If candidate improves his marks, then his improved mark will be taken into consideration for the award of Classification and Distinction only. Such improved marks will not be counted for the award of Prize / Medals and Rank. If the Candidate does not show improvement in the marks, his previous marks will be taken into consideration.

No candidate will be allowed to improve marks in the Practical and Field work.

14. Checklist for Inspection :

A. Qualification for

Technical Faculty : as prescribed by the UGC and the University
Laboratory Staff : as prescribed by the UGC and the University.

B. Infrastructure Facilities

- i) Building: Number of classroom with specifications: 3 rooms measuring 20" x 25" .
If the class strength is above 50 the space shall increase by 10 sq.ft, per student.
Number of staff rooms: one measuring 20" x 20"
- ii). Furniture: One pair of table / chair per student.

PATTERN OF QUESTION PAPER:

PART- A (50 Words)

To Answer 10 Question	10 X 2 Marks	= 20 Marks

PART-B (200 Words)

To Answer 5 Questions (either or Pattern)	5 X 5 Marks	= 25 Marks

PART-C (500 Words)

To Answer 3 Questions out of 5 questions	3X 10Marks	= 30 Marks

Total		= 75 Marks

The Course of Study and the Scheme of Examinations:

Year/ Seme ster	Part	Subject	Paper	Sub. Code	Title of the Paper	Ins. Hrs/ Week	Cre dit	Exa m Hrs	Marks		
									IA	Sem Exam	Total
I Year I Sem	I	Language	Paper I	U1LT11FL	Tamil I	6	3	3	25	75	100
	II	English	Paper I	U1LE01SL	English I	6	3	3	25	75	100
	III	Core	Paper I	U1CS01MT	Digital Logic and Design	5	4	3	25	75	100
	III	Core Practical	Practical I	U1CS01MP	PC Software Lab(MS Word, Excel and Power Point)	4	2	3	20	30	50
	III	Allied I	Paper I	U1MA11AT	Mathematical Foundations I	7	5	3	25	75	100
	IV	---	--	U1ES01GS	Environmental Studies	2	2	3	25	75	100
I Year II Sem	I	Language	Paper II	U2LT11FL	Tamil II	6	3	3	25	75	100
	II	English	Paper II	U2LE01SL	English II	6	3	3	25	75	100
	III	Core	Paper II	U2CS01MT	Programming in C	5	4	3	25	75	100
	III	Core Practical	Practical II	U2CS11MP	Programming in C Lab	4	2	3	20	30	50
	III	Allied I	Paper II	U2MA11AT	Mathematical Foundations II	7	5	3	25	75	100
	IV	---	----	U2VE01GS	Value Education (General Awareness)	2	2	3	-	50	50
II Year III Sem	I	Language	Paper III	U3LT01FL	Tamil III	6	3	3	25	75	100
	II	English	Paper III	U3LE01SL	English III	6	3	3	25	75	100
	III	Core	Paper III	U3CS01MT	Object Oriented Programming Using C++	3	3	3	25	75	100
	III	Core Practical	Practical III	U3CS01MP	C++ and Data Structures Lab	3	3	2	20	30	50
	III	Allied II	Paper III	U3CS02AT	Statistical Methods and their applications I	4	4	3	25	75	100
	III	Allied practical		U3CS02AP	Statistical Methods and their applications-I	3	-	-	-	-	-
	IV	Skill based Elective I	Paper I	U3CS03ST	Data Structures and Algorithms	3	3	3	25	75	100
	IV	Non Major Elective I	Paper I	U3CS01NM	Introduction to Information Technology	2	2	3	25	75	100
	IV	Non Major Elective I	Paper I	U3BA01NM	Management Concepts						
II Year IV Sem	I	Language	Paper IV	U4LT01FL	Tamil IV	6	3	3	25	75	100
	II	English	Paper IV	U4LE01SL	English IV	6	3	3	25	75	100
	III	Core	Paper IV	U4CS01MT	Java Programming	3	3	3	25	75	100
	III	Core Practical	Practical IV	U4CS01MP	Java Programming Lab	3	3	3	20	30	50
	III	Allied II	Paper IV	U4CS02AT	Statistical Methods and their applications II	4	4	3	25	75	100
	III	Allied Practical		U4CS02AP	Statistical Methods and their applications I & II	3	2	3	20	30	50
	IV	Skill Based Elective II	Paper II	U4CS13ST	Microprocessors and Microcontrollers	3	3	3	25	75	100
	IV	Non -Major Elective II	Paper II	U4CS01NM	Internet and its Applications	2	2	3	25	75	100
	IV	Non -Major Elective II	Paper II	U4BA01NM	General Commercial Knowledge						

III year V Sem	III	Core	Paper V	U5CS01MT	Database Management System	6	5	3	25	75	100
	III	Core	Paper VI	U5CS02MT	Operating System	6	5	3	25	75	100
	III	Core Practical	Practical V	U5CS01MP	RDBMS Lab	5	5	3	40	60	100
	III	Core Practical	Practical VI	U5CS02MP	Operating System (Linux/Unix)Lab	5	5	3	40	60	100
	III	Elective I(A) Elective (B)	Paper I	U5CS03ET U5CS04ET	Data and Communication Networks / Computer Graphics	5	5	3	25	75	100
	IV	Skill Based Elective III	Paper III	U5CS05ST	Software Engineering	3	3	3	25	75	100
III year VI Sem	III	Core	Paper VII	U6CS01MT	Visual Programming	4	4	3	25	75	100
	III	Core Practical	Practical VII	U6CS01MP	Web Technology Lab	4	4	3	20	30	50
	III	Core Practical	Practical VIII	U6CS02MP	Visual Programming Lab	4	3	3	20	30	50
	III	Core	Paper VIII	U6CS08MT	Software Project Management	5	5	3	25	75	100
	III	Elective II(A) Elective(B)	Paper II	U6CS02ET U6CS03ET	Web Technology / Client/ Server technology	5	5	3	25	75	100
	III	Elective III(A) Elective(B)	Paper III	U6CS04ET U6CS05ET	Data mining and Warehousing/ Network Security	5	5	3	25	75	100
	IV	Skill Based Elective IV	Paper IV	U6CS06ST	Animation Techniques	3	3	3	25	75	100
	V	Extension Activities		U6CS07EA		-	1	-	-	-	50
					Total	180	140				3650

L	T	P	C
5	0	0	4

SEMESTER I

TOTAL HOURS: 65

DIGITAL LOGIC AND DESIGN

SUBJECT CODE: U1CS01MT

UNIT I : BINARY SYSTEMS

Digital computers and Digital systems – Binary Numbers - Number system conversion – Octal and Hexadecimal numbers – Complements – Binary codes – Binary Storage and Registers – Binary Logic – Integrated Circuits.

UNIT II : BOOLEAN ALGEBRA AND LOGIC GATES

Basic definitions of Boolean Algebra – Axiomatic definition of Boolean Algebra – Basic theorems and properties of Boolean Algebra – Boolean Functions – Canonical and Standard forms – other Logic operations – Digital Logic Gates.

UNIT III : SIMPLIFICATION OF BOOLEAN FUNCTIONS

The Map method – Two and Three variable maps- Four variable map – Five and Six variable map – Product of Sum simplification - NAND and NOR implementation – Don't care conditions.

UNIT IV : COMBINATIONAL LOGIC

Introduction – Adders – Subtractors- Code Conversion – Binary Adder – Encoder – Decoders – Multiplexer and Demultiplexer.

UNIT V : SEQUENTIAL CIRCUITS

Flip flops – Registers – Shift Registers – Ripple Counters – Synchronous Counters – Timing Sequence – The Memory Unit.

Text Book:

1. M. Morris Mano, "Digital Logic and Computer Design", PHI, 4th edition, 2007.

Reference Books:

1. Louis Neshelsky, "Introduction to Digital Technology", John Wiley & Sons, 4th Edition, 2006.
2. Thomas.L Floyd, "Digital Logic Design", PHI, 8th Edition, 2003.

L	T	P	C
0	0	4	2

SEMESTER I

TOTAL HOURS: 52

PRACTICAL I **PC SOFTWARE LAB**

SUBJECT CODE: U1CS01MP

MS-WORD

1. Text Manipulations
2. Usage of Numbering , Bullets, Tools and Headers
3. Usage of Spell Check and Find and Replace
4. Text Formatting
5. Picture Insertion and Alignment
6. Creation of Documents Using Templates
7. Creation of Templates
8. Mail Merge Concept
9. Copying Text and Picture from Excel
10. Splitting the Screen
11. Opening Multiple Document, Inserting Symbols in Documents

MS-EXCEL

1. Creation of Worksheet and Entering Information
2. Alignment, Editing Data in Cell
3. Excel Function (Date, Time, Statistical, Mathematical, Financial Functions)
4. Changing of Column, Width and Row Height (Column and Range of Columns)
5. Moving, copying, Inserting and Deleting Rows and Columns
6. Formatting Numbers and Other Numeric Formats
7. Drawing Borders Around Cells
8. Creation of Charts, Raising, Moving
9. Changing chart Type
10. Controlling the Appearance of a chart

MS-POWERPOINT

Working with Slides

1. Creating, saving, and closing presentation.
2. Adding headers and footers.
3. Changing slide layout
4. Working fonts and bullets
5. Inserting clip art
 - 5.1 Working with clip art
 - 5.2 Applying Transition and Animation effects.
6. Run and slide show.

L	T	P	C
7	0	0	5

SEMESTER I

TOTAL HOURS: 91

MATHEMATICAL FOUNDATIONS I

SUBJECT CODE: U1MA11AT

UNIT I: SYMBOLIC LOGIC

Proposition, Logical Operators: Conjunction, Disjunction, Negation, Conditional and Bi-conditional Operators, Converse, Inverse, Contra positive, Logically equivalent, Tautology and Contradiction. Arguments and validity of arguments.

UNIT II: SET THEOREY

Sets, Set operations, Venn diagram, Properties of Sets, Number of elements in a Set, Cartesian product. **Relations:** Equivalence relation, Equivalence class, partially and totally Ordered sets. **Functions:** Types of Functions, Composite of Functions.

UNIT III: BINARY OPERATIONS

Types of Binary Operations, Commutative, Associative, Distributive and Identity laws. Boolean algebra and their simple properties, Permutations and Combinations.

UNIT IV: NUMERICAL METHODS

Interpolation: Introduction, Interpolation methods, Finite differences, Forward and Backward difference table, Newton's forward and backward difference interpolation formulas, Lagrange's formula and their Inverse Interpolation formula.

UNIT-V: TWO DIMENSIONAL ANALYTICAL GEOMENTORY

Straight Lines-Equation of Straight line with Slope m and the given point-passing through two given points- intercept form-parallel to axes, Perpendicular axes-, pair of Straight lines-condition for two lines to be parallel and perpendicular, circles-general equation of Circle-Centre-Radius-Equation of Circle passing through three points.

Text Book:

1. P.R.Vital, "Mathematical Foundations", Margham publication, Chennai, 4th Edition, 2000.
2. A.Singaravelu, "Numerical Methods", A.R.Publications, 2nd Edition, 2004.

Reference Books:

1. U.Rizwan, "Mathematical Foundation", SciTech, Chennai, 4th Edition, 2013.
2. V.Sundaram & others, "Discrete Mathematical Foundation", A.R.Publication, sirkali,

L	T	P	C
2	0	0	2

SEMESTER I

TOTAL HOURS: 26

ENVIRONMENTAL STUDIES

SUBJECT CODE: U1ES01GS

UNIT I : INTRODUCTION TO ENVIRONMENTAL SCIENCES:

NATURAL RESOURCES

Environmental Sciences – Significance – Public awareness – Forest resources – Water resources – Mineral resources – Food resources - Environmental impact – fertilizer – Pesticide Problems – case studies.

UNIT II: ECOSYSTEM, BIODIVERSITY AND ITS CONSERVATION

Ecosystem – concept – Structure and Function – Producers, Consumers and Decomposers – Food chain – Food web – Forest, Grassland, Desert and Aquatic Ecosystem.

Biodiversity – Definition – Genetic, Species and Ecosystem Diversity – Values and uses of Biodiversity – Biodiversity at Global, National (India) and local levels – Hotspots, Threats to Biodiversity – Conservation of Biodiversity – Insitu & Exsitu.

UNIT III: ENVIRONMENTAL POLLUTION AND MANAGEMENT

Environmental Pollution – Causes – Effects and control measures of Air, Water, Marine, soil, solid waste, Thermal, Nuclear pollution and Disaster Management – Floods, Earth quake, Cyclone and Land slides. Role of individuals in prevention of Pollution – Pollution case studies.

UNIT IV: SOCIAL ISSUES – HUMAN POPULATION

Urban issues – Energy – water conservation – Environmental Ethics – Global Warming – Resettlement and Rehabilitation issues – Environmental Legislations – Environmental protection Act. 1986 – Air, Water, Wildlife and Forest conservation Act – Population growth and Explosion – Human Rights and Value Education – Environmental Health – HIV/AIDS – Role of IT in Environment and Human Health – Women and Child Welfare – Public Awareness – Case studies.

UNIT V: FIELD WORK

Visit to a local area / Local Polluted Site / Local Simple Ecosystem – Report Submission.

Text Book:

1. Kumarasamy, K., A.Alagappa Moses & M.Vasanthi, “Environmental Studies”, Bharathidasan University Pub, Trichy, 2nd Edition, 2004.

Reference Books:

1. Rajamannar, “Environmental Studies”, Evr College Pub(Ed), Trichy, 1st Edition, 2004.
2. Kalavathy,S, “Environmental Studies”, Bishop Heber College Pub (Ed.), Trichy1st/E,

L	T	P	C
5	0	0	4

TOTAL HOURS: 65

SEMESTER II

PROGRAMMING IN C

SUBJECT CODE: U2CS01MT

UNIT I:

C Fundamentals character Set- Identifiers and Keywords – Data types – Constants- Variables- Declarations- Expressions-Statements- Arithmetic, Unary, Relational and Logical, Assignments and Conditional Operators- Library Functions.

UNIT II:

Data Input Output Functions – Simple C Programs- Flow of Control – if, if-else, while, do-while, for loop, nested Control Structures- switch, break and continue, goto statements- comma operator.

UNIT III :

Functions – definitions – prototypes- passing arguments- Recursion-Storage Classes- Automation, External, Static, Register Variable.

UNIT IV:

Arrays – Defining and processing- Passing Arrays to Functions- Multi-dimension arrays- Arrays and String. Structures – User Defined data types- Passing Structures to Functions – Self Referential Structures- Unions – Bit wise Operations.

UNIT V:

Pointer –Declarations- Passing Pointers to Functions- Operation on Pointers-Pointers and Arrays- Arrays of Pointers- Structures and Pointers- Files: creating processing, opening and closing a data file.

Text book:

1. Ashok N.Kamthane, “Programming with ANSI and Turbo C”, Pearson Education, 1st Edition 2009.

Reference books:

1. B.W. Kernighan and D.M.Rithchi, “The C Programming Language”, PHI, 4th Edition, 2006.
2. H.Schildt, “C the Complete Reference”, TMI 4th Edition 2007.
3. Kanetthar Y, “Let us C”, BPB Pub New Delhi, 5th Edition 2004.

L	T	P	C
0	0	4	2

TOTAL HOURS: 52

SEMESTER II

PROGRAMMING IN C LAB

SUBJECT CODE: U2CS11MP

I. Summation of Series

1. Sin(X)
2. Cos(X)
3. Exp(X) (Comparison with built in functions)

II. String Manipulation

1. Counting the no of Vowels, Consonants, Words, white Spaces in a line of Text and array of Lines.
2. Reverse a String & Check for palindrome

III. Recursion

1. nPr, nCr
2. GCD of two numbers

IV.Sorting and Searching

1. Bubble Sort
2. Linear Search

V. Structures and pointers

1. Preparation of MarkSheet
2. Demonstration of Pointer Arithmetic.

VI.File Operations

1. File Copying
2. Usage of command line arguments

SEMESTER II

L	T	P	C
7	0	0	5

TOTAL HOURS: 91

MATHEMATICAL FOUNDATIONS II

SUBJECT CODE: U2MA11AT

UNIT I: MATRICES

Multiplication of Matrices, Singular and Non – Singular Matrices, Adjoint of a Matrix, Inverse of Matrix, Symmetric and Skew – Symmetric, Hermitian and Skew - Hermitian matrices, Orthogonal and Unitary Matrices, Rank of a Matrix, Solution of Simultaneous Linear Equations by

- (i) Cramer's rule
- (ii) Matrix Inversion Method.

UNIT II : MATRICES(Continued)

Test for Consistency and Inconsistency of Linear Equations, [Rank Method], characteristic roots and characteristic vectors, Cayley – Hamilton theorem.

UNIT III: NUMERICAL METHODS

Solutions of Algebraic and Transcendental equations: Bisection method, Regula Falsi method, Newton's Raphson method, Iterative method.

UNIT IV: NUMERICAL METHODS(Continued)

Numerical Differentiation: Newton's forward and backward difference formulas for differentiation.

Numerical Integration: Trapezoidal rule to evaluate the definite integral, Simpson's One – Third rule, Simpson's Three – Eight rule, Weddle's rule.

UNIT V: ANALYTICAL GEOMETRY OF THREE DIMENSION

Planes-General equation of plane-intercept form-plane passing through three points, straight lines- straight line as intersection of two plane –Symmetrical form- line passing through two given points, Spheres-equation of Sphere- centre- radius- sphere through four points [Simple Problem only].

Text Books:

1. P.R.Vital, "Mathematical Foundations", Margham publication, Chennai, 4th Edition,

Reference books:

1. U.Rizwan, "Mathematical Foundation", SciTech, Chennai, 4th Edition, 2013.
2. V.Sundaram & others, "Discrete Mathematical Foundation", A.R.Publication, sirkali, 2nd Edition, 2015.

L	T	P	C
2	0	0	2

SEMESTER II

TOTAL HOURS: 26

VALUE EDUCATION

SUBJECT CODE: U2VE01GS

UNIT I:

Value Education - Definition - relevance to present Day- Concept of Human Values – self Introspection-self esteem-Personal values.

UNIT II :

Family values - Components, structure and responsibilities of family –Neutralization of anger-Adjustability-Threats of family life-Status of Women’s in family and society-caring for needy and elderly –Time allotment for sharing ideas and concerns.

UNIT III :

Ethical values-Professional Ethics-Mass Media Ethics-Advertising Ethics-Influence of Ethics on family life-Psychology of children and youth-leadership qualities-personality development.

UNIT IV :

Social values-faith, service and secularism-social and secularism-social sense and commitment-students and politics-social awareness, consumer awareness, consumer rights and responsibilities – redressal mechanisms.

UNIT V :

Effect of international affairs on values of life/issue of Globalization-Modern Warfare-Terrorism, Environmental issues-Mutual respect of different cultures, religions and their beliefs.

Text Book:

1. T.Anchukandam and J.Kuttaimathathil (ED) “Grow Free Live Free”, Krisitu Jyoti Publications,Bangalore, , 2nd Edition, 2000.

Reference books :

1. Mani Jacob (ED) “Resource Book for Value Education”, Institute for Value Education, New Delhi 3rd Edition, 2002.
2. Dharma Bharti, “DBNI, NCERT, SCERT”, National Institute of Peace and Value Education, Secunderabad, 2nd Edition, 2002.

L	T	P	C
3	0	0	3

III SEMESTER

TOTAL HOURS: 39

PAPER III

OBJECT ORIENTED PROGRAMMING USING C++

SUBJECT CODE: U3CS01MT

UNIT I:

Principles of Object Oriented Programming (OOP) : Evolution of C++ - Programming Paradigms - Key Concepts of OOP - Advantages of OOP - Usage of OOP and C++ .Input and Output in C++-Streams-Stream classes Unformatted console I/O operations-Member functions of istream class-manipulators-manipulators with parameters

UNIT II:

Introduction to C++: Tokens, Keywords, Identifiers, Variables, Operators, Expressions and Control Structures: If, If..Else, Switch - Repetitive Statements- for, while, do..while - Pointers and Arrays.

UNIT III:

Functions in C++ - Main Function - Function Prototyping - Parameters Passing in Functions - Values Return by Functions - Inline Functions - Function Overloading.

Classes and Objects-Constructors and Destructors- and Operator Overloading - Type of Constructors.

UNIT IV:

Inheritance: Single Inheritance - Multilevel inheritance - Multiple inheritance - Hierarchical Inheritance - Hybrid Inheritance. Pointers - Virtual Functions and Polymorphism

UNIT V:

Working with Files: Classes for File Stream Operations - Opening and Closing a File - End-of-File Detection - File Pointers - Updating a File - Error Handling during File Operations - Command-line Arguments

Text Book:

1. Ashok N.Kamthane, "Object Oriented Programming with ANSI & Turbo C ++", Pearson Education, 3rd Edition, 2010.

Reference Book:

1. E. Balagurusamy, OBJECT-ORIENTED PROGRAMMING WITH C++, Tata Mc-Grawhill Publication, 4th Edition, 2009.
2. Maria Litvin & Gray Litvin , C++ for you, Vikas publication, 2nd Edition, 2008.

SEMESTER III

L	T	P	C
4	0	0	4

PAPER III.2**TOTAL HOURS: 52****STATISTICAL METHODS AND THEIR APPLICATIONS I****SUBJECT CODE: U3CS02AT****UNIT I:**

Introduction – Scope and limitations of statistical methods- Classification of data- Tabulation of data – Diagrammatic and graphical representation of data – Graphical determination of percentiles and quartiles.

UNIT II:

Measures of location: Arithmetic Mean, Median, Mode, Geometric mean and Harmonic mean and their properties.

UNIT III:

Measures of dispersion : Range, Quartile deviation, Mean deviation, Standard deviation, Combined Standard deviation, Co-efficient of variation.

UNIT IV:

Measures of Skewness : Karl Pearson's, Bowley's, Kelly's and coefficient of skewness and Kurtosis based on moments.

UNIT V:

Correlation – Karl Pearson – Spearman's rank correlation – Concurrent deviation methods. Regression Analysis : Simple Regression Equations.

Text Book:

Dr. S.P. Gupta-“Statistical Methods”, Sultan chand & sons, New Delhi, 37th Revised Edition, 2008.

Reference Books:

1. S.C. Gupta and V.K. Kapoor- “Fundamental of Mathematical statistics”- Sultan Chand, 8th Edition, 2014.
2. Snedecor G. W. & Cochran W.G. Oxford -“Statistical Methods”, 8th Edition, 2014.
3. Mode – E.B. – “Elements of Statistics” –Prentice Hall, 1st Edition, 2008.

SEMESTER III

L	T	P	C
0	0	3	3

TOTAL HOURS: 39

PRACTICAL III

C++ AND DATA STRUCTURES LAB

SUBJECT CODE: U3CS01MP

1. Program to implement classes, create object and member functions.
2. Program to implement the concept of function overloading.
3. Program to implement the concept of Operator overloading.
4. Program to implement the concept of Inheritance.
5. Program to implement file handling concepts.
6. Implement PUSH, POP operations of stack using Arrays.
7. Implement add, delete operations of a queue using Arrays.
8. Creation, insertion, and deletion in Singly linked list.
9. Binary Search tree traversals (in-order, pre-order, and post-order) using Recursion.
10. Sorting - Quick sort.

SEMESTER III

L	T	P	C
3	0	0	3

TOTAL HOURS: 39**SKILL BASED SUBJECT I****PAPER I****DATA STRUCTURES AND ALGORITHMS****SUBJECT CODE: U3CS03ST****UNIT I:**

Definition of a Data structure - primitive and composite Data Types, Arrays, Operations on Arrays, Ordered list.

UNIT II :

Stacks - Operations - Applications of Stack - Infix to Postfix Conversion, Recursion, Queue- operations.

UNIT III :

Singly Linked List - Operations, Application - Representation of a Polynomial, Polynomial Addition; Doubly Linked List - Operations.

UNIT IV :

Trees and Graphs: Binary Trees - Operations - Recursive Tree Traversals- Graph - Definition, Types of Graphs, Graph Traversal - DFS and BFS

UNIT V:

Searching- linear and binary search - Sorting Insertion, Bubble, Quick And Merge sort.

Text Book:

1. N.Dale, "C++ plus Data structure", publishers narosa publishing, 5th Edition 2011.

Reference Books:

1. Ellis Horowitz, Sartaj Shani, "Data and File Structures", Galgotia Publication, 3rd Edition, 2006.

2. Ellis Horowitz, Sartaj Shani, Sanguthevar Rajasekaran, “Computer Algorithms”, Galgotia Publication, 2nd Edition, 2004.

SEMESTER III

L	T	P	C
2	0	0	2

TOTAL HOURS:26

NON MAJOR ELECTIVE I

PAPER I

INTRODUCTION TO INFORMATION TECHNOLOGY

SUBJECT CODE: U3CS01NM

UNIT I:

Introduction: History of Computer - Parts of Computer System - Hardware Devices - Software - Operating System - Examples of Operating systems - Computer Networking - Visual Editor.

UNIT II:

Microsoft Word - Microsoft Excel - Microsoft PowerPoint.

UNIT III:

Introduction to Multimedia - Images - Sound -Video Desktop Publishing Basics - Page layout Programs - Text Generation - Graphics for DTP - Print Production.

UNIT IV:

Introduction to Internet - Working of Internet - Internet Services - Internet Addressing - E-Mail Basics - Web Development Tools - Introduction to HTML

UNIT V:

Information System - Management Information concepts - Planning Issues and the MIS - Organizing Issues and the MIS - Control Issues and the MIS - Decision Support Systems.

Text Book:

1. Sanjay Saxsena, “A First Course in Computer”, Vikas Publishing House, 2nd Edition, 2000.

References books:

1. Ron Mansfield, “Working in Microsoft Office”, Tata Mcgraw Hill, 3rd Edition, 2009.
2. Linda Tway, Sapphiro Pacific Lajolla, “Multimedia in Action”, Academic Press, 5th Edition, 2008.
3. Neil randal “Teach yourself the internet in a week”, Prentice Hall of India, 2nd Edition, 1996.

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2	0	0	2

TOTAL HOURS: 26

SEMESTER III
MANAGEMENT CONCEPTS
SUBJECT CODE: U3BA01NM

UNIT I:

Management – Definition – Importance – Role and Function of a Manager.

UNIT II:

Planning – Nature – Purpose – Steps – Types – Merits and Demerits of Planning – MBO.

UNIT III:

Organisms – Purpose –Departmentation – Span of Control – Delegation – Centralization and Decentralization – Line and Staffs – Committee.

UNIT IV:

Directions – Leadership – Motivation – Communication Process of Communication – Barriers of Communication.

UNIT V:

Controlling – Concept of Control – Methods of Control – Co-ordination – Need – Principles – Approaches to Achieve effective Co-ordination.

Text Book:

1. J.R.Beulah Bharathi & C.Arunachalam, Principles of Management(Management Concept), Thakur Publishers, First Edition, 2013.

Reference Book:

1. J.Jayasankar, Principles of Management, Margham Publications, First Edition, 2004.

L	T	P	C
3	0	0	3

SEMESTER IV

TOTAL HOURS: 39

PAPER IV

JAVA PROGRAMMING

SUBJECT CODE: U4CS01MT

UNIT I:

Introduction to Java - Features of Java - Object Oriented Concepts - Data Types - Variables - Arrays - Operators - Control Statements-Input and output-Scanner and System class-print(),println(), and printf() methods.

UNIT II:

Classes - Objects - Constructors - Overloading method - Access Control - Static and fixed methods - Inner Classes - String Class - Inheritance - Overriding methods - Using super- Abstract class – Type Wrapper classes for primitive types- Autoboxing and Auto Unboxing – Recursion.

UNIT III:

GUI components – Common GUI Event types and Listener Interfaces- JoptionPane – JLabel, JTextfield, JButton,JCheckBox,JTextarea, JComboBox, JList, JPanel – Mouse Event Handling - Adapter Classes- Key Event Handling.

UNIT IV:

Layout Managers – FlowLayout, BorderLayout, GridLayout - Graphics and Java 2D – Graphics contexts and Graphics objects – Color control – Font Control – Drawing Lines, Rectangles and Ovals – JSlider – Using menus with Frames.

UNIT V:

Packages - Access Protection - Importing Packages - Interfaces - Exception Handling - Throw and Throws - Thread - Synchronization - Runnable Interface - Inter thread Communication – Multithreading - I/O Streams - File Streams - Applets – Introduction to Java API Packages(java.lang and java.util)

Text Book:

1. C.Muthu, “Programming in Java”, TMH Publication ,2nd Edition, 2008.

Reference Books:

1. Deitel & Deitel, “Java How to Program”, PHI Publication, 6th Edition, 2005.

SEMESTER IV

L	T	P	C
0	0	3	3

TOTAL HOURS: 39

PRACTICAL IV
JAVA PROGRAMMING LAB
SUBJECT CODE: U4CS01MP

1. Finding area and Perimeter of a circle. Use Scanner class.
2. Determining the order of numbers generated randomly using Random Class.
3. String Manipulation (Substring removal, string replacement etc.,)
4. Drawing Rectangles, Ovals etc using Applet.
5. Implementing Thread based applications & Exception Handling.
6. Application using synchronization such as Thread based, Class based and synchronized statements.
7. Implementing GUI based applications using swing components
(Jlabel, Jbutton, JtextField)
8. Implementing GUI based application using Layout managers and menus.
9. Application using file streams (sequential file)
10. Application using file streams (Random file)

L	T	P	C
4	0	0	4

**SEMESTER IV
PAPER IV.2**

TOTAL HOURS: 52

STATISTICAL METHODS AND THEIR APPLICATIONS II

SUBJECT CODE: U4CS02AT

Objective

To apply statistical techniques in real life situations

[The proportion between theory and problems shall be 20:80]

UNIT I:

Curve Fitting by the methods of least squares $y = ax + b$, $y = ax^2 + bx + c$,
 $y = ax^b$, $y = ae^{bx}$

UNIT II:

Sample Space – events – probability - Addition and multiplication theorem -
Conditional probability - Baye's Theorem (Without Problems) – Mathematical Expectation
(Simple problems only on discrete series) - Chebychev's Inequality.

UNIT III:

Standard Distribution – Binomial, Poisson, normal distribution and fitting of these
distributions.

UNIT IV:

Test of significance for small sample-t Test and large sample test- χ^2 Test-Test of
significance based on mean, S.D Correlation.

UNIT V:

Analysis of variance-one and Two way classification-Basic principle of design of
Experiments- L.S.D .

Text Book:

Dr. S.P.Gupta – “Statistical methods” – Sultan Chand & sons, Newdelhi, 37th Edition, 2008.

Reference Books:

1. P.R. Vittal.,- Elements of statistical methods, 1st Edition,2012.
2. J.k. Sharma - Business Statistics – Pearson Education, 4th Edition,2014.
3. B.L.Agarwal - Basic statistics – Wiley Eastern, Pollao and Bhagavathi, 6th Edition, 2012.

L	T	P	C
0	0	3	2

SEMESTER IV

TOTAL HOURS: 39

ALLIED PRACTICAL

STATISTICAL METHODS AND THEIR APPLICATIONS I & II

SUBJECT CODE: U4CS02AP

Note

Use of Scientific Calculator shall be permitted for Practical Examination. Statistical and Mathematical Tables are to be provided to the students in the Examination Hall.

ALLIED PRACTICAL

1. Diagrams and Graphs – Percentage subdivided Bar diagram, Pie diagram, Histogram, Ogive curve.
2. Measures of location – Finding Mean, Median & Mode for a continuous frequency distributions.
3. Measures of dispersion – Finding Q.D, M.D, S.D & C.V for a continuous frequency distributions.
4. Skewness and Kurtosis – Finding Karl Pearson's, Bowley's skewness and moments.
5. Correlation and Regression.
6. Curve Fitting: $y = ax + b$, $y = ax^2 + bx + c$, $y = ax^b$, $y = ae^{bx}$.
7. Fitting of distributions – Binomial, Poisson, Normal.
8. Test of significance for small sample and large sample test – t Test & χ^2 test.
9. Analysis of variance: One way classification, Two way classification, Design of Experiments – L.S.D.

BOOKS FOR REFERENCE:

1. Dr. S.P.Gupta – “Statistical methods” – Sultan Chand & sons, Newdelhi, 37th Edition, 2008.
2. S.C. Gupta & V.K. Kapoor- “Fundamentals of Applied Statistics”, 4th Edition, 2014.

L	T	P	C
3	0	0	3

TOTAL HOURS: 39

SEMESTER IV

SKILL BASED SUBJECT II PAPER II

MICROPROCESSORS AND MICROCONTROLLERS

SUBJECT CODE:U4CS13ST

UNIT I: 8085 MICROPROCESSOR

Introduction to Microprocessor- 8085 Architecture and its operations- 8085 pin description- 8085 instruction Set and Classification -8085 addressing modes.

UNIT II: 8085 PROGRAMMING

Writing assembly level Programs -Multibyte addition- Multibyte Subtraction-BCD addition -BCD subtraction-BCD Multiplication-BCD division – BCD to Binary And Binary to BCD conversion-BCD to Hex and Hex to BCD conversion – ASCII to BCD and BCD to ASCII Conversion – ASCII to Binary and Binary to ASCII Conversion.

UNIT III: FEATURES AND INTERFACING OF PROGRAMMABLE DEVICES FOR 8085 BASED SYSTEMS

Intel 8255 Programmable Peripheral Interface: Features of 8255 – Block diagram of Intel 8255- Operating Modes and control words of 8255 – Programming Examples – Interfacing LEDs – Interfacing Seven Segment Displays – Traffic Light control.

UNIT IV: 8086 MICROPROCESSOR AND ADVANCED MICROPROCESSOR

Introduction to 8086 Microprocessor- Architecture of 8086 – Pin details of 8086. Advanced Microprocessor: 80186 Architecture- 80286 Architecture –Pentium Microprocessor: Architecture of Pentium. Other Versions of Pentium: Pentium Pro Processor - Pentium II Processor - Pentium III Processor- Pentium 4 Processor

UNIT V: 8051 MICROCONTROLLER

Introduction to 8051 Microcontroller - Intel's MCS -51 series Microcontrollers - Intel 8051 Architecture –Memory organization – Internal RAM Structure- Power Control in 8051 – Stack operation.

TEXT BOOKS:

1. Ramesh Goankar “Microprocessors and Microcontrollers”, Prentice Hall, 5th edition, 2002. (Unit I & Unit II)
2. N.Senthilkumar M.Saravannan, S.Jeevananthan “Microprocessor and Microcontrollers” Oxford University Press, 1/E, 2010 (unit III, Unit IV & Unit V)

Reference Books:

1. Douglas V. Hall “Microprocessors and Interfacing “, Tata McGraw Hill, 2/E, 2006.
2. Krishna kant “Microprocessors and Microcontrollers Architecture Programming and system design 8086,8086,8051,8096, PHI Learning Pvt Ltd. New Delhi, 2/E, 2010.
3. Barry B. Brey, “The Intel Microprocessor-8086/8088, 80186,286, 386, 486, Pentium Processor”, Prentice Hall of India Pvt Ltd, 8th Edition, 1998.
4. Yu-chang Lin and Clean, “Microprocessor System the 8086/8088 family architecture, Programming and Design”, Prentice Hall of India Pvt Ltd, 2nd edition, 2001.

L	T	P	C
2	0	0	2

TOTAL HOURS: 26

**SEMESTER IV
NON MAJOR ELECTIVE II**

PAPER II

INTERNET AND ITS APPLICATIONS

SUBJECT CODE: U4CS01NM

UNIT I:

Introduction to Computers- Programming Language types- History of Internet- Personal Computers- History of World Wide Web- Micro software .NET Java-Web resources.

UNIT II:

Web Browsers- Internet Explorer- connecting to Internet- Features of Internet explorer6- Searching the Internet- online help and tutorials- File Transmission Protocol (FTP) -Browser settings.

UNIT III:

Attaching a file, Electronic mail -Creating an E-mail ID- Sending and Receiving mails-attaching a file- Instance messaging - other web browsers.

UNIT IV:

Introduction to HTML headers- Linking- Images-special characters and line breaks- unordered lists- simple HTML programs.

UNIT V:

E-marketing -consumer tracking- Electronic advertising- search engine-CRM- credit card payments- Digital cash and e-wallets- micro payments- smart card.

Text book:

1. H.M.Deitel, P.J. Deitel and A.B.Goldberg, "Internet and World Wide Web", PHI, 5th Edition, 2012.

Reference books:

1. Harley hahn, "The Internet- Complete Reference", Tata McGraw Hill, 2nd Edition, 2008.
2. Thomas A.Powell, "The Complete Reference HTML", TMH, 2nd Edition, 2006.
3. Douglas Comer, "The Internet Book", Pearson Education, 3rd Edition, 2007.

L	T	P	C
2	0	0	2

TOTAL HOURS: 26

SEMESTER IV

GENERAL COMMERCIAL KNOWLEDGE SUBJECT CODE: U4BA01NM

UNIT I:

Commerce trade, Industry-meaning-scope and importance of commerce-economics basis of commerce.

UNIT II:

Forms of business organization-sole trading-partnership firms-merits and demerits of partnership firm.

UNIT III:

Joint stock companies-features- memorandum and articles-shares and debentures-types-co-operatives-features-types and advantages.

UNIT IV:

Office organization-what in an office? Functions of office-office accommodation and environment-office layout-office manual.

UNIT V:

Handling of mail, filling and indexing-inward/out ward of mail-filling and indexing-system, essential and classification-methods-horizontal VS vertical filling-centralized and decentralized-indexing.

Text Book:

1.C.D.Balaji & Dr.G.Prasad, Business Organization, Margham Publication, First Edition, 2007.

Reference book:

1. R.N.Gupta, Business Organization & Management, S.Chand Publication, First Edition, 2006.

V SEMESTER

L	T	P	C
6	0	0	5

TOTAL HOURS: 78

PAPER V

DATABASE MANAGEMENT SYSTEM **SUBJECT CODE:U5CS01MT**

UNIT I:

Purpose of Database - Overall System Structure - Entity Relationship Model - Mapping Constraints - Keys - E-R Diagrams.

UNIT II:

Relational Model - Structure - Formal Query Language - Relational Algebra - Tuple and Domain Relational Calculus.

UNIT III:

Structured Query Language - Basic Structure - Set Operations - Aggregate Functions - Date, Numeric, and Character Functions - Nested Sub queries - Modification of Databases - Joined Relations - Embedded SQL.

UNIT IV:

Relational Database Design - Pitfalls - Normalization Using Functional Dependencies - First Normal Form-Second Normal Form-Third Normal Form-Fourth Normal Form And BCNF.

UNIT V:

Oracle - Introduction – SQL (DDL,DML, DCL Commands) – Integrity Constraints – PL/SQL – PL/SQL Block – procedure, function – Cursor management – Triggers – Exception Handling.

Text Book:

1. Singh,“Database systems: Concepts, Design & applications”, Pearson Education, 2nd Edition, 2009.

Reference Books:

1. Abraham Silberschatz, H.F.Korth And S.Sudarshan-Database System Concepts Mcgraw Hill Publication, 5th Edition, 2013.
2. Gerald V.Post, “DBMS-Designing And Business Applications”,Mcgraw Hill Publications, 2nd Edition, 2006.

SEMESTER V

PAPER VI

L	T	P	C
6	0	0	5

TOTAL HOURS: 78

OPERATING SYSTEM SUBJECT CODE: U5CS02MT

UNIT I:

Introduction - Types of Operating Systems - Operating System Services - System calls and System Programs

UNIT II:

Process Management - Process Concepts - Process Scheduling - Operation On Process Inter Process Communication - Cpu Scheduling - Scheduling Algorithms - Deadlocks

UNIT III:

Memory Management - Single and multiple partitioned allocation – Paging - Segmentation - Virtual Memory Management - Demand paging and Page Replacement Algorithms

UNIT IV:

Information management - File concept - Access methods - Directory structure - allocation methods - free space management - disk scheduling.

UNIT V:

UNIX: Unix system-Introduction-User interface -File System-Interprocess Communication - A Case Study.

Text Book:

1. Abraham Silberschatz and P. B. Galvin – “Operating system concepts” - Addison Wesley Publication, 8th Edition, 2011.

Reference Books:

1. Achyut s Godbole , “Operating Systems” , TMH Publications ,3rd Edition, 2005.
2. John J. Donovan , “Systems Programming” , TMH Publications , 3rd Edition, 2001.
3. D.M. Dhamdhrer, “Systems Programming and Operating Systems”, TMH, 2nd Revised Edition, 2002.

**PRACTICAL V
SEMESTER V**

L	T	P	C
0	0	5	5

TOTAL HOURS:65

**RDBMS Lab
SUBJECT CODE:U5CS01MP**

1. Create a table Student-master with the following fields client_no, name, address, city, state, pincode, remarks, bal_due with suitable data types.
 - a) Create another table supplier_table from client_master. Select all the fields and rename client_no with supplier_no and name with supplier_name.
 - b) Insert data into client_master
 - c) Insert data into supplier_master from client_master.
 - d) Delete the selected row in the client_master.
 - e)
2. Create a table sales_order with s_order_no and product_no as primary key. Set other fields to store client number, delivery address, delivery date, order status.
 - a) Add a new column for storing salesman number using ALTER Command.
 - b) Set the s_order_no as foreign key as column constraints.
 - c) Set the s_order_no as foreign key as table constraints.
 - d) Enforce the integrity rules using CHECK.
3. Create a table student_master with the following fields name, regno, dept and year with suitable data types. Use Select command to do the following.
 - a) Select the student's name column.
 - b) Eliminate the duplicate entry in table.
 - c) Sort the table in alphabetical order.
 - d) Select all the Students of a particular department.
4. Create a table sales_order_details with the s_order_no as primary key and with the following fields: product_no, description, qty_ordered, qty_disp, product_rate, profit_percent, sell_price, supplier_name.
 - a) Select each row and compute sell_price*.50 and sell_price*1.50 for each row selected.
 - b) Select product_no, profit_percent, Sell_price where profit_per is not between 10 and 20 both inclusive.
 - c) Select product_no, description, profit_percent, sell_price where profit_percent is not between 20 and 30.
 - d) Select the suppliername and product_no where suppliername has 'r' or 'h' as second character.
5. Create table Order_master with following fields Order_no, Odate, Vencode, Ostatus, Del_date with suitable data types. Create another table Order_detail with Order_no, Itemcode, Qty_ord, Qty_deld with suitable data types. Write Commands to set Operations using the table Order_master and Order_detail.

6. Create a table Order_Info with the following fields Orderid, Orderdate, Commplan, Cusid, Shipdate, total with suitable data types. Create another table Customer with Custid, Name, Address, City, Pincode with suitable data types. Write commands to relating data through Join concepts using the table Order_Info and Customer.
7. Create a table master_book to contain the information of magazine code, magazine name, publisher. Weekly/biweekly/monthly, price. Write PL/SQL block to perform insert, update, delete operations on the above table.
8. Create a table to contain phone number, user name, address of the phone user. Write a function to search for a address using phone numbers.
9. Create a table stock to contain the item code, item name, current stock, date of last purchase. Write a stored procedure to seek for an item using item code and delete it, if the date of last purchase is before 1 year from the current date. If not, update the current stock.
10. Create a table to store the salary details of the employees in a company. Declare the Cursor to contain employee number, employee name and net salary
. Use Cursor to update the employee salaries.
11. Create a table to contain the information about the voters in a particular constituency. Write a proper trigger to update or delete a row in the table.
12. Create a table to store the details of the Alumni in an institution. Write a PL/SQL block to change address of a particular alumni. Write proper exceptions and appropriate error messages.

**SEMESTER V
PRACTICAL VI**

L	T	P	C
0	0	5	5

TOTAL HOURS:65

**OPERATING SYSTEM (LINUX/UNIX) LAB
SUBJECT CODE: U5CS02MP**

1. Creation of a child, orphan and Zombie process.
2. IPC using pipes.
3. IPC using message queues.
4. Simulation of FCFS process scheduling.
5. Simulation of ROUND ROBIN process scheduling.
6. Simulation of SJF process scheduling.
7. Demonstration of process synchronization using signals.
8. Demonstration of process synchronization using semaphores.
9. Deadlock avoidance using banker's algorithm

**SEMESTER V
ELECTIVE I**

L	T	P	C
5	0	0	5

(to choose 1 out of the given 2)

TOTAL HOURS:65

**PAPER I.A
DATA AND COMMUNICATION NETWORKS
SUBJECT CODE: U5CS03ET**

UNIT I:

Introduction to Data Communication-Basic Concepts-Protocols and Standards-Applications of Data Communications. Open Systems and OSI Model. TCP/IP Architecture-Data Transmission Basics.

UNIT II:

Data Link Control and Protocol concepts- Flow Control, Error Control. Asynchronous Protocols, Synchronous Protocols. Local Area Networks-Wide Area Networks.

UNIT III:

Error Detection and Correction- Types of Errors. Data Compression-Image Compression, Video Compression, Audio Compression. ISDN Services-ISDN Topology, ISDN Protocols, Broadband ISDN.

UNIT IV:

Internetworking-Principles of Internetworking. Routing Principles-Internetwork Protocols(IP). Transport service-Transport Protocols-Transmission Control Protocols.

UNIT V:

Network Applications-Client server Model, DNS-TELNET-File Transfer and Remote File Access-Network Management, Network Security-Web security.

Text Books:

1. Brijendra Singh, "Data Communications and Computer Networks", PHI Learning Private Limited, New Delhi, Second Edition, 2005.
2. L. Mathu Krithigha Venkatesh, "Data Communication and Networking", Margham Publications, Chennai, Second Edition, 2013.

Reference Books:

1. Ulysess D. Black, "Data Communications and Distributed Networks", Prentice Hall of India, Third Edition, 1997.
2. Prakash C.Gupta, "Data Communications", Prentice Hall of India, Second edition, 2014.

EMESTER V

PAPER I.B

L	T	P	C
5	0	0	5

TOTAL HOURS:65

COMPUTER GRAPHICS

SUBJECT CODE: U5CS04ET

UNIT I:

Introduction to computer Graphics - Video display devices- Raster scan Systems - Random Scan Systems - Interactive input devices - Hard copy devices - Graphics software - Output primitives - line drawing algorithms - initializing lines - line function - circle Generating algorithms.

UNIT II:

Attributes of output Primitives - line attributes - Color and Grayscale style - Area filling algorithms - Character attributes inquiry functions - Two dimensional transformation - Basic transformation - Composite transformation - Matrix representation - other transformations.

UNIT III:

Two - dimensional viewing - window- to view port co-ordinate transformation - clipping algorithms - Interactive input methods - Physical input devices - logical classification of input devices - interactive picture construction methods.

UNIT IV:

Three - dimensional concepts - Three dimensional display methods - parallel Projection - Perspective Projection - Depth Cueing - Visible line and surface identification - Three dimensional transformation.

UNIT V:

Three dimensional viewing - Projection - Viewing transformation - implementation of viewing operations - Hidden surface and Hidden line removal - backface removals.

Text Book:

1. D.Hearn and M.P.Baker, “Computer Graphics (C version)”, Pearson Education, 2nd Edition, 2011.

Reference Books:

1. W.M. Newman and RF.Sproull, “Principles of Interactive Computer Graphics”, McGraw Hill International 4th Edition – 2002.
2. BasabduGanguly “Computer Graphics” Nandhu Publishers, 2nd Edition, 2014.

L	T	P	C
3	0	0	3

SEMESTER V
SKILL BASED SUBJECT III

TOTAL HOURS:39

PAPER III
SOFTWARE ENGINEERING
SUBJECT CODE: U5CS05ST

UNIT I:

Introduction to Software Engineering: Definitions - Size Factors - Quality and Productivity Factors - Planning a Software Project: Defining the Problem - Goals and Requirements - Solution Strategy - Planning the Development Process: Various Models - Planning an Organizational Structure

UNIT II:

Software cost estimation: Introduction - Software Cost Factors - Software Cost Estimation Techniques - Software Requirements Definition - Software Requirements Specification - Specification Techniques - Languages and Processors for Requirements.

UNIT III:

Software design - Design concepts - Modules And Modularization Criteria - Design Notations - Design Techniques - Design Considerations – Design Guide lines-Implementation Issues: Structures-Loading Techniques-Coding Styles - Standards And Guidelines - Documentation Guidelines.

UNIT IV:

Modern programming Language Features - Type Checking - Separate Compilation - User Defined Data Types - Data Abstraction - Scoping Rules - Exception Handling - Currency Mechanism -Verification And Validation Techniques - Quality Assurance - States Analysis - Symbolic Excretion.

UNIT V:

Unit - Testing And Debugging - System Testing - Formal Verification Software Maintenance - Maintainability - Managerial Aspect Of Software Maintenance - Configuration Management - Source Code Metrics - Other Maintenance Tools And Techniques.

Text Books:

- 1.Richard Fairley, “Software Engineering Concepts”, Tata Mc Graw-Hill, sixth edition,1997.
- 2.Roger S.Pressman-“Software Engineering”-Tata MC Graw Hill International, sixth edition, 2005.

Reference Book:

1. K.K.Aggarwal & Yogesh Singh – “Software engineering programs Documentation Operating Procedures -New Age International Publishers, Second Edition,2005

SEMESTER VI

L	T	P	C
4	0	0	4

TOTAL HOURS:52

PAPER VII

VISUAL PROGRAMMING SUBJECT CODE: U6CS01MT

UNIT I:

Customizing a form- Writing a simple program - Tool box- Creating control-Name property- Command button-Access keys-Image control-Text boxes-Labels-Message boxes-Grid _Editing tools-Variables data types-String number.

UNIT II:

Displaying information-Determinate loops, indeterminate loops -Conditionals - Built in function-Function and Procedure.

UNIT III:

Arrays-List-Sorting and searching -Record - Control arrays-Grid control-Project with multiple form -Do events and sub main –Error trapping.

UNIT IV:

VB objects- Dialogue boxes-Common control-Menus-MDI forms-Testing-Debugging and Optimization -Working with Graphics.

UNIT V:

File and handling-File system control-File system objects.

Text Book:

1. Gary Cornell ,“ Visual Basic 6.0 From the ground up”, Tata McGraw Hill, 2nd Edition, 2002.

Reference Books:

1. Noel Jerke, “Visual Basic (The Complete Reference)”, Tata McGraw Hill, 3rd Edition, 2008.
2. Deitel& Deitel ,T.R. Nieto, ”Visual Basic 6”, PHI , Pearson Edition, 2005.

SEMESTER VI

PRACTICAL VII

L	T	P	C
0	0	4	4

TOTAL HOURS:52

WEB TECHNOLOGY LAB SUBJECT CODE: U6CS01MP

1. Create a simple page introducing yourself how old you are, what you do, What you like and dislike. Modify the introduction to include a bullet list of what you do and put list the 5 things you like most and dislike as numbered lists. Create another page about your favorite hobby and link it to (and from) your main page. Center something, and put a quote on one of your pages.
2. Put an existing image on a web page. Create a table, use a heading and at least one use of row span/col. span. Color a page and some text within the page. Link to another site
3. Create a new file called index.html.
Put the normal HTML document structure tags in the file.
Give it a title.

At the bottom of the page (i.e. the last thing between the body tags) put the following:
A horizontal rule.
A Link to your e-mail Address (With your name between the tag) ; remember to put the link to your E- Mail address within address tags.
A line break.
The date. (I have this same structure at the bottom of this page).
Above this block (which is called the footer), put a title in heading tags.
Add some text describing yourself (you can split this into multiple headings and Paragraphs if you wish).
4. Write a script to create an array of 10 elements and display its contents.
5. Write a function in Java script that takes a string and looks at it character by character.
6. Create a simple calculator using form fields. Have two fields for number entry & one field for the result. Allow the user to be able to use plus, minus, multiply and divide.
7. Create a document and add a link to it. When the user moves the mouse over the link, it should load the linked document on its own. (User is not required to click on the link).

8. Create a document, which opens a new window without a toolbar, address bar or a status bar that unloads itself after one minute.
9. Create a document that accepts the user's name in a text field form and displays the same the next time when the user visits the site informing him that he has accessed the site for the second time, and so on.
10. Create a Web form for an online library. This form must be able to accept the Membership Id of the person borrowing a book, the name and ID of the book and the name of the book's author. On submitting the form, the user (the person borrowing the book) must be thanked and informed of the date when the book is to be returned. You can enhance the look of the page by using various ASPNET controls.

SEMESTER VI

PRACTICAL VIII

L	T	P	C
0	0	4	3

TOTAL HOURS:52

VISUAL PROGRAMMING LAB SUBJECT CODE: U6CS02MP

1. Building simple application
2. Working with Intrinsic controls and ActiveX controls
3. Application with multiple forms
4. Application with dialogs
5. Application with menus
6. Application using data control
7. Application using format dialogs
8. Drag and Drop events
9. Database Management
10. Creating ActiveX controls

SEMESTER VI

PAPER VIII

L	T	P	C
0	0	5	5

TOTAL HOURS:65

SOFTWARE PROJECT MANAGEMENT

SUBJECT CODE: U6CS08MT

UNIT I :

Introduction to Software Projects – An Overview of Project Planning – Project Evaluation – Selection of an appropriate Project approach – Software effort Estimation.

UNIT II:

Activity Planning – Project Schedules – Sequencing and Scheduling Projects – Network Planning Model – forward and backward pass-Identifying the Critical path-Activity float-Shortening Project Duration – Identifying Critical Activities-precedence networks.

UNIT III:

Risk Management – Resource Allocation – Monitoring and Control – Managing People and Organizing Teams – Planning for Small Projects.

UNIT IV:

Software Configuration Management – Basic Functions – Responsibilities – Standards – Configuration Management – Prototyping – Models of Prototyping.

UNIT V:

Case Studies - Application of SPM concepts in Hospital information systems or information systems of any small and medium scale Industry – SPM in Hospital information management System, Small and Medium Scale Enterprises – Application of SPM in Marketing

(For Unit V, students are expected to do a survey and study and submit a report)

Text Book:

1. Mike Cotterell, Bob Hughes, “Software Project Management”, Inclination/Thomas Computer Press, 2nd Edition, 2001.

Reference Books:

1. Darrel Ince, H.Sharp and M.Woodman, “Introduction to Software Project Management and Quality Assurance”, Tata McGraw Hill, 3/ E, 2006.
2. Ramesh Gopalasamy, “Managing Global Software Projects”, 4th Edition, 2005.
3. S. A. Kelkar, “Software Project Management: A Concise Study”, PHI Learning Pvt. Ltd., 5th Edition, Dec-2012.

**SEMESTER VI
ELECTIVE II**

L	T	P	C
5	0	0	5

(to choose 1 out of the given 2)

TOTAL HOURS:65

**PAPER II.A
WEB TECHNOLOGY
SUBJECT CODE:U6CS02ET**

UNIT I:

Internet Basic - Introduction to HTML - List - Creating Table - Linking document Frames - Graphics to HTML Doc - Style sheet - Style sheet basic - Add style to document - Creating Style sheet rules - Style sheet properties - Font - Text - List - Color and background color - Box - Display properties.

UNIT II:

Introduction to Javascript - Advantage of Javascript - Javascript Syntax - Datatype - Variable - Array - Operator and Expression - Looping Constructor - Function - Dialog box.

UNIT III:

Javascript document object model - Introduction - Object in HTML - Event Handling - Window Object - Document object - Browser Object - Form Object - Navigator object Screen object - Build in Object - User defined object - Cookies.

UNIT IV:

ASP. NET Language Structure - Page Structure - Page event, Properties & Compiler Directives. HTML server controls - Anchor, Tables, Forms, Files. Basic Web server Controls- Lable, Textbox, Button, Image, Links, Check & Radio button, Hyperlink. Data List Web Server Controls - Check box list, Radio button list, Drop down list, List box, Data grid, Repeater.

UNIT V:

Request and Response Objects, Cookies, Working with Data - OLEDB connection class, command class, transaction class, data adaptor class, data set class. Advanced Issues - Email, Application Issues, Working with IIS and page Directives, Error handling. Security - Authentication, IP Address, Secure by SSL and Client Certificates.

Text Books:

1. I. Bayross, "Web Enable Commercial Application Development Using HTML, DHTML, Javascript", Pen CGI, BPB Publications, 4/E, 2013.
2. G. Buczek, ASP.NET Developers Guide, TMH, 2/E, 2002.

Reference Books:

1. Deitel & Deitel, "Internet & World Wide Web How to program", Pearson Education, 3rd Edition, 2006.

**SEMESTER VI
PAPER II.B**

L	T	P	C
5	0	0	5

TOTAL HOURS:65

**CLIENT/ SERVER TECHNOLOGY
SUBJECT CODE: U6CS03ET**

UNIT I:

INTRODUCTION-Introduction to client/server computing - Main frame -centric client/server computing - Down sizing and client/server computing - Preserving mainframe applications-Investment through porting - Client/server development tools - Advantages of Client/Server computing.

UNIT II:

CLIENT COMPONENT-Components of client/server applications - The client - Client service, request for services, RPC, windows services, Fax/print services, Remote boot services, other remote services-Utility services and other services, Dynamic data exchange, Object linking and embedding. Common request broker architecture-The server - detailed server functionality - The networking operating system - novell network - LAN manager - IBM LAN server-Banyan VINES-PC network file services - Server operating systems: Netware,OS/2,Windows NT unix-system application architecture (SAA).

UNIT III:

SERVER COMPONENT-Components of client/server architecture-Connectivity - Open Systems Interconnect (OSI) - Inter Process Communication (IPC) - Communication interface technology - Wide area network technology - Client/server development software - Platform migration and reengineering of existing systems - Hardware components.

UNIT IV:

DISTRIBUTED OBJECTS AND INTERNET-Client/server with distributed objects - Distributed objects and components-From orb to business objects - Compound Documents : The client framework - OLE/DCOM-Client/server and the Internet-Web client/server - The hyper text era - The interactive era - The Java object era - The distributed object era.

UNIT V:

APPLICATION DEVELOPMENT TOOLS-GUI front end to 3270/5250 screens - The prototype process - Application development - Workbench architecture - Information Engineering facility Architecture - EASEL Workbench - Ellipse - SQL Windows - Power builder - SQL Tool set. APT workbench component.

Text Book:

1. Dewire and Dawna travis, “client/server computing”, -McGraw hill, 3rd Edition, 2001.

Reference Books:

1. Beth gold-Bernstein, David Marca, “Designing enterprise client/server systems”, PHI, 2nd Edition, 2002.

SEMESTER VI

ELECTIVE III

(to choose 1 out of the given 2)

L	T	P	C
5	0	0	5

TOTAL HOURS:65

PAPER III.A

DATA MINING AND WAREHOUSING

SUBJECT CODE:U6CS04ET

UNIT I:

Introduction - What is Data mining , Data mining - important Data mining - various kind of data - Data mining Functionalities – Various kinds of Patterns Pattern Interesting Classification of Data mining Systems Data mining Task Primitives Integration of Data Mining System Major issues in Data Mining

UNIT II:

Data Processing --Process-the Data-Descriptive Data-Summarization – Measuring-Central Tendency Dispersion-of Data-Graphic-Displays of--BasicDescriptive-Data-Summaries-Data-Cleaning-Data-Integration-andTransformation data Reduction

UNIT III:

Data Warehouse-OLAP Technology-An overview - Data Warehouse Multidimensional-Data Model Data-Warehouse Architecture-Data Warehouse Implementation

UNIT IV:

Mining --Frequent-Patterns Associations Correlations-- Basic-Concepts Road Map-Efficient-Scalable-Frequent Ltemset Mining-methods-Mining –Various Kinds of Association-rules.

UNIT V:

Applications Trends - Data mining Applications-Data mining --System Products-Research Prototype-Additional Themes-on Data Mining-Social impact of-Data mining Trends in-Data mining.

Text Book:

1. Jiawei Han, Micheline Kamber, “Data Mining: Concepts and Techniques”, Morgan Kaufman Publishers, 4/E, 2006.

Reference Books:

1. Karguta, Joshi, Sivakumar & Yesha, “Data Mining (Next Generation Challenges and Future Directions)”, Printice Hall of India, 4th Edition, 2007.

SEMESTER VI

PAPER III.B

L	T	P	C
5	0	0	5

TOTAL HOURS:65

NETWORK SECURITY SUBJECT CODE:U6CS05ET

UNIT I:

Security problems in computer networks – kinds of security breaches – security services – conventional encryption model – classical encryption techniques.

UNIT II:

Block cipher – design principles – Data Encryption Standard (DES) – triple DES – International Data Encryption Algorithm (IDEA) – RC2, RC5 – Blowfish – CAST 128 – Confidentiality using conventional encryption.

UNIT III:

The principle of public key cryptosystems – RSA Algorithm – Elliptic curve cryptography – message authentication and Hash function – MD5 message digest Algorithm – Secure Hash Algorithm (SHA-1).

UNIT IV:

Digital signatures and Authentication protocols – Kerberos – X.509 directory Authentication service – E-mail security – Pretty Good privacy, S/MIME – IP Security – Web security.

UNIT V:

Intruders – Intrusion techniques – Intrusion detection – viruses and related threats – worms – Firewalls.

Text Book:

1. William Stallings, “Cryptography and Network Security: Principles and practice”, Pearson Education Inc., 3rd Edition, 1999.

References:

1. Simonds, “Network Security”, McGraw Hill Publications, 2nd Edition, 1998.
2. Baxer, “Networking Security”, McGraw Hill Publications, 2nd Edition, 1996.
3. Derek Atkins, “Internet Security”, Techmedia Publications, 2nd edition, 1998.

**SEMESTER VI
SKILL BASED SUBJECT IV**

L	T	P	C
3	0	0	3

TOTAL HOURS:39

**PAPER IV
ANIMATION TECHNIQUES
SUBJECT CODE: U6CS06ST**

UNIT I:

What is mean by Animation – Why we need Animation –Types of Animation 2D & 3D – Theory of 2D Animation – Theory of 3D Animation – Difference between Graphics & Animation – Application of 2D & 3D Animation – History of Animation – Software's.

UNIT II:

Traditional 2D Animation Concept – Types of 2D Animation – Techniques of 2D Animation – Color – Text – Formation – Size – Script Animation – Time Line Effects – Application of 2D Animation – Characterization 2D –Principle of 2D Animation – Concept Development.

UNIT III:

3D Animation & its Concepts – Types of 3D Animation– Cycle & Non-Cycle Animation – Theory of Character 3D Animation – 3D Transition Animation – Skeleton & Kinetic 3D Animation – Texturing & Lighting of 3D Animation – 3D Camera Tracking – Applications & Software of 3D Animation.

UNIT IV:

Motion Caption – Formats – Methods – Usages – Motion Capture Software – Merge with Software – Expression – Formats – Methods – Usages – Expression Capture Softwares – Script Animation Usage – Different Language of Script Animation Among the Software.

UNIT V:

Concept Development – Scripting – Story Developing– Output Formats – Audio Formats & Video Formats – Colors – Color Cycle – Color Formats – 3D Production Budgets – 3D Animated Movies – Fields in 3D Animation.

Text Books:

1. Joestadaro, Donkim, “Maya 6.0 Bible”, PHI, 2nd Edition, 2009.
2. Kelly Ldot, Murtock, “3DS MAX BIBLE”, TMH, 4th edition, 2010.

Reference Books:

1. Tom Meade, Shinsaku Arima, “Maya 8.0 the Complete Reference”, TMH, 2nd Edition, 2011.
2. Jean Ann, “Animation Writing and Development”,Wright,Focal Press,2nd Edition 2010.

ADHIPARASAKTHI COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS)

Permanently Affiliated to Thiruvalluvar University, Vellore

Re-accredited by NAAC with B Grade(CGPA– 2- 83)

M.SC - INFORMATION TECHNOLOGY

Under CBCS

[Effective from the Academic year 2015-2016]

REGULATIONS

CBCS:

Choice - Based Credit System is flexible system of Learning “Credit’ defines the quantum of contents/ syllabus prescribed for a course and determine the number of hours of instruction required. The distinguishing features of CBCS are the following

It permits the students to:

- Learn at their own pace
- Choice electives from a wide range of electives courses offered by the departments of the affiliated Colleges
- Undergo additional courses and acquire more than the requires number of credits.
- Adopt an inter disciplinary approach in learning.
- Make best use of the expertise of available faculty

1. Eligibility for Admission:

A Candidate who has passed the B.Sc Degree Examination with Mathematics/ Statistics of this university or an Examination of any other University accepted by the Syndicate as equivalent thereto shall be permitted to appear and qualify for the Master of Science [M.Sc] in information Technology Degree Examination of this University after a course of two academic years in an affiliated College/ Department of this University

2. Eligibility for the Award of Degree:

A Candidates shall be eligible for the award of the degree only if he/she has undergone the prescribed course of study in the college for a period of not less than two academic years and passed the examinations of all the four semesters prescribed earning 90 credits and fulfilled such conditions as have been prescribed therefore.

3. Duration of the Course:

The Course duration shall be two years consisting of four semesters

4. Examination:

The duration Of University Examination for theory and practical subjects shall be 3 hours. The Maximum mark for each theory is 100 with 25 for Continuous Internal Assessment [CIA] and 75 for University Examination. The distribution of internal marks for theory papers shall be: Two tests of three -20 marks, and Assignment./ Seminar – 5 marks. The maximum marks for each practical is 100 with 25 for Internal Assessment and 75 for University Examination. The distribution of internal marks for practical papers shall be: Practical tests Two out of Three-10 marks, Attendance 5 marks, and record – 10 marks. For project work the marks assigned shall be

Project Report	: 150 Marks
Internal Assessment	: 50 Marks

For the conduct of University Examination in practical subjects, the University will appoint two external examiners. The University will set the questions and distribute to the Colleges. The examiners will conduct the examinations and award the marks on the same day and forward to the University. The Principal / Head of the Department will coordinate to provide the laboratory and other facilities for conducting the examination.

Project work shall be carried out individually in an R&D section of any industry or University or in the Institute in which the candidate is studying. The Project work / Dissertation report shall be submitted through the guides / Supervisors to the Head of the Department and then to the University not latter the 31 st May / 31 st December. If He/ She fails to submit the project Work / Dissertation within the stipulated date for particular semester, he/she may be permitted with the approval of the HOD to submit the project work / Dissertation report during the succeeding semesters, within the maximum period of Five years from the date of admission to the First Semester. Project Work/ Dissertation evaluation and Viva- Voce shall be conducted by two external examiners

5. Requirements for Proceeding to Subsequent Semester:

(i).Candidates shall register their name for the first semester Examination after the admission in the P.G. Courses.

(ii) Candidates shall be permitted to proceed from the first semester up to the final semester irrespective of their failure in any of the semester examinations subject to the condition that the candidates should register for all the arrear subject of earlier semesters along the current (subsequent) semester subjects.

(iii). Candidates shall be eligible to go to subsequent semester, only if they earn, sufficient attendance as prescribed there for by the academic council from time to time. provided in case of a candidate earning less than 65 % of attendance in any one of the semester due to any extraordinary circumstances such as medical grounds, such candidates who shall produce Medical Certificate issued by the Authorized Medical Attendant (AMA), duly certified by principal of the college, shall be permitted to proceed to the next semester and to complete the course of study. Such candidates shall have to repeat the missed semester by rejoining after completion of final semester of the course, after paying the fee for the break of study as prescribed by the college from time to time.

6. Passing Minimum:

A Candidate shall be declared to have passed the whole Examination, if he/she passes in all the papers and practical wherever prescribed / as per the scheme of examinations by earnings by earning 90 credit.

In fixing the passing minimum marks, the following will be observed:

- (a). There shall be no passing Minimum for Internal.
- (b) For External Examination, Passing Minimum shall be of 50 % (Fifty percentage) of the maximum marks prescribed for the paper for each paper/Practical/Project and Viva-Voce.
- (c) In the aggregate (External + Internal), the passing minimum shall be of 50 % for the paper for each paper/Practical/Project and Viva-Voce.
- (d) Grading shall be based on Overall Marks Obtained [Internal +External].

7. Classification of Successful Candidates:

Candidates who secured not less than 60% of aggregate marks [Internal + External] in the whole examination shall be declared to have passed the examination in the First Class.

All other successful candidates shall be declared to have passed in Second Class. Candidates who obtain 75% of the marks in the aggregate [Internal + External] shall be deemed to have passed the examination in First Class with Distinction, provided they pass all the examinations [Theory papers, practical, and Project and Viva- voce] prescribed for the course in the first appearance.

8. Requirements to take the Semester Examinations:

- a) A Candidate will be permitted to take the Examination for any semester, If
 - i) He/ she secure not less than 75 % of attendance out of the 90 instructional days during the semester.
[In the case married women students the minimum attendance requirements shall be 55% of the total instruction days]
 - ii) He/ she earns a progress certificate from the Head of the Institution of having satisfactory completed the course of Study prescribed in the subjects as required by the regulations, and
 - iii) His / her conduct has been satisfactory.

Provided that it shall be open the academic council or any authority delegated with such powers by the academic council to grant exemption to a candidate who has failed to earn 75% of the attendance prescribed for any valid reasons(S) subject to the usual conditions.

- b) A candidate who secured attendance less than 75% but 65% and above shall be permitted to take the examination on the recommendation of the Head of the Institution to condone the lack of attendance as well as on the payment of the prescribed fees to the college.
- c) A candidate who has secured attendance less than 65 % but 55% and above in any semester, has to compensate the shortage of attendance in the subsequent semester besides, earning the required percentage of attendance in that semester and take the examination of both the semester papers together at the end of the latter semester.
- d) A Candidate who secured less than 55% of attendance in any semester will not be permitted to take the regular examinations. He/ She to re-do the course after the completion of the final Semesters by rejoining the semester in which the attendance is less than 55%.

e) A Candidate who secured less than 65% of attendance in, the final semester has to compensate his / her attendance shortage in a manner to be decided by the Head of the department concerned after rejoining the course.

9. Grading System:

In addition to the above marking system, grading system is also adopted as detailed below:

[a] The Marks (Sum of IA and UE marks) in each course is assigned with a letter grade on a seven points scale using the following letter grade points and ranges of marks.

SEVEN POINT SCALE [AS per UGC notification 1998]

Marks	Grade Point	Letter Grade	Class
95-100	7.00	H	First Class with Distinction
90-94	6.00	O	First Class with Distinction
75-89	5.50	D	First Class with Distinction
60-74	4.75	A	First Class
55-59	4.00	B	Second Class
50-54	3.5	C	Second Class
Below 50	3.00	F	Fail

From the Second Semester onwards the total performance with in a semester and continuous performance starting from the first semester are indicated respectively by **Grade Point Average [GPA]** and **Cumulative Grade Point Average [CGPA]**. These two are calculated by the Following formulae:

$$GPA = \frac{\sum_{i=1}^n C_i G_i}{\sum_{i=1}^n C_i}$$

where C_i is the credit earned for the Course i in any Semester G_i is the Grade point. obtained by the student for the course i and 'n' is the number of courses **passed** in that semester.

CGPA = GPA of all the courses starting from the first Semester to the Last Semester.

10. Ranking:

Candidates who pass all the examinations prescribed for the course in the first appearance itself alone are eligible for Ranking.

Provided in the case of candidates who pass all the examinations prescribed for the course with a break in the first appearance due to the reasons as furnished in the Regulation 7.(iii) Supra are only eligible for classification / Distinction.

The Mark obtained in improvement examination will not be taken in to consideration for Ranking

11. The Medium of Instruction and Examinations:

The medium of instruction and examinations shall be in English

12. Submission of Record Notebooks for Practical Examinations:

Candidates taking the practical examinations should submit bonafide record note books prescribed for the practical examinations. Otherwise the candidates will not be permitted to take the practical examinations. However, in genuine cases where the students could not submit the record note book may be permitted to take the practical examination provided the Head of the Departments concerns from the institutions certifies that the candidate has performed the experiments prescribed for the Course. For such candidate who do not submit Record Note Books, Zero [0] marks awarded for record note books.

In case a candidate fails in the practical Examination the marks awarded for the record at the time of first appearance for the practical examination should be made available by the college to the examiners at the subsequent appearance by the candidate.

13. Improvements of the Marks in the Subjects already passed

Candidates who have passed in theory paper/ papers are allowed to appear again for theory paper/papers only once in order to improve his/her marks, by paying the fee prescribed from time to time. Such candidates are allowed to improve within a maximum period of 10 Semesters counting from his/her first semester of his/her admission. If candidate improves his marks that his improved marks will be taken into consideration for the award of classification & Distinction only. Such improved marks will not be counted for the award of Prizes/ Medals & Ranks. If the Candidate does not show improvement in the marks his previous marks will be taken into consideration.

No Candidate will be allowed to improve marks in the Practical's, Mini Project, Major project & Viva voce.

14. Checklist for Inspection:

A. Qualification for

Teaching Faculty : as prescribed by the UGC and the University
Laboratory Staff : as prescribed by the UGC and the University.

B. Infrastructure Facilities

- i) Building: Number of classroom with specifications: 3 rooms measuring 20"x 25 "
If the class strength is above 50 the space shall increase by 10 sq, ft, per student.
Number of staff rooms: one measuring 20" x 20"
- ii). Furniture: One pair of table / chair per student.

PATTERN OF QUESTION PAPER:

PART- A (300 Words)		
To Answer 5 Questions (either or type)	5 X 6 Marks	= 30 Marks
PART-B (900 Words)		
To Answer 3 Questions out of 5 questions	3X 15Marks	= 45 Marks
Total		= 75 Marks

Course of Study and the Scheme of Examinations: M.Sc - IT (2015-2016)

Year/ Sem	Subject	Paper	Sub. Code	Title of the Paper	Hr/ week	Credit	Exam Hrs.	Max. Marks		
								IA	Univ. Exam	Total
I Year I Sem	Core	Paper I	P1IT01MT	Principles of Communication System	5	4	3	25	75	100
	Core	Paper II	P1IT02MT	Data Structures Using C	5	4	3	25	75	100
	Core	Paper III	P1IT13MT	Object Oriented Database Management System	5	4	3	25	75	100
	Elective [A] or Elective [B]	Paper I	P1IT04ET	Computer Architecture	5	3	3	25	75	100
			P1IT05ET	Discrete Mathematics						
	Core Practical	Practical I	P1IT11MP	Data Structures Lab	10	5	3	25	75	100
I Year II Sem	Core	Paper IV	P2IT01MT	Operating System	5	4	3	25	75	100
	Core	Paper V	P2IT02MT	Data Communication Networks	5	4	3	25	75	100
	Core	Paper VI	P2IT03MT	Object Oriented Programming Using Java	4	4	3	25	75	100
			P2HR01GS	Human Rights	2	2	3	25	75	100
	Elective [A] or Elective [B]	Paper II	P2IT14ET	Software Engineering	4	3	3	25	75	100
			P2IT05ET	E-Commerce						
	Core Practical	Practical II	P2IT11MP	Java and UNIX Lab	10	8	3	25	75	100
II Year III Sem	Core	Paper VII	P3IT11MT	Mobile Computing	5	4	3	25	75	100
	Core	Paper VIII	P3IT02MT	Internet Programming	5	4	3	25	75	100
	Core	Paper IX	P3IT03MT	Computer Graphics	5	4	3	25	75	100
	Elective (A) Or Elective (B)	Paper III	P3IT04ET	Signals and Systems	4	3	3	25	75	100
			P3IT05ET	Multimedia Systems						
	Elective (A) Or Elective (B)	Paper IV	P3IT06ET	Object Oriented Analysis and Design	3	3	3	25	75	100
			P3IT07ET	Computer Networks						
	Core Practical	Practical III	P3IT01MP	Internet Programming and Graphics Lab	8	4	3	25	75	100
II Year IV Sem	Core	Paper X	P4IT01MT	Visual Programming	5	4	3	25	75	100
	Elective (A) Or Elective (B)	Paper V	P4IT02ET	Optical and Satellite Communication	4	3	3	25	75	100
			P4IT03ET	Network Security						
	Core Practical	Practical IV	P4IT12MP	Visual Programming and DBMS Lab	10	8	3	25	75	100
	Core		P4IT01PV	*Project Work with viva voce	11	8	3	50	150	200
						90				2200

SEMESTER I

L	T	P	C
5	0	0	4

PAPER I

TOTAL HOURS: 65

PRINCIPLES OF COMMUNICATION SYSTEM

SUBJECT CODE: P1IT01MT

UNIT I:

Spectral Analysis and Random Variables Process: Spectral Characteristics of a Periodical Signal – Spectra of Common Signals related to Communication – Cross Correlation auto Correlation and Power / Energy density Spectra- Random Signals and Process- Modeling Noises.

UNIT II:

Analog Modulation System: Basics Principles of AM, FM and PM – Spectra, Power Consideration, Receiver's Characteristics and Deduction of AM, FM and PM System Performance- Threshold effects reduction.

UNIT III:

Baseband Data Communication: Sampling and Quantizing – PCM, ADPCM, DM, ADM- Base band pulse Shaping- Binary data Formats- Base band transmission – ISI Correlative Coding Optimum SNR- Matched Filter Deduction

UNIT IV:

Digital Modulation : Digital Modulation – Coherent binary modulation techniques- Coherent and Quadrature modulation techniques- Non-Coherent binary modulation – M- array modulation – Performance of Digital modulation system based on Probability of error, bandwidth and ISI

UNIT V:

Spread Spectrum Techniques: Fundamental Concepts- Direct Sequence Spread Spectrum- Frequency hopping Spread Spectrum

Text Books:

1. Herbert Taub and Donald.L. Shilling, “ Principles of Communication System” McGraw Hill Publishing, 2nd edition, 2008.
2. Simon Haykins, “Principles of Communication Systems” ,Prentice Hall of India , 3rd edition,2002.

References:

1. Thomas and Chandrasekhar, “ Communication Theory” ,TMH New Delhi, , 1st edition, 2006.
2. Lathi B.P, “Analog and Digital Communication system ” , Prentice Hall of India , 4th edition, 2009.

L	T	P	C
5	0	0	4

SEMESTER I
PAPER II
DATA STRUCTURES USING C

TOTAL HOURS: 65

SUBJECT CODE: P1IT02MT

UNIT-I:

Introduction to C Programming: Programming in C – data types, operators, hierarchy and associativity, expressions, Control structure, functions – structure of a C program – preprocessing – arrays, structures and unions – pointers – pointers and arrays – structures and functions – storage class initialization.

UNIT-II:

Introduction to Data structures: introduction – the stack: definitions and examples – representing stacks in C – examples: infix, postfix and prefix.

UNIT-III:

Queues and Lists: Queue and its sequential representation – linked list – list in C – examples: other list structures.

UNIT-IV:

Trees: Binary trees – binary tree representation – Huffman algorithm – representing list as binary trees – trees and their applications.

UNIT-V:

Sorting: Introduction – exchange sorts – selection and tree sorting – insertion sort – merge and radix sort – searching – basic searching techniques – tree searching – search trees – hashing.

Text Book:

1. Byron Gottrifried , “Programming with C” , Mc Graw Hill, 3rd editon, 2010.
2. Aarom M. Tanenbaum , “Data Structures using C” , Prentice Hill , 2nd edition, 2009.

References:

1. Lipchitz , “ Data Structures” , TMH New Delhi, (Special India Edition) , 2008.
2. Jean Paul & Trembly Paul Sorenson, “ An Introduction to Data Structures Applications” , MCGRAW Hill , 2nd edition, 2001.

L	T	P	C
5	0	0	4

**SEMESTER I
PAPER III**

TOTAL HOURS: 65

OBJECT ORIENTED DATABASE MANAGEMENT SYSTEM

SUBJECT CODE: P1IT13MT

UNIT-1:

Concepts for Object Databases: Object Identity - Object Structure - Type Constructors- Encapsulation of Operations – Methods - Persistence - Type and Class Hierarchies and Inheritance - Complex Objects - Other Object - Oriented Concepts.

Object Databases Standards, Languages and Design: Overview of Object Model Of ODMG-The Object Definition Language-The Object Query Language-Overview of C++ Language Binding-Object Database Conceptual Design.

Object Relational and Extended Relational Database System: Evolution & Current Trends of Database Technology-The Informix Universal Server- Object Relational Features of Oracle 8.

UNIT –II

Functional Dependencies & Normalization for Relational Database: Informal Design Guidelines for Relational Schemas - Functional Dependencies - Normal forms Based on Primary Keys - General Definitions of Second and Third Normal Forms - Boyce-Codd Normal form – Relational Database Design and further Dependencies - Algorithms for Relational Database schema Design - Multivalued Dependencies and Fourth Normal Form - Join Dependencies and Fifth Normal Form.

UNIT-III:

Query processing and Optimization: Translating SQL Queries into Relational Algebra – Algorithms for External Sorting – Algorithms for SELECT AND JOIN Operations – Algorithms for PROJECT and SET Operations - Implementing Aggregate operations and Outer joins – Combining Operations Using Pipelining - Using Heuristics in Query Optimization - Using Selectivity and cost Estimates in Query Optimization – Overview of Query Optimization in Oracle-Semantic Query Optimization.

UNIT-IV:

Transaction Processing Concepts: Introduction to Transaction Processing – Transaction and System Concepts – Characterizing Schedules - Concurrency Control Techniques – Database Recovery concepts. Recovery Techniques – Transaction support in SQL.

Database security and Authorization: Database Security Issues-Discretionary Access Control Based on Granting/Revoking of Privileges-Mandatory Access Control for Multilevel Security-Statistical Database Security-Encryption and public Key Infrastructures.

UNIT-V:

Enhanced Data Models for Advanced Applications: Active Database Concepts - Temporal Database Concepts - Spatial and Multimedia Database -Introduction to Deductive Databases.

Distributed Databases and Client-Server Architecture: Distributed Database Concepts - Data Fragmentation, Replication and Allocation Techniques for Distributed Database Design – Types of Distributed Database systems - Query processing in Distributed Databases - Overview of Concurrency Control and Recovery in Distributed Databases-An overview of 3- Tier client-Server Architecture –Distributed Databases in Oracle.

Text book:

1.Ramez Elmasri Shamkant B. Navathe, “Fundamentals of Database systems” , Addison Wesley ,7th edition, 2015.

Reference:

1. Raghu Ramakrishna Johannes Gehrke, “Database Management System” ,Tata MCGRAW Hill , 3rd edition,2014..

L	T	P	C
5	0	0	3

SEMESTER I
ELECTIVE
PAPER I
(To choose either A or B)
A)COMPUTER ARCHITECTURE

TOTAL HOURS: 65

SUBJECT CODE: P1IT04ET

UNIT – I:

Basic Structure of Computer hardware and Software Addressing methods and machine program sequencing – Computer Arithmetic – logic design for full adders – Multiplication – Booth algorithm – Fast multiplication – Integer division – Floating point number representation – Floating Point arithmetic

UNIT – II:

Control Unit – Instruction execution cycle sequencing of Control Signals – hardwired control – PLAs – Micro Programmed control Signals – Micro instructions – Micro Program Sequencing – Branch address modification – Pre-fetching of Micro Instructions – Emulations – Bit Slices

UNIT – III:

Memory Organization – Semiconductor RAM memories – internal organization – Bipolar and MOS devices – Dynamic memories – Multiple memory modules and interleaving – cache memory – mapping functions – replacement algorithms – virtual memory – address translation – page tables memory management units- secondary memory – disk drivers – Organization and operations different standards

UNIT – IV:

Input – Output Organizations – accessing I/O devices- Direct memory access [DMA] – interrupts – interrupt handling - handling multiple devices – device identification – vectored interrupts- interrupt nesting – Daisy chaining – I/O interfaces – serial parallel standards – Buses- scheduling – bus arbitration- bus standards.

UNIT – V:

Introduction to parallels Organization- Multiple Processor Organization – Symmetric Multiprocessors – Cache Coherence – Non Uniform Memory access – Vector Computation – Introduction to CISC and RISC Architectures- Comparison

Text Books:

1. Hamecher C. V, “Computer Organization” , , McGraw hill , 4 th Edition 2001.
2. Stallings William, “ Computer Organization and Architecture” , Pearson Education, 6th Edition ,2007.

Reference:

- 1.Pal Chaudhary P, “Computer Organization and Design” , Prentice Hall of India ,2nd edition,2008.

L	T	P	C
5	0	0	3

**SEMESTER I
ELECTIVE
PAPER I**

TOTAL HOURS: 65

**(To choose either A or B)
B)DISCRETE MATHEMATICS
SUBJECT CODE: P1IT05ET**

UNIT – I:

Fundamentals: Sets and Subsets – Operations on Sets – Sequences – Division in the Integers- Matrices – Mathematical Structures. Logic: Proposition and Logical Operations – Conditional Statements- Methods of Proof - Mathematical Induction Counting: Permutations – Combinations – The Pigeonhole Principle – Elements of Probability – Recurrence Relations.-

UNIT – II:

Relations and Digraphs: Product Sets and Partitions – Relations and Digraphs- Paths in Relations and Digraphs- Properties of Relations – Equivalence Relations – Computer Representation of Relations and Digraphs- Manipulation of Relation- Transitive Closure and Warshall’s Algorithm

UNIT – III:

Functions: Functions – Permutation Functions – Growth of functions Topics in Graph Theory: Graphs – Euler Paths and Circuits – Hamilton Paths and Circuits – Coloring Graphs

UNIT – IV:

Order Relations and Structures: Partially Ordered Sets – External Elements of Partially Ordered Sets – Lattices – Finite Boolean Algebra- Functions on Boolean Algebra- Boolean Functions as Boolean Polynomials.

UNIT – V:

Semi groups and Groups: Binary Operations Revisited Semigroups- Products and Quotients of Semigroups – Groups – Product and Quotients of Groups. Groups and Coding: Coding of Binary Information and Error Detection Decoding and Error Correction

Text Books:

1.Berneard Kolman Robert C. Busby and Sharon Ross, “Discrete Mathematical Structures”, Prentice Hall of India Pvt Ltd ,6th edition, 2008.

References:

- 1.Korthage R.R., “ DISCRETE COMPUTATIONAL STRUCTURES” , Academic Press , 2nd sub edition,1984.
- 2.Veerarjan , “Discrete Mathematics”, TMH New Delhi, 1st Ediion , 2006.

SEMESTER I

L	T	P	C
0	0	10	5

TOTAL HOURS: 130

PRACTICAL I **DATA STRUCTURES LAB**

SUBJECT CODE: P1IT11MP

1. Array Implementation

- Matrix Addition and Subtraction
- Matrix Multiplication
- Transpose of Matrix

2. String Manipulation

- Counting no of vowels, consonants, spaces, numbers and special symbols.
- Reverse a string and check for palindrome
- Substring detection and count
- substring removal

3. Sorting and searching

- Insertion sort using function
- Bubble sort using function
- Linear Search using function
- Binary Search using function

4. Stack

- Program to implement a stack using array.
- Program to implement a stack using Linked list

5. Queue

- Program to implement a linear queue using array.
- Program to implement a queue using singly Linked list.

6. Linked List

- Singly Linked list.
- Doubly Linked list.
- Binary Tree traversal

L	T	P	C
5	0	0	4

SEMESTER II
PAPER I V
OPERATING SYSTEM
SUBJECT CODE: P2IT01MT

TOTAL HOURS: 65

UNIT I:

Introduction : Main Frame System, Desktop system – Multiprocessor System – Distributed System – Clustered System – Real Time System – Hand Held System, Operating System Structures: System Components – Operating System Services- System Calls System Programs – System Design and Implementation _ CPU Scheduling Basic Concepts – Scheduling Algorithms.

UNIT II :

Process Management: Process Concepts – Process Scheduling – Operation on Process – Co- Operating Process-Inter Process Communication - Threads Multithreads Models- Process Synchronization: The Critical Section Problems – Synchronization Hardware- Semaphores- Classical Problem of Synchronization – Monitors – Dead lock: Deadlock Characterization – Methods for Handling Deadlocks – Deadlock Prevention – Deadlock Avoidance- Deadlock Detection – Recovery from Deadlock.

UNIT III :

Memory Management: Background – Swapping Contiguous Memory Allocation- Paging- Segmentation- Segmentation with Paging- Virtual Memory – Demand Paging- Page Replacement –Thrashing.

UNIT IV:

File System: File Concepts- Access Methods – Directory Structure- File Protection – File System Implementation – File System Structure and Implementation –Allocation Methods Free Space Management – Recovery – Disk Structure – Disk Scheduling.

UNIT V:

Distributed Operating System:Design issues in Distributed Operating System - Distributed File System – Naming and Transparency - Remote File Access - Stateful Versus Stateless Services- Distributed Coordination- Even Ordering- Mutual Exclusion - Atomicity- Concurrency Control- Deadlock Handling - Election Algorithm - Case Study – Linux and Windows.

Text books:

1. Silberschatz Galvin & Gagne , “Operating System Concepts”, 6 th Edition , 2003.
2. Pradeep K.Sinna, “ Distributed OS Concepts and Design” , IEEE Computer Society Press PHI,1st edition, 2006.

References:

1. Dhamdhere , “ Operating System - A Concepts Based Approach”, TMH New Delhi, 2 nd Edition, 2006.
2. Harrias , “Schaums Outline of Operating Systems” , TMH New Delhi ,1st edition, 2005.

L	T	P	C
5	0	0	4

SEMESTER II
PAPER V
DATA COMMUNICATION NETWORKS

TOTAL HOURS: 65

SUBJECT CODE: P2IT02MT

UNIT-I:

Network Architecture: Layering and Protocols-OSI Architecture- Internet Architecture- Link and Medium Access Protocols-framing-Error Detection-reliable transmission –IEEE 802 standards-Ethernet-Token ring-wireless-Network adapters

UNIT-II:

Network layer: circuit switching-Packet switching-switching and forwarding-Bridges and LAN switches-cell switching-Inter networking-routing-Global internet-Multicast.

UNIT-III:

Transport Layer: UDP-TCP-Remote Procedure call-Performance-congestion control and Resource Allocation-TCP congestion control –Congestion Avoidance Mechanisms –quality and service: Bandwidth-delay-jitter.

UNIT-IV:

Network security and Application: cryptographic Algorithms-DES-RSA-MD5 security mechanisms-firewalls –Name service-traditional Applications-SMTP-HTTP-Multimedia Applications-RTP-RTCP-SCTP.

UNIT-V:

Network Management: Introduction-Network Monitoring- Network control-SNMPV1 Network Management concepts-Information-Standard MIBS.

Text books:

1. Larry L. Peterson and Brule S.Davie, “Computer Networks-A system Approach” , MarganKangmann-Harcourt Asia 2nd edition , 2002 (Unit-I, II, III and IV)
2. William Stallings, “SNMP, SNMP V2, SNMP V3” ,RMON1 & 2, 3 ed, Addison Wesley, 6th Indian reprint 2002 (unit V).

References:

1. Forouzan, “ Data Communication and Networking” , TMH New Delhi, 4 th Edition,2006.
2. Carr , “ Data Communication and Network Security”, TMH New Delhi, 1 st Edtion, 2007

**SEMESTER II
PAPER VI**

L	T	P	C
4	0	0	4

TOTAL HOURS: 52

OBJECT ORIENTED PROGRAMMING USING JAVA

SUBJECT CODE: P2IT03MT

UNIT I:

Object Oriented Programming: Abstract Data Type (ADT) Encapsulation, Object Message, Method, Class, Inheritance Late Binding Polymorphism, Virtual Functions, Abstract Class, Interface, Generic Class and Interfaces Constructors and Destructors, Overloading and Overriding Copy Constructors.

UNIT II:

Java Basics: Importance and Features of Java, Modifiers Access Controls, Data Types, Expressions, Declarations, Statements, and Control Structures, Program Structures, String Handling Packages, Interfaces, Working with Java. Util Package, Garbage Collections Object Class.

UNIT III

Exception Handling , I/O and JDBC: Exception Handling: Fundamental Exception Types uncaught exceptions, throw, throws, final , Built in Exceptions Creating own exception, Input Stream and Output Stream: Streams Byte and Character Stream, Predefined Streams, Reading and Writing from Console and Files Buffered Reader and Writer, Serialization Data Compression, Using Standard Java Packages(lang , util,io,net)

Database: JDBC Architecture, JDBC Basics JDBC Drivers Connecting to Database and accessing databases.

UNIT IV:

AWT & Event Handling: Creating User Interface with AWT, Applets, Applet Life Cycle, Simple Graphics, Fonts and Colors, Events, Listeners, Components ,Containers- Working with Layouts, Image Processing, AWT Exceptions Delegation Event Model, Event Classes, Event Listeners, Event Listener Interfaces, Adapter and Inner Classes

UNIT V:

Multithreading and Communication: Java Thread Models: Priorities, Synchronization, messaging Life cycle of Thread, Thread Class Runnable Interface, and Inter thread Communication, Suspending, Resuming and Stopping Threads, Multithreading, Synchronization, Scheduling and Priority of Threads, Sockets, Types of Sockets; Working with URLs -Web Browsers and Handlers.

Text books:

1. Balgurusamy E, “ Programming with Java”, Tata McGraw Hill , A Primer 3 rd Edition,2007.
2. Bruce Eckel, “ Thinking in Java” , Prentice Hall , 3 rd Edition , 2000.

Reference:

- 1.Thomas Wu, “ An Introduction to object Oriented Programming with Java” , TMH New Delhi, 4 th edition , 2006.

L	T	P	C
4	0	0	3

SEMESTER II

TOTAL HOURS: 52

ELECTIVE

PAPER II

(To choose either A or B)

A)SOFTWARE ENGINEERING

SUBJECT CODE: P2IT14ET

UNIT – I:

The Nature of the Software - Changing Nature - **Software Process:** Process Framework, Umbrella Activities, Process Adaptation. **Software Process Structure:** Generic Process Model, Framework Activity, Task Set, Process Patterns, Assessment and Improvement - **Process Models:** Prescriptive, Specialized, Unified, Personal and Team Process Models. **Agile Development:** Process Models, Team Structures, Agile Teams.

UNIT – II

Estimation For Software Projects: Project Planning Process - Software Scope And Feasibility, Resources – Software Sizing - Project Estimation - Problem Based, LOC Based and Process Based Estimation – **Empirical Estimation Models:** Structure - COCOMO II - Estimation For Agile Development.

UNIT – III

Modeling: Principles That Guide Practice - Understanding Requirements - **Requirements Modeling:** Analysis - Scenario Based Modeling - Class Based Methods. **Design Concepts:** Process - Concepts. **Architectural Design:** Styles - Architectural Design - **Component Level Design:** Class Based Components - Component Based Developments - Mobile App Design.

UNIT – IV:

Objects Oriented Software Engineering - Concepts Identifying the Elements of Object Model - Object Oriented Analysis - Domain Analysis - Object Relationship and Behavior Model Design for Object Oriented Systems - **Product Metrics:** Metrics for the design model.

UNIT – V:

Testing Strategies: Strategic Approach to S/W Testing - Unit, Integration, Validation, and System Testing - Art of Debugging - Software Testing Fundamentals - White Box, Black Box, Control Structure Testing - Software Reengineering - Software Engineer's responsibility.

Text Books:

1. Roger S. Pressman, “Software Engineering - A Practitioner’s Approach”, McGraw Hill Companies Inc, 8th Edition, 2014. (UNIT I, II, III and V)
2. Ian Somerville, “Software Engineering”, Pearson Education, Delhi, 8th Edition, 2007. (Unit IV & V)

References:

1. Roger S. Pressman, “Software Engineering - A Practitioner’s Approach”, McGraw Hill Companies Inc, 6th Edition, 2007. (Unit IV)
2. Bali, “Software Engineering”, S K Kataria and Sons, 1/E, 2012
3. Robert C. Martin, “Agile Software Development, Principles, Patterns, and Practices”, Pearson Education, 1/E, 2003

L	T	P	C
4	0	0	3

SEMESTER II
ELECTIVE
PAPER II
(To choose either A or B)
B) E-COMMERCE
SUBJECT CODE: P2IT05ET

TOTAL HOURS: 52

UNIT – I:

Introduction : Infrastructure for Electronic Commerce – Networks – Packet Switched Networks – TCP/IP Internet protocol – Domain name Services – Web Service Protocols – Internet applications – Utility programs – Markup Languages – Web Clients and Servers – Intranets and Extranets – Virtual private Network.

UNIT – II:

Core Technology: Electronic Commerce Models – shopping Cart Technology Data Mining – Intelligent Agents- Internet Marketing – XML and E- Commerce

UNIT – III:

Electronic Payment Systems: Real world Payments System – electronic fund Transfer- digital Payments – Internet Payment System – Micro Payments – Credit Card Transaction – Case Studies

UNIT – IV:

Security: Threats to Network Security – Public Key Cryptography – Secure Sockets Layer- Secure Electronic Transaction – Network Security Solutions- Firewalls.

UNIT – V:

Inter/ Intra Organization Electronic Commerce: EDI – EDI application in Business – legal Security and Privacy issues- EDI and Electronic Commerce- Standards – Internal Information system – Macro forces – Internal Commerce- Workflow Automation and Coordination – Customization and Internal commerce – Supply chain Management.

Text book:

1. Ravi Kalakota and Andrew B. Whinston , “ Frontiers of Electronic Commerce”, Addison Wesley, 3rd edition, 1996.

References:

1. Baskar , “ E-Commerce Framework Technologies and Applications” , TMH New Delhi, 2nd Edition, 2006.
2. Pete Loshin Paul A Murphy, “ Electronic Commerce”, Jaico Publishers , 2nd Edition ,1996.

L	T	P	C
2	0	0	2

SEMESTER II

TOTAL HOURS: 26

HUMAN RIGHTS

SUBJECT CODE: P2HR01GS

UNIT I:

Definition of Human Rights – Nature Content Legitimacy and Priority – Theories on Human Rights – Historical Developments of Human Rights.

UNIT II:

International Human Rights- Prescription and Enforcement upto World War II – Human Rights and the U.N.O – Universal Declaration of Human Rights- International Covenant on Civil and Political Rights- International Covenant on Economic Social And Cultural Rights and Optional Protocol.

UNIT III:

Human Rights Declarations – U.N. Human Rights Declarations – U.N. Human Commissioner.

UNIT IV:

Amnesty International –Human Rights and Helsinki Process-Regional Developments-European Human Rights System- African Human Rights System-International Human Rights in Domestic courts.

UNIT V:

Contemporary issues on Human Rights: Children Rights – Women Rights – Dalit's Right – Bonded Labour and Wages- Refugees- Capital Punishment.

Fundamental Rights in the Indian Constitution – Directive Principles of State Policy- Fundamental Duties-National Human Rights commission.

References:

1. Paul Williams, "International Bill of Human Rights", Entwistle Books; 1st Edition, 1981.
2. Maurice Cranston, "What is Human Rights", American Academy of Arts and Sciences, 1st edition, 1983
3. Desai, A.R, "Violation of Democratize Rights in India", Sangam Books Ltd, 1st edition, 1986.
4. Pandey, "Constitutional Law", Central Law agency, 1st edition, 1977.
5. Timm R.W, "Working for Justice and Human Rights", HOTLINE Asia/Oceania and Commission for Justice and Peace, 1st edition, 1989
6. G.S. Bajwa, "Human Rights in India", Anmol publications, 1st edition, 1995.

7. Ashwini Peetush, "International Human Rights in India", Oxford University press, 1st edition, 2015.
8. P.S. Sinha & K. Cheous, "International Encyclopedia of Peace Security", Anmol publications., 1st edition, 1996.
9. Devasia V.V, "Human rights and Victmology", Dattsons, 1st edition, 1998.

Magazines:

1. The Lawyer Bombay
2. Human Rights Today Columbia University
3. International Instruments of Human Rights UN Publication
4. Human Rights Quarterly, John Hopkins University U.S.A

SEMESTER II

L	T	P	C
0	0	10	8

TOTAL HOURS: 130

PRACTICAL II

JAVA and UNIX LAB

SUBJECT CODE: P2IT11MP

Java Programming

1. Simple Programs to Familiarize concept in Java
2. Write a Java Program using Applet to Display any 3 images when 3 buttons in the Border Layout are clicked. The image should be displays at the Centre.
3. Write a Java program using Applet to display the Dialogue and Menu in Applet
4. Write a Java Program using Applet to create Frames and its Concepts
5. Write a Java Program to display the different colors and Fonts.
6. Write a Swing Program to Create Buttons with
 - a) Tool tip Text
 - b) Image
 - c) Border
 - d) Shortcut key
7. Write a swing Program to create the tabbed Panels
8. Write a java program to create color as the background.

UNIX

1. Fibonacci Series
2. Sum of digits
3. Grep Command
4. Counting chars, Words, Lines
5. Palindrome
6. Prime number

L	T	P	C
5	0	0	4

III SEMESTER PAPER VII

TOTAL HOURS:

65

MOBILE COMPUTING SUBJECT CODE: P3IT11MT

UNIT-I

Introduction: Medium Access Control: Motivation for Specialized MAC -SDMA - FDMA - TDMA - CDMA - Comparison of Access mechanisms - Tele communications: GSM - DECT - TETRA - UMTS - IMT - 2000 - Satellite Systems: Basics - Routing - Localization - Handover - Broadcast Systems: Cyclic Repetition of Data - Digital Audio Broadcasting - Digital Video Broadcasting.

UNIT-II

Wireless Networks: Wireless LAN: Infrared Vs Radio Transmission -Infrastructure Networks - Ad hoc Networks - IEEE 802.11 - HIPERLAN –Bluetooth.

UNIT-III

Mobile Network Layer: Mobile IP: Goals - Assumptions and Requirement -Entities - IP packet Delivery - Agent Advertisement and Discovery -Registration - Tunneling and Encapsulation - Optimization - Reverse Tunneling- IPv6 - DHCP - Ad hoc Networks.

UNIT-IV

Mobile Transport Layer: Traditional TCP - Indirect TCP - Snooping TCP -Mobile TCP - Fast retransmit/ Fast Recovery - Transmission/ Timeout Freezing - Selective Retransmission - Transaction Oriented TCP.

UNIT-V

WAP: Architecture - Datagram Protocol - Transport Layer Security -Transaction Protocol Session Protocol - Application Environment - Wireless Telephony Application.

Text Book :

1.J.Schiller, “Mobile Communication”, Addison Wesley, 2nd edition,2003.

References :

1. William C.Y.Lee, “Mobile Communication Design Fundamentals”, John Wiley,2nd edition 1993.
2. William Stallings, “Wireless Communication and Networks”, PHI/ Pearson Education,2nd edition, 2004.
3. Asoke K Talukder, Hasan Hasan Ahmed, “Mobile computing”, TMG,2nd edition 2011.

III SEMESTER

PAPER VIII

L	T	P	C
5	0	0	4

TOTAL HOURS:65

INTERNET PROGRAMMING

SUBJECT CODE: P3IT02MT

Objective

Upon completion of the course the student will be able to:

- ☐ Write client-side JavaScript programs for executing in a Web browser.
- ☐ Do basic HTML design using colors, images, tables, frames and GUI components such as text boxes, buttons, menus, checkboxes, and radio buttons and develop interactive Web applications that integrate HTML with JavaScript using event handlers.
- ☐ Explain control structures, functions, and arrays, and illustrate how they are used to create JavaScript programs. Also discuss object-oriented programming and the Document Object Model, built-in and custom objects.
- ☐ Create JavaScript applications that use cookies to track and save Web preferences.

UNIT-I

Introduction: Introduction to the Internet and World Wide Web - World Wide Web Consortium (W3C) - History of the Internet History of the World Wide Web - History of SGML -XML- Introduction to HyperText Markup Language - Editing HTML - Common Elements - Headers - Linking - Images - Unordered Lists - Nested and Ordered Lists - HTML Tables-Basic HTML Forms

UNIT-II

Dynamic HTML: Dynamic HTML Object Model and Collections, Event Model, Filters and Transitions, Data Binding with Tabular Data Control, Dynamic HTML-Structured Graphics -ActiveX Controls, Dynamic HTML-Path, Sequencer and Sprite ActiveX Controls.

UNIT-III

JavaScript: JavaScript, Introduction to Scripting, Control Statements, Functions, Arrays, Objects.

UNIT-IV

XML: Creating Markup with XML -Parsers and Well-formed XML Documents - Parsing an XML Document with msxml - Document Type Definition (DTD) - Document Type Declaration - Element Type Declarations - Attribute Declarations - Document Object Model - DOM Implementations - DOM Components - path - XSL: Extensible Stylesheet Language Transformations (XSLT)

UNIT-V

PERL, CGI AND PHP: Perl-String Processing and Regular Expressions - Form Processing and Business Logic-Server side Includes-Verifying a Username and Password-Using DBI to connect to a database-PHP-Form Processing and Business Logic-Connecting to a Database-PHP-Form Processing and Business Logic-Connecting to a Database-Dynamic Content in PHP.

Text Books

1. Deitel & Deitel, “Internet & World Wide Web How to Program”, Pearson Education India, 3rd Edition, 2004.
2. Deitel & Deitel, “XML -How to Program”, Pearson Education, 2nd edition, 2001.

References

1. God bole, “Web Technologies, TCP/IP to Internet Application Architectures”, TMH New Delhi. 1st Edition, 2005.
2. Negrino and Smith, “Javascript for the World Wide Web”, Peachpit Press, 5th Edition, 2003.
3. Deitel & Deitel, “Perl How to Program”, Pearson Education, 1st edition, 2001.
4. Benoit Marchal, “XML by Example”, Que/Sams, 2nd Edition, 2002.

**III SEMESTER
PAPER IX**

L	T	P	C
5	0	0	4

TOTAL HOURS: 65

COMPUTER GRAPHICS

SUBJECT CODE: P3IT03MT

Objective

The objective of this subject is to provide complete understanding of the theoretical aspects of computer graphics. It provides details of algorithms which facilitate implementation of both 2D and 3D graphics and good understanding of graphics modeling and user interface designs.

UNIT-I

Introduction and Hardware: Representative uses of computer graphics - vector display and raster display architectures - display processor - interactive input devices - output primitives - software portability and graphics standards - conceptual framework for interactive graphics.

UNIT-II

2D graphics: Basic raster graphic algorithms for 2D primitives - scan converting lines - circles - ellipses - filling rectangle - character generation - 2D transformations - 2D clipping - windowing transformation.

UNIT-III

3D graphics: 3D representation methods - 3D transformations - viewing and projections - parallel and perspective projections - hidden line elimination - hidden surface elimination.

UNIT-IV

Graphics Modeling: Curves, Surface and solid modeling - color model - ray tracing methods - graphic file formats.

UNIT-V

User interface design: Interactive handling models - Input and Output handling window systems.

Text Books:

1. Foley, Van Dam, Reiner, Aughes, “Computer Graphics- Principles and Practice”, Addison Wesley, 3rd edition, 2013.
2. Hearn and Baker, “Computer graphics”, PHI Ltd., 4th edition, 2010.

References:

1. Plastock , “ Computer Graphics”, TMH New Delhi, 2nd Edition, 2006.
2. William M. Neuman, Robert Sproull, “Principles of interactive computer graphics”, McGraw Hill, 2nd edition, 1989.
3. Steven Harrington, “Computer Graphics - A Programming Approach”, McGraw Hill, International Edition, 2nd edition, 2014

**SEMESTER III
ELECTIVE**

PAPER III

(To choose either A or B)

L	T	P	C
4	0	0	3

TOTAL HOURS: 52

A) SIGNALS AND SYSTEMS

SUBJECT CODE: P3IT04ET

Objective

Provides an introduction to continuous time and discrete time signals and linear systems. Topics covered include time-domain descriptions (differential and difference equations, convolution) and frequency-domain descriptions (Fourier series and transforms, transfer function, frequency response, Z transforms, and Laplace.

UNIT-I

Continuous Time signal: Energy and Power signals, Exponential and sinusoidal signals, periodicity, Impulse and step signals. Continuous Time systems: Properties- Linearity, stability, causality, memory, invertibility, time invariance. Analysis of LTI System - impulse response – convolution - graphical analysis-properties of convolution, Differential equation representation. Frequency analysis of CT systems - Fourier series Fourier Transform. Properties Convolution, multiplication, correlation, Parseval's relationship, Examples. Inverse relationship between time and frequency, Time- Bandwidth product

UNIT-II

Discrete Time signals: Energy and Power signals, Exponential and sinusoidal signals, periodicity, Impulse and step signals. Discrete Time systems: Properties: Linearity, stability, causality, memory, invertibility time invariance. Representation of systems - impulse response - convolution - Difference equation representation. Frequency analysis of DT systems: Discrete Time Fourier Series - Discrete Time Fourier Transforms, Discrete Fourier transform. Properties Convolution, Multiplication, correlation, duality, Examples.

UNIT-III

Filters: Ideal LPF Impulse response. Band pass filter Hilbert Transforms Pre Envelope, BP signals and systems, Phase and Group delay- Applications of Fourier analysis to AM, SSB, PAM and FM -Application of DTFT in DT sinusoidal AM analysis. Z Transforms: Properties Analysis of LTI systems using Z transforms the inverse Z transform - System function. Sampling of CT and DT signals. Sampling Theorem Nyquist rate - Reconstruction - ideal, zero order hold.

UNIT-IV

Random Processes: Review of random variables and pdf. Random processes, statistical averages. Stationary processes, Ergodic processes. Random processes and LTI systems. Random processes in frequency domain Power spectrum of stochastic processes, variance Auto correlation and spectral densities - Properties Power spectral density. Gaussian, Rayleigh, Rice probability density-and White processes, band limited and band pass processes.

UNIT-V

Noise: White noise, Narrow band noise, effective noise temperature and noise figure representation - Sinewave contaminated with narrow band noise. Effect of noise in Linear modulation systems AM, SSB, DSBSC. Effect of noise in angle modulation, threshold effect and threshold extension, pre- emphasis and de-emphasis filtering.

Text Books:

1. Alan V Oppenheim, Alan S, Willsky and A Hamid Nawab, "Signals and Systems" Pearson. Education Asia / PHI, 2nd edition, 1997.
2. Simon Haykin, " Digital Communication Systems", Wiley, 1 st Edition, 2013
3. Proakis & Salehi, "Communication Systems Engineering", LPEA. 2nd Edition.

References :

1. Roberts, M.J., " Signals and Systems Analysis using Transform Methods and Matlab" TMH New Delhi, 2nd edition, 2010.
2. Hsu , " Signals and Systems", TMH New Delhi, 1st Edition , 2006.
3. C L Phillips .J M. Parr. E A Riskin, "Signals, Systems, and transforms", Pearson Education, 4th edition, 2008.
4. R E Ziemer, W H Tranter, D .R Fannin, "Signals and Systems", , Prentice Hall. 4th Edition 2001.
5. Meador Vikas, " Analog Signal Processing with Laplace Transform and Active Filter Design", Thomson Pub, 1st edition, 2001.
6. B P Lathi, "Analog and Digital Communication", Oxford University Press, 4th edition, 2011.
7. S S Soliman, M D Srinath, "Continuous and Discrete Signals and Systems", PHI, 2nd edition, 2003.
8. B B Lathi, " Linear Signal and Systems", Oxford University Press, 2nd edition, 2004.
9. A Papoulis, "Probability Random Variables and Random Process", TMH, 4th edition, 2002.
10. Stark and Wood, "Probability and Random Process with Application to Signal Processing", Pearson Education, 3rd Edition, 2011.

L	T	P	C
4	0	0	3

SEMESTER III

TOTAL HOURS: 52

ELECTIVE PAPER III

(To choose either A or B)

B) MULTIMEDIA SYSTEMS

SUBJECT CODE: P3IT05ET

Objective

Provides a basic understanding of the fundamental issues and problems in the representation, manipulation, compression, and delivery of multimedia content such as images, audio and video, particularly in a networked environment

UNIT-I

Multimedia: Introduction - Use – making multimedia – multimedia skills - Needs and benefits.

UNIT-II

Multimedia Hardware: PC Platform - SCSI - MCI - Storage for Multimedia - DVD, CD-ROM - Input, Output and Communication devices.

UNIT-III

Media Software: Basic tools - Image editing tools - Painting and drawing tools - Sound editing programs - Video formats - Quick time - Linking Multimedia objects - OLE and DDE - Office suites - Presentation tools - Authoring tools.

UNIT-IV

Multimedia Building Blocks: Text - Sound - Images - Animation - Video.

UNIT-V

Assembling and Delivering a Project: Planning and Costing – Designing and Producing – Content and Talent – Delivering – CD ROM Technology – Multimedia applications – Single User, networks.

Text Books:

1. Tay Vaughan, “Multimedia - Making it Works”, McGraw Hill, 8 th Edition, 2010.
2. Judith Jeffcoate, “Multimedia In Practice - Technology and Applications”, Prentice Hall of India, 1st edition,1995.

References:

1. Parekh, “Principles of Multimedia” , TMH, New Delhi, 2nd edition,2012.
2. Tay Vaughan ,”Multimedia making it work”, TMH, New Delhi, 9th Edition , 2014.
3. Barrett Fox, “3DS Max 6 Animation”, McGraw Hill, 1st edition, 2004.
4. Elsom Cook, “Principles of Interactive Multimedia”, McGraw Hill, 1st edition,2001.

L	T	P	C
3	0	0	3

SEMESTER III

TOTAL HOURS: 39

ELECTIVE PAPER IV

(To choose either A or B)

A)OBJECT ORIENTED ANALYSIS AND DESIGN

SUBJECT CODE: P3IT06ET

UNIT-I

System Development – Object Basis – Development Life cycle-Methodologies -Patterns – Frameworks-Unified Approach

UNIT-II

UML- Use-Case models-Object Analysis-Object relationships, Attributes and Methods

UNIT-III

Object Oriented Design Process - Design Axioms - Designing Classes Object storage and Object interoperability.

UNIT-IV

View Layer: Designing Interface Objects – User Interface Design as a creative process – View layer classes – Macro level process – Micro level process – View Layer Interface.

UNIT-V

Software Quality Assurance: Testing Strategies- impact of Object orientation on testing-Test cases – Test plans – Continuous testing- Debugging Principles-System usability – Measuring user satisfaction.

Text Book :

1..Ali Bahrami, “Object Oriented Systems Development”, McGraw Hill International Edition, 1st edition,2008.

Reference:

1.Grady Booch, “Object oriented Analysis and Design”, Pearson Education, 2nd Edition, 2001.

L	T	P	C
3	0	0	3

SEMESTER III

TOTAL HOURS:39

**ELECTIVE
PAPER IV**

**(To choose either A or B)
B)COMPUTER NETWORKS**

SUBJECT CODE:P3IT07ET

UNIT I:

Introduction: Introduction to networks and communication media uses- Network H/W- Network S/W –Reference Model – Example networks- Basic of data communication-Transmission Media-Wireless Transmission- Telephone Satellite Communication.

UNIT II:

Data Link layer: Design Issues- Error Detection Code-Error Correction Methods- Elementary Data Link Protocols- Protocol-Sliding Window Protocol –Verification Methods-Channel Allocation-Multiple Access Protocol- IEEE 802 Standards

UNIT III:

Network Layer: Design Issue- Routing Algorithms-congestion Control Algorithms- Internetworking- Network layer in the Internet

UNIT IV:

Transportation Layer: Transport Service – Transport Protocol-Internet Transfer Protocols UDP- TCP-Performance

UNIT V

Application layer: Design Issues-DNS - Email- WWW-Multimedia-Other Application- Network Security-Basic Cryptography-RSA.

Text Book:

1.Andrew Tanenbaum,"Computer Networks", PHI , 5th edition,2010.

References:

1. William Stallings,Pearson,"Cryptography and Network Security Principles and practice", Prentice Hall, 3/E,2003
2. Bbehrouz Forouzan, "Data communication and Networking", TMH, 2nd edition, 2006.

L	T	P	C
0	0	8	4

CORE PRACTICAL III

TOTAL HOURS:104

INTERNET PROGRAMMING AND GRAPHICS LAB **SUBJECT CODE: P3IT01MP**

Objective

To implement the concept learned in internet programming and make familiarize with the creation of web based applications.

Internet Programming Lab

1. Creating a web page with cascading style sheets and Embedded style sheets.
2. Create a web page with the following.
 Order form using HTML form elements
3. Design a web page to perform screen saver animations using Java script
4. Design a web page to display the text file contents using data binding concepts in DHTML.
5. Design a HTML Editor using Java applet.
6. Design a web page for library Management using Java applet and JDBC.
7. Write a Java RMI program to copy a text file from server to client.
8. Design a web page to conduct On-line Quiz using Java server pages.

Graphics Lab

1. To implement line drawing algorithms.
2. To implement various transformation schemes.
3. To implement polygon drawing algorithms.
4. To implement line clipping algorithms.
5. To implement polygon clipping algorithms.
6. To implement text clipping algorithms.

SEMESTER IV
PAPER X
VISUAL PROGRAMMING

L	T	P	C
5	0	0	4

TOTAL HOURS: 65

SUBJECT CODE: P4IT01MT

UNIT -I:

Customizing a form - Writing a simple program - Tool box – Creating control - Name property - Command button - Access keys-Image control - Text boxes - Labels - Message boxes-Grid -Editing tools-Variables data types - String number.

UNIT -II:

Displaying information-Determinate loops, indeterminate loops-Conditionals- built in function-Function and procedure.

UNIT -III:

Arrays - List - Sorting and searching - record - control arrays - Grid control - Project with multiple forms - Do events and sub main - Error trapping.

UNIT -IV:

VB objects - dialogue boxes - Common control - Menus-MDI forms Texting - Debugging and Optimization Working with Graphics.

UNIT -V:

Monitoring - Mouse activity - File handling - File system control - File system objects.

TEXT BOOK:

1.Gary Cornell, “Visual Basic 6.0”, TMG,1st edition,2008.

REFERENCE BOOK:

1. Noel Jerke, “Visual Basic (The Complete Reference)”, TMG,1st edition, 1999.

ELECTIVE

L	T	P	C
4	0	0	3

PAPER V

(To choose either A or B)

TOTAL HOURS: 52

A) OPTICAL AND SATELLITE COMMUNICATION

SUBJECT CODE: P4IT02ET

Objective

This course is devoted to the analysis and design of a general optical and satellite communication link. Students will understand hardware and performance capabilities and limitations of modern optical and satellite communications.

UNIT-I

Optical Fibers, Sources and Detector: Structure, wave guiding and characteristic modes and configuration, group velocity, dispersion, mode coupling, single mode fiber design - Laser Diodes, light emitting diodes, modal, partition and reflection noise, power coupling, splicing, connectors, PIN - Diode, avalanche photo-diodes. Detector response time.

UNIT-II

Receiver Operation: Probability of error, quantum, limit, receiver sensitivity calculation, performance curves, preamplifiers, light speed circuits, power budget, rise-time budget, line coding, eye-pattern.

UNIT-III

Communication Satellite - Orbit and Description: Orbital period and velocity, effects of orbital inclination, coverage angle and slant range, placement of satellite in a geo-stationary orbit, Satellite description - Communication subsystems, telemetry, command and ranging subsystems, attitude control and electrical power.

UNIT-IV

Earth Station: Earth station antenna types, gain and radiated power, pointing loss, noise temperature, G/T ratio, high power amplifiers, redundancy configurations, carrier and power combining, low noise amplifiers - redundancy configuration and non-linearity, up converter and down converter - conversion process, hopping and redundancy configurations.

UNIT-V

Applications and Services: Satellite packet communications - ALHOA, slotted ALOHA and packet reservation. Very small aperture terminal (VSAT) networks - technologies and configurations. Mobile satellite (MSAT) networks - Operating environment, low orbital satellites, Iridium satellites.

Text Books :

1. Gower J, "Optical Communication Systems", Prentice Hall, 2nd edition, 1993.
2. Rody D, "Satellite Communication", TMH, 4th edition, 2008.

References:

1. Selvarajan , " Optical Fiber Communications Principles and Systems", TMH, New Delhi, 1st Edition, 2005.
2. Senior J, " Optical Communication-Principles and Practice", Prentice Hall, 3rd edition, 2008 .
3. Bhargava et. Al., "Digital Communication by Satellite", Prentice Hall, 2nd edition, 1992.
4. Ha T, " Digital Satellite Communications", McGraw Hill, 2nd editions, 2008.

ELECTIVE

L	T	P	C
4	0	0	3

IV SEMESTER

PAPER V

TOTAL HOURS: 52

B) NETWORK SECURITY

SUBJECT CODE: P4IT03ET

Objective

The goal of the course is to provide students with a foundation allowing them to identify, analyze, and perhaps solve network-related security problems in computer systems. The course covers fundamentals of number theory, authentication, and encryption technologies, as well as the practical problems that have to be solved in order to make those technologies workable in a networked environment, in particular in the wide-area Internet environment.

UNIT-I

Introduction: Attacks - Services - Mechanisms - Conventional Encryption - Classical and Modern Techniques - Encryption Algorithms - Confidentiality.

UNIT-II

Public Key Encryption: RSA - Elliptic Curve Cryptography - Number Theory Concepts.

UNIT-III

Message Authentication: Hash Functions - Digest Functions - Digital Signatures - Authentication Protocols.

UNIT-IV

Network Security Practice: Authentication, Applications - Electronic Mail Security - IP Security - Web Security.

UNIT-V

System Security: Intruders - Viruses - Worms - Firewalls Design Principles - Trusted Systems.

Text Book:

1. William Stallings, “Cryptography and Network Security: Principles & Practice”, Prentice Hall , 4th Edition, 2010.

References:

1. Kahate, “Cryptography and Networks Security”, TMH, New Delhi, 1st Edition , 2005.
2. Man Young Rhee, “Internet Security”, Wiley, 1st edition, 2003.
3. Pfleeger and Pfleeger, “Security in Computing”, Pearson Education, 3rd Edition, 2003.

CORE PRACTICAL IV

L	T	P	C
0	0	10	8

TOTAL HOURS:130

VISUAL PROGRAMMING AND DBMS LAB

SUBJECT CODE: P4IT12MP

Objectives

The students will acquire knowledge on software development using the visual programming languages. This course concentrates on the development of software systems in Visual Basic .

Visual Basic

1. Write a VB project that receives a year number from a text box and month name from list box and displays number of days in the given month. Take care of leap years. Use Lost Focus event for list box.
2. Write a VB project that stores 10 employee records with fields EMPNO, NAME, AGE, SEX and SALARY, in an array. Display data fields in text boxes and provide command buttons to move to desired record.
3. Write a VB project that receives a foreign currency value selected from a list box and converts it into equivalent Indian rupees. (e.g. USD 42.45, Sterling 71.30, D.Mark 25.52, SW Franc 31.58, SaudiRiyal 11.40, French Franc 7.60, UAE Dhiram 11.55, Kuwait Dhinar 140.56)
4. Write a VB project using control array that creates a scientific calculator with appropriate command buttons. Include the following capabilities for the calculator: +, -, *, /, %, power, square root, square and log (base 10).
5. Write a VB project to create a screen saver that displays a list of pictures with 1 second pause in between successive pictures.
6. Write a VB project for commercial bank operations using SB account database, with the following features:
 - 1.ADD NEW ACCOUNT
 2. DEPOSIT AMOUNT
 3. WITHDRAW AMOUNT (with minimum balance condition)
 - 4.Calculate simple interest and update balance taking average of last 6 month balance in the account.
7. Write a VB project using built in Ax control (Rich Text Box), develop the windows NOTEPAD like editor with File and Edit menus and also display the floating menu whenever necessary.

8. Write a VB project for a Blood Bank that maintains a list of donors with address and their blood group. Provide the following reporting features:
- i) Search and display the address of a particular donor, given the name in a text box.
 - ii) Display all the donors (using data report)
 - a) in age group 20-30.
 - b) in particular city.
 - c) with particular blood group.
 - d) male donors with particular blood group
 - e) female donors with particular blood group.
9. Write a VB project using Ax DLL or EXE add a class module that would perform the following functions:
- a) Test whether the given number is perfect or not
 - b) Whether the given number Armstrong or not
 - c) Find the factorial of the given number
 - d) sum of digits
10. Write a VB project using Activex X control to create a Textbox that accepts only numeric value. Provide the following properties for the text box: BackColor, Forecolor and Text.

DBMS:

- 1. SQL Commands.
- 2. Library System.
- 3. Inventory Control.
- 4. Banking.
- 5. Payroll

L	T	P	C
0	0	11	8

TOTAL HOURS: 143

PROJECT WORK WITH VIVA VOCE

SUBJECT CODE: P4IT01PV

The objective of the project is to enable the students to work in a project of latest topic / research area / industrial applications. Each project student shall have a guide who is a faculty member. During this semester the students are expected to do literature survey, formulate the problem and form a methodology of arriving at the solution of the problem. Also during this semester, the students are expected to complete the project and submit a full-fledged report comprising of the complete system developed along with implementation and test results. The departmental committee shall examine the students for 50 marks and the evaluation is based on continuous internal assessment comprising of two reviews.

After two reviews internal 50 marks (is based on seminar (20 marks), demo (20 marks) and internal viva-voce (10 marks)) will be given by the guide with the consultation of the departmental committee. At end of the semester, a viva-voce examination will be conducted for 150 marks (75 marks for internal examiner and 75 marks for external examiner).

ADHIPARASAKTHI COLLEGE OF ARTS AND SCIENCE
(AUTONOMOUS)

Permanently Affiliated to Thiruvalluvar University, Vellore

Accredited by NAAC with B Grade

M.Phil., COMPUTER SCIENCE

Under CBCS

[Effective from the Academic year 2015-2016]

REGULATIONS

CBCS :

Choice – Based Credit System is a flexible system of learning. ‘Credit’ defines the quantum of contents/ syllabi prescribed for a course and determine the number of hours of instruction required. The distinguished features of CBCS are the following:

It permits the students to:

- ❖ Learn at their own pace
- ❖ Choose electives from a wide range of elective courses offered by the departments of the affiliated colleges
- ❖ Undergo additional courses and acquire more than the required number of credits
- ❖ Adopt an inter – disciplinary approach in learning
- ❖ Make best use of the expertise of available faculty.

1. Eligibility for Admission:

A Student who have passed M.Sc (Comp. Sci).,M.Sc(IT).,M.Sc(C.S.T) & MCA with 50% are eligible to admit in M.Phil Computer Science

2. The minimum duration for the completion of M.Phil., in a discipline is two semester and the maximum duration is four semesters.

3. The M.Phil., Degree is awarded if a student has
- Registered, undergone and secured the required minimum number of credits for the core and elective courses including dissertation specified in the corresponding programme within the stipulated time
 - Secured the required attendance
 - No dues to the University, Hostel or Library
 - No disciplinary action pending against him/her

4. Structure of the Programme

The M.Phil Programme consists of

Core courses which are mandatory for all students

Elective courses which students can choose from amongst the courses offered within the department or in other departments of the colleges.

Dissertation (Mandatory)

5. The distribution of credits will be as below

- i. Core courses – Minimum two courses carrying 5 Credit each (10 or more credits)
- ii. Elective carrying 5 Credits each – No minimum
- iii. Dissertation 21 Credits

The total number of credits for core and elective shall be 15 consists of 2 Core courses (10 Credits) plus one elective (5 Credits)

The research topic for the dissertation may be finalized even at the beginning of the M.Phil programme, so that the collection of relevant literature and research design could be completed in the first semester leaving the entire second semester for the research work. The course registration for dissertation shall be in the first semester and separate registration form shall be used for registration.

6. Evaluation of the dissertation

6.1 The dissertation shall be jointly valued by the supervisor and one external examiner.

The external examiner is to be drawn from

University department or affiliated college within the city of Chennai or

Any accredited institution of higher education and/or research within Tamilnadu

The viva-voce examination on the dissertation shall be jointly conducted by the Supervisor and the external examiner. The distribution of marks shall be as under

20% marks for Periodic presentation (to be evaluated and awarded by the supervisor)

60% marks for the Dissertation

20% marks for viva-voce

6.2 The last date for submission of Dissertation shall be 31 August every year without penalty. Those who do not submit the dissertation in time may be given extension of a maximum of two months with a penal fee prescribed by the college (i.e upto 31st October). There shall be no further extension of time beyond this period. Any student failing to submit the dissertation within this period will be permitted to submit the dissertation only in the next academic year along with the subsequent batch of students.

7. Regulations of M.Phil Programme

The rules and regulation governing course registration, attendance and discipline of students for M.Phil Programme shall be the same as for the Maste's programme.

8. Evaluation

The process of evaluation, examination, grading, etc for the M.Phil, programme shall be the same as for Master's Programme except for the dissertation. However, final semester students of the M.Phil should be allowed to appear for examinations in any arrear papers in the month of September / October each year.

ADHIPARASAKTHI COLLEGE OF ARTS & SCIENCE
G.B.NAGAR, KALAVAI-632506 (AUTONOMOUS STATUS)
AFFILIATED TO THIRUVALLUVAR UNIVERSITY, VELLORE
DEGREE COURSES

M.Phil. Computer Science

(With effect from 2015-2016)

The course of study and the scheme of examination

Year/ Semester	Subject	Paper	Subject Code	Title of the Paper	Ins. Hrs/ Week	Credit	Exam Hrs	Marks		
								IA	Sem. Exam	Total
I Year/ I Semester	Core	Paper I	M1RM01SM	Research Methodology	6	5	3	25	75	100
	Core	Paper II	M1CS01MT	Artificial Neural Networks	6	5	3	25	75	100
	Elective	Guide Paper	M1CS02MT	Guide Paper	6	5	3	25	75	100
I Year/ II Semester	-	-	M2CS01DV	Dissertation with Viva Voce	-	21	-	25	75	100
TOTAL					-	36	-	100	300	400

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5	0	0	5

TOTAL HOURS: 52

SEMESTER – I
PAPER - 1
RESEARCH METHODOLOGY
SUBJECT CODE: M1RM01SM

COURSE OBJECTIVES:

- To impart knowledge on research problem and findings scientific article with internet
- To provide knowledge on collection and analysis of data using statistical tools.
- To create awareness on bioinformatics and biological databases.

UNIT 1: RESEARCH METHODOLOGY

Meaning of research – Objectives of research – motivation of research – Types, approaches and significance – Methods versus methodology – Research in scientific methods – Research process – Criteria for good research – Problem encountered by research in India – Funding agencies. (10 Hrs)

UNIT II: RESEARCH DESIGN

Research Problem: Selecting the problem – Necessity of defining the problem – Techniques involved in defining the problem – Research design – Needs and features of good design – Different research design – Basic principles of experimental designs. (10 Hrs)

UNIT III: DATA COLLECTION AND DOCUMENTATION

Data Collection methods – Data types – processing and presentation of data – Techniques of ordering data – Meaning of primary and secondary data – The uses of computers in research – The library and internet – Uses of search engines – virtual libraries – common software for documentation and presentation. (12 Hrs)

UNIT IV: DATA AND ERROR ANALYSIS

Statistical analysis of data – Standard deviation – Correlation – Comparison of sets of data – Chi squared analysis of data – Characteristics of probability distribution – Binomial, Poisson and normal distribution – Principle of least square fittings – Curve fitting – Measurement of errors – Types and sources of errors – Determination and control of errors. (10 Hrs)

UNIT V: RESEARCH COMMUNICATION

Meaning of research report – Logical format for writing thesis and paper – Essential of scientific report: abstract, introduction, review of literature, materials and methods and discussion – Write up steps in drafting report – Effective illustrations: tables and figures – Reference styles: Harvard and Vancouver systems. (10 Hrs)

TEXT BOOKS:

1. Research Methodology, Methods and Techniques – C.R. Kothari – Wishwa Prakasam Publications, II Edition.
2. Research: An Introduction – Robert Ross – Harper and Row Publications.

REFERENCE:

- 1 Research Methodology – P. Saravanel – Kitlab Mahal, Sixth Edition.
- 2 A Hand book of Methodology of Research – Rajammal P.A. Devadass – Vidyalaya Press.
3. Introduction to Computers – N. Subramanian.
4. Statistical methods – G.W. Snedecor and W. Cochran – Oxford and IBH, New Delhi.
5. Research Methodology Methods and Statistical Techniques – Santosh Gupta.

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T TOTAL

HOURS: 52

SEMESTER – I
PAPER - 2
ARTIFICIAL NEURAL NETWORKS
SUBJECT CODE: M1CSO1MT

COURSE OBJECTIVES

- To understand the various concepts of Neural Networks.
- To understand the different ways of AI Learning methods and models
- To learn to represent knowledge based approaches

UNIT I:

Introduction to Neural Networks- Basics Concepts of Neural Networks –Inference and Learning – Classification Models- Association Models- Optimization Models – Self Organization Models.
(10 Hrs)

UNIT II:

Supervised and Unsupervised Learning – Statistical Learning – AI Learning – Neural Network Learning – Rule Based Neural Networks – Network Training – Network Revision- Issues- Theory of Revision – Decision Tree Based NN – Constraint Based NN.
(12 Hrs)

UNIT III:

Incremental Learning- Mathematical Modeling- Application of NN- Knowledge based Approaches
(10 Hrs)

UNIT IV:

Heuristics- Hierarchical Models- Hybrid Models- Parallel Models- Differentiation Models- Control Networks- Symbolic Methods- NN Methods.
(10Hrs)

UNIT V:

Structures and Sequences – Spatiotemporal NN – Learning Procedures – Knowledge based Approaches.
(10Hrs)

TEXT BOOKS:

1. Lamin fu Neural Networks in Computer Intelligence – MCGRAW Hill International Edition 1994

REFERENCE:

- 1.Robert J. Schalkoff – Artificial Neural Networks MCGRAW Hill 1997

OM SAKTHI



**ADHIPARASAKTHI COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)**

**Affiliated to Thiruvalluvar University, Approved by AICTE, New Delhi
Re-accredited by NAAC B Grade (CGPA -2.83)
G.B Nagar, Kalavai – 632 506, Vellore District.**



**DEPARTMENT OF COMPUTER SCIENCE
AND
APPLICATIONS**

BCA - SYLLABUS

(Effective from 2015-2016)

ADHIPARASAKTHI COLLEGE OF ARTS AND SCIENCE
(AUTONOMOUS)

Affiliated to Thiruvalluvar University, Vellore

Re-accredited by NAAC with B Grade (CGPA-2.83)

B.C.A - COMPUTER APPLICATIONS

Under CBCS

[Effective from the Academic year 2015-2016]

REGULATIONS

CBCS:

Choice –Based Credit System is a flexible system of learning. ‘Credit’ defines the quantum of contents / syllabi prescribed for a course and determine the number of hours of instruction required. The distinguished features of CBCS are the following:

It permits the students to:

- ❖ Learn at their own pace
- ❖ Choose electives from a wide range of elective courses offered by the departments of the affiliated colleges
- ❖ Undergo additional courses and acquire more than the required number of credits
- ❖ Adopt an inter – disciplinary approach in learning
- ❖ Make best use of the expertise of available faculty.

1. Eligibility for Admission:

Candidates seeking admission to the first year of the UG Degree Course should have passed the Higher Secondary Course Examination [Academic or Vocationals] conducted by the Govt. of Tamilnadu with Mathematics / Business Mathematics/ Statistics/ Computer Science as a subject or an Examination of any other University accepted as Equivalent thereto by the Syndicate subject to such candidates shall be permitted to take the B.C.A Degree Examination of this University after the Completion of the Course of Three academic years in the University/ Colleges affiliated to this University and shall Qualify for the B.C.A Degree.

2. Eligibility for the Award of Degree:

A candidate shall be eligible for the award of the degree only if he/she has undergone the prescribed course of study in the College affiliated to the university for a period of not less than three academic years and passed the examinations of all the six semesters prescribed earning 140 credits [in Parts-I,II,III,IV and V]

The Upper age limit for admission to UG Degree Courses will be 21 (twenty one) years as on 1st July of the year of admission. For SC/ST/BC/MBC/DNC candidates and women candidates the age limit is relaxed by 3 years. For other communities, the Principals can relax up to three years based on merit. A relaxation of 5 years is permitted for Physically Handicapped as per G.O. Ms No.239, dated 03.09.1993.

3. Duration:

- a. Each academic year shall be divided into two semesters. The first academic year shall comprise the first and second semesters, the second academic year the third semester and fourth semesters and the third academic year the fifth and sixth semesters respectively.
- b. The odd semesters shall consist of the period from June to November of each year and the even semesters from December to April of each year. There shall be not less than 90 working days for each semester

4. The Course of Study:

The main subject of study for Bachelor Degree Courses shall consist of the following:

PART – I TAMIL / OTHER LANGUAGES

PART – II ENGLISH

PART – III CORE SUBJECTS

ALLIED SUBJECTS

PROJECT / ELECTIVES WITH THREE COURSES

PART – IV

1. [a]. Those who have not studied Tamil up to XII Std. and taken a Non-Tamil Language under Part – I shall take Tamil comprising of two courses [level will be at 6th standard].
[b]. Those who have studied Tamil up to XII Std. and taken a Non-Tamil Language under Part – I shall take Advanced Tamil comprising of two courses.
[c]. others who do not come under a/b can choose non-major elective comprising of two courses.
2. SKILL BASED SUBJECTS [ELECTIVE]:

Four courses are to be offered. The papers are to be accommodated in the second / third year of study for UG courses.

3. ENVIRONMENTAL STUDIES

4. VALUE EDUCATION

5. SOFT SKILLS

PART – V EXTENSION ACTIVITIES

5. Extension Activities:

A Candidate shall be awarded a maximum of 1 credit for compulsory Extension Service.

All the students shall have to enroll for NSS/ NCC [Sports and Games] Rotract/Youth Red Cross or any other service organization in the College and shall have to put in compulsory minimum attendance of 40 hours which shall be duly certified by the principal of the college before 31st march in a year. If a student LACKS 40 hours attendance in the first year he/she shall have to compensate the same during the subsequent years.

Students those who complete minimum of attendance of 40 hours in one year get half Credit and those who complete the attendance of 80 or more hours in two years will ONE CREDIT.

Literacy and population Eductaion field Work shall be compulsory components in the above Extensions service Activites.

The following assessment procedure will be followed for Internal Marks:

Continuous Internal Assessment (CIA) Test

S. No	Reg. No	Name	<u>Test I</u> Marks for 50	<u>Test II</u> Marks for 75	<u>Test III</u> Marks for 75	Marks for 200	Marks converted to 20/30	<u>Assignments/; Seminars [5]</u> <u>Records [10]</u>	Marks for 25/20	Total Rounded to Marks for 25/20

Test I : One hour duration for 50 marks (Two Units of the Syllabus)

Test II : Two hours duration for 75 marks (Four Units of the Syllabus)

Test III : Three hours model test for 75 marks (Total Syllabus)

Total marks 200	Theory	Practical
Test marks to be converted to	: 20 marks /	15 marks
Assignments / Seminars	: 5 marks /	----
Records	: ---- /	05 marks
Total	: 25 marks /	20 marks

In the column rounded to 25/20, any fraction may be rounded to the next number.

6. Requirements for proceeding to Subsequent Semesters:

(i). Candidates shall register their name for the first semester Examination after the admission in the U.G. Courses.

(ii) Candidates shall be permitted to proceed from the first semester up to the final semester irrespective of their failure in any of the semester examinations subject to the condition that the candidates should register for all the arrear subject of earlier semesters along the current (subsequent) semester subjects.

(iii). Candidates shall be eligible to go to subsequent semester, only if they earn, sufficient attendance as prescribed there for by the academic council from time to time. provided in case of a candidate earning less than 65 % of attendance in any one of the semester due to any extraordinary circumstances such as medical grounds, such candidates who shall produce Medical Certificate issued by the Authorized Medical Attendant (AMA), duly certified by principal of the college, shall be permitted to proceed to the next semester and to complete the course of study. Such candidates shall have to repeat the missed semester by rejoining after completion of final semester of the course, after paying the fee for the break of study as prescribed by the college from time to time.

7. Requirement to take the Semester Examinations:

a). A candidate will be permitted to take the University Examination for any Semester, if

i). he / she secures not less than 75% of attendance out of the 90 instructional days during the semester.

[In the case of married women students the minimum attendance requirement shall be 55% of the total instructional days].

ii). he / she earns a progress Certificate from the Head of the Institution of having satisfactorily completed the Course of Study prescribed in the subjects as required by the regulations. And

iii). his / her conduct has been satisfactory.

Provided that it shall be open to the academic council, or any authority delegated with such powers by the Syndicate to grant exemption to a candidate who has failed to earn 75% of the attendance prescribed for any valid reason(s) subject to the usual conditions.

b). A candidates who has secured attendance less than 75% but 65% and above shall be permitted to take the Examination on the recommendation of the Head of the Institution to condone the lack of attendance as well as on the payment of the prescribed fees to the college

8. Passing Minimum:

A Candidate shall be declared to have passed the whole Examination, if he/she passes in all the papers and practical wherever prescribed / as per the scheme of examinations by earnings by earning 140 credit in Parts – I, II, III, IV and V. He / She shall also fulfill the extension activities prescribed earning one credit to quality for the Degree.

In fixing the passing minimum marks, the following will be observed:

- (a). There shall be no passing Minimum for Internal.
- (b) For External Examination, Passing Minimum shall be of 40 % (Forty percentages) of the maximum marks prescribed for the paper for each paper/Practical/Project and Viva-Voce.
- (c) In the aggregate (External + Internal), the passing minimum shall be of 40 % for the paper for each paper/Practical/Project and Viva-Voce.
- (d) Grading shall be based on Overall Marks Obtained [Internal +External].

Grading:

Once the marks of the CIA and end-semester examinations for each of the course are available, they will be added. The mark thus obtained will then be graded as per details given below

Marks	Grade Point	Letter Grade	Class
100	7.00	H	First Class with Distinction
90-99	6.00	O	First Class with Distinction
75-89	5.50	D	First Class with Distinction
60-74	4.75	A	First Class
50-59	4.00	B	Second Class
40-49	3.50	C	Third Class

Below 40	3.00	F	Fail

From the second semester onwards, the total performance within a semester and continuous performance starting from the first semester are indicated respectively by **Grade Point Average [GPA]** and **Cumulative Grade Point Average [CGPA]**. These two are calculated by the following formulae:

$$\text{GPA} = \frac{\sum_{i=1}^n C_i G_i}{\sum_{i=1}^n C_i}$$

Where 'C_i' is the Credit earned for the Course i in any semester; 'G_i' is the Grade point obtained by the student for the course i and 'n' is the number of courses passed in that semester.

CGPA = GPA of all the courses starting from the first semester to the current semester.

Note: The GPA and CGPA shall be calculated separately for the following three parts:

For purposes of declaring a candidate to have qualified for the Degree of Bachelor of Arts/Science/Commerce/Management/ Literature in the First Class / Second Class / Third Class or First Class with Distinction, the marks and the Corresponding CGPA earned by the candidate in part III alone will be the criterion, provided he / she has secured the prescribed passing minimum in LCs and ELs.

Grade in Part IV Extension shall be shown separately and it shall not be taken into account for classification. The marks for the course on "Environmental Studies" will be given in a separate certificate.

9. Classification of successful candidates:

Part-I TAMIL/ OTHER LANGUAGES:

Successful candidates passing Examination for the Language and securing the marks (i) 60 percent and above and (ii) 50 percent and above but below 60 percent in the aggregate shall be declared to have passed the examination in the First and Second class, respectively. All other successful candidates shall declare to have passed the examination in the Third Class.

PART –II ENGLISH:

Successful candidates passing examinations for English and securing the marks (I) 60 percent and above and (ii) 50 percent and above but below 60 percent in the aggregate shall be declared to have passed the examination in the First and Second class respectively. All other successful candidates shall be declared to have passed the examination in Third class

PART – III consisting of CORE SUBJECTS, ALLIED SUBJECTS, PROJECT/ELECTIVES

Successful candidates passing examination for core courses together and securing the marks (i) 60 percent and above and (ii) 50 percent and above but below 60 percent in the aggregate of the marks prescribed for the core courses together shall be declared to have passed the examination in the first and second class, respectively. All other successful candidates shall be declared to have passed the examination in the third class.

Part -IV: [Consisting of SUB ITEMS 1 (a), (b) and (c), 2, 3, 4 and 5] as furnishes in the regulations 4 Part –IV supra.

Part –V Extension Activities

The Only Credit earned for Part V Extension activities of a successful candidate. Shall not be taken into Consideration for Classification

10. Ranking:

Candidates who pass all the examinations prescribed for the course in the first appearance itself alone are eligible for Classification/ Ranking / Distinction;

Provided in the case of candidates who pass all the examinations prescribed for the course with a break in the First Appearance due to the reasons as furnished in the Regulations 7.[iii] supra are eligible for Classification / Distinction.

The marks obtained in improvement examinations will not be taken into consideration for ranking.

11. The Medium of Instruction and Examinations:

The medium of instruction and Examinations for the papers under part I and II shall be in the language concerned. For Part III and Part IV the medium of instruction and examination shall be English / Tamil.

12. Submission of Record Notebooks for Practical Examinations:

Candidates taking the Practical Examinations should submit bonafide Record Notebook prescribed for the Practical Examinations. Otherwise the candidate will not be permitted to take the practical Examinations. However, in genuine case where the students could not submit the record notebook may be permitted to take the Practical Examinations provided the Head of the Department concerned certifies that the candidate has performed the experiments prescribed for the Course. For such of those candidates who do not submit Record Books, zero [0] marks will be awarded for record notebooks.

In case a candidate fails in the Practical Examination the marks awarded for the record at the time of first appearance for the Practical Examination should be made available by the University to the Examiners at the subsequent appearance by the candidate.

13. Improvement of marks in the subjects already passed:

Candidates who have passed in theory paper / papers are allowed to appear again for theory paper / papers only once in order to improve his/her marks, by paying the fee prescribed from time to time. Such candidates are allowed to improve within a maximum period of 10 semesters counting from his/her first semester of his/her admission. If candidate improves his marks, then his improved mark will be taken into consideration for the award of Classification and Distinction only. Such improved marks will not be counted for the award of Prize / Medals and Rank. If the Candidate does not show improvement in the marks, his previous marks will be taken into consideration.

No candidate will be allowed to improve marks in the Practical and Field work.

14. Checklist for Inspection

A. Qualification for

Teaching Faculty : as prescribed by the UGC and the University
Laboratory Staff : as prescribed by the UGC and the University.

B. Infrastructure Facilities

- i) Building: Number of classroom with specifications: 3 rooms measuring 20”x 25 “
If the class strength is above 50 the space shall increase by 10 sq. ft, per student.
Number of staff rooms: one measuring 20” x 20”
- ii). Furniture: One pair of table / chair per student.

PATTERN OF QUESTION PAPER:

PART- A (50 Words)		
To Answer 10 Question	10 X 2 Marks	= 20 Marks
PART-B (200 Words)		
To Answer 5 Questions (either or Type)	5 X 5 Marks	= 25 Marks
PART-C (500 Words)		
To Answer 3 Questions out of 5 questions	3 X 10Marks	= 30 Marks
	Total	= 75 Marks

The Course of Study and the Scheme of Examinations:

Year/ Seme ster	Part	Subject	Paper	Sub. Code	Title of the Paper	Ins. Hrs/ Week	Cre dit	Exa m Hrs	Marks		
									IA	Uni. Exam	Tot al
I Year I Sem	I	Language	Paper I	U1LT11FL	Tamil I	6	3	3	25	75	100
	II	English	Paper I	U1LE01SL	English I	6	3	3	25	75	100
	III	Core	Paper I	U1CA01MT	Digital Logic and Design	5	4	3	25	75	100
	III	Core Practical	Practical I	U1CA01MP	PC Software Lab(MS Word, Excel and Power Point)	4	2	3	20	30	50
	III	Allied	Paper I	U1MA11AT	Mathematical Foundations I	7	5	3	25	75	100
	IV	---	--	U1ES01GS	Environmental Studies	2	2	3	25	75	100
I Year II Sem	I	Language	Paper II	U2LT11FL	Tamil II	6	3	3	25	75	100
	II	English	Paper II	U2LE01SL	English II	6	3	3	25	75	100
	III	Core	Paper II	U2CA01MT	Programming in C	5	4	3	25	75	100
	III	Core Practical	Practical II	U2CA11MP	Programming in C Lab	4	2	3	20	30	50
	III	Allied	Paper II	U2MA11AT	Mathematical Foundations II	7	5	3	25	75	100
	IV	---	----	U2VE01GS	Value Education (General Awareness)	2	2	3	-	50	50
II Year III Sem	III	Core	Paper III	U3CA01MT	Object Oriented Programming Using C++	4	3	3	25	75	100
	III	Core	Paper IV	U3CA02MT	Data Structures and Algorithms	5	3	3	25	75	100
	III	Core	Paper V	U3CA03MT	Computer Architecture	5	4	3	25	75	100
	III	Core Practical	Practical III	U3CA01MP	C++ and Data Structures Lab	4	2	3	20	30	50
	III	Allied	Paper III	U3CM11AT	Financial Accounting I (w.e.f. 2012-13)	7	5	3	25	75	100
	IV	Skill Based Elective I	Paper I	U3CA04ST	Enterprise Resource Planning	3	3	3	25	75	100
		Non- Major Elective I	Paper I	U3CA11NM/ U3BA01NM	Introduction to Information Technology(BBA,B.Com)/ Management Concepts(B.C.A)	2	2	3	25	75	100
II Year IV Sem	III	Core	Paper VI	U4CA11MT	Computer Networks	5	4	3	25	75	100
	III	Core	Paper VII	U4CA02MT	Operating System	4	3	3	25	75	100
	III	Core	Paper VIII	U4CA03MT	Visual Programming	5	3	3	25	75	100
	III	Core Practical	Practical IV	U4CA01MP	Visual Programming Lab	4	2	3	20	30	50
	III	Allied	Paper IV	U4CM11AT	Financial Accounting II (w.e.f. 2012-13)	7	5	3	25	75	100
	IV	Skill Based Elective II	Paper II	U4CA04ST	E-Commerce	3	3	3	25	75	100
		Non- Major Elective II	Paper II	U4CA01NM/ U4BA01NM	Internet and its Applications(BBA,B.Com)/ General Commercial Knowledge(BCA)	2	2	3	25	75	100

III Year V Sem	III	Core	Paper IX	U5CA01MT	Database Management System	6	5	3	25	75	100
	III	Core	Paper X	U5CA02MT	COBOL Programming	6	5	3	25	75	100
	III	Core Practical	Practical-V	U5CA01MP	RDBMS - Lab	5	5	3	40	60	100
	III	Core Practical	Practical-VI	U5CA02MP	COBOL Programming Lab	5	5	3	40	60	100
		Elective	Paper-I	U5CA03ET U5CA14ET	Data Mining & Warehousing Microprocessors and Microcontrollers	5	5	3	25	75	100
	IV	Skill Based Elective III	Paper-III	U5CA04ST	Mobile Computing	3	3	3	25	75	100
III Year VI Sem	III	Core	Paper XI	U6CA01MT	Java Programming	4	4	3	25	75	100
	III	Core	Paper XII	U6CA02MT	Software Project Management	5	4	3	25	75	100
	III	Core Practical	Practical-VII	U6CA01MP	Java Lab	4	4	3	20	30	50
	III	Core Practical	Practical-VIII	U6CA02MP	Web Technology Lab	4	4	3	20	30	50
		Elective	Paper-II	U6CA03ET U6CA04ET	Computer Graphics Client /Server Technology	5	5	3	25	75	100
		Elective	Paper-III	U6CA05ET U6CA06ET	Web Technology Management Information systems.	5	5	3	25	75	100
	IV	Skill Based Elective - IV	Paper IV	U6CA07ST	Animation Techniques	3	3	3	25	75	100
	V	Extension Activities		U6CA08EA			1				50
					Total	180	140				3600

L	T	P	C
5	0	0	4

SEMESTER I

TOTAL HOURS: 65

DIGITAL LOGIC AND DESIGN

SUBJECT CODE: U1CA01MT

UNIT- I : BINARY SYSTEMS

Digital Computers and Digital Systems – Binary Numbers - Number Base Conversion – Octal and Hexadecimal Numbers – Compliments – Binary Codes – Binary Storage and Registers – Binary Logic – Integrated Circuits.

UNIT-II : BOOLEAN ALGEBRA AND LOGIC GATES

Basic definitions of Boolean Algebra – Axiomatic Definition of Boolean Algebra- – Basic Theorems and Properties of Boolean Algebra – Boolean Functions – Canonical and Standard forms – Other Logic Operations – Digital Logic Gates.

UNIT-III: SIMPLIFICATION OF BOOLEAN FUNCTIONS

The Map Method – Two and Three Variable Maps- Four Variable Map – Five and Six Variable Maps – Product of Sums Simplifications - NAND and NOR implementation – Don't Care Conditions.

UNIT-IV: COMBINATIONAL LOGIC

Introduction – Adders – Subtractors- Code Conversion – Binary Adder – Encoder – Decoders – multiplexer and demultiplexer.

UNIT-V : SEQUENTIAL CIRCUITS

Flip flops – Registers – shift registers – Ripple counters – Synchronous Counters – Timing sequences – The Memory Unit.

Text Book:

1. M. Morris Mano, "Digital Logic and Computer Design", Pearson, 2nd edition, 2010.

Reference Books:

1. Louis Neshelsky, "Introduction to Digital Technology", John Wiley & Sons, 4th Edition, 2006
2. Thomas.L Floyd, "Digital Logic Design", PHI, 2nd edition, 2004.

L	T	P	C
0	0	4	2

TOTAL HOURS: 52

SEMESTER I

PRACTICAL I **PC SOFTWARE LAB**

SUBJECT CODE: U1CA01MP

MS-WORD

1. Text Manipulations
2. Usage of Numbering , Bullets, Tools and Headers
3. Usage of Spell Check and Find and Replace
4. Text Formatting
5. Picture Insertion and Alignment
6. Creation of Documents Using Templates
7. Creation of Templates
8. Mail Merge Concept
9. Copying Text and Picture from Excel
10. Splitting the Screen
11. Opening Multiple Document, Inserting Symbols in Documents

MS-EXCEL

1. Creation of Worksheet and Entering Information
2. Alignment, Editing Data in Cell
3. Excel Function (Date, Time, Statistical, Mathematical, Financial Functions)
4. Changing of Column Width and Row Height (Column and Range of Columns)
5. Moving, copying, Inserting and Deleting Rows and Columns
6. Formatting Numbers and Other Numeric Formats
7. Drawing Borders Around Cells
8. Creation of Charts Raising Moving
9. Changing chart Type
10. Controlling the Appearance of a chart

MS-POWERPOINT

Working with Slides

1. Creating, saving, and closing presentation.
2. Adding headers and footers.
3. Changing slide layout
4. Working fonts and bullets
5. Inserting clip art
 - 5.1 Working with clip art
 - 5.2 Applying Transition and Animation effects.
6. Run and slide show.

L	T	P	C
7	7	0	5

TOTAL HOURS: 91

SEMESTER I MATHEMATICAL FOUNDATION I

SUBJECT CODE: U1MA11AT

UNIT I: SYMBOLIC LOGIC

Proposition, Logical operators: conjunction, disjunction, negation, conditional and bi-conditional operators, converse, inverse, Contra positive, logically equivalent, tautology and contradiction. Arguments and validity of arguments.

UNIT II: SET THEOREY

Sets, Set operations, Venn diagram, properties of sets, number of elements in a set, Cartesian product. **Relations:** Equivalence relation, .Equivalence class, partially and totally ordered sets. **Functions:** Types of Functions, Composite of Functions.

UNIT III: BINARY OPERATIONS

Types of Binary Operations, Commutative, Associative, Distributive and Identity laws. Boolean algebra and their simple properties, Permutations and combinations.

Unit IV: NUMERICAL METHODS

Interpolation: Introduction, Interpolation methods, Finite differences, forward and backward difference table, Newton's forward and backward difference interpolation formulas, Lagrange's formula and their inverse interpolation formula.

UNIT-V: TWO DIMENSIONAL ANALYTICAL GEOMENTORY

Straight Lines- equation of Straight line with slope m and the given point – passing through two given points – intercept form – parallel to axes – perpendicular axes, Pair of Straight lines- condition for two lines to be parallel and perpendicular, circles-general equation of circle – centre-radius-equation of circle passing through three points.

Text Book:

1. P.R.Vital, "Mathematical Foundations", Margham publication, Chennai, 178th Edition, 2014.

Reference Books:

1. U.Rizwan, "Mathematical Foundation", SciTech, Chennai, 12th Edition, 2007.
2. V.Sundaram & Others,"Discrete Mathematical Foundation", A.R.Publication, 3rd Edition, 2006.
3. A.Singaravelu, "Numerical Methods", A.R.Publication, 3rd Edition, 2006.

L	T	P	C
2	0	0	2

TOTAL HOURS: 26

SEMESTER I **ENVIRONMENTAL STUDIES**

SUBJECT CODE: U1ES01GS

UNIT-I: INTRODUCTION TO ENVIRONMENTAL SCIENCES: NATURAL RESOURCES

Environmental Sciences – Significance – Public awareness – Forest resources – Water resources – Mineral resources – Food resources - Environmental impact – fertilizer – Pesticide Problems – case studies.

UNIT-II: ECOSYSTEM, BIODIVERSITY AND ITS CONSERVATION

Ecosystem – concept – structure and function – producers, consumers and decomposers – Food chain – Food web – Forest, Grassland, desert and aquatic ecosystem.

Biodiversity – Definition – genetic, species and ecosystem diversity – Values and uses of biodiversity – biodiversity at global, national (India) and local levels – Hotspots, threats to biodiversity – conservation of biodiversity – Insitu & Exsitu.

UNIT-III: ENVIRONMENTAL POLLUTION AND MANAGEMENT

Environmental Pollution – Causes – Effects and control measures of Air, Water, Marine, soil, solid waste, Thermal, Nuclear pollution and Disaster Management – Floods, Earth quake, Cyclone and Land slides. Role of individuals in prevention of pollution – pollution case studies.

UNIT-IV: SOCIAL ISSUES – HUMAN POPULATION

Urban issues – Energy – water conservation – Environmental Ethics – Global warming – Resettlement and Rehabilitation issues – Environmental legislations – Environmental protection Act. 1986 – Air, Water, Wildlife and forest conservation Act – population growth and Explosion – Human rights and Value Education – Environmental Health – HIV/AIDS – Role of IT in Environment and Human Health – Women and child welfare – Public awareness – Case studies.

UNIT-V: FIELD WORK

Visit to a local area / local polluted site / local simple ecosystem – Report submission

Text Book

1.Kumarasamy, K., A.Alagappa Moses & M.Vasanthi, “Environmental Studies”, Bharathidasan University Pub, Trichy, 2nd Edition, 2004.

Reference Books:

1. Rajamannar, “Environmental Studies”, Evr College Pub, Trichy, 1st Edition 2004.
- 2.Kalavathy,S, “Environmental Studies”, Bishop Heber College Pub,Trichy, 1st Edition, 2004.

L	T	P	C
5	0	0	4

TOTAL HOURS: 65

SEMESTER II **PROGRAMMING IN C**

SUBJECT CODE: U2CA01MT

UNIT- 1:

C Fundamentals character Set- Identifiers and Keywords – Data types – Constants- variables- declarations- Expressions-statements- Arithmetic, Unary, relational and Logical, Assignments and Conditional Operators- Library Functions.

UNIT -2:

Data input output functions – Simple C Programs- Flow of Control – if, if-else, while, Do...While, for loop, nested control structures- Switch, break and continue, go to statements- comma operator.

UNIT - 3:

Functions – definitions – prototypes- passing arguments- Recursion. Storage Classes- Automatic, External, Static, Register Variable.

UNIT – 4:

Arrays – Defining and processing- Passing arrays to functions- Multi dimension arrays- Arrays and String. Structures – User Defined data types- Passing structures to Functions – Self Referential Structures- Unions – Bit wise Operations.

UNIT - 5:

Pointer –Declarations- Passing pointers to functions- operation on pointers-pointers and Arrays- Arrays of pointers- structures and pointers- files: creating processing, opening and closing a data file.

Text book:

1. Ashok N.Kamthane, “Programming with ANSI and Turbo C”, Pearson Education 1st Edition 2009.

Reference books:

1. B.W. Kernighan and D.M.Rithchi, “The C Programming Language”, PHI, 4th Edition 2006.
2. H.Scildt, “C the Complete Reference”, , TMI 4th Edition 2007.
3. Kanetthar Y, “Let us C”, BPB Pub New Delhi, 5th Edition 2004.

L	T	P	C
0	0	4	2

TOTAL HOURS: 52

**SEMESTER II
PRACTICAL II
PROGRAMMING IN C LAB**

SUBJECT CODE: U2CA11MP

I. Summation of Series

1. Sin(x)
2. Cos(X)
3. Exp(X) (Comparison with built in functions)

II. String Manipulation

1. Counting the no of Vowels, Consonants, Words, white Spaces in a line of Text and array of Lines.
2. Substring detection, count and Removal
3. Finding and Replacing Substrings

III Recursion

1. GCD of two numbers
2. Maximum and Minimum

IV Matrix Manipulation

1. Addition, Subtraction and Multiplication
2. Determinant of a Matrix

V. Sorting and Searching

1. Bubble Sort
2. Binary Search

VI. File Manipulation

1. File Copying
2. Files using command line arguments

L	T	P	C
7	7	0	5

TOTAL HOURS: 91

SEMESTER II **MATHEMATICAL FOUNDATIONS II**

SUBJECT CODE: U2MA11AT

UNIT I: MATRICES

Multiplication of Matrices, Singular and Non – Singular Matrices, Adjoint of a Matrix, Inverse of Matrix, Symmetric and Skew – Symmetric, Hermitian and Skew - Hermitian matrices, Orthogonal and Unitary Matrices, Rank of a Matrix, Solution of Simultaneous Linear Equations by

- (i) Cramer's rule
- (ii) Matrix Inversion Method.

UNIT II : MATRICES(CONTINUED)

Test for Consistency and Inconsistency of Linear Equations, [Rank Method], characteristic roots and characteristic vectors, Cayley – Hamilton theorem.

UNIT III: NUMERICAL METHODS

Solutions of Algebraic and Transcendental equations: Bisection method, Regula Falsi method, Newton's Raphson method, Iterative method.

UNIT IV: NUMERICAL METHODS(CONTINUED)

Numerical Differentiation: Newton's forward and backward difference formulas for differentiation.

Numerical Integration: Trapezoidal rule to evaluate the definite integral, Simpson's One – Third rule, Simpson's Three – Eight rule, Weddle's rule.

UNIT V: ANALYTICAL GEOMETRY OF THREE DIMENSION

Planes-general equation of plane- intercept form-plane passing through three points, Straight lines- straight line as intersection of two plane – symmetrical form – line passing through two given points , Spheres – equation of sphere – centre – radius – sphere through four points [Simple Problem only]

Text Books:

1. P.R. Vittal , “Mathematical Foundations”, Margham Publication Chennai,172th Edition,2014.
2. A.Singara velu, “Numerical methods”, A.R.Publications, 15th Edition, 2013.

Reference book:

1. U.Rizwan, “Mathematical Foundation”, SciTech , Chennai, 3rd Edition, 2010.

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L	T	P	C
2	0	0	2

TOTAL HOURS: 26

SEMESTER II **VALUE EDUCATION**

SUBJECT CODE: U2VE01GS

UNIT – I:

Value Education - Definition - relevance to present Day- Concept of Human Values –self Introspection-self esteem-personal values.

UNIT –II:

Family values - Components, structure and responsibilities of family –Neutralization of anger-Adjustability-Threats of family life-Status of Women’s in family and society- caring for needy and elderly –Time allotment for sharing ideas and concerns.

UNIT –III:

Ethical values-Professional Ethics-Mass Media Ethics-Advertising Ethics-Influence of Ethicson family life-Psychology of children and youth-leadership qualities-personality development.

UNIT –IV:

Social values-faith, service and secularism-social and secularism-social sense and commitment-students and politics-social awareness, consumer awareness, consumer rights and responsibilities – redressal mechanisms.

UNIT –V :

Effect of international affairs on values of life/issue of Globalization-Modern Warfare-Terrorism, Environmental issues-Mutual respect of different cultures, religions and their beliefs.

Text Book:

1. T.Anchukandam and J.Kuttainimathathil (ED) “Grow Free Live Free”, Krisitu Jyoti Publications,Bangalore, 2nd Edition, 2000.

Reference books :

1. Mani Jacob (ED) “Resource Book for Value Education”, Institute for Value Education, New Delhi 3rd Edition, 2002.
2. Dharma Bharti, “DBNI, NCERT, SCERT”, National Institute of Peace and Value Education, Secunderabad, 2nd Edition, 2002.
3. Daniel and Selvamony, “Value Education Today”,Madras Christian College, Tambaram and ALACHI, New Delhi, 2nd Edition, 1990
- 4.S.Ignachmuthu -“Values for Life –Better Yourself Books”, Mumbai, A.P. Publication, 1st Edition, 2009.

L	T	P	C
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TOTAL HOURS: 52

III SEMESTER
PAPER III
OBJECT ORIENTED PROGRAMMING USING C++
SUBJECT CODE: U3CA01MT

UNIT-I

Principles of Object Oriented Programming (OOP) : Evolution of C++ - Programming Paradigms - Key Concepts of OOP - Advantages of OOP - Usage of OOP and C++ .Input and Output in C++-Streams-Stream classes- Unformatted console I/O operations-Member functions of istream class-manipulators-manipulators with parameters

UNIT-II

Introduction to C++; Tokens, Keywords, Identifiers, Variables, Operators, Expressions and Control Structures : If,If..Else, Switch – Repetitive Statements- for, while, do..while - Pointers and arrays

UNIT-III

Functions in C++ - Main Function - Function Prototyping - Parameters Passing in Functions - Values Return by Functions - inline Functions - Function Overloading- Classes and Objects; Constructors and Destructors; and Operator Overloading - Type of Constructors

UNIT - IV

Inheritance : Single Inheritance - Multilevel inheritance - Multiple inheritance - Hierarchical Inheritance - Hybrid Inheritance. Pointers - Virtual Functions and Polymorphism

UNIT-V

Working with Files : Classes for File Stream Operations - Opening and Closing a File - End-of-File Detection - File Pointers - Updating a File - Error Handling during File Operations - Command-line Arguments

Text Book:

1. Ashok N.Kamthane, "Object Oriented Programming with ANSI & Turbo C ++", Pearson Education, 3rd Edition, 2010.

Reference Book:

1. E. Balagurusamy, OBJECT-ORIENTED PROGRAMMING WITH C++, Tata Mc-Grawhill Publication, 4th Edition, 2009.
2. Maria Litvin & Gray Litvin , C++ for you, Vikas publication, 2nd Edition, 2008.
3. John R Hubbard, Programming with C, TMH publication, 2nd Edition, 2002.

L	T	P	C
5	0	0	3

TOTAL HOURS: 65

PAPER IV
DATA STRUCTURES AND ALGORITHMS
SUBJECT CODE: U3CA02MT

UNIT-I

Definition of a Data structure - primitive and composite Data Types, Arrays, Operations on Arrays, Ordered lists.

UNIT-II

Stacks – Operations - Applications of Stack - Infix to Postfix Conversion, Recursion, Queue-operations.

UNIT-III

Singly Linked List - Operations, Application - Representation of a Polynomial, Polynomial Addition; Doubly Linked List - Operations.

UNIT-IV

Trees and Graphs: Binary Trees - Operations – Recursive Tree Traversals- Graph - Definition, Types of Graphs, Graph Traversal – DFS and BFS

UNIT-V

Searching- linear and binary search – Sorting- Insertion, Bubble, Quick and Merge sort.

Text Book:

1. N.Dale, “C++ plus Data structure”, publishers narosa publishing, 5th Edition 2011.

Reference Books:

1. Ellis Horowitz, Sartaj Shani, “Data and File Structures”, Galgotia Publication, 3rd Edition, 2006.
2. Ellis Horowitz, Sartaj Shani, Sanguthevar Rajasekaran, “Computer Algorithms”, Galgotia Publication, 2nd Edition, 2004.

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TOTAL HOURS: 65

PAPER V
COMPUTER ARCHITECTURE
SUBJECT CODE: U3CA03MT

UNIT-I

Introduction - Organization and Architecture, Structure and Function -Computer Evolution and Performance - A Brief History of Computers-System Buses - Computer Components, Computer Function, Interconnection Structures, Bus Interconnection.

UNIT-II

Internal Memory - Computer Memory System Overview, Semiconductor Main Memory, Cache Memory, Advanced DRAM organization. External Memory - Magnetic Disk, RAID, Optical Memory, Magnetic Tape. Input / Output - External Devices, I/O Modules, Programmed I/O, Interrupt-Driven I/O,DMA,I/O channels and Processors, The External Interface.

UNIT-III

Computer Arithmetic - ALU, Integer Representation, Integer Arithmetic, Floating - Point Representation, Floating - Point Arithmetic. Instruction Sets: Characteristics and Functions - Types of operands, Types of Operations, Assembly Language. Instruction Sets - Addressing, Instruction Formats.

UNIT-IV

CPU Structure and Function - Processor Organization, Register Organization, The Instruction Cycle, Instruction Pipelining, The Pentium Processor, The PowerPC Processor. RISC - Instruction Execution Characteristics, The use of a Large Register File, Compiler Based Register Optimization, Reduced Instruction Set Architecture, RISC Pipelining.

UNIT-V

Superscalar Processors - Overview- Micro-Operation, Control of the CPU, H/W Implementation. Micro programmed Control - Basic Concepts, Microinstruction Sequencing, Microinstruction Execution, TI 8800, Applications of Microprogramming.

Text Book:

1. William Stallings, "Computer Organization and Architecture ", PHI, 4th Edition, 1997.

Reference books:

1. V.Carl Hamacher, ZvoKog G.Vranesic and Safwat G.Zaky, "Computer Organization", McGraw-Hill, ISE, 3rd Edition, 2001.
2. M.Morris Mano, "Computer Systems Architecture", PHI, 8th Edition, 2010.

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TOTAL HOURS: 52

PRACTICAL III
C++ AND DATA STRUCTURES LAB
SUBJECT CODE: U3CA01MP

1. Program to implement classes, create object and member functions.
2. Program to implement the concept of function overloading.
3. Program to implement the concept of Operator overloading.
4. Program to implement the concept of Inheritance.
5. Program to implement file handling concepts.
6. Implement PUSH, POP operations of stack using Arrays.
7. Implement add, delete operations of a queue using Arrays.
8. Creation, insertion, and deletion in Singly linked list.
9. Binary Search tree traversals (in-order, pre-order, and post-order) using Recursion.
10. Sorting-Quick sorting.

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TOTAL HOURS: 91

ALLIED II

PAPER III

FINANCIAL ACCOUNTING I

SUBJECT CODE: U3CM11AT

UNIT-I

Introduction : Basic Accounting Concepts and Conventions - Groups interested in accounting - Accounting Equation - Journal - Ledger - Subsidiary Books - Trial Balance .

UNIT-II

Final Accounts : Meaning - Preparation of Final Accounts - Trading Account - Profit and loss a/c Manufacturing a/c- Balance Sheet - Distinction between Trial Balance and Balance Sheet .

UNIT-III

Depreciation Accounting : Meaning of Depreciation - Methods of Providing Depreciation - Fixed Percentage on Original Cost - Fixed Percentage on Diminishing Balance .

UNIT-IV

Average Due Date : Meaning - Practical uses of average due date - basic problems in Average Due Date (Simple problems only).

UNIT-V

Single Entry System : Definition - Salient features - Limitations - Differences between Single Entry System and Double Entry System – only Net Assets method (excluded conversion method).

Text Book:

1. T.S.Reddy and A.Murthy, “Financial Accounting”, PHI Publications, 4th Edition 2012.

Reference Books:

1. Gupta R.L. “Advanced Accountancy”, S.Chand, Delhi, 3rd Edition 2005.
2. Agarwala A.N. “Higher Science of Accountancy”, Kitab Mahal, Allahabad, 2nd Edition 2006.
3. S.P. Jain, and K.L. Narang, “Financial Accounting”, PHI Publications, 4th edition 2007
4. M.C.Shukla and T.S.Grawel, “Adavnced Accounts(Vol. I)”, PHI, 3rd Edition, 2005.

L	T	P	C
3	0	0	3

TOTAL HOURS: 39

SKILL BASED SUBJECT I
PAPER I
ENTERPRISE RESOURCE PLANNING
SUBJECT CODE: U3CA04ST

UNIT – I

Business function and Business process: Functional areas and Business Process - functional area of operations - Business process - Marketing Sales – supply chain management – Accounting and finance – Human Resource – Functional areas of information system – The development of ERP system SAP R/3 – New directions in ERP – significance and benefits of ERP software and systems

UNIT -II

Marketing information system and sales order process in ERP: sales and Distribution in ERP – Pre sales activities – sales order processing – inventory Sourcing - Delivery – Billing – payment – Customer relationship Management – benefits of CRM

UNIT –III

Production and supply chain management information system: Production overview – The production planning process – The SAP ERP Approach to production planning – Sales forecasting – sales and operation Planning – Demand management – Material requirement planning in SAP ERP – ERP and supplier - supply chain

UNIT –IV

Accounting in ERP : Accounting activities – using ERP for accounting Information – operational decision making problem – credit management –Industrial credit management in SAP ERP – product profitability analysis – Management reporting with ERP system – Document flow for customer Service

UNIT – V

Human resource process in ERP: HR with ERP – Advance HR features – Time management – Payroll – Travel management – Training and Development – Management by objectives – ERP process modeling

Text Book:

1. Ellen Monk And Bret Wagner, “Concepts in Enterprise Resource Planning”, MGH 4th edition, 2011.

Reference Book:

1. K.Balasubramanian, S.Usha Priya, K.Hema, “Enterprise Wide Information Systems”, 3rd Edition – 2006.

L	T	P	C
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TOTAL HOURS: 26

NON MAJOR ELECTIVE I

PAPER I

INTRODUCTION TO INFORMATION TECHNOLOGY

SUBJECT CODE: U3CA11NM

UNIT I:

Introduction: History of Computer - Parts of Computer System - Hardware Devices - Software - Operating System - Examples of Operating systems - Computer Networking - Visual Editor.

UNIT II:

Microsoft Word - Microsoft Excel - Microsoft PowerPoint.

UNIT III:

Introduction to Multimedia - Images - Sound - Video Desktop Publishing Basics - Page layout Programs - Text Generation - Graphics for DTP - Print Production.

UNIT IV:

Introduction to Internet - Working of Internet - Internet Services - Internet Addressing - E-Mail Basics - Web Development Tools - Introduction to HTML

UNIT V:

Information System - Management Information concepts - Planning Issues and the MIS - Organizing Issues and the MIS - Control Issues and the MIS - Decision Support Systems.

Text Book:

1. Sanjay Saxsena, "A First Course in Computer", Vikas Publishing House, 2nd Edition, 2000.

References books:

1. Ron Mansfield, "Working in Microsoft Office", Tata Mcgraw Hill, 3rd Edition, 2009.
2. Linda Tway, Sapphiro Pacific Lajolla, "Multimedia in Action", Academic Press, 5th Edition, 2008.
3. Neil randal "Teach yourself the internet in a week", Prentice Hall of India, 2nd Edition, 1996.

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5	0	0	4

TOTAL HOURS: 65

IV SEMESTER

PAPER VI

COMPUTER NETWORKS

SUBJECT CODE: U4CA11MT

UNIT-I

Computer networks – Network hardware- Network software- Protocol Hierarchies – Layering – Interfaces– OSI reference Model – TCP/IP reference model – physical layer – transmission media - Wireless transmission – switching.

UNIT – II

Data link layer: services of DLL – framing – flow control – error control – Error detection codes – Error correction codes – DLL protocol – stop and Wait protocol –sliding window protocol - HDLC

UNIT-III

Network layer: services of network layer - routing – shortest path routing Algorithm – congestion control –Inter network routing – IP protocol –IP address – subnets – internet control protocol

UNIT-IV

Transportation layer: services of transportation layer – addressing –Establishing and releasing connection – flow control – buffering –Multiplexing –TCP and UDP –Model – connection management – TCP congestion control – UDP

UNIT-V

Application layer – DNS – name space – resource – records – name Servers - Email – architecture and services – user agent – message Format and transfer– WWW client and Server sides

Text book:

- 1) Andrew Tanenbaum, “Computer Networks”, PHI, 3rd Edition, 2010.

Reference book:

- 1) William Stalling, “Computer Networks”, PHI, 6th Edition, 2011.
- 2) Behrouz A. Forouzan, “Computer Networks- A To-Down Approach”, PHI, 3rd Edition, 2008.
- 3) Larry L.Peterson, Bruce & Davie, “Computer Networks- A System Approach”, TMH, 2nd Edition, 2006.

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TOTAL HOURS: 52

PAPER VII

OPERATING SYSTEM

SUBJECT CODE: U4CA02MT

UNIT-I

Introduction - types of operating systems - operating system services - system calls and system programs

UNIT-II

Process management - Process concepts - process scheduling - operation on process Inter process communication - CPU scheduling - scheduling algorithms - Deadlocks

UNIT-III

Memory Management - Single and multiple partitioned allocation – paging -segmentation - Virtual Memory Management - Demand paging and Page Replacement Algorithms

UNIT-IV

Information management - File concept - Access methods - Directory structure - allocation methods - free space management - disk scheduling.

UNIT-V

UNIX: UNIX system - A Case Study.

Text Book:

1. Abraham Silberschatz and P. B. Galvin – “Operating system concepts” - Addison Wesley Publication, 8th Edition, 2011.

Reference Books:

1. Achyut s Godbole , “Operating Systems” , TMH Publications ,3rd Edition, 2005.
2. John J. Donovan , “Systems Programming”, TMH Publications , 3rd Edition, 2001.
3. D.M. Dhamdhrer, “Systems Programming and Operating Systems”, TMH, 2nd Revised Edition, 2002.

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TOTAL HOURS: 65

PAPER VIII

VISUAL PROGRAMMING

SUBJECT CODE: U4CA03MT

UNIT -I

Customizing a form- Writing a simple program - Tool box- Creating control-Name property- Command button-Access keys-Image control-Text boxes-Labels-Message boxes-Grid-Editing tools-Variables data types-String number.

UNIT -II

Displaying information-Determinate loops , indeterminate loops -Conditionals Built in function-Function and Procedure.

UNIT -III

Arrays-List-Sorting and searching record - Control arrays-Grid control-Project with multiple form-Do events and sub main –Error trapping.

UNIT –IV

VB objects- Dialogue boxes-Common control-Menus-MDI forms-Testing-Debugging and Optimization -Working with Graphics.

UNIT-V:

File and handling-File system control-File system objects.

Text Book:

1. Gary Cornell ,“ Visual Basic 6.0 From the ground up”, Tata McGraw Hill, 2nd Edition, 2002.

Reference Books:

1. Noel Jerke, “Visual Basic (The Complete Reference)”, Tata McGraw Hill, 3rd Edition, 2008.
2. Deitel& Deitel ,T.R. Nieto, ”Visual Basic 6”, PHI , Pearson Edition, 2005.

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TOTAL HOURS: 52

PRACTICAL IV

VISUAL PROGRAMMING LAB

SUBJECT CODE: U4CA01MP

1. Building simple application
2. Working with Intrinsic controls and ActiveX controls
3. Application with multiple forms
4. Application with dialogues
5. Application with menus
6. Application using data control
7. Application using format dialogues
8. Drag and Drop events
9. Database Management
10. Creating ActiveX controls

L	T	P	C
7	0	0	5

TOTAL HOURS: 91

ALLIED II

PAPER IV

FINANCIAL ACCOUNTING II

SUBJECT CODE: U4CM11AT

UNIT-I

Branch Accounts: Dependent Branches - Stock and Debtors System- independent branch (foreign branches excluded).

UNIT-II

Departmental Accounts: Basis for allocation of expenses - Inter Departmental Transfer at cost or selling price - Treatment of expenses which cannot be allocated.

UNIT-III

Hire Purchase System: Meaning and Legal Position - Accounting aspects - Hire Purchase Trading account. Installment Purchase System: Meaning and Legal Position - Distinction between Hire Purchase System and Installment Purchase System - Accounting Treatment (Simple problems only).

UNIT-IV

Partnership Accounts: Admission of a partner - Retirement of a Partner - Death of a Partner - Dissolution of Partnership.

UNIT-V

Mechanised System of Accounting: Advantages - Limitations - EDP.

Text Book:

1. T.S.Reddy and A.Murthy, "Financial Accounting",DK Publishers, 2nd Edition 2008.

Reference Books:

1. Gupta R.L. "Advanced Accountancy", S.Chand , Delhi, 2nd Edition, 2005.
2. Agarwala A.N. "Higher Science of Accountancy", Kitab Mahal, Allahabad, 2nd Edition, 2006.
3. S.P. Jain, and K.L. Narang, "Financial Accounting" Atlantic Publishers, 4th edition 2007
4. M.C.Shukla and T.S.Grawel, "Adavnced Accounts (Vol. I)", PHI, 2nd Edition, 2005.

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TOTAL HOURS: 39

SKILL BASED SUBJECT II

PAPER II

E-COMMERCE

SUBJECT CODE: U4CA04ST

UNIT-I

Electronic Commerce Framework, Traditional vs. Electronic business applications, the anatomy of E-commerce applications.

UNIT-II

Network infrastructure for E-Commerce - components of the I-way - Global information distribution networks - public policy issues shaping the I-way. The internet as a network infrastructure. The Business of the internet commercialization.

UNIT-III

Network security and firewalls - client server network security - firewalls and network security - data and message security - encrypted documents and electronic mail.

UNIT-IV

Electronic Commerce and World Wide Web, consumer oriented E-commerce, Electronic payment systems, Electronic data interchange (EDI), EDI applications in business, EDI and E-commerce EDI implementation.

UNIT-V

Intraorganizational Electronic Commerce-supply chain management. Electronic Commerce catalogs, Document Management and digital libraries.

Text Book:

- 1.R. Kalakota and A. B. Whinston, "Frontiers of Electronic Commerce", Addison Wesley, 2nd Edition, 2005.

Reference Books:

1. R.Kalakota and A.B.Whinston, "Readings in Electronic Commerce", Addison Wesley, 2nd Edition, 2004.
2. David Kosiur, "Understanding Electronic Commerce", Microsoft Press, 5/E, 2005.
3. Soka, "From EDI to Electronic Commerce", McGraw Hill, 2nd Edition, 2002.
4. Saily Chan, "Electronic Commerce Management", John Wiley, 3rd Edition, 2001.

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TOTAL HOURS: 26

NON MAJOR ELECTIVE II

PAPER II

INTERNET AND ITS APPLICATIONS

SUBJECT CODE: U4CA01NM

UNIT - I

Introduction to Computers- Programming Language types- History of Internet- Personal Computers- History of World Wide Web- Micro software .NET Java-Web resources.

UNIT - II

Web Browsers- Internet Explorer- connecting to Internet- Features of Internet explorer- Searching the Internet- online help and tutorials- File Transmission Protocol (FTP) -Browser settings.

UNIT – III

Attaching a file, Electronic mail -Creating an E-mail ID- Sending and Receiving mails-attaching a file- Instance messaging - other web browsers.

UNIT - IV

Introduction to HTML headers- Linking- Images-special characters and line breaks- unordered lists- simple HTML programs.

UNIT – V

E-marketing -consumer tracking- Electronic advertising- search engine-CRM- credit card payments- Digital cash and e-wallets- micro payments- smart card .

Text book:

- 1.H.M.Deitel, P.J. Deitel and A.B.Goldberg, “Internet and World Wide Web”, PHI, 5th Edition, 2012.

Reference book:

1. Harley hahn, “The Internet- Complete Reference”, Tata McGraw Hill, 2nd Edition, 2008.
2. Thomas A.Powell, “The Complete Reference HTML”, TMH, 2nd Edition, 2006.
3. Douglas Comer, “The Internet Book”, Pearson Education, 3rd Edition, 2007.

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6	0	0	5

TOTAL HOURS: 78

V SEMESTER
PAPER IX
DATABASE MANAGEMENT SYSTEM
SUBJECT CODE: U5CA01MT

UNIT-I :

Purpose of Database - Overall System Structure - Entity Relationship Model - Mapping Constraints - Keys - E-R Diagrams.

UNIT-II:

Relational Model - Structure - Formal Query Language - Relational Algebra - Tuple and Domain Relational Calculus.

UNIT-III :

Structured Query Language - Basic Structure - Set Operations - Aggregate Functions - Date, Numeric and Character Functions - Nested Sub queries - Modification Of Databases Joined Relations-DDL - Embedded SQL.

UNIT-IV :

Relational Database Design - Pitfalls - Normalization Using Functional Dependencies - First Normal Form-Second Normal Form-Third Normal Form-Fourth Normal Form And BCNF.

UNIT-V:

Oracle - Introduction – SQL(DDL,DML, DCL Commands) – Integrity Constraints – PL/SQL – PL/SQL Block – procedure, function – Cursor management – Trigger – Exception Handling.

Text Book:

1. Singh, “Database systems: Concepts, Design & applications”, Pearson Education, 2nd Edition, 2009.

Reference Books:

1. Abraham Silberschatz, H.F.Korth and S.Sudarshan-Database System Concepts Mcgraw Hill Publication, 3rd Edition, 2008.
2. Gerald V.Post, “DBMS-Designing and Business Applications”, Mcgraw Hill Publications, 2nd Edition, 2006.
3. Michael Abbey and Michael.J.Corey-Oracle, “A Beginners guide”, TMH, 4th Edition, 2009.

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6	0	0	5

TOTAL HOURS: 78

PAPER X
COBOL PROGRAMMING
SUBJECT CODE: U5CA02MT

UNIT I

Getting started; Editing the COBOL Program-Running the program-Layout COBOL Programs-Constants and Variables-COBOL Divisions.

UNIT II

Data Division- Basic Verbs-Data movement verb and editing.

UNIT III

Conditional and sequence control verbs: condition-IF statement-testing multiple conditions-IF-ELSE-nested IF-GO TO DEPENDING ON-PERFORM statement.

UNIT IV

Concept of tables: one dimensional table-OCCURS clause-two dimensional table-indexed tables and indexing-SET and SEARCH statement-character handling.

UNIT V

Sequential files – Relative and indexed files.

Text Books :

1. E.Rajasekar,S.Selvi,Structured, “COBOL Programming[With COBOL85]”,Anuradha Agencies, 2nd Edition, 2009.
2. R.Krishna Moorthy, “Introduction to COBOL Programming”, JJ Publications, 4th Edition, 2006.

Reference Books:

- 1.Tyler Welburn and Wilson Price,”Structured Cobol – (Fundamentals and Style)”, Mcgraw Hill, 3rd Edition, 2006.
- 2.Roy M.K. And Ghosh Dastidar, “Cobol Programming”, Tata Mcgraw Hill, 2nd Edition, 2001.

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TOTAL HOURS: 65

PRACTICAL V

RDBMS - Lab

SUBJECT CODE: U5CA01MP

1. Create a table Student-master with the following fields client_no, name, address, city, state, pincode, remarks, bal_due with suitable data types.
 - a) Create another table supplier_table from client_master. Select all the fields and rename client_no with supplier_no and name with supplier_name.
 - b) Insert data into client_master
 - c) Insert data into supplier_master from client_master.
 - d) Delete the selected row in the client_master.

2. Create a table sales_order with s_order_no and product_no as primary key. Set other fields to store client number, delivery address, delivery date, order status.
 - a) Add a new column for storing salesman number using ALTER Command.
 - b) Set the s_order_no as foreign key as column constraints.
 - c) Set the s_order_no as foreign key as table constraints.
 - d) Enforce the integrity rules using CHECK.

3. Create a table student_master with the following fields name, regno, dept and year with suitable data types. Use Select command to do the following.
 - a) Select the student's name column.
 - b) Eliminate the duplicate entry in table.
 - c) Sort the table in alphabetical order.
 - d) Select all the Students of a particular department.

4. Create a table sales_order_details with the s_order_no as primary key and with the following fields: product_no, description, qty_ordered, qty_disp, product_rate, profit_percent, sell_price, supplier_name.
 - a) Select each row and compute sell_price*.50 and sell_price*1.50 for each row selected.

- i. Select product_no, profit_percent, Sell_price where profit_per is not between 10 and 20 both inclusive.
 - c) Select product_no, description, profit_percent, sell_price where profit_percent is not between 20 and 30.
 - d) Select the suppliername and product_no where suppliername has 'r' or 'h' as second character.

5. Create table Order_master with following fields Order_no, Odate, Vencode, Ostatus, Del_date with suitable data types. Create another table Order_detail with Order_no, Itemcode, Qty_ord, Qty_deld with suitable data types. Write Commands to set Operations using the table Order_master and Order_detail.

6. Create a table Order_Info with the following fields Orderid, Orderdate, Commplan, Cusid, Shipdate, total with suitable data types. Create another table Customer with Custid, Name, Address, City, Pincode with suitable data types. Write commands to relating data through Join concepts using the table Order_Info and Customer.
7. Create a table master book to contain the information of magazine code, magazine name, and publisher. Weekly/biweekly/monthly, price. Write PL/SQL block to perform insert, update, and delete operations on the above table.
8. Create a table to contain phone number, user name, address of the phone user. Write a function to search for a address using phone numbers.
9. Create a table stock to contain the item code, item name, current stock, date of last purchase. Write a stored procedure to seek for an item using item code and delete it, if the date of last purchase is before 1 year from the current date. If not, update the current stock.
10. Create a table to store the salary details of the employees in a company. Declare the Cursor to contain employee number, employee name and net salary
. Use Cursor to update the employee salaries.
11. Create a table to contain the information about the voters in a particular constituency. Write a proper trigger to update or delete a row in the table.
12. Create a table to store the details of the Alumni in an institution. Write a PL/SQL block to change address of particular alumni. Write proper exceptions and appropriate error messages.

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TOTAL HOURS: 65

PRACTICAL VI
COBOL PROGRAMMING LAB
SUBJECT CODE: U5CA02MP

1. Sum of 'N' numbers.
2. Average of 'N' numbers
3. Calculation of interest
4. Conversion of centigrade to Fahrenheit.
5. Calculation of charge for electricity bill.
6. Find the number is even or odd.
7. Find the biggest of three numbers
8. Sum of factorial of given numbers
9. Program using GO TO... DEPENDING ON
10. Find maximum and minimum of given n numbers using OCCURS
11. Prepare a student record using OCCURS
12. Creation of employee file.
13. Sorting
14. Merging
15. Generate Library Information System using file.

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5	0	0	5

TOTAL HOURS: 65

ELECTIVE I
(To choose 1 out of the given 2)
PAPER I

DATA MINING AND WAREHOUSING
SUBJECT CODE: U5CA03ET

UNIT-I

Introduction - What is Data mining – Important of Data mining - various kind of data mining Functionalities – Various kinds of Patterns Pattern Interesting Classification of Data mining Systems Data mining Task Primitives Integration of Data Mining System Major issues in Data Mining

UNIT-II

Data Processing - Process the Data Descriptive Data Summarization – Measuring Central Tendency Dispersion of Data Graphic Displays – Basic Descriptive Data Summaries Data Cleaning Data Integration and Transformation data Reduction.
Data Discrimination - Concept Hierarchy Generation

UNIT-III

Data Warehouse : OLAP Technology - An overview - Data Warehouse Multidimensional Data Model - Data Warehouse Architecture - Data Warehouse Implementation from Data Warehouse to Data mining

UNIT-IV

Mining-Frequent patterns - Associations Correlation - Basic Concepts: Road Map, Efficient Scalable Frequent, Item set -Mining methods- Mining Various Kinds of Association mining to correlation-Constraint based mining

UNIT-V

Applications Trends - Data mining Applications Data mining – System Products Research Prototype - Additional Themes on Data Mining - Social impact of Data mining Trends in Data mining

Text Book:

1. Jiawei Han and Micheline Kamber, “Data Mining (Concepts and Techniques)”, Second Edition (Chapter 1,2,3,5,11), 2011.

Reference Books:

1. Karguta, Joshi, Sivakumar & Yesha, “Data Mining (Next Generation Challenges and Future Directions)”, Printice Hall of India (2007)
2. Ian H. Witten & Eibe Frank, “Data Mining (Practical Machine Learning Tools and Techniques”, Morgan Kaufmann Publishers, Second Edition, 2010
3. Alex Benson, Stephen V. Smith, “Data Warehousing, Data mining & OLAP”, Tata McGraw – Hill, Edition 2004.

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TOTAL HOURS: 65

PAPER I.2

MICROPROCESSORS AND MICROCONTROLLERS

SUBJECT CODE:U5CA14ET

UNIT I: 8085 MICROPROCESSOR

Introduction to Microprocessor- 8085 Architecture and its operations- 8085 pin description-8085 instruction Set and Classification -8085 addressing modes.

UNIT II: 8085 PROGRAMMING

Writing assembly level Programs -Multibyte addition- Multibyte Subtraction-BCD addition - BCD subtraction-BCD Multiplication-BCD division – BCD to Binary And Binary to BCD conversion-BCD to Hex and Hex to BCD conversion – ASCII to BCD and BCD to ASCII Conversion – ASCII to Binary and Binary to ASCII Conversion.

UNIT III: FEATURES AND INTERFACING OF PROGRAMMABLE DEVICES FOR 8085 BASED SYSTEMS

Intel 8255 Programmable Peripheral Interface: Features of 8255 – Block diagram of Intel 8255- Operating Modes and control words of 8255 – Programming Examples – Interfacing LEDs – Interfacing Seven Segment Displays – Traffic Light control.

UNIT IV: 8086 MICROPROCESSOR AND ADVANCED MICROPROCESSOR

Introduction to 8086 Microprocessor- Architecture of 8086 – Pin details of 8086. Advanced Microprocessor: 80186 Architecture- 80286 Architecture –Pentium Microprocessor: Architecture of Pentium. Other Versions of Pentium: Pentium Pro Processor - Pentium II Processor - Pentium III Processor- Pentium 4 Processor

UNIT V: 8051 MICROCONTROLLER

Introduction to 8051 Microcontroller - Intel's MCS -51 series Microcontrollers - Intel 8051 Architecture –Memory organization – Internal RAM Structure- Power Control in 8051 – Stack operation.

TEXT BOOKS:

1. Ramesh Goankar “Microprocessors and Microcontroller”, Prentice Hall, 5th edition, 2002. (Unit I & Unit II)
2. N.Senthilkumar M.Saravannan, S.Jeevananthan “Microprocessor and Microcontrollers” Oxford University Press, 1/E, 2010 (unit III, Unit IV & Unit V)

Reference Books:

1. Douglas V. Hall “Microprocessors and Interfacing “, Tata McGraw Hill, 2/E, 2006.
2. Krishna kant “Microprocessors and Microcontrollers Architecture Programming and system design 8086,8086,8051,8096, PHI Learning Pvt Ltd. New Delhi, 2/E, 2010.
3. Barry B. Brey, “The Intel Microprocessor-8086/8088, 80186,286, 386, 486, Pentium Processor”, Prentice Hall of India Pvt Ltd, 8th Edition, 1998.
4. Yu-chang Lin and Clean, “Microprocessor Systemi the 8086/8088 family architecture, Programming and Design”, Prentice Hall of India Pvt Ltd, 2nd edition, 2001.

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TOTAL HOURS: 39

**SKILL BASED SUBJECT III
PAPER III
MOBILE COMPUTING
SUBJECT CODE: U5CA04ST**

UNIT-I

Introduction- Applications-vehicles- Mobile and Wireless devices- History of wireless communications- Mobile Communication Market – A Simplified and reference model – Overview – Wireless Transmission – Signals – Antennas – Signal Propagation – Multiplexing– Modulation – Spread Spectrum.

UNIT-II

Medium Access Control – motivation for a MAC- SDMA – FDMA – TDMA – Comparison of S/T/F/ CDMA. – Telecommunication Systems –GSM – System Architecture – Protocols –DECT – TETRA.

UNIT-III

Satellite system – History – Applications – BASICS – GEO – LEO – MEO – Routing– Localization – Handover – Examples – Broad cast Systems– Cyclic Repetition of data – Digital Video and Audio Broadcasting.

UNIT-IV

Mobile Network Layer – Mobile IP – Goals, assumptions- Entities and term logy – IP Packet Delivery – Tunneling and encapsulation – Optimization - Dynamic Host Configuration Protocol – ad hoc networks – Routing- Destination sequence distance vector – Dynamic source routing – Alternative metrics.

UNIT-V:

Mobile Transport layer- Traditional TCP – Congestion control – Slow start –Fast retransmit / fast recovery – Implication on mobility - Indirect TCP – Snooping TCP – Mobile TCP – Fast retransmit / fast recovery – transmission / time-out freezing.

Text Book:

1. Jochen Schiler, “Mobile Communication”, Addison Wesley, 3rd Edition, 2005.

Reference Books:

1. Honeyman P Huston L.B, “Communications and Consistency in Mobile File Systems”, IEEE Personal communication 2(6), 3rd Edition, Dec 1996.
2. Biplob k Sikdar ,Sipra dasbit, “Mobile Computing” Printice Hall India, 2nd Edition, 2002.
3. William Stallings, “Wireless Communications & Networks”, Pearson Education, 2/E, 2004.

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TOTAL HOURS: 52

VI SEMESTER
PAPER XI
JAVA PROGRAMMING
SUBJECT CODE: U6CA01MT

UNIT- I

Introduction to Java - Features of Java - Object Oriented Concepts - Data Types - Variables - Arrays - Operators - Control Statements-Input and output-Scanner and System class-print(),println(), and printf() methods.

UNIT- II

Classes - Objects - Constructors - Overloading method - Access Control - Static and fixed methods - Inner Classes - String Class - Inheritance - Overriding methods - Using super-Abstract class – Type Wrapper classes for primitive types- Autoboxing and Auto Unboxing – Recursion.

UNIT- III

GUI components – Common GUI Event types and Listener Interfaces-JOptionPane – JLabel, JTextfield, JButton,JCheckBox,JTextarea, JComboBox, JList, JPanel – Mouse Event Handling - Adapter Classes- Key Event Handling.

UNIT- IV

Layout Managers – Flowlayout, BorderLayout, GridLayout - Graphics and Java 2D – Graphics contexts and Graphics objects – Color control – Font Control – Drawing Lines, Rectangles and Ovals – JSlider – Using menus with Frames.

UNIT- V

Packages - Access Protection - Importing Packages - Interfaces - Exception Handling - Throw and Throws - Thread - Synchronization - Runnable Interface - Inter thread Communication – Multithreading - I/O Streams - File Streams - Applets .

Text Book:

1. C.Muthu, “Programming in Java” , TMH Publication ,2nd Edition, 2008.

Reference Book:

1. Deitel & Deitel, “Java How to Program”, PHI Publication, 6th Edition, 2005.
2. Herbert Schildt, “Java – The Complete Reference” MGH, 8th Edition, 2012.
3. Ivor Horton, “Beginning Java 2”, MGH, 3rd Edition, 2004.
4. Steven Holzner, “Java 2 Black book”, Coriolis Group books, 2nd Edition, 2006.

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TOTAL HOURS: 65

PAPER XII
SOFTWARE PROJECT MANAGEMENT
SUBJECT CODE: U6CA02MT

UNIT I

Introduction to Software Projects – An Overview of Project Planning – Project Evaluation – Selection of an appropriate Project approach – Software effort Estimation.

UNIT II

Activity Planning – Project Schedules – Sequencing and Scheduling Projects – Network Planning Model – forward and backward pass-Identifying the Critical path-Activity float-Shortening Project Duration – Identifying Critical Activities-precedence networks.

UNIT III

Risk Management – Resource Allocation – Monitoring and Control – Managing People and Organizing Teams – Planning for Small Projects.

UNIT IV

Software Configuration Management – Basic Functions – Responsibilities – Standards – Configuration Management – Prototyping – Models of Prototyping.

UNIT V

Case Studies - Application of SPM concepts in Hospital information systems or information systems of any small and medium scale Industry – SPM in Hospital information management System, Small and Medium Scale Enterprises – Application of SPM in Marketing
(For Unit V, students are expected to do a survey and study and submit a report)

Text Book:

1. Mike Cotterell, Bob Hughes, “Software Project Management”, Inclination/Thomas Computer Press, 2nd Edition, 2001.

Reference Books:

1. Darrel Ince, H.Sharp and M.Woodman, “Introduction to Software Project Management and Quality Assurance”, Tata McGraw Hill, 3/ E, 2006.
2. Ramesh Gopalasamy, “Managing Global Software Projects”, 4th Edition, 2005.
3. S. A. Kelkar, “Software Project Management: A Concise Study”, PHI Learning Pvt. Ltd., 5th Edition, Dec-2012.

Web Site:

PMBOK, Project management body of knowledge www.pmi.org

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TOTAL HOURS:52

PRACTICAL VII

JAVA LAB

SUBJECT CODE: U6CA01MP

1. Finding area and Perimeter of a circle. Use Scanner class.
2. Determining the order of numbers generated randomly using Random Class.
3. String Manipulation (Substring removal, string replacement etc.,)
4. Drawing Rectangles, Ovals etc using Applet.
5. Implementing Thread based applications & Exception Handling.
6. Application using synchronization such as Thread based, Class based and Synchronized statements.
7. Implementing GUI based applications using swing components (Jlabel, Jbutton, JtextField)
8. Implementing GUI based application using Layout managers and menus.
9. Application using file streams(sequential file)
10. Application using file streams(Random file)

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TOTAL HOURS: 52

PRACTICAL VIII

WEB TECHNOLOGY LAB SUBJECT CODE: U6CA02MP

1. Create a simple page introducing yourself how old you are, what you do, what you like and dislike. Modify the introduction to include a bullet list of what you do and put list the 5 things you like most and dislike as numbered lists. Create another page about your favorite hobby and link it to (and from) your main page. Center something, and put a quote on one of your pages
2. Put an existing image on a web page. Create a table, use a heading and at least one use of row span/col. span. Color a page and some text within the page. Link to another site
3. Create a new file called index. html.
Put the normal HTML document structure tags in the file.
Give it a title.
At the bottom of the page (i.e. the last thing between the body tags) put the following:
A horizontal rule.
A Link to your e-mail Address (With your name between the tag) ; remember to put the link to your E- Mail address within address tags.
A line break.
The date. (I have this same structure at the bottom of this page).
Above this block (which is called the footer), put a title in heading tags.
Add some text describing yourself (you can split this into multiple headings and Paragraphs if you wish).
4. Write a script to create an array of 10 elements and display its contents.
5. Write a function in Java script that takes a string and looks at it character by character.
6. Create a simple calculator using form fields. Have two fields for number entry & one field for the result. Allow the user to be able to use plus, minus, multiply and divide.

7. Create a document and add a link to it. When the user moves the mouse over the link, it should load the linked document on its own. (User is not required to click on the link).
8. Create a document, which opens a new window without a toolbar, address bar or a status bar that unloads itself after one minute.
9. Create a document that accepts the user's name in a text field form and displays the same the next time when the user visits the site informing him that he has accessed the site for the second time, and so on.
10. Create a Web form for an online library. This form must be able to accept the Membership Id of the person borrowing a book, the name and ID of the book and the name of the book's author. On submitting the form, the user (the person borrowing the book) must be thanked and informed of the date when the book is to be returned. You can enhance the look of the page by using various ASPNET controls.

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TOTAL HOURS: 65

ELECTIVE II
(To choose 1 out of the given 2)
PAPER II.1
COMPUTER GRAPHICS
SUBJECT CODE: U6CA03ET

UNIT-I

Introduction to computer Graphics - Video display devices- Raster scan Systems - Random Scan Systems - Interactive input devices - Hard copy devices - Graphics software - Output primitives - line drawing algorithms - initializing lines - line function - circle Generating algorithms.

UNIT-II

Attributes of output Primitives - line attributes - Color and Grayscale style - Area filling algorithms - Character attributes inquiry functions - Two dimensional transformation - Basic transformation - Composite transformation - Matrix representation - other transformations.

UNIT-III

Two - dimensional viewing - window- to view port co-ordinate transformation - clipping algorithms - Interactive input methods - Physical input devices - logical classification of input devices - interactive picture construction methods.

UNIT- IV

Three - dimensional concepts - Three dimensional display methods - parallel Projection - Perspective Projection - Depth Cueing - Visible line and surface identification three dimensional transformations.

UNIT-V

Three dimensional viewing - Projection - Viewing transformation - implementation of viewing operations - Hidden surface and Hidden line removal - back face removals.

Text Book:

1. D.Hearn and M.P.Baker, "Computer Graphics (C version)", Pearson Education, 2nd Edition, 2011.

Reference Book:

1. W.M. Newman and RF.Sproull, "Principles of Interactive Computer Graphics", McGraw Hill International 4th Edition – 2002.
2. BasabdutGanguly "Computer Graphics" Nandhu Publishers, 2nd Edition, 2014.
3. Adries Van Dam, F.Hughes John, Steven K. James D, "Computer Graphics Principles & Practice in C" Pearson, 2nd Edition, 2007.

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TOTAL HOURS:65

PAPER II.2
CLIENT/ SERVER TECHNOLOGY
SUBJECT CODE: U6CA04ET

UNIT-I : INTRODUCTION

Introduction to client/server computing - Main frame -centric client/server computing - Downsizing and client/server computing - Preserving mainframe applications-Investment through porting - Client/server development tools - Advantages of Client/Server computing.

UNIT-II : CLIENT COMPONENT

Components of client/server applications - The client - Client service, request for services, RPC, windows services, Fax/print services, Remote boot services, other remote services-Utility services and other services, Dynamic data exchange, Object linking and embedding. Common request broker architecture-The server - detailed server functionality - The networking operating system - novell network - LAN manager - IBM LAN server-Banyan VINES-PC network file services - Server operating systems: Netware, OS/2, Windows NT unix-system application architecture (SAA)

UNIT-III : SERVER COMPONENT

Components of client/server architecture-Connectivity - Open Systems Interconnect (OSI) - Inter Process Communication (IPC) - Communication interface technology - Wide area network technology - Client/server development software - Platform migration and reengineering of existing systems - Hardware components.

UNIT-IV : DISTRIBUTED OBJECTS AND INTERNET

Client/server with distributed objects - Distributed objects and components-From orb to business objects - Compound Documents : The client framework - OLE/DCOM-Client/server and the Internet-Web client/server - The hyper text era - The interactive era - The Java object era - The distributed object era.

UNIT-V : APPLICATION DEVELOPMENT TOOLS

GUI front end to 3270/5250 screens - The prototype process - Application development - Workbench architecture - Information Engineering facility Architecture - EASEL Workbench - Ellipse - SQL Windows - Power builder - SQL Tool set. APT workbench component.

Text Book:

1. Dewire and dawna travis, “Client/server computing”, -McGraw hill, 3rd Edition, 2001.

Reference Books:

1. Beth gold-Bernstein, David Marca, “Designing enterprise client/server systems”, PHI, 2nd Edition, 2002.
2. Thomas S Ligon, “Client/Server communications”, McGraw Hill series on client/server computing, 2nd Edition, 2000.
3. Robert Orfali, Dan Harley, Jeri Edward, “The essential client/server survival guide”, Galgotia, 2nd Edition, 2003.

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TOTAL HOURS: 65

ELECTIVE III
(To choose 1 out of the given 2)
PAPER III.1
WEB TECHNOLOGY
SUBJECT CODE: U6CA05ET

UNIT-I

Internet Basic - Introduction to HTML - List - Creating Table - Linking document Frames - Graphics to HTML Doc - Style sheet - Style sheet basic - Add style to document - Creating Style sheet rules - Style sheet properties - Font - Text - List - Color and background color - Box - Display properties.

UNIT-II

Introduction to Javascript - Advantage of Javascript - Javascript Syntax - Data type - Variable - Array - Operator and Expression - Looping Constructor - Function - Dialog box.

UNIT-III

Javascript document object model - Introduction - Object in HTML - Event Handling - Window Object - Document object - Browser Object - Form Object - Navigator object Screen object - Build in Object - User defined object - Cookies.

UNIT-IV

ASP. NET Language Structure - Page Structure - Page event, Properties & Compiler Directives. HTML server controls - Anchor, Tables, Forms, Files. Basic Web server Controls- Label, Textbox, Button, Image, Links, Check & Radio button, Hyperlink. Data List Web Server Controls - Check box list, Radio button list, Drop down list, List box, Data grid, Repeater.

UNIT-V

Request and Response Objects, Cookies, Working with Data - OLEDB connection class, command class, transaction class, data adaptor class, data set class. Advanced Issues - Email, Application Issues, Working with IIS and page Directives, Error handling.

Text Books:

1. I. Bayross, "Web Enable Commercial Application Development Using HTML, DHTML, Javascript", Pen CGI, BPB Publications, 4/E, 2013.
2. G. Buczek, ASP.NET Developers Guide, TMH, 2/E, 2002.

Reference Books:

1. Deitel & Deitel, "Internet & World Wide Web How to program", Pearson Education, 3rd Edition, 2006.
2. J. Jaworski, "Mastering Javascript", BPB Publications, 3rd Edition, 1999.
3. T. A. Powell, "Complete Reference HTML", TMH, Third Edition, 2002.
4. Web Technologies HTML, Java Script, PHP, Java, JSP, ASP.NET, XML & AJAX Black Book", Kogent Learning Solutions, Dream Tech Press, 2nd Edition, 2015.

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TOTAL HOURS: 65

PAPER III.2
MANAGEMENT INFORMATION SYSTEMS
SUBJECT CODE: U6CA06ET

UNIT-I:

Introduction to MIS: MIS concept – Definition – Role of MIS – Impact of MIS – MIS and the User – Management as a Control system – MIS: a support to Management - Management Effectiveness and MIS – Organization as a system – MIS: organization effectiveness.

UNIT-II:

Strategic Management of Business: The concept of corporate planning – Essentiality of Strategic Planning – Development of Business Strategies – Types of Strategies – Short-range Planning – Tools of Planning – Strategic Analysis of Business. Information Security Challenges in E-Business

UNIT-III:

Decision Making: Decision-making concepts – Decision-making process – Decision Analysis by Analytical Modeling – Behavioral Concepts in Decision-making – Organizational Decision-making – MIS and Decision-making. Information and Knowledge: Information Concepts.

UNIT-IV:

Applications in Manufacturing Sector: Personnel, Financial, Production, Raw Material and Marketing Managements. Applications in Service Sector: Service management System.

UNIT-V:

Enterprise Management Systems: Enterprise Management Systems – ERP system – ERP Model and Modules – Benefits of ERP – ERP Product Evaluation – ERP Implementation.

Text Book:

1. Waman S Jawadekar , “Management Information Systems Text and Cases”, PHI, 3rd Edition, 2002.

Reference Books:

1. Kenneth C. Laudon & Jane P. Laudon , “Management Information Systems Managing The Digital Firm”, PHI, 9th edition, 2009.
2. Haag, Cummings, McCubrey, “Management Information Systems for the Information Age”, TMH, 4th Edition, 2006.
3. S.A. Kelkar, “Management Information Systems a Concise Study”, PHI, 2nd Edition, 2005.

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TOTAL HOURS: 39

SKILL BASED SUBJECT IV

PAPER IV

ANIMATION TECHNIQUES

SUBJECT CODE: U6CA07ST

UNIT-I:

What is mean by Animation – Why we need Animation –Types of Animation 2D & 3D – Theory of 2D Animation – Theory of 3D Animation – Difference between Graphics & Animation – Application of 2D & 3D Animation – History of Animation – Software’s.

UNIT-II:

Traditional 2D Animation Concept – Types of 2D Animation – Techniques of 2D Animation – Color – Text – Formation – Size – Script Animation – Time Line Effects – Application of 2D Animation – Characterization 2D –Principle of 2D Animation – Concept Development.

UNIT-III:

3D Animation & its Concepts – Types of 3D Animation– Cycle & Non-Cycle Animation – Theory of Character 3D Animation – 3D Transition Animation – Skeleton & Kinetic 3D Animation – Texturing & Lighting of 3D Animation – 3D Camera Tracking – Applications & Software of 3D Animation.

UNIT-IV:

Motion Caption – Formats – Methods – Usages – Motion Capture Software – Merge with Software – Expression – Formats – Methods – Usages – Expression Capture Software – Script Animation Usage – Different Language of Script Animation Among the Software.

UNIT-V:

Concept Development – Scripting – Story Developing– Output Formats – Audio Formats & Video Formats – Colors – Color Cycle – Color Formats – 3D Production Budgets – 3D Animated Movies – Fields in 3D Animation.

Text Books:

1. Joestadaro, Donkim, “Maya 6.0 Bible”, PHI, 2nd Edition, 2009.
2. Kelly Ldot, Murtock, “3DS MAX BIBLE”, TMH, 4th edition, 2010.

Reference Books:

1. Tom Meade, Shinsaku Arima, “Maya 8.0 the Complete Reference”, TMH, 2nd Edition, 2011.
2. Jean Ann, “Animation Writing and Development”,Wright,Focal Press,2nd Edition 2010.

**ADHIPARASAKTHI COLLEGE OF ARTS AND SCIENCE
(AUTONOMOUS)**

Permanently Affiliated to Thiruvalluvar University, Vellore

Re-accredited by NAAC with B Grade (CGPA-2-83)

M.C.A -COMPUTER APPLICATIONS

Under CBCS

[Effective from the Academic year 2015-2016]

REGULATIONS

CBCS:

Choice- Based Credit System is flexible system of Learning “Credit” defines the quantum of contents/ syllabus prescribed for a course and determine the number of hours of instruction required. The distinguishing features of CBCS are the following

It permits the students to:

- Learn at their own pace
- Choice electives from a wide range of electives courses offered by the departments of the Colleges
- Undergo additional courses and acquire more than the required number of credits.
- Adopt an inter-disciplinary approach in learning.
- Make best use of the expertise of available faculty

1. Eligibility for Admission:

A Candidates who have passed the under mentioned degree examinations of this university or an examination of other institution by this university as equivalent thereto provided they have undergone the course under 10+2+3 or 11+1+3 or 11+2+2 pattern shall be eligible for admission to the MCA degree Course

(A) B.C.A / B.E.S/B.Sc in Computer Science / Mathematics/ Physics/ Statistics/ Applied Sciences OR (B) B.Com / Bachelor of Bank Management / B.B.A/ B.L.M/ B.A Corporate Secretary Ship / B.A Economics/ any other Bachelor’s Degree in any discipline with Business Mathematics and Statistics or Mathematics / Statistics in Main / Allied level or (C) B.Sc Chemistry with Mathematics and Physics as allied subjects or (D) B.E/B.Tech/ M.B.A or (e) A Bachelor’s degree in any discipline with mathematics as one of the subjects at the higher secondary level [i.e. in +2 level of the 10+2 pattern]

2. Eligibility for the Award of Degree:

A candidates shall be eligible for the award of the degree only if he/she has undergone the prescribed course of study in the college for a period of not less than three academic years and passed the examinations of all the six semesters prescribed earning 140 credits and fulfilled such conditions as have been prescribed therefore.

3. Duration:

The course duration shall be three years consisting of Six Semesters

4. Examinations:

The duration of University Examination for theory and practical subjects shall be 3 hours. The Maximum mark for each theory is 100 with 25 for Continuous Internal Assessment [CIA] and 75 for University Examination. The distribution of internal marks for theory papers shall be: Two tests of three -20 marks, and Assignment./ Seminar – 5 marks. The maximum marks for each practical is 100 with 40 for Internal Assessment and 60 for University Examination. The distribution of internal marks for practical papers shall be: Practical tests Two out of Three-24 marks, Attendance 6 marks, and record – 10 marks. For project work the marks assigned shall be

Project Report	:	150 Marks
Internal Assessment:		50 Marks

For the conduct of University Examination in practical subjects, the University will appoint two external examiners. The University will set the questions and distribute to the Colleges. The examiners will conduct the examinations and award the marks on the same day and forward to the University. The Principal / Head of the Department will coordinate to provide the laboratory and other facilities for conducting the examination.

Project work shall be carried out individually in an R&D section of any industry or University or in the Institute in which the candidate is studying. The Project work / Dissertation report shall be submitted through the guides / Supervisors to the Head of the Department and then to the University not later than the 31st May / 31st December. If he/ she fail to submit the Project Work / Dissertation within the stipulated date for particular semester, he/she may be permitted with the approval of the HOD to submit the Project work / Dissertation report during the succeeding semesters, within the maximum period of Five years from the date of admission to the First Semester. Project Work/ Dissertation evaluation and Viva-Voce shall be conducted by two external examiners.

5. Requirements for Proceeding to Subsequent Semester:

- (i) Candidates shall register their name for the first semester Examination after the admission in the P.G. Courses.
- (ii) Candidates shall be permitted to proceed from the first semester up to the final semester irrespective of their failure in any of the semester examinations subject to the condition that the candidates should register for all the arrear subject of earlier semesters along the current (subsequent) semester subjects.
- (iii) Candidates shall be eligible to go to subsequent semester, only if they earn sufficient attendance as prescribed there for by the academic council from time to time. provided in case of a candidate earning less than 65 % of attendance in any one of the semester due to any extraordinary circumstances such as medical grounds, such candidates who shall produce Medical Certificate issued by the Authorized Medical Attendant (AMA), duly certified by principal of the college, shall be permitted to proceed to the next semester and to complete the course of study. Such candidates shall have to repeat the missed semester by rejoining after completion of final semester of the course, after paying the fee for the break of study as prescribed by the college from time to time.

6. Passing Minimum:

A Candidate shall be declared to have passed the whole Examination, if he/she passes in all the papers and practical wherever prescribed / as per the scheme of examinations by earnings by earning 90 credits.

In fixing the passing minimum marks, the following will be observed:

- a) There shall be no passing Minimum for Internal.
- b) For External Examination, Passing Minimum shall be of 50 % (Fifty percentages) of the maximum marks prescribed for the paper for each paper/Practical/Project and Viva-Voce.
- c) In the aggregate (External + Internal), the passing minimum shall be of 50 % for the paper for each paper/Practical/Project and Viva-Voce.
- d) Grading shall be based on Overall Marks Obtained [Internal + External].

7. Classification of Successful Candidates :

Candidates who secured not less than 60% of aggregate marks [Internal + External] in the whole examination shall be declared to have passed the examination in the first Class.

All other successful candidates shall be declared to have passed in Second Class. Candidates who obtain 75% of the marks in the aggregate [Internal + External] shall be deemed to have passed the examination in First Class with Distinction, provided they pass all the examinations [Theory papers, practical, and project and Viva- voce] prescribed for the course in the first appearance.

8. Requirements to take the Semester Examinations:

- a) A Candidate will be permitted to take the Examination for any semester, If
 - i) He / she secure not less than 75 % of attendance out of the 90 instructional days during the semester.
[In the case married women students the minimum attendance requirements shall be 55% of the total instruction days]
 - ii) He/ she earns a progress certificate from the Head of the Institution of having satisfactory completed the course of Study prescribed in the subjects as required by the regulations, and
 - iii) His / her conduct has been satisfactory.

Provided that it shall be open the academic council or any authority delegated with such powers by the academic council to grant exemption to a candidate who has failed to earn 75% of the attendance prescribed for any valid reasons(s) subject to the usual conditions.

b) A candidate who secured attendance less than 75% but 65% and above shall be permitted to take the examination on the recommendation of the Head of the Institution to condone the lack of attendance as well as on the payment of the prescribed fees to the college.

c) A candidate who has secured attendance less than 65 % but 55% and above in Any semester, has to compensate the shortage of attendance in the subsequent Semester besides, earning the required percentage of attendance in that semester and Take the examination of both the semester papers together at the end of the latter Semester.

d) A Candidate who secured less than 55% of attendance in any semester will not be permitted to take the regular examinations. He/ She to re-do the course after the completion of the final Semesters by rejoining the semester in which the attendance is less than 55%.

e) A Candidate who secured less than 65% of attendance in, the final semester has to compensate his / her attendance shortage in a manner to be decided by the Head of the department concerned after rejoining the course.

9. Grading System :

In addition to the above marking system, grading system is also adopted as detailed below:

[a] The Marks (Sum of IA and UE marks) in each course is assigned with a letter grade on a seven points scale using the following letter grade points and ranges of marks.

SEVEN POINT SCALE [AS per UGC notification 1998]

Marks	Grade Point	Letter Grade	Class
95-100	7.00	H	First Class with Distinction
90-94	6.00	O	First Class with Distinction
75-89	5.50	D	First Class with Distinction
60-74	4.75	A	First Class
55-59	4.00	B	Second Class
50-54	3.5	C	Second Class
Below 50	3.00	F	Fail

From the Second Semester onwards the total performance with in a semester and continuous performance starting from the first semester are indicated respectively by

Grade Point Average [GPA] and **Cumulative Grade Point Average [CGPA]**

These two are calculated by the Following formulae:

$$GPA = \frac{\sum_{i=1}^n C_i G_i}{\sum_{i=1}^n C_i}$$

Where C_i is the credit earned for the Course i in any Semester G_i is the Grade point obtained by the student for the course i and 'n' is the number of courses passed in that semester. **CGPA = GPA** of all the courses starting from the first Semester to the Last Semester.

10. Ranking:

Candidates who pass all the examinations prescribed for the course in the first appearance itself alone are eligible for Ranking / Distinction. Provided in the case of candidates who pass all the examinations prescribed for the course with a break in the first appearance due to the reasons as furnished in the

Regulation 7 (iii) Supra are only eligible for classification / Distinction. The mark obtained in improvement examination will not be taken in to consideration for ranking.

11.The Medium of Instruction and Examinations:

The medium of instruction and Examinations shall be in English.

12.Submission of Record Notebooks for Practical Examinations:

Candidates taking the practical examinations should submit bonafide record note books prescribed for the practical examinations. Otherwise the candidates will not be permitted to take the Practical Examinations. However, in genuine cases where the students could not submit the record note book may be permitted to take the practical examination provided the Head of the Departments Concerns from the institutions certifies that the candidate has performed the experiments prescribed for the course. For such Candidate who do not submit Record Note Books, Zero [0] marks awarded for record note books.

In case a candidate fails in the practical Examination the marks awarded for the record at the time of first appearance for the practical examination should be made available by the college to the examiners at the subsequent appearance by the candidate.

13. Improvements of the Marks in the Subjects already passed

Candidates who have passed in theory paper/ papers are allowed to appear again for theory paper/papers only once in order to improve his/her marks, by paying the fee prescribed from time to time. Such candidates are allowed to improve within a maximum period of 12semesterscounting from his/her first semester of his/her admission. If candidate improves his marks that his improved marks will be taken into consideration for the award of classification & distinction only.

Such improved marks will not be counted for the award of Prizes/ Medals& Ranks. If the candidate does not show improvement in the marks, his previous marks will be taken into consideration. No Candidate will be allowed to improve marks in the Practical's, Mini Project, and Major Project& Viva voce.

14. Checklist for Inspection:

A. Qualification for

Teaching Faculty: as prescribed by the UGC and the University
Laboratory Staff: as prescribed by the UGC and the University.

B. Infrastructure Facilities

Building: Number of classroom with specifications: 3 rooms measuring 20"x 25 "
If the class strength is above 50 the space shall increase by 10sq, ft, per student.
Number of staff rooms: one measuring 20" x 20"

- i) Furniture: One pair of table / chair per student

PATTERN OF QUESTION PAPER:

PART- A (300 Words)

To Answer 5 Questions (either or Pattern) 5 X 6 Marks = 30 Marks

PART-B (900 Words)

To Answer 3 Questions out of 5 questions 3X 15Marks = 45 Marks

Total = 75 Marks

The Course of Study and the Scheme of Examination

Year/ Sem	Subject	Paper	Sub. Code	Title of the Paper	Hr. / we ek	Cr edi t	Exa m Hrs.	Max. Marks		
								IA	Sem Exa m	Total
I Year I Sem	Core	Paper I	P1CA01MT	Programming in C	5	4	3	25	75	100
	Core	Paper II	P1CA02MT	Digital logic and Computer Organization	5	4	3	25	75	100
	Core	Paper III	P1CA03MT	Principles of Information Technology	4	3	3	25	75	100
	Core	Paper IV	P1CA04MT	Data Structures	5	5	3	25	75	100
	Core	Paper V	P1CA05MT	Discrete Mathematics	4	5	3	25	75	100
	Core Practical	Practical I	P1CA01MP	C and Data Structures – Lab	3	2	3	40	60	100
	Core Practical	Practical II	P1CA02MP	Office Automation -Lab (MSWord, PowerPoint, MS Access, Excel)	3	2	3	40	60	100
I Year II Sem	Core	Paper VI	P2CA01MT	Object Oriented Programming in C++	5	5	3	25	75	100
	Core	Paper VII	P2CA02MT	Design and Analysis of Algorithms	5	5	3	25	75	100
	Core	Paper VIII	P2CA03MT	Computer Graphics	5	5	3	25	75	100
			P2HR01GS	Human Rights	2	2	3	25	75	100
	Core	Paper IX	P2CA04MT	Accounting and Financial Management	5	4	3	25	75	100
	Core Practical	Practical III	P2CA01MP	C++ and Algorithms – Lab	4	2	3	40	60	100
	Core Practical	Practical IV	P2CA02MP	Computer Graphics – Lab	4	2	3	40	60	100
II Year III Sem	Core	Paper X	P3CA11MT	Advanced Operating System	5	5	3	25	75	100
	Core	Paper XI	P3CA12MT	Advanced Database Systems	5	5	3	25	75	100
	Core	Paper XII	P3CA23MT	Software Engineering	5	4	3	25	75	100
	Elective (a) or Elective (b)	Paper I	P3CA04ET	Soft Computing	4	3	3	25	75	100
			P3CA05ET	Digital Image Processing						
	Elective(a) or Elective(b)	Paper II	P3CA06ET	Object Oriented Analysis and Design	4	3	3	25	75	100
			P3CA07ET	Computer Networks						
	Core Practical	Practical V	P3CA11MP	RDBMS (Oracle) – Lab	4	2	3	40	60	100
	Core Practical	Practical VI	P3CA12MP	Advanced Operating System Lab	4	2	3	40	60	100
II Year IV Sem	Core	Paper XIII	P4CA01MT	Principles of Compiler Design	5	4	3	25	75	100
	Core	Paper XIV	P4CA12MT	Advanced Java Programming	5	4	3	25	75	100
	Core	Paper XV	P4CA03MT	Resource Management Techniques	5	4	3	25	75	100
	Core	Paper XVI	P4CA14MT	C# and .Net Framework	5	4	3	25	75	100
	Elective (a) or Elective (b)	Paper III	P4CA05ET	E-Commerce	4	3	3	25	75	100
			P4CA16ET	Software Testing						
	Core Practical	Practical VII	P4CA11MP	Advanced Java Programming Lab	3	2	3	40	60	100
	Core Practical	Practical VIII	P4CA12MP	C# and .Net Lab	3	2	3	40	60	100
III Year V Sem	Core	Paper XVII	P5CA11MT	Cloud computing	5	4	3	25	75	100
	Core	Paper XVIII	P5CA02MT	WAP & XML	5	4	3	25	75	100
	Core	Paper XIX	P5CA13MT	VB.NET & ASP.NET Programming	4	3	3	25	75	100
	Core	Paper XX	P5CA04MT	Data Mining and Warehousing	5	4	3	25	75	100
	Elective (a) or Elective (b)	Paper IV	P5CA05ET	Embedded Systems	5	3	3	25	75	100
			P5CA06ET	Network Security						
	Core Practical	Practical IX	P5CA11MP	VB.NET & ASP.NET Programming Lab	3	2	3	40	60	100
	Core Practical	Practical X	P5CA02PV	Mini Project	3	3	3	40	60	100
III Year / VI Sem			P6CA01PV	Project Work with Viva Voce	30	20		50	150	200
Total					180	140				3700

I SEMESTER

**SEMESTER I
PAPER I**

L	T	P	C
5	0	0	4

TOTAL HOURS: 65

PROGRAMMING IN C

SUBJECT CODE: P1CA01MT

UNIT – I:

C language fundamentals: Program structure – identifiers – data types-integer – float- double – Char – Constants – variables - Operators and expressions - managing input and output operations.

UNIT – II:

C control structures: Decision making with IF statement - IF...ELSE statement - nested IF statement - FOR statement – DO...While statement - WHILE...DO statement – GOTO statement-SWITCH statement.

UNIT -III:

C functions: Mathematical functions - String functions - User defined functions.

UNIT - IV:

Arrays : Arrays - Passing arrays to a function - Structure - Definitions - assigning structure variable - assigning initial values - Structures and functions – Union.

UNIT - V:

Pointers and file operations: Understanding pointers – Pointers and functions - Understanding files - I/O functions formatted Working with structures - reading and writing disk files.

TEXT BOOKS:

- 1.Balagurusamy E, “ Programming in ANSI C”, TMG, 3/E, 2008.
- 2.Rajaraman V, “Programming in C “, PHI, 2/E, 2001.

REFERENCES:

- 1..W.Kernighan and D.M.Ritchie, “The C Programming Language: ANSI C”, Pearson Education Pvt. Ltd. 2/E 1998.
- 2.B.S.Gottfried, “Programming with C “, Schaum Outline Series, TMH, 2/E, 2010.

L	T	P	C
5	0	0	4

**SEMESTER I
PAPER II**

TOTAL HOURS: 65

DIGITAL LOGIC AND COMPUTER ORGANIZATION

SUBJECT CODE: P1CA02MT

UNIT-I:

Number system-converting numbers from one base to another – Complements – binary codes-integrated circuits-Boolean algebra-properties of Boolean algebra -Boolean functions- Canonical and standard form-logic operations-Logic gates-K map up to 6 variables-Don't care condition-Sum of products and product of sum simplification-Tabulation method.

UNIT-II:

Adder-subtractor-code converter-Analyzing a combinational Circuit-Multilevel NAND and NOR circuits-properties of XOR and equivalence function-Binary parallel Adder-Decimal Adder – Magnitude Comparator-Decoder-Multiplexer-ROM-PLA.

UNIT-III:

Flip flops-Triggering of flip flops-Analyzing a sequential circuit-State Reduction-Excitation tables-Design of sequential circuits-Counters-Design with state equation-Registers-Shift registers-Ripple and Synchronous Counters.

UNIT-IV:

Memory unit-Bus Organization-Scratch Pad Memory-ALU-Design of ALU-Status Register-Effects of Output carry-Design of shifter-Processor unit-Microprogramming-Design of Specific Arithmetic Circuits

UNIT-V:

Accumulator-Design of Accumulator-Computer configuration-Instruction and Data formats-Instruction sets-Timing and Control-Execution of Instruction-Design of computer-H/W control-PLA control and Micro program control.

TEXT BOOKS:

1. M. Morris Mano, "Digital Logic and Computer Design", PHI, 4/E, 2007.

REFERENCES:

1. M.M .Mano and C.R.Kime, "Logic and Computer Fundamentals", Pearson 2/E, 2001.
2. Thomas C.Barteel, "Digital Computer Fundamentals", Tata McGraw Hill, 6/E, 1985
- 3.

L	T	P	C
4	0	0	3

SEMESTER I
PAPER III
PRINCIPLES OF INFORMATION TECHNOLOGY
SUBJECT CODE: P1CA03MT
TOTAL HOURS: 52

UNIT-I:

Computer Basics: Evolution-Generations-Classifications-Components-Applications of Computers-CPU-Instruction Format, Instruction Cycle, Instruction Set - Data Representation - Coding Schemes-Memory Hierarchy-RAM-ROM-Types of Secondary Storage Devices-Types of Input and Output Devices.

UNIT-II:

Software: Introduction – Categories - Installing and Uninstalling - Piracy - Terminologies. Operating Systems: Evolution-Types and Functions of Operating Systems - Basic of Microsoft Windows and UNIX Operating Systems.

UNIT-III:

Microsoft Word 2000: Introduction - Working with Word 2000 - Checking Spelling and Grammar - Adding Graphics-Printing. Microsoft Excel 2000: Introduction - Working with Excel 2000 - Formulas and Functions - Inserting Charts - Printing. Power Point 2000: Introduction-Working with PowerPoint 2000 - Designing Presentation – Printing.

UNIT-IV:

Data Communication and Computer Networks: Introduction - Data communication –Transmission Media – Modulation – Multiplexing – Switching - Computer Network - Network Topologies - Communication Protocol - Network Devices **Internet:** Introduction – Evolution - Connect to Internet - Internet Applications - Data over Internet. Internet Tools: Introduction - Web Browser-Browsing Internet Using Internet Explorer - Electronic Mail (E-Mail) - Search Engines - Instant Messaging. **Computer Security:** Introduction - Computer Security: Definition - Malicious Programs – Cryptography - Digital Signature – Firewall - Users Identification and Authentication -Security Awareness and Policies.

UNIT-V:

Database Fundamentals: Introduction-Logical and Physical Data Concepts-Database Management System (DBMS)-DBMS Architecture-Database Models-Normalization-Types of Databases-Data Warehousing and Data Mining. **Structured Query Language (SQL):** Introduction - DDL and DML commands - Querying Multiple Table - Nesting Select Statements. Database Management with **Microsoft Access 2000:** Introduction - Starting Access – Tables - Queries - Forms - Reports.

TEXT BOOKS:

1. ITL Education Solutions, “Introduction to Information Technology”, Pearson, 2/E, 2010
2. V. Raja Raman, “Introduction to Information Technology”, PHI, 2/E, 2007

REFERENCES:

1. Dennis P.Curtin, Kim Foley, KunelSen, Cathleen Morin, “Information Technology” ,TMG, 1/E,2000

L	T	P	C
5	0	0	5

**SEMESTER I
PAPER IV**

TOTAL HOURS: 65

DATA STRUCTURES

SUBJECT CODE: P1CA04MT

UNIT-I:

Introduction to data structures – overview – types – primitive and non-primitive data structures and operations. Arrays – types – strings – array of structures – sparse and dense matrices – row major and column major arrays- pointers and arrays – array of pointers – pointers and strings. Recursion – types – rules – recursion versus iterations – Tower of Hanoi – advantages and disadvantages.

UNIT-II:

Stacks – operations – pointers and stack – representation of arithmetic expressions – infix, prefix and postfix notations – evaluation of postfix expression – conversion of expression – applications. Queues – operations – disadvantage – implementation – types and applications.

UNIT-III:

List – operations – linked list – memory allocation and de-allocation – operations – singly linked list – linked list with and without header – operations – circular linked list – doubly linked list – circular doubly linked list – applications. Storage management – allocation techniques – storage allocations – storage release – compaction – garbage collection.

UNIT-IV:

Tree – terms – binary trees – types – representation – operation and traversal – conversion of expression – binary search tree – threaded binary tree – B tree – B+ tree; Graphs – terminologies – representation – traversal – spanning trees.

UNIT-V:

Sorting – methods: insertion – selection – bubble – quick – tree – merging list – heap – radix – partition exchange. Searching – linear and binary search – hashing – hashing method – hashing function – division – mid square – folding – length – dependent – digit analysis methods.

TEXT BOOKS:

1. Ashok N Kamthane, “Introduction to Data structures in C”, Pearson Education, 1/E, 2010.
2. Samanta D, “Classic data structures”, PHI, 2/E, 2009

REFERENCES:

1. Jean – Paul Tremblay and Paul G. Sorenson, “An Introduction to Data Structures with Applications”, Tata McGraw Hill Publishing Company Lt, New Delhi ,2/E, 1995.

L	T	P	C
4	0	0	5

TOTAL HOURS: 52

SEMESTER I

PAPER V

DISCRETE MATHEMATICS

SUBJECT CODE: P1CA05MT

UNIT -I:

Introduction – Matrix Operators – Inverse of a square Matrix Elementary Operations and Rank of a Matrix – Simultaneous Equations Inverse by Partitioning - Eigen Values and Eigen Vectors.

UNIT –II:

Set Theory: Introduction – Sets – Notions and Description of Sets – Subsets –Venn – Diagram – Operations on Sets – Properties of Set Operations –Verification of the Basic Laws of Algebra by Venn Diagrams –The principles of Duality –Relations: Cartesian Product of Two Sets –Relations – Representation of a Relation –Operations –on Relation –Equivalence Relations – Equivalence Relation – Closure and Wars hall’s algorithm – One-to-one, Onto Functions – Special Types of Functions – Invertible Functions –Composition of Functions.

UNIT –III:

Logic: Introduction – TF Statement – Connectives – Atomic and Compound statements – Well Formed Formulae – Truth Table of a Formula – Tautology – Tautology Implications and Equivalence of Formulae –Replacement Process –Functionally Complete Sets of Connectives and Duality Law – Normal Forms – Principles of Normal Forms –Theory of Inference –Open Statement – Quantifiers – Valid Formulae and Equivalence –Theory of Inference for Predicate Calculus –Statements involving more than one Quantifier.

UNIT –IV:

Finite Automata – Definition of Finite Automation – Representation of finite Automaton – Acceptability of a String by Non-Deterministic Finite Automata –Equivalence of FA and NFA – Procedure for finding an FA equivalent to a given NFA –Properties of Regular Sets –Finite State Machines – The monoid of a Finite NFA –Properties of Regular Sets – Finite State Machines –The monoid of a Finite State Machine –Machine of a monoid –phrase Structured Grammars.

UNIT –V:

Chomsky Hierarchy of Languages – Finite Automata and Regular Languages – Derivation Trees; For Context-free Grammars –Normal Forms for Context-free grammars- Acceptance, Polish Notation – Simple Precedence Grammar - Pushdown Automation – Instantaneous Description of a PDA- Important Properties of Move Relation- Acceptance by PDA – Equivalence of two types of Acceptance by PDA- Context-free Languages and PDAs- Turing Machines- The language accepted by a TM- Turing Machine as a Computer integer- Functions - Techniques for Turing Machine Construction.

TEXT BOOKS:

1. M.K. Venkatraman, Sridharan, N. Chandrasekaran – “Discrete Mathematics”, National Publishing Company, 1/E, 2000.
- 2.R.M. Somasundaram, “Discrete Mathematical Structures”, PHI, 1/E, 2003.

REFERENCES:

1. Hopcraft and Ullman, “Introduction to Automata Theory, Languages & Computation”, Pearson Education, 2/E, 2006.
2. Tremblay and Manohar, “Discrete Mathematical structures with applications to computer science”, Tata McGraw-Hill, 1/E, 1997.

L	T	P	C
0	0	3	2

SEMESTER I

TOTAL HOURS: 39

PRACTICAL I

C AND DATA STRUCTURES - LAB

SUBJECT CODE: P1CA01MP

1. Implementation of arrays
2. Singly linked list
3. Circular linked list
4. Implementation of Stacks
5. Implementation of Queues
6. Implementation of Circular queue
7. Evaluation of Expressions
8. Binary Tree traversal
9. Binary search tree
10. Shortest path (Dijkstra's)

SEMESTER I

L	T	P	C
0	0	3	2

TOTAL HOURS: 39

PRACTICAL II

OFFICE AUTOMATION –LAB

(M.S. WORD, POWERPOINT, MS ACCESS, EXCEL)

SUBJECT CODE: P1CA02MP

1. Creation of New document with various format options
2. Creation of documents with table and their Manipulations
3. Creation of documents with mail merge options
4. Creation of slides with vary slide transitions
5. Creation of slides with pictures and their groupings
6. Create a worksheet with various mathematical functions
7. Create a worksheet with various financial functions
8. Draw suitable charts for the data
9. Create a database with forms and reports for student data
10. Create a database with forms and reports for an employee data
11. Database manipulations for student and employee data
12. Use of import and export options in database Manipulations.

II SEMESTER

SEMESTER II

PAPER VI

L	T	P	C
5	0	0	5

TOTAL HOURS: 65

OBJECT ORIENTED PROGRAMMING IN C++

SUBJECTCODE: P2CA01MT

UNIT - I:

Introduction to OOP: Overview of C++ classes - structures -union -friend function- friend class - inline function - constructors - static members - scope resolution operator - passing objects to functions - function returning objects.

UNIT - II:

Arrays - pointers - this pointer - references - dynamic memory allocation - function overloading -default arguments-overloading constructors-pointers to functions.

UNIT - III:

Operator overloading - member operator function -friend operator function -type conversion - inheritance -types of inheritance - virtual base - polymorphism-virtual functions.

UNIT- IV:

Class templates and generic classes - function templates and generic functions - overloading a function template - power of templates - exception handling - derived class exception - exception handling functions

UNIT- V:

Streams - formatted I/O with its class functions and manipulators - creating own manipulators- file I/O - conversion functions - standard template library.

TEXT BOOK:

1.E. Balaguruswamy, “ Object Oriented Programming with C++” Tata McGraw, 3/E, 2006

REFERENCES:

1.“Object Oriented Programming with C++”, PHI 2/E, 2006 A.K. Jagadev, A.M. Rath,and
S. Dehuri, “Object Oriented Programming with C++”, PHI 2/E, 2007.

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L	T	P	C
5	0	0	5

**SEMESTER II
PAPER VII**

TOTAL HOURS: 65

DESIGN AND ANALYSIS OF ALGORITHMS

SUBJECTCODE: P2CA02MT

UNIT – I:

Introduction -Algorithm - Specification - Performance Analysis -Divide and Conquer - general Method - Binary Search - Finding the Maximum & Minimum - Merge Sort - Quick Sort

UNIT – II:

The Greedy Method - General Method -Knapsack Problem - Tree vertex splitting -Dynamic Programming - General Method - Multistage Graphs - All Pairs Shortest paths - Single Source Shortest paths - The Traveling Sales Person Problem –Flow shop scheduling

UNIT – III:

Basic Traversal and Search Techniques - Binary Trees - Graphs - Connected Components and Spanning Trees - Bi-Connected Components

UNIT – IV:

Backtracking - General Method - 8 Queens Problem - Graph Coloring - Branch and Bound Method –0/1 Knapsack problem

UNIT – V:

NP-Hard and NP Complete Problem-Basic Concepts-Cooke’s theorem-NP Hard problem-Clique Decision problem-Job shop scheduling-Code Generation with common sub expressions-Approximation Algorithms - Introduction - Absolute Approximations – E-Approximations

TEXT BOOK:

1. Ellis Horowitz, SartajSahni and Sanguthevar Rajesekaran, “Computer Algorithms” , Galgotia Publications Ltd., 2/E, 2002

REFERENCES:

1. SaraBaase and Allen Van Gelde, “Computer Algorithms: Introductions to Design and Analysis” Pearson Education, 3/E, 2002
2. Aho, Hopcraft and Ullman, “The Design and Analysis of Computer Algorithm”, Pearson Education, 2/E,2001
3. Basu S.K, ”Design Methods and Analysis of Algorithm”, PHI 2/E, 2006

SEMESTER II

L	T	P	C
5	0	0	5

PAPER VIII**TOTAL HOURS: 65****COMPUTER GRAPHICS****SUBJECT CODE: P2CA03MT****UNIT I:**

Video Display Devices: - Raster Scan Systems – Input Devices- Hard Copy Devices- Graphics Software- Output Primitives- Attributes of Output Primitives.

UNIT II:

Two Dimensional Transformations- Clipping – Window – View Port Mapping

UNIT III:

User Dialogue – Input of Graphical Data- Input Functions- Input Device Parameters-Picture Constructions Techniques- Virtual Reality Environments.

UNIT IV:

Three Dimensional Concepts - 3D Transformations – 3D Viewing

UNIT V:

Visible Surface Detection: Back Face Detection – Depth Buffer Method- Scan Line Method – A Buffer Method- Properties of Light- Intuitive Color Concepts – RGB Color Models – Computer Animation

TEXT BOOK:

1. D.Hearn and M.P.Baker, “Computer Graphics”, PHI, 2/E, 1996

REFERENCES:

1. W.M.Neuma and R.F. Sproull, “Principle of Interactive Computer Graphics”, McGraw Hill, 2/E, 1979
2. Foley, Van Dan, Feiner, Hughes, “Computer Graphics”, Addison Wesley , 2/E, 2000
3. ISRD Group, “Computer Graphics”, TMG ,2/E, 2006

SEMESTER II

L	T	P	C
2	0	0	2

TOTAL HOURS: 26

HUMAN RIGHTS

SUBJECT CODE: P2HR01GS

UNIT I:

Definition of Human Rights – Nature Content Legitimacy and Priority – Theories on Human Rights – Historical Developments of Human Rights

UNIT II:

International Human Rights- Prescription and Enforcement up to World War II – Human Rights and the U.N.O – Universal Declaration of Human Rights- International Covenant on Civil and Political Rights- International Covenant on Economic Social And Cultural Rights and Optional Protocol.

UNIT III:

Human Rights Declarations – U.N. Human Rights Declarations – U.N. Human Commissioner

UNIT IV:

Amnesty International – Human Rights and Helsinki process-Regional Developments- European Human Rights System –African Human Rights System–International Human Rights in Domestic Courts

UNIT V:

Contemporary issues on Human Rights: Children Rights – Women Rights – Dalit's Right – Bonded Labor and Wages- Refugees – Capital Punishment. Fundamental Rights in the Indian Constitution – Directive Principles of State Policy- Fundamental Duties-National Human Rights commission

REFERENCES:

1. International Bill of Human Rights, Amnesty International Publication, 1998
2. Human Rights Questions and Answers, UNESCO - 1982
3. Maurice Cranston - What is Human Right?- Putnam Aeronautical Books-1973
4. Desai, A.R - Violation of Democratize Rights in India-1988

SEMESTER II

L	T	P	C
5	0	0	4

PAPER IX**TOTAL HOURS: 65****ACCOUNTING AND FINANCIAL MANAGEMENT****SUBJECTCODE: P2CA04MT****UNIT – I:**

Financial Accounting: Meaning and Scope of Accounting- Principles – Concepts- Conventions- Accounting Standards- Final Accounts- Trail Balance- Trading Account- Profit and Loss Account- Balance Sheet- Accounting Ratio Analysis – Funds Flow Analysis- Cash Flow Analysis

UNIT – II:

Accounting: Meaning – Objective- Elements of Cost – Cost Sheet – Marginal Costing and Cost Volume Profit Analysis – Break Even Analysis- Applications – Limitation Standard Costing and Variance Analysis – Material – Labor- Overhead- Sales – Profit – Variances

UNIT III:

Budgets and Budgeting Control : Budgets and Budgetary Control- Meaning – Types sales Budget- Production Budget- Cost of Production Budget- Flexible Budgeting Cash Budget- Master Budget- Zero Base Budgeting- Computerized Accounting.

UNIT IV:

Investment Decision and Cost of Capital: Objective and Functions of Financial Management – Risk-Return Relationship- Time Value of Money Concepts- Capital Budgeting- Methods of Appraisal- Cost of Capital Factors Affecting Cost of Capital – Computation for Each Source of Finance and Weighted Average Cost of Capital

UNIT V:

Financing Decision and Working Capital Management: Capital Structure- Factors Affecting Capital Structure- Dividend Policy- Types of Dividend Policy- Concepts of Working Capital- Working Capital Policies- Factors affecting Working Capital- Estimation of Working Capital Requirements.

TEXT BOOKS:

1. S.N.Maheswari, “Financial and Management Accounting”, SultanChand & Sons, 4/E,2003
2. M. Pandey, “Financial Management”, Vikas Publications, 4thReprint, 2002

REFERENCES:

1. S.P. Iyengar, “Cost and Management Accounting”, Sultan Chand & Co,1993
2. I.M. Pandey , “Elements of Management Accounting”, Vikas Publishing House ,1993

SEMESTER II

L	T	P	C
0	0	4	2

PRACTICAL III

TOTAL HOURS: 52

C++ AND ALGORITHMS - LAB

SUBJECTCODE: P2CA01MP

1. Classes and Objects.
2. Function Overloading.
3. Constructors.
4. Friend Function.
5. Inline Function.
6. Operator Overloading.
7. Conversion Function.
8. Inheritance.
9. Polymorphism.
10. Files.
11. Sorting Algorithms
 - a) Selection Sort.
 - b) Straight Insertion.
 - c) Heap sort.
 - d) Quick sort.
12. Searching
 - a) Binary search.
 - b) Linear search.

SEMESTER II

PRACTICAL IV

L	T	P	C
0	0	4	2

TOTAL HOURS: 52

COMPUTER GRAPHICS-LAB

SUBJECTCODE: P2CA02MP

1. Develop a Program for 2D Translation.
2. Develop a program for 2D Scaling.
3. Develop a Program for 2D Rotation.
4. Develop a Program for 3D Translation.
5. Develop a program for 3D Scaling.
6. Develop a Program for 3D Rotation.
7. Draw a Line using Line Drawing Algorithms.
8. Draw a Circle using Circle Drawing Algorithm.
9. Develop A Program Using Graphics Primitives.
10. Develop a Program for Line Clipping.
11. Develop a Program for Window to Viewport.

III SEMESTER

SEMESTER III

PAPER X

L	T	P	C
5	0	0	5

TOTAL HOURS: 65

ADVANCED OPERATING SYSTEM

SUBJECT CODE:P3CA11MT

UNIT -I:

Operating System: Introduction– types of operating system-operating system services - Process structure and PCB Microkernel's-Threads -Inter process communication -CPU scheduling approaches-Process synchronization-Semaphores.

UNIT -II:

Memory management: Paging-Segmentation-Virtual memory-Demand paging –Page replacement algorithms-Allocation algorithms.

Distributed Operating System: Issues - Communication Primitives – Remote procedure call – Logical clocks – Vector clocks – Distributed mutual exclusion – Non token based algorithms Token based algorithms

UNIT -III:

Distributed deadlock detection: Issues in deadlock detection and resolution Centralized and deadlock detection algorithms- Issues in load distributing – Load distributing algorithms – Performance comparison; Distributed File System design issues –Mechanisms for building DFS

UNIT- IV

Real Time and Mobile Operating Systems: Basic Model of Real Time Systems - Characteristics-Applications of Real Time Systems – Real Time Task Scheduling - Handling Resource Sharing - Mobile Operating Systems – Micro Kernel Design - Client Server Resource Access – Processes and Threads.

UNIT - V:

Linux and Unix system: Introduction Linux and Unix and file system, Shell programming-Shell programming basic, various types of shell, shell programming in bash, conditional and looping statement, shell variables, shell keywords, and use of grep in shell programming.

TEXT BOOK:

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, “Operating System Concepts”, John Wiley & Sons, 5/E, 2000
2. Mukesh Singhal, Niranjana G.Shivaratri, “Advanced Concepts in Operating Systems”, TMH 1/E, 1994
3. Yashvant P.Kanetkar, UNIX shell programming, BPB publications 1/E, 2002.

REFERENCES:

1. L. A. Dhotre, “Operating System” Technical Publications, Pune, 1/E, 2008
2. William Stallings, “Operating Systems Internals and Design Principles”, Pearson Education, 4/E, 2003.

**SEMESTER III
PAPER XI**

L	T	P	C
5	0	0	5

TOTAL HOURS: 65

ADVANCED DATABASE SYSTEMS
SUBJECT CODE:P3CA12MT

UNIT I INTRODUCTION TO DATABASE SYSTEM

Basic concepts and Definition – Data dictionary- Database – Database System – Database Administrator – File oriented System versus Database Systems – Database language. **Database System Architecture:** Introduction – Schema, Sub-schema and Instances – Structure, Components and Function of DBMS – Data models – Types of database systems.

UNIT II RELATIONAL MODEL AND DATABASE DESIGN

Relational Query Languages: Structured Query Language (SQL) – Query By Example (QBE). **Entity Relationship Model:** Basic E-Concepts – Conversion of E-R model into Relations – E-R Diagram Symbols. **Normalization:** Normal Forms – Boyce coded normal forms (BCNF) – Multi-Valued Dependencies and Fourth Normal Form (4NF) – Join Dependencies and Fifth Normal Form (5NF).

UNIT III TRANSACTION PROCESSING AND CONCURRENCY CONTROL

Transaction concepts – Concurrency control – Locking Methods – Timestamp Methods – Optimistic Methods. **Database Recovery System:** Database Recovery concepts – Types of database failures – Types of database Recovery – Recovery Techniques.

UNIT IV OBJECT - BASED DATABASES

Object Oriented Data Model - Concept of Object Oriented Database (OODB) – Object Oriented DBMS (OODBMS). **Object Relational Database:** ORDBMS Query language (SQL3) – ORDBMS Design.

UNIT V ADVANCE AND EMERGING DATABASE CONCEPTS

Parallel database systems: Architecture – Key Elements – Query Parallelism. **Distributed database System:** Distributed database – Architecture – DDBS Design – Distributed query processing. **Emerging Database Technologies:** Internet Databases – Digital Libraries – Multimedia Databases – Mobile Databases – Spatial Databases – Clustering based Disaster proof Databases.

TEXT BOOKS:

1. S K Singh, “Database Systems Concepts, Design and Applications”, Pearson Education, 1/E, 2009.
2. Nilesh Shah, “Database Systems using ORACLE”, Prentice Hall of India, 2/E, 2005.

REFERENCES:

1. Abraham Silberschatz, “Database Systems and Concepts”, Tata McGraw Hill, 6/E, 2010.

SEMESTER III

PAPER XII

L	T	P	C
4	0	0	3

TOTAL HOURS: 52

SOFTWARE ENGINEERING

SUBJECT CODE: P3CA23MT

UNIT-I:

Introduction - Evolving Role of Software - Changing Nature of Software – Software Myths; a Generic View of Process: Layered Technology - Process Models: Waterfall Model - Evolutionary Process Models.

UNIT-II:

Requirements Engineering: Tasks - Initiating the Requirements Engineering Process - Eliciting Requirements - Building the Analysis Model - Requirements Analysis - Data Modeling Concepts.

UNIT-III:

Data Engineering: Design Process and Design Quality - Design Concepts - The Design Model Creating an Architectural Design: Software Architecture - Data Design -Architectural Design - Mapping Data Flow into Software Architecture; Performing User Interface Design: Golden Rules.

UNIT-IV:

Testing Strategies: Strategic Approach to Software Testing- Test Strategies for Conventional and Object Oriented Software - Validation Testing - System Testing -Art of Debugging. Testing Tactics: Fundamentals - White Box- Basis Path - Control Structure - Black Box Testing Methods

UNIT-V:

Project Management: Management Spectrum - People - Product - Process - Project. Estimation: Project Planning Process - Resources - Software Project Estimation -Decomposition Techniques - Empirical Estimation Models. Project Scheduling: Project Scheduling - Scheduling. Quality Management: Quality Concepts - Software Quality Assurance - Formal Technical Reviews.

TEXT BOOK:

1. Roger S Pressman, “Software Engineering - A Practitioner’s Approach”, McGraw Hill International Edition, 6/E, 2005.

REFERENCES:

1. an Somerville, “Software Engineering”, Pearson Education, 7/E, 2006.
2. Mall Rajib, “Software Engineering”, PHI, 2/E, 2006.

SEMESTER III

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TOTAL HOURS: 52

ELECTIVE - I

(To choose either A or B)

(A)SOFT COMPUTING **SUBJECT CODE: P3CA04ET**

UNIT -I:

Introduction to soft computing and neural networks: Evolution of Computing –soft computing constituents AI computational intelligence. Adaptive networks: Architecture-back propagation feed forward networks – Extended back propagation feed forward networks. Supervised learning: Perceptions – Adaline – back propagation multilayer perceptions – Radial basic function networks.

UNIT -II:

Learning from Reinforcement: Failure is the surest path to success – The temporal Difference learning-Q-learning. Unsupervised learning Neural networks: Kohonen self – organizing networks – Hebbian learning – the Hopfield networks. Adaptive Resonance Architecture: Noise saturation – Noise saturation dilemma – Building blocks of Resonance.

UNIT -III:

Fuzzy sets and fuzzy logics: Operations of fuzzy sets – Fuzzy Arithmetic – Fuzzy relations – Fuzzy rules and fuzzy reasoning – fuzzy inference system.

UNIT -IV:

Fuzzy Logic: Classical logic an over view – multi-valued logics – Fuzzy prepositions – fuzzy quantifiers – Linguistic Hedges. Fuzzy Decision Making: Individual Decision making – Fuzzy ranking method – Fuzzy linear programming - Neuro fuzzy modeling – Adaptive Neuro fuzzy inference systems.

UNIT -V:

Coactive Neuro fuzzy modeling: Classification and regression trees – Data Clustering algorithm – Rule base architecture identification. Miscellaneous applications: Medicine – Economics – Fuzzy system & genetic algorithms – Fuzzy regression.

TEXT BOOKS:

1. Jhy – Shing Roger Jang, Cheun-Tsai Sun, Eiji Mizutani, “Neuro fuzzy and Soft Computing”, Prentice – Hall of India, 3/E, 2003
2. George J. Klir and Bo Yaun, “Fuzzy sets and Fuzzy Logics and theory and applications”, Prentice – Hall of India, 2/E, 1995
3. Santhiah Kumar, “Neural Networks – A Classroom Approach”, Tata McGraw Hill 2/E, 2004

REFERENCES:

1. James A. Freeman and David M. Skapura, “Neural Networks Algorithms, Applications and Programming Techniques”, Pearson education – 2/E, 2003
2. Limin Fu, “Neural networks in Computer Intelligence”, McGraw-Hill – 4/E, 1994.
3. Bart Kosko, “Neural Networks & Fuzzy System”, Prentice Hall of India 4/E, 1991.

SEMESTER III

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PAPER XII

TOTAL HOURS: 65

(B)DIGITAL IMAGE PROCESSING

SUBJECT CODE: P3CA05ET

UNIT-I:

Introduction: Digital Image Representation, Fundamental steps in Image processing, Elements of Digital Image processing systems. Digital Image Fundamentals: Elements of Visual Perception, Sampling and Quantization, Basic Relationships between Pixels.

UNIT-II:

Image Transformation and Enhancement: Image transforms and their properties-Fourier transform, Discrete Fourier transform, Fast Fourier transform, Walsh Transform, Hadamard Transform, Discrete Cosine Transform, Haar, Slant, Hotelling Transforms. Image Enhancement- Spatial Domain, Frequency Domain methods, Enhancement by point processing, Spatial Filtering.

UNIT-III:

Image Compression - Redundancy, fidelity Criteria, Image Compression models, Elements of Information Theory, Error-Free Compression, Loss Compression, Image file formats.

UNIT-IV:

Image Segmentation: Image Segmentation - Detection of Discontinuities, Edge linking and boundary detection, Thresholding, Region-Oriented Segmentation.

UNIT-V:

Image Representation: Image Representation and Description - Representation schemes, Boundary Descriptors, Regional descriptors, Morphology.

TEXT BOOK:

1. Rafael C.Gonzalez, Richard.E.Woods, "Digital Image Processing", PHI, 2/E, 1998

REFERENCES:

1. Anil K.Jain, "Fundamentals of Digital Image Processing", PHI, 2/E, 1995
2. B. Chanda and DuttaMajumdar, " Digital Image Processing and Analysis", PHI, 3/E,2000

SEMESTER III

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TOTAL HOURS: 52

ELECTIVE - II

(To choose either A or B)

(A)OBJECT ORIENTED ANALYSIS AND DESIGN

SUBJECT CODE: P3CA06ET

UNIT-I

System Development – Object Basis – Development Life cycle- Methodologies -Patterns – Frameworks-Unified Approach

UNIT-II

UML- Use-Case models-Object Analysis-Object relationships, Attributes and Methods

UNIT-III

Object Oriented Design Process - Design Axioms - Designing Classes Object storage and Object interoperability.

UNIT-IV

View Layer: Designing Interface Objects – User Interface Design as a creative process – View layer classes – Macro level process – Micro level process – View Layer Interface.

UNIT-V

Software Quality Assurance: Testing Strategies- impact of Object orientation on testing-Test cases – Test plans – Continuous testing- Debugging Principles-System usability – Measuring user satisfaction.

TEXT BOOK:

1. Ali Bahrami, “Object Oriented Systems Development”, McGraw Hill, 2/E, 2008.

REFERENCE:

1. Grady Booch, “Object Oriented Analysis and Design”, Pearson Education, 2/E, 2009

SEMESTER III

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TOTAL HOURS: 52

(B)COMPUTER NETWORKS **SUBJECT CODE: P3CA07ET**

UNIT: I

Introduction: Introduction to networks and communication media: uses – network h/w-network s/w-reference model- example networks-basic of data communication-transmission media-wireless transmission –telephone satellite communication.

UNIT II:

Data Link layer: design issues- error detection code-error correction methods-elementary data link protocols- protocol-sliding window protocol –verification methods-channel allocation-multiple access protocol- IEEE 802 standards

UNIT III:

Network layer: design issue- routing algorithms-congestion control algorithms-internetworking- network layer in the internet

UNIT IV:

Transportation layer: transport service – transport protocol-Internet transfer protocols UDP-TCP-performance

UNIT V:

Application layer: design issues-DNS - Email- WWW-Multimedia-other application-network security-basic cryptography-RSA

TEXT BOOK

1. Andrew Tanenbaum, “Computer Networks”, PHI, 3/E, 1996

REFERENCES:

1. William Stallings, “Cryptography and Network Security”, Prentice Hall, 3/E, 2003
2. Behrouz Forouzan, “Data communication and networking”, TMH, 2/E, 2006

SEMESTER III

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TOTAL HOURS: 52

PRACTICAL V **RDBMS (ORACLE) - LAB**

SUBJECT CODE:P3CA11MP

SQL

1. Simple Queries using DDL, DML and DCL.
2. SQL Aggregate Functions.
3. SET Operations.
4. Views.
5. Multiple Tables and Nested Queries.

PL/SQL

6. PL/SQL Block.
7. Function and Procedures.
8. Packages.
9. Triggers.
10. Cursors.

FORMS AND REPORTS

11. Develop a package for the payroll of a company.
12. Design and implementation of Library Information System.
13. Develop a package for a bank to maintain its customer details.
14. Develop a Student's Mark sheet processing package.

SEMESTER III

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TOTAL HOURS: 52

PRACTICAL VI

ADVANCED OPERATING SYSTEM LAB

SUBJECT CODE:P3CA12MP

1. Process Scheduling
2. Process Synchronization.
3. Page Replacement Algorithms
4. Simulation of Paging and Segmentations
5. Consumer Problem
6. Unix Shell Programming
 - a. Menu Creation.
 - b. Fibonacci Series
 - c. Sum of digits
 - d. Grep Command
 - e. Counting chars, Words, Lines
 - f. Palindrome
 - g. Prime number

IV SEMESTER

SEMESTER IV

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PAPER XIII

TOTAL HOURS: 65

PRINCIPLES OF COMPILER DESIGN

SUBJECT CODE: P4CA01MT

UNIT-I:

Lexical analysis: Regular expression-non deterministic automata Deterministic automata Equivalent to NFAs-minimizing the states of DFA-implementation of lexical analyzer.

UNIT-II:

Syntax analysis: Top down parsing concepts-recursive descent parsing -predictive parsers - non recursive predicate parsing - bottom-up parsing - handle pruning - shift reduce parsing-operator parsing - LR parsers-parser generators -YACC.

UNIT-III:

Intermediate code generation: Syntax directed definitions - construction of syntax trees - top down translation - bottom up evaluation of inherited attributed - recursive evaluators-assigning space at compiler construction time - type checking - overloading of functions and operators - polymorphic function.

UNIT -IV:

Storage organization: Storage organization-storage allocation strategies parameter passing- symbol tables- dynamic storage allocation-intermediate languages-representation of declarations- assignment statement- Boolean expression- back patching - procedure calls.

UNIT-V:

Code generation and Code optimization: Design of code generators –runtime storage management - basic blocks - flow graphs - register allocation and assignment - DAG representation of basic blocks-peephole optimization- code optimization- the principle sources of optimization -optimization of basic blocks- global data flow analysis - loop optimizations.

TEXT BOOK:

1. Alfred Aho, RaviSethi, JeffyD.Ullman, “Compilers - Principles, Techniques and Tools”, Pearson, 1/E, 1986.

REFERENCES:

1. Chattopadhyay Santhanu, “Compiler Design”, PHI, 2/E, 2006.
2. Holub Allen, “Compilers in C”, PHI, 2/E, 1997.

SEMESTER IV

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PAPER XIV

TOTAL HOURS: 65

ADVANCED JAVA PROGRAMMING **SUBJECT CODE: P4CA12MT**

UNIT I: INTRODUCTION TO ENTERPRISE JAVA

Distributive Systems - Multi-Tier Architecture of J2EE - Clients and Client Tier - Web Tier - EJB Tier - EIS Tier - J2EE best practices - Enterprise Applications Strategy - Session Management.

UNIT II: DATABASE PROGRAMMING IN JAVA

Overview of the JDBC Process - JDBC Concepts - JDBC Driver types - Database Connection - JDBC/ODBC Bridge - Statement Objects - The Connection Interface - Result Set - Interacting with the database - Transaction Processing.

UNIT III: REMOTE METHOD INVOCATION

Distributed Application Architecture - Client proxy and Server Proxy - Remote Interface and Passing Objects - RMI process - Defining and using Remote objects - Remote Object Activation - Object Serialization and RMI

UNIT IV: JAVA SERVLETS

Basics - Benefits of Servlets – Initialization - Deployment - Reading Client Data - Reading HTTP Request Headers - Cookies - Session Tracking - Database Connections. Java Server Pages (JSP) - Overview - JSP tags - Components of a JSP page - Expressions - Scriptlets - Directives - Declarations - Working with JSP - JSP and JDBC.

UNIT V: JQUERY AND AJAX

Introduction - Adding JQuery to Web Pages - JQuery Editor - JQuery Selectors and Elements - Animations and Events handling in JQuery. AJAX: Overview - AJAX and JQuery - Java ME - Java for Mobile Devices.

TEXT BOOKS:

1. Jim Keogh, "The Complete Reference J2EE", Tata McGraw-Hill, 2/E, 2010.
2. Jamie Jaworskie, "Java 2 Platform Unleashed", Tech media SAMS, 4/E, 2008.

REFERENCES:

1. Phil Kanna, "The Complete Reference JSP 2.0", Tata McGraw-Hill, 2/E, 2003.
2. David Sawyer McFarland, "JavaScript and JQuery - The missing manual", 2/E, 2011

SEMESTER IV

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PAPER XV**TOTAL HOURS: 65****RESOURCE MANAGEMENT TECHNIQUES****SUBJECT CODE: P4CA03MT****UNIT– I:**

Linear Programming Models : Mathematical Formulation –Graphical Solution of linear Programming models – Simplex Method -Artificial Variable Techniques .

UNIT - II:

Transportation and Assignment Models : - Methods for finding initial Basic feasible solution – Optimum solution-degeneracy- Hungarian Algorithm-Variants of the Assignment Problem.

UNIT- III:

Integer Programming Models: Formulation- Gomory’s IPP Method –Gomory’s mixed integer method.

UNIT - IV:

Scheduling by PERT and CPM : Network Construction-Critical Path Method – Project Evaluation and Review Technique.

UNIT- V:

Queuing Models : Characteristics of Queuing Models – Poisson Queues - (M/M/1) : (FIFO/ ∞ / ∞), (M/M/1) : (FIFO /N/ ∞) models.

TEXT BOOK:

1. Taha H.A, “Operation Research: An Introduction”, Pearson Education, 8/E, 2006.

REFERENCES:

1. S.P. Gupta, “ An Introduction to Operation Research”, Pearson Education, 8/E, 2006
2. R. Sivarethina mohan, “ An Introduction to Operation Research”, TMG, 1/E, 2006
3. P.K. Gupta, Gandhi Swaroop, Manmohan, “Problem in Operation Research”, Sultan and Chands, 4/E, 2004
4. P.R.Vittal and Malini , “An Introduction to Operation Research”, Pearson Education, 8/E, 2006

SEMESTER IV

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PAPER XVI

TOTAL HOURS: 65

C# AND .NET FRAMEWORK

SUBJECT CODE:P4CA14MT

UNIT I:

.NET Platform – Introduction to Microsoft .NET Framework – Benefits of .NET Framework – CTS – CLS – Assemblies – Framework Base classes – Languages in the .NET Framework – Your First c# application

UNIT II:

Overview of C# - Literals, variables and Data types – Operators and Expression – Decision Making and Branching – Looping- Methods – Arrays and Strings - Structures and Enumerations.

UNIT III:

Classes and Objects – Inheritance and Polymorphism – Interfaces and Multiple Inheritance – Managing Errors and Exceptions – Preprocessors – Working with C# IO files [Directories, Files and Streams]

UNIT IV:

Implementing ICloneable and IComparable Interfaces – Delegates and Events – Multithreading and Synchronization - Attributes – Reflection – Namespace – Properties – Indexers

UNIT V:

Introduction to Window Forms – Win forms – Message Box – Designing a Form – Adding C# controls to Windows Forms-working with Controls – Graphics Class – ActiveX Data Objects (ADO)

TEXT BOOKS:

1. B.RamaKrishnaRao, “Programming with C#”, PHI 1/E, 2007
2. E.Balagurusamy, “Programming in C#”, Tata McGraw Hill, 3/E, 2006
3. Herbert Schildt, “The Complete reference C#”, Tata McGraw Hill, 2/E, 2002

REFERENCE:

1. DevPrakash, “Understanding C#”, Cyber Tech Publications, 1/E, 2001

SEMESTER IV

L	T	P	C
4	0	0	3

TOTAL HOURS: 52

ELECTIVE - III

(To choose either A or B)

(A)E-COMMERCE

SUBJECT CODE: P4CA05ET

UNIT-I:

Electronic Commerce Environment and Opportunities: Background- Electronic Commerce Environment - Electronic Marketplace Technologies - Modes of Electronic Commerce: Overview - Electronic Data Interchange- Migration to open EDI-Electronic Commerce with WWW/Internet - Commerce Net Advocacy.

UNIT-II:

Approaches to Safe Electronic Commerce : Secure Transport Protocols - Secure Transactions - Secure Electronic Payment Protocol - Secure Electronic Transaction-Certificates for Authentication - Security on Web Servers & Enterprise Networks-Electronic Cash and Electronic Payment Schemes : Internet Monetary Payment and Security Requirements - Payment and Purchase Order Process - On-line E-Cash.

UNIT-III:

Internet/Intranet Security Issues and Solutions: Need for Computer Security-Specific Intruder Approaches- Security Strategies- Security Tools- Encryption -Enterprise Networking and Access to the Internet - Antivirus Programs - Security Teams.

UNIT-IV:

MasterCard/Visa Secure Electronic Transaction: Introduction - Business Requirements - Concepts- Payment Processing- E-mail and Secure E-mail Technologies for Electronic Commerce: Introduction- The means of Distribution- A Model for Message Handling - How Does E-mail Work ? - MIME: Multipurpose Internet Mail Extensions - MOSS: Message Object Security Services - Comparisons of Security Methods - MIME and Related Facilities for EDI over the Internet.

UNIT-V:

Internet & Website Establishment: Technologies for Web Servers- Internet Tools Relevant to Commerce - Internet Applications for Commerce - Internet Charges-Internet Access & Architecture - Searching Internet. Applications: EP - Web Based EP - Intellectual Property Issues in EP, Multimedia/Hypermedia Development.

TEXT BOOK:

1. Daniel Minoli & Emma Minoli, "Web Commerce Technology Handbook", Tata McGraw-Hill Publishing Company Ltd., 16th Reprint, 1999.

REFERENCES:

1. Ravi Kalakota and Andrew B. Whinston, "Frontiers of Electronic Commerce", Pearson Education Pvt. Ltd., 4/E, 2006.
2. Joseph P.T., "E-commerce - Indian Perspective", PHI, 2/E, 2006.

SEMESTER IV

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TOTAL HOURS: 52

(B) SOFTWARE TESTING

SUBJECT CODE:P4CA16ET

UNIT-I PRINCIPLES OF TESTING

Context of testing - The Incomplete Car - Dijkstra's Doctrine - A test in time - The cat and the saint - Test the tests first - The pesticide paradox - The convoy and the rags - The Policemen on the bridge - The ends of the pendulum - Men in black - Automation syndrome - Phase of software project - Quality, Quality Assurance and Quality Control - Testing, Verification and Validation -Process model to represent different phases - Life cycle models.

UNIT-II BLACK BOX AND WHITE BOX TESTING

White box testing - Challenges - Static testing - Structural testing - Black box testing.

UNIT-III INTEGRATION, SYSTEM AND ACCEPTANCE TESTING

Integration testing - Types - Phase of testing - Scenario testing - Defect bash - System and Acceptance testing: Overview - Functional vs. Non-Functional testing - Functional system testing - Non-functional testing-Acceptance testing.

UNIT-IV PERFORMANCE AND REGRESSION TESTING

Introduction - Factors Governing - Methodology for Performance testing - Tools and Process for Performance Testing - Regression Testing - Types of Regression testing - How to do Regression Testing?

UNIT-V INTERNATIONALIZATION AND ADHOC TESTING

Introduction to Internationalization - Primer on Internationalization - Test phases for Internationalization testing - Enabling testing - Locale testing - Internationalization Validation- Fake language testing - Language testing - Localization testing - Tools used for Internationalization - Challenges and Issues - Overview of Ad Hoc testing - Buddy, Pair, Exploratory, Iterative, Agile and Extreme Testing - Defect Seeding.

TEXT BOOK:

1. Srinivasan Desikan, Gopalaswamy Ramesh, "Software Testing: Principles and Practices", Pearson Publications, 1/E, 2006.

REFERENCES:

1. Renu Rajani, Pradeep Oak, "Software Testing- Effective Methods, Tools and Techniques", Tata McGraw Hill, 2/E, 2004.
2. Boris Beizer, "Software Testing Techniques", Dream Tech Press, 2/E, 2003.

SEMESTER IV

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TOTAL HOURS: 39

PRACTICAL VII

ADVANCED JAVA PROGRAMMING LAB

SUBJECT CODE:P4CA11MP

1. Writing Java programs by making use of class, interface, package, etc for the following
 - a. Different types of inheritance study
 - b. Uses of 'this' keyword
 - c. Polymorphism
 - d. Creation of user specific packages
 - e. User specific exception handling
2. Writing window based GUI applications using frames and applets such as Calculator application, Fahrenheit to Centigrade conversion etc
3. Application of threads
4. Reading and writing text files
5. Writing an RMI application to access a remote method
6. Writing a Servlets program with database connectivity for a web based application such as students result status.
7. Create a Personal Information System using Swing
8. Event Handling in Swing

SEMESTER IV

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TOTAL HOURS: 39

PRACTICAL VIII

C# AND .NET Lab

SUBJECT CODE:P4CA12MP

1. Bank Transaction using Class
2. Inheritance
3. Interface
4. Delegates and Events
5. Exception Handling
6. Develop Programs using window Form Controls
7. Develop Program using GDI
8. Dialog Box
9. Evaluation of Objective Type questions using files
10. Database application using ADO.NET

V SEMESTER

**SEMESTER V
PAPER XVII**

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TOTAL HOURS: 65

**CLOUD COMPUTING
SUBJECT CODE:P5CA11MT**

UNIT I: UNDERSTANDING CLOUD COMPUTING

Cloud Computing – History of Cloud Computing – Cloud Architecture – Cloud Storage – Why Cloud Computing Matters – Advantages of Cloud Computing – Disadvantages of Cloud Computing – Companies in the Cloud Today – Cloud Services.

UNIT II: DEVELOPING CLOUD SERVICES

Web-Based Application – Pros and Cons of Cloud Service Development – Types of Cloud Service Development – Software as a Service – Platform as a Service – Web Services – On-Demand Computing – Discovering Cloud Services Development Services and Tools – Amazon Ec2 – Google App Engine – IBM Clouds.

UNIT III: CLOUD COMPUTING FOR EVERYONE

Centralizing Email Communications – Collaborating on Schedules – Collaborating on To-Do Lists – Collaborating Contact Lists – Cloud Computing for the Community – Collaborating on Group Projects and Events – Cloud Computing for the Corporation.

UNIT IV: PROGRAMMING MODEL

Parallel and Distributed Programming Paradigms – Map Reduce, Twister and Iterative Map Reduce – Hadoop Library from Apache – Mapping Applications - Programming Support - Google App Engine, Amazon AWS - Cloud Software Environments -Eucalyptus, Open Nebula, Open Stack, Aneka, CloudSim.

UNIT V: SECURITY IN THE CLOUD

Security Overview - Cloud Security Challenges and Risks - Software-as-a-Service Security- Security Governance - Risk Management - Security Monitoring - Security Architecture Design - Data Security - Application Security - Virtual Machine Security - Identity Management and Access Control - Autonomic Security.

TEXT BOOK:

1. Michael Miller, “Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online”, Que Publishing, 1/E, August 2008.

REFERENCES:

1. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, “Distributed and Cloud Computing, From Parallel Processing to the Internet of Things”, Morgan Kaufmann Publishers, 1/E, 2012.
2. John W.Rittinghouse and James F.Ransome, “Cloud Computing: Implementation, Management, and Security”, CRC Press, 1/E, 2010.
3. Toby Velte, Anthony Velte, Robert Elsenpeter, “Cloud Computing, A Practical Approach”, TMH, 1/E, 2009.

SEMESTER V

PAPER XVIII

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TOTAL HOURS: 65

WAP & XML

SUBJECT CODE: P5CA02MT

UNIT I:

The Rise of mobile data: Market convergence Enabling convergence – Key services the
Mobile internet: Overview of the wireless application protocol: The origins of WAP – overview
Of the WAP architecture – components of the WAP standard – network infrastructure services
Supporting WAP clients – WAP architecture design principles – relationship to other standards

UNIT II:

The wireless markup language: overview – the WML documents model – WML Authoring – URL's
identity content – Markup basics - WML – basics – basics content – events,
Trash and bindings

UNIT III:

Variables — controls – miscellaneous markup – sending Information – application security – other data:
The Meta element – document type declarations –Error and browser limitations – content generation –
WML version negotiation.

UNIT IV:

Introduction to XML: Role of XML - XML and the Web-XML Language Basics-SOAP-
Web Services-Revolutions of XML-Service Oriented Architecture (SOA)

UNIT V:

XMLTechnology: XML–Namespaces-structuring with Schemas and DTD-presentation techniques-
transformation-XML Infrastructure

REFERENCES:

1. SandeepSinghal, Thomas Bridgram, LalithaSuryanarayana, Daniel Mauney,
JariAluinen, David Bevis, Jim Chan, Stefan Hild, “The WAP”, Pearson Education
2/E, 2003.

SEMESTER V

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PAPER XIX**TOTAL HOURS: 52****VB.NET & ASP.NET PROGRAMMING****SUBJECT CODE:P5CA13MT****UNIT-I**

Getting Started with Visual Basic.Net IDE – Visual basic language concepts – Control Structures and Loops-Arrays-Working with forms-Working with common tool box controls-Working with other controls of tool boxes.

UNIT-II

Working with menus - Dialog boxes-Sub procedures and functions-Exception handling-Multiple document interface (MDI)-Inbuilt Functions-String Manipulation.

UNIT-III

Object Oriented Programming-Creating Classes-Objects-Fields- File Handling-Using File Stream Class-File Modes-File Sharing-File Access Enumerations-Opening or Creating Files with File Stream Class-Reading and Writing text using Stream Reader and Stream Writer Classes.

UNIT-IV

Application and Page Frameworks-ASP.NET Server Controls and Client-Side Scripts- ASP.NET 2.0 Web Server Controls- Validation Server Controls-Working with Master Pages-Collections and Lists

UNIT-V

Data Binding in ASP.NET 2.0-Data Management with ADO.NET-Site Navigation-Debugging and Error Handling Techniques

TEXT BOOKS:

1. Jeffrey R. Shapiro, “Visual Basic .NET The Complete Reference”, McGraw–Hill/Osborne, 3/E, 2002.
2. Bill Evjen, Scott Hanselman, Farhan Muhammad, Srinivasa Sivakumar, Devin Rader, “Professional ASP.NET 2.0”, Wiley Publishing Inc, 2/E, 2005.

REFERENCES:

1. Paul Vick, “The Visual Basic .NET Programming Language”, Addison Wesley, 2/E, 2004.
2. Denise Gosnell, Matthew Reynolds, Bill Forgey, “Beginning Visual Basic .NET Database Programming”, Wrox Press Ltd., 2/E, 2001.
3. Alex Homer, Dave Sussman, “ASP.NET 2.0 Illustrated”, Addison Wesley Professional, 4/E, 2006.
4. Mridula Parihar etal, “ASP.NET Bible”, Hungry Minds Inc., 2/E, 2003.

**SEMESTER V
PAPER XX**

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TOTAL HOURS: 65

DATA MINING AND WAREHOUSING

SUBJECT CODE: P5CA04MT

UNIT - I:

Introduction: Definition of data mining - data mining vs. query tools - machine learning - steps in data mining process - overview of data mining techniques.

UNIT - II:

Data Warehousing: Definition - Multidimensional Data Model - Data Cube - Dimension Modeling - OLAP Operations - Warehouse Schema - Data Warehouse Architecture - Data Mart - Meta Data - Types of Meta Data - Data Warehouse Backend Process -Development Life Cycle.

UNIT - III:

Data Pre-Processing And Characterization :Data Cleaning - Data Integration and Transformation - Data Reduction - Discretization and Concept Hierarchy Generation - Primitives - Data Mining-Query Language - Generalization - Summarization - Analytical Characterization and Comparison - Association Rule - Mining Multi-Dimensional data from Transactional Database and Relational Database.

UNIT - IV:

Classification: Classification - Decision Tree Induction - Bayesian Classification - Prediction - Back Propagation - Cluster Analysis - Hierarchical Method - Density Based Method - Grid Based Method - Outlier Analysis.

UNIT - V:

Cluster analysis: Types of data - Clustering Methods - Partitioning methods - Model based clustering methods - outlier analysis. Advanced topics: Web Mining - Web Content Mining - Structure and Usage Mining - Spatial Mining - Time Series and Sequence Mining - Graph Mining Applications: Case studies in Data Mining applications.

TEXT BOOKS:

1. PaulrajPonnaiah, "Data Warehousing Fundamentals", Wiley Publishers, 2/E, 2001.
2. Jiawei Han, Micheline Kamber, "Data Mining: Concepts and Techniques", Morgan Kaufman Publishers, 4/E, 2006.

REFERENCES:

1. Usama M.Fayyad, Gregory Piatetsky Shapiro, Padhraí Smyth, Ramasamy Uthurusamy, "Advances in Knowledge Discover and Data Mining", M.I.T. Press, 3/E, 2007.
2. Ralph Kimball, Margy Ross, "The Data Warehouse Toolkit", John Wiley and Sons Inc. 2/E, 2002
3. Alex Berson, Stephen Smith, Kurt Thearling, "Building Data Mining Applications for CRM", Tata McGraw Hill, 12th Reprint, 2000.

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SEMESTER V

TOTAL HOURS: 65

ELECTIVE - IV

(To choose either A or B)

(A) EMBEDDED SYSTEMS

SUBJECT CODE: P5CA05ET

UNIT-I:

Introduction to an embedded systems design & RTOS: Introduction to Embedded system, Processor in the System, Microcontroller, Memory Devices, Embedded System Project Management, ESD and Co-design issues in System development Process, Design cycle in the development phase for an embedded system, Use of target system or its emulator and In-circuit emulator, Use of software tools for development of an ES; Inter-process Communication and Synchronization of Processes, Tasks and Threads, Problem of Sharing Data by Multiple Tasks.

UNIT - II:

Real Time Operating Systems: OS Services, I/O Subsystems, Interrupt Routines in RTOS Environment, RTOS Task Scheduling model, Interrupt Latency and Response times of the tasks- Overview of Microcontroller: Microcontroller and Embedded Processors, Overview of 8051 Microcontroller family: Architecture, basic assembly language programming concepts, The program Counter and ROM Spaces in the 8051, Data types, 8051 Flag Bits and PSW Register.

UNIT - III:

8051 Register Banks and Stack Instruction set, Loop and Jump Instructions, Call Instructions, Time delay generations and calculations. I/O port programming Addressing Modes, accessing memory using various addressing modes, Arithmetic instructions and programs, Logical instructions, BCD and ASCII application programs, Single-bit instruction programming, Reading input pins vs. port Latch, Programming of 8051 Timers, Counter Programming

UNIT - IV:

Communication with 8051: Basics of Communication, Overview of RS-232, I2C Bus, UART, USB, 8051 connections to RS-232, 8051 serial communication programming, 8051 interrupts, Programming of timer interrupts, Programming of External hardware interrupts, Programming of the serial communication interrupts, Interrupt priority in the 8051

UNIT-V:

Interfacing with 8051: Interfacing an LCD to the 8051, 8051 interfacing to ADC, Sensors, Interfacing a Stepper Motor, 8051 interfacing to the keyboard, Interfacing a DAC to the 8051, 8255 Interfacing with 8031/51, 8051/31 interfacing to external memory.

TEXTBOOKS:

1. RajKamal, "Embedded Systems", TMH, 1/E, 2004.
2. M.A. Mazidi and J. G. Mazidi, "The 8051 Microcontroller and Embedded Systems", PHI, 2/E, 2004

REFERENCES:

1. David E. Simon, "An Embedded Software Primer", Pearson Education, 2/E, 1999.
2. K.J. Ayala, "The 8051 Microcontroller", Penram International, 1/E, 1999

SEMESTER V

L	T	P	C
5	0	0	3

TOTAL HOURS: 65

(B) NETWORK SECURITY

SUBJECT CODE: P5CA06ET

UNIT I:

Security attacks - security services - a model for internetwork security -conventional encryption model - steganography - the data encryption standard.

UNIT II:

Principles of public key cryptosystems - the RSA algorithm - key management -Diffie-Hellman key exchange - prime and relatively prime numbers - Fermat's ad Euler's theorems - testing of primality - Euclid's algorithm - the Chinese remainder theorem.

UNIT III:

Authentication requirements - authentication functions - message authentication codes - hash functions - digital signatures - authentication protocols - digital signature standards.

UNIT IV:

Kerberos - pretty good privacy - S/MIME - IP security overview - IP security architecture - authentication header.

UNIT V:

Intruder - viruses and related threads - recommended reading - firewall design principles - trusted system.

TEXT BOOK:

2. William Stallings, "Cryptography and network security", PHI, 4/E, 2006.

REFERENCES:

1. Singh, Brijendra, "Network Security and Management", PHI, 3/E, 2007.
2. Charles.P.Pleege, "Security in Computing", PHI, 3/E, 1989.
3. Hans, "Information and Communication Security", Springer Verlag, 2/E, 1998.
4. Simonds, "Network Security", McGraw Hill, 1/E, 1998.
5. Derek Atkins, "Internet Security", Tec media, 2/E, 1998.
6. Kernel Texplan, "Communication Network Management", PHI, 2/E, 1992.

SEMESTER V

L	T	P	C
0	0	3	2

PRACTICAL IX

TOTAL HOURS: 39

VB.NET & ASP.NET PROGRAMMING LAB **SUBJECT CODE:P5CA11MP**

VB.NET PROGRAMS

1. Create a VB.NET Program for Font Application
2. Create a VB.NET Program for Notepad Application
3. Create a simple calculator using form fields. Have two fields for number entry & one field for the result. Allow the user to be able to use plus, minus, multiply and divide.
4. Create a VB.NET Program for Employee Details with necessary fields and Employee basic pay calculation.
5. Create a VB.NET Program for Students Information with necessary fields and students mark calculation.
6. Create a VB.NET Program for Adding data into a text file

ASP.NET PROGRAMS

1. Create a College Website with basic information about the courses, departments, fees structure etc.
2. Create a Web site for an Online Recruitment System.
3. Create a Web site for an Online Examination System.
4. Create a Web site for an Online Mobile phone shop.
5. Create a Web site for an Online Tax information System.
6. Create a Web site for an Online Voting System.

SEMESTER V

L	T	P	C
0	0	3	3

TOTAL HOURS: 39

PRACTICAL X

MINI PROJECT

SUBJECT CODE: P5CA02PV

Students are to take up sample project development activities with the guidelines given below:

Preparing a project - brief proposal including

- a. Problem Identification
- b. Developing a model for solving the problem
- c. A statement of system / process specifications proposed to be developed (Data Flow Diagram)
- d. List of possible solutions including alternatives and constraints
- e. Cost benefit analysis
- f. Time line activities

A report highlighting the design finalization [based on functional requirements & standards (if any)]

A presentation including the following

- g. Implementation phase (Hardware / Software / both)
- h. Testing & Validation of the developed system
- i. Learning in the project

Consolidated report preparation

VI SEMESTER

SEMESTER VI

L	T	P	C
0	0	30	20

TOTAL DAYS: 90 Days

PROJECT WORK WITH VIVA VOCE

SUBJECT CODE: P6CA01PV

The objective of the project is to enable the students to work in a project of latest topic / research area / industrial applications. Each project student shall have a guide who is a faculty member.

During this semester the students are expected to do literature survey, formulate the problem and form a methodology of arriving at the solution of the problem. Also during this semester, the students are expected to complete the project and submit a full-fledged report comprising of the complete system developed along with implementation and test results. The departmental committee shall examine the students for 50 marks and the evaluation is based on continuous internal assessment comprising of two reviews.

After two reviews internal 50 marks (is based on seminar (20 marks), demo (20 marks) and internal viva-voce (10 marks)) will be given by the guide with the consultation of the departmental committee. At end of the semester, a viva-voce examination will be conducted for 150 marks (75 marks for internal examiner and 75 marks for external examiner).

ADHIPARASAKTHI COLLEGE OF ARTS & SCIENCE,
(Autonomous)

Permanently Affiliated to Thiruvalluvar University, Vellore

Accredited by NAAC with B⁺⁺ Grade

Bachelor of Commerce

Under CBCS

(Effective from the Academic Year 2016-2018)

REGULATIONS

CBCS:

Choice –Based Credit System is a flexible system of learning. ‘Credit’ defines the quantum of contents / syllabi prescribed for a course and determine the number of hours of instruction required. The distinguished features of CBCS are the following:

It permits the students to:

- ❖ Learn at their own pace
- ❖ Choose electives from a wide range of elective courses offered by the departments of the colleges
- ❖ Undergo additional courses and acquire more than the required number of credits
- ❖ Adopt an inter – disciplinary approach in learning
- ❖ Make best use of the expertise of available faculty.

1. Eligibility for Admission:

Candidates seeking admission to the first year of the Degree of Bachelor of Commerce Course shall be required to have passed the Higher Secondary Examinations (Academic or Vocational Stream) conducted by the Government of Tamilnadu or an Examination accepted.

Provided that candidates for admission into the specific main subject of study shall also process such other qualifying conditions as may be prescribed by the University in the Regulations governing respective courses of study.

The Upper age limit for admission to B.Com Degree will be 21 (twenty one) years as on 1st July of the year of admission. For SC/ST/BC/MBC/DNC candidates and women candidates the age limit is relaxed by 3 years. For other communities, the Principals can relax up to three years based on merit. A relaxation of 5 years is permitted for Physically Handicapped as per G.O. Ms No.239, dated 03.09.1993.

2. Eligibility for the Award of Degree:

A candidate shall be eligible for the award of the Degree only if he/she has undergone the prescribed course of study in the College for a period of not less than three academic year and passed the examinations of all the Six Semesters prescribed earning 140 credits (in Parts I, II, III, IV and V)

3. Duration:

- a. Each academic year shall be divided into two semesters. The first academic year shall comprise the first and second Semesters, the second academic year the third semester and fourth semesters and the third academic year the fifth and Sixth semesters respectively.
- b. The odd semesters shall consist of the period from June to November of each year and the even semesters from December to April of each year.
There shall be not less than 90 working days for each semester.

4. Course of Study:

The main subject of the study for Bachelor Degree Course shall consist of the following

PART-I TAMIL

PART-II ENGLISH

PART-III CORE SUBJECTS

ALLIED SUBJECTS

ELECTIVE WITH THREE COURSES

PART – IV

1. (a) Those who have not studied Tamil up to XII std. and taken a Non- Tamil Language under Part-I shall take Tamil Comprising of two courses (Level will be at 6th Standard)
- (b) Those who have studied Tamil up to XII Std and taken a Non-Tamil Language under part-I shall take Advanced Tamil Comprising of two courses.
- (c) Others who do not come under a / b can choose non-major elective comprising of two courses.

2. SKILL BASED SUBJECTS (ELECTIVE):

Four courses are to be offered. Let the compulsory papers be accommodated in the second / third year of study for UG Courses.

3. ENVIRONMENTAL STUDIES

4. VALUE EDUCATION

5. SOFT SKILL

PART- V: EXTENSION ACTIVITIES

5. Extension Service (Part-V):

A Candidate shall be awarded a maximum of I credit for compulsory Extension Service. All the Students shall have to enroll for NSS / NCC / NSO (Sports and Games) Rotaract / Youth Red Cross or any other service organization in the college and duly certified by the Principal of the college before 31st March of the IV semester. If a student LACKS 40 hours of attendance in the First year, he / she shall have to compensate the same during the subsequent years. Students those who complete minimum attendance of 40 hours in One year will get Half Credit and those who complete the attendance of 80 or more hours in the two years will ONE CREDIT. Literacy and population Education Field Work shall be compulsory components in the above extension service activities.

The following assessment procedure will be followed for Internal Marks:

Continuous Internal Assessment (CIA) Test

S. No	Reg. No	Name	<u>Test I</u> Marks for 50	<u>Test II</u> Marks for 75	<u>Test III</u> Marks for 75	Marks for 200	Marks converted to 20	<u>Assignments/Seminars</u> [5]	Marks for 25	Total Rounded to Marks for 25

Test I : One hour duration for 50 marks (Two Units of the Syllabus)

Test II : Two hours duration for 75 marks (Four Units of the Syllabus)

Test III : Three hours model test for 75 marks (Total Syllabus)

Total marks **200 (Theory)**

Test marks to be converted to : 20 marks

Assignments / Seminars : 5 marks

Total **: 25 marks**

In the column rounded to 25, any fraction may be rounded to the next number.

6. Requirements for proceeding to Subsequent Semesters:

(i). Candidates shall register their name for the First Semester Examination after the admission in the U.G. Courses.

(ii) Candidates shall be permitted to proceed from the First Semester up to the Final Semester irrespective of their failure in any of the Semester examinations subject to the condition that the candidates should register for all the arrear subject of earlier semesters along the current (subsequent) Semester subjects.

(iii). Candidates shall be eligible to go to subsequent semester, only if they earn, sufficient attendance as prescribed there for by the Academic Council from time to time. provided in case of a candidate earning less than 65 % of attendance in any one of the Semester due to any extraordinary circumstances such as medical grounds, such candidates who shall produce Medical Certificate issued by the Authorized medical Attendant (AMA), duly certified by principal of the college, shall be permitted to proceed to the next semester and to complete the course of study. Such Candidates shall have to repeat the missed semester by rejoining after completion of Final Semester of the course, after paying the fee for the break of study as prescribed by the College from time to time.

7. Requirement to take the Semester Examinations.

a). A candidate will be permitted to take the Examination for any Semester, if

i). He / She secures not less than 75% of attendance out of the 90 instructional days during the semester. [In the case of married women students the minimum attendance requirement shall be 55% of the total instructional days].

ii). He / she earns a progress Certificate from the Head of the Institution of having satisfactorily completed the Course of Study prescribed in the subjects as required by the regulations, and

iii). His / her conduct has been satisfactory.

Provided that it shall be open to the Academic Council, or any authority delegated with such powers by the Academic Council to grant exemption to a candidate who has failed to earn 75% of the attendance prescribed for any valid reason(s) subject to the usual conditions.

b). A candidates who has secured attendance less than 75% but 65% and above shall be permitted to take the Examination on the recommendation of the Head of the Institution to condone the lack of attendance as well as on the payment of the prescribed fees to the College.

c] A candidate who has secured attendance less than 65% but 55% and above in every semester, as to compensate the shortage of attendance in the subsequent semester besides, earning the required percentage of attendance in that semester and take the examinations of both the semester papers together at the end of the later semester.

d] A candidate who has secured less than 55% of attendance in any semester will not be permitted to take the regular examinations. He/She has to re-do the course after the completion of the final semesters by rejoining the semester in which the attendance is less than 55%.

e] A candidate who has secured less than 65% of attendance in the final semester as to compensate his/her attendance shortage in a manner to be decided by the Head of the Department concerned after rejoining the course.

8. Passing Minimum:

A Candidate shall be declared to have passed the whole Examination, if he/she passes in all the papers and practical wherever prescribed / as per the scheme of examinations by earnings by earning 140 CREDIT in Parts – I, II, III, IV and V. He / She shall also fulfill the extension activities prescribed earning one Credit to qualify for the Degree.

In fixing the passing minimum marks, the following will be observed:

- (a). There shall be no Passing Minimum for Internal.
- (b) For External Examination, Passing Minimum shall be of 40 % (Forty percentages) of the maximum marks prescribed for the paper.
- (c) In the aggregate (External + Internal), the passing minimum shall be of 40 % for each paper.
- (d) Grading shall be based on overall marks obtained [Internal + External]

9. Grading System:

Once the marks of the CIA and end-semester examinations for each of the course are available, they will be added. The mark thus obtained will then be graded as per details given below

Marks	Grade Point	Letter Grade	Class
100	7.00	H	First Class with Distinction
90-99	6.00	O	First Class with Distinction
75-89	5.50	D	First Class with Distinction
60-74	4.75	A	First Class
50-59	4.00	B	Second Class
40-49	3.50	C	Third Class
Below 40	3.00	F	Fail

From the second semester onwards, the total performance within a semester and continuous performance starting from the first semester are indicated respectively by **Grade Point Average [GPA]** and **Cumulative Grade Point Average [CGPA]**. These two are calculated by the following formulae:

$$\text{GPA} = \frac{\sum_{i=1}^n C_i G_i}{\sum_{i=1}^n C_i}$$

Where ‘C_i’ is the Credit earned for the Course i in any semester; ‘G_i’ is the Grade point obtained by the student for the course i and ‘n’ is the number of courses passed in that semester.

CGPA = GPA of all the courses starting from the first semester to the current semester.

Note: The GPA and CGPA shall be calculated separately for the following three parts:

For purposes of declaring a candidate to have qualified for the Degree of Bachelor of Commerce in the First Class / Second Class / Third Class or First Class with Distinction, the marks and the Corresponding CGPA earned by the candidate in part III alone will be the criterion, provided he / She has secured the prescribed passing minimum in LCs and ELs.

Grade in Part IV & V Extension shall be shown separately and it shall not be taken into account for classification

10. Classification of successful candidates:

Part-I TAMIL

Successful candidates passing Examination for the Language and securing the marks (i) 60 percent and above and (ii) 50 percent and above but below 60 percent in the aggregate shall be declared to have passed the examination in the First and Second class, respectively. All other successful candidates shall declare to have passed the examination in the Third Class.

PART –II ENGLISH

Successful candidates passing examinations for English and securing the marks (I) 60 percent and above and (ii) 50 percent and above but below 60 percent in the aggregate shall be declared to have passed the examination in the First and Second class respectively. All other successful candidates shall be declared to have passed the examination in Third class

PART – III consisting of CORE SUBJECTS, ALLIED SUBJECTS, ELECTIVES

Successful candidates passing examination for Core courses together and securing the marks (i) 60 percent and above and (ii) 50 percent and above but below 60 percent in the aggregate of the marks prescribed for the Core Courses together shall be declared to have passed the examination in the First and Second Class, respectively. All other successful candidates shall be declared to have passed the examination in the Third Class.

PART – IV (Consisting of sub items 1 (a) (b) and (c), 2, 3, and 4 & 5) as furnished in the Regulation 4 part – IV supra.

PART - V EXTENSION ACTIVITIES

The only credit earned for Part V Extension activities of a Successful Candidate shall not be taken into consideration for Classification / Ranking / Distinction.

11. Ranking:

Candidates who pass all the examinations prescribed for the course in the first appearance itself alone are eligible for Ranking;

Provided in the case of Candidates who pass all the examinations prescribed for the course with a break in the First Appearance due to the reasons as furnished in the Regulations 7.[iii] supra are eligible for Classification / Distinction.,

The marks obtained in improvement examinations will not be taken into consideration for ranking.

12. The Medium of Instruction and Examinations:

The medium of instruction and Examinations for the papers under part I and II shall be in the language concerned. For Part III and Part IV the medium of instruction and examination shall be English

13. Improvement of marks in the subjects already passed.

Candidates who have passed in theory paper / papers are allowed to appear again for theory paper / papers only once in order to improve his/her marks, by paying the fee prescribed from time to time. Such candidates are allowed to improve within a maximum period of 10 semesters counting from his/her first semester of his/her admission. If candidate improves his marks, then his improved mark will be taken into consideration for the award of Classification and Distinction only. Such improved marks will not be counted for the award of Prize / Medals and Rank. If the Candidate does not show improvement in the marks, his previous marks will be taken into consideration.

14. Checklist for Inspection

A. Qualification for

UG - Teaching Faculty : as prescribed by the UGC and the University

B. Infrastructure Facilities

- i) Building: Number of classroom with specifications: 3 rooms measuring 20x”25”.
If the class strength is above 50 the space shall be increase by 10 sq.ft, per student.
Number of staff rooms: one measuring 20” x20
- ii). Furniture: One pair of table / chair per student.

PATTERN OF QUESTION PAPER

PART- A(50 Words)

To Answer 10 Questions	10 X 2 Marks	= 20 Marks

PART-B (200 Words)

To Answer 5 Questions (either Or Pattern)	5 X 5 Marks	= 25 Marks

PART-C (500 Words)

To Answer 3 Questions out of 5 questions	3X 10Marks	= 30 Marks

Total	= 75 Marks

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BACHELOR OF COMMERCE (UNDER CBCS PATTERN)

[With effect from 2016-2018]

The course of study and the Scheme of Examinations.

Year/ Sem	Part	Subject	Sub Code	Paper	Title of the Paper	Ins. Hrs/ Week	Credit	Exam Hrs	Maximum Marks		
									IA	Uni. Exam	Total
I Year/ I Sem	I	Language	U1LT01FL	I	Tamil - I	6	3	3	25	75	100
	II	English	U1LE01SL	I	English - I	6	3	3	25	75	100
	III	Core	U1CM01MT	I	Principles of Accountancy	5	4	3	25	75	100
			U1CM02MT	II	Business Communication	5	4	3	25	75	100
		Allied - I	U1EC01AT	I	Indian Economy - I	6	5	3	25	75	100
	IV		U1ES01GS	I	Environmental Science	2	2	3	25	75	100
I Year / II Sem	I	Language	U2LT01FL	II	Tamil - II	6	3	3	25	75	100
	II	English	U2LE01SL	II	English - II	6	3	3	25	75	100
	III	Core	U2CM01MT	III	Financial Accounting	5	4	3	25	75	100
			U2CM02MT	IV	Business Organization	5	4	3	25	75	100
		Allied	U2EC01AT	II	Indian Economy - II	6	5	3	25	75	100
	IV		U2VE01GS	II	Value Education	2	2	3	-	50	50

Year/ Sem	Part	Subject	Sub Code	Paper	Title of the Paper	Ins. Hrs/Week	Credit	Exam Hrs	Maximum Marks		
									IA	Sem Exam	Total
II Year/ III Sem	III	Core	U3CM01MT	V	Corporate Accounting	5	4	3	25	75	100
	III	Core	U3CM02MT	VI	Business law	5	4	3	25	75	100
	III	Core	U3CM03MT	VII	Modern Banking	5	3	3	25	75	100
		Core	U3CM04MT	VIII	Business Economics I	5	3	3	25	75	100
	III	Allied	U3CM05AT	III	Business Statistics and Operations Research I	5	5	3	25	75	100
	IV	Skill Based Subject I	U3CM06ST	I	Development of Small Business	3	3	3	25	75	100
		Non-Major Elective I	U3CM01NM	I	Elements of Accounting	2	2	3	25	75	100
II Year / IV Sem	III	Core	U4CM01MT	IX	Advanced Corporate Accounting	5	4	3	25	75	100
	III	Core	U4CM02MT	X	Company Law	5	4	3	25	75	100
	III	Core	U4CM03MT	XI	Banking Law and Practice	5	3	3	25	75	100
	III	Core	U4CM04MT	XII	Business Economics II	5	3	3	25	75	100
	III	Allied	U4CM05AT	IV	Business Statistics and Operations Research II	5	5	3	25	75	100
	IV	Skill Based Subject II	U4CM06ST	II	Industrial Organization	3	3	3	25	75	50
		Non-Major Elective II	U4CM01NM	II	General Commercial Knowledge	2	2	3	25	75	100

Year/ Sem	Part	Subject	Sub Code	Paper	Title of the Paper	Ins. Hrs/Week	Credit	Exam Hrs	Maximum Marks		
									IA	SC	Total
III Year/ V Sem	III	Core	U5CM01MT	XIII	Cost Accounting I	6	4	3	25	75	100
	III	Core	U5CM02MT	XIV	Practical Auditing	6	4	3	25	75	100
	III	Core	U5CM03MT	XV	Business Management	5	4	3	25	75	100
	III	Core	U5CM04MT	XVI	Management Accounting	5	4	3	25	75	100
		Elective I (to choose 1 out of 4)	U5CM05ET U5CM06ET U5CM07ET U5CM08ET	I	1. Income Tax Law & Practice - I 2. Personnel Management 3. Office Management 4. Industrial Law	5	5	3	25	75	100
	IV	Skill Based Subject	U5CM09ST	III	Merchant Banking	3	3	3	25	75	100
	TOTAL					30	24				
III Year / VI Sem	III	Core	U6CM01MT	XVII	Cost Accounting II	6	4	3	25	75	100
	III	Core	U6CM02MT	XVII	Financial Management	6	4	3	25	75	100
	III	Core	U6CM03MT	XIX	Entrepreneurial Development	5	4	3	25	75	100
		Elective II (to choose 1 out of 4)	U6CM04ET U6CM05ET U6CM06ET U6CM07ET	II	1. Income Tax Law & Practice - II 2. Marketing Management 3. Services Marketing 4. Computer Applications (Theory and Practice)	5	5	3	25	75	100
		Elective III (to choose 1 out of 4)	U6CM08ET U6CM09ET U6CM10ET U6CM11ET	III	1. Human Resource Management 2. Indirect taxes 3. Business Environment 4. Business Financial Services	5	5	3	25	75	100
	IV	Skill Based Subject	U6CM12ST	IV	Public Enterprises in India	3	3	3	25	75	100
	V	Extension Activities	U6CM13EA				1	-	-	-	50
	TOTAL					30	26				
	GRAND TOTAL CREDITS						140				

SEMESTER - I

L	T	P	C
5	0	0	4

Total Hours: 65

PRINCIPLES OF ACCOUNTANCY

SUBJECT CODE: U1CM01MT

UNIT-I

Need for Concepts and Conventions-Accounting Equation-Opening Entries, Close Entries, Adjustment Entries and Rectification Entries-Bank Reconciliation Statement

UNIT-II

Depreciation, Reserves and Provisions –Depreciation, Depletion and Amortization – Objectives of providing Depreciation – Causes of Depreciation – Methods of Recording Depreciation – Straight Line Method – Diminishing Balance method – Change in Method of Depreciation – Annuity method – Sinking fund method – Insurance policy method – Machine hour rate method – Depletion method-Revaluation method

UNIT-III

Insurance Claim – Loss of stock – average clause (simple problems)

UNIT-IV

Financial accounts – Distinction between Capital and Revenue Expenditure-Classification of Assets and Liabilities

UNIT-V

Single Entry system – objectives – Definition – salient features – Limitations of single entry system-Difference between single Entry and Double Entry – Ascertainment of profit – Methods – Net worth Method and Conversation Method – Difference between statement of Affairs and Balance sheet.

Reference Books:

1. M.C.Shukla and T.S.Grewal, Advanced Accounts [Vol.1] S.Chand & Co.
2. R.L. Gupta and V.K.Gupta, Financial Accounting, Sultan Chand & Sons
3. T.S.Reddy and A.Murthy, Financial Accounting, Margham Pub.

SEMESTER - I

L	T	P	C
5	0	0	4

Total Hours: 65

BUSINESS COMMUNICATION

SUBJECT CODE: U1CM02MT

UNIT-I

Features of Business Communication – Importance of effective Communication in Business – Classification of Communication – Characteristics [7cs] and Guidelines of Effective Business Communication

UNIT-II

Analysis of Business Letter – Basic Principles in Drafting – Appearance, Structure and Layout – Letter Styles

UNIT-III

Various types of Business Letter – letters of enquiry – offers, Quotations, Orders, Complaints and settlement, Circular letters, Status Enquiry – Collection Letters.

UNIT-IV

Letters of Application – Essential Qualities – Letters of Application with CV, Resumes – Application Answering an Advertisement – Solicited and Unsolicited Letters – Reference Letters.

UNIT-V

Business Report – Importance – Characteristics – Types – Reports by Individuals and Committees.

Reference books:

1. Business Communication by Ramesh and Pattanchetti, R Chand & Co.
2. Essentials of Business Communication – Rajendra Pal & J S Korlahall

SEMESTER - I

L	T	P	C
6	0	0	5

Total Hours: 78

INDIAN ECONOMY – I

SUBJECT CODE: U1EC01AT

UNIT- I

Meaning and Characteristics of underdevelopment – salient features of Indian Economy – factors responsible for development – development as distinct from growth – a comparison between Indian and other developing economies like China, Pakistan, Taiwan, Korea will give a better idea of development.

UNIT- II

Planning in India – Meaning, Process and Approaches. Five year plans – Objectives in general and targets and performance.

UNIT- III

Agricultural role in Indian Economy [Contribution to GNP, employment, etc.,] Problems of low productivity – Land Reforms – need and scope. The food problem and Green Revolution; Mechanization – desirability and feasibility

UNIT- IV

Agricultural Marketing – Regulated Markets – Warehousing – Role of Agricultural Prices commission [APC] – Procurement Policy – Buffer-Stock – Dual pricing – Role of Pricing. Agricultural Credit : Need and Sources.

UNIT- V

Industry – Importance – Role of Small Scale Industry – Some Large Scale Industries [Iron & Steel, Cotton, Textiles, Sugar, Jute, Petro-Chemicals, Tea, etc.,] Industrial Sickness – Causes and measures; industrial Policy Resolutions [of 1956, 1985 & 1991]

Reference Books

1. Ruddar Dutt and KPM Sundaram, Indian Economy, S. Chand & CO., New Delhi.
2. A.N. Agarwal, Indian Economy, New Age International Pvt Ltd, New Delhi.
3. S. Sankaran, Indian Economy, Margham Publications, Chennai.

SEMESTER - I

L	T	P	C
2	0	0	2

Total Hours: 26

ENVIRONMENTAL SCIENCE

SUBJECT CODE: U1ES01GS

UNIT-I

INTRODUCTION TO ENVIRONMENTAL SCIENCES: NATURAL RESOURCES: Natural Resources Environmental Sciences –Relevance-Significance- Public awareness –Forest Resources-Water resources-Mineral resources-Food resources- Conflicts over resource sharing-Exploitation-Land use pattern-Environmental impact-fertilizer-pesticide problems-case studies.

UNIT-II

ECOSYSTEM, BIODIVERSITY AND ITS CONSERVATION: Ecosystem- Concept- Structure and function-producers, consumers and decomposers- Food chain – Food web- Ecological pyramids-Energy flow- Forest, Grassland, desert and aquatic ecosystem.

Biodiversity-Definition-genetic, species and ecosystem. diversity-values and uses of biodiversity-biodiversity at global, National(India) and local levels- Hotspots, threats to biodiversity conservation of biodiversity-Insitu & Exsitu.

UNIT-III

ENVIRONMENTAL POLLUTION AND MANAGEMENT: Environmental pollution-Causes – Effects and control measures of Air, Water, Marine, soil, solid waste, Thermal, Nuclear pollution and Disaster Management-Floods, Earth quake, Cyclone and Land slides. Role of individuals in prevention of pollution case studies

UNIT-IV

SOCIAL ISSUES-HUMAN POPULATION:Urban issues- Energy – Water conservation- Environmental Ethics-Global warming-Resettlement and Rehabilitation issues-Environmental legislations –Environmental protection Act 1986-Air, Water, Wildlife and forest value Education –Environmental Health-HIV/AIDS –Role of IT in Environmental and Human Health-Women and Child welfare-public awareness-Case studies

UNIT-V

FIELD WORK:Visit to a local area / Local polluted site / local simple ecosystem –Report submission

Reference:

1. Kumarasamy, K., A.Alagappa moes and M.Vasanthy, 2004, Environmenta Studies.
2. Rajamannar , 2004 Environmental Studies,
3. Kalavathy, [Ed.]2004, Environmental Studies

SEMESTER - II

L	T	P	C
5	0	0	4

Total Hours: 65

FINANCIAL ACCOUNTING

SUBJECT CODE: U2CM01MT

UNIT- I

Branch Accounts- Objects of Branch Accounts – Types of Branches- Dependent Branch – Stock and Debtor System- Accounting System- Independent Branch [Foreign branch excluded] – Incorporation of Branch – Figures in the Head office Books [only simple problems]

UNIT- II

Departmental Accounts – Distinction between departments and branches – Allocation of common expenses – expenses which cannot be allocated – Inter Departmental Transfer at cost and at Selling Price [simple problems only]

UNIT- III

Hire purchase system- Accounting treatment – calculation of interest – Books of Hire Purchaser and Hire Vendor – Default and Repossession- Hire purchase Trading Accounting- Installment System – Distinguish- between Hire purchase and Installment purchase System- Accounting treatment- Books of buyer and seller [simple problems only]

UNIT- IV

Partnership Accounts – Profit and Loss Appropriation Account – Admission, Retirement and Death of Partners – Adjustments in the Profit Sharing Ratio – Adjustment for Revaluation of Assets and Liabilities – Treatment of Goodwill

UNIT -V

Partnership Accounts – Dissolution of Firm – Settlement of accounts – Accounting treatment for unrecorded Assets and Liabilities – Insolvency of a partner – Garner v/s Murray – Fixed and Fluctuating Capital – All Partners Insolvency [simple problems only]

Reference Book

1. M.C.Shukla and T.S.Grewal, S.Chand &Co.
2. R.L.Guptha and V.K.Guptha- AdvancedAccounts, Sultan Chand & Co.
3. T.S.Reddy and A.Murthy-Financial Accounting, Margham Pub.
4. S.P.Jain and K.L.Narang, Advanced Accountancy, Kalyan Pub.

SEMESTER - II

L	T	P	C
5	0	0	4

Total Hours: 65

BUSINESSS ORGANISATION

SUBJECT CODE: U2CM02MT

UNIT-I

Business: Meaning and Types – Profession – Meaning and importance of Business Organization. Social Responsibilities of Business – Business Ethics

UNIT-II

Forum of Business Organization –Sole Trader – Partnership –Joint Hindu Family-Joint Stock Companies –Co-Operative Societies- Public Utilities and Public Enterprises. Public Sector Vs Private Sector

UNIT-III

Location of Industries – Factors influencing location – Size of Industries – Optimum Firm- Advantages of Large Scale Operation –Limitations of Small Scale Operations – Industrial Estates – District Industries Centers (DIC's)

UNIT-IV

Stock Exchange – Functions – Types – Working – Regulations of Stock Exchange in India – Business Combination – causes – Types – Effects of Combination in India.

UNIT-V

Trade Association – chamber of Commerce – Functions – Objectives – Working in India.

Reference Books:

1. G D Balaji, G Prasad – Business Organization – Margam Publications
2. Y.K.Bhusan-Business Organization-Sultan Chand.
3. Prakash and Jagadesh- Business Organization & Management-
4. Reddy and Gushan- Principles of Business Organization & Management
5. R.N.Guptha- Business Organization & Management-S.Chand & Co.

SEMESTER - II

L	T	P	C
6	0	0	5

Total Hours: 78

INDIAN ECONOMY-II

SUBJECT CODE: U2EC01AT

UNIT- I

Industrial Finance – Need and sources of credit, development financial institution (IFCI, SFC, ICICI, IDBI, SIDBI, IIBI, EXIM Bank etc.) - Foreign capital – various forms (Foreign Public Vs Private and Loans Vs Investment etc) FDI and FII.

UNIT -II

Privatization and economic reforms; public vs, private sector – debate, new economic policy liberalization, privatization and globalization economic reforms phase –I (1985 -1990); & phase –II after (reforms pertain to the following policies fiscal, monetary pricing industrial, trade, public sector, external and foreign investment) common minimum program (CMP).

UNIT -III

Human resource and economic development; Unique demographic features in India (growth rate, density, sex wise and age – wise distribution, etc.,) new population policy (integration of economic and population planning). Unemployment and Poverty : - remedial measures and govt. schemes like IRDP, Micro finance, etc., Business process outsourcing (BPO) – the problems and benefits to India.

UNIT- IV

Labour economics : Trade unions – industrial relations – (industrial disputes) – Mechanization and labour problems – labour legislation – social security schemes – recent policy changes – contributory pension schemes, etc.,

UNIT -V

Foreign trade and balance of payments – position, problems and measures to improve, India in the global market. Functions of IMF, IBRD and WTO.

Reference Books

1. Ruddar Dutt and KPM Sundaram, Indian Economy, S. Chand & CO., New Delhi.
2. A.N. Agarwal, Indian Economy, New Age International Pvt Ltd, New Delhi.
3. S. Sankaran, Indian Economy, Margham Publications, Chennai.

SEMESTER - II

L	T	P	C
2	0	0	2

Total Hours: 26

VALUE EDUCATION

SUBJECT CODE: U2VE01GS

UNIT – I

Value education – Definition – relevance of present day – concept of human values- self introspection – self esteem.

UNIT – II

Family values – components, structure and responsibilities of family – neutralization of anger – Adjustability – Threats of family life – status of women in family and society – caring for needy and elderly – time allotment for sharing ideas and concerns.

UNIT – III

Ethical values – professional ethics – mass media ethics – advertising ethics – influence of ethics on family life – psychology of children and youth – leadership qualities – personality development.

UNIT –IV

Social values – faith, service and secularism – social sense and commitment – students and politics – social awareness, consumer awareness, consumer rights and responsibilities – Redressal mechanisms.

UNIT –V

Effect of international affairs on values of life/issue of globalization – modern warfare – Terrorism. Environmental issues – mutual respect of different cultures, religions and their beliefs.

Reference book:

1. T.Anchukandam and j.kuttainimathathil (ed) Grow Free Live Free, Krisitu Jyoti Publications, Bangalore(1995)
2. Mani Jacob[Ed] Resource Book for Value Education
3. Daniel and Selvamony- Value Education Today.

SEMESTER - III

L	T	P	C
5	0	0	4

Total Hours: 65

CORPORATE ACCOUNTING

SUBJECT CODE: U3CM01MT

UNIT – I

Issue of Shares – at Par, Premium and Discount – Pro-Rate Allotment – Forfeiture and Reissue of Shares

UNIT-II

Issue of Debentures – Redemption of Debenture with and without Provisions – Redemption of Preference Shares.

UNIT-III

Acquisition of Business – Profit Prior to Incorporation – Final Accounts (Managerial Remuneration Excluded)

UNIT-IV

Purchase Consideration – Methods – Amalgamation in the Nature of Merger and Purchase – Absorption – ASI4 – Alteration of Share Capital – Reduction of Share Capital (Scheme of Capital Reduction is Excluded)

UNIT-V

Liquidation Accounting – Order of Payments – Preferential Payments – Liquidators Final – Statement of Account – Remuneration – Statement of Affairs and Deficiency Accounts (Weightage of Marks, Problems - 80%, theory - 20%)

Reference: Books:

1. Shukla M.C.Grewal, T.S.Gupta S.C. – Advanced Accounts – S.Chand & Co. Ltd, New Delhi
2. Gupta R.L. & Radhaswamy M. – Sultan Chand & Sons, New Delhi
3. Jain & Narang – Advanced Accountancy – Kalyani Publishers
4. Iyengar S.P. – Advanced Accounting - Sultan Chand & Sons, New Delhi
5. Reddy T.S. & Murthy A. – Corporate Accounting – Margam Publications, Chennai
6. Dr.S.Ganesan, S.R.Kalavathy, Thirumalai Publications, Nagarkoil.

SEMESTER - III

L	T	P	C
5	0	0	4

Total Hours: 65

BUSINESS LAW

SUBJECT CODE: U3CM02MT

UNIT – I

Formation and Essential Elements of Contract – Types of Contract and Agreements – Rules as to offer, Acceptance and Consideration – Capacity to Contract – Lawful Object and Free Consent –

UNIT-II

Performance of Contract – Devolution of Joint Rights and Liabilities – Discharge of Contract – Breach of Contract and Remedies – Quasi Contracts

UNIT-III

Indemnity and Guarantee – Features and Distinctions – Extent of Surety's Liability – Rights and Discharge of Surety – Bailment and Pledge – Features – Difference – Rights and Duties of Bailor and Bailee – Law Relating to Lien and Finder of Lost Goods – Rights and Duties of Pawnor and Pawnee – Pledge by Non-Owner.

UNIT-IV

Contract of Agency – Definition and Meaning – Creation – Ratification and Requisites – Rights of Principal and Agent – Relation of Principal with Third Parties – Personal Liability of Agent – Termination of Agency – Irrevocable Agency.

UNIT-V

Sale of Goods Act 1930 – Definition of Sale – Sale Vs Agreement to Sell – Subject Matter – Express and Implied Conditions and Warranties – Caveat Emptor and Exceptions – Performance of Contract – Transfer of Property – Rights of an Unpaid Seller – Sale by Non – Owner – Auction Sale.

Reference: Books

:

1. Business Laws – N.D.Kapoor, Sultan Chand & Sons, New Delhi
2. Business Laws – M.C.Dhandapani, Sultan Chand & Sons, New Delhi
3. Mercantile Law – M.C.Shukla, S.Chand & Co., New Delhi
4. Business Laws – R.S.N.Pillai & Bagavathi, S.Chand & Co., New Delhi

SEMESTER - III

L	T	P	C
5	0	0	3

Total Hours: 65

MODERN BANKING

SUBJECT CODE: U3CM03MT

UNIT – I

Brief History of Banking – Unit Banking – Branch Banking – Structure of Indian Financial System – Mixed Banking – Functions and Importance of Commercial Banks – Credit Creation of Commercial Banks.

UNIT-II

State Bank of India – Organization – Function – Management – Regional Rural Banks (RRBS)

UNIT-III

Central Banking (Special Reference to India) – Functions – Instruments of Credit Control – Quantitative and Qualitative or Selective Credit Control.

UNIT-IV

Constituents of Well Developed Money Market – Importance of Developed Money Market – Indian Money Market – Capital Market in India.

UNIT-V

Development Banking – Industrial Finance Corporation of India (IFC) – Industrial Credit and Investment Corporation of India (ICICI) – Industrial Development Bank of India (IDBI) – Recent Trends – Debit card, Credit Card, ATM and e-banking.

Reference: Books:

1. K.P.M.Sundaram and E.N.Sundaram, Modern Banking, Sultan Chand & Sons
2. Shekhar & Shekhar, Banking and Financial System, Margham Publications, Chennai
3. B.Santhanam, Banking and Financial System, Margham Publications, Chennai -17.
4. Dr.V.Balu, Banking and Financial System, Sri Venkateswara Publications
5. Radhaswami and Vasudevan, A Text book of banking (Law, Practice and Theory of Banking).

SEMESTER - III

L	T	P	C
5	0	0	3

Total Hours: 65

BUSINESS ECONOMICS I

SUBJECT CODE: U3CM04MT

UNIT – I

Introduction to Business Economics - Objectives of Business Profit maximization - Social responsibility of Business.

UNIT-II

Demand analysis - Demand schedule - Demand curve - Different types of Elasticity of demand - Measurement - Importance of elasticity of demand.

UNIT-III

Utility analysis - Cardinal - Ordinal - The law of diminishing marginal utility - Equi-Marginal utility - Indifference curve - Break-even analysis - Profit theories and concepts.

UNIT-IV

Different types of Demand Forecasting.

UNIT-V

Production - Production function - The law of variable proportions - Economies of scale, Law of returns to scale.

Reference: Books:

1. Mankar: Business Economics, Macmilan Ltd.,
2. Varshney RL and Maheshwari KL - Managerial Economics
3. Yogesh Maheshwari - Managerial Economics - Prentice-Hall of India
4. Gupta GS - Managerial Economics
5. Jinghan M.L. - Micro Economics, Vrinda Publications (P) Ltd. (Theory)
6. Dean - Managerial economics - Prentice-Hall of India
7. Peterson - Managerial Economics - Prentice-Hall of India
8. Mote Paul Gupta - Managerial Economics – MGH
9. Mehta P.L. - Managerial Economics

SEMESTER - III

L	T	P	C
5	0	0	5

Total Hours: 65

BUSINESS STATISTICS AND OPERATION RESEARCH I

SUBJECT CODE: U3CM05AT

UNIT – I

Statistics - Definitions - Scope and Limitations - Collection of Data - Primary and Secondary Data - Questionnaire - Classification and Tabulation - Types of Sampling Methods, Simple Random, Systematic, Stratified and Cluster.

UNIT-II

Measure of Central Tendency - Mean - Median - Mode Harmonic Mean and Geometric Mean.

UNIT-III

Measure of Dispersion - Range - Quartile Deviation - Mean Deviation - Standard Deviation - Coefficient of Variation - Lorenz Curve. Measure of skewness - Karl Pearson's and Bowley's coefficient of skewness.

UNIT-IV

Statistical Quality Control - Control Charts - X,P,C,R - Charts - Acceptance sampling only.

UNIT-V

Linear Programming - Formation and Graphical Solution - Simplex Method.

Reference Books

1. J.K. Sharma - Business Statistics - Pearson Education.
2. B. Agarwal - Basic Statistics - Wiley Eastern.
3. R.S.N. Pillai & Bhagavathi - Statistics.
4. Dr. S.P. Gupta - Statistical Methods - Sultan Chand.
5. Hamdy & A. Tahe - Operation Research - Macmillan.
6. Dr. S.P. Gupta - Business Statistics & Operation Research - Sultan Chand.

SEMESTER - III

L	T	P	C
3	0	0	3

Total Hours: 39

DEVELOPMENT OF SMALL BUSINESS

SUBJECT CODE: U3CM06ST

UNIT – I

Meaning of Small Scale Enterprises – Objectives of Micro, Small and Medium Enterprises Act of 2006 (MSME) – Importance of MSMEs – Advantages – Problems – Measures of the Government to Develop Small Industries.

UNIT-II

Steps for Starting a Small Industry – Search for Business Idea, Sources of Ideas – Project Formulation and Design.

UNIT-III

Selection of Type of Organization – Sole Proprietorship, Partnership – Joint Stock Company – Factors Influencing the Choice of Organization.

UNIT-IV

Sources of Project Finance – Short Term, Medium Term and Long Term Finance – Role of Banks – Institutions Assisting Small Enterprises – District Industries Centres (DICs), Industrial Estates, SIDO, NSIC, SIDCO, SISIs and SIPCOT.

UNIT-V

Incentives and Subsidies – Meaning – Need and Problems – Schemes of Incentives for SSI Units – Taxation Benefits to SSIs.

Reference Books:

1. Y.K.Bhusan- Business organization – Sultan Chand, New Delhi
2. C.B.Gupta & N.P.Srinivasan – Entrepreneurship Development in India Sultan Chand
3. P.Saravanavel – $\frac{3}{4}$ Entrepreneurship Development ESS PEE KAY Pub, Chennai.

SEMESTER - III

L	T	P	C
2	0	0	2

Total Hours: 26

ELEMENTS OF ACCOUNTANCY

SUBJECT CODE: U3CM01NM

UNIT – I

Definition of Accountancy – Book Keeping – Accounting Concepts and Conventions – Double entry System – Accounting Rules – Journal Entries.

UNIT-II

Posting of Journal to Ledger – Balancing of Ledger Accounts – Trial Balance.

UNIT-III

Preparation of Three Columnar Cash Book – Contra Entry – Petty Cash Book – Imprest System

UNIT-IV

Classification of Errors – Rectification – Suspense Account (simple problems only)

UNIT-V

Final Accounts – Trading and Profit and Loss Account and Balance Sheet – Simple Adjustments – Closing Stock, Outstanding and Prepaid Expenses, Depreciation and Provision for Bad and Doubtful Debts.

Reference Books:

1. T.S.Reddy & Murthy – Financial Accounting, Margham Publications, Chennai
2. R.L.Gupta & V.K.Gupta – Financial Accounting, Sultan Chand & Sons, New Delhi.
3. S.P.Jain & K.L.Narang – Advanced Accountancy, Kalyani Publications, New Delhi
4. M.C.Shukla & T.S.Grewal – Advanced accounts, S.Chand & Co.Ltd., New Delhi
5. N.Vinayaga, P.L.Mani, K.L.Nagarajan – Principals of Accountancy S.Chand Co.LTd., New Delhi.

SEMESTER - IV

L	T	P	C
5	0	0	4

Total Hours: 65

ADVANCED CORPORATE ACCOUNTING

SUBJECT CODE: U4CM01MT

UNIT – I

Valuation of Goodwill – Need – Factors Effecting the Valuation – Methods – Average Profit, Super Profit, Annuity and Capitalization Methods, Valuation of Shares: Need – Factors Effecting the Valuation – Net Asset, Yield and Fair Value Methods

UNIT-II

Accounts of Holding Companies – Minority Interest – Cost of Control – Elimination of Common Transactions – Unrealized Profits – Revaluation of Assets and Liabilities – Bonus Shares – Consolidated Balance Sheet (Inter Company Investment Excluded)

UNIT-III

Bank Accounts : Rebate on Bills Discounted, Interest in Doubtful Debts, Preparation of Profit and Loss Account and Balance Sheet with Relevant Schedules (New Method) – Non-performing Assets (NPA)

UNIT-IV

Insurance Company Accounts: Life Insurance – Revenue Account, Valuation Balance Sheet and Balance Sheet (New Method). General Insurance Fire and Marine Revenue Account, Profit and Loss Appropriation Account and Balance Sheet (New Method)

UNIT-V

Inflation Accounting (Accounting for Price Level Changes) – Limitations of Historical Accounting – Current Purchasing Power Method – Current Cost Accounting Method – Hybrid Method – Preparation of Income Statement – Profit and Loss Account and Balance Sheet. (Weightage of Marks, Problems - 80%, Theory - 20%)

Reference Books:

1. Shukla M.C.Grewal, T.S.Gupta S.C – Advanced Accounts, S.Chand & Co. Ltd., New Delhi
2. Jain & Narang – Advanced Accountancy – Kalyani Publishers
3. Iyengar S.P.Advanced Accounting – Sultan Chand & Sons, New Delhi
4. Reddy T.S. & Murthy A. Corporate Accounting – Margham Publications, Chennai.

SEMESTER - IV

L	T	P	C
5	0	0	4

Total Hours: 65

COMPANY LAW

SUBJECT CODE: U4CM02MT

UNIT – I

Introduction – Meaning and Definition of a Company – Characteristics of a Company – Advantages – Limitations – Types of Companies – Distinction between a Private Company and a Public Company

UNIT-II

Formation of a Company – Promotion – Functions of a Promoter – Memorandum of Association – Meaning – Contents – Purpose – Articles of Association – Meaning – Contents – Distinction between Memorandum and Articles.

UNIT-III

Prospectus – Meaning – Requirements of a Prospectus – Conditions for a Prospectus – Objects of Issuing a Prospectus – Contents – Liability for Mis-Statement – Remedies for Mis-Statement – Statement in Lieu of Prospectus.

UNIT-IV

Members of a Company – Meaning and Definition – Who can become a Member? – Rights of the Members – Liabilities of the Members – Termination of Membership

UNIT-V

Directors of a Company – Definition – Who is eligible to become a Director? – Number of Directorships – Appointment of Directors – First Directors – Subsequent Directors – Vacation of Office – Removal of Directors – Positions of the Directors – Powers, Duties and Liabilities of Directors – Winding up of a Company – Meaning – Methods of Winding up – Powers and Consequences.

REFERENCE BOOK:

1. N.D.Kapoor – Company Law – S Chand
2. Kathiresan and Radha – Company law – Prasanna Publishers, Madras

SEMESTER - IV

L	T	P	C
5	0	0	3

Total Hours: 65

BANKING LAW AND PRACTICE

SUBJECT CODE: U4CM03MT

UNIT – I

Banker – Customer Relationship – Meaning of Banker and Customer – Customer – Old View – Duration Theory and Modern View – Relationship Between Banker and Customer – General Relationship – Debtor and Creditor – Special Relationship – Bailor and Bailee, Principal and Agent, Trustee and Beneficiary, Banker as Adviser – Rights of a Banker – Right of set off – Right of lien – Law of Limitation, Right of Appropriation – Obligations (Duty) – Duty to honor Cheques, Duty to Maintain Secrecy, Duty not to Close the Account of the Customer with Proper Notice – Opening of Bank Account – General Precaution to be taken by a Bank – Special Type of Banker's Customer – Minor, Club, Societies, Partnership, Joint Stock Companies, Joint Account – Closing of a Bank Account.

UNIT-II

Negotiable Instruments – Meaning – Characteristics – Types – Cheque, Promissory Note, Bills of Exchange – Differences between Promissory Note and Bills – Bill and Cheque – Cheque – Meaning – Features of a Cheque – Specimen of a Cheque – Material Alterations

UNIT-III

Crossing of Cheques – Meaning – Objects – Types – General, Special and Double Crossing – Its Significance – Parties Eligible to Cross. Endorsement – Meaning – Rules for Endorsement or Essentials of a Valid Endorsement – Kinds – Significance

UNIT-IV

Payment of Cheques – Paying Banker – Role of a Paying Banker – Duties of a Paying Banker – Precautions by the Paying Banker – Statutory Protection to the Paying Banker – Refusal of Payment of Cheques. Collection of Cheques – Collecting Banker – Meaning – Capacity of the Collecting Banker – Precautions to be taken by the Collecting Banker – Statutory given to the Collecting Banker – Negligence – Duties and Responsibilities of a Collecting Banker – Procedure for Collection

UNIT-V

Short term Banking Instruments - Meaning – Certificate of Deposits- Commercial Papers
– Mortgage, Pledge and Hypothecation of Certificate of Deposits

Reference Books:

1. K P M Sundharam and P NCTE Varshney – Banking Law and Practice – Sultan chand
2. Kandasami, Natarajan and Parameswaran – Banking Law and Practice – S Chand
3. B Santhanam – Banking Law and Practice – Margham Publications

SEMESTER - IV

L	T	P	C
5	0	0	3

Total Hours: 65

BUSINESS ECONOMICS II

SUBJECT CODE: U4CM04MT

UNIT-I

Cost and Revenue analysis - Different types of cost and their relations to each other - Average cost - Marginal cost etc. - Various types of revenue curves short term and long term - Diagrammatic representation.

UNIT-II

Market structure and pricing - Pricing under perfect competition - Pricing under monopoly - Pricing under monopolistic competition.

UNIT-III

Distribution - Theories of distribution - Theories of profits.

UNIT-IV

Government and Business - Industrial Policy - National Income Computation - Gross Domestic Products - National Income in India - Contribution.

UNIT-V

Fiscal Economics - Revenues and Public expenditure - Canon of Taxation - Fiscal policy of India.

Reference Books:

1. Mankar: Business Economics, Macmillan Ltd.,
2. Varshney RL and Maheshwari KL - Managerial Economics
3. Yogesh Maheshwari - Managerial Economics - Prentice-Hall of India
4. Gupta GS - Managerial Economics
5. Jingan M.L. - Micro Economics, Vrinda Publications (P) Ltd. (Theory)
6. Dean - Managerial economics - Prentice-Hall of India
7. Peterson - Managerial Economics - Prentice-Hall of India
8. Mote Paul Gupta - Managerial Economics – MGH

SEMESTER - IV

L	T	P	C
5	0	0	5

Total Hours: 65

BUSINESS STATISTICS AND OPERATION RESEARCH II

SUBJECT CODE: U4CM05AT

UNIT-I

Correlation - Definition - Karl Pearson's Coefficient of Correlation - Rank Correlation - Regression Equations.

UNIT-II

Index Number - Definition - Uses - Unweighted Index Number Simple Aggregate Price Index, Simple Average of Price Relatives Index - Weighted Index - Laspeyre's Paasche, Dorbish Bowley's - Marshall Edgeworth, Fisher Ideal Index - Time and Factor Reversal Test - Cost of Living Index.

UNIT-III

Time Series - Definition and Uses - Components - Semi average Moving Average - Method of Least Square - Seasonal Variation - Simple Average Method - Interpolation: Definition - Newton (Forward only) - Lagrange's - Binomial Expansion.

UNIT-IV

Probability - Addition and Multiplication Theorem - Permutation and Combination - Baye's Theorem.

UNIT-V

Transportation (IBFS) and Assignment problem.

Reference Books

1. J.J. Sharma - Business Statistics - Pearson Education.
2. B. Agarwal - Basic Statistics - Wiley Eastern.
3. R.S.N. Pillai & Bhagavathi - Statistics.
4. Dr. S.P. Gupta - Statistical Methods - Sultan Chand.
5. Hamady & A. Trade - Operation Research - Macmillan.
6. Dr. S. P. Gupta - Business Statistics and Operation research - Sultan Chand.

SEMESTER - IV

L	T	P	C
3	0	0	3

Total Hours: 39

INDUSTRIAL ORGANIZATION

SUBJECT CODE: U4CM06ST

UNIT-I

Principles of Industrial Revolution – Industrial Growth – Mass Production – Aggregation, Consolidation and Integration – Specialization, its Advantages and Disadvantages – Division of Labour, its Advantages and Disadvantages.

UNIT-II

Industrial Ownership – Sole Proprietorship, Partnership and Joint Stock Companies – Advantages and Disadvantages

UNIT-III

Plant Location – Layout – Types of Layouts $\frac{3}{4}$ - Plant Design – One Story and Multi-Story Plants – Building Design for Industrial Fire Prevention, Fireproof Buildings – Its Walls, Floors, Doors and Window – The Power Factor, Plant Communication Systems – Employee Facilities

UNIT-IV

Purchasing and Inventory Control – Purchasing Policies – Need for Inventory Control.

UNIT-V

Production Control – Need – Essential of Planning, Assembly, Scheduling and Dispatching – Time and Motion Study – Inspection and Quality Control – Reasons and Basis for Inspection - Methods of Inspection – Inspection of Purchase, Inspection during Manufacture.

Reference Books:

1. Principles of Industrial organization – Kimball & Kimball McGraw – Hill Book Company
2. Effective Industrial Management – Lundy, Eurasia Publishing House (Pvt.) Ltd., New Delhi
3. Industrial organization and management, L Bethel, Atwater, Smith and Stackman, McGraw – hill Book company

SEMESTER - IV

L	T	P	C
2	0	0	2

Total Hours: 26

GENERAL COMMERCIAL KNOWLEDGE

SUBJECT CODE: U4CM01NM

UNIT-I

Commerce, Trade, Industry – Meaning – Scope and Importance of Commerce – Economic Basis of Commerce

UNIT-II

Forms of Business Organizations – Sole Trade – Partnership Features – Merits and Demerits

UNIT-III

Joint Stock Company – Features – Memorandum and Articles – Contents – Prospects and Contents – Shares and Debentures – Types – Co-operatives – Features – Types – Advantages

UNIT-IV

Office Organization – What is an Office? Functions of Office – Office Accommodation and Environment – Office Layout – Office Manual

UNIT-V

Handling of Mail, Filing and Indexing – Inward / Outward Mail – Filing and Indexing – System, Essentials and Classification – Methods – Horizontal vs Vertical Filing – Centralized and Decentralized – Indexing

Reference Books:

1. Principles of Commerce and General Commercial Knowledge – K.L.Nagarajan, Vinayagam, Radhasamy and Vasudevan – S.Chand & Co., New Delhi
2. A text book of Commerce – J.C. Sinha & V.N.Mughali – R.Chand & Co., New Delhi
3. Commerce – Principles & Practice – P.N. Reddy & S.S.Gulshan – S. Chand & Co., New Delhi
4. Elements of Commerce & Business Methods – J.C. Bahl & E.R.Dhongde – New Book & Co., Mumbai

SEMESTER - V

L	T	P	C
6	0	0	4

Total Hours: 78

CORE PAPER - XIII COST ACCOUNTING I SUBJECT CODE: U5CM01MT

UNIT-I: NATURE AND SCOPE OF COST ACCOUNTING

Cost Accounting : Nature and Scope – Objectives, Advantages and Limitations – Financial Vs. Cost Accounting, Cost System : Types of Costing and Cost Classification – Cost Sheet and Tenders – Cost Unit – Cost Center and Profit Centre.

UNIT-II: MATERIAL PURCHASE AND CONTROL

Purchase Department and its Objectives – Purchase Procedure – Classification and Codification of Materials, Material Control : Levels of Stock and EOQ.

UNIT-III: METHODS OF PRICING OF MATERIAL ISSUES

Cost Price Methods : FIFO, LIFO, Average Price Methods : Simple and Weighter Average Price Methods, National Price Methods : Standards Price, and Market Price Methods

UNIT-IV: LABOUR COST CONTROL

Labour Turnover : Causes, Methods of Measurement and Reduction of Labour Turnover – Idle and Over Time – Remuneration and Incentives : Time and Piece Rate – Taylor's Merricks and Gantt's Task – Premium Bonus System – Halsey, Rowan and Emerson's Plans. Calculation of Earnings of Workers.

UNIT-V: OVERHEADS

Classification of Overhead Costs – Departmentalization of Overheads – Allocation Absorption and Apportionment of Overhead Costs – Primary and Secondary Distribution of Overheads – Computation of Machine Hour Rate and Labour Hour Rate. (Weightage of Marks, problems 80%, theory 20%)

TEXT BOOK:

1. T.S. Reddy & Hari Prasad Reddy – Cost Accounting – Marham Publications, Chennai

REFERENCE BOOKS:

1. S.P.Jain and Narang – Cost Accounting – Kalyani Publishers, New Delhi
2. S.N.Maheswarin – Principles of Cost Accounting – Sultan Chand & sons, New Delhi
3. Tulsian P.C. – Cost Accounting – Tata McGraw Hills
- 4.S.P.Iyengar – Cost Accounting – Sultan Chand & Sons, New Delhi

SEMESTER - V

L	T	P	C
6	0	0	4

Total Hours: 78

CORE PAPER - XIV PRACTICAL AUDITING SUBJECT CODE: U5CM02MT

UNIT-I : INTRODUCTION TO AUDITING

Meaning and Definition of Auditing – Nature and Scope of Auditing – Accountancy and Auditing, Auditing and Investigation – Objectives of Auditing – Limitations of Audit – Advantages of Audit – Classification of Audit

UNIT-II : AUDIT PROGRAMME & INTERNAL CHECK, CONTROL

Meaning and Definition of Audit Programme – Advantages and Disadvantages – Audit File, Audit Note Book, Audit Working Papers – Purposes and Importance of Working Papers – Internal Check – Meaning, Object of Internal Check – Features of Good Internal Check System – Auditors Duty in Regards to Internal Check System – Internal Check and Internal Audit

UNIT-III : VOUCHING OF BOOKS & RECORDS

Vouching – Meaning of Vouching – Importance – Objects – Vouching of Cash Transactions – Verification of Assets and Liabilities – Meaning of Verification – Objectives – Distinction between Vouching and Verification – Distinction between Valuation and Verification

UNIT-IV : POWERS & DUTIES OF AUDITORS

Company Auditors – Qualification and Disqualification of an Auditor – Appointment and Removal of an Auditor – Powers and Duties of Auditors – Liabilities of an Auditor

UNIT-V : IMPORTANCE OF AUDIT REPORT

Auditor's Report – Importance of Auditor's Report – Contents of Audit Report – Kinds of Reports – Qualified Report.

TEXT BOOK:

1.Premavathy – Practical Auditing, Margham Publication, Chennai.

REFERENCE BOOKS:

1. B.N. Tandon – Sultan Chand – A handbook of practical auditing
2. B.N. Tandon,
- 3.Sudharsanam, Sundharabahu – S Chand – Practical auditing

SEMESTER - V

L	T	P	C
5	0	0	4

Total Hours: 65

CORE PAPER - XV

BUSINESS MANAGEMENT

SUBJECT CODE: U5CM03MT

UNIT-I : CONCEPT OR INTRODUCTION OF MANAGEMENT

Concept of Management – Meaning and Definitions – Nature and Characteristics of Management – Management Vs Administration – Levels of Management – Importance of Management and Scope of Management - Principles

UNIT-II : PLANNING

Process of Management – Planning – Its Nature, Need Characteristics, Objectives and Importance of Planning – Types of Planning – Principles of Planning – Steps in Planning Process – Planning Premises – Forecasting – Decision Making

UNIT-III : ORGANIZING

Organizing – Principles of Organization – Staffing Functions and Importance of Staffing – Departmentation - Authority and Responsibility – Organization Charts and Manual – Job Analysis and Job Evaluation

UNIT-IV : DIRECTING

Directing : Principles of Delegation – Delegation Vs Decentralisation – Principles and Techniques of Directing – Span of Supervision – Fundamentals of Effective Supervision – Role of Communication

UNIT-V : LEADERSHIP

Leadership – Qualities of a Good Leader – Types of Leadership – Co-ordination and Control – Problems in Co-ordination – Steps Involved in Control Process

TEXT BOOK:

1.Principles of Management – J.Jayashankar, Margam Publications, Chennai.

REFERENCE BOOKS:

1. Business Management – Dr.C.B.Gupta – Sultan Chand & Sons
2. Management principles and Practices – Lallan Prasad & S.S.Gulshan & S.Chand & Co.
3. Principles of management – Koontz, Weihrich and Aryasri & Tata McGraw hill
4. Principles & Practice of Management – Dr.H.C. Das Gupta & Sahitya Bhawan Agra

SEMESTER - V

L	T	P	C
5	0	0	4

Total Hours: 65

CORE PAPER - XVI

MANAGEMENT ACCOUNTING

SUBJECT CODE: U5CM04MT

UNIT-I : INTRODUCTION TO MANAGEMENT ACCOUNTING

Management Accounting: Definition, objectives functions – Advantages and limitations – Financial Statement Analysis – Comparative and Common size statements – Trend Analysis

UNIT-II : RATIO ANALYSIS

Ratio Analysis : Definition – Significance and Limitations – Classification – Liquidity, Solvency, Turnover and Profitability ratios – Computation of Ratios from Financial Statements – Preparation of Financial Statement from Ratios

UNIT-III : FUND FLOW STATEMENT & CASH FLOW STATEMENT

Fund Flow and Cash Flow Analysis: Concept of Funds, Sources and Uses of Funds – Fund Flow Statement – Concept of Cash Flow – Cash Flow Statement as Per AS3

UNIT-IV : BUDGETARY CONTROL

Budget and Budgetary Control: Definition – Objectives – Essentials – Uses and Limitations – Preparation of Material Purchase, Production, Sales, Cash and Flexible Budget – Zero Base Budgeting

UNIT-V : CAPITAL BUDGETING

Capital Budgeting : Concepts – Nature – Advantages and Limitations – Ranking Investment Proposals – Pay Back Period, ARR, NPV, IRR and Present Value Index. (Weightage of Marks, Problems - 80%, theory - 20%)

TEXT BOOK:

1.T.S.Reddy & Hari Prasad Reddy – Management Accounting – Marham Publications, Chennai

REFERENCE BOOKS:

1. S.N.Maheswari – Management Accounting – Sultan Chand & Sons, New Delhi
2. Manmohan & Goyal – Management Accounting – Saithiya Bhavan, Agra
3. R.S.N.Pillai & Bhagavathi–Management Accountin –S.Chand & Co. Ltd., New Delhi

SEMESTER - V

L	T	P	C
5	0	0	5

Total Hours: 65

ELECTIVE PAPER – 1A INCOME TAX LAW & PRACTICE - I SUBJECT CODE: U5CM05ET

UNIT-I : INTRODUCTION TO TAXATION

Objectives of Taxation – Direct and Indirect Taxes – Definitions in Income Tax Act 1961 – Person, Assesses Income – Previous Year Vs Assessment Year - Residential Status – Incidence of Tax

UNIT-II : SALARY INCOME

Heads of Income – Salaries, Definition – features – perquisites – Pension – Leave encashment – Provident fund.

UNIT-III : ALLOWANCES & DEDUCTIONS

Allowances'-Profit in Lieu of Salary - Gross Salary - Computation of Salary – Deductions.

UNIT-IV : HOUSE PROPERTY INCOME

Income from House Property – Annual Value – Gross annual value – Net annual value – Self Occupied House – Let out House – Deemed to be let out House – Partly let out & Self Occupied – Deductions.

UNIT-V: BUSINESS OR PROFESSION INCOME

Profits and Gains of Business or Profession – Expressly Allowed and Disallowed Deductions .

Note: The proportion between theory oriented and problem oriented questions in the semester examination shall be 50:50

TEXT BOOK:

1.A.Murthy - Income Tax Law & Practice- Vijay Nichole Publications

REFERENCE BOOKS:

1. Dr. H.C.Mehrotra – Income Tax Law and Practice
2. Gaur and Narang – Income Tax Law and Practice
3. Dr.Bagavathi Prasad – Income Tax Law and Practice
4. Hariharan – Income Tax Law and Practice
5. Singhania - Income Tax Law and Practice

SEMESTER - V

L	T	P	C
5	0	0	5

Total Hours: 65

ELECTIVE PAPER – 1B PERSONNEL MANAGEMENT SUBJECT CODE: U5CM06ET

UNIT-I : SCOPE & NATURE OF PERSONNEL MANAGEMENT

Personnel Management – Definition – Significance – Scope – Functions – Qualities of a Good Personnel Manager

UNIT-II : MANPOWER PLANNING

Manpower Planning – Benefits – Problems and Limitations – Planning Job Requirements – Job Description and Job Evaluation – Skill Analysis

UNIT-III : MANPOWER REQUIREMENT

Manpower Requirement – Sources – Selection – Tests – Employee Orientation and Training – Training Needs and Objectives

UNIT-IV : MOTIVATION & MORALE

Labour Productivity – Motivation – (Theories Excluded) – Financial and Non-Financial Incentives – Morale – Absenteeism – Causes – Employee Turnover

UNIT-V : LEADERSHIP

Personnel Supervision – Leadership – Styles – Leadership Qualities

TEXT BOOK:

1. Personnel Management and Industrial Relation – P C Thirupathi – Sultan Chand & Sons

REFERENCE BOOKS:

1. Personnel Management – K K Ahuja – Kalyani publications
2. Personnel Management and Industrial Relation R S Davar – Vikas Publishing house

SEMESTER - V

L	T	P	C
5	0	0	5

Total Hours: 65

ELECTIVE PAPER – 1C OFFICE MANAGEMENT SUBJECT CODE: U5CM07ET

UNIT-I : OFFICE -INTRODUCTION

Modern Office – Functions – Growth of Office Work – Activities of Modern Office - Importance

UNIT-II : FUNCTIONS OF OFFICE MANAGEMENT

Functions of Office Management – Planning, Organizing, Directing, Motivating, Coordinating and Controlling – Elements of Office Management – Office Manager – Functions, Qualities and Drawbacks

UNIT-III : OFFICE LAYOUT

Office Accommodation and Layout – Location of Office – Layout and Merits – Open and Private Office – Merits and Demerits – Office Environment

UNIT-IV : OFFICE APPLIANCES

Office Appliances – Importance, Merits and Demerits – Types – Record Administration – Objects and Principles – Advantages of Records – Keeping – Filing – Objects – Essentials of Good Filing – Centralized Vs Decentralized Filing – Modern Methods and Classification – Indexing – Importance and Essentials – Methods and Merits

UNIT-V : REPORT WRITING

Report Writing – Types – Objectives – Model Reports

TEXT BOOK:

1. Office Management – R.S.N. Pillai and Bagavathi – S.Chand & Co., New Delhi

REFERENCE BOOKS:

1. Office Organization and Management – C.B.Gupta, Sultan Chand, New Delhi
2. Office Management – P.K.Ghosh – Sulthan Chand, New Delhi
3. Office Management – A.Kamaraj – Pallavan Pathippagam – Karamanikuppam

SEMESTER - V

L	T	P	C
5	0	0	5

Total Hours: 65

ELECTIVE PAPER – 1D INDUSTRIAL LAW SUBJECT CODE: U5CM08ET

UNIT-I : FACTORIES ACT 1948

Factories Act 1948 – Definition and Meaning – Health, Safety and Welfare – Hazardous Process – Working Hours for Adults – Holidays – Employment of Young Persons and Women – Annual Leave with Wages

UNIT-II : WORKMEN COMPENSATION ACT 1923

The Workmen's Compensation Act 1923 – Definition of Scope – Rules Regarding Compensation – Amount and Distribution of Compensation – Fatal Accident – Medical Examination – Insolvency of Employer – First Charge on Assets Transferred – Returns as to Compensation – Contracting Out - Penalties

UNIT-III : WAGES ACT 1936

The Payment of Wages Act 1936 – Definition – Rules for Payment of Wages – Deduction from Wages – Registers and Records – Inspection – Appeal – Penalty of Offence

UNIT-IV : INDUSTRIAL DISPUTE ACT 1947

Industrial Dispute Act 1947 – Objects and Definitions – Industrial Dispute Meaning – Reference of Disputes to Grievance – Settlement Authorities – Authorities under the Act – Conciliation and Adjudication Machinery – Procedure, Powers and Duties of Authorities – Strike, Lockout and Layoff - Retrenchment

UNIT-V : TRADE UNIONS ACT 1926

The Trade Unions Act 1926 – Definition and Registration – Rights and Privileges of Registered Trade Union – Amalgamation and Distribution of Trade Union – Regulation and Penalties

TEXT BOOK:

1.Elements of Mercantile Law – N.D.Kapoor – Sulthan Chand & Sons, New Delhi

REFERENCE BOOKS:

1. Legal Aspects of Business – Saravanavel and Sumathi, Kalyani Publishers, Delhi
2. Commercial and Industrial Law–M.V.Dhandepani –Sulthan Chand & Sons, New Delhi

SEMESTER - V

L	T	P	C
3	0	0	3

Total Hours: 39

SKILL BASED SUBJECT - III

MERCHANT BANKING

SUBJECT CODE: U5CM09ST

UNIT-I : MERCHANT BANKING - OVERVIEW

Merchant Banking – Definitions and Functions – Regulatory Framework – Registration of Merchant Bankers – Procedure Capital Adequacy Requirement – Lead Merchant Banker Appointment, Restrictions and Responsibilities

UNIT-II : PUBLIC ISSUE MANAGEMENT

Public Issue Management – Functions and Mechanism – Categories of Issue – Issue Manager – Category and Restrictions Activities Involved in Public issue Management – Marketing of New Issues – Methods – Pricing of Rights and Other Public Issues

UNIT-III : POST ISSUE MANAGEMENT

Post Issue Management – Allotment / Dispatch of Shares / Refunds – Basis of Allotment – Procedure – Listing Requirements of Stock Exchanges – Advantages – Listing Requirements of OTCEI

UNIT-IV : CAPITAL & MONEY MARKET INSTRUMENTS

Capital Market Instruments – Meaning and Types – Commercial Paper – Issue of Commercial Paper – Usance – Enomiation – Ceiling – Mode of Issue – Credit Syndication – For Long Term and Working Capital

UNIT-V : INVESTMENT DECISIONS / PORTPOLIO MANAGEMENT

Port Folio Management – Functions – Registration of Port-folio Managers – Obligation – Investment of Client Funds – Maintenance of Book and Accounts – Reports to be Furnished – Code of Conduct

TEXT BOOK:

1. Merchant Banking and financial services – Dr.S.Guruswamy – Vijay Nichole, Chennai

REFERENCE BOOKS:

1. A Manual of Merchant Banking – Dr. J.C.Verma – Bharath Law house, New Delhi
2. Merchant Banking – H.R. Machiraju – New Age International, New Delhi
3. Merchant Banking and Financial Services – Dr.V.Balu – Sri Venkateswara Publications, Chennai
4. A Treatise on Merchant Banking – Skylark Publications, New Delhi

SEMESTER - VI

L	T	P	C
6	0	0	4

Total Hours: 78

CORE PAPER - XVII COST ACCOUNTING II

SUBJECT CODE: U6CM01MT

UNIT-I : JOB, BATCH, CONTRACT COSTING

Job, Batch, Contract Costing: Job Costing – definition – Features – Procedure – WIP – Cost Accumulation, Batch Costing – EBQ, Contract Costing – Definition, Features, Work Certified and Uncertified – Incomplete Contract

UNIT-II : PROCESS COSTING

Process Costing : Definition – Features – Job Vs Process Costing – Process Account – Losses – By Products and Joint Products

UNIT-III : OPERATING COSTING

Operating Costing (Transport Costing): Cost Unit – Cost Classification – Operating Cost sheet – Reconciliation of Cost and Financial Account.

UNIT-IV : MARGINAL COSTING

Marginal Costing: Definition – Advantages and Limitation – Break Even Point – Margin of Safety – P/V Ratio – Key factor – Make or Buy Decision – Selection of Product Mix – Changes in Selling Price – Foreign Market Offer – Desired Level of Profit.

UNIT-V : STANDARD COSTING

Standard Costing: Definition – Features – Advantages – Limitation – Analysis of Variances – Material, Labour and Overhead – Sales Variances.
(Weightage of Marks, Problems - 80%, Theory - 20%)

TEXT BOOK:

1. T.S.Reddy & Hari Prasad Reddy – Cost Accounting – Marham Publications, Chennai

REFERENCE BOOKS:

1. S.P.Jain and Narang – Cost Accounting - Kalyani Publishers, New Delhi
2. S.N.Maheswarin – Principles of Cost Accounting – Sultan Chand & Sons, New Delhi
3. Tulsian P.C – Cost Accounting – Tata McGraw Hills
4. S.P.Iyengar – Cost Accounting – Sultan Chand & Sons, New Delhi

SEMESTER - VI

L	T	P	C
6	0	0	4

Total Hours: 78

CORE PAPER - XVIII

FINANCIAL MANAGEMENT

SUBJECT CODE: U6CM02MT

UNIT-I ; INTRODUCTION TO FINANCIAL MANAGEMENT

Financial Management – Meaning- Definition – Objectives – Significance- Risk Return trade off – Financial Management and other functional areas – Role of Finance manager.

UNIT-II : CAPITAL STRUCTURE DECISIONS

Goals of Finance Function – Financing Decisions – Financial Planning – Financial Forecasting – Capital Structure Decisions – Capitalization – Cost of Capital – Dividend Policy

UNIT-III : INVESTMENT DECISIONS

Investment Decisions – Estimation of Cash Flows – Evaluation of Alternative Investment Proposals like NPV, ARR, IRR Methods – Decision Making Under Risk and Uncertainty – Inflation and Investment Decisions

UNIT-IV : WORKING CAPITAL

Working Capital – Gross and Net Working Capital – Determinants of Working Capital – Sources of WC – Credit and Collection Policies.

UNIT-V : SECURITY ANALYSIS

Security Analysis and Portfolio Management Leverages

(Unit 4 and 5 include principles and problems. Question paper may be prepared in the ratio of 60 : 40)

TEXT BOOK:

1. Financial Management – T.S Reddy & Murthy , Margham publications.

REFERENCE BOOKS:

1. Financial Management – I.M.Panday
2. Financial Management – Dr. S.N.Maheswari
3. Financial Management – Prasanna Chndra
4. Financial Management – Subir kumar Banerjee

SEMESTER - VI

L	T	P	C
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Total Hours: 65

CORE PAPER - XIX

ENTREPRENEURIAL DEVELOPMENT

SUBJECT CODE: U6CM03MT

UNIT-I : INTRODUCTION TO ENTREPRENEUR

Meaning of Entrepreneur – Entrepreneur and Enterprise – Entrepreneur and Manager – Entrepreneur and Intrapreneur – Qualities (Traits) of a True Entrepreneur – Characteristics of Entrepreneur – Types of Entrepreneurs – Functions of an Entrepreneur – Roles of Entrepreneurs in the Economic Development

UNIT-II : PROJECT REPORT

Establishing an Enterprise – Project Identification – Selection of the Product – Project Formulation – A Assessment of Project Feasibility – Preparation of Project Report – Selection of Site (Location)

UNIT-III : TYPES OF ORGANIZATION

Selection of Types of Organization – Sole Proprietorship – Partnership Joint Stock Company – Factors Influencing the Choice of Organization – Sources of Project Finance – Sources of Long Term Finance – Sources of Short Term Finance

UNIT-IV : INCENTIVES AND SUBSIDIES

Incentives and Subsidies – Meaning of Incentives and Subsidies – Need and Problems – Incentives for Development of Backward Area – Incentives for SSI Units in Backward Areas – Taxation Benefits to SSI Units – Subsidies and Incentives in Tamil Nadu

UNIT-V : WOMEN ENTREPRENEURS

Women Entrepreneurs – Concept – Functions and Role – Problems of Women Entrepreneurs – Suggestions for Development of Women Entrepreneurs – Rural Entrepreneurship – Need – Problems – How to Develop Rural Entrepreneurship

TEXT BOOK:

1. Jayashree Suresh - Entrepreneurial Development, Margham publications.

Reference books:

1. C.B. Gupta – Entrepreneurship development in India – Sultan Chand
2. Jayashree Suresh – Entrepreneurial Development – Margham publications
3. P Sarvanavel – Entrepreneurial development – Ess Pee kay Pub. House

SEMESTER - VI

L	T	P	C
5	0	0	5

Total Hours: 65

ELECTIVE PAPER – 2A

INCOME TAX LAW & PRACTICE - II

SUBJECT CODE: U6CM04ET

UNIT-I : CAPITAL GAIN

Capital Assets – Short term Capital Assets – Long term Capital Assets – transfer-
Capital Gains – Short Term – Long Term – Deductions

UNIT-II : INCOME FROM OTHER SOURCES

Income from Other Sources – General and Specific Incomes- Set Off of Losses and Carry
Forward and Set Off of Losses – Clubbing of Incomes

UNIT-III : TOTAL INCOME DEDUCTIONS

Deductions allowed in computing total Income – Section 80C to 80U – Section 80G
Calculations.

UNIT-IV: ASSESSMENT OF INDIVIDUALS AND FIRM

Assessment of Individuals and Firm – Book Profit – Remuneration -Computation of Tax
Liability

UNIT-V : TAX AUTHORITIES

Income Tax Authorities – Powers and Duties – Procedure for Assessment – Kinds of
Returns and Kinds of Assessment

Note: The proportion between theory oriented and problem oriented questions in the
semester examination shall be 50:50

TEXT BOOK:

1.A.Murthy - Income Tax Law & Practice- Vijay Nichole Publications

REFERENCE BOOKS:

1. Dr. H.C.Mehrotra – Income Tax Law and Practice
2. Gaur and Narang – Income Tax Law and Practice
3. Dr.Bagavathi Prasad – Income Tax Law and Practice
4. Hariharan - Income Tax Law & Practice

SEMESTER - VI

L	T	P	C
5	0	0	5

Total Hours: 65

ELECTIVE PAPER – 2B MARKETING MANAGEMENT SUBJECT CODE: U6CM05ET

UNIT-I : SCOPE OF MARKETING

Marketing – Definition – Importance – Features of Marketing – Marketing Concepts – Marketing Approaches – Marketing Mix – Marketing Management – Functions – Marketing Information System.

UNIT-II : PRODUCT

Product – Features, Classification, Product Concepts, Product Mix, Product Policy, Product Planning – Idea Generation, Screening, Business Analysis, Product Development, Test Marketing and Commercialization – Product Life Cycle.

UNIT-III : PRICING

Pricing – Importance – Objectives – Pricing Policies, Strategies and Techniques – Pricing from the Point of View of Government

UNIT-IV : SALES PROMOTION

Sales Promotion Techniques and Methods – Advertising – Objectives, Benefits, Selection of Media, Advertising Copy and Ethics in Advertising.
Salesmanship – Objectives, Qualities and Types of Salesmen.

UNIT-V : CONSUMER BEHAVIOUR

Consumer Behaviour – Buying Motives – Consumerism – Consumer Rights, CRM – Marketing Segmentation – Targeting – Positioning – E Marketing

TEXT BOOK:

1. R.S.N.Pillai – Modern Marketing, S.Chand & Co. Ltd., New Delhi

REFERENCE BOOKS:

1. Rajan Nair – Marketing, Sultan Chand & Sons, New Delhi
2. Jha and Singh – Marketing Management, Himalaya
3. Philips Kotler – Marketing Management, Prentice Hall
4. Cundiff – Fundamentals of Marketing

SEMESTER - VI

ELECTIVE PAPER – 2C

SERVICES MARKETING

SUBJECT CODE: U6CM06ET

L	T	P	C
5	0	0	5

Total Hours: 65

UNIT-I : SCOPE OF SERVICE MARKETING

Concept of service – Meaning, definitions – Components and types – Service Vs goods – Service Marketing mix characteristics – Advertising – objectives – Advertising message and media selection – merits – personal selling – process - Advantages

UNIT-II : PHYSICAL EVIDENCE OF SERVICES

Physical evidence – Essential and peripheral evidence – Guidelines for physical evidence – Managing demand and supply Capacity constraints – demand patterns – Capacity planning and types – Managing capacity to match demand – Managing demand to match capacity

UNIT-III : PRICING OF SERVICES

Pricing in services – objectives – types of pricing – characteristics and factors affecting pricing decisions – customer relationship marketing – objectives and requisites – benefits

UNIT-IV : QUALITY OF SERVICE

Quality of service – five dimensions of quality – Gap analysis and causes for customer gap – key factors leading to Customer Gap – Provider Gaps

UNIT-V : MARKETING SERVICE

Marketing of Services by Insurance business – Banks – Education – Tourism - Transport

TEXT BOOK:

1. Services Marketing – Dr.L.Natarajan – Margahm Publications, Chennai

REFERENCE BOOKS:

1. Services Marketing – Vasanthi Venugopal & Raghu V.N. – Himalaya Publications,
2. Services Marketing – M.K.Rampal – S.L.Gupta – Galgotta Pub. House
3. Services Marketing – S.M.Jha – Himalaya Publications, New Delhi
- 4.Services Marketing – Dr.B.Baly – S.Chand & Co., New Delhi

SEMESTER - VI

L	T	P	C
5	0	0	5

Total Hours: 65

ELECTIVE PAPER – 2D COMPUTER APPLICATIONS (THEORY) SUBJECT CODE: U6CM07ET

UNIT-I : BASICS OF IT

Information Technology Basics – Information definition – Perquisites of Information – need for Information – Components of Information Technology – Role of Information Technology in Business

UNIT-II : MS WORD

Word Processing with MS Word – Starting MS Word - MS Word environment - Working with word documents – Working with text – working with tables – checking spelling and grammar – printing a document

UNIT-III : MS EXCEL

Spreadsheets and MS Excel – Starting MS Excel – MS Excel environment – working with Excel workbook – working with worksheet – Formulas and functions – Inserting charts – Printing in Excel

UNIT-IV : MS POWER POINT

Making presentation with MS Power Point – Starting MS Power Point – MS Power Point environment – Working with power point – working with different views – designing presentation – printing in power point

UNIT-V : E-COMMERCE

Electronic commerce – types – advantages and disadvantages – Electronic data interchange (EDI) – how EDI works – EDI benefits – EDI limitations

TEXT BOOK:

1. Basic Principles of Computer Applications - Saxena

SEMESTER - VI

L	T	P	C
5	0	0	5

Total Hours: 65

ELECTIVE PAPER – 3A HUMAN RESOURCE MANAGEMENT SUBJECT CODE: U6CM08ET

UNIT-I : INTRODUCTION TO HRM

Nature and scope of HRM – personnel Management and HRM – Functions of HRM – Functions of HR Manager – HRM as a profession – Indian perspective

UNIT-II : RECRUITMENT & SELECTION

Human Resource Planning – Recruitment – Selection – Methods of Selection – Use of Various tests – Interview techniques in selection - Placement

UNIT-III : TRAINING & DEVELOPMENT

Induction – Training methods – Techniques – Identification of training needs – Training and Development

UNIT-IV : THEORIES OF MOTIVATION

Job satisfaction – Motivation (Maslow's and Two Factor Theory only) – Performance Appraisal – Methods – Compensation – Incentives – Monetary and Non-Monetary

UNIT-V : TRANSFER & CAREER DEVELOPMENT

Transfer – Promotion and Termination of Services – Career Development - Monitoring

TEXT BOOK:

1. Jayasankar – Human Resource Management , Margahm Publications, Chennai

REFERENCE BOOKS:

1. Aswathappa – Human Resource and Personnel Management
2. Memoria CB – Personnel Management
3. Decenzo / Robbins – Human Resource Management
4. C B Gupta - Human Resource Management
5. L M Prasaad - Human Resource Management

SEMESTER - VI

L	T	P	C
5	0	0	5

Total Hours: 65

ELECTIVE PAPER – 3B

INDIRECT TAXES

SUBJECT CODE: U6CM09ET

UNIT-I : INTRODUCTION TO INDIRECT TAXES

Concept of Direct and Indirect Taxes – Salient Features, Objectives and Scope of Indirect Taxes, Merits and Demerits of Direct and Indirect Taxes

UNIT-II : NATURE & IMPORTANCE OF SERVICE TAX

Service Tax: Meaning and Elements – Persons liable to pay Service Tax – Taxable Service – Value of Taxable Service – Exempted Services – Different Services on which tax is payable – Consultancy – Services, Professional Services, Financial Services and Personal Services – Service Tax Procedure – Registration, records, payment and refund to tax – offences and penalties.

UNIT-III : CUSTOMS DUTIES

Principles governing levy of and exemption from customs duties – Classification and valuation of goods – customs authorities, Appointment of customs ports, Warehousing Stations – Importation and Exportation of goods, Baggage, Goods imported or exported by post and stores – Transportation and Warehousing drawback of customs duties paid

UNIT-IV : CENTRAL EXCISE DUTY 1944

Nature of Excise Duty, Levy and Collection of excise duties under the CST Act. Legal effects of notifications, Tariff advices, Trade notices – Manufacture and removal of excisable goods – Type of excise duty – Valuation of goods – Daily stock account – Revision of duty lost or destroyed goods – Clearance of goods – Clearance of samples – Registration and exemption from registration

UNIT-V : CENVAT

Dutiability in special cases, CENVAT measuring and features – CENVAT credit – Difference between CENVAT and MODAVAT – New CENVAT schemes – Valuation of goods – Distinction between MRP and wholesale price – Computation of Excise duty – Concession to small scale industry

TEXT BOOK:

1. T.S.Reddy– Indirect Taxes – Marham Publications, Chennai

REFERENCE BOOKS:

1. Indirect Taxes, Dr. H.C. Mehrotra, Prof. V.C. Agarwal, Sahitya Bawan Publications
2. Indirect Taxes, Dr. Sanjeev Kumar, Bharat Law house Pvt. Ltd., New Delhi

SEMESTER - IV

L	T	P	C
5	0	0	5

Total Hours: 65

ELECTIVE PAPER – 3C

BUSINESS ENVIRONMENT

SUBJECT CODE: U6CM10ET

UNIT-I : BUSINESS ENVIRONMENT - OVERVIEW

An Overview of Business Environment – Types – Internal and External, Micro and Macro – Environmental Analysis and Strategies Management – Techniques of Environmental Analysis – Steps and Approaches.

UNIT-II : ECONOMIC ENVIRONMENT

Economic Environment – Nature and Structure of Economy – Economic Policies and Conditions – Political and Government Environment – Government and Legal Environment.

UNIT-III : NATURAL AND TECHNOLOGICAL ENVIRONMENT

Natural and Technological Environment – Innovation – Technology and Competitive Advantage – Demographic Environment – Population Size, Falling Birth Rate and Changing Age Structure – Migration and Ethnic Aspect.

UNIT-IV : SOCIAL ENVIRONMENT

Social Environment – Social Responsibility of Business – Consumer Protection – Need for Consumer Protection – Consumer Bill of Rights – Corporate Governance.

UNIT-V : GLOBALISATION

Globalisation – Meaning and Dimensions – Features and Stages of Globalisation – Essential Conditions for Globalisation – Pros and Cons – Globalisation of Indian Business

TEXT BOOK:

1. Business Environment, Dr.S.Sankaran, Mangam Publication, Chennai

REFERENCE BOOKS:

1. Business Environment, Francis Cherunilam, Himalaya Publishing House, Delhi
2. Business Environment, K.Aswathappa, Himalaya Publishing House, Delhi
3. Business Environment, I/e Sheik Saleem, Pearson Education, Chennai - 2006
4. Business and Society, Keith Davis William, C.Frederik, McGraw Hill International Books Co., New Delhi

SEMESTER - VI

L	T	P	C
5	0	0	5

Total Hours: 65

ELECTIVE PAPER – 3D BUSINESS FINANCIAL SERVICES SUBJECT CODE: U6CM11ET

UNIT-I : INTRODUCTION TO FINANCIAL SERVICES

Financial services – meaning – Financial services and economic environment – legal and regulatory framework – financial institutions and other participants in the financial services sector – capital and money markets – Instruments – Government – Securities market – SWAP Analysis

UNIT-II : LEASING & HIREPURCHASE

Introduction to leasing – legal and tax aspects – lease evaluation – Merits and Demerits – Accounting and Reporting for Lease – lease funding – Types of lease – Lease agreement – Hire purchase Vs lease – Legal aspects of Hire purchase – rights and duties of hire vendor and hire purchaser

UNIT-III : FACTORING

Factoring – Types and feature of factoring agreement – Factoring Vs Bills discounting – Services of factor – Consumer Finance and credit card services - forfeiting

UNIT-IV : VENTURE CAPITAL

Venture capital – meaning and characteristics – criteria for assistance – schemes and guidelines – infrastructure financing – assessment of risk – legal aspects

UNIT-V ; SEBI & CREDIT RATING AGENCIES

Mutual funds – SEBI Guidelines – Features and types – Management structure and performance evaluation – Growth and recent trends – Investor services – Credit rating agencies – CRISIL, CARE, ICRA – Services – Criteria for rating - Symbols

TEXT BOOK:

1. Financial Services – B.Santhanam, Margham Publications, Chennai.

REFERENCE BOOKS:

1. Indian Financial System, M.Y.Khan, Tata McGraw Hill, 2001
2. Indian Financial System, H.R.Machiraju Vikas Publishing House, 1999
3. Management of Capital Markets, Financial Services and Institutions, B.S. Bhatia & G.S.Bhatre, Deep and Deep Publishers, 2000

SEMESTER - VI

L	T	P	C
3	0	0	3

Total Hours: 39

SKILL BASED SUBJECT - IV PUBLIC ENTERPRISES IN INDIA SUBJECT CODE: U6CM12ST

UNIT-I : EVOLUTION OF THE PUBLIC SECTOR

Evolution of the Public Sector in India – Forms of organization – Growth – Causes for the Expansion of Public Enterprises.

UNIT-II : ROLE OF PUBLIC SECTOR

Role of Public Sector in India – Employment – Capital Formation – Infrastructure Development – Export Promotion.

UNIT-III : PRICING POLICY

Pricing Policy in Public Enterprises – Features – Guidelines – On Pricing Policy.

UNIT-IV : PROBLEMS & REMEDIES OF PUBLIC SECTOR

Problems of the Public Sector – Remedial Measures – New Policy of the Government.

UNIT-V : PUBLIC ENTERPRISES

Public Enterprises under State and Central Government.

TEXT BOOK:

1. Dutt & Sundaram - Indian Economy, S Chand & Co., New Delhi

REFERENCE BOOKS:

1. Ramanadham VV - The Structure of Public Enterprises in India, Allied Publications, New Delhi
2. Gopal Das - The Public Sector in India, Asia Publishing House, New Delhi
3. Sankaran S - Indian Economy, Margham Publication, Chennai

Om Sakthi
ADHIPARASAKTHI COLLEGE OF ARTS & SCIENCE
(Autonomous)
Permanently Affiliated to Thiruvalluvar University, Vellore
Accredited by NAAC with B⁺⁺ Grade
MASTER OF COMMERCE
Under CBCS
(Effective from the Academic Year 2016-2018)
REGULATIONS

CBCS:

Choice –Based Credit System is a flexible system of learning. ‘Credit’ defines the quantum of contents / Syllabi prescribed for a course and determine the number of hours of instruction required. The distinguished features of CBCS are the following:

It permits the students to:

- ❖ Learn at their own pace
- ❖ Choose electives from a wide range of elective courses offered by the departments of the colleges
- ❖ Undergo additional courses and acquire more than the required number of credits
- ❖ Adopt an inter – disciplinary approach in learning
- ❖ Make best use of the expertise of available faculty

1. Eligibility for Admission:

A candidate who has passed the B.Com. B.Com. [Corporate Secretaryship], B.C.S., B.B.A., B.Com., [Bank Management], B.A [Co-op.], B.A., [Economics], B.A [Corporate Economics] and B.Sc., Mathematics or B.Sc., [Computer Science] or B.C.A. or B.Sc.,[ISM] with any two Core Papers offered at the B.Com level

2. Eligibility for the Award of Degree:

A candidate shall be eligible for the award of the Degree only if he/she has undergone the prescribed course of study in the College for a period of not less than two academic year and passed the examinations of all the Four Semesters prescribed earning 90/91 credits and fulfilled such conditions as have been prescribed therefore.

3. Duration of the Course:

The course duration shall be Two years consisting of Four semesters.

4. Examinations:

There shall be four semester examinations: first semester examination at the middle of the first academic year and the second semester examination at the end of the first academic year. Similarly, the third and fourth semester examinations shall be at the middle and the end of the second academic year, respectively.

The following assessment procedure will be followed for Internal Marks:

Continuous Internal Assessment [CIA] Test

S. No	Reg. No	Name	<u>Test I</u> Marks for 50	<u>Test II</u> Marks for 50	<u>Test III</u> Marks for 50	Marks of Best Two Tests 100	Marks converted to 20	<u>Assignment/; Seminars [5]</u>	Marks for 25

Test I : One hour duration for 50 marks (Two Units of the Syllabus)

Test II : Two hours duration for 50 marks (Four Units of the Syllabus)

Test III : Three hours model test for 50 marks (Total Syllabus)

Total marks 100

Theory

Test marks to be converted to : 20 marks

Assignments / Seminars : 5 marks

Total : 25 marks

5. Requirements for proceeding to Subsequent Semesters:

- a) Candidates shall register their name for the First Semester Examination after the admission in the P.G. Courses.
- b) Candidates shall be permitted to proceed from the First Semester up to Final Semester irrespective of their failure in any of the Semester Examination subject to the condition that the candidates should register for all the arrear subject of earlier semesters along the current [subject] Semester subjects.
- c) Candidates shall be eligible to go to subsequent semester, only if they earn sufficient attendance as prescribed therefore by the Academic council from time to time. Provided in case of a candidate earning less than 65% of attendance in any one of the Semesters due to any extraordinary circumstances such as medical grounds, such candidate who shall produce Medical Certificate issued by the Authorized Medical Attendant [AMA], duly certified by the Principal of the college shall be permitted to proceed to the next semester and to complete the course of study. Such candidates shall have to repeat the missed Semester by rejoining after completion of Final Semester of the course, after paying the fee for the break of study as prescribed by the College from time to time.

6. Passing Minimum:

A candidate shall be declared to have passed the whole examination, if he/she passes in all the papers wherever prescribed/as per the scheme of examinations by earning 90 CREDITS.

In fixing the passing minimum marks the following will be observed.

- a. There shall be no Passing Minimum for Internal
- b. For External Examinations, Passing Minimum shall be of 50% [Fifty Percentage] of the maximum marks prescribed for the paper.
- c. In the aggregate [External + Internal] the passing minimum shall be of 50% for each Paper/ Practical/Project and Viva-voce.
- d. Grading shall be based on overall marks obtained [Internal + External]

7. Classification of Successful Candidates:

Candidates who secured not less than 60% of aggregate marks [Internal + External] in the whole examination shall be declared to have passed the examination in the First Class.

All other successful candidates shall be declared to have passed in Second Class.

Candidates who obtain 75% of the marks in the aggregate [Internal + External] shall be deemed to have passed the examination in the First Class with Distinction, provided they pass all the examination [theory papers, practicals, Project and Viva-Voce] prescribed for the course in the First appearance.

8. Requirement to take the Semester Examinations.

a). A candidate will be permitted to take the college Examination for any Semester, if

- i). He / she secures not less than 75% of attendance out of the 90 instructional days during the semester. [In the case of married women students the minimum attendance requirement shall be 55% of the total instructional days].
- ii). He / she earns a progress Certificate from the Head of the Institution of having satisfactorily completed the Course of Study prescribed in the subjects as required by the regulations, and
- iii). His / her conduct has been satisfactory.

Provided that it shall be open to the Academic Council, or any authority delegated with such powers by the Academic Council to grant exemption to a candidate who has failed to earn 75% of the attendance prescribed for any valid reason(s) subject to the usual conditions.

b). A candidates who has secured attendance less than 75% but 65% and above shall be permitted to take the Examination on the recommendation of the Head of the Institution to condone the lack of attendance as well as on the payment of the prescribed fees to the University.

c). A candidate who has secured attendance less than 65% but 55% and above in any Semester, has to compensate the shortage of attendance in the subsequent Semester besides, earning the required percentage of attendance in that Semester and take the Examinations of both the Semester papers together a the end of the later Semester.

d). A candidates who has secured less than 55% of attendance in any Semester will not be permitted to take the regular Examinations. He / she has to re-do the Course after the completion of the final semesters by rejoining the Semester in which the attendance is less than 55%.

e). A candidate who has secured less than 65% of attendance in the final Semester has to compensate his / her attendance shortage in a manner to be decided by the Head of the Department concerned after rejoining the Course.

9. Grading System:

In addition to the above marking system grading system is also adopted as detailed below.

The marks (sum of IA and UE marks) in each course is assigned with a letter grade on a five points scale using the following letter grade points and a range of marks.

SEVEN POINT SCALE [As per UGC notification 1998]

Marks	Grade Point	Letter Grade	Class
95-100	7.00	H	First Class with Distinction
90-94	6.00	O	First Class with Distinction
75-89	5.50	D	First Class with Distinction
60-74	4.75	A	First Class
55-59	4.00	B	Second Class
50-54	3.50	C	Second Class
Below 50	3.00	F	Fail

From the second semester onwards, the total performance within a semester and continuous performance starting from the first semester are indicated respectively by Grade Point Average [GPA] and Cumulative Grade Point Average [CGPA].

These two are calculated by the following formulae:

$$\text{GPA} = \frac{\sum_{i=1}^n C_i G_i}{\sum_{i=1}^n C_i}$$

Where ‘C_i’ is the Credit earned for the Course i in any semester; ‘G_i’ is the Grade point obtained by the student for the course i and ‘n’ is the number of courses passed in that semester.

CGPA = GPA of all the courses starting from the first semester to the last semester.

10. Ranking:

Candidates who pass all the examinations prescribed for the course in the first appearance itself alone are eligible for Ranking.

Provided in the case of candidates who pass all the examinations prescribed for the course with a break in the First Appearance due to the reasons as furnished in the Regulations 7.[iii] supra are only eligible for Classification / Distinction.

11. The Medium of Instruction and Examinations:

The medium of instruction and Examinations shall be in English.

12. Appearance for Improvement:

Candidates who have passed in theory / papers are allowed to appear again for theory paper/ papers only once in order to improve his / her marks, by paying the fee prescribed from time to time. Such Candidates are allowed to improve within a maximum period of 10 Semester counting from his / her first semester of his / her admission. If candidate improves his marks, then his improved marks will be taken into consideration for the award of classification only. Such improved marks will not be counted for the award of prizes / Medals, Rank and Distinction. If the Candidate does not show improvement in the marks, his previous marks will be taken into consideration.

No candidate will be allowed to improve marks in the Mini Project, Viva-voce.

Question Paper Pattern:

Section A

5 X 6 = 30 Marks (Either or Choice)

Section B

3 X 15 = 45 Marks (Out of 5 Questions)

Total

75 Marks

MASTER OF COMMERCE (UNDER CBCS PATTERN)
[With effect from 2016-2018]

The course of study and the Scheme of Examinations.

Year/Sem	Sub.	Paper	Sub Code	Title of the Paper	Ins. Hrs/ Week	Credit	Exam Hrs	Maximum Marks		
								I A	Uni Exam	Total
I Yer/ I Sm	Core	I	P1CM01MT	Advanced Financial Management	6	4	3	25	75	100
	Core	II	P1CM02MT	Accounting for Managerial Decision	6	4	3	25	75	100
	Core	III	P1CM03MT	Global Marketing	6	4	3	25	75	100
	Core	IV	P1CM04MT	Advanced Business Statistics	6	4	3	25	75	100
	Elect ive I	I		(to choose 1 out of 3)	6	4	3	25	75	100
			P1CM05ET	1. Insurance and Risk Management						
			P1CM06ET	2. Managerial Economics						
			P1CM07ET	3. Computer Applications in Business						
I Yer/ II Sm	Core	V	P2CM01MT	Corporate Laws	6	4	3	25	75	100
	Core	VI	P2CM02MT	Human Resource Management	6	4	3	25	75	100
	Core	VII	P2CM03MT	Advanced Accounts	6	4	3	25	75	100
	Core	VIII	P2CM14MT	Quantitative Techniques for Business Decisions	6	4	3	25	75	100
	Elect ive II	II		(to choose 1 out of 3)	4	4	3	25	75	100
			P2CM05ET	1. E- Commerce						
			P2CM06ET	2. Industrial Relations						
			P2CM07ET	3. Bank Management						
			P2HR01GS	Human Rights	2	2	3	25	75	100

Year/ Sem	Sub.	Paper	Sub Code	Title of the Paper	Ins.Hrs/ Week	Credit	Exam Hrs	Maximum Marks		
								I A	Semester Exam	Total
II Year/ III Sem	Core	IX	P3CM01MT	Indirect Taxes	6	4	3	25	75	100
	Core	X	P3CM02MT	Organizational Behaviour	6	4	3	25	75	100
	Core	XI	P3CM03MT	Advanced Cost Accounting	6	4	3	25	75	100
	Core	XII	P3CM04MT	Research Methodology	4	4	3	25	75	100
	Elective III	III		(to choose 1out of 2)						
			P3CM05ET	Services Marketing	4	4	3	25	75	100
			P3CM06ET	Working Capital Management	4	4	3	25	75	100
	Elective IV	IV		(to choose 1out of 2)						
			P3CM07ET	Financial Services	4	4	3	25	75	100
			P3CM08ET	Computer and Office Management	4	4	3	25	75	100
II Year/ IV Sem	Core	XIII	P4CM01MT	Direct Taxes	6	5	3	25	75	100
	Core	XIV	P4CM02MT	Investment Management	6	5	3	25	75	100
	Core		P4CM01PV	Project/Dissertation * with viva voce	12	10		50	150	200
				(or)						
		XV	P4CM04MT	Project Development	6	5	3	25	75	100
		XVI	P4CM05MT	Marketing Research	6	5	3	25	75	100
	Elective V	V		(to choose 1out of 2)						
			P4CM03ET	Sales & Advertisement Management	6	4	3	25	75	100
			P4CM04ET	Business Environment and Policy	6	4	3	25	75	100
				TOTAL	120	90				2200

SEMESTER - I

L	T	P	C
6	0	0	4

Total Hours: 78

ADVANCED FINANCIAL MANAGEMENT

SUBJECT CODE: P1CM01MT

UNIT-I

Financial management-Functions-Goals of financial management-maximizations
Optimization- Risk-Return trade off.

UNIT-II

Management of funds – long term sources- shares and Debentures – convertible securities and term loans- working capital financing – sources and approaches – Bank credit – Basic principles and methods of assessment – other sources of short term finance – operating environment of working capital.

UNIT-III

Capital Structure planning: Concepts of cost of capital – cost of equity, Debt, retained earnings weighted average cost of capital – capital structure theories – Net income, net operating income MM and traditional theories- Leverage types and significance. Dividend policies and practices- Dividend policy factors affecting dividend decisions, dividend theories, Graham, Gordon, Walter and MM theories

UNIT –IV

Management of fixed Assets – Evaluation of capital investment decision: Pay back period- ARR- IRR-NPV-CAPM.

UNIT –V

Working Capital management – working Capital cycle – forecasting of working capital requirements – Factors influencing working capital – management of inventory, cash and account receivables- Payable management- credit and collection policies.

Note: The proportion between theory and problems shall be 40 and 60.

References:

1. I.M Pandey, Financial Management, Vikas publishing house private limited.
2. Prasanna Chandra, Financial management TaTa McGraw Hill publishing company Limited.
3. John H Hampton, Financial Decision Making, Prantice hall of India Ltd.
4. M Y Khan and P K Jain, Financial Management, TaTa McGraw Hill publishing company Limited.

SEMESTER - I

L	T	P	C
6	0	0	4

Total Hours: 78

ACCOUNTING FOR MANAGERIAL DECISIONS

SUBJECT CODE: P1CM02MT

UNIT-I

Accounting for Decision making – Scope and Importance –Decision Accounting Vs. Financial Accounting and Cost Accounting.

UNIT-II

Financial and Investment analysis – Analysis and Interpretation – Ratio Analysis –Leverage analysis – Budgeting and budgetary control– Functional Budgets–Master Budget – Flexile budgeting – Zero Base Budgeting.

UNIT-III

Understanding financial statements – Construction and analysis of profit and loss account and balance sheet – Construction and analysis of fund flow and cash flow statements

UNIT-IV

Cost Management – Absorption and Marginal Costing – Volume – Profit analysis – Applications and techniques.

UNIT-V

Financial decisions – Capital structure – dividend decisions
(only simple problems)

Note: 80 % of the total marks be allotted for problems and 20 % for theory

References:

1. Management Accounting - Man Mohan and Goyal.
2. Management Accounting – J. Batty
3. Management Accounting and Financial Control – S.N.Maheswari, Sultan Chand & Sons, New Delhi.

SEMESTER - I

L	T	P	C
6	0	0	4

Total Hours: 78

GLOBAL MARKETING

SUBJECT CODE: P1CM03MT

UNIT-I

Global Marketing – Scope – Importance - Global Vs National marketing – Global Marketing Environment – Social – Cultural – Political – Legal and Regulatory Environments.

UNIT-II

International Infrastructure for global trade promotion – GATT / WTO – Export Promotion Councils – Services Institutions – IIFT – NCTI – ECGC – EXIM Bank – Export Promotion council – Directorate General of shipping

UNIT-III

Global Customers – Segmentation, Targeting and Positioning – Global product positioning – Product life cycle in Global Marketing – Global Pricing – Objectives and Strategies.

UNIT-IV

Global Marketing Channels and Physical Distribution – Channel Objectives and Constraints – Channel Strategy – Physical Distribution and Logistics – Global Advertising and Branding – Global promotion.

UNIT-V

Global Trade Procedure – Export Documentation – Processing of Export Procedure – payment terms and conditions – Letter of Credit – Pre-shipment and Post Shipment finance- Forfeiting – Buyers Credit – Global Trade Assistance.

Reference:

1. Varshney, R.L. and Bhattacharya B: International Marketing Management, Sultan Chand and Sons, New Delhi.
2. Warnen J.Keegan, Global Marketing Management, Prantice Hall of India.
3. Cherian and Jacob, Export Marketing, Himalya Publishing House.
4. Duby V K , Export Marketing, Common Wealth Publishers.

SEMESTER - I

L	T	P	C
6	0	0	4

Total Hours: 78

ADVANCED BUSINESS STATISTICS

SUBJECT CODE: P1CM04MT

UNIT-I

Partial Correlation – Partial Correlation Co-efficient – Partial correlation in case of four variables – Multiple Correlation – Multiple regression.

UNIT-II

Theory of probability – probability rules – Bayes theorem – Probability distribution – Characteristics and application of Binomial, Poission and normal distribution

UNIT-III

Sampling – Sampling methods – sampling error and standard error – relationship between sample size and standard error: testing hypothesis – testing of means and proportions – large and small samples – Z test and t test

UNIT-IV

Chi square distribution – characteristics and application – test of goodness of fit and test of independence – Test of Homogeneity

UNIT-V

F distribution – testing equality of population variances – Analysis of variance – one way and two way Classification.

Note: The Proportion between theory and problems shall be 20:80

Reference:

1. S.P Gupta, Statistical methods, Sultan chand & Sons, 2000, New Delhi
2. D C Sancheti and V K Kapoor, Business Statistics, Sultan Chand and Pub.
3. J K Sharma, Business Statistics, Pearson Education.
4. Richard I Levin and David S Rubit, Statistics for Management, Pearson Edition.

SEMESTER - I

L	T	P	C
6	0	0	4

Total Hours: 78

INSURANCE AND RISK MANAGEMENT

SUBJECT CODE: P1CM05ET

UNIT-I

Risk and Risk Management Process – risk identification – evaluation – risk management techniques – Insurance and risk Management – Selecting and implementing risk management techniques

UNIT-II

Commercial risk management application – property – liability – commercial property insurance – different policies and contracts – business liability and risk management insurance – workers compensation and risk financing

UNIT-III

Personal risk management – applications- property and liability – risk management for auto owners – Lorry owners – Risk management for home owners.

UNIT-IV

Risk management applications – loss of health – medi-claim – retirement planning and annuities – employee benefits – financial and estate planning.

UNIT-V

Risk management nenvironment – insurance industry – functions and organization of insurers – Govt regulations of insurance sector – IRDA – privatization of insurance business in India – changes in insurance Act – insurance intermediaries – insurance products-pricing – claim valuation – foreign insurers in India

Reference:

1. Anand Gangly, Insurance Management, New Age International
2. Arthur C Williams, Risk Management and Insurance, McGraw Hill Co
3. Insurance Act – Latest Edition

SEMESTER - I

L	T	P	C
6	0	0	4

Total Hours: 78

MANAGERIAL ECONOMICS

SUBJECT CODE: P1CM06ET

UNIT-I

Definition and scope of the subject – fundamental concepts and methods – firms objectives and role of managerial Economist.

UNIT-II

Demand analysis and Forecasting for consumer goods and capital goods – use of business indicators – type of elasticity.

UNIT-III

Concept and resource allocation – Cost Analysis – Short run and long run cost functions – Production functions – cost price – Output relations.

UNIT-IV

Economics of size and capacity utilization – Input – Output analysis – Market structure – Pricing and output general equilibrium.

UNIT-V

Pricing objectives – pricing methods and approaches – price discrimination, product line pricing – profit planning and cost control – business cycle and policies.

Reference:

1. Peterson, Managerial Economics, Pearson education – New Delhi
2. Sampat Mokherjee, Business and Managerial Economics, New central Book Agency, New Delhi
3. Spancer M.H, Managerial Economics Text, Problems and short cases, Richard D.Inwin INC.
4. Dwivedi D.N, Managerial Economics, Vikas-New Delhi

SEMESTER - I

L	T	P	C
6	0	0	4

Total Hours: 78

COMPUTER APPLICATIONS IN BUSINESS

SUBJECT CODE: P1CM07ET

UNIT-I

COMPUTER HARDWARE:CPU, Input devices, Output devices, Communication devices, Storage devices types of Computer system

UNIT-II

INFORMATION TECHNOLOGY:Basic idea of LAN [Local Area Network], and WAN [Wide Area Network], E-mail: Internet Technologies, Access Devices, Concept of World Wide Web and Internet Browising.

UNIT-III

WORD PROCESSING: Introducing and working with MS Word in MS-Office – Word Basic Commands, Formatting – Text and documents, Sorting and Tables, Working with Graphics, Introduction to Mail merge.

UNIT-IV

SPREAD SHEET: Working with EXCEL – Formatting functions, chart features, working with graphics in EXCEL using worksheets as database in accounting, Marketing, finance and personnel areas.

UNIT-V

PRESENTATION WITH POWER POINT: Power Point, basics creating presentation of easy way: working with graphics in Power Point show time, sound effect and animation effects.

Reference:

1. Date .C.J, An introduction to Data base System, Addison Wesley, Massaachusetts
2. Dienes. Sheih.S, Micro soft office, Professional for Windows 95: Instant reference: BPB Publications, New Delhi.
3. O.Brain, Management information System, Tata McGrew Hill, Delhi.

SEMESTER - II

L	T	P	C
2	0	0	2

Total Hours: 26

HUMAN RIGHTS

SUBJECT CODE: P2HR01GS

UNIT-I

Definition of Human Rights-Nature, Content, Legitimacy and Priority-Theories on Human Rights-Historical Development of Human Rights

UNIT-II

International Human Rights-Prescription and Enforcement up to World War II – Human Rights and the UNO –Universal Declaration of Human Rights-International Covenant on Civil and Political Rights – International covenant on Economic and Cultural Rights and Optional Protocol

UNIT-III

Human Rights Declarations – U.N. Human Rights Declarations – U.N. Human Commissioner

UNIT-IV

Amnesty International – human Rights and Helsinki Process – Regional Developments – European Human Rights system – African Human Rights System – International Human Rights in Domestic courts

UNIT-V

Contemporary issues on Human Rights: Children's Rights-Women's Rights – Dalit's Rights – Bonded labour and Wages-Refugees– Capital punishment
Fundamental Rights in the Indian Constitution – Directive principles of State policy – Fundamental Duties – National Human Rights Commission

Reference:

1. Human Rights, Questions and Answer, UNESCO, 1982.
2. International Bill of Human Rights, Amnesty International Pub.
3. Desai, A R, Violation of Democratic Rights in India
4. Mausice Cranston, What is Human Right

SEMESTER - II

L	T	P	C
6	0	0	4

Total Hours: 78

CORPORATE LAWS

SUBJECT CODE: P2CM01MT

UNIT-I

CORPORATE LAWS: Importance – objectives. Doctrine of indoor Management, Liability of Misstatement – Mergers and Acquisitions

UNIT-II

INFORMATION TECHNOLOGY ACT: Intellectual Property Rights – Patents Act – Foreign Exchange Management Act-2000(FEMA)– Competition Act – 2002

UNIT-III

SEBI ACT SEBI Regulations – Corporate Governance Transparency and Disclosures Latest trends.Audit Committee. Nolin Committee

UNIT-IV:

ENVIRONMENTAL PROTECTION ACT: 1986 , Power of Government Air (Prevention and Control of pollution) Act, 1981.Water (Prevention and Control of Pollution) Act 1974.

UNIT-V

CONSUMER PROTECTION ACT, 1986 – MRTP Act 1969 – Provisions relating to restrictive Trade Practices and Unfair Trade Practices.

Reference:

1. N.D. Kapoor, Elements of Company Law, Sultan Chand & sons, New Delhi.
2. N.D. Kapoor, Elements of Marcantile Law, Sultan Chand & sons, New Delh
3. Company Acts, 1956 (Acts and Rules)
4. Gulshan, S S. a hand Book of Corporate Laws, S.Chand & Co.

SEMESTER - II

L	T	P	C
6	0	0	4

Total Hours: 78

HUMAN RESOURCE MANAGEMENT

SUBJECT CODE: P2CM02MT

UNIT-I

Humans and other physical resources – development of the human potential – Implications of Behavioral Science theories to HRM – Link between organization planning and HR planning

UNIT-II

Acquisitions and maintenance of personnel – recruitment and selection purposes and methods of recruitment and selection – Maintenance of personnel – motivation of increased productivity – Q W L

UNIT-III

Rewards and incentives – financial and non-financial incentives – Grievance procedure- Conflict – process – stress Vs challenge – sources – resolution.

UNIT-IV

Performance appraisal – Ranking, rating scales, critical incident method– MBO as a method of appraisal – Removing subjectivity from evaluation– criteria for promotions and job enrichment

UNIT-V

Human development – training – need and importance – methods of training – designing training program – Evolution of training program – Executive development – Organization change – change agents – resistance to change – managing the resistance.

Reference:

1. Dressler – Human resource management, 8 th Ed pearson Education, 2002
2. S K Chakraborty, Values and Ethics for Organization, Oxpord University Press
3. Aswathappa, Human resource and Personnel management, Tata McGrew Hill.
4. A M Sheik, Human resource Development and management, S.Chand & Co.

SEMESTER - II

L	T	P	C
6	0	0	4

Total Hours: 78

ADVANCED ACCOUNTS **SUBJECT CODE: P2CM03MT**

UNIT-I

Accounts of Banking Companies – Legal provisions – Capital Adequacy Norms – Rebate on Bills Discounted – Asset Classification and provisioning – Preparation of final accounts

UNIT-II

Insurance Company Accounts – Nature of Insurance Business – Distinction between Life and Non life Insurance – Accounts of life insurance Business – Accounts of General Insurance Business – IRDA Regulations Regarding preparation of financial statements.

UNIT-III

Holding Company Accounts – Consolidated Financial statements– Consolidation of balance sheet and Profit and Loss Accounts.

UNIT-IV

Accounts of Electricity Companies – preparation of final accounts using statutory forms prescribed by Electricity Rules 1956 – Replacement of an asset. Inflation accounting – Need – Objections – adjustments for General Price Changes – Current purchasing power Accounting (CPP) – CPP method of preparing financial statements.

UNIT-V

Human Resource Accounting – Need and Development – Importance of Human Resource Accounting–Objections against Human Resource Accounting – Human Resource Accounting in India. Corporate Social Reporting – Concept and Objectives of responsibilities.

Reference:

1. M C Shukla and T S Grewal, Advance accounts, S.Chand & Co New Delhi.
2. Anjan Battacharya & Subrata Mukarjee, Advanced Practical Accounts, .Chand & Co

SEMESTER - II

L	T	P	C
6	0	0	4

Total Hours: 78

QUANTITATIVE TECHNIQUES FOR BUSINESS DECISIONS

SUBJECT CODE: P2CM14MT

UNIT-I

Net work analysis – PERT and CPM.

UNIT-II

Inventory models – general concepts and definitions – Various cost concepts – The technique of inventory control – EOQ models

UNIT-III

Transportation model – Definitions – Formulation and solution of Transportation models – North West corner – Least Cost Method-Vogel's Approximation Method-Optimal Solution.

UNIT-IV

Assignment model - Definitions – Formulation and solution of Assignment models – Hungarian method

UNIT-V

Queuing theory – meaning – objectives – limitations – Elements of queuing system- Queuing models: Simple methods.

M/ M /1 : (∞ / FCFS)

M/ M /C : (∞ / FCFS)

M/ M /1 : (N / FCFS)

M/ M /C : (N/ FCFS)

Note: The proportion between theory and practice shall 20:8

Reference:

1. J.K. Sharma, Mathematical Models in operation research, TMH Publishers
2. C R Kothari, Quantitative Techniques', Vikas Publishing.
3. P R Gupta and Mohan, Operation Research, Sulthan Chand and Sons.

SEMESTER - II

L	T	P	C
4	0	0	4

Total Hours: 54

E - COMMERCE

SUBJECT CODE: P2CM05ET

UNIT-I

ELECTRONIC COMMERCE: Meaning–Traditional Commerce – E.Commerce and its application in business. Basic Blocks of E.Commerce. E.Commerce consumer–Anatomy of E.Commerce

UNIT-II

NETWORK INFRASTRUCTURE: Global Information Distribution Networks – Components of the I – way- policy issues – Internet terminology – internet Governance – An overview of internet Applications

UNIT-III

NETWORK LAYERS: Internet protocol (IP) – transmission Control Protocol (TCP) – Multimedia Concepts – Advantages of internet. Electronic Data interchange (EDI) –EDI and E.- Commerce – EDI application in Business

UNIT-IV

NETWORK SECURITY: Client Server Network security – Firewalls and Network Security –Data and message Security encrypted documents and Electronic Mail. Video conferencing

UNIT-V

DIGITAL DOCUMENTS: Document Library–Types of Digital Documents – Corporate data warehouse – Electronic payment Scheme-Intra-Organizational Electronic Commerce

Reference:

1. David Kosuur, Understanding electronic Commerce, Addison Wesley, 1986
2. Soka, From EDI to Electronics Commerce, Tata McGraw Hill.
3. Saily Chan, Electronic Commerce Management, John Wiley.

SEMESTER - II

L	T	P	C
4	0	0	4

Total Hours: 52

INDUSTRIAL RELATIONS

SUBJECT CODE: P2CM06ET

UNIT-I

The changing concept of Industrial Relations; Factors affecting employee stability – Application on psychology to industrial relations – Workers participation in management

UNIT-II

Trade unions – growth – conditions for the development of trade unionism – Aims and objectives of trade unions – Trade unions in India, problems and future.

UNIT-III

Industrial disputes Act – Machinery – Functions, powers, scope, strikes, lockouts, lay off, Retrenchment and closure.

UNIT-IV

Management and personnel administration – managing, working and living in a changing world. Managers and their personnel concepts. Organization structure and Management development.

UNIT-V

Diagnosing organizational health situational thinking; A systematic Approach – interviewing – indicators of organizational health – personal research turnover and internal mobility, complaints and grievances, occupational safety and health trends.

Reference:

1. Pigou and Myers, Personnel Administration; appoint of view and a method, McGraw Hill , Inc.
2. C.B.Memoria, Industrial and labour relations in India, Kitab Mahal.
3. N.K.Singh, Dimensions of Personnel Management, Vani Educational Books, New Delhi.
4. S C Srivastava, Industria Relations and Labour Laws, Vikas.

SEMESTER - II

L	T	P	C
4	0	0	4

Total Hours: 52

BANK MANAGEMENT

SUBJECT CODE: P2CM07ET

UNIT-I

Banking structure in India – Banking function and services – Foreign commercial banks – Private commercial banks – capital adequacy.

UNIT-II

Principles of lending – financial adequacy assessing the borrower – project appraisal – structural and infrastructural analysis – legal formalities – follow up loans, asset management companies.

UNIT-III

Non Performing Assets [NPA's] with latest provisions – Early warning signals – management of NPA's – Remedies available – Recent measures – loan recovery tribunals – provisions of Revenue Recovery Act.

UNIT-IV

Investment management – priorities in allocation of bank funds – investment in Government securities – maturity and yield – quality and diversification, profitability management – profit planning.

UNIT-V

Traditional banking vs. E-Banking – facets of E-Banking – Internet procurement – E-Banking Transaction- Electronic delivery channel – Truncated Cheque – complete centralized solutions – Features of CCS – Advances of E-Banking – constraints in E-Banking – Security measures.

Reference:

1. Varsheny, P.N, Banking Law & practice, Sultan Chand, New Delhi.
2. S.N.Maheshwari, Banking Law & practice, Kalyani Publications, Ludiana.
3. Vasanth Desai, Principles of Bank Management, Himalya Publications.
4. K.Subramaniyan, Banking Refirms in India, TMH, New Delhi.

SEMESTER - III

L	T	P	C
6	0	0	4

Total Hours: 78

INDIRECT TAXES

SUBJECT CODE: P3CM01MT

UNIT-I

Indian Federal System - An overview - Important features of federal finance - Canons of taxation - Direct and Indirect taxation - Merits and Demerits.

UNIT-II

Central Excise - Definitions - Goods - Excisable goods - manufacture - Deemed manufacture - Basis of charge - Valuation of Excisable goods - Clearance of goods - Physical control - Compounded Levy Schemes - Self Removal Procedure - CENVAT.

UNIT-III

Customs Duties - Definitions - Goods - Imported goods - Export goods - Levy of Customs duty - Exemptions from customs Duty - Baggage Rules.

UNIT-IV

Authorities of customs and Excise. Powers - imposition of fines and penalties.

UNIT-V

VAT - Significance - Cascading effect of Taxes - VAT in Tamilnadu - Rates of Tax - Exemptions from Vat - White Paper on VAT.

References Books

1. Dinkar Pagare, Business Taxation, Sultan Chand & Sons, New Delhi.
2. Balachandran V, Indirect Taxation, Sultan Chand & Sons, New Delhi.
3. Govindan M.S, Indirect Taxes Made Easy, Sitaraman & Co, Chennai.
4. Datey V.S, Indirect Taxes, Taxman Publications, New Delhi.
5. Jayakumar.A, Indirect taxes, Learntech Press, Trichy.

SEMESTER - III

L	T	P	C
6	0	0	4

Total Hours: 78

ORGANISATIONAL BEHAVIOUR

SUBJECT CODE: P3CM02MT

UNIT-I

Organizational Behavior - Fundamental concepts - nature and scope - OB in the new millennium - Foundations of Individual behavior - Personality, Perception, Learning, Values and Attitudes.

UNIT-II

Motivation - Early theories - Contemporary theories - Motivation at work - Designing and Motivating for jobs.

UNIT-III

Group Dynamics - Group Behaviour, - Inter-group relations - Communication and Group - Decision making.

UNIT-IV

Leadership - Trait, behaviour and contingency theories- Power and Politics - Conflict - causes, conflict management, Transactional Analysis (TA) - Work Stress.

UNIT-V

Organizational Structure And Design: Organizational changes and development - Organizational culture and climate -Organizational effectiveness.

Reference Books

1. Stephen Robbins, Organisational Behaviour, 0th Ed. Pearson Education, 2001
2. Fred Luthans, Organizational Behavior, McGraw Hill, 1998
3. Wagner, Organizational Behaviour, Thomson Learning, 2002.
4. S.S. Khanka, Organisational Behaviour, S.Chand & Co.,,New Delhi Edn,2007

SEMESTER - III

L	T	P	C
6	0	0	4

Total Hours: 78

ADVANCED COST ACCOUNTING

SUBJECT CODE: P3CM03MT

UNIT-I

Nature and significance of cost accounts - Definition of Costing, Scope, Objectives, Functions and limitations of cost accounting - Installation of costing system - Elements of Cost - Cost centre and profit centre - Preparation of Cost sheet, tender of quotations.

UNIT-II

Methods of Costing - Process costing, Treatment of equivalent production - Inter process profit - Joint and by product Costing - Preparation of contract account, Cost plus contract and escalation clause.

UNIT-III

Standard Costing and Variance analysis - Material, Labor and Overheads -reporting of variances

UNIT-IV

Cost control - Reconciliation Statement - Control over wastages, Scrap, Spoilage and defectives - Constituting cost reduction cell.

UNIT-V

Activity based costing - JIT Costing - Cost Audit

Note: The proportion between theory oriented and problem oriented questions in the university examination shall be 20:80

Reference Books

1. S.P. Jain and K.L. Narang - Cost accounting-Kalyani Publishers-New Delhi.
2. B.K. Bhar - Cost Accounting-Academic publishers, Calcutta
3. T.S.Reddy and Y.H. Reddy- Cost and Management Accounting-Margam Publications,Chennai
4. C.T.Horangren - Cost Accounting - A Managerial Emphasis - Pearson education

SEMESTER - III

L	T	P	C
4	0	0	4

Total Hours: 52

RESEARCH METHODOLOGY

SUBJECT CODE: P3CM04MT

UNIT-I : INTRODUCTION

Research - definition, characteristics, nature and scope. Various types of research - Formulation of research problem - Major steps in Research – Hypothesis - Research Design - Uses of social research.

UNIT-II : SAMPLING AND DATA COLLECTION

Sampling: Meaning, definition, need and types. Sampling errors - Merits and demerits of Sampling. Data collection: Sources of data; Primary and Secondary data. Procedure for data collection, Tool of data collection - Questionnaire – Interview - Schedule.

UNIT-III : DATA PROCESSING AND ANALYSIS

Processing of data: editing, coding and Tabulation - Problems - use of computer in social research. Analysis of data: Statistical analysis; diagrammatic and graphic representation. Interpretation of results.

UNIT-IV : STATISTICAL APPLICATIONS

Factor Analysis - bivariate and Multivariate Analysis. (Practical problems.)

UNIT-V : RESEARCH REPORTS

Structure and components - Types of Research Report, Good Research Report. Pictures and Graphs. Introduction to SPSS Package.

References Books

1. Wilkinson. T.S. & Bhandarkar. P.L. Methodology and Techniques of Social Research, Himalaya Publishing House, 2000, Mumbai.
2. Panneerselvam. R. Research Methodology, Prentice Hall of India, New Delhi, 2004.
3. Green, P.E., et al., Research for Marketing Decisions, 5th ed., Prentice-Hall of India,
4. Young, P.V., Scientific Social Survey and Research, Prentice Hall, 1949. New York.
5. Kothari.C.R. Research Methodology - Methods & Technology, New Age International Publisher, New Delhi

SEMESTER - III

L	T	P	C
4	0	0	4

Total Hours: 52

SERVICES MARKETING

SUBJECT CODE: P3CM05ET

UNIT-I

Growth of the Service Sector - Nature and Concept of Service - classification of services - Characteristics of Services and their marketing implications - Essential Elements of marketing mix in Service marketing.

UNIT-II

Marketing strategies for service firms with special reference to information, communication, consultancy, advertising, professional services, after sales service, recruitment training and tourism.

UNIT-III

Product support services - pricing of services - problems of Service quality management - Customer Expectations - innovation in services.

UNIT-IV

Marketing of financial services - nature - types - marketing of insurance - mutual fund - marketing for non - profit firms - Growth of financial services in India.

UNIT-V

CRM - identifying and Satisfying Customer needs - Relationship marketing - Customer Satisfaction - Managing Service Brands.

Reference Books

1. Christopher Lovelock, Services Marketing, Pearson Education.
2. E.G. - Bateson, Managing Service marketing - Text and Readings, Dryden press,
3. Philip Kotler and Paul N. Bloom, Marketing professional Services, Prentice hall

SEMESTER - III

L	T	P	C
4	0	0	4

Total Hours: 52

WORKING CAPITAL MANAGEMENT

SUBJECT CODE: P3CM06ET

UNIT-I :

Working Capital Policy : Importance of working capital management- Concept of working capital-Risk Return trade off for financing working capital-Sources and uses of working capital-Factors influencing working capital cycle- Issues in working capital policy-Forecasting and management of working capital.

UNIT-II :

Cash management :Importance-Factors influencing cash balance- Determining minimum cash balance- Cash budgeting-Cash control- Monitoring collection and disbursement- Cash management models.

UNIT-III :

Inventory management :Need for Inventories and importance of its management- Techniques for managing inventory –Different models-Reorder point- Monitoring and control of inventories.

UNIT-IV :

Receivables Management :Credit Policy-Credit Evaluation-Credit granting decision- Control of Receivables- Collection policy.

UNIT-V :

Financing Current Assets :Trade credit-Short term bank finance-commercial paper-public deposits- regulation of bank credit-Recommendations.

Reference Books:

1. Vijay Prakash Joshi: Working capital management, TATA Mc-Graw Hill publishing co Ltd New delhi.
2. John J Hampton, Lecillial wagner and S. Shivaraman : Working capital management, John Wiley & Sons, New York, 1989.
3. V K Bhalia: Working capital management, Anmol Publications, New Delhi, V edition

SEMESTER - III

L	T	P	C
4	0	0	4

Total Hours: 52

FINANCIAL SERVICES

SUBJECT CODE: P3CM07ET

UNIT I

Introduction : Overview of Financial Services in India, Nature, importance, Growth , Structure and Types. An overview of financial market - capital market, money, market, government securities market, foreign exchange market - international financial markets

UNIT II

Leasing : Introduction -Concept and Classification of Leasing, essential elements of Leasing-Types of Leasing(finance lease & operating lease)- Procedure of a Lease, Advantages and Limitations of Leasing-Financial evaluation of Leasing.

UNIT III

Venture Capital : Meaning and Definition of venture Capital, Characteristics of Venture Capital, Forms/Types of Venture Capital Assistances

UNIT IV

Factoring : Introduction, Meaning of Factoring, , Types of Factoring, Functions of Factoring, Advantages & Disadvantages of Factoring.

UNIT V

Organisation and functions of stock exchanges - regulation and control of stock exchanges - NSE, BSE, OTCEI, regional exchanges.

Text Book:

1. . Dr. S. Gurusamy, “Financial Services and Systems ”, Vijay Nicole Imprint, Pvt. Ltd.

REFERENCE BOOKS

1. M.Y. Khan, “Financial Services”, Tata McGraw Hill, 2001.
2. Machiraji, “Indian Financial System”, Vikas Publishers, 1998.
3. Mark Grinblatt, Sheridan Titman, “Financial markets and corporate strategy”, Tata McGraw Hill, New Delhi, 2003.
4. B.S. Bhatia, G.S. Bhatra, “Management of Capital Markets, Financial services and institutions”, Deep & Deep Publishers, 2000.

SEMESTER - III

L	T	P	C
4	0	0	4

Total Hours: 52

COMPUTER AND OFFICE MANAGEMENT

SUBJECT CODE: P3CM08ET

UNIT-I

History of computers- Types-Generation- Features- Hardware-Software-CPU-Floppy drives- Hard disk-CD Rom- Keyboard- Printer- Magnetic tapes.

UNIT-II

External storage units-Net work attached storage device (NAS)-CD Media-Pen Drive- External Hard Disks-Classification -Applications-Use of computers in various fields

UNIT-III

Flow charting- data communication- LAN-WAN-INTERNET-INTRANET- E mail- Security of data- Anti virus programmes.

UNIT-IV

Word basics-Formatting- Working with Headers-Footers and footnotes-Tab and tables-working with graphics-Macros Mail merge.

UNIT-V

Excel basics-Formatting tips- Function- Chart features-Working with graphics-Excels command Macros using worksheet as data base- Power point Presentation.

Reference Books:

- 1) Sanchs H Donald, Computer concepts and applications, Sultan Chand & Sons, New Delhi.
- 2) Subash Mehta: Easy Computers, Wheeler Publishing company, New Delhi.

SEMESTER - IV

L	T	P	C
6	0	0	5

Total Hours: 78

DIRECT TAXES

SUBJECT CODE: P4CM01MT

UNIT-I

Basic concepts - Definitions - Assesses - Assessment year - Previous Year - Income - Residential Status - Scope of Total Income - Exempted income - Agricultural income - Capital income and expenditure - Revenue Income and expenditure.

UNIT-II

Heads of Income - Income from Salaries - Income from House property - Income from Business or Profession - Depreciation.

UNIT-III

Income under the head capital gains - Income from other sources - Deductions from Gross Total Income.

UNIT-IV

Computation of Total Income - Individual - Firm - Companies - MAT - Tax Deducted at Source - Advance Tax - Interest payable - Set off and Carry forward of losses - PAN - Rates of Tax.

UNIT-V

Assessment Procedure - Income tax Authorities - Penalties - An outline of Wealth Tax - Computation of Net wealth.

Note: The ratio between theory and problems shall be 40:60.

Reference Books

1. Jayakumar A. & C.Dhanapal - Income Tax Theory, Law and Practice – Learnetech Press, Trichy,
2. Gaur V.P & Narang K.L, Income Tax Law and Practice, Kalyani Publishers,
3. Dr. Vinod Sighania, Direct Taxes, Tax Man Publications, New Delhi.
4. Dinkar Pagare, Income Tax Law and Practice, Sultan Chand & Sons, New Delhi.

SEMESTER - IV

L	T	P	C
6	0	0	5

Total Hours: 78

INVESTMENT MANAGEMENT

SUBJECT CODE: P4CM02MT

UNIT-I

Properties of financial assets - Financial Markets - Investments - Types - Characteristics - Objectives - Types of investors - Investment vs. Gambling, Speculation, Speculation Vs. Gambling.

UNIT-II

Nature and Scope of Security Analysis - Concept of Risk and Return - Measurement of Risk

UNIT-III

Fundamental analysis - Economic analysis, Industry Analysis and company Analysis - Technical analysis - Trend indications - Indices and moving average applied in technical analysis.

UNIT-IV

Valuation of Securities - Equity shares - Preference shares - Debentures - Bonds

UNIT-V

Efficient market Hypothesis - Random Walk Theory - Markowitz Theory - Sharpe's optimization solution - Dow Theory - CAPM model - SML, CML.

Note: Only theory questions.

Reference Books

1. Dr.Raganatham m & Madhumathi R. Investment analysis 7 Portfolio management. Person Education, New Delhi.
2. Dr.Bhalla V.K.Investment Management, S.Chand and Company, New Delhi.
3. Fisher & Jordan, Security analysis and portfolio management, Prentice Hall of India,
4. Sharpe, William and Gordon, Investments – Prentice hall of India, New Delhi.
5. Rustagi R.P, Investments Analysis and Portfolio management, Sultan Chand & Sons,

SEMESTER - IV

L	T	P	C
6	0	0	5

Total Hours: 78

PROJECT DEVELOPMENT

SUBJECT CODE: P4CM04MT

UNIT-I : PROJECT

Meaning and overview - Project Development Cycle - Capital Expenditure Decisions - Importance and Difficulties.

UNIT-II : PROJECT APPRAISAL

Aspects of Appraisal - Market Appraisal - Technical Appraisal - Financial Appraisal - Economic Appraisal. Project formulation. Feasibility Report.

UNIT-III : PROJECT COST AND MEANS OF FINANCE

Project cost - Social Cost and Social Benefit. Term Loans - Loans from Development banks - Assistance from Indian finance Corporations and international finance Corporations. External commercial borrowing.

UNIT-IV : PROJECT SELECTION

Selection of a suitable project - Programming - scheduling and Controlling Mechanism.

UNIT-V : PROJECT CONTROL

Time and cost control - Budgetary control - corrective and preventive actions. Risk Management functions.

References Books

1. Prasanna Chandra, Projects - Preparation, Appraisal, Budgeting and Implementation, 3rd ed. Tata McGraw- Hill Publishing Company Limited, New Delhi.
2. Dr. Gupta, C.B. & Dr. Srinivasan, N.P. Entrepreneurial Development, Sultan Chand & sons, New Delhi.
3. Bryce, M.D. Industrial Development: A Guide for Accelerating Economic Growth, McGraw- Hill, 1960 New York.
4. Varma, M.L. Foreign Trade Management in India, Vikas Publishing House, 1993

SEMESTER - IV

L	T	P	C
6	0	0	5

Total Hours: 78

MARKETING RESEARCH

SUBJECT CODE: P4CM05MT

UNIT-I

Marketing research - Nature, Scope and importance - Research proposal - Steps in marketing research.

UNIT-II

Research design - Exploratory research - Descriptive research - survey research.

UNIT-III

Data collection - Secondary data - primary data-types, merits and Limitations -Methods of collection - Processing of collected data - Management Information System.

UNIT-IV

Ethics in marketing research-Treatment of respondents, buyer and Researchers-International code of marketing research practice.

UNIT-V

Application of marketing research - product research-motivation Research-presentation of research project - Future of Marketing Research in India.

Reference Books

1. Philip Kotler-Marketing Management and Control-Asian perspectives-Prentice Hall of India1999 (The Millennium Edition).
2. Boyd Harper W. and Ralph Westfall-marketing research-text and cases-Richard D. Irwin Inc. Indian Edition.
3. Schreir Fredric T. Modern Marketing research, World wide publishing company.Inc.
4. Dr.D.D Sharma - Marketing research - Sulthan Chand &Sons, New Delhi.
5. Donald Tull and Deli Hawkins, Marketing research, Macmillan.

SEMESTER - IV

L	T	P	C
6	0	0	4

Total Hours: 78

SALES AND ADVERTISING MANAGEMENT

SUBJECT CODE: P4CM03ET

UNIT-I

Sales management - Meaning and Scope - Functions Sales and Planning - Sales policy - Sales organization - Sales Territories - Sales Quota - Selling process-Responsibilities of Sales manager

UNIT-II

Need for sales force - Recruitment and Selection of sales force - Training of salesmen - Qualities of a Good salesman

UNIT-III

Advertising - Scope and Function - Need for Advertising classification -Advertisement Planning and Organization - Ethical Issues in Advertising

UNIT-IV

Advertising Media - Role of Media - Types of Media - Merits and Demerits - Media Research - Evaluation and Effectiveness of Advertising.

UNIT-V

The Advertising budget - Advertising Agencies - Types of Legal framework of advertising - Self regulation of Advertising.

Reference Books

1. Ramasamy : V S Marketing Management, Macmillan
2. Davar: Salesmanship and Advertising
3. Pillai and Bagavathi: Salesmanship.
4. Richard R Still and Edward W Gundiff - Sales management- Prentice Hall

SEMESTER - IV

L	T	P	C
6	0	0	4

Total Hours: 78

BUSINESS ENVIRONMENT AND POLICY

SUBJECT CODE: P4CM04ET

UNIT-I

Business Environment: Cultural, social, political, technological, economic and legal environment - scanning - techniques of environmental forecasting - SWOT - Internal environment - their impact on policy formulation.

UNIT-II

Economic reforms in India - Liberalization - privatization and globalization - Competitive Strength of Indian industry - Impact of liberalization policy on different sectors - Foreign Investments policy in India.

UNIT-III

Multi-national corporations - Their participation in India - Their strategies, competitive strengths policies and performance.

UNIT-IV

Business policy and corporate strategy: Policies; Strategies and Tactics; Policies and procedures - Corporate strategy: alternatives - variations - Strategic choice, implementation.

UNIT-V

Business ethics and social responsibilities - relationship between business and society - Corporate power social accountability - Ethical issues and values in business - Corporate Social policies - issues and challenges - Ecological and environmental issues.

Reference Books

1. Wheelen, Concepts of Strategic Management and Business policy, 8th Ed. Pearson Education, New Delhi, 2002.
2. William Gluck & L R Jauch, Business Policy & Strategic Management, McGraw-Hill 2001.
3. Kazhmi Azhar , Business Policy, TMH, 2002.
4. Gupta, Liberalisation - its impact on Indian Economy, Macmillan, 2002.

Om Sakthi
ADHIPARASAKTHI COLLEGE OF ARTS & SCIENCE
(Autonomous)
Permanently Affiliated to Thiruvalluvar University, Vellore
Accredited by NAAC with B⁺⁺ Grade

MASTER OF PHILOSOPHY IN COMMERCE

Under CBCS

(Effective from the Academic Year 2016-2018)

REGULATIONS

CBCS:

Choice –Based Credit System is a flexible system of learning. ‘Credit’ defines the quantum of contents / Syllabi prescribed for a course and determine the number of hours of instruction required.

1. Eligibility for Admission:

Admission to the M.Phil (Commerce) Degree Course shall be need as follows:

A student who has passed M.Com. Degree with 50% of marks.

2. The minimum duration for completion of M.Phil in Commerce is Two Semesters
maximum duration is Four semester.

3. The M.Phil Degree is Awarded if a student has,

- Registered, undergone and secured the required minimum number of credits for the core and elective courses including dissertation specified in the corresponding programme within the stipulated time.
- Secured the required attendance:
- No dues to the college, Hostel or Library:
- No disciplinary action pending against him/her.

4. Structure of the Programme

The **M.Phil.** programme consists of:

Core courses which are mandatory for all students

Elective courses which students can choose from amongst the courses offered within the department of the college.

Dissertation [Mandatory]

5. The distribution of credits will be as below:

- i. Core courses – minimum two courses carrying 5 credits each (10 or more credits)
- ii. Elective carrying 5 credits each – No minimum
- iii. Dissertation 21 credits

The total number of credits for core and electives shall be 15, consisting of

- 2 Core courses (10 credits) plus one elective (5credits)

The research topic for the dissertation may be finalized even at the beginning of the M.Phil Programme, so that the collection of relevant literature and research design could be completed in the First semester leaving the entire second semester for the research work. The course registration for dissertation shall be in the First semester and a separate registration form shall be used for Registration.

6. Evaluation of the dissertation

6.1 The dissertation shall be jointly valued by the supervisor and one external examiner.

The external examiner is to be drawn from:

- i. University department or affiliated college within the city or vellore; or
- ii. Any accredited institution of higher education and / or research within tamilnadu

The viva-voce examination on the dissertation shall be jointly conducted by the supervisor and the external examiner. The distribution of marks shall be as under:

- 20% marks for periodical presentation (to be evaluated and awarded by the supervisor)
- 60%marks for the Dissertation
- 20%marks for Viva-voice

6.2 The last date for submission of dissertation shall be 31st August every year without penalty. Those who do not submit the dissertation in time may be given an extension of a maximum of two months with a penal fee prescribed by the college (i.e. up to 31st October). There shall be no further extension of time beyond this period. Any student failing to submit the dissertation within this period will be permitted to submit the dissertation only in the next academic year along with the subsequent batch of students.

7 Regulations of M.Phil. Programme

The rules and regulations governing course registration, attendance and discipline of student for M.Phil. Programme shall be the same as for the Master's Programme.

8 Evaluation

The process of evaluation, examination, grading, etc for the M.Phil. Programme shall be the same as for Master's Programme except for the dissertation; However, final semester students of the M.Phil. should be allowed to appear for examinations in any arrear papers in the month of September / October each year.

Illustration: M.Phil. CUMULATIVE GRADE STATEMENT

Semester and Course	Course Number/ Code	Credits earned	Marks Secured [Max.100]	Grade Point	Letter Grade	Results
First Semester						
Research Methodology (Core)	M1RM01AM	5	70	5.05	A+	PASS
Advanced Financial Management (Core)	M1CM01MT	5	60	4.00	A	PASS
Elective	M1CM02MT	5	75	5.50	O	PASS
Grade Point Average [GPA] / Weighted average Marks [WAM]		15	68.33	4.85		
Second Semester						
Dissertation and Viva-voce	M2CM01DV	21	64	4.49	A	PASS
Grade Point Average [GPA] / Weighted average Marks [WAM]		21	64	4.49		
Cumulative Grade Point Average [CGPA] / Overall Weighted average Marks [WAM]			65.81	4.64	A+	FIRST CLASS

Question paper pattern:

1. **Section A** (5X 6=30 marks) either or type
2. **Section B** (3X 15=45marks) three out of five

(Note: One question from unit for section A and section B.)

PART – I
CORE COURSE - I

L	T	P	C
5	0	0	5

Total Hours:65

RESEARCH METHODOLOGY

SUBJECT CODE: M1RM01AM

UNIT - I

Meaning of research and scope of research methodology – stakeholders of social research – ethical considerations – significance of research in social and business science identification of the problem area – section of the problem – formulation of research question(s) – pilot study – meaning and components of research design – review of literature: purpose.

UNIT- II

Meaning and role of hypothesis - structure of hypothesis :concepts, constructs and variables – The relationship between variables – types of hypothesis – strong and weak hypothesis – sampling theory – sampling methods and techniques – sample error.

UNIT- III

Data collection- sources: primary and secondary – data matrix – unit of data collection and unit of data analysis – methods and tools of data collection: Interview and questionnaires and their types – observation and its types – Audio visual aids in data collection – scaling and testing techniques – reliability and validity of instruments – uses of information technology in data collection.

UNIT- IV

Data analysis – analysis of quantitative data: Descriptive statistics – inferential statistics – tests of significance – parametric and non-parametric tests-presentation of data – computer software for quantitative data analysis. Analysis of qualitative data : data reduction, data display and conclusion drawing – saturation – conceptual mapping – computer software for qualitative data analysis – interpretation – explanation – theorization.

UNIT- V

Report writing – meaning, techniques and precautions of interpretation- significance of report writing – target audience – different steps in writing report – layout of research report – types: technical report, popular report – mechanics of writing a research report.

Reference:

1. C.R.Kothari – Research Methodology; Methods and Techniques, Wiley Eastern Ltd., New Delhi.
2. Amarchand .D – Research Methods in Commerce – Emerald Publishers, Chennai.
3. Anderson.J.Berry & Poole.M – Thesis and Assignment Writing - Wiley Eastern Ltd., New Delhi.
4. Almark, J.C – Research and Thesis Writing,[Boston:Houghton]
5. Anderson, R.l and Bancroft – A Stastical Theory in Research, McGraw-Hill, New York
6. Bennet, Spencer and David Bower's – An Introduction to Multivariate Techniques for Social and Behavioral Sciences. , Macmillan Press, London.

PART – I
CORE COURSE - II

L	T	P	C
5	0	0	5

Total Hours:65

ADVANCED FINANCIAL MANAGEMENT

SUBJECT CODE: M1CM01MT

UNIT- I

Financial management – meaning, functions and objectives and scope-
management of sources of funds – working capital: financing policy, analysis and
management.

UNIT- II

Capital structure and dividend decisions – approaches and theories – payout
policy, investment policy, management of investments.

UNIT -III

Capital budgeting decisions – cost of capital – risk analysis in capital budgeting –
issues in capital budgeting – constraints, value options, influences, corporate strategies
and organizational considerations.

UNIT- IV

Security analysis – risk and return – valuation of instruments – equity, derivatives
–options, rights, warrants and convertibles futures – types of analysis: economic,
industry, company, technical-efficient market theory.

UNIT- V

Portfolio analysis and selection – capital market theory – managing portfolios and
performance measurements – corporate restructuring : mergers and acquisition –
corporate ownership, control and governance.

Reference:

1. Prasanna Chandra – Financial Management, Tata Mc Graw Hill.
2. Dralald . E. Fischer and Ronald.J – Security Analysis and Portfolio Management,
Prentice Hall of India.
3. I.M.Pandey – Financial Management – Vikas Publishers.
4. Richard A. Brealey, Stewart.C.Myers, Franklin Allen, Pitabes Mohanty-
Principles of Corporate Finance, Tata Mc Graw Hill.

L	T	P	C
5	0	0	5

PART – II

ELECTIVE COURSE - I

Total Hours:65

HUMAN RESOURCE MANAGEMENT

SUBJECT CODE: M1CM02MT

UNIT- I

Human and other physical resources – objectives, nature and scope of HRM – objectives of HRM – development of the human potential – the foundation of individual behavior – value, knowledge, skill, personality, perception, motivation, beliefs and attitudes – HR planning.

UNIT – II

Acquisition and maintenance of personnel – recruitment and selection process – trainings & development – types of training – user of training – evaluation of training designing effective program.

UNIT - III

Rewards and incentives – financial and non financial – executive pay & employee benefit. Grievance procedure – conflict – process – stress Vs challenges – sources of stress – resolution.

UNIT- IV

Performance appraisal methods – criteria for promotions and job enrichment – leadership– type and effectiveness.

UNIT - V

Employer and employee relations – collective bargaining – process – protecting safety and health measures.

Reference:

1. K.Aswathappa, Human Resource Management Tata McGraw Hill.
2. J. Jayasankar, , Human Resource Management, Margam Publisher

PART – II
ELECTIVE COURSE - II

L	T	P	C
5	0	0	5

Total Hours:65

MARKETING AND MARKETING RESEARCH

SUBJECT CODE: M1CM02MT

UNIT- I

Introduction – Definition – Scope of Marketing – Modern approach- Market Environment – Marketing Mix –Marketing Segmentation – Consumer Behaviour.

UNIT – II

Product – Meaning and Classification – Product Planning and Development – Product Life Cycle – Product Mix – Product Line Strategies – Branding, Packaging and Packing, Grading, Standardization, Labelling – Trade Marks.

UNIT – III

Product Pricing – Pricing Objectives – Pricing Policies, Strategies and Techniques – Pricing.

UNIT- IV

Distribution channels – Sales Promotion – Techniques and methods – Salesmanship and advertising – Publicity and Public Relations – Direct Marketing, personal Selling and Target Marketing.

UNIT – V

Marketing Research – Nature and Scope of the Marketing research – Marketing Information System – Research Techniques – Planning and formulating research problem – methods of data collection – preparation of Report.

Reference:

1. D.D Sharma, Marketing & Marketing Research, Sultan & Sons Publications, New Delhi.
2. Dr. Ravilochanan, Marketing Research, Margham Publications, Chennai.

**ADHIPARASAKTHI COLLEGE OF ARTS &
SCIENCE**

(Autonomous)

Permanently Affiliated to Thiruvalluvar University, Vellore

Re – accredited by NAAC with B⁺⁺ Grade (CGPA – 2.83)

**B.Sc., MATHEMATICS
Under CBCS**

SYLLABUS

(Effective from the Academic Year 2015-2016)

ADHIPARASAKTHI COLLEGE OF ARTS & SCIENCE

(Autonomous)

Permanently Affiliated to Thiruvalluvar University, Vellore

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B.Sc., MATHEMATICS

Under CBCS

(Effective from the Academic Year 2015-2016)

REGULATIONS

CBCS

Choice-Based Credit System is a flexible system of learning. ‘Credit’ defines the quantum of contents / syllabi prescribed for a course, and determines the number of hours of instruction required. The distinguishing features of CBCS are the following:

It permits the students to:

- ❖ Learn at their own pace
- ❖ Choose electives from a wide range of elective courses offered by the departments of the college.
- ❖ Undergo additional courses and acquire more than the required number of credits
- ❖ Adopt an inter – disciplinary approach in learning
- ❖ Make best use of the expertise of available faculty

1. Eligibility for Admission:

Candidates seeking admission to the first year of the Degree of Bachelor of Science Courses, shall be required to have passed the Higher Secondary Examinations [Academic or Vocational Stream] conducted by the Government of Tamil Nadu or an Examination accepted as equivalent thereto by the Syndicate of the Thiruvalluvar University.

The upper age limit for admission to UG Degree courses will be 21 (Twenty one) years as on 1st July of the year of admission. For SC/ST/BC/MBC/DNC candidates and women candidates the age limit is relaxed by 3 years. For other communities the Principals can relax upto 3 years based on merit. A relaxation of 5 years is permitted for Physically Handicapped as per G.O.Ms. No. 239, dated 03.09.1993.

Provided that candidates for admission into the specific main subject of study shall also possess such other qualifying conditions as may be prescribed by the University in the Regulations governing respective courses of study.

Candidate for the Degree of Bachelor of Science in Mathematics shall be required to have passed the Higher Secondary Examination [10 + 2 year] conducted by the Government of Tamil Nadu, or an Examination accepted as equivalent there to by the Academic Council, subject to conditions as may be prescribed. Candidates should have studied one of the following Subjects at the +2 level.

- 1) Mathematics
- 2) Physics
- 3) Chemistry
- 4) Biology [Zoology + Botany]
- 5) Computer Science

2. Eligibility for the Award of Degree:

A Candidate shall be eligible for the award of the Degree only if he/she has undergone the prescribed course of study in the college for a period of not less than three academic year and passed the examinations of all the Six Semesters prescribed earning 140 credits [in part- I, II, III, IV and V].

3. Duration:

- a. Each academic year shall be divided into two semesters. The first academic year shall comprise the first and second semesters, the second academic year the third semester and fourth semesters and the third academic year the fifth and sixth semesters respectively.
- b. The odd semesters shall consist of the period from June to November of each year and the even semesters from December to April of each year. There shall be not less than 90 working days for each semester.

4. Course of Study:

The main subject of study for Bachelor Degree Courses shall consist of the following:

PART – I	TAMIL / OTHER LANGUAGES
PART – II	ENGLISH
PART – III	CORE SUBJECTS ALLIED SUBJECTS ELECTIVES WITH THREE COURSES

PART – IV

1. [a]. Those who have not studied Tamil up to XII Std and taken a Non-Tamil Language under Part – I shall take Tamil comprising of two courses [level will be at 6th standard].
[b]. Those who have studied Tamil up to XII Std and taken a Non-Tamil Language under Part – I shall take Advanced Tamil comprising of two courses.

[c]. Those who do not come under a/b can choose non-major elective comprising of two courses.

2. SKILL BASED SUBJECTS [ELECTIVE]:

Four courses are to be offered. The papers are to be accommodated in the second / third year of study for UG courses.

3. ENVIRONMENTAL STUDIES

4. VALUE EDUCATION

5. SOFT SKILL

PART – V EXTENSION ACTIVITIES

5. Extension Activities:

A Candidate shall be awarded a maximum of 1 credit for Compulsory Extension Service. All the students shall have to enroll for NSS / NCC/ NSO [Sports and Games] Rotract / Youth Red Cross or any other service organization in the college and shall have to put in compulsory minimum attendance of 40 hours which shall be duly certified by the principal of the college before 31st Mach in a year. If a student LACKS 40 hours attendance in the First year, he/she shall have to compensate the same during the subsequent years.

Students those who complete minimum of attendance of 40 hours in One year will get Half Credit and those who complete the attendance of 80 or more hours in two years will get ONE CREDIT.

Literacy and population Education Field Work shall be compulsory components in the above Extensions service activities.

The following assessment procedure will be followed for Internal Marks:

Continuous Internal Assessment [CIA] Test

S. No	Reg. No	Name	Test I Marks For 50	Test II Marks For 75	Test III Marks For 75	Marks For 200	Marks Converted to 20/20	Assignments /Seminars [5] Records [5]	Marks For 25/25	Total Rounded to Marks for 25 /25

Test I : One hour duration for 50 marks [Two Units of the Syllabus]

Test II : Two hours duration for 75 marks [Four Units of the Syllabus]

Test III: Three hours model test for 75 marks [Total Syllabus]

Total marks	200									
Test marks to be converted to	:	20 marks	/	20 marks						
Assignments / Seminars	:	5 marks	/	-						
Records	:	-	/	5 marks						
Total	:	25 marks	/	25 marks						

In the column Rounded to 25 / 25, any fraction may be rounded to the next number.

6. Requirements for proceeding to Subsequent Semester:

- i. Candidates shall register their names for the First Semester Examination after admission in the UG Courses.
- ii. Candidates shall be permitted to proceed from the First Semester up to Final Semester irrespective of their failure in any of the Semester Examination subject to the condition that the candidates should register for all the arrear subject of earlier semesters along the current [subsequent] Semester subjects.
- iii. Candidates shall be eligible to go to subsequent semester, only if they earn sufficient attendance as prescribed therefore by the Academic Council from time to time. Provided in case of a candidate earning less than 65% of attendance in any one of the Semesters due to any extraordinary circumstances such as medical grounds, such candidate who shall produce Medical Certificate issued by the Authorised Medical Attendant [AMA], duly certified by the Principal of the college, shall be permitted to proceed to the next semester and to complete the course of study. Such candidates shall have to repeat the missed Semester by rejoining after completion of Final Semester of the course, after paying the fee for the break of study as prescribed by the College from time to time.

7. Requirements to take the Semester Examinations

- a] A candidate will be permitted to take the Examination of any Semester, if
 - i] He/She secures not less than 75% of attendance out of the 90 instructional days during the semester. [In the case of married women students the minimum attendance requirement shall be 55% of total instructional days].
 - ii] He / She earns a Progress Certificate from the Head of the Institution, of having satisfactorily completed the prescribed course of study in the subject as required by these Regulations, and
 - iii] His/ Her conduct has been satisfactory.Provided that it shall be open to the Academic Council or any authority delegated with such powers by the Academic council to grant exemption to a candidate who has fail to earn 75% of the attendance prescribed for any valid reason[s] subject to the usual conditions.
- b] A candidate who has secured attendance less than 75% but 65% and above shall be permitted to take the Examination on the recommendation of the Head of the Institution to condone the lack of attendance as well as on the payment of the prescribed fees to the College.

8. Passing Minimum:

A Candidate shall be declared to have passed the whole examination, if he/she passes in all the papers and practicals wherever prescribed / as per the scheme of examinations by earning 140 CREDITS in parts – I, II, III, IV and V. He / She shall also fulfill the extension activities prescribed earning one credit to qualify for the Degree.

In fixing the passing minimum marks, the following will be observed:

- [a]. There shall be no Passing Minimum for Internal.
- [b]. For External Examinations, Passing Minimum shall be of 50% [Fifty Percentage] of the minimum marks prescribed for the paper.
- [c]. In the aggregate (External + Internal) the Passing Minimum shall be of 50% for each Paper/Practical/Project and Viva-voce.
- [d]. Grading shall be based on overall marks obtained (Internal + External)

Grading:

Once the marks of the CIA and end-semester examinations for each of the course are available, they will be added. The mark thus obtained will then be graded as per details given below:

Marks	Grade Point	Letter Grade	Class
100	7.00	H	First Class with Distinction
90-99	6.00	O	First Class with Distinction
75-89	5.50	D	First Class with Distinction
60-74	4.75	A	First Class
50-59	4.00	B	Second Class
40-49	3.50	C	Third
Below 40	3.00	F	Fail

From the second semester onwards the total performance within a semester and continuous performance starting from the first semester are indicated respectively by **Grade Point Average [GPA]** and **Cumulative Grade Point Average [CGPA]**. These two are calculated by the following formulae:

$$GPA = \frac{\sum_{i=1}^n C_i G_i}{\sum_{i=1}^n C_i}$$

Where 'C_i' is the credit earned for the course 'i' in any semester; 'G_i' is the Grade Point obtained by the student for the course 'i' and 'n' is the number of courses passed in that semester.

CGPA=GPA of all the courses starting from the first semester to the current semester.

Note: The GPA and CGPA shall be calculated separately for the following three parts:

For purpose of declaring a candidate to have qualified for the Degree of Bachelor of Arts / Science / Commerce / Management / Literature in the First Class / Second Class / Third Class or First Class with Distinction, the marks and the corresponding CGPA earned by the candidate in part III alone will be the criterion, provided he / she has secured the prescribed passing minimum in LCs and ELCs.

Grade in Parts IV & V shall be shown separately and it shall not be taken into account for classification.

9. Classification of Successful Candidates:

PART – I TAMIL / OTHER LANGUAGES:

Successful candidates passing Examinations for the Language and securing the marks [i] 60 percent and above and [ii] 50 percent and above but below 60 percent in the aggregate shall be declared to have passed the examination in the First and Second Class, respectively. All other successful candidates shall be declared to have passed the examination in the Third Class.

PART – II ENGLISH :

Successful candidates passing Examinations for English and securing the marks [i] 60 percent and above and [ii] 50 percent and above but below 60 percent in the aggregate shall be declared to have passed the examination in the First and Second Class, respectively. All other successful candidates shall be declared to have passed the examination in the Third Class.

PART – III CONSISTING OF CORE SUBJECTS, ALLIED SUBJECTS, ELECTIVES

Successful candidates passing Examinations for Core Courses together and securing the marks [i] 60 percent and above and [ii] 50 percent and above but below 60 percent in the aggregate of the marks prescribed for the Core Courses together shall be declared to have passed the examination in the First and Second Class, respectively. All other successful candidates shall be declared to have passed the examination in the Third Class.

PART – IV: [Consisting of sub items 1 (a), (b) and (c), 2, 3,4 and 5] as furnished in the Regulations 4 part – IV supra.

PART – V EXTENSION ACTIVITIES:

The only credit earned for Part V Extension activities of a Successful Candidate SHALL NOT BE taken into consideration for Classification / Ranking / Distinction.

10. RANKING

Candidates who pass all the examinations prescribed for the course in the First Appearance itself alone are eligible for Ranking;

Provided in the case of Candidates who pass all the examinations prescribed for the course with a break in the First Appearance due to the reasons as furnished in the Regulation 7.[iii] Supra are eligible for Classification / Distinction.

The marks obtained in improvement examination will not be taken into consideration for Ranking.

11. The Medium of Instruction and Examinations

The medium of Instruction and Examinations for the papers under part I and II shall be in language concerned. For parts III & IV, the medium of Instruction and Examinations shall be English.

12. Submission of Record Notebooks for Practical Examinations

Candidates taking the Practical Examinations should submit bonafide Record Notebook prescribed for the Practical Examinations. Otherwise the candidate will not be permitted to take the practical Examinations. However, in genuine case where the students could not submit the record notebook may be permitted to take the Practical Examinations provided the Head of the Department concerned certifies that the candidate has performed the experiments prescribed for the Course. For such of those candidates who do not submit Record Books, zero [0] marks will be awarded for record notebooks.

In case a candidate fails in the Practical Examination the marks awarded for the record at the time of first appearance for the Practical Examination should be made available by the University to the Examiners at the subsequent appearance by the candidate.

13. Improvement of marks in the subjects already passed

Candidates who have passed in theory paper/papers are allowed to appear again for theory paper/papers only once in order to improve his/her marks, by paying the fee prescribed from time to time. Such candidates are allowed to improve within a maximum period of 10 semesters counting from his/her first semester of his/her admission. If candidate improves his/her marks, then his/her improved mark will be taken into consideration for the award of Classification and Distinction only. Such improved marks will not be counted for the award of Prize/Medals and Rank. If the candidate does not show improvement in the marks, his/her previous marks will be taken into consideration.

No candidate will be allowed to improve marks in the Practical and Field work.

14. Checklist for Inspection

- a. Qualification for

- i. Teaching Faculty : as Prescribed by the UGC and the University
- ii. Technical Faculty : as Prescribed by the UGC and the University
- iii. Laboratory Staff : as Prescribed by the UGC and the University
- b. Infrastructure Facilities
 - i. Building : Number of Classrooms with specifications: 3 rooms measuring 20' X 25'. If the class strength is above 50, the space shall increase by 10 square feet /student. Number of Staff rooms: One measuring 20' X 20'
 - ii. Furniture : One pair of table / chair per student
 - iii. Laboratory @ 10 Sq. ft. per student

PATTERN OF QUESTION PAPER

Part – A [50 words]	
To Answer 10 questions	10 X 2 marks = 20 marks
Part – B [200 words]	
To Answer 5 questions (either / or pattern)	5 X 5 marks = 25 marks
Part – C [500 words]	
To Answer 3 questions out of 5 questions	3 X 10 marks = 30 marks
	Total = 75 marks

MISSION & GOALS OF MATHEMATICS

We aim to provide a learning environment that excites and informs undergraduate majors and non-majors about Mathematics and the many ways that it is relevant to everyday life. Through our Mathematics department is committed to providing a transformative education through the following elements:

- Develop a positive attitude towards learning Mathematics
- Perform mathematical operations and manipulations with confidence, speed and accuracy.
- Think and reason precisely, logically and critically in any given situation.
- Find employment utilizing their mathematical knowledge.
- To teach effectively mathematical concepts in problem solving.
- Gain knowledge in foundational areas of mathematics.

ADHIPARASAKTHI COLLEGE OF ARTS & SCIENCE (AUTONOMOUS)

G. B. NAGAR, KALAVAI – 632 506

AFFILIATED TO THIRUVALLUVAR UNIVERSITY, VELLORE

DEGREE COURSES

B.Sc., Mathematics

(With effect from 2015 - 2016)

The course of study and the scheme of examination.

Year/ Semester	Part	Subject	Paper	Subject Code	Title of the Paper	Ins. Hrs/ week	Credit	Exam Hrs.	Max. Mark		
									CIA	ESE	Total
I Year I Sem	I	Language	Paper I	U1LT11FL	Tamil I	6	3	3	25	75	100
	II	English	Paper I	U1LE01SL	English I	6	3	3	25	75	100
	III	Core	Paper I	U1MA01MT	Algebra	5	4	3	25	75	100
	III	Core	Paper II	U1MA02MT	Trigonometry	4	4	3	25	75	100
	III	Allied I	Paper I	U1MA02AT	Numerical Methods- I	7	3	3	25	75	100
	IV	Environmental Studies	Paper I	U1ES01GS	Environmental Studies	2	2	3	25	75	100
Total						30	19		150	450	600
I Year II Sem	I	Language	Paper II	U2LT11FL	Tamil II	6	3	3	25	75	100
	II	English	Paper II	U2LE01SL	English II	6	3	3	25	75	100
	III	Core	Paper III	U2MA01MT	Calculus	5	4	3	25	75	100
	III	Core	Paper IV	U2MA02MT	Analytical Geometry of Three dimensions	4	4	3	25	75	100
	III	Allied I	Paper II	U2MA02AT	Numerical Methods- II	7	3	3	25	75	100
	IV	Value Education	Paper I	U2VE11GS	Value Education	2	2	2	—	50	50
Total						30	19		125	425	550

Year/ Semester	Part	Subject	Paper	Subject Code	Title of the Paper	Ins. Hrs/ week	Credit	Exam Hrs.	Max. Mark		
									CIA	ESE	Total
II Year III Sem	I	Language	Paper III	U3LT11FL	Tamil III	6	3	3	25	75	100
	II	English	Paper III	U3LE01SL	English III	6	3	3	25	75	100
	III	Core	Paper – V	U3MA01MT	Differential equations	6	5	3	25	75	100
	III	Allied	Paper – I	U3MA12AT	Mathematical statistics-I	7	5	3	25	75	100
	IV	Skill based Subject	paper – I	U3MA03ST	Mathematics for Competitive Examinations	3	3	3	25	75	100
	IV	Non Major Elective	Paper I	U3BA01NM	Management Concepts	2	2	3	25	75	100
Total						30	21	-	150	450	600
II Year IV Sem	I	Language	Paper IV	U4LT11FL	Tamil IV	6	3	3	25	75	100
	II	English	Paper IV	U4LE01SL	English IV	6	3	3	25	75	100
	III	Core	Paper VI	U4MA01MT	Vector Analysis and Fourier Analysis	6	5	3	25	75	100
	III	Allied	Paper – II	U4MA12AT	Mathematical Statistics-II	5	4	3	25	75	100
	IV	Skill based Subject	paper – II	U4MA03ST	Linear Programming	3	2	3	25	75	100
	IV	Non Major Elective	Paper II	U4BA01NM	General Commercial Knowledge	2	2	3	25	75	100
	III	Allied Practical	Practical-I	U4MA01AP	Allied-II Practical Mathematical Statistics	2	2	3	20	30	50
Total						30	21	-	170	480	650

Year/ Semester	Part	Subject	Paper	Subject Code	Title of the Paper	Ins. Hrs/ week	Credits	Exam Hrs.	Max. Mark		
									CIA	SEM	Total
III Year V Sem	III	Core	Paper - VII	U5MA01MT	Abstract Algebra	5	5	3	25	75	100
	III	Core	Paper-VIII	U5MA02MT	Real Analysis - I	5	5	3	25	75	100
	III	Core	Paper - IX	U5MA03MT	Complex Analysis – I	5	5	3	25	75	100
	III	Core	Paper – X	U5MA04MT	Statics	5	5	3	25	75	100
	III	Core	Paper - XI	U5MA05MT	Operation Research	4	4	3	25	75	100
	III	Elective I (Choose 1 out of 2)	Paper - I	U5MA06ET	Graph Theory	3	3	3	25	75	100
			Paper - II	U5MA07ET	Astronomy						
	IV	Skill based Subject	Paper - III	U5MA08ST	Quantitative Techniques	3	3	3	25	75	100
Total						30	30		175	525	700
III Year VI Sem	III	Core	Paper - XII	U6MA01MT	Linear Algebra	5	5	3	25	75	100
	III	Core	Paper- XIII	U6MA02MT	Real Analysis-II	5	5	3	25	75	100
	III	Core	Paper- XIV	U6MA03MT	Complex Analysis-II	4	4	3	25	75	100
	III	Core	Paper- XV	U6MA04MT	Dynamics	4	4	3	25	75	100
	III	Elective II (Choose 1 out of 2)	Paper - III	U6MA05ET	Programming in C	3	3	3	25	75	100
			Paper - IV	U6MA06ET	Matlab Programming						
			Practical- II	U6MA01EP	Programming in C Lab	3	2	3	20	30	50
			Practical - III	U6MA02EP	Matlab						
	III	Elective III (Choose 1 out of 2)	Paper – V	U6MA07ET	Special Functions	3	3	3	25	75	100
			Paper - VI	U6MA08ET	Fuzzy Mathematics						
	IV	Skill based Subject	Paper - IV	U6MA09ST	Fundamentals of Applied Mathematics	3	3	3	25	75	100
	V	Extension Activities	-	U6EA01GS	Extension Activities	0	1	-	50	-	50
Total						30	30	-	245	555	800
Grand Total						180	140	-	1175	3125	4300

SEMESTER – I
MAJOR PAPER - I
ALGEBRA
SUBJECT CODE – U1MA01MT

L	T	P	C
5	0	0	3

Total Hours : 65

OBJECTIVES :

In this course students are exposed to topics like Theory of Equations, Summation of Series, Matrices, Continued Fractions and Elementary Number Theory. The stress is on the development of problem solving skills.

UNIT – I : THEORY OF EQUATIONS

Polynomial Equations – Imaginary and Irrational roots – Symmetric Functions of roots in terms of co-efficients – Sum of r-th power of roots – Reciprocal Equations – Transformation of Equations.

UNIT – II : THEORY OF EQUATIONS (Contd.)

Descarts Rule of Signs – Approximate Solutions of Polynomials by Horner's method – Newton Raphson method of Solution of Cubic Polynomial.

UNIT – III : SUMMATION OF SERIES

Summation of series using Binomial – Exponential and Logarithmic series (Theorems without proofs)- Approximation using Binomial & Exponential series.

UNIT – IV : MATRICES

Symmetric – Skew Symmetric – Hermitian – Skew Hermitian – Orthogonal and Unitary Matrices – Rank of Matrix – Consistency and Solutions of linear Systems- Cayley-Hamilton Theorem(without proof) – Eigen Values – Eigen Vectors – Similar Matrices – Diagonalisation of a Matrix.

UNIT – V : ELEMENTARY NUMBER THEORY

Prime Number – Composite Number – Decomposition of a Composite Number as a Product of Primes uniquely (without proof) – Divisors of a positive Integers – Congruence Modulo n – Euler Function (without proof) – Highest Power of a Prime Number p contained in n! – Fermat's and Wilson's Theorems.

Recommended Texts :

1. T. K. Manicavachagam Pillay, T. Natarajan and K. S. Ganapathy, Algebra, Volume - I & II S. Viswanathan Printers Pvt. Ltd., Chennai. (II Edition) 2011
2. P. Kandasamy, K. Thilagavathy, Mathematic for B.Sc., Volume - I, II, III & IV, S. Chand & Company Ltd., New Delhi - 55. (I Edition) 2010

Reference Books:

1. S. Arumugam, Algebra, New Gamma Publishing House, Palayamkottai. (II Edition) 2003
2. S. Sudha, Algebra and Trigonometry. Emerald Publishes, Chennai. (I Edition) 2008
3. A. Singaravelu, Algebra and Trigonometry , Volume - I & II Meenakshi Agency, Chennai. (II Edition) 2015

**SEMESTER – I
MAJOR PAPER - II
TRIGONOMETRY
SUBJECT CODE – U1MA02MT**

L	T	P	C
4	0	0	3

Total Hours : 52

OBJECTIVES :

This course is a fundamental one for many courses of this degree programme. This covers topics on the expansions of trigonometric functions, hyperbolic functions, inverse circular, inverse hyperbolic functions and it aims to develop computational skills.

UNIT – I : EXPANSIONS

Expansions of $\cos n\theta$, $\sin n\theta$ – Expansion of $\tan n\theta$ in terms of $\tan\theta$ – Expansion of $\tan(A+B+C+\dots)$ – Formation of Equations.

UNIT – II : POWERS OF SINES AND COSINES

Powers of sines and cosines of θ in terms of functions of multiples of θ – Expansions of $\sin \theta$ and $\cos \theta$ in a series of ascending powers of θ – Expansion of Inverse Circular Functions.

UNIT – III : HYPERBOLIC FUNCTIONS

Definition of hyperbolic functions – Relation between Hyperbolic Functions – Inverse Hyperbolic Functions.

UNIT – IV : DE - MOIVRE'S PROPERTY

Resolution into Factors – De Moivre's Property on the Circle and Cote's Property on the Circle. Logarithm of complex quantities.

UNIT – V : SUMMATION OF TRIGONOMETRIC SERIES

Summation of Trigonometric Series: Method of Differences – Gregory Series – Euler Series.

Recommended Text :

1. P. Kandaswamy, K. Thilagavathy, Mathematic for B.Sc., Volume - I, II, III & IV, S. Chand & Company Ltd., New Delhi - 55. (I Edition) 2005
2. S. Narayanan and T. K. Manicavachagom Pillay, Calculus, S. Vishwanathan Printers & Publishers Pvt. Ltd. Chennai. (II Edition) 2009

Reference Books :

1. A. Singaravelu, Algebra and Trigonometry, Volume -I Meenakshi Agency, Chennai. (I Edition) 2003
2. P. R. Vital, Trigonometry, Margham Publications, Chennai. (III Edition) 2004
3. P. Duraipandian and Laxmi Duraipandian, Trigonometry. Emerald Publishers, Chennai. (I Edition) 2009
4. S. L. Loney, Plane Trigonometry, Part - II, Cambridge University Press, London. (II Edition) 2014
5. B. S. Grewal, Higher Engineering Mathematics. Khanna Publishers. New Delhi. (43rd Edition) 2014

SEMESTER – I
ALLIED - I PAPER – I
NUMERICAL METHODS - I
SUBJECT CODE – U1MA02AT

L	T	P	C
7	0	0	5

Total Hours : 91

OBJECTIVES :

This course will cover basic methods for finding the Finite differences, Central differences, Inverse Interpolation, Summation of series, Interpolation for equal & unequal intervals, Solutions of simultaneous equations, Important principles, Method and Processes to get numerical results, Reliability of numerical results.

UNIT – I : FINITE DIFFERENCES

First and higher order differences and Backward differences – Properties of Operators – Differences of a Polynomial – Factorial Polynomials – Operator E, Relation between Δ and E-Interpolation – Newton – Gregory forward & Backward formulae for Interpolation.

UNIT – II : CENTRAL DIFFERENCES

Central difference Operators-Central differences formulae: Gauss Forward and Backward formulae-Sterling's formula-Bessel's formula.

UNIT – III : INTERPOLATION FOR UNEQUAL INTERVALS

Divided differences-Newton's divided differences formula and Lagrange's-Estimating the Missing terms(With one or more missing values).

UNIT – IV : INVERSE INTERPOLATION

Lagrange's method and Reversion of series method(Using Newton's forward formula only).
 Summation of series: Sum to n term of the series whose general term is the first difference of a function-summation by parts.

UNIT – V : SOLUTIONS OF SIMULTANEOUS LINEAR EQUATIONS

Gauss elimination method-matrix inversion method-Gauss-Jordan method, Gauss-Seidal method=Crout's method(Three unknowns only)

Recommended Text :

1. M. K. Venkataraman, Numerical methods for science and Engineering, National Publishing Company, Chennai. (I Edition) 2010

2. B. D. Gupta, Numerical Analysis, Konark Pub. Ltd., Delhi. (I Edition) 2008

Reference Books :

1. S. Arumugham, Numerical Methods, New Gamma Publishing, Palayamkottai. (I Edition) 2003
2. A. Singaravelu, Numerical Methods, Meenakshi Agency, Chennai. (I Edition) 2004
3. H. C. Saxena, Finite differences and Numerical analysis S. Chand & Co., Delhi. (II Edition) 2010
4. P. Kandasamy, K. Thilagavathy, Calculus of Finite differences & Numerical Analysis, S. Chand & Company Ltd., New Delhi - 55. (I Edition) 2012

**SEMESTER – II
MAJOR PAPER – III
CALCULUS
SUBJECT CODE – U2MA01MT**

L	T	P	C
5	0	0	3

Total Hours : 65

OBJECTIVES :

This course introduces students to the fundamental principles, concepts and knowledge in the areas of differential and integral calculus. This prepares the students to apply these fundamental concepts and working knowledge to other courses.

UNIT - I : DIFFERENTIAL CALCULUS

Differential Calculus: nth derivative – Leibnitz's theorem (without proof) and its application – Jacobians – Total differential – Maxima and Minima functions of 2 & 3 independent variable, Lagranges method (without proof), Problems on this concepts.

UNIT - II : CURVATURE & RADIUS OF CURVATURE

Curvature, Radius of Curvature in Cartesian and Polar coordinates, p-r equation, Evolutes.

UNIT - III : ASYMPTOTES

Asymptotes: Methods (without proof) of finding asymptotes of rational algebraic curves with special cases.

UNIT - IV : INTEGRAL CALCULUS

Reduction formulae, Beta and Gamma Functions – Properties and Problems.

UNIT - V : MULTIPLE INTEGRALS

Double Integrals – Change of order of order of Integration – Triple Integrals – Applications to Area, Surface Area and Volume.

Recommended Text :

1. P. Kandasamy, K. Thilagavathy, Mathematic for B.Sc., Volume - I, II, III & IV, S. Chand & Company Ltd., New Delhi - 55. (I Edition) 2005

2. S. Narayana and T. K. Manicavachagom Pillay, Calculus.
S. Vishwanathan Printers & Publishers Pvt. Ltd., Chennai. (II Edition) 2012

Reference Books :

1. Shanti Narayan, Differential Calculus, Shyamlal Charitable Trust, New Delhi. (30th Edition) 2005
2. Shanti Narayan, Integral Calculus. S. Chand & Co. New Delhi. (35th Edition) 2005
3. S. Sudha, Calculus, Emerald Publishers, Chennai. (I Edition) 2008
4. G. B. Thomas and R.L. Finney, Calculus and Analytic Geometry, Addison Wesley, Mass. (Indian Print) (IX Edition) 2009
5. P. R. Vittal, Calculus, Margham Publication, Chennai. (I Edition) 2013

L	T	P	C
4	0	0	3

Total Hours : 52

SEMESTER – II
MAJOR PAPER - IV
ANALYTICAL GEOMETRY
SUBJECT CODE – U2MA02MT

OBJECTIVES :

Students are exposed to fundamental aspects of Two and Three Dimensional Analytical Geometry and it develops logical and systematic computational skills.

UNIT – I : TWO DIMENSIONAL ANALYTICAL GEOMETRY(CONICS)

Chord in terms of middle points using r-method (or) otherwise – Pole, Polar.
Chapter VI-Sections:1,2,4,5,6,7,8,9,13 (Only results with proof and no problems)
Chapter VII-Sections:1-1.1 to 1.4, 4 to 7,10,11,15, 16-16.1 to 16.4
Chapter VIII-Sections: 1-1.1,1.2,4-4.1,6

UNIT – II : CONJUGATE DIAMETER

Conjugate Hyperbola, Conjugate Diameter for Ellipse Hyperbola
Chapter VII-Sections:16-16.1,16.3
Chapter VIII-Sections: 7,8,9

UNIT – III : THREE DIMENSIONAL ANALYTICAL GEOMETRY

Planes and Straight lines
Chapter II-Sections- 1 to 9, 10-10.1,10.2,11
(Only statement of theorems without proof and problems)
Chapter III-Sections: 1 to 8 (Only statement of theorems without proof and problems)

UNIT – IV : SPHERE

Sphere-Section of a Sphere by a Plane – Tangent Plane, Orthogonal Spheres.

UNIT – V : CONE & CYLINDER

Cone-Equation of a Cone – Cone whose vertex is at the origin – Quadric Cone with the vertex at the origin – Right Circular Cone – Cylinder – Right Circular Cylinder – Equation of a Cylinder

Recommended Text :

1. G. B. Thomas and R. L. Finney, Calculus and Analytic Geometry, Addison Wesley, Mass. (Indian Print) (I Edition) 2009
2. P. Duraipandian and Laxmi Duraipandian, Analytical Geometry - 2D, Asia Publishing company, Bombay. (I Edition) 2010
3. P. Duraipandian and Laxmi Duraipandian, Analytical Geometry - 3D, Emerald Publishers, Chennai. (I Edition) 2010

Reference Books :

1. P. R. Vittal, Coordinate Geometry. Margham Publishers, Chennai. (III Edition) 2012
2. S. G. Venkatachalapathy, Analytical Geometry, Margham Publishers, Chennai. (I Edition) 2008

SEMESTER – II
ALLIED - I PAPER – II
NUMERICAL METHODS - II
SUBJECT CODE – U2MA02AT

L	T	P	C
7	0	0	5

Total Hours : 91

OBJECTIVES :

This course will cover basic methods for finding the Finite differences, Central differences, Inverse Interpolation, Summation of series, Interpolation for equal & unequal intervals, Solutions of simultaneous equations, Important principles, Method and Processes to get numerical results, Reliability of numerical results.

UNIT – I : NUMERICAL DIFFERENTIATION

Newton's forward and backward differences to compute derivatives- Derivative using divided differences formula- Maxima and Minima using the above formulae.

UNIT – II : NUMERICAL INTEGRATION

General Quadrature formula- Trapezoidal rule- Simpson's one third rule- Simpson's three-eight rule, Weddle's rule – Euler –Maclaurin Summation Formula

UNIT – III : DIFFERENCE EQUATIONS

Linear differences equations – Linear homogeneous difference equation with constant coefficient- Particular integrals for ax , xm , $\sin ax$, $\cos ax$ and $axf(x)$.

UNIT – IV : SOLUTION OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS

Bisection method- Iteration method – Regular-falsi method (Falsi Position Method)- Newton-Raphson Method.

UNIT - V: NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS (FIRST ORDER ONLY)

Euler's method- Euler's modified method – Picard's method – Taylor's methods – Runge-Kutta method (Fourth order only).

Recommended Text :

1. B. D. Gupta, Numerical Analysis, Konark Pub. Ltd., Delhi. (I Edition) 2008
2. M. K. Venkatarama, Numerical methods for Science and Engineering, National Publishing Company, Chennai. (I Edition) 2010

Reference Books :

1. A. Singaravelu, Numerical methods, Meenakshi Publications, (II Edition) 2009
2. H. C. Saxena, Finite differences and Numerical Analysis, S. Chand & Co., New Delhi. (II Edition) 2010
3. P. Kandasamy, K. Thilagavathy, Calculus of finite difference & Numerical Analysis, S. Chand & Company Ltd., New Delhi - 55. (II Edition) 2012
4. Gupta - Malik, Calculus of finite differences and numerical Analysis, Kirshba Prakashan Mandir, Meerut. (II Edition) 2014

SEMESTER – III
MAJOR PAPER - V
DIFFERENTIAL EQUATIONS
SUBJECT CODE – U3MA01MT

L	T	P	C
6	0	0	5

Total Hours : 78

OBJECTIVES :

This course aims to provide logical skills in the formation of differential equations, to expose to different techniques of finding solutions to these equations and in addition stress is laid on the Application of these equations in geometrical and physical problems.

UNIT - I : ORDINARY LINEAR DIFFERENTIAL EQUATIONS

Bernoulli Equation – Exact Differential Equations – Equations Reducible to Exact Equations – Equations of First order and Higher degree: Equations solvable for p, Equation solvable for x and equations Solvable for y – Clairaut's Equation.

UNIT - II : ORDINARY LINEAR DIFFERENTIAL EQUATION (Contd.)

Method of variation of Parameters - 2nd order Differential Equations with Constant Coefficients for finding the P. I 's of the form $e^{ax} V$, where V is $\sin(mx)$ or $\cos(mx)$ and X^n - Equations reducible to Linear Equations with Constant Coefficients- Cauchy's homogeneous Linear Equations –Legendre's Linear Equations – Linear Dependence of Solutions - Simultaneous Equations with Constant Coefficients.

UNIT – III : DIFFERENTIAL EQUATIONS OF OTHER TYPES

Equations of the form $\frac{d^2y}{dx^2} = f(x)$ - Equations of the form $\frac{d^2y}{dx^2} = f(y)$ - Equations which do not contain y - Equations which do not contain x –Total Differential Equations Simultaneous Total Differential Equations – Equations of the form $\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R}$ – Method of Grouping.

UNIT – IV : LAPLACE TRANSFORM

Laplace Transform –Inverse Laplace Transform – Properties – Application of Laplace Transform to solution of first and second order Linear Differential Equations [with Constant Coefficients] and Simultaneous Linear Differential Equations.

UNIT – V : PARTIAL DIFFERENTIAL EQUATIONS

Formation of PDE- Complete integral-Particular integral-Singular integral-Equations solvable by direct Integration-Linear Equations of the first order-Non-linear Equations of the first order Types: $f(p, q) = 0$, $f(X, p, q) = 0$, $f(Y, p, q) = 0$, $f(Z, p, q) = 0$, $f(X, q) = f(Y, p)$, $Z = px + qy + f(p, q)$

Recommended Texts :

1. Sheply L. Ross, Differential Equations, John Wiley & Sons, Newyork. (III Edition) 2007
2. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, New Delhi. (43rd Edition) 2014

Reference Books :

1. S. Sudha, Differential Equations and integral Transform, Emerald Publishers, Chennai. (I Edition) 2003
2. M. R. Spiegel, Laplace Transforms, Tata McGraw Hill, New Delhi. (I Edition) 2010
3. P. R. Vittal, Differential Equations and Laplace Transform, Margham Publications, Chennai. (I Edition) 2010
4. M. R. Spiegel, Advanced Mathematics for Engineers and Scientists, Tata McGraw Hill Edition, NewDelhi. (I Edition) 2010
5. S. Narayanan & T. K. Manicavachagam Pillai, Calculus, S. Viswanathan Printers & Publishers Pvt. Ltd., Chennai. (II Edition) 2012
6. P. Kandasamy, K. Thilagavathy, Mathematics for B.Sc., Volume - III, S. Chand & Co., Ltd., New Delhi - 55. (II Edition) 2014
7. M. K. Venkataraman, Higher Engineering Mathematics III –B, National Publishing Co., Chennai. (XI Edition) 2014
8. M. D. Raisinghania, Ordinary and partial Differential Equations, S. Chand & co., (II Edition) 2015

SEMESTER – III
SKILL BASED SUBJECT - I
MATHEMATICS FOR COMPETITIVE EXAMINATIONS
SUBJECT CODE – U3MA03ST

L	T	P	C
3	0	0	3

Total Hours : 39

OBJECTIVES :

To introduce concepts of mathematics with emphasis on analytical ability and computational Skill needed in competitive examinations.

UNIT – I : PROBLEMS ON GENERAL ARITHMETIC

Ratio and Proportions - Inverse ratio – Properties(Addendo, Subtrahendo, componendo &dividendo)-ratio of four numbers-increasing and decreasing order of fractions -problems of ages. Section 1.12 and 1.8

UNIT – II : PROBLEMS ON PERCENTAGE

Percentages - gain and loss percents-partnership problems. Section 1.10, 1.11 and 1.13

UNIT – III : TIME, DISTANCE AND WORK

Time and distance - Time and work Section 1.17 and 1.15

UNIT – IV : COMMERCIAL ARITHMETIC

Simple interest-compound interest-Shares and Stocks Section 1.21,1.22 and 1.29

UNIT – V : BASIC STATISTICS

Measures of Central tendencies, mean, median, mode, Geometric Mean & Harmonic Mean, error corrections, Application, properties. Measures of dispersion- Range, Standard Deviation, Quartile Deviation, Percentiles and deciles applications

Recommended Text :

1. S. C. Gupta and V. K. Gupta, Fundamentals of applied Statistics (V- Unit) (II Edition) 2000
2. R. S. Aggarwal, Quantitative Aptitude (I - IV Units) S. Chand & Co., New Delhi. (III Edition) 2012

Reference Books :

1. Edgar Thorpe, Course in Mental Abilities and Quantitative Aptitude for Competitive Examinations, Tata McGraw Hill Pub., Co., Ltd. New Delhi. (III Edition) 2012
2. RSN Pillai and A. Bagavathi, Statistics, S. Chand & Co., (II Edition) 2010
3. Arun Sharma, Quantitative aptitude for CAT, McGraw Hill Education (India) Private Ltd., (VI Edition) 2014
4. Abhigat Guha, Quantitative Aptitude for Competitive Examinations, Tata McGraw Hill Pub., Co., Ltd. New Delhi. (III Edition) 2014
5. Sarvesh K. Verma, Quantitative Aptitude Quantum CAT, Arihant. (V Edition) 2015

SEMESTER – III
ALLIED-II PAPER – I
MATHEMATICAL STATISTICS – I
SUBJECT CODE – U3MA02AT

L	T	P	C
7	0	0	5

Total Hours : 91

OBJECTIVES :

To apply Statistics methods for Mathematical Problems

UNIT – I : PROBABILITY

Concept of Sample Space-Events-Definition of Probability (Classical, Statistical and Axiomatic)-Addition and Multiplication laws of Probability-Independence of Events-Conditional Probability-Bayes theorem-Simple Problems.

UNIT – II : CHEBYCHEV'S INEQUALITY

Random Variables(Discrete and Continuous)-Distribution Function-Expectation and Moments-Moment Generating Function-Probability Generating Function-Cumulant Generating Function-Simple Problems- Chebychev's inequality-Simple Problems.

UNIT – III : RANK CORRELATION

Characteristic Function-Properties-Uniqueness and Inversion Theorem(Statement only) - Concept of Bivariate Distribution-Correlation-Karl Pearson's Coefficient of correlation-Rank Correlation-Linear Regression -Concept of Partial and Multiple correlation(Three Variables only) .

UNIT – IV : DISTRIBUTIONS

Standard distribution: (Discrete distributions)- Binomial, Poisson, Hyper-Geometric and Negative-Binomial Distributions-Interrelationship among these Distributions.

UNIT – V : GAMMA AND BETA DISTRIBUTIONS

Standard distribution: (Continuous Distribution)- Normal, Uniform, Exponential, Gamma and Beta Distributions-Interrelationship among these Distributions.

Recommended Text :

S. C. Gupta & V. K. Kapoor, Fundamentals of Mathematical Statistics, Sultan & sons. (VIII Edition) 2014

Reference Books :

1. Mood. A. M., Graybill. F. A. & Boes. D. G., Introduction to theory of statistics, McGraw Hill. (I Edition) 2007
2. Hoel. P. G., Introduction to mathematical Statistics, Wiley. (I Edition) 2008
3. Wilks. S. S., Elementary Statistical Analysis, Oxford and IBH. (I Edition) 2008
4. Hogg. R.V. & Criag. A. T., Introduction to Mathematical Statistics, Macmillan. (VII Edition) 2013
5. Snedecor. G. W. & Cochran. W. G., Statistical Methods, Oxford and IBH. (VIII Edition) 2014

SEMESTER – IV
MAJOR PAPER – VI
VECTOR ANALYSIS AND FOURIER ANALYSIS
SUBJECT CODE : U4MA01MT

L	T	P	C
6	0	0	5

Total Hours : 78

Objectives :

This course covers the topics in vector calculus and Fourier Analysis which are essential tools of modern Applied mathematics. To develop deep understanding of key concepts followed by problems of Applied nature. The portion on Fourier analysis will lead to post graduate studies and research in Pure as well as applied mathematics.

UNIT – I : DIFFERENTIATION OF VECTOR

Differentiation of a vector-Geometrical interpretation of the Derivative-Differentiation Formulae-Differentiation of dot and cross products-Partial derivatives of vectors-Differentials of vectors

UNIT – II : GRADIENT, DIVERGENCE AND CURL

Vector differential operator Del-Gradient of a Scalar function-Directional Derivative-Geometric Interpretation-Gradient of the sum, functions, the product of functions and a function of Function-operations involving del-divergence of a vector and it's physical interpretation-Curl of a vector and it's physical interpretation- formulae involving operator Del- solenoidal and irrotational.

UNIT – III : VECTOR INTEGRATION

The Line integral-Surface integral and Volume- Gauss Divergence theorem, Green's theorem and Stoke's theorem (only statement , simple theorem).

UNIT – IV : FOURIER SERIES

Euler's Formulae- Fourier expansion of function with period 2π -Odd and Even Function-Half range series - Parseval's formula- Change of intervals.

UNIT – V : FOURIER TRANSFORM

Fourier integral - Complex form of Fourier integral- Fourier Sine and cosine integral-Fourier Transform – Definition, properties, Convolution theorem , Parseval's identity – simple problems. Finite Fourier Sine and Cosine transforms (without proof).

Recommended Text :

B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, New Delhi.
(43rd Edition) 2014

Reference Books :

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, Addison Wesley, Mass. (Indian Print) (I Edition) 2009
2. M. K. Venkataraman, Engineering Mathematics Part-B, National Publishing company, Chennai. (XI Edition) 2014
3. P. R. Vittal, Vector Calculus, Fourier Series and Fourier Transform, Margham Publications, Chennai. (II Edition) 2015

SEMESTER – IV
SKILL BASED SUBJECT – II
LINEAR PROGRAMMING
SUBJECT CODE : U4MA03ST

L	T	P	C
3	0	0	2

Total Hours : 39

OBJECTIVES :

To improve the skills of solving very common problems which we come across in various fields like transportation, games and industries with machines.

UNIT – I : LINEAR PROGRAMMING PROBLEM

Linear programming problem – Mathematical formulation of the problem – Graphical solution method – Simplex method – Duality – Primal and dual relation (simple problems).

UNIT – II : TRANSPORTATION PROBLEM

Transportation problem – Degeneracy in transportation problem.

UNIT – III : ASSIGNMENT PROBLEM

The Assignment problem – Travelling salesman problem.

UNIT – IV : GAME THEORY

Game theory – two persons Zero sum game – the maximin minimax principle - Saddle points – games without saddle points.

UNIT – V : JOB SEQUENCING PROBLEM

Job sequencing problem (2,3,n jobs) – application – advantages and disadvantages – Monte Carlo method – simple problems.

Recommended Text:

Gupta P. K and Hira D. S., Problems in operations Research, S.Chand & Co.Delhi.
(III Edition) 2000

Reference books:

1. Kanti Swaroop, Gupta P. K. and Manmohan, Problems in operation Research, Sultan Chand & Sons. (II Edition) 2010
2. J. K. Sharma, operations Research: Theory and Applications Macmillan, Delhi. (II Edition) 2011
3. V. K. Kapoor Operations Research (Concepts, Problems & Solutions), Sultan Chand & Sons. (I Edition) 2012
4. P. R. Vittal, Operations Research, Margham publications, Chennai. (I Edition) 2012
5. Taha H.A. Operations Research, Macmillian Publishing Company, New York. (IX Edition) 2013

SEMESTER – IV
ALLIED-II PAPER – II
MATHEMATICAL STATISTICS - II
SUBJECT CODE : U4MA02AT

L	T	P	C
5	0	0	4

Total Hours : 65

OBJECTIVES :

To apply Statistics for Mathematical problems

UNIT – I : SAMPLING AND SAMPLING DISTRIBUTION

Statistical population Census and Sampling Survey – Parameter and Statistics – Sampling and Sampling Distribution and Standard Error. Sampling distributions – students ‘t’ distribution.

UNIT – II : ‘t’, CHI - SQUARE AND F – DISTRIBUTION

Test of significance – Large sample test for proportion, mean and standard deviation – Exact test based on ‘t’, Chi- square and F distribution with respect to population mean, variance and correlation coefficient – Tests of independence of attributes – goodness of fit tests.

UNIT – III : CRAMER & RAO INEQUALITY

Point estimation – Concepts of unbiasedness, Consistency, Efficiency and Sufficiency – Cramer – Rao Inequality – Methods of Estimation – Maximum Likelihood Estimation – Method of Moments – Interval Estimation – Confidence Interval for Population Mean, Proportion and Variance Based on Normal, ‘t’, Chi- square and F distributions.

UNIT – IV : TEST OF HYPOTHESIS

Test of Hypothesis: Null and Alternate Hypothesis – Type I and Type II error – Power of the test – Neymann Pearson Lemma – Likelihood Ratio Test – Concept of Most Powerful test (Statement and Results only) – Simple Problems.

UNIT – V : ANALYSIS OF VARIANCE

Analysis of Variance – One way and Two way Classification - Chi- square and F distributions

Recommended Text :

S. C. Gupta & V. K. Kapoor, Fundamentals of Mathematical Statistics, Sultan & sons.
(VIII Edition) 2014

Reference Books :

1. Mood A. M., Graybill. F. A. & Boes D. G., Introduction to theory of Statistics, McGraw Hill. (III Edition) 2001
2. Hogg R. V. & Craig A. T., Introduction to Mathematical Statistics, Macmillan. (III Edition) 2001
3. Hoel P. G., Introduction to Mathematical Statistics, Wiley. (I Edition) 2008
4. Wilks S. S., Elementary Statistical Analysis, Oxford and IBH. (I Edition) 2008
5. M. N. Das and N. C. Giri, Design of Experiments, Wiley Eastern. (II Edition) 2010
6. Snedecor G. W. & Cochran. W. G. Statistical Methods, Oxford and IBH. (VIII Edition) 2014
7. S. C. Gupta & V. K. Kapoor, Fundamentals of Mathematical Statistics, Sultan & Sons. (II Edition) 2014
8. S. C. Gupta & V. K. Kapoor, Fundamentals of Applied Statistics, Sultan & Sons. (IV Edition) 2014

SEMESTER – IV
ALLIED PRACTICAL
MATHEMATICAL STATISTICS
SUBJECT CODE : U4MA01AP

L	T	P	C
2	0	2	2

Total Hours : 26

1. Measures of location and Dispersion(absolute and relative)
2. Computation of Correlation Coefficient for raw and Grouped data, Rank Correlation Coefficient.
3. Computation of Regression Equations for Raw and Grouped Data.
4. Curve Fitting by the Method of Least Squares.
 - a) $y = aX + b$
 - b) $y = aX^2 + bX + c$
 - c) $y = ae^{bx}$
 - d) $y = aX^b$
5. Fitting of Binomial, Poisson, Normal distributions and Tests of goodness of fit.
6. Large sample tests with regard to population mean, proportion, standard deviation.
7. Exact tests with Respect to Mean , Variance and Coefficient of Correlation.
8. Test for Independence of Attributes Based on Chi – square Distribution.
9. Confidence interval based on Normal, 't' , and Chi-square and F Distributions.
10. Problems based on ANOVA – One and Two way Classification.

Note :

Use of scientific calculator shall be permitted for practical examination. Statistical and Mathematical tables are to be provided to the students at the examination hall.

- Mathematics faculty alone should be appointed as examiners.

Reference Books :

1. Mood A. M., Graybill. F. A. & Boes D. G., Introduction to theory of Statistics, McGraw Hill. (III Edition) 2001
2. Hogg R. V. & Craig A. T., Introduction to Mathematical Statistics, Macmillan. (III Edition) 2001
3. Hoel P. G., Introduction to Mathematical Statistics, Wiley. (I Edition) 2008
4. Wilks S. S., Elementary Statistical Analysis, Oxford and IBH. (I Edition) 2008
5. M. N. Das and N. C. Giri, Design of Experiments, Wiley Eastern. (II Edition) 2010
6. Snedecor G. W. & Cochran. W. G. Statistical Methods, Oxford and IBH. (VIII Edition) 2014
7. S. C. Gupta & V. K. Kapoor, Fundamentals of Mathematical Statistics, Sultan & Sons. (II Edition) 2014
8. S. C. Gupta & V. K. Kapoor, Fundamentals of Applied Statistics, Sultan & Sons. (IV Edition) 2014

SEMESTER – V
MAJOR PAPER - VII
ABSTRACT ALGEBRA
SUBJECT CODE – U5MA01MT

L	T	P	C
5	0	0	5

Total Hours : 65

OBJECTIVES :

This course aims to impart emphasis on concepts and technology of the groups and rings as these algebraic structures have applications in Mathematical Physics, Mathematical Chemistry and Computer Science.

UNIT – I : GROUPS

Definition of a Group – Examples - Some Preliminary Lemmas – Subgroups.
Sections 2.1 - 2.4 of I.N.Herstein

UNIT – II : GROUPS (Contd.)

Counting Principle - Normal Subgroups & Quotient group - Homomorphisms.
Sections 2.5 - 2.7 of I.N.Herstein

UNIT – III : GROUPS (Contd.)

Automorphisms - Cayley's Theorem - Permutation Groups.
Sections 2.8 - 2.10 of I.N.Herstein

UNIT-IV: RINGS

Definition and Examples – Some Special Classes of Rings - Homomorphism of Rings - Ideals and Quotient Rings. Sections 3.1 - 3.4 of I.N.Herstein

UNIT-V: RINGS (Contd.)

Prime Ideal and Maximal Ideal - The field of quotients of an Integral domain - Euclidean rings.

Sections 3.5 - 3.7 of I.N.Herstein

Recommended Text :

I. N. Herstein, Topics in Algebra, Wiley Eastern Ltd., New Delhi. (II Edition) 2013

Chapter – 2 : Sections 2.1 - 2.10 (Omit Applications 1 and 2 of 2.7)

Chapter – 3 : Sections 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7

Reference Books :

1. M. L. Santiago, Modern Algebra, Tata McGraw Hill, New Delhi. (I Edition) 2002

2. J. B. Fraleigh, A First Course in Algebra, Addison Wesley, Mass. (Indian Print) (VII Edition) 2003

3. Lloyd R. Jaisingh and Frank Ayres, Jr. Abstract Algebra, Tata McGraw Hill Edition, New Delhi.

- (II Edition) 2005
4. Surjeet Singh and Qazi Zameeruddin, Modern Algebra, Vikas Publishing House Pvt. Ltd., New Delhi. (VIII Edition) 2006
5. S. Arumugam, Modern Algebra. Scitech Publications, Chennai. (II Edition) 2013

SEMESTER – V
MAJOR PAPER - VIII
REAL ANALYSIS - I
SUBJECT CODE – U5MA02MT

L	T	P	C
5	0	0	5

Total Hours : 65

OBJECTIVES:

To understand various limiting behavior of sequences and series To explore the various limiting processes viz. continuity, uniform continuity, differentiability and integrability and to enhance the mathematical maturity and to work comfortably with concepts.

UNIT – I: FUNCTIONS & SEQUENCES

Functions - real valued functions - equivalence - countability and real numbers - least upper bound - definition of sequence and subsequence - limit of a sequence - convergent sequence Ch. 1.4 to 1.7, 2.1 to 2.3 of Goldberg.

UNIT – II: SEQUENCES (Contd.)

Divergent sequences - Bounded sequences - Monotone sequence - Operations on convergent sequences - Operations on divergent sequences - Limit superior and Limit inferior - Cauchy sequences Ch. 2.4 to 2.10 of Goldberg.

UNIT – III: SERIES OF REAL NUMBERS

Convergence and Divergence - Series with non negative terms - Alternating series - conditional convergence and Absolute convergence - Test for Absolute convergence. Ch. 3.1 to 3.4 and 3.6 of Goldberg.

UNIT – IV: SERIES OF REAL NUMBERS (Contd.)

Test for Absolute convergence – The class ℓ^2 - Limit of a function on the real line - Metric spaces - Limits in Metric spaces. Ch. 3.7, 3.10, 4.1 to 4.3 of Goldberg.

UNIT-V: Continuous Functions on Metric Spaces

Functions Continuous at a point on the real line - Reformulation - Functions Continuous on a Metric Spaces - Open Sets - Closed Sets. Ch. 5.1 to 5.5 of Goldberg

Recommended Text :

R. Goldberg, Methods of Real Analysis. Oxford & IBH Publishing Co., New Delhi. (II Edition) 2012

Reference Books :

1. Tom M. Apostol, Mathematical Analysis, Addison-Wesley New York. (II Edition) 2002
2. Sanjay Arora and Bansilal, Introduction to Real Analysis, Satya Prakashan, New Delhi.

- (II Edition) 2008
3. Malik S.C. and Savita Arora, Mathematical Analysis, Wiley Eastern Limited, New Delhi.
- (II Edition) 2010
4. Bartle R.G. and Shebert, Real Analysis, John Wiley and Sons Inc., New York. (III Edition) 2012

SEMESTER – V
MAJOR PAPER - IX
COMPLEX ANALYSIS - I
SUBJECT CODE – U5MA03MT

L	T	P	C
5	0	0	5

Total Hours : 65

OBJECTIVES :

This course provides

- (i) A modern treatment of concepts and techniques of complex function theory
- (ii) To gain knowledge about the complex number system, the complex function and complex integration.

UNIT – I : COMPLEX NUMBERS AND ELEMENTARY FUNCTIONS

Complex Number system, complex numbers -Algebraic properties-Point at Infinity Stereographic Projection-Function of a complex variable-Mappings-Elementary Functions-The Logarithmic function- Branches of $\log Z$ - Simple problems. Sections 1-10, 21-30. of R.V.Churchill and J.W.Brown

UNIT – II : ANALYTIC FUNCTIONS

Definitions of Limits -Continuity- Derivatives and Differentiation formula-Cauchy-Riemann equations-Cauchy-Riemann equations in polar form-properties of Analytic functions-Necessary and sufficient conditions for Analytic functions - Simple problems. Sections 11-19. of R.V.Churchill and J.W.Brown

UNIT – III : CONFORMAL MAPPINGS

Harmonic functions-Determination of Harmonic conjugate and Analytic functions-conformal mapping-Isogonal mapping-Further properties and examples-transformations of Harmonic functions - Simple problems. Sections 20, 76-80. of R.V.Churchill and J.W.Brown

UNIT – IV: MAPPING BY ELEMENTARY TRANSFORMATIONS

The transformations $w=z+d$, $w=1/z$, $w=z$, $w=z^2$, $w=\sqrt{z}$, $w = e^z$, $w=\sin z$ Bilinear Transformation and special Bilinear Transformation- Simple problems. Sections 31-36, 38-39 of R.V.Churchill and J.W.Brown

UNIT – V : INTEGRALS

Contours - Line Integrals Cauchy - Goursat's Theorem (with out proof) Cauchy's Integral Formula - Derivatives of Analytic Functions - Simple problems. Sections 43-46, 50-52. of R.V.Churchill and J.W.Brown

Recommended Text :

R. V. Churchill and J. W. Brown, Complex Variables and Applications.
McGraw Hill International Book Co., Singapore. (VIII Edition) 2009

Reference Books :

1. P. Duraipandian and Laxmi Duraipandian, Complex Analysis: Emerald Publishers, Chennai.
(II Edition) 2003
2. S. Ponnusamy. Foundations of Complex Analysis, Narosa Publishing House, New Delhi.
(II Edition) 2012
3. Murray R. Spiegel. Theory and Problems of Complex Variable.
Tata-Mcgraw Hill Edition, New Delhi. (II Edition) 2014

SEMESTER – V
MAJOR PAPER - X
STATICS
SUBJECT CODE – U5MA04MT

L	T	P	C
5	0	0	5

Total Hours : 65

OBJECTIVES :

This course introduces the students the basic concepts of forces, moments, couple, friction law virtual displacement and work, catenary and the centre of gravity and kinematics. This course stresses the development of skills in formation of suitable mathematical models and problems solving techniques.

UNIT- I : THREE FORCES

Forces, Type of forces- Resultant of three forces related to triangle acting at a point - Resultant of several forces acting on a particle - Equilibrium of a particle under three forces - Equilibrium of a particle under several forces - Limiting Equilibrium of a particle on an inclined plane.

UNIT- II : PARALLEL FORCES, COUPLES AND COPLANAR FORCES

Moment of a forces- Parallel forces- Forces along the sides of the triangle - Couples- Resultant of several coplanar forces - Equilibrium of a rigid body under three coplanar forces.

UNIT- III : FRICTION

Friction – laws of friction -cone of friction and angle of friction- Applications involving frictional forces.

UNIT – IV: CENTRE OF MASS

Centre of mass – Centre of mass of a triangular lamina - uniform rods forming a triangle - lamina in the form of a trapezium and solid tetrahedron – Centre of mass using integration - circular arc - circular lamina - elliptic lamina - solid hemisphere - solid right circular cone - hemispherical shell - hollow right circular cone - cardioid lamina - Center of mass of a non-homogeneous solid.

UNIT- V EQUILIBRIUM OF STRING

Equilibrium of a uniform homogeneous string - Equation of the shape of the strings hanging under gravity in Cartesian form - Equation of the shape of the string hanging under gravity in parametric form - Sag - Suspension bridge.

Recommended Text :

P. Duraipandian, Laxmi Duraipandian , Muthamizh Jayapragasam, Mechanics,
S. Chand and Company Ltd, (I Edition) 2005 Chapter 2,3,4,5,6,9 (Omit 5.2.1, 6.2.4,
6.3)

Reference Books :

1. S. Narayanan, R. Hanumantha Rao, K. Sitaraman, P. Kandaswamy, Statics, S. Chand and Company Ltd, New Delhi. (II Edition) 2008
2. Joseph F. Shelley, Vector Mechanics for Engineers Volume - I: Statics, Tata McGraw Hill Edition, New Delhi. (I Edition) 2008
3. A.V. Dharmapadam, Mechanics. S. Viswanathan Printers & Publishers. Chennai. (II Edition) 2011
4. M. K. Venkataraman, Statics, A. Rajhans Publications. Meerut. (16th Edition) 2013
5. S. L. Loney, An Elementary Treatise on Statics, Cambridge University Press, (IV Edition) 2014

SEMESTER – V
MAJOR PAPER - XI
OPERATION RESEARCH
SUBJECT CODE – U5MA05MT

L	T	P	C
4	0	0	4

Total Hours : 52

OBJECTIVES :

To develop computational skill and logical thinking in formulating industry oriented problems as a mathematical problem and finding solutions to these problems.

UNIT – I : CRITICAL PATH METHOD

Network-construction of network diagram-Critical path method (CPM) - Three floats

UNIT – II : PROJECT EVALUATION REVIEW TECHNIQUE

Three time estimates-Network scheduling by PERT Method-PERT Computation

UNIT – III : ECONOMIC ORDERING QUANTITY

Inventory models - EOQ model (a) Uniform demand rate infinite production rate with no shortages (b) Uniform demand rate finite production rate with no shortages - Inventory control with Price Breaks.

UNIT – IV : SEQUENCING PROBLEM

Sequencing problem - n jobs through 2 machines, n jobs through 3 machines - two jobs through m machines - n jobs through m machines.

UNIT – V : QUEUEING SYSTEM

Queueing Theory - Basic concepts - Steady state analysis of M/M/1 and M/M/N systems with finite and infinite capacities.

Recommended Text :

Gupta P. K. and Hira D. S., Problems in Operations Research, S. Chand & Co., Delhi. (II Edition) 2010

Reference Books :

1. P. R. Vittal, Operation Research, Margham Publications, Chennai. (II Edition) 2003
2. Arumugam & Issac, Operation research - Volume - I, New Gamma Pub., House. Palayamkottai. (II Edition) 2006
3. Ravindran A., Philips D.T. and Solberg J.J., Operation research, John Wiley & Sons, New York. (I Edition) 2009
4. V. K. Kapoor, Operation Research, Sultan Chand & sons. (II Edition) 2010
5. Taha H. A., Operation Research, Macmillan Publishing Company, New York. (IX Edition) 2010
6. S. J. Venkatesan, Operation Research, J. S. Publishers, Cheyyar - 604 407. (III Edition) 2012
7. Kanti Swaroop, Gupta P.K. and Manmohan, Problems in Operation Research, Sultan Chand & Sons., Delhi. (16 th Edition) 2013

SEMESTER – V
ELECTIVE PAPER - I
GRAPH THEORY
SUBJECT CODE – U5MA06ET

L	T	P	C
3	0	0	3

Total Hours : 39

OBJECTIVES :

To study and develop the concepts of graphs, subgraphs, trees connectivity, Eulerian and Hamiltonian graphs, matching colorings of graphs and planar graphs

UNIT – I : BASICS OF GRAPH

Graphs, subgraphs, Degree of a vertex, Isomorphism of graphs, independent sets and coverings.

UNIT - II: OPERATIONS ON GRAPHS

Intersection graphs; Adjacency and incidence of matrices; Operations on graphs.

UNIT – III : CONNECTED GRAPHS

Walks; trails; paths; Connectedness and components; cut point, bridge, block.

UNIT – IV : EULERIAN AND HAMILTONIAN GRAPHS

Connectivity theorems and simple problems. Eulerian graphs and Hamiltonian graphs; simple problems

UNIT – V : TREES

Trees, theorems, and simple problems.

Recommended Text :

S. Arumugam and S. Ramachandran, "Invitation to Graph Theory"

SITECH Publications India Pvt. Ltd., 7/3C, Madley Road, T.Nagar, Chennai – 17. (I Edition)
2013

Reference Books :

1. N. Biggs, E. Lloyd, and R. Wilson, Graph Theory, Clarendon Press Oxford, (II Edition) 2010
2. L. Steen editor, Introduction to contemporary mathematics, W. H. Freeman and Company, New York. (III Edition) 2012
3. O. Ore, The four colour problem, academic press, New York. (III Edition) 2014
3. O. Ore, The four colour problem, academic press, New York. (III Edition) 2014

SEMESTER – V
ELECTIVE PAPER - I
ASTRONOMY
SUBJECT CODE – U5MA07ET

L	T	P	C
3	0	0	3

Total Hours : 39

OBJECTIVES :

1. Acquire knowledge of the Physical universe and its evolution.
2. Define and use fundamental principles and techniques of astronomy and astrophysics.
3. This course aims to provide working knowledge about the universe.

UNIT-I

Celestial Sphere -Diurnal motion -Simple Problems page 39 -83 (Use the results 65,67,83,84) to solve problems. No derivation.)

UNIT-II

Zones of Earth -Terrestrial Latitudes and Longitudes -Rotation of Earth -Dip of the horizon --Simple problems. Page 90-131 (Use the results of 96,99,102 to solve problems. No need for derivation.

UNIT-III

Twilight-simple problems-Astronomical refraction -Simple problems. page 131-157.
(use the result of 124,125,126,127 to solve problems. No need to derive the result)

UNIT-IV

Kepler's Laws -simple problems page 172-189. (Use results of 159,160 to solve the problems. No need to derive the results.

UNIT-V

Moon -phases of moon -Eclipses -Introduction -umbra and penumbra -lunar eclipse -solar eclipse -condition for the occurrence of lunar and solar eclipses. Page 334-377.(Use the results of 270,271,272 to solve problem, no need to derive the results)

RECOMMENDED TEXT

S.Kumaravelu and SusheelaKumaravelu.(2004) Astronomy.SKV Publishers, Nagarkoil

REFERENCE BOOKS

- 1.L.W.Frederick and R.H.Baker (1976) Astronomy(10thEdn) Van Nostrand, New York.
- 2.R.Jastrow and M.H.Thompson (1984) Astronomy : Fundamentals and Frontiers,(4thEdn) John Wiley & Sons, New York.
- 3.H.Karttunen et. al. (2003) Fundamental Astronomy(4thEdn) Springer Verlag, Berlin.
- 4.L.Motz and A.Duveen. (1977) Essentials of Astronomy(2ndEdn) Columbia University Press, New York.
- 5.G.V.Ramachandran. (1965) A Text Book of Astronomy(5thEdn) Published by Mrs.RukmaniRamachandran, Tiruchirappalli
- 6.M.Zeilik (2002) Astronomy: The Evolving Universe(9thEdn) Cambridge University Press, Cambridge.

SEMESTER – V
SKILL BASED SUBJECT
PAPER - III
QUANTITATIVE TECHNIQUES
SUBJECT CODE – U5MA08ST

L	T	P	C
3	0	0	3

Total Hours : 39

OBJECTIVES :

To formulate design and solve the practical problems in various fields using the quantitative techniques.

UNIT – I : STATISTICAL TECHNIQUES: STATISTICAL QUALITY CONTROL

Introduction - basis of control charts - control charts for variables - control charts for attributes - control charts for mean and variance.

UNIT – II : INDEX NUMBERS

Introduction - construction of index number - classification of index number - wholesale index number - cost of living index numbers (Importance to be given only to simple problems)

UNIT – III : TIME SERIES ANALYSIS

Introduction - components of time series - analysis of time series - measurement of trends (Importance to be given only to simple problems).

UNIT – IV : TEST OF SIGNIFICANCE

Definition of t-test and its applications, χ^2 test and its applications.

UNIT – V : Z - TRANSFORM TECHNIQUES

Z-transform - elementary properties - Inverse Z - transforms - solution of difference equations using Z-transforms.

Recommended Text :

1. S. C. Gupta and V. K. Kapoor, Fundamentals of Applied Statistics, S. Chand & Co., Delhi. (II Edition) 2013
2. Kanti Swaroop, Gupta P. K. and Manmohan, Operations Research, Sultan Chand & Sons. (XIII Edition) 2013
3. A. Singaravelu, Engineering mathematics - III, Meenakshi agency, Chennai. (III Edition) 2014

Reference Books :

1. Arumugam & Issac, Linear programming, New Gamma Pub., House Palayamkottai. (II Edition) 2010
2. P. Kandasamy and others, Probability statistics and queuing theory, Sultan Chand & Sons. (I Edition) 2010
3. V. Sundaresan, K. S. Ganapathy Subramanian and K. Ganesan, Resource management Techniques, Meenakshi Pub., Arapakkam-609111 [Ph.04364-71417-20081] (I Edition) 2011

SEMESTER – VI
MAJOR PAPER – XII
LINEAR ALGEBRA
SUBJECT CODE – U6MA01MT

L	T	P	C
5	0	0	5

Total Hours : 65

OBJECTIVES :

To study the Algebraic structures of Vector Spaces and Linear Transformation

UNIT – I : VECTOR SPACES

Definition and examples-Linear dependence and independence ,basis

UNIT – II : VECTOR SPACES (Contd.)

Dual space - Inner Product spaces.

UNIT – III : LINEAR TRANSFORMATION

Algebra of linear transformations –Characteristic equation- Characteristic roots

UNIT – IV : LINEAR TRANSFORMATION (Contd.)

Matrices, Canonical forms; Triangular forms.

UNIT-V: LINEAR TRANSFORMATION (Contd.)

Trace and Transpose, Determinants

Recommended Text :

I. N. Herstein, Topics in Algebra, Wiley Eastern Ltd., New Delhi. (II Edition) 2013

Chapter – 4 : Sections 4.1, 4.2, 4.3, 4.4, Chapter – 6 : Sections 6.1, 6.2, 6.3, 6.4, 6.8, 6.9

Reference Books :

1. M. L. Santiago, Modern Algebra, Tata McGraw Hill, New Delhi. (I Edition) 2002

2. J. B. Fraleigh, A First Course in Algebra, Addison Wesley, Mass. (Indian Print) (VII Edition) 2003

3. Lloyd R. Jaisingh and Frank Ayres, Jr. Abstract Algebra, Tata McGraw Hill Edition, New Delhi.

(II Edition) 2005

4. Surjeet Singh and Qazi Zameeruddin, Modern Algebra,

Vikas Publishing House Pvt. Ltd., New Delhi. (VIII Edition) 2006

5. S. Arumugam, Modern Algebra. Scitech Publications, Chennai. (II Edition) 2013

SEMESTER – VI
MAJOR PAPER - XIII
REAL ANALYSIS - II
SUBJECT CODE – U6MA02MT

L	T	P	C
5	0	0	5

Total Hours : 65

OBJECTIVES:

To understand Integration process of Riemann

To develop the understanding of point wise and uniform convergence of sequence and series of functions.

To enhance the mathematical maturity and to work comfortably with concepts.

UNIT – I: CONNECTEDNESS, COMPLETENESS

Open Sets - Connected Sets - Bounded Sets and Totally Bounded Sets - Complete Metric Spaces. Ch. 6.1 to 6.4 of Goldberg

UNIT – II: COMPACTNESS

Compact Metric Space - Continuous Functions on Compact Metric Spaces - Continuity of Inverse Functions - Uniform Continuity. Ch. 6.5 to 6.8 of Goldberg

UNIT – III: RIEMANN INTEGRATION

Sets of measure zero - Definition Riemann Integral - Properties of Riemann Integral - Derivatives. Ch. 7.1, 7.2, 7.4, 7.5 of Goldberg.

UNIT – IV: RIEMANN INTEGRATION (Contd.)

Rolle's Theorem - The law of mean - Fundamental theorems of calculus - Taylor's theorem Ch. 7.6 to 7.8 and 8.5 of Goldberg.

UNIT – V: SEQUENCES AND SERIES OF FUNCTIONS

Point wise convergence of sequences of functions - Uniform convergence of sequences of functions - consequences of uniform convergence - Convergence and uniform convergence of series of functions. Ch. 9.1 to 9.4 of Goldberg.

Recommended Text:

R. Goldberg, Methods of Real Analysis. Oxford & IBH Publishing Co., New Delhi. (II Edition) 2012

Reference Books:

1. Tom M. Apostol, Mathematical Analysis, Addison-Wesley New York. (II Edition) 2002
2. Sanjay Arora and Bansilal, Introduction to Real Analysis, Satya Prakashan, New Delhi. (II Edition) 2008
3. Malik S.C. and Savita Arora, Mathematical Analysis, Wiley Eastern Limited, New Delhi. (II Edition) 2010
4. Bartle R.G. and Sherbert, Real Analysis, John Wiley and Sons Inc., New York. (III Edition) 2012

SEMESTER – VI
MAJOR PAPER - XIV
COMPLEX ANALYSIS - II
SUBJECT CODE – U6MA03MT

L	T	P	C
4	0	0	4

Total Hours : 52

OBJECTIVES :

- (1) To gain knowledge about complex Integration and series.
- (2) This course provides methods to solve problems in pure as well as in applied mathematics.

UNIT – I : INTEGRALS

Morera's theorem- Maximum Moduli of functions- The fundamental theorem of Algebra- Liouville's theorem-convergence of sequences and series-uniform convergence.
Sections 53-56, 61 of R.V.Churchill and J.W.Brown

UNIT – II : POWER SERIES

Taylor's and Laurent's theorem-Integration and differentiation of power series- problems.
Sections 57- 60. Of R.V.Churchill and J.W.Brown

UNIT – III : SINGULARITIES AND RESIDUES

Singularities and classifications-Isolated singularity: Removable singularity -Pole and essential singularity-Residues-Cauchy's Residue theorem-problems.
Sections 67-71 of R.V.Churchill and J.W.Brown

UNIT – IV : ANALYTIC CONTINUATION

Conditions under which $f(z) = 0$ – Uniqueness - Singular points: Poles and zeros - Essential singular points - Number of zeros and poles - The Argument principle.
Sections 106-114 of R.V.Churchill and J.W. Brown

UNIT – V : CONTOUR INTEGRATION

Evaluation of Improper Real Integrals-Improper integrals involving Trigonometric functions
Sections 72-75. of R.V.Churchill and J.W.Brown

Recommended Text :

R. V. Churchill and J. W. Brown, Complex Variables and Applications.
McGraw Hill International Book Co., Singapore. (VIII Edition) 2009

Reference Books :

1. P. Duraipandian and Laxmi Duraipandian, Complex Analysis: Emerald Publishers, Chennai.
(II Edition) 2003
2. S. Ponnusamy. Foundations of Complex Analysis, Narosa Publishing House, New Delhi.
(II Edition) 2012
3. Murray R. Spiegel. Theory and Problems of Complex Variable.
Tata-Mcgraw Hill Edition, New Delhi. (II Edition) 2014

SEMESTER – VI
MAJOR PAPER - XV
DYNAMICS
SUBJECT CODE – U6MA04MT

L	T	P	C
4	0	0	4

Total Hours : 52

OBJECTIVES :

This course aims to provide models for some real life problems. This covers topics like Simple Harmonic Motion, Projectiles, Central Orbits and Moment of Inertia. Stress is on the mathematical formulation of the physics aspects of the problems and it develops logical deduction and interpretation.

UNIT – I : VELOCITY

Velocity - Relative Velocity - Angular Velocity, Acceleration, Rectilinear motion - Rectilinear motion with constant acceleration - Relative angular velocity - Work, Power, Energy.

UNIT – II : PROJECTILE

Motion of a projectile - Nature of a trajectory - Results pertaining to the motion of a projectile - Range on an inclined plane - Maximum range on the inclined plane. Simple problems.

UNIT – III : IMPACT

Impulsive force - Conservation of linear momentum - Impact of a sphere - Laws of impact - Impact of two smooth spheres - Direct impact of two smooth spheres - Direct impact of a smooth sphere on a plane - oblique impact of two smooth spheres on a plane. Simple problems.

UNIT- IV: CENTRAL FORCE

Central force and Central Orbit - Equation of central orbit - finding law of force and speed for a given orbit Determination of the orbit when law of force is given - Kepler's Laws on planetary motion. Simple problems.

UNIT – V: MOMENT OF INERTIA

Moment of Inertia of simple bodies - Theorem on parallel and perpendicular axes - Moment of inertia of triangular lamina - circular lamina - circular ring - right circular cone – sphere - Simple problems.

Recommended Text :

P. Duraipandian, Laxmi Duraipandian , Muthamizh Jayapragasam, Mechanics, S. Chand and Company Ltd, (I Edition) 2005 Chapter 2,3,4,5,6,9 (Omit 5.2.1, 6.2.4, 6.3)

Reference Books :

1. S. Narayanan, R. Hanumantha Rao, K. Sitaraman, P. Kandaswamy, Statics, S. Chand and Company Ltd, New Delhi. (II Edition) 2008
2. Joseph F. Shelley, Vector Mechanics for Engineers Volume - I: Statics, Tata McGraw Hill Edition, New Delhi. (I Edition) 2008
3. A.V. Dharmapadam, Mechanics. S. Viswanathan Printers & Publishers. Chennai. (II Edition) 2011
4. M. K. Venkataraman, Statics, A. Rajhans Publications. Meerut. (16th Edition) 2013
5. S. L. Loney, An Elementary Treatise on Statics, Cambridge University Press, (IV Edition) 2014

**SEMESTER – VI
ELECTIVE PAPER – III
PROGRAMMING IN C
SUBJECT CODE – U6MA05ET**

L	T	P	C
3	0	0	3

Total Hours : 39

OBJECTIVES :

To develop programming skill in the Computer Language C

UNIT - I : C- CONSTANTS & VARIABLES

C- Constants, variables, Data-type, Declaration of variables, assigning values to variables.

UNIT – II : OPERATORS

Arithmetic, Relational, Logical, Assignment, Increment and decrement, Conditional, Arithmetic Expressions, Evaluation of Expressions, Precedence of Arithmetic operators, Formatted input and output.

UNIT – III : OPERATORS AND ARRAYS

Decision making and branching If, simple if, If else, Nesting of if - else, Else – If ladder, Switch statement, the?: operator, Go to statement. Decision making with looping: While, Do, For statement, Jumps in loops. **Arrays:** 1 - dimensional array, 2 - dimensional array, Initializing 2 - dimensional array, Multi - dimensional arrays.

UNIT – IV : USER - DEFINED FUNCTION & STRUCTURES AND UNIONS

User-Defined Function : Need for User-defined function, Multi-function program, the form of C-Function, Return Value and their types. **Structures and Unions :** Structure definition, Structure initialization, Comparison of structure variables, union.

UNIT – V : POINTERS

Understanding Pointers, Accessing the address of a variable, Declaring and initializing of pointers, accessing a variable through its pointer, Pointer expression. Pointers and arrays, Pointers and structures.

Recommended Text :

E. Balagurusamy, Programming in ANSI C. Tata McGraw Hill, New Delhi. (VI Edition) 2012

Chapters:

2.5 to 2.9, 3.2 to 3.7, 3.10 to 3.12, 4.4 to 4.5
5.2 to 5.9, 6.2 to 6.5, 7.2 to 7.5, 9.2 to 9.5
10.2, 10.4, 10.5, 10.10, 11.2 to 11.6, 11.8, 11.11

Reference Books :

1. H. Schildt, Osborne. Teach Yourself C, McGraw Hill. New York. (II Edition) 2008
2. Mullish Cooper, The Spirit of C- An Introduction to Modern Programming, Jaico Publishing House, Delhi. (II Edition) 2009
3. V. Rajaraman, Computer Programming in C, Prentice Hall, New Delhi. (II Edition) 2010
4. Yashavant kanetkar, let us C, BPB publication. (16th Edition) 2012

SEMESTER – VI
ELECTIVE PAPER - III
PROGRAMMING IN C Lab
SUBJECT CODE – U6MA01EP

L	T	P	C
0	0	3	2

Total Hours : 39

OBJECTIVES :

This computer practice course aims to provide strong logical thinking and error-free syntax codes writing, to master the debugging techniques and to present the results in neat form in C Language for numerical methods. Students will be able to solve problems numerically whenever theoretical methods are not available.

The following exercises shall be performed as minimum mandatory requirements (for eligibility to take the practical examination) and a RECORD of the code-listing and outputs shall be maintained by each students.

1. Assigning the ASCII value.
2. Square of numbers: Using For loop, While loop
3. Square of numbers: Do-While loop, Goto statement.
4. Characters between two given characters.
5. Number of vowels and consonants.
6. Three - dimensional matrix.
7. Prime numbers between two give numbers.
8. Fibonacci series.
9. Factorial numbers
10. Power of a value.
11. Interchange sort.
12. Student record.

Note: Mathematics faculty should be appointed as an Examiner.

Recommended Text :

E. Balagurusamy, Programming in ANSI C, Tata McGraw Hill, New Delhi. (VI Edition)
2012

Reference Books :

1. Herbert Schildt, Obsbome Megrawhill, Teach yourself C, (II Edition) 2008
2. Mullish Cooper, The spirit of C, Indian Edition by Jaico Publishers. (II Edition) 2009
3. Schaum Series, Programming in C, (XIII Edition) 2010

L	T	P	C
3	0	0	3

Total Hours : 39

**SEMESTER – VI
ELECTIVE PAPER – IV
MATLAB PROGRAMMING
SUBJECT CODE – U6MA05ET**

UNIT – I : INTRODUCTION TO MATLAB

The Advantages of MATLAB-Disadvantages of MATLAB- The MATLAB Environment-Using MATLAB as a Scratch Pad

UNIT – II : MATLAB BASICS

Variables and Arrays – Multidimensional Arrays – Subarrays – Special Values – Displaying Output Data – Data Files- Scalar and Array Operations – Hierarchy of Operations – Built-in MATLAB Functions – Introduction to Plotting.

UNIT –III : BRANCHING STATEMENTS AND PROGRAM DESIGN

Introduction to Top-Down Design Techniques – Use of Pseudo code – The Logical Data Type – Branches –Additional Plotting Features – More on Debugging MATLAB Programs

UNIT – IV : LOOPS

The While Loop – The For Loop – Logical Arrays and Vectorization – The MATLAB Profiler – User defined Functions

UNIT - V: ADDITIONAL DATA TYPES AND PLOT TYPES

Complex Data – String Functions – Multi Dimensional Arrays – Additional Data Types – Additional Two Dimensional Plots – Three Dimensional Plots.

Recommended Text :

1. Stephen J. Chapman, MATLAB Programming for Engineering, BAE Systems, Australia.
(IV Edition) 2008

Reference Books :

1. Stormy Attaway, MatLAB, A Practical Introduction to Programming and Problem Solving,
BH Publications. (III Edition) 2009
2. David Kuncicky, MatLAB Programming, Prentice Hall, (II Edition) 2010

3. Duane C. Hanselman , Bruce L. Littlefield, Mastering MATLAB, Prentice Hall. (I Edition) 2011

SEMESTER – VI
ELECTIVE PAPER - IV
MATLAB
SUBJECT CODE – U6MA02EP

L	T	P	C
0	0	3	2

Total Hours : 39

1. Write a Program to Solve for the roots of a quadratic equation.
2. Generation of N Fibonacci Series.
3. Find Geometric Mean, Harmonic Mean and RMS average.
4. Using While Construct loop, Find factorial of a given number
5. Write the MATLAB statements required to calculate and print out the squares of all the even integers between 0 and 50. Create a table consisting of each integer and its square, with appropriate labels over each column.
6. Sum of N elements using Array.
7. MATLAB Program for Matrix Addition.
8. Write a program that allows a user to enter a string containing a day of the week (“Sunday,” “Monday,” “Tuesday,” etc.) and uses a switch construct to convert the day to its corresponding number.
9. Write a program that accepts a series of strings from a user with the input function, sorts the strings into ascending order disregarding case, and prints them out.
10. Write a function that converts a Roman numeral to its decimal equivalent.

Recommended Text :

1. Stephen J. Chapman, MATLAB Programming for Engineering, BAE Systems, Australia.
(IV Edition) 2008

Reference Books :

1. Stormy Attaway, MatLAB, A Practical Introduction to Programming and Problem Solving,
BH Publications. (III Edition) 2009
2. David Kuncicky, MatLAB Programming, Prentice Hall, (II Edition) 2010

3. Duane C. Hanselman , Bruce L. Littlefield, Mastering MATLAB, Prentice Hall. (I Edition) 2011

**SEMESTER – VI
ELECTIVE PAPER - V
SPECIAL FUNCTIONS
SUBJECT CODE – U6MA07ET**

L	T	P	C
3	0	0	3

Total Hours : 39

OBJECTIVES :

To develop computational skill in certain special functions which are frequently occurring in higher mathematics and mathematical physics.

UNIT – I : LINEAR OPERATORS

Properties of Linear Operators - Simultaneous Linear Differential Equations -

UNIT – II : NONLINEAR EQUATIONS

Special Solvable Types of Nonlinear Equations. Numerical Solutions Using Taylor Series -

UNIT – III : ADAMS METHOD

Adams and Modified Adams Method - Extrapolation with Differences Properties of Power Series - Examples

UNIT – IV : SINGULAR POINTS

Singular Points of Linear Second Order Differential Equations - Method of Frobenius.

UNIT - V : BESSEL FUNCTIONS AND LEGENDRE FUNCTIONS

Bessel Functions - Properties - Legendre Functions.

Recommended Text :

F. B. Hildebrand, Advanced Calculus for Applications. Prentice Hall. New Jersey. (II Edition) 2010

Reference Books :

1. B. D. Gupta, Mathematical Physics, Vikas Publishing House. (IV Edition) 2009
2. J. N. Sharma and R. K. Gupta, Special Functions, Krishna Prakashan Mandir, Meerut. (II Edition) 2014
3. Satya Prakash, Mathematical Physics, Sultan & Sons, New Delhi. (II Edition) 2014

SEMESTER – VI
ELECTIVE PAPER - VI
FUZZY MATHEMATICS
SUBJECT CODE – U6MA08ET

L	T	P	C
3	0	0	3

Total Hours : 39

OBJECTIVES:

1. To know the fundamentals of fuzzy Algebra.
2. To know the basic definitions of fuzzy theory
3. To know the applications of fuzzy Technology.

UNIT – I: FUZZY SETS

Introduction- Fuzzy subsets-Lattices and Boolean Algebras- L fuzzy sets-operations on fuzzy - level sets - properties of fuzzy subsets of a set sections 1.1-1.10 of S. Nanda and N. R. Das

UNIT – II: OPERATIONS ON FUZZY SETS

Algebraic product and sum of two fuzzy subsets-properties satisfied by Addition and product-cartesian product of fuzzy subsets. Sections 1.11-1.13. of S. Nanda and N. R. Das

UNIT – III: LOGIC

Introduction- Algebra of fuzzy relations-logic-connectives. sections 2.1-2.4 of S. Nanda and N. R. Das

UNIT – IV: FUZZY SUBGROUP

Some more connectives-Introduction-fuzzy subgroup - homomorphic image and Pre-image of subgroupoid. Sections 2.5, 3.1-3.3 of S. Nanda and N. R. Das

UNIT – V: FUZZY SUBRING

Fuzzy invariant subgroups-fuzzy subrings. Section 3.4 and 3.5 of S. Nanda and N. R. Das

Recommended Text:

S. Nanda and N. R. Das "Fuzzy Mathematical concepts", Narosa Publishing House, New Delhi.
(I Edition) 2012

Reference Books:

1. G. J. Klir and Bo Yuan, Fuzzy sets and fuzzy logic: Theory And Applications
Prentice Hall,
Upper Saddle River, NJ. (I Edition) 2008
2. G. J. Klir and T. A. Folger, Fuzzy sets, Uncertainty, and Information, Prentice Hall,
Englewood Cliffs, NJ, (II Edition) 2009

3. A. Kaufmann and M. M .Gupta, Introduction to Fuzzy Arithmetic Theory and Application, Van Nostrand Reinhold, New York. (III Edition) 2011

SEMESTER – VI
SKILL BASED SUBJECT
PAPER - IV
FUNDAMENTALS OF APPLIED MATHEMATICS
SUBJECT CODE – U6MA09ST

L	T	P	C
3	0	0	3

Total Hours : 39

OBJECTIVES :

This course aims to develop mathematical maturity and ability to deal with abstraction and to develop construction and verification of formal logical manipulation.

UNIT – I : RECURRENCE RELATIONS AND GENERATING FUNCTIONS

Recurrence - Polynomials and their Evaluations - Recurrence Relations - Solution of Finite Order Homogeneous [linear] Relations - Solutions of Non-homogeneous Relations.

UNIT – II : MATHEMATICAL LOGIC

TF Statements - Connectives - Atomic and Compound Statements - Well-formed[Statement Formulae] - Parsing - Truth Table of a Formula - Tautology - Tautological Implications and Equivalence of Formulae.

UNIT – III : MATHEMATICAL LOGIC (Contd.)

Replacement process - Functionally complete sets of connectives and Duality law - Normal Forms - Principal Normal Forms.

UNIT – IV : LATTICES

Lattices [omit example 15 Pg. No.10.6) - Some properties of Lattices - New Lattices (omit remark Pg. No. 10.14) - Modular and Distributive Lattices (omit theorem 10 and 17, Example 4 – Pg. No. 10.23, Example 11 – Pg. No. 10.24)

UNIT – V : BOOLEAN ALGEBRA

Boolean Algebra (omit theorem 25) - Boolean Polynomials - Karnaugh Maps (omit K-map for 5 and 6 variables)

Recommended Text :

M. K. Venkataraman, N. Sridharan and N. Chandrasekaran, Discrete Mathematics, The National Publishing Company, Chennai. (II Edition) 2003

Reference Books :

1. C. L. Liu, Elements of Discrete Mathematics, McGraw Hill, New York, (III Edition) 2008
2. J. K. Truss. Discrete Mathematics for Computer Scientists, Pearson Education, Asia. (II Edition) 2009

3. R. Johnsonbaugh, Discrete Mathematics, Pearson Education, Asia. (V Edition) 2010
4. M. K. Sen and B. C. Chakraborty, Discrete Mathematics, Books and allied private Ltd., Kolkata.
(II Edition) 2012

**ADHIPARASAKTHI COLLEGE OF ARTS &
SCIENCE
(Autonomous)**

Permanently Affiliated to Thiruvalluvar University, Vellore

Re – accredited by NAAC with ‘B’ Grade (CGPA – 2.83)

**M.Sc., MATHEMATICS
Under CBCS**

SYLLABUS

(Effective from the Academic Year 2015-2016)

ADHIPARASAKTHI COLLEGE OF ARTS & SCIENCE

(Autonomous)

Permanently Affiliated to Thiruvalluvar University, Vellore

Re – accredited by NAAC with ‘B’ Grade (CGPA – 2.83)

M.Sc., MATHEMATICS

Under CBCS

(Effective from the Academic Year 2015-2016)

REGULATIONS

CBCS

Choice-Based Credit System is a flexible system of learning. ‘Credit’ defines the quantum of contents / syllabi prescribed for a course, and determines the number of hours of instruction required. The distinguishing features of CBCS are the following:

It permits the students to:

- ❖ Learn at their own pace
- ❖ Choose electives from a wide range of elective courses offered by the departments of the college.
- ❖ Undergo additional courses and acquire more than the required number of credits
- ❖ Adopt an inter – disciplinary approach in learning
- ❖ Make best use of the expertise of available faculty

5. Eligibility for Admission:

No student shall be eligible for admission to a Master’s degree programme in any of the faculties unless he/she has successfully completed a three year undergraduate degree or earned prescribed number of credits for an undergraduate degree through the examinations conducted by a University / autonomous institutions or possesses such qualifications recognized by Thiruvalluvar University as equivalent to an undergraduate degree.

Provided that candidates for admission into the specific main subject of study shall also possess such other qualifying conditions as may be prescribed by the University in the Regulations governing respective courses of study.

Admission to the M.Sc., MATHEMATICS Degree Course shall be made as follows:

Preference

A student who has passed B.Sc. Degree with 55% with MATHEMATICS as Major Subject 5% relaxation shall be given to SC /ST applicants.

6. Eligibility for the Award of Degree:

A Candidate shall be eligible for the award of the Degree only if he/she has undergone the prescribed course of study in the college for a period of not less than two academic year and passed the examinations of all the Four Semesters prescribed earning 90 credits and fulfilled such conditions as have been prescribed therefore.

7. Duration of the course:

The duration of course shall be two years consisting of four semesters.

4. Examination:

There shall be four semester examinations: The first semester examination at the middle of the first academic year and the second semester examination at the end of the first academic year. Similarly the third and fourth semester examinations shall be held at the middle and the end of the second academic year, respectively.

A candidate who does not pass the examination in any subject or subjects in one semester will be permitted to appear in such failed subject or subject along with the papers of following semesters.

The following assessment procedure will be followed for Internal Marks:

Continuous Internal Assessment [CIA] Test

S. No	Reg. No	Name	Test I Marks For 50	Test II Marks For 75	Test III Marks For 75	Marks For 200	Marks Converted to 20/20	Assignments /Seminars [5] Records [5]	Marks For 25/25	Total Rounded to Marks for 25 /25

Test I : One hour duration for 50 marks [Two Units of the Syllabus]

Test II : Two hours duration for 75 marks [Four Units of the Syllabus]

Test III: Three hours model test for 75 marks [Total Syllabus]

Total marks 200		Theory		Practical
Test marks to be converted to	:	20 marks	/	20 marks
Assignments / Seminars	:	5 marks	/	-
Records	:	-	/	5 marks
Total	:	25 marks	/	25 marks

In the column Rounded to 25 / 25, any fraction may be rounded to the next number.

a. Requirements for proceeding to Subsequent Semester

- i. Candidates shall register their names for the First Semester Examination after admission in the PG Courses.
- ii. Candidates shall be permitted to proceed from the First Semester up to Final Semester irrespective of their failure in any of the Semester Examination subject to the condition that the candidates should register for all the arrear subject of earlier semesters along the current [subject] Semester subjects.
- iii. Candidates shall be eligible to go to subsequent semester, only if they earn sufficient attendance as prescribed therefore by the Academic council from time to time. Provided in case of a candidate earning less than 65% of attendance in any one of the Semesters due to any extraordinary circumstances such as medical grounds, such candidate who shall produce Medical Certificate issued by the Authorised Medical Attendant [AMA], duly certified by the Principal of the college shall be permitted to proceed to the next semester and to complete the course of study. Such candidates shall have to repeat the missed Semester by rejoining after completion of Final Semester of the course, after paying the fee for the break of study as prescribed by the College from time to time.

6. Passing Minimum:

A candidate shall be declared to have passed the whole examination, if he/she passes in all the papers and practical wherever prescribed/as per the scheme of examinations by earning 90 CREDITS.

In fixing the passing minimum marks the following will be observed.

- [a]. There shall be no Passing Minimum for Internal.
- [b]. For External Examinations, Passing Minimum shall be of 50% [Fifty Percentage] of the minimum marks prescribed for the paper.
- [c]. In the aggregate (External + Internal) the Passing Minimum shall be of 50% for each Paper/Practical/Project and Viva-voce.
- [d]. Grading shall be based on overall marks obtained (Internal + External).

7. Classification of Successful Candidates:

Candidates who secured not less than 60% of aggregate marks [Internal + External] in the whole examination shall be declared to have passed the examination in the First Class.

All other successful candidates shall be declared to have passed in Second Class. Candidates who obtain 75% of the marks in the aggregate [Internal + External] shall be deemed to have passed the examination in First Class with Distinction, provided they pass all the examinations [theory papers, practical, project and Viva-voce] prescribed for the course in the First appearance.

8. Requirements to take the Semester Examinations

a] A candidate will be permitted to take the Examination of any Semester, if

i] He/She secures not less than 75% of attendance out of the 90 instructional days during the semester. [In the case of married women students the minimum attendance requirement shall be 55% of total instructional days].

ii] He / She earns a Progress Certificate from the Head of the Institution, of having satisfactorily completed the prescribed course of study in the subject as required by these Regulations, and

iii] His/ Her conduct has been satisfactory.

Provided that it shall be open to the Academic council or any authority delegated with such powers by the Academic council to grant exemption to a candidate who has failed to earn 75% of the attendance prescribed for any valid reason[s] subject to the usual conditions.

b] A candidate who has secured attendance less than 75% but 65% and above shall be permitted to take the Examination on the recommendation of the Head of the Department to condone the lack of attendance as well as on the payment of the prescribed fees to the College.

c] A candidate who has secured attendance less than 65% but 55% and above in every semester, as to compensate the shortage of attendance in the subsequent semester besides, earning the required percentage of attendance in that semester and take the examinations of both the semester papers together at the end of the later semester.

d] A candidate who has secured less than 55% of attendance in any semester will not be permitted to take the regular examinations. He/She has to re-do the course after the completion of the final semesters by rejoining the semester in which the attendance is less than 55%.

e] A candidate who has secured less than 65% of attendance in the final semester as to compensate his/her attendance shortage in a manner to be decided by the Head of the Department concerned after rejoining the course.

9. Grading System:

In addition to the above marking system grading system is also adopted as detailed below.

The marks (sum of IA and UE marks) in each course are assigned with a letter grade on a five points scale using the following letter grade points and a range of marks.

SEVEN POINT SCALE [As per UGC notification 1998]

Marks	Grade Point	Letter Grade	Class
95-100	7.00	H	First Class with Distinction
90-94	6.00	O	First Class with Distinction
75-89	5.50	D	First Class with Distinction
60-74	4.75	A	First Class
54-59	4.00	B	Second Class
50-54	3.50	C	Second Class
Below 50	3.00	F	Fail

From the second semester onwards the total performance within a semester and continuous performance starting from the first semester are indicated respectively by **Grade Point Average [GPA]** and **Cumulative Grade Point Average [CGPA]**. These two are calculated by the following formulae:

$$\text{GPA} = \frac{\sum_{i=1}^n C_i G_i}{\sum_{i=1}^n C_i}$$

Where 'C_i' is the credit earned for the course 'i' in any semester; 'G_i' is the Grade Point obtained by the student for the course 'i' and 'n' is the number of courses passed in that semester.

CGPA=GPA of all the courses starting from the first semester to the last semester.

10. RANKING

Candidate who pass all the examinations prescribed for the course in the First Appearance itself alone are eligible for Ranking.

Provided in the case of Candidates who pass all the examinations prescribed for the course with a break in the First Appearance due to the reasons as furnished in the Regulation 7.[iii] Supra are eligible for Classification / Distinction.

The mark obtained in improvement examination will not be taken into consideration for Ranking.

11. The Medium of Instruction and Examinations

The medium of Instruction and Examinations shall be in English.

15. Submission of Record Notebooks for Practical Examinations

Candidates taking the Practical Examinations should submit bonafide Record Notebook prescribed for the Practical Examinations. Otherwise the candidate will not be permitted to take the practical Examinations. However, in genuine case where the students could not submit the record notebook may be permitted to take the Practical Examinations provided the Head of the Department concerned certifies that the candidate has performed the experiments prescribed for the Course. For such of those candidates who do not submit Record Books, zero [0] marks will be awarded for record notebooks.

In case a candidate fails in the Practical Examination the marks awarded for the record at the time of first appearance for the Practical Examination should be made available by the College to the Examiners at the subsequent appearance by the candidate.

16. Improvement of marks in the subjects already passed

Candidates who have passed in theory paper/papers are allowed to appear again for theory paper/papers only once in order to improve his/her marks, by paying the fee prescribed from time to time. Such candidates are allowed to improve within a maximum period of 10 semesters counting from his/her first semester of his/her admission. If candidate improves his/her marks, then his/her improved mark will be taken into consideration for the award of Classification and Distinction only. Such improved marks will not be counted for the award of Prize/Medals and Rank. If the candidate does not show improvement in the marks, his/her previous marks will be taken into consideration.

No candidate will be allowed to improve marks in the Practical and Field work.

17. Checklist for Inspection

1. Qualification for
 - iv. Teaching Faculty : as Prescribed by the UGC and the University
 - v. Technical Faculty : as Prescribed by the UGC and the University
 - vi. Laboratory Staff : as Prescribed by the UGC and the University
2. Infrastructure Facilities
 - iv. Building : Number of Classrooms with specifications: 3 rooms measuring 20'X 25' Number of Staff rooms: One measuring 20' X 20'
 - v. Furniture : One pair of table / chair per student
 - vi. Laboratory @ 10 Sq. ft. per student

PATTERN OF QUESTION PAPER

Section – A (300 words)

To Answer 5 questions (either / or pattern)

5 X 6 marks = 30 marks

Section – B (900 words)

To Answer 3 questions out of 5 questions

3 X 15 marks = 45 marks

Total = 75 marks

ANNEXURE – I

ELIGIBILITY FOR ADMISSION TO M.Sc., MATHEMATICS

Admission to the M.Sc., MATHEMATICS Degree Course shall be made as follows:

Preference

A student who has passed B.Sc. Degree with 50% either with MATHEMATICS as Major Subject 5% relaxation shall be given to SC /ST applicants.

MISSION & GOALS OF MATHEMATICS

We aim to provide a learning environment that excites and informs undergraduate majors and non-majors about MATHEMATICS and the many ways that it is relevant to everyday life.

Through our MATHEMATICS Department is committed to providing a transformative education through the following elements:

- To provide strong mathematical foundation, analytical and computational skills and abstract understanding to young post graduate Mathematics students which enable them to handle any industrial and research problems.
- To promote high quality research in pure and applied Mathematics in the diversified areas thereby creating opportunities for the young researchers to contribute significantly in the frontier areas of Mathematics.
- To enhance the computational facilities to suit the needs of faculty members and research scholars working on research areas such as CFD, Applied Probability & Statistics, Complex Analysis & Fuzzy Logic and Graph Algorithm.
- To create computer software and mathematical modeling to cater to the growing needs of Industries/Research establishments.
- To popularize and project in proper perspective the scope of Mathematics and Computer Science so as to attract young talents to take up teaching and research career in Computer and Mathematical Sciences.

ADHIPARASAKTHI COLLEGE OF ARTS & SCIENCE (AUTONOMOUS)
G.B. NAGAR, KALAVAI – 632 506
PERMANENTLY AFFILIATED TO THIRUVALLUVAR UNIVERSITY, VELLORE
DEGREE COURSES

M.Sc., Mathematics
(With effect from 2015 - 2016)
The course of study and the scheme of examination.

Year/ Semester	Subject	Paper	Subject Code	Title of the Paper	Ins. Hrs/week	Credits	Exam Hrs.	Max. Mark		
								CIA	SEM	Total
I Year I Sem	CORE	Paper-I	P1MA01MT	Algebra I	6	5	3	25	75	100
	CORE	Paper-II	P1MA02MT	Mathematical Analysis I	6	5	3	25	75	100
	CORE	Paper-III	P1MA03MT	Ordinary Differential Equations	6	4	3	25	75	100
	CORE	Paper-IV	P1MA04MT	Mechanics	6	4	3	25	75	100
	ELECTIVE-I (to choose 1 out of 3)	Paper-I	P1MA05ET	A. Probability Theory	6	3	3	25	75	100
			P1MA06ET	B. Mathematical Programming						
			P1MA07ET	C. Reliability and Queuing Theory						
Total					30	21	-	125	375	500
I Year II Sem	CORE	Paper-V	P2MA01MT	Algebra II	6	5	3	25	75	100
	CORE	Paper-VI	P2MA02MT	Mathematical Analysis II	6	5	3	25	75	100
	CORE	Paper-VII	P2MA03MT	Partial Differential Equations	5	4	3	25	75	100
	CORE	Paper-VIII	P2MA04MT	Calculus of Variations and Integral Equations	5	4	3	25	75	100
	GENERAL STUDIES	Paper-I	P2HR01GS	Human Rights	2	2	3	25	75	100
	ELECTIVE-II (to choose 1 out of 3)	Paper-II	P2MA05ET	A. * Programming in C++ With Practical	6	3	3	25	75	100
			P2MA06ET	B. Algebraic Number Theory						
P2MA07ET			C. Optimization Techniques							
Total					30	23	-	150	450	600

Year/ Semester	Subject	Paper	Subject Code	Title of the Paper	Ins. Hrs/week	Credits	Exam Hrs.	Max. Mark		
								CIA	SEM	Total
II Year III Sem	CORE	Paper-IX	P3MA01MT	Complex Analysis I	6	5	3	25	75	100
	CORE	Paper-X	P3MA02MT	Topology	6	5	3	25	75	100
	CORE	Paper-XI	P3MA03MT	Differential Geometry	6	5	3	25	75	100
	CORE	Paper-XII	P3MA04MT	Discrete Mathematics	6	5	3	25	75	100
	ELECTIVE-III (to choose 1 out of 3)	Paper-III	P3MA05ET	A. Tensor Analysis and Relativity Theory	6	3	3	25	75	100
			P3MA06ET	B. Analytic Number Theory						
			P3MA07ET	C. Fluid Dynamics						
Total					30	23	-	125	375	500
II Year IV Sem	CORE	Paper-XIII	P4MA01MT	Complex Analysis II	6	5	3	25	75	100
	CORE	Paper-XIV	P4MA02MT	Functional Analysis	6	5	3	25	75	100
	CORE	Paper-XV	P4MA03MT	Mathematical Statistics	6	5	3	25	75	100
	CORE	Paper-XVI	P4MA04MT	Difference Equations	6	5	3	25	75	100
	ELECTIVE-IV (to choose 1 out of 3)	Paper-IV	P4MA05ET	A. Number Theory and Cryptography	6	3	3	25	75	100
			P4MA06ET	B. Fuzzy Mathematics						
			P4MA07ET	C. Stochastic Processes						
Total					30	23	-	125	375	500
Grand Total					120	90	-	525	1575	2100

SEMESTER – I
MAJOR PAPER - I
ALGEBRA - I
SUBJECT CODE – P1MA01MT

L	T	P	C
6	0	0	5

Total Hours : 78

OBJECTIVES :

To introduce the concepts and to develop working knowledge on class equation, solvability of groups, finite abelian groups, linear transformations, real quadratic forms.

UNIT - I : COUNTING PRINCIPLE

Another counting principle - class equation for finite groups and its applications - Sylow's theorems (For theorem 2.12.1, Only First proof).

Chapter 2: Sections 2.11 and 2.12 (Omit Lemma 2.12.5) of I. N. Herstein

UNIT - II : GROUPS

Solvable groups - Direct products - Finite abelian groups- Modules

Chapter 5 : Section 5.7 (Lemma 5.7.1, Lemma 5.7.2, Theorem 5.7.1) Chapter 2: Sections 2.13 and 2.14 (Only Theorem 2.14.1) Chapter 4: Section 4.5 of I. N. Herstein

UNIT - III : LINEAR TRANSFORMATIONS

Linear Transformations: Canonical forms - Triangular form - Nilpotent transformations.

Chapter 6: Sections 6.4 , 6.5 of I. N. Herstein

UNIT – IV : JORDAN FORM

Jordan form - rational canonical form.

Chapter 6 : Sections 6.6 and 6.7 of I. N. Herstein

UNIT – V : MATRICES AND TRANSFORMATIONS

Trace and transpose - Hermitian, unitary, normal transformations, real quadratic form.

Chapter 6 : Sections 6.8, 6.10 and 6.11 (Omit 6.9) of I. N. Herstein

Recommended Text :

I. N. Herstein. Topics in Algebra, Wiley Eastern Limited, New Delhi. (II Edition) 2013

Reference Books :

1. I. S. Luther and I. B. S. Passi, Algebra, Volume - I Groups ; Volume - II Rings, Narosa Publishing House, New Delhi, (II Edition) 2004 .
2. D. S. Malik, J.N. Mordeson and M. K. Sen, Fundamental of Abstract Algebra, McGraw Hill (International Edition), New York. (II Edition) 2007.
3. P. B. Bhattacharya, S. K. Jain, and S. R. Nagpaul, Basic Abstract Algebra, Cambridge University Press, (Indian Edition), (II Edition) 2009.
4. M. Artin, Algebra, Prentice Hall of India, (II Edition) 2010.
5. N. Jacobson & W. H. Freeman, Basic Algebra, Volume - I & II; Published by Hindustan Publishing Company, New Delhi. (II Edition) 2012.

SEMESTER – I
MAJOR PAPER - II
REAL ANALYSIS - I
SUBJECT CODE – P1MA02MT

L	T	P	C
6	0	0	5

Total Hours : 78

OBJECTIVES :

To work comfortably with functions of bounded variation, Riemann - Stieltjes Integration, convergence of infinite series, infinite product and uniform convergence and its interplay between various limiting operations.

UNIT - I : FUNCTIONS OF BOUNDED VARIATION

Introduction - Properties of monotonic functions - Functions of bounded variation - Total variation - Additive property of total variation - Total variation on $[a, x]$ as a function of x - Functions of bounded variation expressed as the difference of two increasing functions - Continuous functions of bounded variation.

Chapter - 6 : Sections 6.1 to 6.8 Chapter 8 : Sections 8.5 & 8.7 of Tom M. Apostol

UNIT - II : THE RIEMANN - STIELTJES INTEGRAL

Introduction - Notation - The definition of the Riemann - Stieltjes integral - Linear Properties - Integration by parts- Change of variable in a Riemann - Stieltjes integral - Reduction to a Riemann Integral - Euler's summation formula - Monotonically increasing integrators, Upper and lower integrals - Additive and linearity properties of upper and lower integrals - Riemann's condition. Chapter - 7 : Sections 7.1 to 7.13 of Tom M. Apostol

UNIT - III : THE RIEMANN-STIELTJES INTEGRAL

Integrators of bounded variation-Sufficient conditions for the existence of Riemann-Stieltjes integrals-Necessary conditions for the existence of Riemann-Stieltjes integrals- Mean value theorems for Riemann - Stieltjes integrals - The integrals as a function of the interval - Second fundamental theorem of integral calculus-Change of variable in a Riemann integral-Second Mean Value Theorem for Riemann integral-Riemann-Stieltjes integrals depending on a parameter-Differentiation under the integral sign.

Chapter - 7 : 7.15 to 7.25 of Tom M. Apostol

UNIT - IV : INFINITE SERIES AND INFINITE PRODUCTS

Absolute and conditional convergence - Dirichlet's test and Abel's test - Rearrangement of series - Riemann's theorem on conditionally convergent series. Double sequences - Double series - Rearrangement theorem for double series - A sufficient condition for equality of iterated series - Multiplication of series - Cesaro summability - Infinite products.

Chapter 8 : Sections 8.8, 8.15, 8.17, 8.18, 8.20, 8.21 to 8.26 of Tom M. Apostol

UNIT – V : SEQUENCES OF FUNCTIONS

Pointwise convergence of sequences of functions - Examples of sequences of real - valued functions - Definition of uniform convergence - Uniform convergence and continuity - The Cauchy condition for uniform convergence - Uniform convergence of infinite series of functions - Uniform convergence and Riemann - Stieltjes integration - Uniform convergence and differentiation - Sufficient condition for uniform convergence of a series - Mean convergence. Chapter - 9 Sec 9.1 to 9.6, 9.8, 9.10,9.11, 9.13 of Tom M. Apostol

Recommended Text :

Tom M. Apostol, Mathematical Analysis, Addison Wesley Publishing Company Inc., New York. (II Edition) 2009

Reference Books :

1. Malik. S. C. and Savita Arora, Mathematical Analysis, Wiley Eastern Limited, New Delhi. (II Edition) 2005
2. A. L. Gupta and N. R. Gupta, Principles of Real Analysis, Pearson Education, (Indian print), (IV Edition) 2008
3. Sanjay Arora and Bansilal, Introduction to Real Analysis, Satya Prakashan, New Delhi. (III Edition) 2012
4. Rudin. W, Principles of Mathematical Analysis, McGraw Hill Company, New York. (III Edition) 2013
5. Bartle. R. G., Real Analysis, John Wiley and Sons Inc., (II Edition) 2014

SEMESTER – I
MAJOR PAPER - III
ORDINARY DIFFERENTIAL EQUATIONS
SUBJECT CODE – P1MA03MT

L	T	P	C
6	0	0	4

Total Hours : 78

OBJECTIVES :

To develop strong background on finding solutions to linear differential equations with constant and variable coefficients and also with singular points, to study existence and uniqueness of the solutions of first order differential equations.

UNIT - I : LINEAR EQUATIONS WITH CONSTANT COEFFICIENTS

Second order homogeneous equations-Initial value problems-Linear dependence and independence - Wronskian and a formula for Wronskian -Non-homogeneous equation of order two. Chapter - 2 : Sections 1 to 6 of E. A. Coddington

UNIT - II : LINEAR EQUATIONS WITH CONSTANT COEFFICIENTS

Homogeneous and non-homogeneous equation of order n - Initial value problems-Annihilator method to solve non-homogeneous equation - Algebra of constant coefficient operators. Chapter - 2 : Sections 7 to 12. of E. A. Coddington

UNIT - III : LINEAR EQUATION WITH VARIABLE COEFFICIENTS

Initial value problems - Existence and uniqueness theorems - Solutions to solve a non-homogeneous equation - Wronskian and linear dependence - reduction of the order of a homogeneous equation - homogeneous equation with analytic coefficients -The Legendre equation. Chapter - 3 Sections 1 to 8 (Omit section 9) of E. A. Coddington

UNIT - IV : LINEAR EQUATION WITH REGULAR SINGULAR POINTS

Euler equation - Second order equations with regular singular points -Exceptional cases - Bessel Function.
Chapter 4 : Sections 1 to 4 and 6 to 8 (Omit sections 5 and 9) of E. A. Coddington

UNIT - V: EXISTENCE AND UNIQUENESS OF SOLUTIONS TO FIRST ORDER EQUATIONS

Equation with variable separated - Exact equation - method of successive approximations - the Lipschitz condition - convergence of the successive approximations and the existence theorem. Chapter 5 : Sections 1 to 6 (Omit Sections 7 to 9) of E. A. Coddington

Recommended Text :

E. A. Coddington, An introduction to ordinary differential equations
Prentice-Hall of India Ltd., New Delhi. (III Edition) 2012 .

Reference Books :

1. Williams E. Boyce and Richard C. DI Prima, Elementary differential equations and boundary value problems, John Wiley and sons, New York. (IX Edition) 2002.
2. George F. Simmons, Differential equations with applications and historical notes, Tata McGraw Hill, New Delhi. (II Edition) 2005.
3. W. T. Reid, Ordinary Differential Equations, John Wiley and Sons, New York. (99th Edition) 2008.
4. B. Rai, D. P. Choudary and H. I. Freedman, A Course in Ordinary Differential Equations, Narosa Publishing House, New Delhi. (II Edition) 2012.
5. N. N. Lebedev, Special functions and their applications, Prentice Hall of India, New Delhi. (II Edition) 2012.
6. M. D. Raisinghania, Advanced Differential Equations, S. Chand & Company Ltd., New Delhi. (V Edition) 2013

SEMESTER – I
MAJOR PAPER - IV
MECHANICS
SUBJECT CODE – P1MA04MT

L	T	P	C
6	0	0	4

Total Hours : 78

OBJECTIVES :

To study mechanical systems under generalized coordinate systems, virtual work, energy and momentum, to study mechanics developed by Newton, Lagrange, Hamilton Jacobi and Theory of Relativity due to Einstein.

UNIT - I : MECHANICAL SYSTEMS

The Mechanical system - Generalised coordinates - Constraints - Virtual work - Energy and Momentum Chapter 1 : Sections 1.1 to 1.5 of D. T. Greenwood

UNIT - II : LAGRANGE'S EQUATIONS

Derivation of Lagrange's equations- Examples - Integrals of motion.
Chapter 2 : Sections 2.1 to 2.3 (Omit Section 2.4) of D. T. Greenwood

UNIT - III : HAMILTON'S EQUATIONS

Hamilton's Principle - Hamilton's Equation - Other variational principle.
Chapter 4 : Sections 4.1 to 4.3 (Omit section 4.4) of D. T. Greenwood

UNIT - IV : HAMILTON-JACOBI THEORY

Hamilton Principle function - Hamilton-Jacobi Equation - Separability
Chapter 5 : Sections 5.1 to 5.3 of D. T. Greenwood

UNIT - V : CANONICAL TRANSFORMATION

Differential forms and generating functions - Special Transformations - Lagrange and Poisson brackets.
Chapter 6 : Sections 6.1, 6.2 and 6.3 (omit sections 6.4, 6.5 and 6.6) of D. T. Greenwood

Recommended Text :

D. T. Greenwood, Classical Dynamics, Prentice Hall of India, New Delhi. (I Edition) 2008

Reference Books :

1. H. Goldstein, Classical Mechanics, Narosa Publishing House, New Delhi. (II Edition) 2010
2. N. C. Rane and P. S. C. Joag, Classical Mechanics, Tata McGraw Hill, (II Edition) 2010
3. J. L. Synge and B. A. Griffith, Principles of Mechanics, McGraw Hill Book Co., New York. (III Edition) 2015

SEMESTER – I
ELECTIVE PAPER - 1
A.PROBABILITY THEORY
SUBJECT CODE – P1MA05ET

L	T	P	C
6	0	0	3

Total Hours : 78

OBJECTIVES :

To introduce axiomatic approach to probability theory, to study some statistical characteristics, discrete and continuous distribution functions and their properties, characteristic function and basic limit theorems of probability.

UNIT - I : RANDOM EVENTS AND RANDOM VARIABLES

Random events - Probability axioms - Combinatorial formulae - conditional probability - Bayes Theorem - Independent events - Random Variables - Distribution Function - Joint Distribution - Marginal Distribution - Conditional Distribution - Independent random variables - Functions of random variables.

Chapter 1: Sections 1.1 to 1.7 Chapter 2 : Sections 2.1 to 2.9 of M. Fisz

UNIT - II : PARAMETERS OF THE DISTRIBUTION

Expectation- Moments - The Chebyshev Inequality - Absolute moments - Order parameters - Moments of random vectors - Regression of the first and second types.

Chapter 3 : Sections 3.1 to 3.8 of M. Fisz

UNIT - III : CHARACTERISTIC FUNCTIONS

Properties of characteristic functions - Characteristic functions and moments - semi-invariants - characteristic function of the sum of the independent random variables - Determination of distribution function by the Characteristic function - Characteristic function of multidimensional random vectors - Probability generating functions.

Chapter 4 : Sections 4.1 to 4.7 of M. Fisz

UNIT - IV : SOME PROBABILITY DISTRIBUTIONS

One point , two point , Binomial - Polya - Hypergeometric - Poisson (discrete) distributions - Uniform - normal gamma - Beta - Cauchy and Laplace (continuous) distributions.

Chapter 5 : Section 5.1 to 5.10 (Omit Section 5.11) of M. Fisz

UNIT - V: LIMIT THEOREMS

Stochastic convergence - Bernoulli law of large numbers - Convergence of sequence of distribution functions - Levy-Cramer Theorems - de Moivre-Laplace Theorem - Poisson, Chebyshev, Khintchine Weak law of large numbers - Lindberg Theorem - Lyapunov Theroem - Borel-Cantelli Lemma - Kolmogorov Inequality and Kolmogorov Strong Law of large numbers. Chapter 6 : Sections 6.1 to 6.4, 6.6 to 6.9 , 6.11 and 6.12.

(Omit Sections 6.5, 6.10,6.13 to 6.15) of M. Fisz

Recommended Text :

M. Fisz, Probability Theory and Mathematical Statistics,
John Wiley and Sons, New York. (II Edition) 2010

Reference Books :

1. V. K. Rohatgi, An Introduction to Probability Theory and Mathematical Statistics,
Wiley Eastern Ltd., New Delhi, (I Edition) 2007
2. R. B. Ash, Real Analysis and Probability, Academic Press, New York, (II Edition) 2009
3. S. I. Resnick, A Probability Path, Birhauser, Berlin. (I Edition) 2010.
4. R. Durrett, Probability: Theory and Examples, Duxbury Press, New York .
(II Edition) 2010
5. K. L. Chung, A course in Probability, Academic Press, New York, (III Edition) 2012
6. B. R. Bhat, Modern Probability Theory, New Age International (P) Ltd,
New Delhi. (III Edition) 2014

SEMESTER – I
ELECTIVE PAPER - 1
B. MATHEMATICAL PROGRAMMING
SUBJECT CODE – P1MA06ET

L	T	P	C
6	0	0	3

Total Hours : 78

OBJECTIVES :

This course introduces advanced topics in Linear and non-linear Programming

UNIT - I : INTEGER LINEAR PROGRAMMING

Types of Integer Linear Programming Problems - Concept of Cutting Plane - Gomory's All Integer Cutting Plane Method - Gomory's mixed Integer Cutting Plane method - Branch and Bound Method.

DYNAMIC PROGRAMMING: Characteristics of Dynamic Programming Problem - Developing Optimal Decision Policy - Dynamic Programming Under Certainty - DP approach to solve LPP. Chapter-7: 7.1 - 7.6 and Chapter-20: 20.1 - 20.5 of J. K. Sharma

UNIT - II : CLASSICAL OPTIMIZATION METHODS

Unconstrained Optimization - Constrained Multi-variable Optimization with Equality Constraints - Constrained Multi-variable Optimization with inequality Constraints.

NON-LINEAR PROGRAMMING METHODS: Examples of NLPP - General NLPP - Graphical solution - Quadratic Programming - Wolfe's modified Simplex Methods. Chapter-23: 23.1 - 23.4 and Chapter-24: 24.1 - 24.4 of J. K. Sharma

UNIT - III : THEORY OF SIMPLEX METHOD

Canonical and Standard form of LP - Slack and Surplus Variables - Reduction of any Feasible solution to a Basic Feasible solution - Alternative Optimal solution - Unbounded solution - Optimality conditions - Some complications and their resolutions - Degeneracy and its resolution Chapter-25: 25.1 - 25.4, 25.6-25.9 of J. K. Sharma

UNIT - IV : REVISED SIMPLEX METHOD

Standard forms for Revised simplex Method - Computational procedure for Standard form I - comparison of simplex method and Revised simplex Method. BOUNDED VARIABLES LP PROBLEM: The simplex algorithm Chapter-26: 26.1 - 26.4 Chapter-28: 28.1, 28.2 of J. K. Sharma

UNIT - V : PARAMETRIC LINEAR PROGRAMMING

Variation in the coefficients c_j , Variations in the Right hand side, b_i . GOAL PROGRAMMING : Difference between LP and GP approach - Concept of Goal Programming - Goal Programming Model formulation - Graphical Solution Method of Goal Programming - Modified Simplex method of Goal Programming. Chapter-29: 29.1 - 29.3. Chapter-8: 8.1 - 8.4, 8.6 and 8.7. of J. K. Sharma

Recommended Text :

J. K. Sharma, Operations Research Theory and Applications, Macmillan India Ltd.,
(III Edition) 2011

Reference Books :

1. S. S. Rao, Optimization Theory and Applications, Wiley Eastern Ltd., New Delhi,
(IV Edition) 2011
2. Beightler. C. D. Phillips, B. Wilde, Foundations of Optimization,
Prentice Hall Pvt. Ltd., New York. (II Edition) 2012
3. Hamdy A. Taha, Operations Research, Prentice - Hall of India Private Limited, New Delhi.
(VII Edition) 2013
4. F. S. Hillier & J. Lieberman, Introduction to Operation Research,
Tata- McGraw Hill Company, New Delhi. (VII Edition) 2014

SEMESTER – I
ELECTIVE PAPER - 1
C. RELIABILITY AND QUEUEING THEORY
SUBJECT CODE – P1MA07ET

L	T	P	C
6	0	0	3

Total Hours : 78

OBJECTIVES :

To study applications of Mathematics.

UNIT - I : RELIABILITY DEFINITION AND FAILURE DATA ANALYSIS

Introduction – Definition of Probability – Failure Data – Mean Failure Rate – Mean Time To Failure (MTTF) – Mean Time Between Failure (MTBF) – Graphical Plots.

Chapter-2: 2.1 - 2.2 Chapter-3: 3.2 - 3.6 of Srinath. L. S.

UNIT - II : FAILURE DATA ANALYSIS

Four important points – MTTF in terms of Failure density – Generalization – Reliability in terms of Hazard rate and failure density – MTTF in integral form. Introduction – Definition of Probability – Failure Data – Mean Failure Rate – Mean Time To Failure – Mean Time Between Failure – Graphical Plots.

Chapter-3: 3.7 - 3.11 of Srinath. L. S.

UNIT - III : SYSTEM RELIABILITY

Introduction – Series Configuration – Parallel Configuration – Mixed Configuration – Application to specific hazard Models – An r out of n structure – Systems not reducible to mixed configuration.

Chapter-6: 6.1 - 6.6 and 6.8 of Srinath. L. S.

UNIT - IV : INTRODUCTION TO QUEUEING PROCESS

Measuring system performance – Some general results Simple data book keeping for queues - Poisson process and the exponential distribution – Markovian Property of the exponential distribution.

Chapter-1: 1.4 - 1.8 of Donald Gross

UNIT - V : SIMPLE MARKOVIAN BIRTH-DEATH QUEUEING MODELS

Steady state solution for the M / M / 1 model – Methods of solving steady state difference equations – Queues with parallel channels and truncation (M / M / c / K). of Donald Gross

Recommended Text :

1. Donald Gross, Carl M. Harris, Fundamentals of Queueing Theory, Wiley India.
(for Units IV and V) (IV Edition) 2012
2. Srinath. L. S., Reliability Engineering, East West Press, New Delhi.
(for Units I , II and III) (IV Edition) 2013

Reference Books :

1. Karlin. S and H. Taylor, A First Course in Stochastic Processes, Academic Press, New York. (II Edition) 2007
2. Cox. D. R. and H. D. Miller, Theory of Stochastic Processes, Methuen, London. (II Edition) 2009
3. Cramer. H. and M. Leadbetter, Stationary and Related Stochastic Processes Wiley, New York.(III Edition) 2013

SEMESTER – II
MAJOR PAPER - V
ALGEBRA - II
SUBJECT CODE – P2MA01MT

L	T	P	C
6	0	0	4

Total Hours : 78

OBJECTIVES :

To study field extension, roots of polynomials, Galois Theory, finite fields, division rings, solvability by radicals and to develop computational skill in abstract algebra.

UNIT - I : EXTENSION FIELDS

Extension fields - Transcendence of e . Chapter 5: Section 5.1 and 5.2 of I. N. Herstein

UNIT - II : ROOTS OF POLYNOMIALS

Roots of Polynomials - More about roots Chapter 5: Sections 5.3 and 5.5 of I. N. Herstein

UNIT - III : GALOIS THEORY

Elements of Galois theory. Chapter 5 : Section 5.6 of I. N. Herstein

UNIT - IV: FINITE FIELDS, DIVISION RINGS

Finite fields - Wedderburn's theorem on finite division rings.
Chapter 7: Sections 7.1 and 7.2 of I. N. Herstein

UNIT - V : RADICALS

Solvability by radicals - A theorem of Frobenius - Integral Quaternions and the Four - Square theorem.

Chapter 5: Section 5.7 Chapter 7 : Sections 7.3 and 7.4 of I. N. Herstein

Recommended Text :

I. N. Herstein. Topics in Algebra, Wiley Eastern Limited, New Delhi. (II Edition) 2013

Reference Books :

1. I. S. Luther and I. B. S. Passi, Algebra, Volume - I Groups (1996); Volume - II Rings, Narosa Publishing House , New Delhi. (II Edition) 2004
2. D. S. Malik, J. N. Mordeson and M. K. Sen, Fundamental of Abstract Algebra, McGraw Hill, (International Edition) New York. (II Edition) 2007
3. B. Bhattacharya, S. K. Jain, and S. R. Nagpaul, Basic Abstract Algebra, Cambridge University Press, (Indian Edition) (II Edition) 2009
4. N. Jacobson, Basic Algebra, Vol. I & II Hindustan Publishing Company, New Delhi. (II Edition) 2012.
5. M. Artin, Algebra, Prentice Hall of India, (II Edition) 2015

SEMESTER – II
MAJOR PAPER - VI
REAL ANALYSIS - II
SUBJECT CODE – P2MA02MT

L	T	P	C
6	0	0	5

Total Hours : 78

OBJECTIVES :

To introduce measure on the real line, Lebesgue measurability and integrability, Fourier Series and Integrals, in-depth study in multivariable calculus.

UNIT - I : FOURIER SERIES AND FOURIER INTEGRALS

Introduction - Orthogonal system of functions - The theorem on best approximation - The Fourier series of a function relative to an orthonormal system - Properties of Fourier Coefficients - The Riesz-Fischer Theorem - The convergence and representation problems in trigonometric series - The Riemann - Lebesgue Lemma - The Dirichlet Integrals - An integral representation for the partial sums of Fourier series - Riemann's localization theorem - Sufficient conditions for convergence of a Fourier series at a particular point - Cesaro summability of Fourier series- Consequences of Fejes's theorem - The Weierstrass approximation theorem Chapter 11 : Sections 11.1 to 11.15 of Apostol

UNIT - II : MULTIVARIABLE DIFFERENTIAL CALCULUS

Introduction - The Directional derivative - Directional derivative and continuity - The total derivative - The total derivative expressed in terms of partial derivatives - The matrix of linear function - The Jacobian matrix - The chain rule - Matrix form of chain rule - The mean - value theorem for differentiable functions - A sufficient condition for differentiability - A sufficient condition for equality of mixed partial derivatives - Taylor's theorem for functions of R_n to R_1 Chapter 12 : Section 12.1 to 12.14 of Apostol

UNIT - III : IMPLICIT FUNCTIONS AND EXTREMUM PROBLEMS

Functions with non-zero Jacobian determinants - The inverse function theorem - The Implicit function theorem - Extrema of real valued functions of several variables - Extremum problems with side conditions. Chapter 13 : Sections 13.1 to 13.7 of Apostol

UNIT - IV THE LEBESGUE INTEGRAL

Length of open sets and closed sets - Inner and outer measure : Measurable sets - Properties of measurable sets - Measurable functions - Definition and existence of the Lebesgue integral for bounded function. Chapter 11 : Section 11.1 to 11.5 of R. R. Goldberg]

UNIT - V THE LEBESGUE INTEGRAL (Contd . . .)

Properties of the Lebesgue integral for bounded measurable functions - The Lebesgue integral for unbounded functions - Some fundamental theorems - The metric space $L_2 [a, b]$ - The integral on $(-\infty, \infty)$ and in the plane. Chapter 11 : Section 11.6 to 11.10 of R. R. Goldberg

Recommended Texts :

1. Tom M. Apostol, Mathematical Analysis, Addison-Wesley Publishing Company Inc., New York. (II Edition) 2012 (for Units I, II and III)
2. Richard R. Goldberg, Methods of Real Analysis, Oxford & IBH Publishing, New Delhi. (II edition) 2012 (for Unit IV and V)

Reference Books :

1. Munroe. M. E. Measure and Integration. Addison-Wesley, Mass. (II Edition) 2010
2. Burkill. J. C. The Lebesgue Integral, Cambridge University Press. (II Edition) 2011
3. Sanjay Arora and Bansi Lal, Introduction to Real Analysis, Satya Prakashan, New Delhi, (III Edition) 2012
4. Rudin. W. Principles of Mathematical Analysis, McGraw Hill Company, New York, (III Edition) 2013
5. Roydon. H. L. Real Analysis, Macmillan Pub. Company, New York. (IV Edition) 2014
6. Malik. S. C. and Savita Arora. Mathematical Analysis, Wiley Eastern Limited. New Delhi, (II Edition) 2015

SEMESTER-II
MAJOR PAPER - VII
PARTIAL DIFFERENTIAL EQUATIONS
SUBJECT CODE – P2MA03MT

L	T	P	C
5	0	0	5

Total Hours : 65

Objectives :

The aim of the course is to introduce to the students the various types of partial differential equations and how to solve these equations.

UNIT - I : PARTIAL DIFFERENTIAL EQUATIONS OF FIRST ORDER

Formation and solution of PDE- Integral surfaces - Cauchy Problem order equation - Orthogonal surfaces - First order non-linear - Characteristics - Compatible system - Charpits method.

Chapter 0: 0.4 to 0.11 (omit 0.1, 0.2, 0.3 and 0.11.1) of K. Sankar Rao

UNIT - II : FUNDAMENTALS

Intrduction-Classification of Second order PDE-Canonical forms-Adjoint operators-Riemans method.

Introduction – Classification of Second Order PDE - Canonical forms – Adjoint Operators _ Riemann’s method. Chapter 1 : 1.1 to 1.5 of K. Sankar Rao

UNIT - III : ELLIPTIC DIFFERENTIAL EQUATIONS

Derivation of Laplace and Poisson equation - BVP - Separation of Variables - Dirichlet’s Problem and Newmann Problem for a rectangle - Solution of Laplace equation in Cylindrical and spherical coordinates - Examples. Chapter 2 : 2.1, 2.2, 2.5 to 2.7, 2.10 to 2.13 (omit 2.3, 2.4, 2.8 and 2.9) of K. Sankar Rao

UNIT - IV : PARABOLIC DIFFERENTIAL EQUATIONS

Formation and solution of Diffusion equation - Dirac-Delta function - Separation of variables method - Solution of Diffusion Equation in Cylindrical and spherical coordinates - Examples. Chapter 3 : 3.1 to 3.7 and 3.9 (omit 3.8) of K. Sankar Rao

UNIT - V : HYPERBOLIC DIFFERENTIAL EQUATIONS

Formation and solution of one-dimensional wave equation - canocical reduction - IVP- d’Alembert’s solution - IVP and BVP for two-dimensional wave equation - Periodic solution of one-dimensional wave equation in cylindrical and spherical coordinate systems - Uniqueness of the solution for the wave equation - Duhamel’s Principle - Examples. Chapter 4: 4.1 to 4.12 (omit 4.5, 4.6 & 4.10) of K. Sankar Rao

Recommended Text :

K. Sankar Rao, Introduction to Partial Differential Equations,
Prentice Hall of India, New Delhi. (III Edition) 2011

Reference Books :

1. R. C. McOwen, Partial Differential Equations, Pearson Education, New Delhi,
(II Edition) 2005
2. R. Dennermeyer, Introduction to Partial Differential Equations and Boundary Value
Problems, McGraw Hill, New York, (I Edition) 2008
3. M. D. Raisinghania, Advanced Differential Equations, S. Chand & Company Ltd.,
New Delhi, (II Edition) 2010
4. I. N. Sneddon, Elements of Partial Differential Equations, McGraw Hill, New Delhi.
(II Edition) 2010

SEMESTER-II
MAJOR PAPER - VIII
CALCULUS OF VARIATIONS AND INTEGRAL EQUATIONS
SUBJECT CODE – P2MA04MT

L	T	P	C
5	0	0	4

Total Hours : 65

Objectives :

The aim of the course is to introduce to the students the concept of calculus of variation and its applications and second to introduce various types of integral equations and how to solve these equations.

UNIT-I : VARIATIONAL PROBLEMS WITH MOVING BOUNDARIES

The concept of Variation and its properties – Euler's equation – Variational problems for functional – Functionals dependent on higher order derivatives – Functions of several independent variables – Some applications to problems of mechanics. Chapter 1 : 1.1 to 1.7 of A. S. Gupta

UNIT - II : VARIATIONAL PROBLEMS WITH MOVING BOUNDARIES

Movable boundary for a functional dependent on two functions – One sided variations – Reflection and Refraction of extremals – Diffraction of light rays. Chapter 2 : 2.1 to 2.5 of A. S. Gupta

UNIT – III : INTEGRAL EQUATIONS

Introduction – Definition – Regularity conditions – Special kinds of Kernels – Eigen values and eigen functions – Convolution integral – Reduction to a system of algebraic equations – Examples – Fredholm alternative – Examples – An approximation method. Chapter 1 : 1.1 to 1.5 Chapter 2 : 2.1 to 2.5 of Ram P. Kanwal

UNIT – IV : METHOD OF SUCCESSIVE APPROXIMATIONS AND FREDHOLM THEORY

Method of successive approximations – Iterative scheme – Examples – Volterra integral equations – Examples – Some results about the resolvent kernel – The method of solution of Fredholm equation – Fredholm first theorem – Examples. Chapter 3 : 3.1 to 3.5 Chapter 4 : 4.1 to 4.3 of Ram P. Kanwal

UNIT – V : APPLICATIONS TO ORDINARY DIFFERENTIAL EQUATIONS

Initial value problems – Boundary value problems – Examples – Singular integral equations – The Abel integral equations - Examples. Chapter 5 : 5.1 to 5.3 Chapter 8 : 8.1 to 8.2 of Ram P. Kanwal

Recommended Text :

1. A. S. Gupta, Calculus of Variations with Applications, PHI, New Delhi.
(II Edition) 2005 (for Units I and II)
2. Ram P. Kanwal, Linear Integral Equations, Theory and Techniques, Academic Press,
New York. (I Edition) 2013 (for Units III, IV and V)

Reference Books :

1. Sudir K. Pundir and Rimple Pundir, Integral Equations and Boundary Value Problems,
Pragati Prakasam, Meerut. (II Edition) 2010
2. M. D. Raisinghania, Integral Equations and Boundary Value Problems, S. Chand & Co.,
New Delhi. (V Edition) 2013

**SEMESTER-II
ELECTIVE - II
A. PROGRAMMING IN C++ WITH PRACTICALS
SUBJECT CODE – P2MA05ET**

L	T	P	C
6	0	0	3

Total Hours : 78

(Theory 60 marks + Practical 40 Marks)
(Theory: Int.15 + Univ. Exam. 45) (Practical: Int.10 + Univ. Exam. 30)

Objectives :

This course introduces a higher level language C++ and numerical methods for hands-on experience on computers. Stress is also given on the error analysis.

UNIT – I : PRINCIPLES OF OOP

Principles of OOP – Beginning with C++ - Tokens, Expressions and Control Structures.
Chapters : 1 to 3 of E. Balagurusamy

UNIT – II : FUNCTIONS IN C++

Functions in C++ - Classes and Objects. Chapters : 4 and 5 of E. Balagurusamy

UNIT - III : CONSTRUCTORS AND DESTRUCTORS

Constructors and destructors - Operator Overloading and Type Conversions.
Chapters : 6 and 7 of E. Balagurusamy

UNIT – IV : INHERITANCE

Inheritance : Extending Classes - Pointers, Virtual Functions and Polymorphism.
Chapters : 8 and 9 of E. Balagurusamy

UNIT – V: I/O OPERATIONS

Managing Console I/O Operations - Working with Files. Chapters : 10 and 11 of E. Balagurusamy

Recommended Text :

E. Balagurusamy, Object Oriented Programming with C++, Tata McGraw Hill, New Delhi.
(III Edition) 2013

Reference Books :

D. Ravichandran, Programming with C++, Tata McGraw Hill, New Delhi. (II Edition) 2010

COMPUTER LABORATORY PRACTICE EXERCISES
COMPUTER LANGUAGE EXERCISES FOR PROGRAMMING IN C++

1. Write a class to represent a vector (a series of float values). Include member functions to perform the following tasks: To create the vector, To modify the value of a given element, To multiply by a scalar value, To display the vector in the form (10, 20, 30,...). Write a program to test your class.
2. Create a class FLOAT that contains one float data member. Overload all the four arithmetic operators so that they operate on the objects of FLOAT.
3. Write a program which shows the days from the start of year to date specified. Hold the number of days for each month in an array. Allow the user to enter the month and the day of the year. Then the program should display the total days till the day.
4. Write a program to include all possible binary operator overloading using friend function.
5. Write a program to read an array of integer numbers and sort it in descending order. Use read data, putdata, and arraymax as member functions in a class.
6. Write a program to read two character strings and use the overloaded '+' operator to append the second string to the first.
7. Develop a program Railway Reservation System using Hybrid Inheritance and Virtual Function.
8. Using overloaded constructor in a class write a program to add two complex numbers.
9. Create a class MAT of size(m,n). Define all possible matrix operations for MAT type objects.
10. Write a program that determines whether a given number is a prime number or not and then prints the result using polymorphism.
11. Write a program to illustrate the dynamic initialization of constructors.
12. Write a program to illustrate the use of pointers to objects.
13. Write a program to illustrate how to construct a matrix of size $m \times n$.
14. Write a program to arrange the given data in ascending / descending order using various sorting algorithms
15. Write a program to find the biggest /smallest number in the given data using various search algorithms

SEMESTER-II
ELECTIVE - II
B. ALGEBRAIC NUMBER THEORY
SUBJECT CODE – P2MA06ET

L	T	P	C
6	0	0	3

Total Hours : 78

Objectives :

The course aims to provide a study on modules over rings, finite fields, algebraic extensions, number fields and cyclotomic fields, Noetherian rings and modules and Dedekind rings.

UNIT-I : ALGEBRAIC BACKGROUND

Rings and Fields- Factorization of Polynomials - Field Extensions - Symmetric Polynomials - Modules - Free Abelian Groups. Chapter 1: Sec. 1.1 to 1.6 of I. Steward and D.Tall

UNIT-II : ALGEBRAIC NUMBERS

Algebraic numbers - Conjugates and Discriminants - Algebraic Integers - Integral Bases - Norms and Traces - Rings of Integers. Chapters 2: Sec. 2.1 to 2.6 of I. Steward and D.Tall

UNIT-III : QUADRATIC AND CYCLOTOMIC FIELDS

Quadratic fields and cyclotomic fields : Factorization into Irreducibles : Trivial factorization - Factorization into irreducibles - Examples of non-unique factorization into irreducibles.

Chapter 3: Sec. 3.1 and 3.2 ; Chapter 4: Sec. 4.2 to 4.4 of I. Steward and D.Tall

UNIT-IV : EUCLIDEAN DOMAINS

Prime Factorization - Euclidean Domains - Euclidean Quadratic fields - Consequences of unique factorization - The Ramanujan -Nagell Theorem. Chapter 4: Sec. 4.5 to 4.9 of I. Steward and D.Tall

UNIT-V : IDEALS

Prime Factorization of Ideals - The norms of an Ideal - Non-unique Factorization in Cyclotomic Fields. Chapter 5 : Sec. 5.2 to 5.4 of I. Steward and D.Tall

Recommended Text :

I. Steward and D. Tall. Algebraic Number Theory and Fermat's Last Theorem
A. K. Peters Ltd., Natick, Mass. (III Edition) 2013

Reference Books :

1. P. Ribenboim, Algebraic Numbers, Wiley, New York. (II Edition) 2007
2. Z. I. Bosevic and I. R. Safarevic, Number Theory, Academic Press, New York (II Edition) 2008
3. J. W. S. Cassels and A. Frohlich, Algebraic Number Theory, Academic Press, New York, (II Edition) 2010
4. A. Weil. Basic Number Theory, Springer, New York,(II Edition), 2012.
5. P. Samuel, Algebraic Theory of Numbers, Houghton Mifflin Company, Boston (III Edition) 2013

**SEMESTER-II
ELECTIVE - II
C. OPERATIONS RESEARCH
SUBJECT CODE – P2MA07ET**

L	T	P	C
6	0	0	3

Total Hours : 78

Objectives :

This course aims to introduce decision theory, PERT, CPM, deterministic and probabilistic inventory systems, queues, replacement and maintenance problems.

UNIT-I : DECISION THEORY

Steps in Decision theory Approach - Types of Decision-Making Environments - Decision Making Under Uncertainty - Decision Making under Risk - Posterior Probabilities and Bayesian Analysis - Decision Tree Analysis - Decision Making with Utilities. Chapter-11 : 11.1 - 11.8 of J. K. Sharma

UNIT-II : PROJECT MANAGEMENT : PERT AND CPM

Basic Differences between PERT and CPM - Steps in PERT/CPM Techniques - PERT/CPM Network Components and Precedence Relationships - Critical Path Analysis - Probability in PERT Analysis - Project time-cost Trade Off - Updating the Project. Chapter-13 : 13.1 - 13.7 of J. K. Sharma

UNIT-III : DETERMINISTIC INVENTORY CONTROL MODELS

Meaning of Inventory Control - Functional Classification - Advantage of Carrying Inventory - Features of Inventory System - Inventory Model building - Deterministic Inventory Models with no shortage - Deterministic Inventory with Shortages Chapter-14 : 14.1 - 14.8 of J. K. Sharma

UNIT-IV : QUEUEING THEORY

Essential Features of Queueing System - Operating Characteristic of Queueing System - Probabilistic Distribution in Queueing Systems - Classification of Queueing Models - Solution of Queueing Models - Probability Distribution of Arrivals and Departures. Chapter-16: 16.1-16.8; Appendix 16.A (PP 774-781) of J. K. Sharma

UNIT-V : REPLACEMENT AND MAINTENANCE MODELS

Failure Mechanism of items - Replacement of Items Deteriorates with Time - Replacement of items that fail completely - other Replacement Problems. Chapter - 17 : 17.1 - 17.5 of J. K. Sharma

Recommended Text

J. K. Sharma, Operations Research Theory and Applications, Macmillan India Ltd.,
(V Edition) 2014

Reference Books

1. Hamdy. A. Taha, Operations Research Prentice, Hall of India Private Limited, New Delhi.
(IX edition) 2010
2. Beightler. C, D. Phillips, B. Wilde, Foundations of Optimization Prentice Hall Pvt. Ltd.,
New York. (III Edition) 2010
3. Bazaraa, M. S; J. J. Jarvis, H. D. Sharall, Linear Programming and Network flow,
John Wiley and sons, New York. (II Edition) 2011
4. Gross. D and C. M. Harris, Fundamentals of Queueing Theory, Wiley and Sons, New
York, (IV Edition) 2013
5. F.S. Hillier and J. Lieberman, Introduction to Operations Research,
Tata McGraw Hill Publishing Company, New Delhi. (VIII Edition) 2014

SEMESTER – III
MAJOR PAPER - IX
COMPLEX ANALYSIS - I
SUBJECT CODE – P3MA01MT

L	T	P	C
6	0	0	5

Total Hours : 78

OBJECTIVES : To Study Cauchy integral formula, local properties of analytic functions, general form of Cauchy's theorem and evaluation of definite integral and harmonic functions

UNIT-I : CAUCHY'S INTEGRAL FORMULA

The Index of a point with respect to a closed curve - The Integral formula - Higher derivatives. Local Properties of Analytic Functions: Removable Singularities - Taylors's Theorem - Zeros and poles - The local Mapping - The Maximum Principle.
Chapter 4 : Section 2 : 2.1 to 2.3; Chapter 4 : Section 3 : 3.1 to 3.4

UNIT-II : THE GENERAL FORM OF CAUCHY'S THEOREM

Chains and cycles- Simple Continuity - Homology - The General statement of Cauchy's Theorem - Proof of Cauchy's theorem - Locally exact differentials- Multiply connected regions - Residue theorem - The argument principle.
Chapter 4 : Section 4 : 4.1 to 4.7; Chapter 4 : Section 5: 5.1 and 5.2

UNIT-III : EVALUATION OF DEFINITE INTEGRALS AND HARMONIC FUNCTIONS

Evaluation of definite integrals - Definition of Harmonic function and basic properties - Mean value property - Poisson formula.
Chapter 4 : Section 5 : 5.3 ; Chapter 4 : Sections 6 : 6.1 to 6.3

UNIT-IV : HARMONIC FUNCTIONS AND POWER SERIES EXPANSIONS

Schwarz theorem - The reflection principle - Weierstrass theorem - Taylor's Series - Laurent series .
Chapter 4 : Sections 6.4 and 6.5 ; Chapter 5 : Sections 1.1 to 1.3

UNIT-V: PARTIAL FRACTIONS AND ENTIRE FUNCTIONS

Partial fractions - Infinite products - Canonical products - Gamma Function - Jensen's formula - Hadamard's Theorem
Chapter 5 : Sections 2.1 to 2.4 ; Chapter 5 : Sections 3.1 and 3.2

RECOMMENDED TEXT

Lars V. Ahlfors, Complex Analysis, McGraw Hill Co., New York, (III Edition) 2014.

REFERENCE BOOKS

1. H.A.Presfly, Introduction to complex Analysis, Clarendon Press,Oxford, (II Edition) 1990.
2. J. B. Conway, Functions of one complex variables Springer - Verlag, International student Edition, Naroser Publishing Co. (II Edition) 2002.
3. E. Hille, Analytic function Thorey (2 vols.), Gonm & Co, (II Edition) 1959.
4. M. Heins, Complex function Theory, Academic Press, New York, (II Edition) 1968.
5. S. G. Venkatachalapathy, Margham Publications, (I Edition) 2012.
6. Shishir Gupta, Complex Variables, Tata McGrawhill Education Private Limited, (II Edition) 2013.

SEMESTER – III
MAJOR PAPER - X
TOPOLOGY
SUBJECT CODE – P3MA02MT

L	T	P	C
6	0	0	5

Total Hours : 78

OBJECTIVES :

To study topological spaces, continuous functions, connectedness, compactness, countability and separation axioms.

UNIT-I : TOPOLOGICAL SPACES

Topological spaces - Basis for a topology - The order topology - The product topology on $X \times Y$ - The subspace topology - Closed sets and limit points.

Chapter 2 : Sections 12 to 17

UNIT-II : CONTINUOUS FUNCTIONS

Continuous functions - the product topology - The metric topology.

Chapter 2 : Sections 18 to 21

UNIT-III : CONNECTEDNESS

Connected spaces - connected subspaces of the Real line - Components and local connectedness. Chapter 3 : Sections 23 to 25

UNIT-IV : COMPACTNESS

Compact spaces - compact subspaces of the Real line - Limit Point Compactness - Local Compactness. Chapter 3 : Sections 26 to 29

UNIT-V: COUNTABILITY AND SEPARATION AXIOM

The Countability Axioms - The separation Axioms - Normal spaces - The Urysohn Lemma - The Urysohn metrization Theorem-The Tietz extension theorem. Chapter 4: Sections 30 to 35

RECOMMENDED TEXT

James R. Munkres, Topology Pearson Education Pvt. Ltd., Delhi.
(Third Indian Reprint) (II Edition) 2015.

REFERENCE BOOKS

1. J. Dugundji , Topology , Prentice Hall of India, New Delhi, 1975.
2. George F.Simmons, Introduction to Topology and Modern Analysis, McGraw Hill Book Co., Indian Edition (II Edition) 2015.
3. J. L. Kelly, General Topology, Van Nostrand, Reinhold Co., New York (I Edition) 2001.
4. L. Steen and J. Subhash, Counter Examples in Topology, Holt, Rinehart and Winston, New York, (II Edition) 2000.
5. S. Willard, General Topology, Addison - Wesley, Mass., (II Edition) 2002.
6. General Topology, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi. (II Edition) 2014.

SEMESTER – III
MAJOR PAPER - XI
DIFFERENTIAL GEOMETRY
SUBJECT CODE – P3MA03MT

L	T	P	C
6	0	0	5

Total Hours : 78

OBJECTIVES :

This course introduces space curves and their intrinsic properties of a surface and geodesics. Further the non-intrinsic properties of surfaces are explored.

UNIT-I : SPACE CURVES

Definition of a space curve - Arc length - tangent - normal and binormal - curvature and torsion - contact between curves and surfaces - tangent surface - involutes and evolutes - Intrinsic equations - Fundamental Existence Theorem for space curves - Helics.
Chapter I : Sections 1 to 9

UNIT-II : INTRINSIC PROPERTIES OF A SURFACE

Definition of a surface - curves on a surface - Surface of revolution - Helicoids - Metric - Direction coefficients - families of curves - Isometric correspondence - Intrinsic properties.
Chapter II: Sections 1 to 9

UNIT-III : GEODESICS

Geodesics - Canonical geodesic equations - Normal property of geodesics - Existence Theorems - Geodesic parallels Chapter II: Sections 10 to 14

UNIT-IV : GEODESICS (Contd . . .)

Geodesics curvature - Gauss - Bonnet Theorem - Gaussian curvature - surface of constant curvature. Chapter II: Sections 15 to 18

UNIT-V : NON INTRINSIC PROPERTIES OF A SURFACE

The second fundamental form - Principal curvature - Lines of curvature - Developable - Developable associated with space curves and with curves on surface - Minimal surfaces - Ruled surfaces. Chapter III: Sections 1 to 8

RECOMMENDED TEXT

T. J. Willmore, An Introduction to Differential Geometry, Oxford University Press, New Delhi. (Indian Print) (30th Edition) 2014.

REFERENCE BOOKS

1. Struik, D. T. Lectures on Classical Differential Geometry, Addison - Wesley, Mass. (IV Edition) 1950.
2. Kobayashi. S. and Nomizu. K. Foundations of Differential Geometry, Interscience Publishers, (II Edition) 1963.
3. Wilhelm Klingenberg: A course in Differential Geometry, Graduate Texts in Mathematics, Springer-Verlag (I Edition) 1978.
4. J. A. Thorpe, Elementary topics in Differential Geometry, Under - graduate Texts in Mathematics, Springer - Verlag (III Edition) 1979.
5. D. Somasundaram, Differential Geometry, Narosa Publishing, Chennai. (III Edition) 2014.

SEMESTER – III
MAJOR PAPER - XII
DISCRETE MATHEMATICS
SUBJECT CODE – P3MA04MT

L	T	P	C
6	0	0	5

Total Hours : 78

OBJECTIVES :

This course aims to explore the topics like lattices and their applications in switching circuits, finite fields, polynomials and coding theory.

UNIT - I : LATTICES

Properties and examples of Lattices - Distributive lattices - Boolean algebras - Boolean polynomials - Minimal Forms of Boolean Polynomials. Chapters : 1 to 4 and 6.

UNIT - II : APPLICATIONS OF LATTICES

Switching Circuits - Applications of Switching Circuits Chapters : 7 and 8.

UNIT - III : FINITE FIELDS

Finite fields Chapter : 13.

UNIT - IV : POLYNOMIALS

Irreducible Polynomials over Finite fields - Factorization of Polynomials over Finite fields. Chapters : 14 and 15.

UNIT - V: CODING THEORY

Introduction to Coding - Linear Codes. Chapters : 16 and 17.

RECOMMENDED TEXT

Rudolf Lidl & Gunter Pilz. Applied Abstract Algebra, Springer Verlag, New York.
Second Indian Reprint (II Edition) 2010.

REFERENCE BOOKS

1. A. Gill, Applied Algebra for Computer Science, Prentice Hall Inc., New Jersey.
(I Edition) 2012.
2. J. L. Gersting, Mathematical Structures for Computer Science, Computer Science Press,
New York. (I Edition) 2014.
3. S. Wiitala, Discrete Mathematics- A Unified Approach, McGraw Hill Book Co.
(I Edition) 2015.
4. John B. Fraleigh, A first course in Abstract algebra, (II Edition) 2011.

SEMESTER – III
ELECTIVE PAPER - III
A. TENSOR ANALYSIS AND RELATIVITY THEORY
SUBJECT CODE – P3MA05ET

L	T	P	C
6	0	0	3

Total Hours : 78

OBJECTIVES :

The course aims to introduce vector algebra and vector calculus and special relativity and relativistic kinematics, dynamics and accelerated systems.

UNIT-I : TENSOR ALGEBRA

Systems of Different orders - Summation Convention - Kronecker Symbols - Transformation of coordinates in S_n - Invariants - Covariant and Contravariant vectors - Tensors of Second Order - Mixed Tensors - Zero Tensor - Tensor Field - Algebra of Tensors - Equality of Tensors - Symmetric and Skew –symmetric tensors - Outer multiplication, Contraction and Inner Multiplication - Quotient Law of Tensors - Reciprocal Tensor of Tensor - Relative Tensor - Cross Product of Vectors.

Chapter I : I.1 - I.3, I.7 and I.8 and Chapter II : II.1 - II.19

UNIT-II : TENSOR CALCULUS

Riemannian Space - Christoffel Symbols and their properties

Chapter III: III.1 and III.2

UNIT-III : TENSOR CALCULUS (Contd . . .)

Covariant Differentiation of Tensors - Riemann - Christoffel Curvature Tensor - Intrinsic Differentiation.

Chapter III: III.3 - III.5

UNIT-IV : SPECIAL THEORY OF RELATIVITY

Galilean Transformation - Maxwell's equations - The ether Theory - The Principle of Relativity **Relativistic Kinematics** : Lorentz Transformation equations - Events and simultaneity - Example - Einstein Train - Time dilation - Longitudinal Contraction - Invariant Interval. Proper time and Proper distance - World line - Example - twin paradox - addition of velocities - Relativistic Doppler effect.

Chapter 7 : Sections 7.1 and 7.2

UNIT-V : RELATIVISTIC DYNAMICS

Momentum - Energy - Momentum - energy four vector - Force - Conservation of Energy - Mass and energy - Example - inelastic collision - Principle of equivalence - Lagrangian and Hamiltonian formulations. **Accelerated Systems** : Rocket with constant acceleration - example - Rocket with constant thrust.

Chapter 7 : Sections 7.3 and 7.4

RECOMMENDED TEXT

For Units I, II and III

U.C. De, Absos Ali Shaikh and Joydeep Sengupta, Tensor Calculus, Narosa Publishing House, New Delhi, (II Edition) 2014.

For Units IV and V

D. T. Greenwood, Classical Dynamics, Prentice Hall of India, New Delhi, (I Edition) 1985.

REFERENCE BOOKS

1. J. L. Synge and A. Schild, Tensor Calculus, Toronto, (I Edition) 2010.
2. A. S. Eddington. The Mathematical Theory of Relativity, Cambridge University Press, (II Edition) 2010.
3. P. G. Bergman, An Introduction to Theory of Relativity, New York, (I Edition) 2007.
4. C. E. Weatherburn, Riemannian Geometry and the Tensor Calculus, Cambridge, (I Edition) 2008.

SEMESTER – III
ELECTIVE PAPER - III
B. ANALYTIC NUMBER THEORY
SUBJECT CODE – P3MA06ET

L	T	P	C
6	0	0	3

Total Hours : 78

OBJECTIVES :

This course introduces arithmetic function and Dirichlet multiplication, averages of arithmetic function, congruence and quadratic residues

UNIT-I : ARITHMETICAL FUNCTION

Arithmetical function and Dirichlet multiplication. Chapter 2

UNIT-II : AVERAGES OF ARITHMETICAL FUNCTION

Averages of Arithmetical function. Chapter 3

UNIT-III : CONGRUENCE

Congruence - Finite Abelian Groups and their characters
Chapter 5 (5.10 and 5.11 Excluded) ; Chapter 6: 6.1 to 6.4

UNIT-IV: FINITE ABELIAN GROUPS

Finite Abelian Groups and their characters (contd. . .) - Dirichlet's theorem on Primes in Arithmetic Progressions Chapter 6: 6.5 to 6.10; Chapter 7: All sections (7.9 Excluded)

UNIT-V: QUADRATIC RESIDUES

Quadratic residues and quadratic reciprocity law. Chapter 9 (9.10 and 9.11 Excluded)

RECOMMENDED TEXT

Tom Apostol, Introduction to Analytic Number theory, Narosa Publications, New Delhi.
(I Edition) 2011.

REFERENCE BOOKS

1. I. Niven and Zuckermann H.S. : An Introduction to the theory of numbers, Wiley Eastern Ltd. (V Edition) 2011.
2. C.Y. Hsiung : Elementary Theory of Numbers, World Scientific Publishing Co. Pvt. Ltd., (I Edition) 1991.
3. W. W. Adams and L. J. Goldstein, Introduction to Number Theory, Prentice Hall Inc. (I Edition) 2001.
4. David M. Burton, Elementary Number Theory, Tata McGraw Hill Education India Pvt. Ltd., (VII Edition) 2012.

SEMESTER – III
ELECTIVE PAPER - III
C. FLUID DYNAMICS
SUBJECT CODE – P3MA07ET

L	T	P	C
6	0	0	3

Total Hours : 78

Objectives :

This course aims to discuss kinematics of fluids in motion, Equations of motion of a fluid, three dimensional flows, two dimensional flows and viscous flows.

UNIT-I : BASICS OF FLUID

Kinematics of Fluids in motion. Real fluids and Ideal fluids - Velocity of a fluid at a point, Stream lines , path lines , steady and unsteady flows- Velocity potential - The vorticity vector- Local and particle rates of changes - Equations of continuity - Worked examples - Acceleration of a fluid - Conditions at a rigid boundary.
Chapter 2. Sections 2.1 to 2.10.

UNIT-II: EQUATIONS OF MOTION OF A FLUID

Pressure at a point in a fluid at rest. - Pressure at a point in a moving fluid - Conditions at a boundary of two inviscid immiscible fluids- Euler's equation of motion - Discussion of the case of steady motion under conservative body forces.
Chapter 3. Sections 3.1 to 3.7

UNIT-III : THREE DIMENSIONAL FLOW

Some three dimensional flows. Introduction- Sources, sinks and doublets - Images in a rigid infinite plane - Axis symmetric flows - stokes stream function
Chapter 4 Sections 4.1 to 4.5 (4.4 Excluded)

UNIT-IV : TWO DIMENSIONAL FLOWS

Meaning of two dimensional flow - Use of Cylindrical polar coordinate - The stream function - The complex potential for two dimensional, irrotational incompressible flow - Complex velocity potentials for standard two dimensional flows - Some worked examples - Two dimensional Image systems - The Milne Thompson circle Theorem.
Chapter 5. Sections 5.1 to 5.8

UNIT-V : VISCOUS FLOWS

Stress components in a real fluid. - Relations between Cartesian components of stress- Translational motion of fluid elements - The rate of strain quadric and principal stresses - Some further properties of the rate of strain quadric - Stress analysis in fluid motion - Relation between stress and rate of strain - The coefficient of viscosity and Laminar flow - The Navier - Stokes equations of motion of a Viscous fluid.
Chapter 8. Sections 8.1 to 8.9

RECOMMENDED TEXT

F. Chorlton, Text Book of Fluid Dynamics, CBS Publications. Delhi. (I Edition) 2015.

REFERENCE BOOKS

1. R.W.Fox and A. T.McDonald, Introduction to Fluid Mechanics, Wiley. (I Edition) 2015.
2. E. Krause, Fluid Mechanics with Problems and Solutions, Springer, (I Edition) 2005.
3. B.S.Massey, J.W.Smith and A.J.W.Smith, Mechanics of Fluids, Taylor and Francis, New York, (VIII Edition) 2007.
4. P. Orlandi, Fluid Flow Phenomena, Springer Publisher, Kluwer, New York, (I Edition) 2006.
5. T. Petrila, Basics of Fluid Mechanics and Introduction to Computational Fluid Dynamics, Springer, berlin, (I Edition) 2008.

SEMESTER – IV
MAJOR PAPER - XIII
COMPLEX ANALYSIS II
SUBJECT CODE – P4MA01MT

L	T	P	C
6	0	0	5

Total Hours : 78

OBJECTIVES :

To study Riemann Theta Function and normal families, Riemann mapping theorem, Conformal mapping of polygons, harmonic functions, elliptic functions and Weierstrass Theory of analytic continuation.

UNIT-I : RIEMANN THETA FUNCTION AND NORMAL FAMILIES

Product development - Extension of $\zeta(s)$ to the whole plane - The zeros of zeta function - Equicontinuity - Normality and compactness - Arzela's theorem - Families of analytic functions - The Classical Definition

Chapter 5 : Sections 4.1 to 4.4 ; Chapter 5 : Sections 5.1 to 5.5

UNIT-II : RIEMANN MAPPING THEOREM

Statement and Proof - Boundary Behavior - Use of the Reflection Principle. **Conformal mappings of polygons** : Behavior at an angle - Schwarz-Christoffel formula - Mapping on a rectangle. **Harmonic Functions** : Functions with mean value property - Harnack's principle. Chapter 6 : Sections 1.1 to 1.3; Sections 2.1 to 2.3 Section 3.1 and 3.2

UNIT-III : ELLIPTIC FUNCTION

Simply periodic functions - Doubly periodic functions

Chapter 7 : Sections 1.1 to 1.3 ; Sections 2.1 to 2.4

UNIT-IV : WEIRSTRASS THEORY

The Weierstrass - p-function - The functions $\zeta(z)$ and - The differential equation - The modular equation - The Conformal mapping by.

Chapter 8 : Sections 1.1 to 1.7

UNIT-V: ANALYTIC CONTINUATION

The Weierstrass Theory - Germs and Sheaves - Sections and Riemann surfaces - Analytic continuation along Arcs - Homotopic curves - The Monodromy Theorem - Branch points.

Chapter 7 : Sections 3.1 to 3.5

RECOMMENDED TEXT

Lars V. Ahlfors, Complex Analysis, McGraw Hill Co., New York, (III Edition) 2014.

REFERENCE BOOKS

1. H.A.Presfly, Introduction to complex Analysis, Clarendon Press,Oxford, (II Edition) 1990.
2. J. B. Conway, Functions of one complex variables Springer - Verlag, International student Edition, Naroser Publishing Co. (II Edition) 2002.
3. E. Hille, Analytic function Thorey (2 vols.), Gonm & Co, (II Edition) 1959.
4. M. Heins, Complex function Theory, Academic Press, New York, (II Edition) 1968.
5. S. G. Venkatachalapathy, Margham Publications, (I Edition) 2012.
6. Shishir Gupta, Complex Variables, Tata McGrawhill Education Private Limited, (II Edition) 2013.

SEMESTER – IV
MAJOR PAPER - XIV
FUNCTIONAL ANALYSIS
SUBJECT CODE – P4MA02MT

L	T	P	C
6	0	0	5

Total Hours : 78

OBJECTIVES :

To study the details of Banach and Hilbert Spaces and to introduce Banach algebras.

UNIT-I : BANACH SPACES

Definition - Some examples - Continuous Linear Transformations - The Hahn -Banach

Theorem - The natural embedding of N in N^{**}

Chapter 9 : Sections 46 to 49

UNIT-II : BANACH SPACES AND HILBERT SPACES

Open mapping theorem - conjugate of an operator - Definition and some simple properties -

Orthogonal complements - Orthonormal sets

Chapter 9 : Sections 50 and 51 ; Chapter 10 : Sections 52, 53 and 54

UNIT-III : HILBERT SPACE

Conjugate space H^* - Adjoint of an operator - Self-adjoint operator - Normal and Unitary

Operators - Projections

Chapter 10 : Sections 55, 56, 57, 58 and 59

UNIT-IV : PRELIMINARIES ON BANACH ALGEBRAS

Definition and some examples - Regular and single elements - Topological divisors of zero - spectrum - the formula for the spectral radius - the radical and semi-simplicity.

Chapter 12 : Sections 64 to 69

UNIT-V: STRUCTURE OF COMMUTATIVE BANACH ALGEBRAS

Gelfand mapping - Applications of the formula $r(x) = \lim_{n \rightarrow \infty} \|x^n\|^{1/n}$ - Involutions in Banach Algebras - Gelfand-Neumark Theorem.

Chapter 13 : Sections 70 to 73

RECOMMENDED TEXT

G. F. Simmons, Introduction to topology and Modern Analysis, McGraw Hill International Book Company, New York, (I Edition) 2004.

REFERENCE BOOKS

1. W. Rudin Functional Analysis, Tata McGraw-Hill Publishing Company, New Delhi. (II Edition) 2013
2. G. Bachman & L. Narici, Functional Analysis Academic Press, New York, (II Edition) 2013.
3. H.C. Goffman and G. Fedrick, First Course in Functional Analysis, Prentice Hall of India, New Delhi. (I Edition) 2003.
4. E. Kreyszig Introductory Functional Analysis with Applications, John Wiley & Sons, New York. (I Edition) 2007.

SEMESTER – IV
MAJOR PAPER - XV
MATHEMATICAL STATISTICS
SUBJECT CODE – P4MA03MT

L	T	P	C
6	0	0	5

Total Hours : 78

OBJECTIVES :

This course introduces sampling theory, significance tests, estimation, testing of hypotheses, ANOVA and sequential analysis with rigorous mathematical treatment.

UNIT-I: SAMPLE MOMENTS AND THEIR FUNCTIONS

Notion of a sample and a statistic - Distribution functions of X , S^2 and (X, S^2) - χ^2 distribution - Student t-distribution - Fisher's Z - distribution - Snedecor's F - distribution - Distribution of sample mean from non-normal populations. Chapter 9 : Sections 9.1 to 9.8

UNIT-II: SIGNIFICANCE TEST

Concept of a statistical test - Parametric tests for small samples and large samples - χ^2 test - Kolmogorov Theorem 10.11.1 - Smirnov Theorem 10.11.2 - Tests of Kolmogorov and Smirnov type - The Wald-Wolfowitz and Wilcoxon -Mann-Whitney tests - Independence Tests by contingency tables.

Chapter 10 : Sections 10.11; Chapter 12: 12.1 to 12.7

UNIT-III: ESTIMATION

Preliminary notion - Consistency estimation - Unbiased estimates - Sufficiency - Efficiency - Asymptotically most efficient estimates - methods of finding estimates - confidence Interval.

Chapter 13 : Sections 13.1 to 13.8

UNIT-IV: ANALYSIS OF VARIANCE

One way classification and two - way classification. **Hypotheses Testing:** Power functions - OC function - Most Powerful test - Uniformly most powerful test - unbiased test.

Chapter 15 : Sections 15.1 and 15.2 Chapter 16 : Sections 16.1 to 16.5

UNIT-V: SEQUENTIAL ANALYSIS

SPRT - Auxiliary Theorem - Wald's fundamental identity - OC function and SPRT - $E(n)$ and Determination of A and B - Testing a hypothesis concerning p on 0-1 distribution and m in Normal distribution. Chapter 17 : Sections 17.1 to 17.9

RECOMMENDED TEXT

M. Fisz, Probability Theory and Mathematical Statistics, John Wiley and sons, New York. (III Edition) 1963.

REFERENCE BOOKS

1. E. J. Dudewicz and S. N. Mishra , Modern Mathematical Statistics, John Wiley and Sons, New York. (I Edition) 2008.
2. V. K. Rohatgi An Introduction to Probability Theory and Mathematical Statistics, Wiley Eastern New Delhi. (II Edition) 2013.
3. G. G. Roussas, A First Course in Mathematical Statistics, Addison Wesley Publishing Company. (II Edition) 2007.
4. B. L. Vander Waerden, Mathematical Statistics, G. Allen & Unwin Ltd., London. (II Edition) 1970.

5. Irwin Miller & Mary Lees Miller, Mathematical Statistics, Pearson Publishers.
(VII Edition) 2003.

SEMESTER – IV
MAJOR PAPER - XVI
DIFFERENCE EQUATIONS
SUBJECT CODE – P4MA04MT

L	T	P	C
6	0	0	5

Total Hours : 78

OBJECTIVES :

To introduce the process of discretization, Discrete version of Differential Equations, Discrete oscillation and the asymptotic behaviour of solutions of certain class of difference equations for linear cases only. Solution of difference equations using z-transforms is stressed.

UNIT-I : LINEAR DIFFERENCE EQUATIONS OF HIGHER ORDER

Difference Calculus - General Theory of Linear Difference Equations - Linear Homogeneous Equations with Constant coefficients - Linear non-homogeneous equations - Method of Undetermined coefficients, the method of variation of constants - Limiting behavior of solutions.

Chapter 2: Sections 2.1 to 2.5

UNIT-II : SYSTEM OF DIFFERENCE EQUATIONS

Autonomous System - The Basic Theory - The Jordan form - Linear periodic system.

Chapter 3: Section 3.1 to 3.4

UNIT-III : THE Z-TRANSFORM METHOD

Definition, Example and properties of Z-transform - The Inverse Z-transform and solution of Difference Equations: Power series method, partial fraction method, the inverse integral method - Volterra Difference Equation of convolution types - Volterra systems.

Chapter 5: Sections 5.1 to 5.5 (5.4 Excluded)

UNIT-IV : ASYMPTOTIC BEHAVIOUR OF DIFFERENCE EQUATION

Tools and Approximations - Poincare's Theorem - Second order difference equations - Asymptotic diagonal systems - Higher order Difference Equations.

Chapter 8 : Sections 8.1 to 8.5

UNIT-V : OSCILLATION THEORY

Three-term difference Equation - Non-linear Difference Equations - Self-Adjoint second order equations.

Chapter 7 : Sections 7.1 to 7.3

RECOMMENDED TEXT

Saber N. Elaydi, An Introduction to Difference Equations, Springer Verlag, New York.
(III Edition) 2005.

REFERENCE BOOKS

1. R. P. Agarwal, Difference Equations and Inequalities, Marcel Dekker.
(II Edition) 2000.
2. S. Goldberg, Introduction to Difference Equations, Dover Publications.

- (II Edition) 2004.
3. V. Lakshmi kantham and Trigiante, Theory of Difference Equations, Academic Press, New York. (I Edition) 1988.
 4. Peterson, A Difference Equations, An Introduction with Applications, Academic Press, New York. (II Edition) 2000.

**SEMESTER-IV
ELECTIVE - IV
A. NUMBER THEORY AND CRYPTOGRAPHY
SUBJECT CODE – P4MA05ET**

L	T	P	C
6	0	0	3

Total Hours : 78

Objectives :

This course aims to give elementary ideas from number theory which will have applications in cryptography.

UNIT-I : ELEMENTARY NUMBER THEORY

Time Estimates for doing arithmetic - Divisibility and Euclidean algorithm - Congruences - Applications to factoring. Chapter-I

UNIT-II : CRYPTOGRAPHY

Some simple crypto systems - Enciphering matrices Chapter-III

UNIT-III : FINITE FIELDS AND QUADRATIC RESIDUES

Finite fields - Quadratic residues and Reciprocity Chapter-II

UNIT-IV : PUBLIC KEY CRYPTOGRAPHY

The idea of public key cryptography - RSA - Discrete log - Knapsack
Chapter-IV : Sections IV.1 to IV.4

UNIT-V : PRIMALITY AND FACTORING

Pseudo primes - The rho method - Fermat factorization and factor bases - The Continued fraction method - The quadratic sieve method. Chapter-V

RECOMMENDED TEXT

Neal Koblitz, A Course in Number Theory and Cryptography, Springer-Verlag, New York, (II Edition) 2012.

REFERENCE BOOKS

1. Niven and Zuckermann, An Introduction to Theory of Numbers, Wiley Eastern Ltd., New Delhi, (V Edition) 2011.
2. David M.Burton, Elementary Number Theory, Wm C.Brown Publishers, Dubuque, Iowa, (VII Edition) 2012.

3. K.Ireland and M.Rosen, A Classical Introduction to Modern Number Theory,
Springer Verlag, (II Edition) 2010.

**SEMESTER-IV
ELECTIVE - IV
B. FUZZY MATHEMATICS
SUBJECT CODE – P4MA06ET**

L	T	P	C
6	0	0	3

Total Hours : 78

OBJECTIVES :

To introduce the basic notions and study the techniques of Fuzzy Mathematics.

UNIT - I : FUZZY SETS

Fuzzy sets – Basic Types – Basic concepts – Characteristics – Significance of the paradigm shift – Additional properties of α – cuts.

Chapter 1 : Sections 1.3 to 1.5 and Chapter 2 : Section 2.1

UNIT - II : FUZZY SETS VERSUS CRISP SETS

Representation of Fuzzy sets – Extension principle of Fuzzy sets – Operation on Fuzzy sets – Types of operation – Fuzzy complements.

Chapter 2 : Sections 2.2 and 2.3 and Chapter 3 : Sections 3.1 and 3.2

UNIT - III : OPERATIONS ON FUZZY SETS

Fuzzy intersection – t-norms – Fuzzy unions – t-conorms – Combinations of operations- Aggregation operations. Chapter 3 : Sections 3.3 to 3.6

UNIT - IV : FUZZY ARITHMETIC

Fuzzy number – Linguistic variables – Arithmetic operation on intervals – Lattice of Fuzzy numbers. Chapter 4 : Sections 4.1 to 4.4

UNIT - V : CONSTRUCTING FUZZY SETS

Methods of construction : An overview – Direct methods with one expert – Direct method with multiple experts – Indirect method with multiple experts and one expert – Construction from sample data. Chapter 10 : Sections 10.1 to 10.7

RECOMMENDED TEXT

G. J. Klir and Bo Yuan, Fuzzy Sets and Fuzzy Logic : Theory and Applications, PHI, New Delhi, (I Edition) 2010.

REFERENCE BOOKS

1. H. J. Zimmerman, Fuzzy Set Theory and its Applications, Allied Publishers,

- (I Edition) 2013.
2. A. Kaufman, Introduction to the theory of Fuzzy Subsets, Academic Press, (I Edition) 2011.
 3. V. Novak, Fuzzy Sets and their Applications, Adam Hilger, Bristol, (I Edition) 2012.

**SEMESTER-IV
ELECTIVE - IV
C. STOCHASTIC PROCESSES
SUBJECT CODE – P4MA07ET**

L	T	P	C
6	0	0	3

Total Hours : 78

OBJECTIVES :

This course aims to introduce advanced topics in Markov process, Markov chains and Renewal theory.

UNIT - I : STOCHASTIC PROCESSES

Specification of stochastic processes – stationary processes – Markov Chains : Definitions and Examples – Higher transition probabilities – Generalization of independent Bernoulli trials.

Chapter 2 : 2.1 to 2.4; Chapter 3 : 3.1 to 3.1

UNIT - II : MARKOV CHAINS

Stability of Markov system – Graph theoretic approach – Markov chain with denumerable number of state – Reducible chains – Statistical inference for Markov chains. specification of stochastic processes – stationary processes – Markov Chains : Definitions and Examples – Higher transition probabilities – Generalization of independent Bernoulli trials.

Chapter 3 : 3.6 to 3.10

UNIT - III : MARKOV PROCESS WITH DISCRETE STATE SPACE

Poisson process: Poisson process and related distributions – Generalizations of Poisson process – Birth and death process – Markov process with discrete state space (Continuous time Markov chain). Chapter 4 : 4.1 to 4.5

UNIT - IV : MARKOV PROCESS WITH CONTINUOUS STATE SPACE

Brownian motion – Wiener process – Differential equations for Wiener Process – Kolmogorov equations – First passage time distribution for Wiener process.

Chapter 5 : 5.1 to 5.5

UNIT - V : RENEWAL PROCESS AND THEORY

Renewal process and renewal equation – Stopping time – Wald's equation – Renewal theorem – Delayed and equilibrium renewal process.

Chapter 6 : 6.1 to 6.6

RECOMMENDED TEXT

J. Medhi, Stochastic Processes, New Age International Publishers, (III Edition) 2015.

REFERENCE BOOKS

1. S. Karlin, A first course in Stochastic Processes, Academic Press, (II Edition) 2011.
2. U. N. Bhat, Elements of Applied Stochastic Processes, John Wiley Sons, (III Edition) 2002.
3. E. Cinlar, Introduction to Stochastic Processes, PHI, (I Edition) 2013.
4. S. K. Srinivasan and A. Vijayakumar, Stochastic Processes, Narosa, (I Edition) 2003.

ADHIPARASAKTHI COLLEGE OF ARTS & SCIENCE

(Autonomous)

Permanently Affiliated to Thiruvalluvar University, Vellore

Accredited by NAAC with B Grade

Bachelor of Business Administration

Under CBCS

(Effective from the Academic Year 2015-2016)

REGULATIONS

CBCS:

Choice Based Credit System is a flexible system of learning. 'Credit' defines the quantum of contents / syllabi prescribed for a course and determine the number of hours of instruction required. The distinguished features of CBCS are the following:

It permits the students to:

- ❖ Learn at their own pace.
- ❖ Choose electives from a wide range of elective courses offered by the departments of the colleges.
- ❖ Undergo additional courses and acquire more than the required number of credits.
- ❖ Adopt an inter – disciplinary approach in learning
- ❖ Make best use of the expertise of available faculty.

1. Eligibility for Admission:

Candidates seeking admission to the first year of the Degree of Bachelor of Business Administration Course shall be required to have passed the Higher Secondary Examinations

(Academic or Vocational Stream) conducted by the Government of Tamilnadu or an Examination accepted.

Provided that candidates for admission into the specific main subject of study shall also process such other qualifying conditions as may be prescribed by the University in the Regulations governing respective courses of study.

The Upper age limit for admission to BBA Degree will be 21 (twenty one) years as on 1st July of the year of admission. For SC/ST/BC/MBC/DNC candidates and women candidates the age limit is relaxed by 3 years. For other communities, the Principals can relax up to three years based on merit. A relaxation of 5 years is permitted for Physically Handicapped as per G.O. Ms No.239, dated 03.09.1993.

2. Eligibility for the Award of Degree:

A candidate shall be eligible for the award of the Degree only if he/she has undergone the prescribed course of study in the College for a period of not less than three academic year and passed the examinations of all the Six Semesters prescribed earning 140 credits (in Parts I, II, III, IV and V)

3. Duration:

- a. Each academic year shall be divided into two semesters. The first academic year shall comprise the first and second Semesters, the second academic year the third semester and fourth semesters and the third academic year the fifth and Sixth semesters respectively.
- b. The odd semesters shall consist of the period from June to November of each year and the even semesters from December to April of each year.
There shall be not less than 90 working days for each semester.

4. Course of Study:

The main subject of the study for Bachelor Degree Course shall consist of the following

PART-I	TAMIL
PART-II	ENGLISH
PART-III	CORE SUBJECTS
	ALLIED SUBJECTS

ELECTIVE WITH THREE COURSES

PART – IV

1. (a) Those who have not studied Tamil up to XII std. and taken a Non- Tamil Language under Part-I shall take Tamil Comprising of two courses (Level will be at 6th Standard)

(b) Those who have studied Tamil up to XII Std and taken a Non-Tamil Language under part-I shall take Advanced Tamil Comprising of two courses.

(c) Others who do not come under a / b can choose non-major elective comprising of two courses.

2. SKILL BASED SUBJECTS (ELECTIVE):

Four courses are to be offered. Let the compulsory papers be accommodated in the second / third year of study for UG Courses.

3. ENVIRONMENTAL STUDIES

4. VALUE EDUCATION

PART- V: EXTENSION ACTIVITIES

The following assessment procedure will be followed for Internal Marks:

Continuous Internal Assessment (CIA) Test

S. No	Reg. No	Name	Test I Marks for 75	Test II Marks for 75	Marks for 150	Marks converted to 15	<u>Assignments</u> (5) <u>/;Seminars(5)</u> [10]	Marks for 25	Total Rounded to Marks for 25

Test I : Three hours duration for 75 marks (Two Units of the Syllabus)

Test II : Three hours duration for 75 marks (Total Syllabus)

Total marks **150 (Theory)**

Test marks to be converted to : 15 marks

Assignments / Seminars : 10 marks

Total **: 25 marks**

In the column rounded to 25, any fraction may be rounded to the next number.

6. Requirements for proceeding to Subsequent Semesters:

(i). Candidates shall register their name for the First Semester Examination after the admission in the U.G. Courses.

(ii) Candidates shall be permitted to proceed from the First Semester up to the Final Semester irrespective of their failure in any of the Semester examinations subject to the condition that the candidates should register for all the arrear subject of earlier semesters along the current (subsequent) Semester subjects.

(iii). Candidates shall be eligible to go to subsequent semester, only if they earn, sufficient attendance as prescribed there for by the Academic Council from time to time. provided in case of a candidate earning less than 65 % of attendance in any one of the Semester due to any extraordinary circumstances such as medical grounds, such candidates who shall produce Medical Certificate issued by the Authorized medical

Attendant (AMA), duly certified by principal of the college, shall be permitted to proceed to the next semester and to complete the course of study. Such Candidates shall have to repeat the missed semester by rejoining after completion of Final Semester of the course, after paying the fee for the break of study as prescribed by the College from time to time.

7. Requirement to take the Semester Examinations.

a). A candidate will be permitted to take the Examination for any Semester, if

- i). He / She secures not less than 75% of attendance out of the 90 instructional days during the semester. [In the case of married women students the minimum attendance requirement shall be 55% of the total instructional days].

- ii).He / she earns a progress Certificate from the Head of the Institution of having satisfactorily completed the Course of Study prescribed in the subjects as required by the regulations, and
- iii). His / her conduct has been satisfactory.

Provided that it shall be open to the Academic Council, or any authority delegated with such powers by the Academic Council to grant exemption to a candidate who has failed to earn 75% of the attendance prescribed for any valid reason(s) subject to the usual conditions.

b). A candidates who has secured attendance less than 75% but 65% and above shall be permitted to take the Examination on the recommendation of the Head of the Institution to condone the lack of attendance as well as on the payment of the prescribed fees to the College.

c] A candidate who has secured attendance less than 65% but 55% and above in every semester, as to compensate the shortage of attendance in the subsequent semester besides, earning the required percentage of attendance in that semester and take the examinations of both the semester papers together at the end of the later semester.

d] A candidate who has secured less than 55% of attendance in any semester will not be permitted to take the regular examinations. He/ She has to re-do the course after the completion of the final semesters by rejoining the semester in which the attendance is less than 55%.

e] A candidate who has secured less than 65% of attendance in the final semester as to compensate his/her attendance shortage in a manner to be decided by the Head of the Department concerned after rejoining the course.

8. Passing Minimum:

A Candidate shall be declared to have passed the whole Examination, if he/she passes in all the papers and practical wherever prescribed / as per the scheme of examinations by

earnings by earning 140 CREDIT in Parts – I, II, III, IV and V. He / She shall also fulfill the extension activities prescribed earning one Credit to qualify for the Degree.

In fixing the passing minimum marks, the following will be observed:

- (a). There shall be no Passing Minimum for Internal.
- (b) For External Examination, Passing Minimum shall be of 40 % (Forty percentages) of the maximum marks prescribed for the paper.
- (c) In the aggregate (External + Internal), the passing minimum shall be of 40 % for each paper.
- (d) Grading shall be based on overall marks obtained [Internal + External]

9. Grading System:

Once the marks of the CIA and end-semester examinations for each of the course are available, they will be added. The mark thus obtained will then be graded as per details given below

Marks	Grade Point	Letter Grade	Class
100	7.00	H	First Class with Distinction
90-99	6.00	O	First Class with Distinction
75-89	5.50	D	First Class with Distinction
60-74	4.75	A	First Class
50-59	4.00	B	Second Class
40-49	3.50	C	Third Class
Below 40	3.00	F	Fail

From the second semester onwards, the total performance within a semester and continuous performance starting from the first semester are indicated respectively by **Grade Point Average [GPA]** and **Cumulative Grade Point Average [CGPA]**. These two are calculated by the following formulae:

$$\text{GPA} = \frac{\sum_{i=1}^n C_i G_i}{\sum_{i=1}^n C_i}$$

Where ‘Ci’ is the Credit earned for the Course i in any semester; ‘Gi’ is the Grade point obtained by the student for the course i and ‘n’ is the number of courses passed in that semester.

CGPA = GPA of all the courses starting from the first semester to the current semester.

Note: The GPA and CGPA shall be calculated separately for the following three parts:

For purposes of declaring a candidate to have qualified for the Degree of Bachelor of Business Administration in the First Class / Second Class / Third Class or First Class with Distinction, the marks and the Corresponding CGPA earned by the candidate in part III alone will be the criterion, provided he / She has secured the prescribed passing minimum in LCs and ELs.

Grade in Part IV & V Extension shall be shown separately and it shall not be taken into account for classification

10. Classification of successful candidates:

Part-I TAMIL

Successful candidates passing Examination for the Language and securing the marks (i) 60 percent and above and (ii) 50 percent and above but below 60 percent in the aggregate shall be declared to have passed the examination in the First and Second class, respectively. All other successful candidates shall declare to have passed the examination in the Third Class.

PART –II ENGLISH

Successful candidates passing examinations for English and securing the marks (I) 60 percent and above and (ii) 50 percent and above but below 60 percent in the aggregate shall be declared to have passed the examination in the First and Second class respectively. All other successful candidates shall be declared to have passed the examination in Third class

PART – III consisting of CORE SUBJECTS, ALLIED SUBJECTS, ELECTIVES

Successful candidates passing examination for Core courses together and securing the marks (i) 60 percent and above and (ii) 50 percent and above but below 60 percent in the aggregate of the marks prescribed for the Core Courses together shall be declared to have passed the examination in the First and Second Class, respectively. All other successful candidates shall be declared to have passed the examination in the Third Class.

PART – IV (Consisting of sub items 1 (a) (b) and (c), 2, 3, and 4 & 5) as furnished in the Regulation 4 part – IV supra.

PART - V EXTENSION ACTIVITIES

The only credit earned for Part V Extension activities of a Successful Candidate shall not be taken into consideration for Classification / Ranking / Distinction.

11. Ranking:

Candidates who pass all the examinations prescribed for the course in the first appearance itself alone are eligible for Ranking; Provided in the case of Candidates who pass all the examinations prescribed for the course with a break in the First Appearance due to the reasons as furnished in the Regulations 7.[iii] supra are eligible for Classification / Distinction.,

The marks obtained in improvement examinations will not be taken into consideration for ranking.

12. The Medium of Instruction and Examinations:

The medium of instruction and Examinations for the papers under part I and II shall be in the language concerned. For Part III and Part IV the medium of instruction and examination shall be English

13. Improvement of marks in the subjects already passed.

Candidates who have passed in theory paper / papers are allowed to appear again for theory paper / papers only once in order to improve his/her marks, by paying the fee prescribed from time to time. Such candidates are allowed to improve within a maximum period of 10 semesters counting from his/her first semester of his/her admission. If candidate improves his marks, then his improved mark will be taken into consideration for the award of Classification and Distinction only. Such improved marks will not be counted for the award of Prize / Medals and Rank. If the Candidate does not show improvement in the marks, his previous marks will be taken into consideration.

14. Checklist for Inspection

A. Qualification for

UG - Teaching Faculty : as prescribed by the UGC and the University

B. Infrastructure Facilities

i) Building: Number of classroom with specifications: 3 rooms measuring 20x”25”.

If the class strength is above 50 the space shall be increase by 10 sq.ft, per student.

Number of staff rooms: one measuring 20” x20

ii). Furniture: One pair of table / chair per student.

PATTERN OF QUESTION PAPER

PART- A(50 Words)

To Answer 10 Questions	10 X 2 Marks	= 20 Marks

PART-B (200 Words)

To Answer 5 Questions (either Or Pattern)	5 X 5 Marks	= 25 Marks

PART-C (500 Words)

To Answer 3 Questions out of 5 questions	3 X 10Marks	= 30 Marks

Total	= 75 Marks

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DEPARTMENT OF BUSINESS ADMINISTRATION

I B.B.A

Year / Sem	Part	Subject	Sub Code	Paper	Title of the Paper	Ins.Hrs/ Week	Credit	Exam Hrs	Maximum Marks			
									I A	Uni. Exam	Total	
I Year / I Sem	I	Language	U1LT11FL	I	Tamil-I	6	3	3	25	75	100	
	II	English	U1LE01SL	I	English-I	6	3	3	25	75	100	
	III	Core	U1BA11MT	I	Principles of Management	5	5	3	25	75	100	
	III	Core	U1BA02MT	II	Business Mathematics and Statistics-I	5	4	3	25	75	100	
	III	Allied	U1BA01AT	I	Business Organisation	6	4	3	25	75	100	
	IV	-	U1ES01GS	-	Environmental Science	2	2	3	25	75	100	
I Year / II Sem	I	Language	U2LT11FL	II	Tamil-II	6	3	3	25	75	100	
	II	English	U2LE01SL	II	English-II	6	3	3	25	75	100	
	III	Core	U2BA01MT	III	Business Communication	5	5	3	25	75	100	
	III	Core	U2BA02MT	IV	Business Mathematics and Statistics-II	5	4	3	25	75	100	
	III	Allied	U2BA11AT	II	Organizational Behavior	6	4	3	25	75	100	
	IV	-	U2VE11GS	-	Value Education	2	2	3	-	50	50	
					TOTAL	60	42				1150	

II BBA

Year / Sem	Part	Subject	Sub Code	Paper	Title of the Paper	Ins.Hrs /Week	Credit	Exam Hrs	Maximum Marks			
									IA	Uni. Exam	Total	
II Year/ III Sem	III	Core	U3BA11MT	v	Production Management	5	5	3	25	75	100	
	III	Core	U3BA02MT	VI	Financial Accounting	5	4	3	25	75	100	
	III	Core	U3BA03MT	VII	Strategic Management	5	4	3	25	75	100	
	III	Core	U3BA04MT	VIII	Managerial Economics	5	4	3	25	75	100	
	III	Allied	U3BA11AT	III	Office Management	5	4	3	25	75	100	
	IV	Skill Based Subject I	U3BA01ST		Customer Relationship Management	3	3	3	25	75	100	
		Non-Major Elective I	U3CS01NM		Introduction to information technology	2	2	3	25	75	100	
II Year / IV Sem	III	Core	U4BA01MT	IX	Materials Management	5	5	3	25	75	100	
	III	Core	U4BA02MT	X	Management Accounting	5	5	3	25	75	100	
	III	Core	U4BA03MT	XI	Business Environment	5	4	3	25	75	100	
	III	Core	U4BA04MT	XII	Operations Research	5	4	3	25	75	100	
	III	Allied	U4BA01AT	IV	Financial Management	5	4	3	25	75	100	
	IV	Skill Based Subject II	U4BA01ST		Total Quality Management	3	3	3	25	75	100	
		Non-Major Elective II	U4CS01NM		Internet and its application	2	2	3	25	75	100	
					TOTAL	60	53				1400	

III BBA

Year / Sem	Part	Subject	Sub Code	Paper	Title of the Paper	Ins. Hrs/Week	Credit	Exam Hrs	Maximum Marks		
									I A	SEM. Exam	Total
III Year / V Sem	III	Core	U5BA01MT	XIII	Business Law	6	5	3	25	75	100
	III	Core	U5BA02MT	XIV	Marketing Management	6	5	3	25	75	100
	III	Core	U5BA03MT	XV	Human Resources Management	6	5	3	25	75	100
		Elective I	U5BA04ET	I	Entrepreneurial Development	9	5	3	25	75	100
	IV	Skill Based Subject III	U5BA05ST		,E-Business	3	3	3	25	75	100
III Year / VI Sem	III	Core	U6BA01MT	XVI	Industrial Relations	6	5	3	25	75	100
	III	Core	U6BA02MT	XVII	Computer Application In Business	6	4	3	25	75	100
		Elective II	U6BA03ET	II	Marketing research	6	4	3	25	75	100
		Elective III	U6BA04PV	III	Project Work	9	5	3	25	75	100
	IV	Skill Based Subject II	U6BA05ST		Creativity and Innovation Management	3	3	3	25	75	100
	V	Extension Activities	U6EA01GS		Extension		1				50
					TOTAL	60	45				1050
GRAND TOTAL						180	140				3600

SEMESTER I

PRINCIPLES OF MANAGEMENT

SUBJECT CODE : U1BA11MT

L	T	P	C
5	0	0	5

Total Hours: 65

UNIT-I

Management-Importance-Definition-Nature and Scope of Management-process-Role and function of a Manager-Levels of Management-Management Art or Science - Managements as a Profession.

UNIT-II

Planning-Nature-Importance-Types-Steps in Planning-Objectives-Policies -Procedures-and Methods-Natures and types of Policies-Decision making-Process of decision making-Types of decision.

UNIT-III

Organizing -Types of Organization structure-Span of Control- Departmentalization-Informal Organization.

UNIT-IV

Authority -Delegation-Decentralization-Difference between authority and power-Responsibility-Staffing-Sources of recruitment-Selection process.

UNIT-V

Co-ordination-Need of co-ordination-Types-Techniques-and co-ordination-Controlling-Meaning and importance of Controls-Control process.

Reference book

1. P.C. Tripathi & P.N. reddy- Principles of Management- Tata McGraw-hill
2. Harold Koontz and O' Donnel- Management concepts & practices-McMillan India Ltd.
3. Dr.N.Perma-Business management
4. L.M.Prasad-Essential of management-Sultan Chand & sons- New delhi
5. C.B.Gupta- Business management-Sultan Chand & sons- New delhi
6. Dinkar Dagare- Principles of management-Sultan Chand & sons –New delhi

SEMESTER I
BUSINESS MATHEMATICS AND STATISTICS-I
SUBJECT CODE : U1BA02MT

L	T	P	C
5	0	0	5

Total Hours :65

UNIT-I

Statistics-definition-scope and limitation-presentation of data- diagrammatic and graphical representation of data. (theory and problems)

UNIT-2

Measures of central tendency-Mean-Median and Mode- GM and HM- Their limitations. (theory and Problems)

UNIT- 3

Measures of Dispersions-Range-Mean Deviation-Quartile Deviation-Standard Deviation-Coefficient of Variation-Lorenz curve-Measures of Skewness-Karlpearson and Bowley's methods. (Theory and Problems)

UNIT-IV

Mathematics for finance-simple and compound interest annuities-Sinking Funds- discount and Present values. (problems and simple theory (like definitions))

UNIT-V

Basic Calculus-Rules for differentiation- Maxima and Minima- and their applications to business. (Theory and problems).

Books for reference:

1. J.K. Sharma- Business Statistics- Pearsons publications.
2. P. Navaneetham- Business Statistics & Mathematics
3. P.R. Vital- Business Mathematics & Statistics- Margam Publications
4. Pillai & Bagawathi- Business Statistics- S.Chand new Delhi
- 5.

SEMESTER I

BUSINESS ORGANIZATION

SUBJECT CODE : U1BA01AT

L	T	P	C
6	0	0	4

UNIT-I

Total Hours : 78

Business: Meaning and types - Profession - Meaning and importance of Business Organization.
Social responsibilities of Business-Business Ethics

UNIT-II

Forms of Business Organization - Sole Trader- Partnership - Joint Hindu Family - Joint Stock Companies - Co-operative Societies - Public Utilities and Public Enterprises. Public Sectors Vs Private sectors.

UNIT-III

Location of Industries - Factors influencing location-Size of Industries-Optimum Firm - Advantages of Large Scale Operation- Limitations of small scale Operations- Industrial Estates- District Industries Centers (DIC's)

UNIT-IV

Stock Exchange - Functions –Types - Working - Regulations of Stock Exchange in India - Business combinations - Causes - Types – Effects of Business combinations in India.

UNIT-V

Trade Associations - Chamber of Commerce- Functions-Objectives-Working in India.

Reference Book

1. G.D. Balaji, G. Prasad- business Organisation- Margam Publication Chennai
2. Prakash Jagadeesh- Business Organisation and management
3. M.C. Shukla- Business Organisation & Management- Sultan Chand, New Delhi.
4. Y.K.Bhushan- Business Organisation-Sultan Chand, New Delhi
5. C.B. Gupta- Business Organisation & Management

SEMESTER II

BUSINESS COMMUNICATION

SUBJECT CODE: U2BA01MT

L	T	P	C
6	0	0	5

Total Hours: 65

UNIT-I

Form and arrangement of business letters-Characterization of a good business letter-Trade letters: Inquiries, offers, quotations-Orders-Confirmation-Execution, Refusal and cancellation of an order-Claims, Complaints and adjustment.

UNIT-II

Status enquiry-Letters of collection-Business circular letters- Letters relating to import and export - Agency correspondence.

UNIT-III

Banking correspondents-Transport and Insurance letters- Correspondence with Government Central and State- Report Writing: Drafting reports by individuals and committees.

UNIT-IV

Organization of a modern office-Layout and environment-Functions and importance of Office-Relationship of Office with other Departments-Office manuals-Handling mail: Inward and outward-Internal and External communication:

UNIT-V

Maintenance of Office records-Filing –Indexing- Office machines and Labour Saving Appliances.

Reference Book:

1. B.N.Tandon, Manual of Office Management and Correspondence,S.Chand & Co., Ltd., New Delhi.
2. Pattanshethy-Essential of Business Communication
3. Rajendrapaul-Business Communication.

SEMESTER II

L	T	P	C
5	0	0	5

Total Hours :65

BUSINESS MATHEMATICS AND STATISTICS- II

SUBJECT CODE : U2BA02MT

UNIT-I

Matrix Theory - Operations on Determinants - Inverse of a Square Matrix (not more than 3rd order). (Theory (like definitions))

UNIT-II

Solving Simultaneous Equations using Matrix Method - Integration and their application to business. (Problems)

UNIT-III

Correlation - Scatter Diagram - Karl Pearson's Correlation - Concurrent Deviation Method - Rank Correlation - Uses of Correlation in Business - Regression Lines - Regression Coefficients - Properties of Regression Coefficients - Uses of Regression in Business Problems. (Theory & Problems)

UNIT-IV

Time Series - Components of time Series - Measurement of Trend - Semi Average method - Moving Average method - Method of Least Squares - Measurement of Seasonal Variations - Simple Average Method - Ratio to Moving Average Method. (Theory & Problems)

UNIT-V

Index Numbers - Weighted and Un weighted Index Numbers - Cost of Living Index Number - Test on index Numbers. (Theory & Problems)

Books for Reference

1. J.K. Sharma - Business Statistics - Pearson Publications
2. P. Navaneetham - Business Statistics & Mathematics
3. P.R. Vittal-Business Mathematics & Statistics- Margam publication
4. Pillai & Pagawathy-Business Statistics- S. Chand New Delhi.

SEMESTER - II
ORGANISATIONAL BEHAVIOUR

L	T	P	C
6	0	0	4

SUBJECT CODE : U2BA11AT

Total Hours: 78

Unit-I

Organizational behavior – Meaning – Importance -Organization as a social system-factors influencing organizational behavior-Meaning of individual-similarities and differences among individuals- personality-stages of personality development-determinants of personality-learning-perception –factors influencing perception-values-attitudes-attitude formation-role behavior.

Unit-II

Meaning of group and group dynamics-reasons for the formation of groups-characteristics of groups-theories of group dynamics-types of groups in organization-group cohesiveness-factor influencing group cohesiveness-group decision making process.

Unit-III

Leadership concept - characteristics - leadership theories – leadership styles-leadership continuum-leadership effectiveness-Motivation-concept and importance of motivation.

Unit-IV

Management of change: meaning-importance-resistance to change-causes-dealing with resistance to change- concepts of social change and organizational causes-factors contributing to organizational change-introducing change in large organizations-change agents-organizational development-meaning and process.

Unit-V

Organisational culture, conflict and effectiveness:

Organizational culture-concept-distinction between organizational culture and organizational climate-factors influencing organizational culture-morale-concept and types-managing conflict-organizational effectiveness.

Reference Book:

1. Aswathappa.K-Organizational Behaviour-HPH,Bombay
2. S.S. Khanka- Organisational Behaviour
3. J.Jayasankar-Organisational Behaviour

SEMESTER - III

L	T	P	C
5	0	0	5

Total Hours: 65

PRODUCTION MANAGEMENT

SUBJECT CODE: U3BA11MT

Unit-I

Production- Meaning- Definition- Model of production system- Types of production- Productivity-Functions and scope of Production management-Relationship of production with other functional areas.

Unit-II

Production planning and control- Routing- Scheduling-Despatching-Maintenance management-Types of Maintenance- Break down -preventive- Routine-Maintenance scheduling-Meaning.

Unit-II

Plant location-Introduction-Need for selecting a suitable location-Plant location problem-Types-Advantage of Urban, Suburban- Rural location- factors influencing plant location- plant location model.

Plant layout- Objectives- Principles of plant layout-factors influencing plant layout-types of layout- Process- product- fixed-FMS- cellular manufacturing.

Unit-IV

Work and Method study-Importance of work study-Work study procedures-time study-Human considerations in work study-Introduction to method study-Objectives of method study-Steps involved in method study.

Work measurement-Objectives of work measurement-Techniques of work measurement-Computation of standard time-Allowance-Comparison of various techniques.

Unit-V

Quality control-Types of Inspection-Centralized and Decentralized- P chart-X chart-Construction.

TEXT BOOKS

1. Saravanavel.P and Sumathi.S-Production and Material Management.
2. Chunnawalla and Patel-Production and Material Management.
3. Muhelmann Production and Operation Management MacMillan I Ltd.
4. Paneerselvam-Production and Operations Management-Prentice-Hall of India.
5. Martand T.Telsang-Production Management-S.Chand.

REFERENCE BOKS

1. Harding HA-Production Management.
2. Buffa Production Management.
3. Broom Production Management.
4. SN Chari-Production and Operation Management.

SEMESTER - III

L	T	P	C
5	0	0	4

Total Hours: 65

FINANCIAL ACCOUNTING

SUBJECT CODE : U3BA02MT

UNIT -1

Accounting concepts – conventions – objectives of accounting – rules – principles of double entry system – journal – ledger – subsidiary books – purchase book, sales book, returns book and cash books. (Theory only)

UNIT – II

Trial balance – depreciation – need for depreciation – straight line and WDV methods of charging depreciation only.(simple problems)

UNIT – III

Preparation of trading, profit and loss account and balance sheet.

UNIT – IV

Accounting from incomplete records

UNIT – V

Company accounts – shares – issue, forfeiture and reissue – debentures – issue of debentures only.(only theory)

60:40

Problem:60Marks

Theory :40Marks

Text and reference Books

1. Reddy & Murthy – Financial Accounting
2. Grewal. T.S – Introduction to Financial accounting.
3. Jain .S.P. – Introduction to Financial Accounting.
4. Maheswari.S.N. – Financial and Management Accounting.
5. Bhattacharya – Financial accounting for Business managers.
6. Gupta .R.L.and Radhaswamy – Advanced Accounting.
7. Shukla. M.C. & Grewal . T.S.Advanced Accounting.

Note:

The Proportion between theory and problems shall be 20:80.

SEMESTER – III

L	T	P	C
5	0	0	4

Total Hours: 65

STRATEGIC MANAGEMENT

SUBJECT CODE: U3BA03MT

Unit-1

The business system-Objectives of the business- Setting up and balancing the objectives mission-Vision-Goals Strategic analysis of functional areas production-Marketing-Human resources-Finance corporate capabilities-SWOT.

Unit-II

Corporate strategy-Nature and scope-process of strategic planning-formulation of strategy-project life cycle-Portfolio analysis: BCG matrix-G.E matrix-Step high strategy-Directional policy matrix strategy management-Strategic decision making-business level sub Strategies.

Unit-III

Generic strategic alternatives-Horizontal,Vertical,Diversification-Active and passive alternatives

Unit-IV

External growth strategy-merger acquisition-amalgamation-joint venture-Problems organizational structure and corporate development-Line and staff function-evaluation of organizational structure-management of change.

Unit-V

Implementation of strategy-Element of strategy-Leadership and organizational climate-Planning and control of implementation.

ERP-Features and applications, Packages: Baan, Marshall, SAP-Functional feature and implementation difficulties.

TEXT AND REFERENCE BOOKS:

1. Dr. C.B Mamoria & Satish Mamoria, Business planning and policy (1987) Himalaya publishing house, Mumbai.
2. Kazmi-Business policy & Strategy Management-Tata McGraw-Hill pub.
3. Azhaskazmi, Business policy.
4. S.C Bhattacharya- Strategic Management Concepts & Cases-S.Chand.

SEMESTER - III

L	T	P	C
5	0	0	4

Total Hours: 65

MANAGERIAL ECONOMICS

SUBJECT CODE: U3BA04MT

UNIT – I

Nature and Scope of Managerial Economics – Definition of Economics –Important Concepts of Economics – Basic Economic problem – Relationship between Micro and Macro Economics – Managerial Economics – Nature and Scope –Objectives of the Firm.

UNIT – II

Theory of Consumer behavior – Managerial Utility Analysis indifference curve and analysis.

Meaning of Demand – Law of Demand – Types of Demand – Determinants of Demand – Elasticity of Demand – Demand of Forecasting.

UNIT – III

Production and Cost Analysis – Law of Returns to scale and Economics of scale – Cost analysis – different cost concepts – Cost – Output relationship – Short run and Long run – Revenue curves of Firms – Supply Analysis.

UNIT – IV

Pricing Methods and Strategies – Objectives – Factors – General Consideration of Pricing – Methods of Pricing – Role of Government – Dual pricing – Price Discrimination.

UNIT – V

Market forms – Market Structure – Basis of Market Classification - Output Determination – Perfect Competition – Monopoly – Monopolistic Competition – Duopoly –Oligopoly .

Reference Books

1. Mankar : Business Economics, Macmillan Ltd.
2. Varshney RL and Maheshwari KL-Managerial Economics
3. Yogesh Maheshwari-Managerial Economics-Prentice-Hall of India.
4. Gupta GS-Managerial Economics.
5. Jhinghan ML-Micro Economics, Vrinda Publications(P) Ltd.(Theory)
6. Dean-Managerial Economics-Prentice-Hall of India
7. Peterson-Managerial Economics-Prentice-Hall of India.
8. Mote Paul Gupta-Managerial Economics-MGH.
9. Mehta P.L-Managerial Economics.

SEMESTER - III

L	T	P	C
5	0	0	4

Total Hours: 65

OFFICE MANAGEMENT

SUBJECT CODE: U3BA11AT

Unit-I

Meaning and scope-Function and Qualifications of Office Manager-Poor and good Organisation Departments-Flow of Work- Organisation Charts and manual.

Unit-II

Administrative arrangements and physical conditions- Centralization and Decentralisation of Office services-Office accommodation and Layout-Office furniture- Meaning Of Various terms-Basic pattern of work- Sub-Division-Standardization and Standards-Work Measurement and Control.

Unit-III

Office equipments-Reproduction equipments-Typewriter-Duplicators-Photo Copier-Franking Machine-Communication Equipments-Dictaphone-Intercom-Telephone-Telex-Teleprinters-PABX-PBX-STD-Storage equipments-Filing Cabinets-Time Clocks-Use of Computers in Office Management. Office system-Procedure-Routine and methods-Paper work in Office.

Unit-IV

Mail service and communication-Office Correspondence-Central vs. Departmental Correspondence- Postal services-Postbag and Box Numbers Registered and Insured Posts-VPP.

Unit-V

Office supervisor-Meaning and Characteristics of supervisor-Status-Place and Role of Supervisor-Effective Supervisor-Qualification-Knowledge and skill of Supervisor.

TEXT BOOKS

1. Chopra PK-Office management.
2. Pillai R.S.N, Bhagwathi. V-Office management.

REFERENCE BOOKS:

1. Denyer JC- Office Management.
2. Hicks CB and Place L- Office Practice and Management.
3. Littlefield CL and Peterson RL-Modern Office Management

SEMESTER - III

L	T	P	C
3	0	0	3

Total Hours: 39

CUSTOMER RELATIONSHIP MANAGEMENT

SUBJECT CODE: U3BA01ST

Unit-I

CRM-Introduction-Definition-Need for CRM-Complementary Layers of CRM-Customer Satisfaction-Customer loyalty-Product Marketing—Direct Marketing.

Unit-II

Customer Learning Relationship-Key Stages of CRM-Forces driving CRM-Benefits of CRM-Growth of CRM Market in india-Key principles of CRM.

Unit-III

CRM Program-Ground work for effective use of CRM-Information Requirement for an Effective use of CRM-components of CRM-Types of CRM.

Unit-IV

CRM Process Framework-Governance Process-Performance Evaluation Process.

Unit-V

Use of Technology in CRM- Call Center Process-CRM Technology Tools-Implementation-Requirements Analysis-Selection of CRM Package-Reasons and Failure of CRM.

TEXT BOOKS:

1. Customer Relation Ship Management,K.Balasubramaniyan,GIGO publication,2005.
2. The essentials guide to knowledge management-E-Business and CRM application,Amrit tlwana,Person education,2001.

REFERENCE BOOKS:

1. E-Business-Roadmap for success,Dr.Ravi Kalakota,Pearson education asia,2000.
2. Business-The Dell way,Rebecca saunders, India book distributors,2000

SEMESTER - IV

L	T	P	C
5	0	0	5

Total Hours: 65

MATERIALS MANAGEMENT

SUBJECT CODE: U4BA01MT

UNIT – I

Materials Management – Definition and Function – Importance of materials Management.

UNIT – II

Integrated materials management – The concept – Service function advantages – Inventory control – Function of inventory – Importance – Replenishment stock – Material Demand Forecasting – Material Requirement Planning MRP – Basis –Tools of Inventory Control – ABC – VED –FSN analysis – Inventory control of spares and slow moving items – EOQ and EBQ etc – Stores planning.

UNIT – III

Purchase Management – Purchasing – Procedure – Dynamic Purchasing –Principles – Import substitution – Internal Purchase – Import purchase Procedure.

UNIT – IV

Store Keeping and Materials Handling – Objectives – Functions of store keeping – Store responsibilities – Location of store house – Centralized store room – Equipment – Security Measures – Protection and prevention of stores – Fire and other Hazards – Bincard – Stock Cards

UNIT – V

Vendor rating – Vendor development – Purchase Department – Responsibility – Buyer – Seller relationship – Value analysis – ISO –Types

Reference Books

- 1.Saravanel P and Sumathi S – Production and Materials Management
- 2.Gopalakrishnan – Materials Management – Prentice – Hall of India
- 3..Muhdnan – Production and Operation Management MacMillan
- 4.Dutta – Integrated Materials Management
- 5.Veb – Materials Management

SEMESTER - IV

L	T	P	C
5	0	0	5

Total Hours: 65

MANAGEMENT ACCOUNTING

SUBJECT CODE: U4BA02MT

UNIT – I

Meaning, definition and objectives of management accounting – Advantages and limitations of management accounting – differences between management accounting and financial accounting – Financial statements – tools for the analysis of financial statement(only theory)

UNIT – II

Ratio Analysis – meaning, uses and limitations of ratios – types of ratios – liquidity ratios, profitability ratios, activity ratio and solvency ratios. (problem only)

UNIT – III

Fund flow analysis and cash flow analysis. Costing – meaning, uses and limitations – variance analysis – material and labor variances only. (Theory & Problems)

UNIT – IV

Budgetary Control – meaning, objectives, advantages & limitations of budgetary control – types of budgets – purchase budget, materials budget, flexible budget & cash budget. .(Theory & Problems)

UNIT – V

CVP analysis – uses and limitations of marginal costing – assumptions of BE chart – simple problems relating to decision making based n marginal costing – standard costing – meaning, uses and limitations – variance analysis – material and labor variances only.(Simple problems)

Text and Reference Books

- 1.Reddy. T.S & Hari Prasad Reddy – Management Accounting.MargahamPublications 2013.
- 2.Maheswari . S. N – Management Accounting.
- 3.Sharma R.K & Shashi K.Gupt – Management Accounting.
- 4.Khan & Jain – Management accounting.(Tata Mc Graw Hill 20003rdEd)
- 5.I.M.Pandey(Vikas 2004,3rd Ed)

Note:

The Proportion between theory and problems shall be 20:80.

SEMESTER - IV

L	T	P	C
5	0	0	4

Total Hours: 65

BUSINESS ENVIRONMENT

SUBJECT CODE: U4BA03MT

UNIT – I

The concept of Business Environment – Its nature and significance – Brief overview of political – Cultural – Legal – Economic and social environments and their impact on business and strategic decisions.

UNIT – II

Political Environment – Government and Business relationship in India Provisions of Indian Constitution pertaining to business.

UNIT – III

Social Environment – Cultural heritage – Social attitudes – Impact of foreign culture – castes and communities – Joint family systems – Linguistic and Religious groups – Types of Social Organization.

UNIT – IV

Economic Environment – Economic Systems and their impact in Business – Macro Economic Parameters like GDP – Growth rate – Population – Urbanization – Fiscal deficit – Plan investment – Per capita Income and their impact on business decisions.

UNIT – V

Financial Environment – Financial System – Commercial Banks – RBI –IDBI – Non Banking Financial Companies NBFC'S

Text and Reference Books

1. Dr.S.Sankaran – Business Environment
2. Francis Cherunilam – Business Environment
3. Aswathappa – Business Environment
4. Paul – Business Environment
5. Dasgupta and Senguptha – Government and Business in India.
6. Srinivasan K – Productivity and Social Environment
7. International Business Environment – Prentice – Hall of India

SEMESTER - IV

L	T	P	C
5	0	0	4

Total Hours: 65

OPERATIONS RESEARCH

SUBJECT CODE: U4BA04MT

UNIT – I

Operation Research (OR) – Nature and significance of OR – Various models in OR – Applications and scope of OR – linear Programming Problem(LPP) – Characteristics of LPP and its formulation – Graphical method of solving LPP.

UNIT – II

Simplex method of solving LPP – Big M method – Assignment problem and its solution – Transportation problem – Method of finding initial basic solution – Simple problems.

UNIT – III

Game theory – Two –person Zero sum games – Pure and mixed strategies – saddle point – Dominance Rules – Graphical solution of Rectangular games

UNIT – IV

Sequencing problem – Processing n jobs through two machines – Processing n jobs through three machines – Replacement models – Replacement of items of whose efficiency deteriorates with time – simple problems.

UNIT – V

Basic difference between PERT – CPM – Construction of Network diagram – Critical path analysis – Three time estimates.

Reference

- 1.J.K.Sharma (2002): Operations Research – Theory and Applications, MacMillan.
- 2.P.K.Gupta and Hira D.S (1995): Problems in operations Research, S.Chan and Company Ltd., Newdelhi.
- 3.Taha. H.A. (1977) : Operations Research – An Introduction, PHI
- 4.Kanti Swarup, Manmohan and Gupta (2002) Operations Research, Sultan Chand and sons, New Delhi
- 5.R.Panneer Selvam (2000) : Operations Research, PHI

SEMESTER - IV

L	T	P	C
5	0	0	4

Total Hours: 65

FINANCIAL MANAGEMENT

SUBJECT CODE: U4BA01AT

UNIT – I

Finance function – nature and scope – its relationship with other functions – finance organization.

Interpretation and analysis of financial statements – Financial forecasting – actual proforma, and model statements preparation and uses.

Financial planning and control – break – even analysis operation leverage –Profit cost (and volume) analysis.(Theory & Problems)

UNIT - II

Current assets management – cash, receivables, inventories liquidity, profitability and solvency criteria.

Current liabilities management – size and sources – money market banks – regulation of working capital finance Dhejia Committee Tandon Committee – Marathe Committee.

(Theory Only)

UNIT – III

Long term capital management. (Theory Only)

UNIT – IV

Cost of capital basic concepts; rational and assumptions cost of equity capital – Cost of retained earnings.

Capital structure decision of the firm – Composition and source of long term funds – financial leverage – zero base budgeting. (Theory & Problems)

UNIT – V

Financial information system (Theory Only)

Text and Reference Books

- 1.Fundamentals of financial management – James C. Van Horne – Prentice Hall of India Pvt Ltd., New Delhi.
- 2.Financial and Management and policy – James C. Van Horne – Prentice Hall of India Pvt Ltd., New Delhi.
- 3.Financial Management – P.V. Kulkarni – Himalaya Publishing House.
- 4.Financial Management – Theory and practice – Prasanna Chandra – Tata McGraw Hill Publishing Co Ltd., New Delhi.
- 5.Fundamentals of Financial Management - Prasanna Chandra – Tata Mcgraw hill Publishing co ltd., New Delhi.
- 6.Financial Management – I.M.Pandey – Vikas Publishing House Private Ltd.,
- 7.Financial Management – An analytical and conceptual Approach.S.C. Kuchlal – Chaitanya Publishing House, Allahabad.
- 8.Basic Financial Management – Khan – Tata McGraw Hill Pub.

Note:

The Proportion between theory and problems shall be 20:80.

SEMESTER – IV

L	T	P	C
3	0	0	3

Total Hours: 39

TOTAL QUALITY MANAGEMENT

SUBJECT CODE: U4BA01ST

Unit-I Basic Concepts and Origin of TQM

Basic Concept of total quality-Evaluation of Total Quality Management-Cost of Quality-Quality Productivity-Components of Total Quality Loop.

Unit-II Statistical Quality Control and Inspection

Conceptual approach to SQC-Acceptance Sampling and Inspection-Plans-Statistical Process Control-Prevention Through Process Improvement.

Unit-III Process Capability

Process Capability Studies-Humanistic Aspects of TQM-Management of Quality Circle and ZD Programmes.

Unit-IV Just in time,Kanban

Q-7 Tools-Taguchi Loss Function-Failure Analysis-Just in time-JIT Pull System-JIT Purchase.

Unit-V Total Productive Management

Optimum Maintenance Decisions-Total Productive Maintenance-Process Design-Buyer Seller Relations-Supply Chain Management.

TEXT BOOK:

1. Subburaj, Total Quality Management, Tata mcgraw hill, 2006
2. Shridhara bhat, Total Quality Management, Himalaya Publishing House, 2006.

REFERENCE BOOKS:

1. Ansari.A and Modarress, JIT Purchasing, Free Press, Newyork.
2. Sandeep Malhotra, Quality Management planning, Deep & Deep. 2006.

SEMESTER-V

BUSINESS LAW

SUB CODE-U5BA01MT

L	T	P	C
6	0	0	5

TOTAL HOURS 78

UNIT-I-Introduction

Introduction and meaning of law-Need for law-Definition-mercantile law-Elements of Valid Contract-Classification of Contract-Offer- Essentials of Valid Offer.

UNIT-II Essentials of Valid acceptance

Acceptance, Essentials of Valid acceptance-Revocation of Offer and Acceptance. Consideration-Essentials of Valid Consideration-no consideration no contract-exceptions.

UNIT-III Capacity of contract

Capacity of contract-persons not competent to contract-Minor-persons of unsound mind-persons disqualified by law. Free consent, coercion-undue influence-Fraud-misrepresentation-Mistake.

UNIT-IV Performance of contract

Performance of contract-Actual Performance-Attempted performance- Quasi contract-finder of cost goods.

UNIT-V Contract of Sale of goods

Contract of Sale of goods-goods-Classification sale and agreement to sell-unpaid seller-Rights of unpaid seller.

Reference: Books:

1. Sreenivasan MR-Business Law
2. Kapoor ND – Business Law
3. Alam, S b and Saravanard – Business Law
4. Shkula-Business Law
5. Kushal-Business Law

SEMESTER-V

MARKETING MANAGEMENT

SUB CODE-U5BA02MT

L	T	P	C
6	0	0	5

TOTAL HOURS 78

UNIT – I Introduction of Marketing

Fundamentals of Marketing – Role of Marketing – Relationships of Marketing with other functional areas – Concept of marketing mix – Marketing Management of Product services – Marketing approaches – Selling – Various Environmental factors affecting the marketing functions.

UNIT – II Buyer Behavior

Buyer Behavior – Consumer Goods and Industrial goods – Buying motives – Buyer Behavior Model – Factors influencing buyer behavior.

Market segmentation – Need and basis of Segmentation – Marketing Strategy – Segmentation – Targeting – Positioning.

UNIT – III Sales Forecasting

Sales Forecasting – Various methods of sales Forecasting – Analysis and Application.

The Product – Characteristics – Benefits - Classifications of goods – New product development process and product life Cycle – Product line and product mix decisions – Branding – Packaging

UNIT – IV Pricing

Pricing – Factors influencing pricing decisions – Pricing objectives – Pricing policies and procedures Kinds of Pricing– Pricing strategies – Physical distribution – importance of various kinds of marketing channels – Distribution problems – Salesman motivation – Compensation – Control.

UNIT – V Promotion

Promotion – Advertising – Publicity – Public relations – Personal Selling – Direct selling – Sales promotion Administration.

Text Books

- 1.Ramaswamy and Namakumari – Marketing Management 3/e Revised MacMillan Ltd
- 2.Philip Kotler and Armstrong – Marketing Management
- 3.Rajan Nair – Marketing
- 4.Nag – Marketing Strategy – MacMillan Ltd
5. Philip Kotlar – Marketing Management – Prentice – Hall of India
- 6.Saxena – Marketing Management – Tata McGraw Hill Pub
- 7.J.Jeyasankar – Marketing

Reference Books

- 1.Varshney RL and Gupta SL – Marketing Management
- 2.Dholokia – Marketing Management Cases & concepts, MacMillan Ltd.
- 3.Bender – Secrets of Power Marketing.

SEMESTER-V
HUMAN RESOURCE MANAGEMENT
SUB CODE-U5BA03MT

L	T	P	C
6	0	0	5

TOTAL HOURS 78

UNIT – I Introduction of Human Resource Management

Nature and scope of HRM – Difference between Personnel Management and HRM – Functions of HRM – Environment of HRM – Strategic HRM

UNIT – II Human Resource Planning

Human Resource Planning – Recruitment – Selection – Methods of Selection – Use of various tests – Interview techniques in selection – Placement.

UNIT – III Training methods

Induction – Training methods – Techniques – Identification of Training needs – Training and Development.

UNIT – IV Performance Appraisal

Performance Appraisal – Methods – Job Evaluation and Performance Appraisal – Compensation

UNIT – V Transfer and Promotion

Transfer – Promotion and termination of services – Career development – Mentoring – HRM Audit – Nature – Scope – Approaches

Text Books

- 1.Dwivedi RS – Human Relations and Organization Behavior.
- 2.Aswathappa K – Human Resource and Personnel Management.
- 3.Memoria CB – Personnel Management.
- 4.Subba Rao P – Human Resource Management and Industrial Relations
- 5.Prasad – Getting the right people – MacMillan I ltd,
- 6.Pattanayak – Human Resources Management – Prentice – Hall of India.
- 7.Decenzo/Robbins – Personnel/Human Resource Management – Prentice – Hall of India.
- 8.Saiyadain Mirza – Human Resource Management – Saxena – Marketing Management – Tata McGraw Hill Pub.
- 9.Venkataratanam – Personnel Management & Human Resources – Saxena – Marketing Management – Tata McGraw Hill Pub.
- 10.J.Jeyasankar – Human Resource Management.
- 11.A.M.Sheikh – Human Resource Management

Reference Books

- 1.Monappa – Managing Human Resources MacMillan Ltd
- 2.Gary Dessier - Human Resource Management
- 3.Beardwell and Holden – Human Resource Management
- 4.Davar – Personnel Management
- 5.Mckenna – The Essence of Human Resource Management – Prentice – Hall of India.

SEMESTER-V

ENTREPRENEURIAL DEVELOPMENT

SUB CODE-U5BA04ET

L	T	P	C
9	0	0	5

TOTAL HOURS 117

UNIT I Introduction of Entrepreneurship

Introduction – Understanding the meaning of Entrepreneurship Characteristics of an Entrepreneur – Classification of Entrepreneurs – Entrepreneurial Scene in India – Factors influencing Entrepreneurship.

UNIT – II Entrepreneurial growth

Entrepreneurial growth – Role played by government and Non – Government agencies –EDP’S, TIIC, SIDBI, IDBI, IFCI, ETC.

Problems and prospects of Women entrepreneurs – Rural Entrepreneurs – Small Scale entrepreneurs and Export Entrepreneurs

UNIT – III Marketing Feasibility

How to enter Into Market? – Business idea generation techniques – Identification of Business Opportunities – Marketing Feasibility – Financial Feasibility – Technical – Legal – Managerial and Locational Feasibility

UNIT – IV Project Appraisal

Project Appraisal – Methods – Techniques – Preparation of Business plan – Content of a Business Plan – Project Report.

UNIT – V Promotional Strategies

How to start an enterprise? – Franchising and Acquisition – Product Strategies – Pricing Strategies – Distribution Strategies – Promotional Strategies

How to be a successful Entrepreneur? – Learning to be successful entrepreneurs

Text and Reference Books

1. Jayshree Suresh – Entrepreneurial Development.
2. Khanka – Entrepreneurial Development
3. Saini – Entrepreneurship : Theory & Practice
4. Gupta CB – Entrepreneurial Development
5. Vasant Desai – Dynamics of Entrepreneurial Development and Management.

SEMESTER-V

E-BUSINESS

SUB CODE-U5BA05ST

L	T	P	C
3	0	0	3

TOTAL HOURS 39

UNIT-I : Introduction

E-Commerce Framework – Traditional vs E-Business Applications – Architectural Framework – The Internet as Network Infrastructure – Major Categories of E-Commerce – B2C, B2B, C2B and C2C.

UNIT-II : Networks

Overview of Communication Network – Communication Processors – Communication Media – Types of Networks – Communication Satellite – Wireless Networks – Wireless Internet Access ISDN – Dial-Up – Broadband.

UNIT-III : Firewalls and Securities

OSI Models – Network Security and Firewalls – Protocols – Types – Client Server Network Security – Firewalls and Network Security – Data and Message Security – Digital Signature, Certificates, Envelopes - Encrypted Documents.

UNIT-IV : EDI in Business

E-Commerce and World Wide Web – E-Payment Systems – Electronic Data Interchange(EDI) – EDI Applications in Business, Intranet Application in Business.

UNIT-V : E-Payment Systems

Online Payment – Payments Cards – Electronic Cash – Electronic Wallets – Digital Cards – Types – Stored Value Cards – Internet Technologies – Banking – Net, Mobile.

UNIT-VI : World Wide Web – Process

Web Hosting Services – Web Servers, Domain Naming Systems (DNS) – Types – POP, IMAP – Accredited Registrars – Country Coded and Top Level Domains – Internet Regulatory Organizations.

Text Books:

1. Gray Schneider, Electronic Commerce, Thomson Course Technology, Noida, 7th Annual Edition, 2007.
2. U.S.Pandey, Rahul Srivastava, Saurabh Shukla, E-Commerce and its applications, S.Chand, New Delhi, 1st Edition, 2007.
3. R.Kolkata and A.B.Whinston: Frontiers of Electronic Commerce, New Delhi, Addison Wesley, 1996.

Reference Books:

1. P.T.Joseph: Electronic Commerce: A Managerial Perspective, Prentice Hall of India Learning, New Delhi, 3rd Edition, 2008.
2. Efraim Turbon, Jae Lee, David King, H.Michael Chung, Electronic Commerce, A Managerial Perspective, Pearson Education Asia, 2001.

SEMESTER-VI
INDUSTRIAL RELATIONS
SUB CODE-U6BA01MT

L	T	P	C
6	0	0	5

TOTAL HOURS 78

Unit-I Introduction of Industrial Relations

Industrial Relations-Role-Importance-Trade Unions-Industrial disputes and their Resolutions

Unit-II Collective bargaining

Participative management-structure-scope-collective bargaining-works committee-joint management councils-Pre-requisite for successful participation-Role of Government in collective bargaining.

Unit-III Industrial unrest

Industrial unrest-employee dissatisfaction-grievances- disciplinary action-domestic Enquiry-strikes-lockout-prevention of strikes-lockouts.

Unit-IV Factories act 1948

Factories act 1948-Definition-Factory-Approval licensing and registration of factories-Inspectors-Appointment and Power of Inspectors.

Unit-V Workmen compensation act 1923

Workmen compensation act 1923-Introduction-Definition-Employees compensation-Employees Liability for Compensation-ILO- Role and Functions of ILO

Text books2

1. Sreenivasan M.R.- Industrial Relationship and labor legislations
2. Aswathappa K.-Human Resource and Personnel Management
3. Subba Rao P.-Human Resource management and industrial elations
4. Monoppa-industrial Relations

Reference books

1. Michael V industrial relations in India and workers involvement in management cowing-
Essence of personnel management and industrial relations-prentice-hall of India.

SEMESTER-VI
COMPUTER APPLICATION IN BUSINESS
SUB CODE-U6BA02MT

L	T	P	C
6	0	0	4

TOTAL HOURS 78

Unit-I Introduction

Information Technology Basics-Information Definition-Prerequisites of information-Need for information-Components of Information Technology-Role of Information Technology in Business.

Unit-II Word processing

Word processing with MS Word: Starting MS Word-MS Word environment- Working with word documents-Working with text-Working with tables-Checking spelling and grammar-Printing a document.

Unit-III Spreadsheets and MS Excel

Spreadsheets and MS Excel: Starting MS Excel-MS Excel Environment- Working with Excel Workbook-Working with worksheet-Formulas and functions-Inserting charts-Printing in Excel.

Unit-IV Making Presentation

Making Presentation with MS Power point- Starting MS Power Point-MS Power Point Environment-Working with power point- Working with different views-designing presentation-printing in power point.

Unit-V Electronic Commerce

Electronic Commerce - Types- Advantages and Disadvantages- Electronic Data Interchange(EDI)- How EDI Benefits-EDI limitations-SMART card- Smart card applications.

Text Book:

Introduction to Information Technology, ITL ESL, Pearson Education

SEMESTER-VI
MARKETING RESEARCH
SUB CODE-U6BA03ET

L	T	P	C
6	0	0	4

TOTAL HOURS 78

Unit-I Introduction of Marketing Research

Introduction-Definition of Marketing Research Nature and Scope - Marketing Research as aid to Rational Decision Making. Marketing research methodology

Unit-II Sampling techniques

Sampling techniques-Random Stratified Area Quota Observation Questionnaire Interview techniques Interviewing skills on the part of investigator.

Unit-III Motivation research

Motivation research- product research

Unit-IV
Consumer survey

Consumer survey- sales control research

Unit-V Media research

Media research -copy testing- pre testing and post testing

Text books

1. Sharma DD-Marketing Research
2. Tull and Hawkins-Marketing Research Prentice-hall of india
3. BOYD – M.R

Reference books

1. Majumdar-marketing research
2. Green and tull-marketing research
3. Green,tull and albaum-research for marketing decision-prentice-hall of india
4. Chinsnall-Essence of marketing research—prentice-hall of india
5. Mishra-MN- Modu M.R
6. Seymour D.T-Marketing research-S.Chand.

SEMESTER-VI

CREATIVITY AND INNOVATION MANAGEMENT

SUB CODE-U6BA05ST

L	T	P	C
3	0	0	3

TOTAL HOURS 39

Objective

To enable the students to learn the various aspects of creativity and innovation.

UNIT-I Introduction of Creativity and Innovation Management

What is Creativity – Individual and Group Creativity – Convergent Thinking – Divergent Thinking and Generation of Creative Ideas?

UNIT-II Thinking Hats Methods

Thinking Hats Methods – Redefinition Techniques – Random Stimulus – Generation of Creative Ideas in Groups – Brainstorming – Reverse Brainstorming – Synaptic – Morphological Method.

UNIT-III Creativity Exercises

Creativity Exercises – Mental Gym – The Way the Mind Works – Difference Between Lateral and Vertical Thinking – Attitudes Towards Lateral Thinking – Basic Nature of Lateral Thinking – Techniques – The Generation of Alternatives – Challenging Assumptions.

UNIT-IV Innovation

Innovation – Suspended judgment – Analogies – Lateral Thinking – What is a Problem – Defined Problems – Creative Problem Solving – Models of Techniques of Creative Problem Solving

UNIT-V Comparison of Creativity

Comparison of Creativity Techniques – Mental Gym Quiz – Blocks of Creativity – Fears and Disabilities – Energy for your Creativity – Creative – Making Your Environment More Creative – The Creative Life Quiz – Case Study

Text Books:

1. Training Creative Thinking – Davis Gary and Scott New York Pub.
2. Lifelong Creativity – Pradip NCTE and Khandwalla Tata Mc Graw Hill.

Reference Books:

1. Managing creativity for Corporate Excellence – NCTE Rastogi Mac Millan
2. Lateral Thinking – Edward de Bono Penguin Pub
3. Innovation and Entrepreneurship – Peter F.Drucker

OTHER DEPT SYLLABUS (B.C.A, CS AND MATHS)(NON-MAJOR PAPERS)

SEMESTER - III

L	T	P	C
2	0	0	2

Total Hours: 26

MANAGEMENT CONCEPTS

SUBJECT CODE: U3BA01NM

Unit-I

Management-Definition-Importance-Role and Function of a Manager.

(6 Hrs)

Unit-II

Planning-Nature-Purpose-Steps-Types-Merits and Demerits of Planning-MBO.

(5 Hrs)

Unit-III

Organization- Purpose- Departmentation- Span of control-Delegation- Centralization and Decentralization-Line and staff-Committee.

(5 Hrs)

Unit-IV

Directions-Leadership-Motivation-Communication Process of Communication-Barriers in Communication.

(5 Hrs)

Unit-V

Controlling-Concepts of Control-Methods of Control-Co-Ordination-Need-Principles-Approaches to Achieve effective Co-Ordination.

(5 Hrs)

TEXT BOOKS:

1. J. Jayasankar-Principles of Management-Margam Publications,(2nd Edition 2013)
2. Dinkar Pagare-Principles of Management-Sulthan Chand & Sons, (2nd Edition 2005)

REFERENCE BOOKS

1. Gupta, C. B. Management concept & practices. New Delhi: Sultan Chand & Sons. (3rd Edition 2009)
2. Prasad, L. M. Principles and practice of management. New Delhi: Chand & Sons. (4th Edition 2012)
3. Tripathi, P. C. & Reddy P. N. Principles of management. New Delhi: Tata McGraw Hill(2nd Edition 2006)

L	T	P	C
2	0	0	2

TOTALHOURS:

SEMESTER - IV

GENERAL COMMERCIAL KNOWLEDGE

SUBJECT CODE: U4BA01NM

OBJECTIVES:

1. To enable the students in terms of understanding the various concepts related to business organizations and office management.
2. Students to understand the office accommodation and office environment.

UNIT-I

Commerce, trade and industry-meaning-scope and importance of commerce-economics basis of commerce.

(6 Hrs)

UNIT-II

Forms of business organization-sole trading-partnership firms-merits and demerits of partnership firm.

(5 Hrs)

UNIT-III

Joint stock companies-features-memorandum and articles of association - shares and debentures-types-co-operatives-features-types and advantages.

(5 Hrs)

UNIT-IV

Office organization –what is an office? Functions of office -office accommodation and environment-office layout-office manual.

(5 Hrs)

UNIT-V

Handling of mail, filing and indexing-inward/out ward of mail-filing and indexing system, essential and classification-methods- horizontal vs. vertical filing-centralized and decentralized-indexing.

(5 Hrs)

TEXT BOOKS

1. C.D. Balaji and G. Prasad-Business Organization, Margham Publications,(1st Edition 2015)
2. Pillai R.S.N, Bhagwathi. V-Office Management-Sulthan chand and company, (1st edition 2003)

REFERENCE BOOKS:

1. Dr.C.B.Guptha-Office organization-. Sulthan chand and sons,(3rd edition 2007)
2. Arora, S. P. Office Organization and Management. New Delhi: Vikas Publishing House(2nd Edition,2003)

ஆதிபராசக்தி கலை மற்றும் அறிவியல் கல்லூரி

தமிழ்த்துறை

பொதுத் தமிழ்

அடித்தளப்படிப்பு

புதிய பாடத்திட்டம் 2020-2021

முதலாம் ஆண்டு -- முதற்பருவம்

பொருளடக்கம்

L	T	P	C
5	0	0	3

Sub code : U1LT21FL

மொத்த பாடவேளை=64

நோக்கம் மற்றும் பாடப்பொருள்

தமிழ்ப்பற்று சமூகம் பெண்ணியம் குறித்த விழுமியங்கள் சார்ந்த கவிதைகளும் கருத்து பரிமாற்றத்திறனுக்கு அடிப்படையாக உள்ள இலக்கணப் பகுதியும், பயிற்சிப்பகுதியும் தன் சுய சிந்தனையுடன் படைப்பாக்கச் சிந்தனைத் திறனை வளர்த்தெடுக்கும் வகையில் சிறுகதை பகுதியும், காலவோட்டத்துடன் இணைந்து சிந்திக்கும் ஆற்றலைப் பெறும் வகையில் இலக்கிய வரலாற்றுப் பகுதியும் உரைநடைக் கட்டுரைகளும் தெரிவு செய்யப்பட்டுள்ளன.

1. அடித்தளப்படிப்பு - தமிழ்
2. பாரதிதாசன் - பிசிராந்தையார் (நாடகம்)
3. முனைவர் அ.ஜெயம்
சந்திரலேகா வைத்தியநாதன் - இலக்கிய வரலாறு
4. சொ. பரமசிவம் - நற்றமிழ் இலக்கணம்

அலகு -1 கவிதை

- பாரதியார் - புதுமைப்பெண்
- பாரதிதாசன் - தமிழின் இனிமை
- தேசிய விநாயகம்பிள்ளை - ஆசிய ஜோதி அருள்உரிமை
- கண்ணதாசன் - கவிஞர் கண்ணதாசன் கவிதைகள்
7-ஆம் தொகுதி புதியன பொலிவதாக
- பிரபஞ்சன் - ஈரோடு தமிழர் உயிரோடு
சுயமரியாதைக்கும்பாபிஷேகம்
- அப்துல் ரகுமான் - (ஆலாபனை) மானுடத்தின் திருவிழா
- மு.மேத்தா - கனவுக்குதிரைகள்-கிரிடமேகேள்
என் பிள்ளைத்தமிழ் - என் தாய்
- வைரமுத்து - இராமர்களுக்கு இன்று ரத்தமில்லை

அலகு-2 உரைநடை

ரா.பி.சேதுப்பிள்ளை

மு. வரதராசன்

- தமிழ் இன்பம்
கர்ணனும் சும்பகர்ணனும்
- நல்வாழ்வு மனவலிமை வேண்டும்

அலகு-3 சிறுகதை

புதுமைப்பித்தன்

சுஜாதா

- ஒருநாள் கழிந்தது
- நச்சுப்பொய்கை

அலகு-4 நாடகம்

பாரதிதாசன்

- பிசிராந்தையார்

அலகு-5 மொழித்திறன்

மொழித்திறன்

இலக்கிய வரலாறு

சொ.பரமசிவம்

- கலைச்சொல்லாக்கம் மரபுத்தொடர்கள்
- நாடகம். புதுக்கவிதை. மரபுக்கவிதை
- நற்றமிழ் இலக்கணம்
எழுத்து எழுத்துக்களின் பிறப்பு ஒலிகளின்
பாகுபாடு

CO1	கவிதையின் பாடுபொருள்களை அறிதல், கவிதை எழுதும் திறன் வளர்த்தல்.
CO2	இயல் தமிழ் பற்றியும் உரைநடை வளர்ச்சி, உரையாசிரியர்கள் பற்றியும் அறிந்துகொள்ளுதல்.
CO3	சிறுகதை எழுத்தாளர்களை பற்றியும் சிறுகதையின் வளர்ச்சி திறனை மேம்படுத்துதல்.
CO4	நாடகத்தமிழ் படித்து நாடகம் எழுதும் திறனை வளர்த்தல்.
CO5	நாடகங்கள், நாடகக்கலைஞர்களின் கலைதிறனை கண்டு நடிக்கும் திறனை வளர்த்தல், மரபு கவிதை, புதுக்கவிதை, எழுதும் திறனை வளர்த்தல், புதிய கலைச்சொல்லாக்கம் தருதல். எழுத்து இலக்கணம் பற்றி அறிதல்.
CO6	கவிதை, உரைநடை, சிறுகதை, நாடகம் இவற்றின் வளர்ச்சி பற்றியும் எழுதும் திறனை வளர்த்தல்.
CO7	இலக்கணம் பற்றியும் மரபுத்தொடர்கள் கலைச்சொல்லாக்கம் பற்றியும் அறிந்துக்கொள்ளுதல்.

ஆதிபராசக்தி கலை மற்றும் அறிவியல் கல்லூரி

தமிழ்த்துறை

பொதுத் தமிழ்

அடித்தளப்படிப்பு

புதிய பாடத்திட்டம் 2020-2021

முதலாம் ஆண்டு -- இரண்டாம் பருவம்

பொருளடக்கம்

Sub code : U2LT21FL

L	T	P	C
5	0	0	3

மொத்த பாடவேளை=64

1. அடித்தளப்படிப்பு - தமிழ்
2. முனைவர் அ. ஜெயம் - இலக்கிய வரலாறு
சந்திரலேகா வைத்தியநாதன்
3. சொ. பரமசிவம் - நற்றமிழ் இலக்கணம்

நோக்கம் மற்றும் பாடப்பொருள்

பக்தி இலக்கியங்களையும் சிற்றிலக்கியங்களையும் அறிந்துக்கொள்ளுதல்

அலகு - 1

- 1 .இராமலிங்க அடிகள் - திருவருட்பா சிறுவிண்ணப்பம்
1-10 பாடல்கள்
- 2 .குணங்குடி மஸ்தான் சாகிபு - பராபரக்கண்ணி 21-40 கண்ணிகள்
3. வீரமாமுனிவர் - திருக்காவலூர்க் கலம்பகம்
5 பாடல்கள்

அலகு - 2

4. குமரகுருபரர் - மீனாட்சியம்மை பிள்ளைத் தமிழ்
5 பாடல்கள்
தாலப்பருவம் (25-32)
5. ... - தமிழ்விடுதாது 1-20 கண்ணிகள்
(121-140)

அலகு – 3

6. திரிகூடராசப்பக்கவிராயர் - குற்றாலக் குறவஞ்சி 5 பாடல்கள் (78-82) .
7. காளமேகப் புலவர் - தனிப்பாடல்கள் 5 பாடல்கள் (49 51 55 62 64)
8. ஓளவையார் - தனிப்பாடல்கள் 5 பாடல்கள் (43 46 54 79 113)

அலகு – 4

9. சுந்தரர் - தேவாரம் (7ஆம் திருமுறை) (1-10) பாடல்கள்
10. ஸ்ரீ ஆண்டாள் - திருப்பாவை 5 பாடல்கள் (2 3 4 5 6)
11. ... - முத்தொள்ளாயிரம் (5 10 62 67 71 73 75 76 77)

அலகு – 5

இலக்கிய வரலாறு மற்றும் மொழித்திறன்

12. சிற்றிலக்கியம். பக்தி இலக்கியம் (இலக்கிய வரலாறு)
13. பொதுக்கட்டுரை எழுதுதல்
14. நோக்காணல்
15. சொ.பரமசிவம் - நற்றமிழ் இலக்கணம்

சொல் சொற்களின் வகைகள்

தொகைநிலைத்தொடர், தொகாநிலைத்தொடர்

CO1	திருவருட்பா பாடல்களையும் பராபரக்கண்ணி பாடல்களையும் படித்து அதன் நெறிகளை பின்பற்றுதல்.
CO2	பிள்ளைத்தமிழ் தூது ஆகிய சிற்றிலக்கியங்களின் வகைகளை அறிதல்.
CO3	தனிப்பாடல்கள் எழுதும் திறன் வளர்த்தல்.
CO4	தேவாரம், திருப்பாவை படித்து பக்தி உணர்வை வளர்த்தல்.
CO5	இலக்கிய வரலாறு பற்றி அறிதல்.
CO6	சிற்றிலக்கியங்கள் பற்றியும் பக்தி இலக்கியங்கள் பற்றியும் அறிந்துகொள்ளுதல்.
CO7	கட்டுரை எழுதும் திறன் வளர்த்தல், இலக்கண சொற்களின் வகைகளை அறிதல்.

ஆதிபராசக்தி கலை மற்றும் அறிவியல் கல்லூரி

தமிழ்த்துறை

பொதுத் தமிழ்

அடித்தளப்படிப்பு

புதிய பாடத்திட்டம் 2020-2021

இரண்டாமாண்டு -- மூன்றாம் பருவம்

பொருளடக்கம்

Sub code : U3LT21FL

L	T	P	C
5	0	0	3

மொத்த பாடவேளை=64

1. அடித்தளப்படிப்பு - தமிழ்
2. முனைவர் அ. ஜெயம் - இலக்கிய வரலாறு
சந்திரலேகா வைத்தியநாதன்
3. சொ. பரமசிவம் - நற்றமிழ் இலக்கணம்

நோக்கம் மற்றும் பாடப்பொருள்

அற இலக்கியங்களையும் காப்பிய இலக்கியங்களையும் இலக்கணப்பகுதிகளையும் அறிந்துக்கொள்ளுதல்

அலகு 1

1. திருக்குறள்- அறத்துப்பால் - செய்ந்நன்றியறிதல்
2. நாலடியார் - பொருட்பால் - அறன்வலியுறுத்தல்
3. பழமொழி நானூறு - கல்வி

அலகு 2

4. சிலப்பதிகாரம் - வழக்குரை காதை
5. மணிமேகலை - ஆதிரை பிச்சையிட்ட காதை

அலகு 3

6. சீவக சிந்தாமணி - நாமகள் இலம்பகம்
7. கம்பராமாயணம் - கும்பகர்ணன் வதைப் படலம்

அலகு 4

8. பெரியபுராணம் - அப்பூதிஅடிகள்நாயனார் புராணம்
9. சீறாப்புராணம் - ஈத்தங்குலை வரவழைத்த படலம்
10. இரட்சண்ய யாத்திரிகம் - குமார பருவம்

அலகு 5

இலக்கிய வரலாறு

அறஇலக்கியம் (புதினெண்கீழ்க்கணக்கு)

காப்பிய இலக்கியங்கள்

சொ.பரமசிவம்

- நற்றமிழ் இலக்கணம்

ஐந்திணை, அறத்தொடு நிறறல்

உடன்போக்கு, உள்ளுறை, இறைச்சி.

மொழித்திறன்

நூல் மதிப்புரை அறிக்கை தயாரித்தல்

கடிதம் வரைதல்

விண்ணப்பம் எழுதுதல்

CO1	அறநூல்கள் கூறும் அறக்கருத்துக்களை விளக்குதல்.
CO2	ஐம்பெரும் காப்பியங்கள் பற்றியும் சிலம்பு மணிமேகலையின் சிறப்பு பற்றியும் எடுத்துரைத்தல்.
CO3	கம்பஇராமாயணம் போன்ற இதிகாசங்களைக் கூறி அறிவுத்திறனை மேம்படுத்துதல்.
CO4	புராணங்களை படித்து திறனை வளர்த்தல்.
CO5	புதினெண்கீழ்க்கணக்கு நூல்களின் வகைகளை அறிதல்.
CO6	அற இலக்கியங்கள் பற்றி அறிந்து கொள்ளுதல்.
CO7	காப்பியங்களின் பண்பினை அறிதல், இலக்கணம் அக இலக்கியம் பற்றி அறிதல்.

ஆதிபராசக்தி கலை மற்றும் அறிவியல் கல்லூரி

தமிழ்த்துறை

பொதுத் தமிழ்

அடித்தளப்படிப்பு

புதிய பாடத்திட்டம் 2020-2021

இரண்டாமாண்டு – நான்காம் பருவம்

பொருளடக்கம்

Sub code : U4LT21FL

L	T	P	C
5	0	0	3

மொத்த பாடவேளை=64

1. அடித்தளப்படிப்பு - தமிழ்
2. முனைவர் அ. ஜெயம் - இலக்கிய வரலாறு
சந்திரலேகா வைத்தியநாதன்
3. சொ. பரமசிவம் - நற்றமிழ் இலக்கணம்

நோக்கம் மற்றும் பாடப்பொருள்

மானுடச் சிறப்பியலை மையப்படுத்தி, அதன் புரிதிறனை மேம்படுத்தும் வகையில்
செய்யுட்பகுதிகளும் சங்க இலக்கியங்களும் தொகுக்கப்பட்டுள்ளன.

அலகு 1

புறநானூறு பாடல்கள் - (21 192 204 226 235)

பதிற்றுப்பத்து பாடல்கள் - (17 18)

அலகு 2

ஐங்குறுநூறு – கிள்ளைப்பத்து பாடல்கள் - (281 – 290)

குறுந்தொகை பாடல்கள் - (2 66 75 230 250)

அகநானூறு பாடல்கள் - (36 254 318)

அலகு 3

நற்றிணை பாடல்கள் - (55 69 70 307 387)

கலித்தொகை பாடல்கள் - (9 51 80 115 133)

அலகு 4

பத்துப்பாட்டு – முல்லைப்பாட்டு முழுவதும்

அலகு 5

இலக்கிய வரலாறு

எட்டுத்தொகை பத்துப்பாட்டு நூல்கள்

சொ.பரமசிவம் - நற்றமிழ் இலக்கணம்

யாப்பின் உறுப்புகள் அணியின் வகைகள்

மொழித்திறன்

ஆங்கிலப் பகுதியைத் தமிழில் மொழிபெயர்த்தல்

CO1	புறநூல்களில் உள்ள செய்திகளை படித்து புரிந்துக்கொள்ளுதல்.
CO2	குறுந்தொகை, ஐங்குறுநூறு, அகம் படித்து நூலின் பொருளினை அறிதல்.
CO3	நற்றிணை, கலித்தொகை அகநூலைப்படித்து பயன்பெறுதல்.
CO4	அகநூல் முல்லைப்பாட்டு படித்து தெரிந்துக்கொள்ளுதல்.
CO5	எட்டுத்தொகை, பத்துப்பாட்டு நூல் வகைகளை தெரிந்துக்கொள்ளுதல், மொழித்திறன் அறிந்துக்கொள்ளுதல்.
CO6	சங்க இலக்கியங்கள் பற்றி அறிதல்.
CO7	யாப்பிலக்கணம், அணியிலக்கணங்களையும் அறிந்துக்கொள்ளுதல்.

Om sakthi

ADHIPARASAKTHI COLLEGE OF ARTS & SCIENCE (AUTONOMOUS)

G.B. NAGAR- KALAVAI, RANIPET- DT- 632 506

COMMUNICATIVE ENGLISH I

L	T	P	C
5	0	0	3

SEMESTER I

SUBJECT CODE: U1CE21SL

Objective: To enhance the learner's communication skills by giving adequate exposure in reading, writing, speaking and listening skills

Unit I

1. Listening and Speaking

- a. Introducing self and others
- b. Listening for specific information
- c. Pronunciation (without phonetic symbols)
 - Essentials of pronunciation
 - American and British pronunciation

2. Reading and Writing

- a. Reading short articles – newspaper reports / fact based articles
 - i. Skimming and scanning
 - ii. Diction and tone
 - iii. Identifying topic sentences
- b. Reading aloud: Reading an article/report
- c. Journal (Diary) Writing

3. Study Skills – 1

- a. Using dictionaries, encyclopedias, thesaurus

4. Grammar in Context:

- Naming and Describing
- Nouns & Pronouns

- Adjectives

Unit II

1. Listening and Speaking

- Listening with a Purpose
- Effective Listening
- Tonal Variation
- Listening for Information
- Asking for Information
- Giving Information

2. Reading and Writing

- Strategies of Reading:
Skimming and Scanning
 - Types of Reading:
Extensive and Intensive Reading
 - Reading a prose passage
 - Reading a poem
 - Reading a short story
- Paragraphs: Structure and Types
 - What is a Paragraph?
 - Paragraph structure
 - Topic Sentence
 - Unity
 - Coherence
 - Connections between Ideas: Using Transitional words and expressions
 - Types of Paragraphs

3. Study Skills II:

Using the Internet as a Resource

- Online search
- Know the keyword
- Refine your search
- Guidelines for using the Resources
- e-learning resources of Government of India
- Terms to know

4. Grammar in Context

Involving Action-I

- a. Verbs
- b. Concord

Unit III

1. Listening and Speaking

- a. Giving and following instructions
- b. Asking for and giving directions
- c. Continuing discussions with connecting ideas

2. Reading and writing

- a. Reading feature articles (from newspapers and magazines)
- b. Reading to identify point of view and perspective (opinion pieces, editorials etc.)
- c. Descriptive writing – writing a short descriptive essay of two to three paragraphs.

3. Grammar in Context:

Involving Action – II

- Verbals - Gerund, Participle, Infinitive
- Modals

Unit IV

1. Listening and Speaking

- a. Giving and responding to opinions

2. Reading and writing

Note taking

- a. Narrative writing – writing narrative essays of two to three paragraphs

3. Grammar in Context:

Tense

- Present
- Past
- Future

Unit V

1. Listening and Speaking
 - a. Participating in a Group Discussion
2. Reading and writing
 - a. Reading diagrammatic information – interpretations maps, graphs and pie charts
 - b. Writing short essays using the language of comparison and contrast
3. Grammar in Context: Voice (showing the relationship between Tense and Voice)

OUTCOMES:

CO1	To develop skills in functional literacy, including appropriate spelling, punctuation and grammar.
CO2	To develop skills in reading (understanding, comprehending, interpreting, analyzing) texts for work
CO3	To develop skills in producing (constructing, creating, writing) texts for work, learning, community and/or everyday personal contexts
CO4	To improve vocabulary and develop the writing skills.
CO5	To explain the application of learning theories in the classroom situation.
CO6	To discuss the concept and theories of intelligence and creativity.
CO7	To speak and write choosing from a wider range of vocabulary

Reference Books:

Tamil Nadu State Council For Higher Education (TANSCH)

Om sakthi

ADHIPARASAKTHI COLLEGE OF ARTS & SCIENCE (AUTONOMOUS)

G.B. NAGAR- KALAVAI, RANIPET- DT- 632 506

COMMUNICATIVE ENGLISH II

L	T	P	C
5	0	0	3

SEMESTER II

SUBJECT CODE: U2CE21SL

Objective: To develop the abilities of all students in the college to read, write, listen, speak, and think critically.

Unit I

1. Listening and Speaking
 - a. Listening and responding to complaints (formal situation)
 - b. Listening to problems and offering solutions (informal)
2. Reading and writing
 - a. Reading aloud (brief motivational anecdotes) paragraph
 - b. Writing a paragraph on a proverbial expression/motivational idea.
3. Word Power/Vocabulary
 - a. Synonyms & Antonyms
4. Grammar in Context
 - ❖ Adverbs
 - ❖ Prepositions

Unit II

1. Listening and Speaking
 - a. Listening to famous speeches and poems
 - b. Making short speeches- Formal: welcome speech and vote of thanks.
Informal occasions- Farewell party, graduation speech
2. Reading and Writing

a. Writing opinion pieces (could be on travel, food, film / book reviews or on any contemporary topic)

b. Reading poetry

b.i. Reading aloud: (Intonation and Voice Modulation)

b.ii. Identifying and using figures of speech - simile, metaphor, personification etc.

3. Word Power

a. Idioms & Phrases

4. Grammar in Context

Conjunctions and Interjections

Unit III

1. Listening and Speaking

a. Listening to Ted talks

b. Making short presentations - Formal presentation

with PPT, analytical presentation of graphs and reports of multiple kinds

c. Interactions during and after the presentations

2. Reading and writing

a. Writing emails of complaint

b. Reading aloud famous speeches

3. Word Power

a. One Word Substitution

4. Grammar in Context: Sentence Patterns

Unit IV

1. Listening and Speaking

a. Participating in a meeting: face to face and online

b. Listening with courtesy and adding ideas and

giving opinions during the meeting and making concluding remarks.

2. Reading and Writing

- a. Reading visual texts - advertisements
- b. Preparing first drafts of short assignments

3. Word Power

- a. Denotation and Connotation

4. Grammar in Context: Sentence Types

Unit V

1. Listening and Speaking

- a. Informal Interview for feature writing
- b. Listening and responding to questions at a formal interview

2. Reading and Writing

- a. Writing letters of application
- b. Readers' Theatre (Script Reading)
- c. Dramatizing everyday situations/social issues through skits. (writing scripts and performing)

3. Word Power

- a. Collocation

4. Grammar in Context: Working With Clauses

OUTCOMES:

CO1	To refer to the dictionary for meaning, usage and grammar.
CO2	To interact confidently in situations like debates and group discussions and seminars.
CO3	Exercise dramatic and life skills.
CO4	Analyze poetic texts using appropriate terms such as diction, tone, imagery, figures of speech, motif, etc.
CO5	To interpret a poem based on contextual evidence
CO6	To identify the main ideas, details and speakers' attitudes and emotions by listening to different types of spoken texts.
CO7	Speak intelligibly (pronunciation, stress, intonation)

Reference Books:

Tamil Nadu State Council For Higher Education (TANSCHE)

Om sakthi

ADHIPARASAKTHI COLLEGE OF ARTS & SCIENCE (AUTONOMOUS)

G.B. NAGAR- KALAVAI, RANIPET- DT- 632 506

PART II ENGLISH- III

L	T	P	C
5	0	0	3

SEMESTER III

SUBJECT CODE: U3LE21SL

Objective: To motivate students in pursuing multidisciplinary learning vocabulary and communication skills.

UNIT –I PROSE

1. The Right to Public Amnesia – Santhosh Desai
2. On saying “Please” – .A.G. Gardiner.
3. With the Photographer- Stephen Leacock.

UNIT -II POETRY

1. Time and Love -William Shakespeare
2. Obituary – A.K. Ramunujam
3. The Professor – Nissim Ezekiel

UNIT – III DRAMA & BIOGRAPHY

1. Lady Macbeth’s Soliloquy (Act I scene V) – William Shakespeare
2. Mother Teresa -F.G.Herod

UNIT -IV GRAMMAR AND COMMUNICATION SKILLS

1. Figure of Speech
2. Homophones and Homonyms
3. Composition (Reading, Listening, Writing)
4. Asking for Advice

5. Expressing Gratitude
6. Complimenting/Congratulating
7. Complaining.

UNIT-V SOFT SKILLS

1. Grammatical skills and Spelling rules.
2. Career Skills.

OUTCOMES:

CO1	Expose the different genres to acquire knowledge and apply that in the creative writing.
CO2	Interpret Shakespeare's works critically in their written form through performance.
CO3	Analyze various types of novels with reference to thematics and other approaches
CO4	Appreciate the working of various literary devices like irony in fiction.
CO5	Acquire familiarity with a wide variety of forms, styles, structures, and modes in English.
CO6	Identify and understand the significance of these forms in shaping a text's meaning.
CO7	To become proficient in English for global competency.

Reference Books:

- Board of Editors, 'Medley III', Emerald Publishers: 2018
- Board of Editors, 'Soft Skills', Trichy Publishers: 2018

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ADHIPARASAKTHI COLLEGE OF ARTS & SCIENCE (AUTONOMOUS)

G.B. NAGAR- KALAVAI, RANIPET- DT- 632 506

PART II ENGLISH- IV

SEMESTER IV

L	T	P	C
5	0	0	3

SUBJECT CODE: U4LE21SL

Objective: To impart morals, grammar and communication in English and soft skills.

UNIT -1 PROSE

- 1 Travel by Train - J.B.Priestly
2. Malala's Nobel Lecture- C. Malala Yousafzai
3. I won't Let him Go- Mathavan Kutty

UNIT -2 POETRY

1. Stopping by Woods on a Snowy Evening – Robert Frost
2. Refugee Mother and Child -Chinua Achebe
3. An October Morning - Jayanta Mahapatra

UNIT -3 DRAMA& BIOGRAPHY(16 hours)

1. Hamlet (Soliloquy) Act III Scene I – William Shakespeare
2. Rabindranath Tagore – Krishna Kriplani

UNIT -4 GRAMMAR AND COMMUNICATION SKILLS

1. Exclamatory Words and Sentences
2. Conjunctions
3. Active and Passive Voice
3. E-Mail and Presentation Skills
4. Curriculum Vitae
5. Covering Letter
6. Facing an Interview

UNIT-5 SOFT SKILLS

1. Skills of Formal and In-formal expressions
2. Skills of Non-Verbal Communication

OUTCOMES:

CO1	Identify the distinct literary genres of the tragedies, comedies, and histories present in Shakespeare's work.
CO2	To enhance their close reading skill.
CO3	Analyze plays for their structure and meaning, using correct terminology.
CO4	Learn to use correct articulation of English sounds.
CO5	Use intonation and stress properly
CO6	Enhance their ability to understand, appreciate, and discuss works of literature through extensive reading and discussion of short stories, novels and plays.
CO7	Analyze works of fiction and drama for plot structure, setting, characterization, theme, and narrative point of view.

Reference Books:

- Board of Editors, 'Medley IV', Emerald Publishers: 2018
- Board of Editors, 'Easy English', MacMillan Publishers:2013
- Radhakrishna Pillai.G, 'Spoken English for You', Emerald Publishers:1987

SEMESTER-I
PROFESSIONAL ENGLISH FOR LIFE SCIENCES I
SUBJECT CODE – U1PE01SL

L	T	P	C
2	0	0	2

TOTAL HOURS:75

OBJECTIVES:

- 1.To develop the language skills of students by offering adequate practice in professional contexts.
- 2.To enhance the lexical, grammatical and socio-linguistic and communicative competence of first year physical sciences students
- 3.To focus on developing students' knowledge of domain specific registers and the required language skills.

UNIT 1: COMMUNICATION (07)

Listening: Listening to audio text and answering questions - Listening to Instructions

Speaking: Pair work and small group work.

Reading: Comprehension passages –Differentiate between facts and opinion

Writing: Developing a story with pictures.

Vocabulary: Register specific - Incorporated into the LSRW tasks

UNIT 2: DESCRIPTION (08)

Listening: Listening to process description.-Drawing a flow chart.

Speaking: Role play (formal context)

Reading: Skimming/Scanning- Reading passages on products, equipment and gadgets.

Writing: Process Description –Compare and Contrast Paragraph-Sentence Definition and Extended definition- Free Writing.

Vocabulary: Register specific -Incorporated into the LSRW tasks.

UNIT 3: NEGOTIATION STRATEGIES (08)

Listening: Listening to interviews of specialists / Inventors in fields (Subject specific)

Speaking: Brainstorming. (Mind mapping). Small group discussions (Subject- Specific)

Reading: Longer Reading text.

Writing: Essay Writing (250 words)

Vocabulary: Register specific - Incorporated into the LSRW tasks

UNIT 4: PRESENTATION SKILLS (08)

Listening: Listening to lectures.

Speaking: Short talks.

Reading: Reading Comprehension passages

Writing: Writing Recommendations Interpreting Visuals inputs

Vocabulary: Register specific - Incorporated into the LSRW tasks

UNIT 5: CRITICAL THINKING SKILLS(08)

Listening: Listening comprehension- Listening for information.

Speaking: Making presentations (with PPT- practice).

Reading : Comprehension passages –Note making. Comprehension: Motivational article on Professional Competence, Professional Ethics and Life Skills)

Writing: Problem and Solution essay– Creative writing –Summary writing

Vocabulary: Register specific - Incorporated into the LSRW tasks

OUTCOMES:

CO 1	Recognize their own ability to improve their own competence in using the language
CO 2	Use language for speaking with confidence in an intelligible and acceptable manner
CO 3	Understand the importance of reading for life
CO 4	Read independently unfamiliar texts with comprehension
CO 5	Understand the importance of writing in academic life
CO 6	Write simple sentences without committing error of spelling or
CO 7	To speak and write choosing from a wider range of vocabulary

Reference:

1. Professional English II Thiru. K. Vivekanandan, I.A.S. Member Secretary, TANSCHHE (Tamil Nadu State Council for Higher Education)

SEMESTER-II

L	T	P	C
2	0	0	2

PROFESSIONAL ENGLISH FOR LIFE SCIENCES II TOTAL HOURS:75 SUBJECT CODE – U2PE01SL

Objectives:

The Professional Communication Skills Course is intended to help Learners in Arts and Science colleges,

1. Develop their competence in the use of English with particular reference to the workplace situation.
2. Enhance the creativity of the students, which will enable them to think of innovative ways to solve issues in the workplace.

Unit 1- Communicative Competence (07)

Listening – Listening to two talks/lectures by specialists on selected subject specific topics - (TED Talks) and answering comprehension exercises (inferential questions)

Speaking: Small group discussions (the discussions could be based on the listening and reading passages- open ended questions)

Reading: Two subject-based reading texts followed by comprehension activities/exercises

Writing: Summary writing based on the reading passages.

Unit 2 - Persuasive Communication (08 hours)

Listening: listening to a product launch- sensitizing learners to the nuances of persuasive communication

Speaking: debates – Just-A Minute Activities

Reading: reading texts on advertisements (on products relevant to the subject areas) and answering inferential questions

Writing: dialogue writing- writing an argumentative /persuasive essay.

Unit 3- Digital Competence (08 hours)

Listening to interviews (subject related)

Speaking: Interviews with subject specialists (using video conferencing skills) Creating Vlogs (How to become a vlogger and use vlogging to nurture interests – subject related)

Reading: Selected sample of Web Page (subject area) Writing: Creating Web Pages Reading

Comprehension: Essay on Digital Competence for Academic and Professional Life. The essay will address all aspects of digital competence in relation to MS Office and how they can be utilized in relation to work in the subject area

Unit 4 - Creativity and Imagination (08 hours)

Listening to short (2 to 5 minutes) academic videos (prepared by EMRC/ other MOOC videos on Indian academic sites – E.g. <https://www.youtube.com/watch?v=tpvicScuDy0>)

Speaking: Making oral presentations through short films – subject based

Reading : Essay on Creativity and Imagination (subject based)

Writing – Basic Script Writing for short films (subject based) - Creating blogs, flyers and brochures (subject based) - Poster making – writing slogans/captions (subject based)

Unit 5- Workplace Communication & Basics of Academic Writing (08 hours)

Speaking: Short academic presentation using PowerPoint Reading & Writing: Product Profiles, Circulars, Minutes of Meeting. Writing an introduction, paraphrasing Punctuation (period, question mark, exclamation point, comma, semicolon, colon, dash, hyphen, parentheses, brackets, braces, apostrophe, quotation marks, and ellipsis) Capitalization (use of upper case)

OUTCOMES:

CO 1	Attend interviews with boldness and confidence.
CO 2	Adapt easily into the workplace context, having become communicatively competent.
CO 3	Apply to the Research & Development organisations/ sections in companies and offices with winning proposals.
CO 4	To improve vocabulary and develop the writing skills.
CO 5	To explain the application of learning theories in the classroom situation.
CO 6	To discuss the concept and theories of intelligence and creativity.
CO 7	To speak and write choosing from a wider range of vocabulary

Reference:

1. Professional English II Thiru. K.Vivekanandan, I.A.S. Member Secretary, TANSCH (Tamil Nadu State Council for Higher Education)

SEMESTER – I

L	T	P	C
2	0	0	2

TOTAL HOURS:75

PROFESSIONAL ENGLISH FOR PHYSICAL SCIENCES- I **SUB CODE: U1PE02SL**

OBJECTIVES:

- 1.To develop the language skills of students by offering adequate practice in professional contexts.
- 2.To enhance the lexical, grammatical and socio-linguistic and communicative competence of first year physical sciences students
- 3.To focus on developing students' knowledge of domain specific registers and the required language skills.

UNIT 1: COMMUNICATION

1. **Listening:** Listening to audio text and answering questions
-Listening to Instructions
2. **Speaking:** Pair work and small group work.
3. **Reading :** Comprehension passages- Differentiate between facts and opinion
4. **Writing:** Developing a story with pictures.
5. **Vocabulary :** Register specific – Incorporated into the LSRW tasks

UNIT 2: DESCRIPTION

1. **Listening :** Listening to process description – Drawing a flow chart.
2. **Speaking :** Role play (formal context)
3. **Reading :** Skimming/Scanning – Reading passages on products, equipment and gadgets.
4. **Writing :** Process Description – Compare and Contrast
Paragraph-Sentence Definition and Extended definition – Free Writing.
5. **Vocabulary :** Register specific – Incorporated into the LSRW tasks.

UNIT 3: NEGOTIATION STRATEGIES

1. **Listening** : Listening to interviews of specialists / inventors in fields (Subject specific)
2. **Speaking** : Brainstorming. (Mind mapping).
Small group discussions (Subject- Specific)
3. **Reading** : Longer Reading text.
4. **Writing** : Essay Writing (250 words)
5. **Vocabulary** : Register specific – Incorporated into the LSRW tasks

UNIT 4: PRESENTATION SKILLS

1. **Listening** : Listening to lectures.
2. **Speaking** : Short talks.
3. **Reading** : Reading Comprehension passages
4. **Writing** : Writing Recommendations
Interpreting visuals inputs
5. **Vocabulary** : Register specific – Incorporated into the LSRW tasks

UNIT 5: CRITICAL THINKING SKILLS

1. **Listening** : Listening comprehension – Listening for information.
2. **Speaking** : Making presentations(with PPT-practice).
3. **Reading** : Comprehension passages – Note making.
Comprehension:Motivational article on Professional Competence,
Professional Ethics and Life Skills)
4. **Writing** : Problem and Solution essay – Creative writing – Summary writing
5. **Vocabulary** : Register specific – Incorporated into the LSRW tasks

OUTCOMES:

CO1	Students will be enabled to understand the basic objective of the course by being acquainted with specific dimensions of communication skills i.e. Reading, Writing, Listening, Thinking and Speaking.
CO2	Students would be able to create substantial base by the formation of strong professional vocabulary for its application at different platforms and through numerous modes as Comprehension, reading, writing and speaking etc.

CO3	Students will apply it at their work place for writing purposes such as Presentation/official drafting/administrative communication and use it for document/project/report/research paper writing.
CO4	Students will be made to evaluate the correct & error – free writing by being well-versed in rules of English grammar & cultivate relevant technical style of communication & presentation at their work place & also for academic uses.
CO5	Students will apply it for practical and oral presentation purposes by being honed up in presentation skills and voice-dynamics. They will apply techniques for developing inter-personal communication skills and positive attitude leading to their professional competence.
CO6	Develop professional work habits, including those necessary for effective collaboration and cooperation with other students, instructors and Service Learning contact representatives.
CO7	Learning contact representatives.

Reference:

1. Professional English II Thiru. K. Vivekanandan, I.A.S. Member Secretary, TANSCH (Tamil Nadu

State Council for Higher Education

SEMESTER – II

PROFESSIONAL ENGLISH FOR PHYSICAL SCIENCES- II SUB CODE: U2PE02SL

L	T	P	C
2	0	0	2

TOTAL HOURS:75

OBJECTIVES :

1. Develop their competence in the use of English with particular reference to the workplace situation.
2. Develop their competence and competitiveness and thereby improve their employability skills.
3. Help students with a research bent of mind develop their skills in writing reports and research proposals.

UNIT 1- COMMUNICATIVE COMPETENCE

1. **Listening:** Listening to two talks/lectures by specialists on selected subject specific topics -(TED Talks) and answering comprehension exercises (inferential questions)
2. **Speaking:** Small group discussions (the discussions could be based on the listening and reading passages- open ended questions)
3. **Reading:** Two subject-based reading texts followed by comprehension activities/exercises
4. **Writing:** Summary writing based on the reading passages.

Grammar and vocabulary exercises/tasks to be designed based on the discourse patterns of the listening and reading texts in the book. This is applicable for all the units.

UNIT 2 - PERSUASIVE COMMUNICATION

1. **Listening:** listening to a product launch- sensitizing learners to the nuances of persuasive communication
2. **Speaking:** debates – Just-A Minute Activities
3. **Reading:** reading texts on advertisements (on products relevant to the subject areas) and answering inferential questions

Writing: dialogue writing- writing an argumentative /persuasive essay

UNIT 3- DIGITAL COMPETENCE

1. Listening to interviews (subject related)
2. **Speaking:** Interviews with subject specialists (using video conferencing skills)
Creating Vlogs (How to become a vlogger and use vlogging to nurture interests – subject related)
3. **Reading:** Selected sample of Web Page (subject area) **Writing:** Creating Web Pages
4. **Reading Comprehension:** Essay on Digital Competence for Academic and Professional Life.

The essay will address all aspects of digital competence in relation to MS Office and how they can be utilized in relation to work in the subject area.

UNIT 4 - CREATIVITY AND IMAGINATION

1. **Listening** to short (2 to 5 minutes) academic videos (prepared by EMRC/ other MOOC videos on Indian academic sites –
E.g. <https://www.youtube.com/watch?v=tpvicScuDy0>)
2. **Speaking:** Making oral presentations through short films – subject based **Reading:** Essay on Creativity and Imagination (subject based)
3. **Writing :** Basic Script Writing for short films (subject based)
 - Creating blogs, flyers and brochures (subject based)
 - Postermaking – writing slogans/captions (subject based)

UNIT 5- WORKPLACE COMMUNICATION & BASICS OF ACADEMIC WRITING

Speaking: Short academic presentation using PowerPoint

Reading & Writing: Product Profiles, Circulars, Minutes of Meeting. Writing an introduction, paraphrasing

Punctuation (period, question mark, exclamation point, comma, semicolon, colon, dash, hyphen, parentheses, brackets, braces, apostrophe, quotation marks, and ellipsis)

Capitalization (use of upper case)

OUTCOMES:

CO1	Students will improve their reading fluency skills through extensive reading.
CO2	Students will increase their reading speed and comprehension of academic articles.
CO3	Students will heighten their awareness of correct usage of English grammar in writing and speaking.
CO4	Students will improve their speaking ability in English both in terms of fluency and comprehensibility.
CO5	Able to Attend interviews with boldness and confidence.
CO6	Adapt easily into the workplace context, having become communicatively competent.
CO7	Apply to the Research &Development organisations/ sections in companies and offices with winning proposals.

REFERENCE BOOKS:

1. A.P.J.AbdulKalam –Ignited Minds -Wings of Fire.
2. Richard Back –Jonathan Livingston Seagull

SEMESTER-I
PROFESSIONAL ENGLISH – I
SUBJECT CODE: U1PE03SL

L	T	P	C
2	0	0	2

TOTAL HOURS:75

Objectives:

1. To develop the language skills of students by offering adequate practice in professional contexts.
2. To focus on developing student's knowledge of domain specific registers and the required language skills

Unit 1: Communication

(15 hrs)

Listening to audio text and answering questions - Listening to Instructions

Speaking: Pair work and small group work.

Reading: Comprehension passages –Differentiate between facts and opinion

Writing: Developing a story with pictures. Vocabulary: Register specific - Incorporated into the LSRW tasks.

Unit 2: Description

(15 hrs)

Listening to process description.- Drawing a flow chart.

Speaking: Role play (formal context)

Reading: Skimming/Scanning- Reading passages on products, equipment and gadgets.

Writing: Process Description –Compare and Contrast Paragraph-Sentence Definition and Extended definition- Free Writing. Vocabulary: Register specific -Incorporated into the LSRW tasks.

Unit 3: Negotiation Strategies

(15 hrs)

Listening to interviews of specialists / Inventors in fields (Subject specific)

Speaking: Brainstorming. (Mind mapping). Small group discussions (Subject- Specific)

Reading: Longer Reading text.

Writing: Essay Writing (250 words) Vocabulary: Register specific - Incorporated into the LSRW tasks

Unit 4: Presentation Skills

(15 hrs)

Listening to lectures. Speaking: Short talks.

Reading: Reading Comprehension passages

Writing: Writing Recommendations Interpreting Visuals inputs Vocabulary: Register specific - Incorporated into the LSRW tasks .

Unit 5: Critical Thinking Skills

(15 hrs)

Listening: Listening comprehension- Listening for information.

Speaking: Making presentations (with PPT- practice). 4 Reading: Comprehension passages – Note making. Comprehension: Motivational article on Professional Competence, Professional Ethics and Life Skills)

Writing: Problem and Solution essay– Creative writing –Summary writing Vocabulary: Register specific - Incorporated into the LSRW tasks.

OUTCOMES:

CO1	To develop skills in functional literacy, including appropriate spelling, punctuation and grammar.
CO2	To develop skills in reading (understanding, comprehending, interpreting, analyzing) texts for work
CO3	To develop skills in producing (constructing, creating, writing) texts for work, learning, community and/or everyday personal contexts
CO4	To improve vocabulary and develop the writing skills.
CO5	To explain the application of learning theories in the classroom situation.
CO6	To discuss the concept and theories of intelligence and creativity.
CO7	To speak and write choosing from a wider range of vocabulary

TEXT BOOKS

1. Shiv Khera –You Can Win.
2. Robin Sharma –The Monk Who Sold His Ferrari.

REFERENCE BOOKS:

1. A.P.J.AbdulKalam –Ignited Minds -Wings of Fire.
2. Richard Back –Jonathan Livingston Seagull.
3. Med Serif –How to Manage Yourself.

SEMESTER-II

PROFESSIONAL ENGLISH – II

SUBJECT CODE: U1PE03SL

L	T	P	C
2	0	0	2

TOTAL HOURS: 75

Objectives:

1. To enhance the lexical, grammatical and socio-linguistic and communicative competence of first year physical sciences students.
2. Enhance the creativity of the students, which will enable them to think of innovative ways to solve issues in the workplace.

Unit 1- Communicative Competencies

(15 hrs)

Listening – Listening to two talks/lectures by specialists on selected subject specific topics - (TED Talks) and answering comprehension exercises (inferential questions).

Speaking: Small group discussions (the discussions could be based on the listening and reading passages- open ended questions).

Reading: Two subject-based reading texts followed by comprehension activities/exercises

Writing: Summary writing based on the reading passages. Grammar and vocabulary exercises/tasks to be designed based on the discourse patterns of the listening and reading texts in the book. This is applicable for all the units.

Unit II Persuasive Communication

(15 hrs)

Listening: listening to a product launch- sensitizing learners to the nuances of persuasive communication.

Speaking: debates – Just-A Minute Activities. Reading: reading texts on advertisements on products relevant to the subject areas) and answering inferential questions.

Writing: dialogue writing- writing an argumentative /persuasive essay.

Unit III - Digital Competence

(15 hrs)

Listening: Listening to interviews (subject related).

Speaking: Interviews with subject specialists (using video conferencing skills) Creating Blogs (How to become a blogger and use Blogging to nurture interests – subject related).

Reading: Selected sample of Web Page (subject area).

Writing: Creating Web Pages. Reading Comprehension: Essay on Digital Competence for Academic and Professional Life. The essay will address all aspects of digital competence in relation to MS Office and how they can be utilized in relation to work in the subject area (15 hrs)

Unit IV- Creativity and Imagination

(15 hrs)

Listening: Listening to short (2 to 5 minutes) academic videos (prepared by EMRC/ other MOOC videos on Indian academic sites (E.g. <https://www.youtube.com/watch?v=tpvicScuDy0>).

Speaking: Making oral presentations through short films – subject based.

Reading: Essay on Creativity and Imagination (subject based).

Writing : Basic Script Writing for short films (subject based). - Creating web pages, blogs, flyers and brochures (subject based). - Poster making – writing slogans/ captions (subject based)

Unit V - Workplace Communication

(15 hrs)

Speaking: Short academic presentation using PowerPoint .

Reading & Writing: Product Profiles, Circulars, Minutes of Meeting. Writing an introduction, paraphrasing Punctuation (period, question mark, exclamation point, comma, semicolon, colon, dash, hyphen, parentheses, brackets, braces, apostrophe, quotation marks, and ellipsis).

OUTCOMES:

CO1	To refer to the dictionary for meaning, usage and grammar.
CO2	To interact confidently in situations like debates and group discussions and seminars.
CO3	Exercise dramatic and life skills.
CO4	Analyze texts using appropriate terms such as diction, tone, imagery, figures of speech, motif, etc.
CO5	To interpret a theme based on contextual evidence
CO6	To identify the main ideas, details and speakers' attitudes and emotions by listening to different types of spoken texts.

TEXT BOOKS

1. Essentials of Business Communication – Rajendra Pal and Korahill,
2. Speaking and Writing for Effective Business Communication - Francis Soundararaj

REFERENCE BOOKS:

1. Effective Technical communication - Ashraf Rivi
2. Essentials of Business Skills- Shalini Aggarwal
3. Business Communication - Madhukar, R K

**ADHIPARASAKTHI COLLEGE OF ARTS & SCIENCE,
(Autonomous)**

Permanently Affiliated to Thiruvalluvar University, Vellore

Accredited by NAAC with B⁺⁺ Grade

B.Sc BIOCHEMISTRY

Under CBCS

(Effective from the Academic Year 2018-2019)

Regulations

CBCS

Choice-Based Credit System is a flexible system of learning. 'Credit' defines the quantum of contents / syllabi prescribed for a course, and determines the number of hours of instruction required. The distinguishing features of CBCS are the following:

It permits the students to:

- ❖ Learn at their own pace
- ❖ Choose electives from a wide range of elective courses offered by the departments of the college.
- ❖ Undergo additional courses and acquire more than the required number of credits
- ❖ Adopt an inter – disciplinary approach in learning
- ❖ Make best use of the expertise of available faculty

1. Eligibility for Admission:

Candidates seeking admission to the first year of the Degree of Bachelor of Science Courses, shall be required to have passed the Higher Secondary Examinations [Academic or Vocational Stream] conducted by the Government of Tamil Nadu or an Examination accepted as equivalent thereto by the Syndicate of the Thiruvalluvar University.

The Upper age limit for admission to UG Degree Courses will be 21 (twenty one) years as on 1st July of the year of admission. For SC/ST/BC/MBC/DNC candidates and women candidates the age limit is relaxed by 3 years. For other communities, the Principals can relax up to three years based on merit. A relaxation of 5 years is permitted for Physically Handicapped as per G.O. Ms No.239, dated 03.09.1993.

Provided that candidates for admission into the specific main subject of study shall also possess such other qualifying conditions as may be prescribed by the University in the Regulations governing respective courses of study.

ELIGIBILITY FOR ADMISSION TO

B.Sc. BIOCHEMISTRY

Candidate for the Degree of Bachelor of Science in Biochemistry shall be required to have passed the Higher Secondary Examination [10 + 2 year] conducted by the Government of Tamil Nadu, or an Examination accepted as equivalent there to by the Academic Council, subject to conditions as may be prescribed. Candidates should have studied one of the following Subjects at the +2 level.

- 1) Biochemistry
- 2) Biology [Zoology + Botany]
- 3) Zoology
- 4) Botany
- 5) Chemistry
- 6) Biotechnology
- 7) Nutrition and Dietetics
- 8) Nutritional Biochemistry
- 9) Or Any other subject related to Bioscience

2. Eligibility for the Award of Degree:

A Candidate shall be eligible for the award of the Degree only if he/she has undergone the prescribed course of study in the college for a period of not less than three academic year and passed the examinations of all the Six Semesters prescribed earning 140 credits [in parts - I, II, III, IV and V].

3. Duration:

- a. Each academic year shall be divided into two semesters. The first academic year shall comprise the first and second semesters, the second academic year, the third semester and fourth semesters and the third academic year, the fifth and sixth semesters respectively.
- b. The odd semesters shall consist of the period from June to November of each year and the even semesters from December to April of each year. There shall be not less than 90 working days for each semester.

4. Course of Study:

The main subject of study for Bachelor Degree Courses shall consist of the following:

PART – I TAMIL / OTHER LANGUAGES

PART – II ENGLISH

PART – III CORE SUBJECTS

ALLIED SUBJECTS

PROJECT / ELECTIVES WITH THREE COURSES

PART – IV

1. [a]. Those who have not studied Tamil up to XII Std. and taken a Non-Tamil Language under Part – I shall take Tamil comprising of two courses [level will be at 6th standard].
[b]. Those who have studied Tamil up to XII Std. and taken a Non-Tamil Language under Part – I shall take Advanced Tamil comprising of two courses.
[c]. others who do not come under a/b can choose non-major elective comprising of two courses.

2. SKILL BASED SUBJECTS [ELECTIVE]:

Four courses are to be offered. The papers are to be accommodated in the second / third year of study for UG courses.

3. ENVIRONMENTAL STUDIES

4. VALUE EDUCATION

PART – V EXTENSION ACTIVITIES

Extension Activities:

A Candidate shall be awarded a maximum of 1 credit for Compulsory Extension Service.

All the students shall have to enroll for NSS / NCC / NSO [Sports and Games] Rotract / Youth Red Cross or any other service organization in the college and shall have to put in compulsory minimum attendance of 40 hours which shall be duly certified by the principal of the college before 31st Mach in a year. If a student LACKS 40 hours attendance in the First year, he/she shall have to compensate the same during the subsequent years.

Students those who complete minimum of attendance of 40 hours in one year will get Half Credit and those who complete the attendance of 80 or more hours in two years will get ONE CREDIT.

Literacy and population Education Field Work shall be compulsory components in the above Extensions service activities.

The following assessment procedure will be followed for Internal Marks:

Continuous Internal Assessment [CIA] Test

S.No	Reg. No	Name	Test I Marks For 75	Test II Marks For 75	Marks For 150	Marks Converted to 15/20	Assignments /Seminars [10] Records [05]	Marks For 25 / 25	Total Rounded to Marks for 25 / 25

Test I : Three hour duration for 75 marks

Test II : Three hours duration for 75 marks

Total marks	150				Theory		Practical
Test marks to be converted to	:	15 marks	/	20 marks			
Assignments / Seminars	:	10 marks	/	-			
Records	:	-	/	05 marks			
Total	:	25 marks	/	25 marks			

In the column Rounded to 25 / 25, any fraction may be rounded to the next number.

6. Requirements for proceeding to Subsequent Semester:

- Candidates shall register their names for the First Semester Examination after the admission in the UG Courses.
- Candidates shall be permitted to proceed from the First Semester up to Final Semester irrespective of their failure in any of the Semester Examination subject to the condition that the candidates should register for all the arrear subject of earlier semesters along the current [subsequent] Semester subjects.
- Candidates shall be eligible to go to subsequent semester, only if they earn sufficient attendance as prescribed therefore by the Academic Council from time to time. Provided in case of a candidate earning less than 65% of attendance in any one of the Semesters due to any extraordinary circumstances such as medical grounds, such candidate who shall produce Medical Certificate issued by the Authorised Medical Attendant [AMA], duly certified by the Principal of the College, shall be permitted to proceed to the next semester and to complete the course of study. Such candidates shall have to repeat the missed Semester by rejoining after completion of Final Semester of the course, after paying the fee for the break of study as prescribed by the College from time to time.

7. Requirements to take the Semester Examinations

a] A candidate will be permitted to take the Examination of any Semester, if

i] He/She secures not less than 75% of attendance out of the 90 instructional days during the semester. [In the case of married women students the minimum attendance requirement shall be 55% of total instructional days].

ii] He / She earns a Progress Certificate from the Head of the Institution, of having satisfactorily completed the prescribed course of study in the subject as required by these Regulations, and

iii] His / Her conduct has been satisfactory.

Provided that it shall be open to the Academic Council or any authority delegated with such powers by the Academic council to grant exemption to a candidate who has fail to earn 75% of the attendance prescribed for any valid reason[s] subject to the usual conditions.

b] A candidate who has secured attendance less than 75% but 65% and above shall be permitted to take the Examination on the recommendation of the Head of the Institution to condone the lack of attendance as well as on the payment of the prescribed fees to the College.

8. Passing Minimum:

A Candidate shall be declared to have passed the whole examination, if he/she passes in all the papers and practicals wherever prescribed / as per the scheme of examinations by earning 140 CREDITS in parts – I, II, III, IV and V. He / She shall also fulfill the extension activities prescribed earning one credit to qualify for the Degree.

In fixing the passing minimum marks, the following will be observed:

[a]. There shall be no Passing Minimum For Internal

[b]. For External Examinations, Passing Minimum shall be of 40% [Forty Percentage] of the maximum marks prescribed for the paper.

[c]. In the aggregate [External + Internal] the Passing Minimum shall be 40% for each paper / practical.

[d]. Grading shall be based on overall marks obtained [Internal + External].

Grading:

Once the marks of the CIA and end-semester examinations for each of the course are available, they will be added. The mark thus obtained will then be graded as per details given below:

Marks	Grade Point	Letter Grade	Class
100	7.00	H	First Class with Distinction
90-99	6.00	O	First Class with Distinction
75-89	5.50	D	First Class with Distinction
60-74	4.75	A	First Class

50-59	4.00	B	Second Class
40-49	3.50	C	Third
Below 40	3.00	F	Fail

From the second semester onwards the total performance within a semester and continuous performance starting from the first semester are indicated respectively by **Grade Point Average [GPA]** and **Cumulative Grade Point Average [CGPA]**. These two are calculated by the following formulae:

$$\text{GPA} = \frac{\sum_{i=1}^n C_i G_i}{\sum_{i=1}^n C_i}$$

Where 'C_i' is the credit earned for the course 'i' in any semester; 'G_i' is the Grade Point obtained by the student for the course 'i' and 'n' is the number of courses passed in that semester.

CGPA=GPA of all the courses starting from the first semester to the current semester.

Note: The GPA and CGPA shall be calculated separately for the following three parts:

For purpose of declaring a candidate to have qualified for the Degree of Bachelor of Arts / Science / Commerce / Management / Literature in the First Class / Second Class / Third Class or First Class with Distinction, the marks and the corresponding CGPA earned by the candidate in part III alone will be the criterion, provided he / she has secured the prescribed passing minimum in LCs and ELCs.

Grade in Parts IV and V be shown separately and it shall not be taken into account for classification.

9. Classification of Successful Candidates:

PART – I TAMIL / OTHER LANGUAGES:

Successful candidates passing Examinations for the Language and securing the marks [i] 60 percent and above and [ii] 50 percent and above, but below 60 percent in the aggregate shall be declared to have passed the examination in the First and Second Class, respectively. All other successful candidates shall be declared to have passed the examination in the Third Class.

PART – II ENGLISH:

Successful candidates passing Examinations for English and securing the marks [i] 60 percent and above and [ii] 50 percent and above, but below 60 percent in the aggregate shall be declared to have passed the examination in the First and Second Class,

respectively. All other successful candidates shall be declared to have passed the examination in the Third Class.

PART – III consisting of CORE SUBJECTS, ALLIED SUBJECTS, PROJECT / ELECTIVES

Successful candidates passing Examinations for Core Courses together and securing the marks [i] 60 percent and above and [ii] 50 percent and above but below 60 percent in the aggregate of the marks prescribed for the Core Courses together shall be declared to have passed the examination in the First and Second Class, respectively. All other successful candidates shall be declared to have passed the examination in the Third Class.

PART – IV: [Consisting of sub items 1 (a), (b) and (c), 2, 3, 4 and 5] as furnished in the Regulations 4 part – IV supra.

PART – V EXTENSION ACTIVITIES:

The only credit earned for Part V Extension activities of a Successful Candidate SHALL NOT BE taken into consideration for Classification / Ranking / Distinction.

10. RANKING

Candidates who pass all the examinations prescribed for the course in the First Appearance itself alone are eligible for Ranking;

Provided in the case of Candidates who pass all the examinations prescribed for the course with a break in the First Appearance due to the reasons as furnished in the Regulation 7.[iii] Supra are eligible for Classification / Distinction.

The marks obtained in improvement examination will not be taken into consideration for Ranking.

11. The Medium of Instruction and Examinations

The medium of Instruction and Examinations for the papers under part I and II shall be in language concerned. For Parts III and IV, the medium of Instruction and Examinations shall be English.

12. Submission of Record Notebooks for Practical Examinations

Candidates taking the Practical Examinations should submit bonafide Record Notebook prescribed for the Practical Examinations. Otherwise the candidate will not be permitted to take the practical Examinations. However, in genuine case where the students could not submit the record notebook may be permitted to take the Practical Examinations provided the Head of the Department concerned certifies that the candidate has performed the experiments prescribed for the Course. For such of those candidates who do not submit Record Books, zero [0] marks will be awarded for record notebooks.

In case a candidate fails in the Practical Examination the marks awarded for the record at the time of first appearance for the Practical Examination should be made available by the University to the Examiners at the subsequent appearance by the candidate.

13. Improvement of marks in the subjects already passed

Candidates who have passed in theory paper / papers are allowed to appear again for theory paper / papers only once in order to improve his/her marks, by paying the fee prescribed from time to time. Such candidates are allowed to improve within a maximum period of 10 semesters counting from his/her first semester of his/her admission. If candidate improves his marks, then his improved mark will be taken into consideration for the award of Classification and Distinction only. Such improved marks will not be counted for the award of Prize / Medals and Rank. If the Candidate does not show improvement in the marks, his previous marks will be taken into consideration.

No candidate will be allowed to improve marks in the Practical and Field work.

14. Checklist for Inspection

- a. Qualification for
 - i. Teaching Faculty : as Prescribed by the UGC and the University
 - ii. Technical Faculty : as Prescribed by the UGC and the University
 - iii. Laboratory Staff : as Prescribed by the UGC and the University
- b. Infrastructure Facilities
 - i. Building : Number of Classrooms with specifications: 3 rooms measuring 20'X 25'.
If the class strength is above 50, the space shall increase by 10 sq.ft per student.
Number of Staff rooms: One measuring 20' X 20'
 - ii. Furniture : One pair of table / chair per student
 - iii. Laboratory @ 10 Sq. ft. per student

PATTERN OF QUESTION PAPER

Part – A [50 words]

To Answer 10 questions

10 X 2 marks = 20 marks

Part – B [200 words]

To Answer 5 questions (either / or pattern)

5 X 5 marks = 25 marks

Part – C [500 words]

To Answer 3 questions out of 5 questions

3 X 10 marks = 30 marks

Total = 75 marks

ADHIPARASAKTHI COLLEGE OF ARTS & SCIENCE (AUTONOMOUS)
G.B.NAGAR, KALAVAI-632506
AFFILIATED TO THIRUVALLUVAR UNIVERSITY, VELLORE
DEGREE COURSES
B.Sc. Biochemistry
(With effect from 2018-2019)
The course of study and the scheme of examination.

Year/ Semester	Part	Subject	Paper	Subject code	Title of the paper	Ins. Hrs/ week	Credit	Exam Hrs.	Max. Mark		
									CIA	ESE	Total
I Year I Semester	I	Language	Paper I	U1LT21FL	TAMIL – I	6	3	3	25	75	100
	II	English	Paper I	U1LE21SL	ENGLISH – I	6	3	3	25	75	100
	III	Core	Paper I	U1BC21MT	CELL BIOLOGY	5	5	3	25	75	100
	III	Core Practical				3	--	--	--	--	--
	III	Allied I	Paper I	U1CH21AT	CHEMISTRY – I	5	5	3	25	75	100
	III	Allied I Practical				3	--	--	--	--	--
	IV			U1ES21GS	ENVIRONMENTAL STUDIES	2	2	3	25	75	100
						30	18		125	375	500
I Year II Semester	I	Language	Paper II	U2LT21FL	TAMIL – II	6	3	3	25	75	100
	II	English	Paper II	U2LE21SL	ENGLISH – II	6	3	3	25	75	100
	III	Core	Paper II	U2BC21MT	BIOMOLECULES	5	5	3	25	75	100
	III	Core Practical	Practical-I	U2BC21MP	VOLUMETRIC AND QUALITATIVE ANALYSIS	3	5	6	25	75	100
	III	Allied I	Paper II	U2CH21AT	CHEMISTRY – II	5	5	3	25	75	100
	III	Allied I Practical		U2CH21AP	ALLIED – I PRACTICAL	3	2	3	25	75	100
	IV			U2VE21GS	VALUE EDUCATION (GENERAL AWARENESS)	2	2	2	0	50	50
						30	25		150	500	650
TOTAL HOURS & CREDITS						60	43		275	875	1150

Year/ Semester	Part	Subject	Paper	Subject code	Title of the paper	Ins. Hrs/ week	Credit	Exam Hrs.	Max. Mark		
									CIA	ESE	Total
II Year III Semester	I	Language	Paper III	U3LT21FL	TAMIL – III	6	3	3	25	75	100
	II	English	Paper III	U3LE21SL	ENGLISH – III	6	3	3	25	75	100
	III	Core	Paper III	U3BC21MT	BIOPHYSICS AND ANALYTICAL BIOCHEMISTRY	4	4	3	25	75	100
	III	Core Practical				3	--	--	--	--	--
	III	Allied II	Paper I	U3MB21AT	MICROBIOLOGY – I	4	4	3	25	75	100
	III	Allied II Practical				3	--	--	--	--	--
	IV	Skill Based Subject I		U3BC22ST	FUNDAMENTALS OF COMPUTER	2	2	3	25	75	100
	IV	Non- Major Elective I		U3BC21NM	DIAGNOSTIC BIOCHEMISTRY– I	2	2	2	25	75	100
						30	18		150	450	600
II Year IV Semester	I	Language	Paper IV	U4LT21FL	TAMIL – IV	6	3	3	25	75	100
	II	English	Paper IV	U4LE21SL	ENGLISH – IV	6	3	3	25	75	100
	III	Core	Paper IV	U4BC21MT	MEDICAL LABORATORY TECHNOLOGY	4	4	3	25	75	100
	III	Core Practical	Practical- II	U4BC21MP	MEDICAL LABORATORY TECHNOLOGY	3	5	6	25	75	100
	III	Allied II	Paper II	U4MB21AT	MICROBIOLOGY – II	4	4	3	25	75	100
	III	Allied II Practical		U4MB21AP	ALLIED – II PRACTICAL	3	2	3	25	75	100
	IV	Skill Based Subject II		U4BC22ST	COMPUTER APPLICATIONS	2	2	2	25	75	100
	IV	Non- Major Elective II		U4BC21NM	DIAGNOSTIC BIOCHEMISTRY-II	2	2	2	25	75	100
						30	25		200	600	800
TOTAL HOURS & CREDITS						60	43		350	1050	1400

Year/ Semester	Part	Subject	Paper	Subject code	Title of the paper	Ins. Hrs/ week	Credit	Exam Hrs.	Max. Mark		
									CIA	ESE	Total
III Year V Semester	III	Core	Paper V	U5BC21MT	BASIC ENZYMOLOGY	5	5	3	25	75	100
	III	Core	Paper VI	U5BC22MT	INTERMEDIARY METABOLISM	5	5	3	25	75	100
	III	Core	Paper VII	U5BC23MT	GENETICS AND MOLECULAR BIOLOGY	5	5	3	25	75	100
	III	Elective I (to choose 1 out of 2)	Paper I	U5BC24ET	HORMONAL AND NUTRITIONAL BIOCHEMISTRY	5	5	3	25	75	100
				U5BC25ET	BIOCHEMICAL AND ENVIRONMENTAL TOXICOLOGY						
	III	Core Practical	Practical III			4	--	--	--	--	--
	III	Elective Practical	Practical III			3	--	--	--	--	--
	IV	Skill Based Subject	Paper III	U5BC26ST	BIO STATISTICS	3	2	3	25	75	100
						30	22		125	375	500
III Year VI Semester	III	Core	Paper VIII	U6BC21MT	HUMAN ANATOMY AND PHYSIOLOGY	5	5	3	25	75	100
	III	Core	Paper IX	U6BC22MT	CLINICAL BIOCHEMISTRY	5	5	3	25	75	100
	III	Elective II (to choose 1 out of 2)	Paper II	U6BC23ET	BIOTECHNOLOGY	5	5	3	25	75	100
				U6BC24ET	PLANT BIOCHEMISTRY AND PLANT MOLECULAR BIOLOGY						
	III	Elective III (to choose 1 out of 2)	Paper III	U6BC25ET	IMMUNOLOGY	5	5	3	25	75	100
				U6BC26ET	BIONANOTECHNOLOGY						
	III	Core Practical	Practical III	U6BC21MP	BLOOD ANALYSIS AND ENZYMOLOGY	4	5	6	25	75	100
	III	Elective Practical	Practical IV	U6BC22EP	FOOD ANALYSIS, MICROBIOLOGY AND SEPARATION TECHNIQUES	3	4	6	25	75	100
	IV	Skill Based Subject II	Paper IV	U6BC27ST	PHARMACOLOGY AND PHARMACEUTICAL BIOCHEMISTRY	3	2	3	25	75	100
	V	Extension Activities		U6BC21EA			1	-	50		50
						30	32		225	525	750
TOTAL HOURS & CREDITS						60	54		350	900	1250
GRAND TOTAL HOURS & CREDIT						180	140		975	2825	3800

SEMESTER – I

L	T	P	C
5	0	0	5

CELL BIOLOGY

SUBJECT CODE: U1BC21MT

Total Hours: 65

OBJECTIVES: On successful completion of the course the students should have:

1. Understood the relationship between cellular organization and biological function of normal cell, pro and eukaryotic cells.
2. Learnt on the various cell organelles with their functions and actions.
3. Learnt the application of cell biology in research and applications of histopathology.

UNIT - I: AN OVERALL VIEW OF CELLS

(13 Hrs)

Origin and evolution of cells. Cell theory. Classifications of cells – prokaryotic and eukaryotic cells. Composition of prokaryotic and eukaryotic cells. Molecular composition of cells – water, carbohydrates, lipids, nucleic acids and proteins.

UNIT - II: CELL MEMBRANE

(13 Hrs)

Fluid mosaic model of membrane structure. Membrane proteins and their properties. Membrane carbohydrates and their role. Transport across membranes – diffusion, active and passive transport.

UNIT - III: CELL ORGANELLES

(11 Hrs)

Endoplasmic reticulum – types, structure and functions. Golgi apparatus – structure and functions. Lysosome – structure and functions, Ribosomes – types, structure and functions. Mitochondria- structure and functions.

UNIT - IV: NUCLEUS

(15 Hrs)

Structure and functions. Chromosome – chromatin structure, the cell cycles – phases of cell cycle. Meiotic and mitotic cell divisions, cell – cell communications, cell recognition, cell adhesion and cell functions.

UNIT - V: HISTOPATHOLOGY

(13 Hrs)

Fixation, fixatives – types, preparation and functions, tissue processing, microtome and its types, staining – Haematoxylin and Eosin stain, Vangeson's stain, PAS stain, Gomori's reticulin,

Popanicolaou stain, Giemsa stain. Mounting, identification of morphological changes related to pathology (ex. Hepatitis, glomerulonephritis and myocardial infarction).

OUTCOMESS: Upon completion of this course, the students

CO1	Understanding the relationship between cellular organization and biological function of normal cell, pro and eukaryotic cells
CO2	Broad knowledge on the cell membrane and transport
CO3	Knowledge on basic cell organelles and their functions
CO4	Able to explain the structure and functions of nucleus and Chromosome as well as the Meiotic and mitotic cell divisions
CO5	Methodology on tissue processing
CO6	Understanding the various cell organelles with their functions
CO7	Application of cell biology in research along with applications of histopathology

Text Books:

1. P.S. Verma and V.K. Agarwal, Cell Biology. S. Chand Publishing, 2016.
2. N. Arumugam. Cell Biology. Saras publications, 2014.

Reference Books:

1. Lodish, et al, Molecular Cell Biology, 7th Edition, Freeman, 2012.
2. G M Cooper, Robert E Hausman. **The cell : a molecular approach**. Sunderland (Mass.): Sinauer Associates publishers, 7th edition, 2016.
3. Watson JD et al. Molecular biology of gene, 7th edition, Pearson education, 2013.
4. De Robertis E.D.D & De Robertis E.M.F. Cell and Molecular Biology, 8th Ed., LWW, 2011.
5. Cook DJ & Warren PJ. Cellular Pathology: An Introduction to techniques and applications, 3rd edition, Scion Publishing, 2015.

SEMESTER – I**ALLIED – I****CHEMISTRY – I**

L	T	P	C
5	0	0	5

SUBJECT CODE: U1CH21AT**Total Hours: 65****OBJECTIVES:**

1. To provide the basic knowledge on extraction, refining of metals, polarization.
2. Understood the importance of fuels and nuclear chemistry
3. To give a knowledge about biochemistry

UNIT – I**(13 Hrs)****1.1 EXTRACTION OF METALS**

General metallurgy -Minerals and ores – Difference between Minerals and ores- minerals of Iron, Aluminium and copper – Ore dressing (Concentration of ore) – Types of ore Dressing – Froth Floatation process, Magnetic Separation and Gravity separation.

1.2 REFINING OF METALS

Calcination, Smelting, Roasting, Flux, Slag, Refining of metals-Definition, Types of Refining – Electrolytic, Van Arkel and Zone Refining.

1.3 Ores of uranium and thorium- Extraction of uranium and Thorium.

UNIT – II**(13 Hrs)****2.1 CYCLOALKANES**

Preparation-Wurtz reaction and Properties of Cycloalkanes – Substitution reaction, Baeyer's Strain Theory.

2.2 POLARIZATION

Inductive effect, Mesomeric effect and steric effect (Acid and Base Strength)

2.3 STEREO ISOMERISM

Stereo isomerism – Definition, Types, Causes of optical activity of lactic and Tartaric acid – Racemisation – Resolution- definition and methods- Geometrical isomerism – definition and example maleic and fumaric acid -Differences

UNIT – III**(13 Hrs)****3.1 CHEMICAL KINETICS**

Rate of reaction, order and molecularity- Definition, Distinction between order and molecularity – derivation of first order rate equation – half life period of First order reaction –determination of rate constant of hydrolysis of ester.

3.2 CATALYSIS

Catalyst– Autocatalyst – Enzyme catalyst – promoters – Catalytic poisons – Active center, Distinction between homogeneous and heterogeneous catalysis – Industrial application of catalysts.

3.3 PHOTOCHEMISTRY

Grothus Draper's law, Stark Einstein's law – Quantum yield – Phosphorescence – fluorescence – chemiluminescence – Photosensitization – definitions with examples.

UNIT – IV

(13 Hrs)

4.1 VSEPR THEORY

Postulates of VSEPR theory – shapes of simple molecules BF_3 , PCl_5 , SF_6 and XeF_6 .

4.2 FUELS

Fuels-Definition, Calorific value of fuels –Classification of Fuels-water gas, producer gas-composition and uses – Need of Solar Energy – applications, Biofuels-Oil gas, Natural gas, LPG-Uses.

4.3 OSMOSIS

Osmosis, Osmotic pressure, Reverse osmosis – Definition, Desalinisation of sea water.

UNIT – V

(13 Hrs)

5.1 NUCLEAR CHEMISTRY

Atomic number, mass Number, Isotopes, Isobars, Isotones-Definition and Examples, Half life period –Definition, Nuclear fission and Nuclear fusion – Application of Radioisotopes in Medicine, Agriculture, Industries – Carbon dating.

5.2 CRUDE OIL

Petroleum – Petroleum Refining – Cracking – Application of cracking.

Naphthalene – Preparations, properties, structure, and uses.

5.3 ELEMENTS OF SYMMETRY

Space lattice, Unit cell -Definition – types of cubic lattice –Definition with example, Tanning-Definition, Sources of leather-Hides, Skins and Types of Tanning- Vegetable and Chorme Tanning.

OUTCOMES: On successful completion of the course the students should have understood the significance of the

CO1	Basic knowledge on extraction and refining of metals
CO2	Chemistry of cycloalkanes, polarization and stereo isomerism
CO3	Understanding chemical kinetics and photochemistry
CO4	Applications of VSEPR theory, fuels and osmosis
CO5	Awareness on nuclear chemistry, crude oil and elements of symmetry
CO6	Basic knowledge on various chemicals for better understanding of biochemistry
CO7	Applications of biofuels and nuclear chemistry

Text Books:

1. G. Chatwal. Organic Chemistry of Natural Products. Vol. I, Himalaya Publishing House, 2011.
2. Arun Bahl, B.S. Bahl and G.D. Tuli. Essentials of Physical Chemistry. Sultan Chand & Sons, 2014.
3. Dr. Veeraiyan V., Text book of Ancillary Chemistry, Highmount Publishing house, Chennai-14. Edition - 2008.

Reference Books:

1. Ksasture and Wadodkar. Pharmaceutical Chemistry. Nirali Praksahan Educational Publishers, 2015.
2. S.M. Mukherji, S.P. Singh, R.P. Kapoor, Organic Chemistry. Vols. I & II, New Age International Publishers, 2017.
3. I.L. Finar. Organic Chemistry. Vols. I & II, Pearson Education Publishers, 6th edition, 2002.

SEMESTER – I

ENVIRONMENTAL STUDIES

SUBJECT CODE: U1ES21GS

L	T	P	C
2	0	0	2

Total Hours: 26

OBJECTIVES: Students in Environmental Studies are motivated by concern for welfare of the many human and non-human communities that shape this planet.

- Recognize the interconnectedness of multiple factors in environmental challenges
- Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.

UNIT – I: INTRODUCTION TO ENVIRONMENTAL SCIENCES: NATURAL RESOURCES (4 Hrs)

Environmental Sciences – Significance – Public awareness – Forest resources – Water resources – Mineral resources – Food resources - Environmental impact – fertilizer – Pesticide Problems.

UNIT – II: ECOSYSTEM, BIODIVERSITY AND ITS CONSERVATION (6 Hrs)

Ecosystem – concept – structure and function – producers, consumers and decomposers – Food chain – Food web – Forest, Grassland, desert and aquatic ecosystem.

Biodiversity – Definition – genetic, species and ecosystem diversity – Values and uses of biodiversity – biodiversity at global, national (India) and local levels – Hotspots, threats to biodiversity – conservation of biodiversity – In-situ & Ex-situ.

UNIT – III: ENVIRONMENTAL POLLUTION AND MANAGEMENT (6 Hrs)

Environmental Pollution – Causes – Effects and control measures of Air, Water, Marine, soil, solid waste, Thermal, Nuclear pollution and Disaster Management – Floods, Earth quake, Cyclone and Landslides. Role of individuals in prevention of pollution – pollution, Case studies - – Bhopal gas tragedy, Minamata disease, Mercury factory (Kodaikanal), London fog.

UNIT – IV: SOCIAL ISSUES AND ENVIRONMENT (5 Hrs)

Urban issues – Energy – water conservation – Environmental Ethics – Global warming – Resettlement and Rehabilitation issues – Environmental legislations – Environmental protection Act. 1986 – Air, Water, Wildlife and forest conservation Act.

UNIT – V: HUMAN POPULATION AND ENVIRONMENT**(5 Hrs)**

Population growth and Explosion – Human rights and Value Education – Environmental Health – HIV/AIDS – Role of IT in Environment and Human Health – Women and child welfare – Public awareness – Case studies. Visit to a local area / local polluted site / local simple ecosystem – Report submission

OUTCOMES:

CO1	Recognize the importance of environment and public awareness required for sustainability.
CO2	Understand the availability of various resources, their availability and conservation.
CO3	Develop knowledge on structure and functions of the ecosystem, productivity and energy flow.
CO4	Comprehend the importance and conservation needs of biodiversity by framing policies.
CO5	Able to link causal effects of human activities and develop mitigation strategies for different pollution.
CO6	Demonstrate an integrative approach to environmental issues
CO7	Demonstrate and ability to integrate the many disciplines and filed that intersect with environmental concerns

Text Books:

1. Kumaraswamy, K. Alagappa Moses, A and M. Vasanthy, (2005), Environmental Studies, Publication Division, Bharathidasan University, Tiruchirappalli.
2. Kumaraswamy, K. (Ed) (2008) GIS for Natural Resources and Disaster Management, Department of Geography, Bharathidasan University, Tiruchirappalli.
3. Rajamannar. Environmental Studies, EVR College Pub, Trichy. 2004.
4. Kalavathy, S. Environmental Studies, Bishop Heber College Pub., Trichy. 2004.

SEMESTER – II

BIOMOLECULES

SUBJECT CODE: U2BC21MT

L	T	P	C
5	0	0	5

Total Hours: 65

OBJECTIVES:

1. To provide the knowledge on various biomolecules and its significance.
2. Learnt the structure, chemical composition of nucleic acid, lipids, carbohydrate, protein
3. To provide the idea about the role of the biomolecules

UNIT – I: CARBOHYDRATES

(13 Hrs)

Carbohydrates: Definition, classification, Haworth projections. Monosaccharides- Structure, chemistry and functions. Action of acids and alkalies on sugars. Reaction of carbohydrates due to the presence of hydroxyl, aldehyde and ketone groups. Disaccharides- Structure, chemistry and function – Sucrose, Lactose, Maltose and Cellobiose. Trisaccharides-Structure of Raffinose. Polysaccharides- Homopolysaccharides-starch, glycogen and cellulose. Heteropolysaccharides-hyaluronic acid, chondroitin sulfate and heparin.

UNIT – II: AMINO ACIDS

(10 Hrs)

Definition, Structure and classification of amino acids based on chemical nature and polarity, zwitter ion and isoelectric point. chemical reaction of amino acids due to carboxyl and amino groups. Essential amino acids and Non protein amino acids.

UNIT – III: PROTEINS

(14 Hrs)

Definition, classification based on solubility, shape, and functions. Structure of proteins – primary, secondary, tertiary and quaternary. Chemical synthesis of polypeptide chain. Biologically important peptides – structure and functions (insulin, glutathione, vasopressin).

UNIT – IV: LIPIDS

(13 Hrs)

Definition, classification of lipids. fatty acids - Classification, structures and properties. Structure and functions of phospholipids (lecithin, Cephalin, Phosphatidyl inositol, Phosphatidyl serine). Structure and function of glycolipids, (gangliosides and lipopolysaccharides). Structure and function of spingolipids (spingomyelin) Structure and function of cholesterol.

UNIT – V: NUCLEIC ACIDS

(15 Hrs)

Nucleic acids; Structure of Purines and Pyrimidines; Nucleotides and Nucleosides.

Watson crick model of DNA. Types of DNA (A, B, Z) DNA denaturation and renaturation. – types of RNA (mRNA, tRNA and rRNA), unusual bases. DNA as genetic material Structure of chromatids, nucleosome and histones. Properties of nucleic acids - T_m, denaturation, renaturation, hypo and hyperchromicity.

OUTCOMES: On successful completion of the course the students

CO1	Basic knowledge on structure, chemistry and functions of carbohydrates
CO2	Classification, structure and properties of amino acids
CO3	Classification, structure, shape and functions of proteins
CO4	General knowledge on types, classification and functions of lipids
CO5	Understanding the structure, composition and functions of Nucleic acids
CO6	Ability to understand the significance of the complex biomolecules, polysaccharides, lipids, proteins, nucleic acids, vitamins and minerals
CO7	Basic knowledge on various biomolecules and their significance

Text Books:

1. J.L. Jain, S. Jain and N. Jain. Fundamentals of Biochemistry. S. Chand & Co, 2016.
2. Ambika Shanmugam. Biochemistry. Published by Wolters Kluwer, 8th Edition, 2016.
3. A.C. Deb. Fundamental of Biochemistry. New Central Book Agency, 2012.

Reference Books:

1. D.L. Nelson and M.M. Cox. Lehninger's Principles of Biochemistry, 7th Edition, Freeman Publishers, 2017.
2. V.W. Rodwell, D.A. Bender, K.M. Botham, P.J. Kennell and P.A. Weil. Harper's Illustrated Biochemistry, 30th Edition. McGraw Hill, 2015.

SEMESTER – II

Allied – I

CHEMISTRY – II

SUBJECT CODE: U2CH21AT

L	T	P	C
5	0	0	5

Total Hours: 65

OBJECTIVES:

1. To provide the basic knowledge on Co-ordination chemistry.
2. To understand the Heterocyclic Compounds, Electro Chemistry, Paints and Sulpha Drugs.
3. Understanding preservatives, artificial sweetening agents and colloids

UNIT – I

(13 Hrs)

1.1 CO-ORDINATION CHEMISTRY

Nomenclature of co-ordination compounds – Werner Theory of Co-ordination compound – Chelation – functions and Structure of Haemoglobin and chlorophyll.

1.2 INDUSTRIAL CHEMISTRY

Contents in Match Sticks and Match box, Preparation and uses of CHCl_3 , DDT, Gamhexane and Freons

1.3 FERTILIZERS

Fertilizers, Manures and Biofertilizers – Definition – organic manures and their importance – Role of NPK in plants – preparation and uses of urea, Ammonium Nitrate, Potassium Nitrate and Super Phosphate of lime

UNIT – II

(13 Hrs)

2.1 HETEROCYCLIC COMPOUNDS

Heterocyclic Compounds – Definition, Heterocyclic rings – Nitrogen containing compounds eg. Pyridine, sulphur containing compounds – eg. Thiazole, oxygen containing compounds. Eg. Furan.

2.2 ENVIRONMENTAL CHEMISTRY

Pollution of air, water and soil by chemicals, chemical industries – sources, Consequences and controlling methods.

2.3 ORGANIC CHEMISTRY

Preparation, properties and uses of Organic Acids – Salicylic acid, Lactic acid and Benzoic acid.

UNIT – III

(13 Hrs)

3.1 ELECTRO CHEMISTRY

Electrolyte- Definition with Examples, Specific and Equivalent conductance – their determination. Variation of specific and equivalent conductance with dilution.

3.2 CONDUCTANCE

Kohlrausch law – Determination of dissociation constant of weak Electrolyte using conductance Measurement – conductometric Titrations- Definition and Significance.

3.3 pH and Buffer

pH and Buffer-Definition, Determination of pH by Indicator Method – Importance of buffer in the living system – Derivation of Henderson-Hasselbalch equation.

UNIT – IV

(13 Hrs)

4.1 PAINTS

Paints- Components of Paint- Requisites of a good Paint – Pigments – Classification on pigments on the basis of Colour- Examples-Dyes-Definition of chromophores and Auxochromes- Examples-Colour and Dyes- Classification based on Constitution and Application-Examples.

4.2 CHEMICALS IN FOOD

Preservatives, artificial sweetening agents – definition with one eg. Antioxidants – Definition and Types, Non Enzymatic Antioxidants- Vit ‘C’, ‘E’ and its importance.

4.3 COLLOIDS

Colloids- Definition and Types, Gold Number, Preparation of colloids, Properties – Brownian movements and Tyndall Effect, Emulsions

UNIT – V

(13 Hrs)

5.1 SULPHA DRUGS

Uses and mode of action of sulpha drugs – sulpha pyridine, sulphadiazine – Antibiotics – uses of penicillin, chloramphenicol Streptomycin, Drug abuse and Lethal dose of Drugs,

5.2 DRUGS

Definition and one example Each for Analgesics, Antipyretics, Tranquilisers, Sedatives, Anaesthetics – Local & General, Causes for diabetes, cancer and AIDS.

5.3 CORROSION

Electrochemical corrosion and its prevention – Electro plating-Application.

OUTCOMES: On successful completion of the course the students should have understood the significance of the

CO1	Understanding of coordination and industrial chemistry
CO2	Basic knowledge on heterocyclic compounds, environmental and organic chemistry
CO3	Familiarity with electro chemistry, conductance, pH and buffer
CO4	Information on components of paint, preservatives, artificial sweetening agents and colloids
CO5	Knowledge on the uses and mode of action of sulpha drugs and electrochemical corrosion and its prevention
CO6	Awareness on Coordination chemistry and Heterocyclic Compounds
CO7	Understanding on electrochemistry, paints and sulpha drugs

Text Books:

1. G. Chatwal. Organic Chemistry of Natural Products. Vol. I, Himalaya Publishing House, 2011.
2. Arun Bahl, B.S. Bahl and G.D. Tuli. Essentials of Physical Chemistry. Sultan Chand & Sons, 2014.
3. Dr. Veeraiyan V., Text book of Ancillary Chemistry, Highmount Publishing house, Chennai-14. Edition - 2008.

Reference Books:

1. Ksasture and Wadodkar. Pharmaceutical Chemistry. Nirali Praksahan Educational Publishers, 2015.
2. S.M. Mukherji, S.P. Singh, R.P. Kapoor, Organic Chemistry. Vols. I & II, New Age International Publishers, 2017.
- I.L. Finar. Organic Chemistry. Vols. I & II, Pearson Education Publishers, 6th edition, 2002.

I B.Sc. BIOCHEMISTRY

MAJOR PRACTICALS - I

L	T	P	C
0	0	3	2

VOLUMETRIC AND QUALITATIVE ANALYSIS

Total Hours: 78

SUBJECT CODE: U2BC21MP

Objectives

Analysis provides a way to identify and evaluate these interventions and to systematically and descriptively analyze alternative or new interventions

VOLUMETRIC ANALYSIS

1. Estimation of Glycine by Sorenson's method.
2. Estimation of fructose from fruit juice by Benedict's method.
2. Estimation of Ascorbic acid from lemon by Dye method.
3. Determination of Saponification number of edible oil.
4. Determination of Acid number of oil.
5. Determination of Iodine number of oil.
6. Estimation of Hydrogen peroxide by Permanganate method.
7. Estimation of calcium in milk.

QUALITATIVE ANALYSIS

- a) Reactions of simple sugar – Glucose, Fructose, Galactose, Maltose, Pentose, Sucrose, Lactose, Starch and Dextrin.
- b) Reactions of proteins – Solubility, Biuret, Xanthoproteic, Denaturation by heat, pH change & precipitation by acidic reagent, colour reactions of aminoacids like Tryptophan, Tyrosine, Cystiene, Methionine, Arginine, Proline and Histidine.
- c) Reactions of lipids -Solubility, Iodine No. for unsaturation, and Libermann-Burchard test.

BIOCHEMICAL PREPARATION

1. Preparation of Starch from Potato.
2. Preparation of Casein from Milk.
3. Extraction of fat from animal source.
4. Collection of blood

OUTCOMES:

CO1	Develop practical skills and applications of analytical methods based on titrations.
CO2	Practical knowledge in systematic analysis of organic compounds containing one functional group and characterization
CO3	Understanding the qualitative test for adulterants present in foods

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Reference Books (Practical Manuals):

1. D.T. Plummer. An Introduction to Practical Biochemistry. Tata McGraw-Hill, 3rd Edition, 1987 (Reprint 2015)
2. J. Jayaraman. Laboratory Manual in Biochemistry, 2ND Ed., New Age International Publishers, 2011.
3. T.N. Pattabiraman. Laboratory Manual in Biochemistry, 3rd Ed.. All India Publishers & Distributors, 3rd Edition, 2015.

I B.Sc. BIOCHEMISTRY
ALLIED PRACTICAL-I
CHEMISTRY
SUBJECT CODE: U2CH21AP

L	T	P	C
0	0	3	2

Total Hours: 78

Objective

1. To familiar with some single stage preparation of organic compounds.
2. Identification of components in a two component mixture and preparation of their derivatives.

I VOLUMETRIC ANALYSIS

1. Estimation of HCl using NaOH.
2. Estimation of NaOH using Standard Na_2CO_3 .
3. Estimation of Iron using KMnO_4 .
4. Estimation of Oxalic acid using NaOH.
5. Estimation of Calcium carbonate using NaOH from Egg shell.
6. Estimation of Total Hardness of water

II. ORGANIC ANALYSIS

Systematic analysis of organic compounds containing one functional group and characterization by confirmatory Test

Qualitative Analysis of Organic acids, amides, aldehydes, carbohydrates, amines, phenols and diamide.

III ADULTERATION IN FOOD - ANALYSIS

Qualitative test for adulterants present in foods such as Turmeric, Pepper, Milk, Tea and Butter.

OUTCOMES:

CO1	Develop practical skills and applications of analytical methods based on titrations.
CO2	Practical knowledge in systematic analysis of organic compounds containing one functional group and characterization
CO3	Understanding the qualitative test for adulterants present in foods

Reference (Practical Manuals):

1. Kulandaivelu A.R. , Veeraswamy R. , Venkateswaran V. Basic Principles of Practical Chemistry. Sultan Chand & Sons, 2nd edition, 2012
2. V. Venkateswaran and R. Veeraswamy. Practical Chemistry. S. Chand & Sons, 2nd Edition, 1997.
3. S. Sahay. Quantitative Chemical Analysis. S. Chand & Co., 1993.

L	T	P	C
2	0	0	2

SEMESTER - II

VALUE EDUCATION

SUBJECT CODE: U2VE21GS

Total Hours: 26

OBJECTIVES:

- To make the students responsible citizens in the personal and social life.
- To develop proper attitude towards self and fellow being of one's own country and people of other countries thereby enriching humanity.

UNIT – I: INTRODUCTION AND OUTLINE OF VALUE EDUCATION (6 Hrs)

Value education – Definition and Scope. Family Values – Responsibility of family, Status of Women in family and society, Caring for needy and elders. Ethical Values – Mass and media Ethics in family. Influence of Ethics in Family. Issue of globalization – Modern warfare, Terrorism, Mutual respect of different cultures and religions.

UNIT – II: PERSONAL SKILLS (5 Hrs)

Self Esteem – Definition, Factors influencing Self Esteem, Qualities of high and low self esteem. Self Concept- Definition, Characteristics of self concept. Role of self concept in Personal growth. Self acceptance – Definition, Benefits and obstacles of self acceptance.

UNIT –III: POSITIVE THINKING, MOTIVATION AND PERSONALITY DEVELOPMENT (5 Hrs)

Positive thinking- Definition, Positive and Negative Attitude, Power of Positive thinking, Positive imaging. Motivation – Definition, Difference between Inspiration and Motivation, Internal and External Motivation. Demotivation, Demotivating factors. Personality Development – Definition, characteristics and elements of personality, Development of Personality.

UNIT – IV: COPING AND DEVELOPING COPING MECHANISM (5 Hrs)

Coping – Definition, Positive and Negative Coping, kinds of coping, Typical responses to coping. Shyness – Definition, types and symptoms of shyness. How to overcome shyness. Depression – Definition, symptoms, causes and impact of Depression, How to overcome Depression. Failure – Definition, coping with failure, Developing Competence.

UNIT – V: LEADERSHIP TEAMWORK AND WORK ENVIRONMENT (5 Hrs)

Leadership – Definition, characteristics of leadership, various kinds of leaders, factors influencing leadership styles. Characteristics of successful leader. Teamwork – Definition, Characteristics of Teamwork, Team learning. Lifeskills required for work environment and ways to build a better work environment.

OUTCOMES:

SEMESTER – II		
COs	Course Name: Value Education	Code:U2VE21GS Credits: 2
CO1	Acquire the basic knowledge on value education.	
CO2	Understand the importance of principles of life and components of values.	
CO3	To learn about philosophy of Life and Individual qualities and family values.	
CO4	Creating and improving awareness of values and their importance and role.	
CO5	To know about ethics and social values.	
CO6	To learn more of Risk and Safety assessment with case studies.	
CO7	To learn more of Responsibilities and Rights as Professional and facing Global Challenges.	

Text books

1. S.Xavier Alphonse. We shall overcome - A textbook on life coping skills. 6th edition. ICRDCE Publication, 2012.
2. Lakshminarayanan K. R and Uma Mageswari. M. Value Education. Nalnilam publication, 2009.

Reference books

1. T.Anchukandam and J.Kuttainimathathil (ED) Grow Free Live Free, Krisitu Jyoti Publications, Bangalore (1995).
2. Mani Jacob (ED) Resource Book For Value Education, Institute for value education, New DELHI 2002.
3. DBNI, NCERT, SCERT, Dharma Bharti National Institute of Peace and Value education, Secunderabad, 2002.
4. Daniel and Selvamony – Value Education Today, (Madras Christian College, Tambaram and ALACHI, New Delhi, 1990)
5. S.Ignachmuthu – Values for Life – Better Yourself Books, Mumbai, 1991.
6. M.M.M.Mascaronhas, Centre for Research Education Science and Training for Family. Life Promotion – Family Life Education, Bangalore, 1993.

SEMESTER – I

L	T	P	C
4	0	0	4

Total Hours: 52**Allied – I****BIOCHEMISTRY – I****SUBJECT CODE: U1BC21AT****OBJECTIVES:**

1. To give an idea to students on chemistry, structures and classification of carbohydrates, proteins, nucleic acids, vitamins and minerals.
2. Learnt the biological importance of carbohydrates, proteins, nucleic acids, vitamins and minerals
3. To create the knowledge about the deficiency diseases of vitamins and minerals

UNIT – I: CARBOHYDRATES**(11 Hrs)**

Definition and classification of carbohydrates, Monosaccharides (glucose, fructose, mannose) - structure and properties and chemical reactions of Monosaccharides (oxidation, reduction, osazone formation, Seliwanoff's reaction). Mutarotation. Disaccharides (maltose, lactose, sucrose) – occurrence, structure and reaction with phenylhydrazine. Polysaccharides – Definition and classification – Homopolysaccharides – starch and glycogen.

UNIT – II: AMINO ACIDS AND PROTEINS**(11 Hrs)**

Amino acids, classifications based on structure, non-protein amino acids, essential and non essential amino acids, amphoteric nature, isoelectric point. Reactions due to carboxyl group (hydrazine), amino group (Sanger's reagent) and both the groups (Ninhydrin). Proteins: classification – based on solubility and shape. Physical properties - salting in and salting out, denaturation and formation of peptide bond. Structure of proteins – primary, secondary, tertiary and quaternary structure.

UNIT – III: LIPIDS**(9 Hrs)**

Lipids: Definition, Classification and properties of lipids. Types of fatty acids -saturated, unsaturated and essential fatty acids. Classification and significance of lipoproteins and phospholipids. Structure and biological significance of cholesterol. Bile salts - function.

UNIT – IV: NUCLEIC ACIDS**(10 Hrs)**

Nucleic acids - Components of DNA and RNA - Purine and pyrimidine base, nucleosides, nucleotides and polynucleotides. Phosphodiester bond. Double helical structure of DNA. Structure and types of RNA. Clover leaf model of t-RNA. Denaturation and renaturation of DNA.

UNIT – V: VITAMINS AND MINERALS**(11 Hrs)**

Vitamins - definition, classification and daily requirement, biological roles and deficiency diseases of water-soluble (B₁, B₂, B₃ and vitamin-C) and fat-soluble vitamins (A, D, E and K) (Structure not necessary). Micro and macro nutrients - biological functions of calcium, iron, iodine, sodium and phosphorous

OUTCOMES: On successful completion of the course the students should have understood the

CO1	Basic knowledge on classification, chemistry and properties of carbohydrates
CO2	Understanding the classification and reactions of amino acids and proteins
CO3	Knowledge on types, classification and functions of lipids
CO4	Understanding the types, structure and composition of Nucleic acids.
CO5	Awareness on requirement, biological roles and deficiency diseases of vitamins and minerals.
CO6	Understanding the significance of the complex biomolecules, polysaccharides, lipids, proteins, nucleic acids, vitamins and minerals.
CO7	Basic understanding of Biochemistry for the undergraduate students.

Text Books:

1. J.L. Jain, S. Jain and N. Jain. Fundamentals of Biochemistry. S. Chand & Co, 2016.
2. Ambika Shanmugam. Biochemistry. Published by Wolters Kluwer, 8th Edition, 2016.
3. A.C. Deb. Fundamental of Biochemistry. New Central Book Agency, 2012.

Reference Books:

1. D.L. Nelson and M.M. Cox. Lehninger Principles of Biochemistry, WH Freeman Publishers, 7th Edition, 2017.
2. V.W. Rodwell, D.A. Bender, K.M. Botham, P.J. Kennell and P.A. Weil. Harper's Illustrated Biochemistry, 30th Edition. McGraw Hill, 2015.

SEMESTER – II

Allied – I

BIOCHEMISTRY – II

SUBJECT CODE: U2BC21AT

L	T	P	C
4	0	0	4

Total Hours: 52

OBJECTIVES:

1. To provide a basic knowledge on bioenergetics, biophysics of macromolecules
2. To know the Metabolism of carbohydrates, proteins, lipids and nucleic acids
3. Basic understanding of an enzymes and hormones.

UNIT – I: BIOENERGETICS AND BIOPHYSICS

(10 Hrs)

Structure of mitochondria, Electron transport chain, high-energy phosphates (ATP, GTP). Osmotic pressure, surface tension, viscosity, pH, determination of pH by hydrogen electrode and Henderson-Hasselbach equation.

UNIT – II: METABOLISM OF CARBOHYDRATES AND AMINO ACIDS

(11 Hrs)

Carbohydrate metabolism: Glycolysis, TCA cycle, Gluconeogenesis, Glycogenesis and Glycogenolysis. .

Metabolism of amino acids: Deamination, Transamination and Urea cycle.

UNIT – III: METABOLISM OF LIPIDS AND NUCLEIC ACIDS

(11 Hrs)

Metabolism of lipids: Biosynthesis of fatty acids, β -Oxidation and Ketogenesis.

Metabolism of nucleic acids: De novo synthesis of purines and pyrimidines.

UNIT – IV: VITAMINS

(10 Hrs)

Enzyme definition, units, IUB classification, isoenzymes, factors affecting enzyme activity - substrate, pH and temperature. Michaelis-Menten equation, Enzyme inhibition – types - competitive, non-competitive and un-competitive.

UNIT – V: HORMONES

(10 Hrs)

Definition – Exocrine, endocrine, paracrine and autocrine. Hypothalamic and pituitary hormones. Biological functions and disorders of pancreatic adrenal medullary and thyroid hormones. Diabetes mellitus, Pheochromocytoma, Goiter and Grave's disease.

OUTCOMES: On successful completion of the course the students should have understood the

- Basic knowledge on bioenergetics and biophysics.

CO1	Basic knowledge on bioenergetics and biophysics.
CO2	Understanding the metabolism of carbohydrates and amino acids.
CO3	Learn the metabolism of lipids and nucleic acids.
CO4	Basic knowledge on the classification, mechanism and inhibition of enzymes.
CO5	Awareness on biological functions and disorders of hormones.
CO6	Understanding the metabolism of complex biomolecules, polysaccharides, lipids, proteins, nucleic acids, vitamins and minerals.
CO7	Basic understanding of enzymes and hormones.

- **Text Books:**

1. J.L. Jain, S. Jain and N. Jain. Fundamentals of Biochemistry. S. Chand & Co, 2016.
2. Ambika Shanmugam. Biochemistry. Published by Wolters Kluwer, 8th Edition, 2016.
3. A.C. Deb. Fundamental of Biochemistry. New Central Book Agency, 2012.

Reference Books:

1. D.L. Nelson and M.M. Cox. Lehninger Principles of Biochemistry, WH Freeman Publishers, 7th Edition, 2017.
2. V.W. Rodwell, D.A. Bender, K.M. Botham, P.J. Kennell and P.A. Weil. Harper's Illustrated Biochemistry, 30th Edition. McGraw Hill, 2015

I B.Sc. BIOCHEMISTRY
ALLIED PRACTICAL - I
BIOCHEMISTRY
SUBJECT CODE: U2BC21AP

L	T	P	C
0	0	3	2

Total Hours: 78

Objective

To understand the various metabolic pathways operating in living cells with special emphasis on carbohydrate, lipid, amino acid, nucleic acid metabolism and the electron transport chain

VOLUMETRIC ANALYSIS

- a. Estimation of HCl using suitable bases
- b. Determination of Saponification number of oil
- c. Estimation of Iron using potassium permanganates as link solution and ferrous ammonium sulphate as standard
- d. Estimation of glycine by formal titration method
- e. Estimation of glucose by Benedict's method
- f. Estimation of ascorbic acid using 2,6-dichlorophenol indophenol as link solution

QUALITATIVE ANALYSIS

- A. Qualitative analysis of carbohydrates: Glucose, fructose, galactose, lactose, maltose and sucrose.
- B. Qualitative analysis of amino acids, arginine, cysteine, tryptophan and tyrosine
- C. Qualitative analysis of Abnormal constituent in urine-Glucose,Protein,Bilesalt Bilepigment, and Ketonebodies

QUANTITATIVE ANALYSIS (only for demonstration; with single standard method)

1. Colorimetric estimation of protein by Biuret method.
2. Colorimetric estimation of Glucose by OT method
3. Colorimetric estimation of Creatinine by Jaffe's method
4. Colorimetric estimation of Urea by DAM Method

OUTCOME

CO1	Proficiency in volumetric analysis of basic chemicals.
CO2	Understanding the reactions of simple sugar, proteins, and lipids
CO3	Analysis of biochemicals by colorimetric methods by single-step method.

Reference Books (Practical Manuals):

1. D.T. Plummer. An Introduction to Practical Biochemistry. Tata McGraw-Hill, 3rd Edition, 1987 (Reprint 2015)
2. J. Jayaraman. Laboratory Manual in Biochemistry, 2ND Ed., New Age International Publishers, 2011.
3. T.N. Pattabiraman. Laboratory Manual in Biochemistry, 3rd Ed.. All India Publishers & Distributors, 3rd Edition, 2015.

SEMESTER – III

L	T	P	C
5	0	0	5

BIOPHYSICS AND ANALYTICAL BIOCHEMISTRY

SUBJECT CODE: U3BC21MT

Total Hours: 65

OBJECTIVES:

1. To know the significance of biomedical instrumentation in research.
2. To provide the technical knowledge of the instruments
3. To understand the applications of the biochemical and analytical techniques.

UNIT – I: SOLUTIONS AND ELECTROCHEMICAL TECHNIQUES (13 Hrs)

Properties of solutions: Colloids - types and properties, Surface tension, adsorption, viscosity and osmotic pressure.

Electrochemical techniques - pH meter, Buffer solutions, Measurement of pH, Standard hydrogen electrode, Principle and applications of oxygen electrode. Various ways of expressing and conversion of concentration of solutions-molality, molarity, normality, mole fraction. Simple problems to be worked out.

UNIT – II: CHROMATOGRAPHY TECHNIQUES (10 Hrs)

Chromatography - Principle, method and applications of paper, thin layer, ion exchange, affinity chromatography, gel permeation chromatography, Gas liquid chromatography and high pressure liquid chromatography.

UNIT – III: ELECTROPHORESIS AND CENTRIFUGATION (15 Hrs)

Electrophoresis - Principles, Instrumentation and applications of paper electrophoresis, , Agarose gel electrophoresis, native and SDS-PAGE, Isoelectric focusing and molecular weight determination.

Principles of centrifugation, Low speed and high speed centrifugation, Preparative, Analytical ultra centrifuge - Instrumentation and applications. Basic principle and technique of subcellular fractionation by differential centrifugation.

UNIT – IV: SPECTROSCOPY (14 Hrs)

Colorimetry: Beer-Lambert's Law, Light absorption and its transmittance, Absorption Spectroscopy - Principle, instrumentation and applications of colorimetry and UV-Vis spectrophotometer. Emission Spectroscopy – Spectrofluorimeter - Principle, instrumentation and applications. Flame photometry - principle and applications.

UNIT – V: RADIOISOTOPES TECHNIQUES

(13 Hrs)

Radioactive decay, Types of radioactive decay, Units of radio activity, measurement of radioactivity based on ionization- GM counter and excitation- Scintillation counter. Autoradiography. Applications of radioisotopes in biology. Hazards of radioactivity.

OUTCOMESS: On successful completion of the course the students

CO1	Proficiency in solution preparation and electrochemical techniques
CO2	Awareness on the principle, methods and applications of of chromatographic techniques
CO3	Understanding the principle, methods and applications of electrophoresis and centrifugation
CO4	Acquiring knowledge on colorimeter and UV-VIS-Spectrophotometer
CO5	Basic information about the isotopes and applications of radioisotopes in biology
CO6	Understanding the principles, methods and applications of the analytical instruments
CO7	Awareness on biomedical instrumentation in research

Text Books:

1. S. Ramakrishnan. Textbook of Medical biochemistry, 3rd Edition, Orient Longman Limited, 2001.
2. P. Asokan. Analytical Biochemistry. Chinnaa Publications, 2003.

Reference Books:

1. Wilson and Walker. Principles and Techniques of Practical Biochemsitry, 6th edition, Cambridge University, Press. 2005.
2. Upadhyaya A Upadhyaya K and Nath. Biophysical Chemistry: Principles and Techniques, 3rd Edition. Himalayan publications, 2009.
3. M.N. Chatterjee and Rana Shinde, Textbook of Medical Biochemistry, 8th Edition. Jaypee Brothers Medical Publishers (P) Ltd., 2012.

SEMESTER – III
NON-MAJOR ELECTIVE I
DIAGNOSTIC BIOCHEMISTRY – I
SUBJECT CODE: U3BC21NM

L	T	P	C
2	0	0	2

Total Hours: 26

OBJECTIVES:

1. The study of diagnostic biochemistry aims to increase understanding of Specimen collection
2. Understanding of disorders of carbohydrate metabolism, liver, renal and gastric functional tests.
3. To provide the Knowledge on applications of diagnostic biochemistry.

UNIT-I

(5 Hrs)

Specimen collection and processing (Blood, urine, feaces), anti-coagulant and preservatives for blood and urine. Transport of specimens. Units of measurements of solutes in solution, e.g. Normality, Molality, Molarity, Osmolarity, Ionic strength. Examples of this concept. Osmosis and its application. Isotonic solution, hyper and hypotonic solution.

UNIT-II

(6 Hrs)

Disorders of Carbohydrate Metabolism –Diabetes mellitus, glucose and galactose tolerance tests, sugar levels in blood, renal threshold for glucose, factors influencing blood glucose level, glycogen storage diseases – Vongierke disease, Pompe's Disease,

UNIT-III

(5 Hrs)

Structure and functions of liver, Metabolism of Bilirubin, Jaundice - types differential diagnosis and liver function tests.

UNIT-IV

(5 Hrs)

Renal functional test - clearance test - Urea, Creatinine, Inulin, PAH test, concentration and dilution test.

UNIT-V

(5 Hrs)

Gastric functional tests - collection of gastric contents, examination of gastric residues, FTM stimulation test, tubeless gastric analysis.

OUTCOMES: Upon completion of this course, the students know

CO1	Basic knowledge on collection and processing of blood, urine and feces.
CO2	Familiarity with the disorders of carbohydrate metabolism
CO3	Understanding the structure and functions of liver and liver function tests
CO4	Basic knowledge on kidney and renal function tests
CO5	Analysis and interpretation of gastric function tests
CO6	Knowledge on collection of specimens and disorders of carbohydrate metabolism, liver, renal and gastric function tests.
CO7	Knowledge on applications of diagnostic biochemistry.

Text books:

1. M.N. Chatterjee and Rana Shinde, Textbook of Medical Biochemistry, 8th Edition. Jaypee Brothers Medical Publishers (P) Ltd., 2012.
2. K. V. Krishna Das. Text book of Medicine. Jaypee Brothers Medical Publishers (P) Ltd, 6th edition, 2017.
3. Kanai L. Mukherjee and Anuradha Chakravarthy, Medical Laboratory Technology, Procedure Manual for Routine Diagnostic Tests, Vols. I, II and III. Tata McGraw Hill Publishing Company Ltd., 2017.
4. U. Sathyanarayana. Biochemistry. Elsevier publications, 4th edition, 2013.

References:

1. Thomas M Devlin. Text book of Biochemistry with clinical correlation. Wiley publications, 7th edition, 2010.
2. Varley H, Gowenlock AH, McMurray JR, McLauchlan DM. Varley's practical clinical biochemistry. London : Heinemann Medical Books ; New Delhi (India) : CBS publishers, 6th edition, 2006.

SEMESTER – IV
MEDICAL LABORATORY TECHNOLOGY
SUBJECT CODE: U4BC21MT

L	T	P	C
4	0	0	4

Total Hours: 52

OBJECTIVES:

- To develop an understanding about good laboratory practice and laboratory instruments.
- To briefly elucidate on clinical pathology of body fluids.
- To impart basic knowledge on haemopoiesis and serology.
- To understand the basic concepts of haemostasis and anaemia.
- To develop sound knowledge on haematology and blood banking.

UNIT – I: GOOD LABORATORY PRACTICE AND LABORATORY INSTRUMENTS

(10 Hrs)

Good laboratory procedure. Code of conduct for laboratory personnel. Safety measures in laboratory – safety with chemicals, first aid in lab accidents caused by acids, alkalies, heat, broken glass, infectious materials and electric shock. Concepts of Accuracy, Precision, Reliability and Reproducibility. Preparation of solutions – stock, working, saturated, percent, molar, normal, isotonic, hypertonic and hypotonic solutions.

Basic principles and applications of Balance, Hot air oven, Incubator, Water bath and Autoanalyser. Method of writing and releasing lab test reports. Proper disposal of wastes. General approaches to quality control.

UNIT – II: CLINICAL PATHOLOGY

(10 Hrs)

Collection and preservation of urine. Gross examination and chemical examination of urine for abnormal constituents (sugars, protein, ketone bodies, bile pigments, porphyrins and blood) and their clinical significance. Microscopic examination of urine.

Collection, gross, chemical and microscopic examination of cerebrospinal fluid, stool, sputum and seminal fluid.

UNIT – III: HAEMOPOIESIS, RED CELL MORPHOLOGY AND SEROLOGY

(12 Hrs)

Blood cell formation. Components of blood and their functions. Haemopoietic system. Production, development and maturation of cellular elements of blood. Microcytosis, Anisocytosis, Pokilocytosis, Target cells, Sickle cells, Schistocytes, Acanthocytes, Burr Cells

Methods used in serology – precipitation, flocculation, haemagglutination and complement fixation test. Principle & procedure for VDRL, RPR, TPHA and Widal Tests.

UNIT- IV: HAEMOSTASIS AND ANAEMIA

(10 Hrs)

Mechanism of blood clotting. Blood coagulation factors. Disorders of clotting – Thrombocytopenia, Thromboasthaemia, Haemophilia A and B.

Anaemia – Different types – Aplastic, Megaloblastic, Iron deficiency, Pernicious, Sickle cell, Spherocytosis, Drug-induced autoimmune haemolytic anaemia.

UNIT- V: HAEMATOLOGY AND BLOOD BANKING

(10 Hrs)

Collection of blood (Capillary and Venous) and preservation. Anticoagulants. Estimation, normal values and interpretation of ESR, PCV, Haemoglobin, RBC, WBC (total and differential), Platelets, bleeding time, clotting time and prothrombin time. Preparation of thick, thin and wet films. Examination of blood smear for malaria and microfilaria.

ABO and Rh blood group systems. Blood grouping. Coombs test, Compatibility, Cross matching (major and minor). Selection and screening of blood donors. Anticoagulants used in blood collection bags – ACD and CPD. Complications of blood transfusion.

OUTCOMES: Upon completion of the course, the student

CO1	Understanding good laboratory practices and laboratory instruments.
CO2	To Basic knowledge on clinical pathology of body fluids.
CO3	To Acquiring knowledge on haemopoiesis and serology.
CO4	To Understanding the basic concepts of haemostasis and anaemia.
CO5	Basic knowledge on haematology and blood banking.
CO6	Familiarity with good laboratory practice, laboratory instruments and clinical pathology of body fluids
CO7	Understanding of haemopoiesis, serology, haemostasis, anaemia, haematology and blood banking

Text Books:

1. Kanai L. Mukherjee and Anuradha Chakravathy, Medical Laboratory Technology, Procedure Manual for Routine Diagnostic Tests, Vols. I, II and III. Tata McGraw Hill Publishing Company Ltd., 2017.
2. Ramnik Sood, Concise Book of Medical Laboratory Technology Methods and Interpretations. Jaypee Brothers Medical Publishers (P) Ltd., New Delhi, 2015.
3. N. Pattabiraman. Laboratory Manual in Biochemistry, 4th Edition. All India Publishers & Distributors, 2015.
4. Namita Jaggi. Microbiology Theory for MLT. 2nd Edition. Jaypee Brothers Medical Publishers (P) Ltd., 2013.

Reference Books:

1. Alan H. Lowenclock. Varley's Practical Clinical Biochemistry, 6th Edition. CBS Publishers and Distributors, 1988.

SEMESTER – IV
NON-MAJOR ELECTIVE - II

L	T	P	C
2	0	0	2

DIAGNOSTIC BIOCHEMISTRY – II

Total Hours: 26

SUBJECT CODE: U4BC21NM

OBJECTIVES:

1. This course would have made the students understand the significance of diagnostic biochemistry.
2. To understand the basic concepts of haemostasis and anaemia.
3. To provide the Knowledge on applications of diagnostic biochemistry.

UNIT-I

(5 Hrs)

Inborn errors of metabolism - Alkaptonuria, Phenyl ketonuria, Cystinuria, Galactosemia, Fanconi's syndrome and Albinism.

UNIT-II

(6 Hrs)

Plasma enzymes in diagnosis - Functional and non functional plasma enzymes - Isoenzymes. Myocardial Infarction, acute pancreatitis, biochemical diagnosis of diseases by enzyme assays – SGOT, SGPT, and muscle wasting.

UNIT-III

(5 Hrs)

Cholesterol – HDL and LDL, Lipoproteins - Factor affecting blood cholesterol , Atherosclerosis and its Risk factor, Fatty liver, lipid storage disease.

UNIT-IV

(5 Hrs)

Blood coagulation - disturbances in blood clotting - haemophilia A and haemophilia B. haemoglobin in anaemias, sickle cell anemia, thalassemia, Porphyrias and porphyrinurias.

UNIT-V

(5 Hrs)

Hormones - Definition and classification- Thyroid hormone- thyroid function test, male sex hormones and female sex hormone.

OUTCOMES: Upon completion of the course, the student

CO1	Knowledge on different types of inborn errors of metabolism
CO2	Understanding different types of plasma enzymes in diagnosis
CO3	Awareness on lipid related disorders and its diagnostic methods
CO4	Basic knowledge on the blood coagulation mechanism and disturbances in blood clotting
CO5	Understanding classification of hormones and hormone assays
CO6	Familiarity with the significance of diagnostic biochemistry
CO7	Knowledge on basic diagnostic analysis of specimens and its importance

Text books:

1. M.N. Chatterjee and Rana Shinde, Textbook of Medical Biochemistry, 8th Edition. Jaypee Brothers Medical Publishers (P) Ltd., 2012.
2. K. V. Krishna Das. Text book of Medicine. Jaypee Brothers Medical Publishers (P) Ltd, 6th edition, 2017.
3. Kanai L. Mukherjee and Anuradha Chakravarthy, Medical Laboratory Technology, Procedure Manual for Routine Diagnostic Tests, Vols. I, II and III. Tata McGraw Hill Publishing Company Ltd., 2017.
4. U. Sathyanarayana. Biochemistry. Elsevier publications, 4th edition, 2013.

References:

1. Thomas M Devlin. Text book of Biochemistry with clinical correlation. Wiley publications, 7th edition, 2010.
2. Varley H, Gowenlock AH, McMurray JR, McLauchlan DM. Varley's practical clinical biochemistry. London : Heinemann Medical Books ; New Delhi (India) : CBS publishers, 6th edition, 2006.

II B.Sc. BIOCHEMISTRY

CORE PRACTICAL – II

MEDICAL LABORATORY TECHNOLOGY

SUBJECT CODE: U4BC21MP

L	T	P	C
6	0	0	5

Total Hours: 78

Objective

1. To develop sound knowledge on haematology and blood banking.
2. To understand the basic concepts of haemostasis and anaemia.

HAEMATOLOGY

1. Collection and Storage of Blood
2. Total and differential WBC Count
3. Total RBC Count
4. Platelet Count
5. PCV and ESR
6. ABO system, Rh System
7. Determination of Bleeding Time and Clotting time
8. Estimation of haemoglobin by Sahli's method

I. SEROLOGY

1. RA
2. Pregnancy test

II. URINE ANALYSIS

1. Gross examination of urine
2. Qualitative analysis of Urine for Normal and pathological conditions

III. MICROBIOLOGY

1. Sterilization by Autoclave, direct heat method.
2. Media preparation, Inoculation, Streaking methods.

IV. BIOCHEMISTRY (with single standard method)

1. Estimation of Glucose by Folin WU Method
2. Estimation of Urea By DAM Method
3. Estimation of Creatinine by Jaffe's method

4. Estimation of Protein by Biuret method

OUTCOMES

CO1	Understanding and application of the hands-on knowledge gained in medical laboratory technology in their future career as well as while establishing clinical laboratories
CO2	Basic knowledge on collection of samples, role of preservatives, and also various procedures involved in collection of clinical samples like blood, urine,
CO3	Hands-on experience of clinical and diagnostic laboratory activities.

Reference Books (Practical Manuals):

1. Kanai L. Mukherjee and Anuradha Chakravarthy, Medical Laboratory Technology, Procedure Manual for Routine Diagnostic Tests, Vols. I, II and III. Tata McGraw Hill Publishing Company Ltd., 2017.

SEMESTER – V
BASIC ENZYMOLOGY

L	T	P	C
5	0	0	5

SUBJECT CODE: U5BC21MT

Total Hours: 65

OBJECTIVES: The objectives of this course are to:

- Introduce students to various theoretical and practical aspects of enzymology; and
- Stimulate their interest in learning the structure, function and kinetics of enzyme and their role as catalyst and regulator of cell metabolism.
- Serve as foundation for more advanced enzymology courses.

UNIT I: INTRODUCTION TO ENZYMOLOGY (11 Hrs)

Definition, characteristic of enzymes, International classification of enzymes, Numbering and nomenclature. Enzyme units: Definition of IU, Katal, enzyme turn over number. Enzyme specificity – Absolute, group, bond and stereo chemical specificity. Active site – salient features of active site. Proposed theories for mono-substrate reaction, Fischer's lock and key model, Koshland's Induced fit theory.

UNIT II: COENZYME AND COFACTORS (13 Hrs)

Definition of Apoenzyme, Holoenzyme, cofactor. Coenzyme and its classification, structure and functions of coenzymes, reactions involving nucleotide TPP, NAD⁺/NADP⁺. FMN/FAD, PLP, Coenzyme - A. Metalloenzyme, monomeric and oligomeric enzyme. Multienzyme complex - pyruvate dehydrogenase.

UNIT III: ENZYME KINETICS (14 Hrs)

Order of reaction – first, second and third order of reaction. Energy of activation, Progress curve of enzyme catalyzed reaction. Factors affecting enzyme activity, substrate concentration, pH, temperature and enzyme concentration. Bisubstrate reaction – Random order model, compulsory order model and ping pong model. Derivation of Michaeli's menton equation for unit substrate reaction. Transformation of MM equation – Line weaver Burk plot and Eadie Hofstee plot

UNIT IV: ENZYME INHIBITON AND REGULATION (14 Hrs)

Enzyme inhibitor. Types of enzyme inhibition – Reversible and irreversible inhibition. Reversible inhibition – Competitive inhibition, Non competitive inhibition and uncompetitive inhibition. Irreversible inhibition - Group specific inhibition (Iodoacetate, Disulfiram).

Regulation of enzyme, Allosteric enzyme with reference to Aspartate transcarboxylase. Feed back inhibition (HMG COA reductase) and feed forward stimulation, enzyme repression.

UNIT V: MECHANISM OF ACTION AND APPLICATIONS OF ENZYME (13 Hrs)

Mechanism of action – Proximity effect, metal ion catalysis, covalent catalysis and acid base catalysis. Mechanism of chymotrypsin. Industrial application of enzymes – Immobilized enzymes – Methods of immobilization- Entrapment method, carrier binding method and covalent linkage. Application of immobilized enzyme. Clinical uses of enzymes – enzyme as diagnostic agents: Glucose oxidase, uricase, urease, cholesterol esterase and triglyceride assay. Brief outline on Ribozyme, abzyme.

OUTCOMES:

CO1	Understanding the basics regarding the enzymes and their properties
CO2	Acquiring knowledge on coenzyme and cofactors
CO3	Understanding the kinetics of enzyme catalyzed reactions
CO4	Familiarity with enzyme inhibitory and regulatory process
CO5	Knowledge on applications of enzymes in industries
CO6	Familiarity with the structure, functions and the mechanisms of action of enzymes.
CO7	Understanding the applications of enzymes and their future potential.

Text Books:

1. Trevor Palmer and Philip Bonner. Enzymes: Biochemistry, Biotechnology, Clinical chemistry, 2nd Edition, East West, 2008.
2. T. Devasena. Enzymology. Oxford University Press, 2010.
3. Anusha Bhaskar and V.G. Vidhya. Enzyme Technology, MJP Publishers, 2009.

Reference Books:

1. Dixon and Webb. Enzymes, 2nd Edition. Longmans Green and Co Ltd., 1979.
2. D.L. Nelson and M.M. Cox. Lehninger's Principles of Biochemistry, 7th Edition, Freeman Publishers, 2017.
3. P.C. Champe. Lippincott's Biochemistry, 6th Edition. Raven Publishers, 2014.
4. V.W. Rodwell, D.A. Bender, K.M. Botham, P.J. Kennell and P.A. Weil. Harper's Illustrated Biochemistry, 30th Edition. McGraw Hill, 2015.
5. D. Voet and J.G. Voet, Fundamentals of Biochemistry, 5th Edition. John Wiley, 2016.

SEMESTER – V

L	T	P	C
5	0	0	5

INTERMEDIARY METABOLISM

SUBJECT CODE: U5BC22MT

Total Hours: 65

OBJECTIVES:

1. To provide much information related to carbohydrate, fat and protein metabolism that takes place in our body.
2. This course use to know about metabolism and disorders.
3. Detailed descriptive about ETC and photosynthesis

UNIT – I: CARBOHYDRATE METABOLISM

(15 Hrs)

The basic metabolic pathways, anabolic, catabolic and amphibolic pathways. Fate of absorbed carbohydrates. Glycolysis: - Pathways and energetics; Oxidation of pyruvate to acetyl CoA. TCA Cycle: - Pathway and energetic, Glycogenesis, Glycogenolysis, Pentose phosphate pathway, Gluconeogenesis - Pathways and energetic.

UNIT – II: ELECTRON TRANSPORT CHAIN AND PHOTOSYNTHESIS

(14 Hrs)

The Electron Transport Chain – Components and reactions of ETC. Role of ETC – Oxidative phosphorylation – Chemiosmotic hypothesis. P/O ratio, Uncouplers of oxidative phosphorylation. Photosynthesis – Hill reaction, Light reaction, Cyclic and Non-Cyclic photo phosphorylation, Dark reaction – Calvin cycle.

UNIT – III: LIPID METABOLISM

(11 Hrs)

Fate of absorbed dietary lipids. Oxidation of fatty acids – β oxidations. Metabolism of Ketone bodies. Biosynthesis of fatty acids, Triacylglycerol, lecithin and cephalin Biosynthesis and degradation of Cholesterol.

UNIT – IV: PROTEIN METABOLISM

(12 Hrs)

Fate of dietary proteins, catabolism of Amino acids – Transamination, Oxidative and non-oxidative deamination, Decarboxylation – Urea cycle. Detoxification – Conjugation, Hydrolysis, Reduction and oxidation. Interrelation between carbohydrates, fat and protein metabolism.

UNIT – V: NUCLEIC ACID METABOLISM

(13 Hrs)

Biosynthesis and degradation of Purine and Pyrimidines – De novo synthesis and Salvage pathway. Nucleotide inhibitors.

OUTCOMES: On successful completion of the course the students should have understood clearly on

CO1	Knowledge on carbohydrate pathways and metabolism
CO2	Understanding the Electron Transport Chain and Photosynthesis
CO3	Understanding the importance of metabolism of lipids
CO4	Acquiring the knowledge of protein metabolism
CO5	Basic knowledge on biosynthesis and degradation of nucleic acids
CO6	Understanding the relationship between carbohydrate, fat and protein metabolism
CO7	Basic knowledge in metabolism and disorders.

Text Books:

1. V.W. Rodwell, D.A. Bender, K.M. Botham, P.J. Kennell and P.A. Weil. Harper's Illustrated Biochemistry, 30th Edition. McGraw Hill, 2015.

Reference Books:

1. U. Satyanarayana and U. Chakrapani. Biochemistry, 4th Revised Edition. Elsevier Publishers 2013.
2. D.L. Nelson and M.M. Cox. Lehninger's Principles of Biochemistry, 7th Edition. Freeman WH company, 2017.
3. Denise. R. Ferrier. Lippincott's Biochemistry, 6th edition, Wolter Kluwer publishers 2017.
4. D. Voet and J.G. Voet, Fundamentals of Biochemistry, 5th Edition. John Wiley, 2016.

SEMESTER – V

L	T	P	C
5	0	0	5

GENETICS AND MOLECULAR BIOLOGY**SUBJECT CODE: U5BC23MT****Total Hours: 65****OBJECTIVES:**

1. To provide the strong knowledge in the mechanism of synthesis of DNA, RNA and proteins,
2. This course use to know the gene regulation, gene mutation and DNA repair in prokaryotes and eukaryotes.
3. It provide knowledge about the DNA repair mechanism in eukaryotes and prokaryotes

UNIT – I: BASIC GENETICS**(13 Hrs)**

Definition- Gene and Genetics. Structure of DNA and Chromosome. Central dogma of molecular biology and it's modification. DNA as a genetic material- Experimental evidences - Griffith's experiment, Avery–MacLeod–McCarty experiment and Hershey Chase experiment. Mendelian principles: Dominance, segregation, Independence assortment. Complete dominance, Incomplete dominance and Codominance. Allele and Multiple alleles.

UNIT – II: REPLICATION**(13 Hrs)**

Definition- conservative, semi conservative and dispersive types of replication. Evidence for semi conservative replication- Meselson and Stahl experiment. Unit of replication, DNA polymerases, other enzymes and protein factors involved in prokaryotic replication. Mechanism and Stages of replication in prokaryotes – Initiation, Elongation and Termination. Inhibitors of replication.

UNIT – III: TRANSCRIPTION**(13 Hrs)**

Transcription in prokaryotes: Sense strand and anti-sense strand, Promoters, introns and exons, transcription bubble, RNA polymerases. Significance of sigma factor. Stages of Transcription - Initiation, Elongation and Termination (Rho-dependent and Rho independent). Post-transcription modification in prokaryotes. Inhibitors of Transcription. Reverse transcription.

UNIT – IV: GENETIC CODE AND TRANSLATION**(13 Hrs)**

Genetic code: Definition, General features and Wobble hypothesis. Ribosomes - composition of prokaryotic and eukaryotic ribosomes. Structure of tRNA. Stages of Translation – Activation of amino acids, aminoacylation of tRNA, Initiation, Elongation and Termination. Post-Translational modifications. Inhibitors of Translation.

UNIT – V: GENE REGULATION, MUTATION AND REPAIR MECHANISM**(13 Hrs)**

Prokaryotic gene regulation - lac operon. Concept of mutation and mutagens – causes and its types - missense, nonsense, Point mutation and frameshift mutation. DNA Repair mechanism – Mismatch repair, Excision repair, and Direct repair.

OUTCOMES: On successful completion of the course the student should have

CO1	Basics knowledge about the genes, DNA, Chromosome and Mendalian laws
CO2	Acquiring knowledge in DNA synthesis in prokaryotes and Eukaryotes
CO3	Understanding the mechanism of RNA biosynthesis
CO4	Understanding the uses of genetic code and steps involved in protein synthesis
CO5	Knowledge on Gene Regulation, Mutation and Repair Mechanism
CO6	Awareness on synthesis of DNA, RNA and proteins
CO7	Familiarity in gene regulation, gene mutation and DNA repair in prokaryotes and eukaryotes

Text books:

1. D. Frifelder and M. Malacinski. Essentials of Molecular Biology, 5th Edition. Jones and Bartlett publishers, 2015
2. P.S. Verma and V.K. Agarwal. Genetics, 9th Edition, S. Chand Publishing, 2010.

Reference Books:

1. B. Lewin. Genes XII, 12th Edition. Jones and Bartlett Publishers, 2017.
2. G. Karp. Cell and Molecular Biology, 8th Edition. Wiley International, 2016.
3. D.L. Nelson and M.M. Cox. Lehninger's Principles of Biochemistry, 7th Edition, Freeman Publishers, 2017.
4. S.C. Rastogi. Molecular biology, 4th Edition. Medtech publishing, 2016.
5. RM. Twyman. Advanced Molecular Biology. Viva Book, 2003.

SEMESTER – V

L	T	P	C
5	0	0	5

(ELECTIVE-I) – PAPER – I

HORMONAL & NUTRITIONAL BIOCHEMISTRY

SUBJECT CODE: U5BC24ET

Total Hours: 65

OBJECTIVES

1. The course will give a detailed description of the knowledge hormones and their importance.
2. Understanding of human nutrition, nutritional aspects.
3. Detail descriptive of the various classes of food with the nutritional requirements

UNIT – I: HORMONES OF HYPOTHALAMUS AND PITUITARY (12 Hrs)

Introduction, Classification of hormones. Feedback regulation. Hormones of the hypothalamus and pituitary - Chemical nature, Secretion, release and their biological functions. Disorders – Gigantism and Dwarfism, Diabetic insipidus.

UNIT – II: HORMONES OF THYROID, PARATHYROID AND PANCREATIC GLAND (12 Hrs)

Chemical nature, secretion, function and disorder of thyroid & parathyroid hormones. Disorders - Grave's disease, Rickets and Osteomalacia. Chemical nature and functions of Insulin, Glucagon. Disorders – Diabetes mellitus.

UNIT – III: HORMONES OF ADRENAL AND GONADS (11 Hrs)

Chemical nature and Functions of Adrenal Medullary and Cortex hormones. Disorders - Cushing's syndrome and Pheochromocytoma. Chemical nature and functions of Androgens, Estrogens, Progesterone. Disorders – Cryptorchidism and Amenorrhea.

UNIT – IV: FOOD AND NUTRITION (15 Hrs)

Definition of Nutrition, unit of energy, measurement of energy in food stuff by Bomb Calorimeter. BMR and factors affecting it, RQ of food stuff, SDA.

Composition of food, physiological role and nutritional significance of Carbohydrates, Lipids and Proteins. Nutritive value of proteins - BV, DC, NPU. Essential and Non-Essential Amino Acids.

UNIT – V: DIET IN HUMAN NUTRITION (15 Hrs)

Definition of Macronutrients and micronutrients, Nutritional significance of dietary Sodium, Potassium, Copper, Zinc and Iron. Anti-nutrients. Definition of Vitamins, Fat soluble and Water

soluble vitamins, RDA and disorders. Protein calorie malnutrition (Kwashiorkor and Marasmus). Diet requirement for children, Pregnancy and Lactating Women.

OUTCOMES: Students will acquire

CO1	Basic knowledge about classification of hormones as well as the secretion, release and biological functions of hypothalamus and pituitary hormones
CO2	Understanding the Chemical nature, secretion, function and disorder of thyroid, parathyroid and Pancreatic hormones
CO3	Knowledge on the adrenal and sex hormones
CO4	Understanding the composition of food, physiological role and nutritional significance of Carbohydrates, Lipids and Proteins
CO5	Basic knowledge about the nutritional significance of dietary elements and vitamins
CO6	Awareness on the hormones and their biological functions
CO7	Comprehensive knowledge on human nutrition, nutritional aspects of the various classes of food with the nutritional requirements

Text books:

1. Prakash S. Lohar. Endocrinology. MJP Publications, 2014.
2. M. Swaminathan, Hand Book of Food & Nutrition, 5th Edition, The Bangalore printing and publishing Co., Ltd., 2014.

Reference Books:

1. Devlin, TM. Textbook of Biochemistry with Clinical correlations. 7th edition, Willey Liss, 2010.
2. Edward Staunton West, Wilbert R. Todd, Howard S. Mason and John T. Van Bruggen. Textbook of Biochemistry, 4th edition. Oxford & IBH publishing Co. Pvt.Ltd, 1996.
3. White, Handler and Smith. Mammalian Biochemistry. McGraw Hill publications, 2006.
4. Davidson and R. Passmore. Human Nutrition and Dietetics, ELBS, 8th Edition. ELBS, 1986.
5. Jeremy M. Berg, Lubert Stryer, John L. Tymoczko, Gregory J. Gatto. Biochemistry, 9th edition, W. H. Freeman & Co, 2015.

SEMESTER – V

L	T	P	C
5	0	0	5

(ELECTIVE-I) – PAPER - I

BIOCHEMICAL AND ENVIRONMENTAL TOXICOLOGY

SUBJECT CODE: U5BC25ET

Total Hours: 65

OBJECTIVES: The objectives of this course are to:

- Introduce students to the subject of toxicology in general and biochemical toxicology in particular;
- Make students aware of the various types of toxicant in the environment, and
- Teach students how toxicants interact with living systems, especially human

UNIT – I: TOXICOLOGY

(13 Hrs)

Definition and scope of toxicology: Eco-toxicology and its environment significance toxic effects. Basis for general classification & nature, dose - response relationship. Synergism and Antagonism, Determination of ED₅₀ and LD₅₀.

Acute and chronic exposures. Factors influencing toxicity. Pharmacodynamics and Chemodynamics.

UNIT – II: BIOCHEMICAL BASIS OF TESTING

(13 Hrs)

Principles and procedures of testing for acute toxic effects. Regulators guidelines, mammalian systems affected and the clinical signs of systemic toxicity. Factors affecting acute toxicity studies. Biochemical basis of toxicity. Mechanism of toxicity: disturbance of excitable membrane function altered calcium homeostasis. Covalent binding to cellular macromolecules. Genotoxicity. Tissue specific toxicity.

UNIT – III: TOXICITY TESTING

(13 Hrs)

Test Protocol, Genetic Toxicity Testing and Mutagenesis Assays: Invivo test systems- Bacterial Mutation Tests: Reversion Tests, Ames test, Fluctuation Tests & Eukaryote Mutation Tests In Vivo Mammalian Mutation Tests – host mediated assay & dominant lethal test. Use of drosophila in toxicity testing. DNA repair assays. Chromosome damage test. Toxicological Evaluation Of Recombinant DNA –Derived Proteins.

UNIT – IV: FOOD TOXICOLOGY

(13 Hrs)

Food toxicology: Role Of Diet In Cardio-Vascular Disease And Cancer. Toxicology of food additives. Metal toxicity: Toxicology Of Arsenic, Mercury, Lead And Cadmium. Environmental Factors Affecting Metal Toxicity- Effect Of Light, Temperature & PH. Diagnosis of toxic

changes in liver and kidneys: Metabolism Of Haloalkanes. Haloalkenes & Paracetamol With Their Toxic Effects On Tissues.

UNIT – V: AIR POLLUTION

(13 Hrs)

Common air pollutants and their sources. Air pollution and ozone. Air pollution due to chlorofluorocarbons (CFCs) and asbestos. Occupational toxicology and assessment of occupational hazards: industrial effluent toxicology and environmental health. An overview of regulatory agencies: responsibilities of regulatory agencies. Management of toxicological risk. Regulatory approaches. Regulatory systems and organizations.

OUTCOMES: Upon successful completion of this course, the student will be able to:

CO1	Understanding the basics and scope of toxicology
CO2	Basic knowledge on principles and procedures of testing for acute toxic effects
CO3	Awareness in Genetic Toxicity Testing and Mutagenesis Assays regarding the toxicity
CO4	Understanding the food toxicology
CO5	Basic knowledge on the management of toxicological risk, Regulatory systems and organizations about the air related toxicological effects
CO6	General awareness of biochemical toxicology
CO7	Awareness of the various types of toxicant in the environment and how toxicants interact with living systems, especially human.

Text Books:

1. N. Chaudhary. Biochemical Environmental Toxicology. Write and Print Publications, 2016.
2. A.W. Hayes and C.L. Kruger. Hayes; Principles and methods of toxicology, 6th edition. CRC press, 2014.

Reference Books:

1. Stewart CP and Stolman A. Toxicology: Mechanisms and Analytical Methods. Academic press, 2013.

SEMESTER – VI

L	T	P	C
5	0	0	5

HUMAN ANATOMY AND PHYSIOLOGY

SUBJECT CODE: U6BC21MT

Total Hours: 65

OBJECTIVES:

1. To provide the strong knowledge in the structure and functions of human body
2. To impart basic knowledge about digestive system, excretory system, and some other vital systems in the human body.
3. Familiarity in the structure and functions of organs.

UNIT-I: HUMAN SKELETAL SYSTEM

(13 HRS)

Basic structure of human body - bone, cartilage, ligaments and tendons. Classification of bones – long, short, flat. Axial and appendicular skeleton. Structure and formation of bone. Classification of joints. Clinical notes.

UNIT-II: DIGESTIVE AND EXCRETORY SYSTEM

(13 HRS)

Definition of Digestion, Absorption and defecation. Structure and function Human alimentary canal. Mechanism of HCl production. Role of enzymes and hormones (Gastrin, Secretin and cholecystokinin) involved in digestion and absorption of Carbohydrates, Lipids and Proteins.

Structure and function of kidney, nephrons. GFR, Mechanism of urine formation, Role of ADH in urine formation, Diabetes insipidus, Acute and Chronic Nephritis.

UNIT-III: RESPIRATORY AND CIRCULATORY SYSTEM

(14 HRS)

Structure and function of Lungs, Mechanism of respiration, transport of O₂ and CO₂, Oxygen Dissociation Curve, Role of hemoglobin in respiratory gas transport, Hypoxia.

Structure and function of Heart, Pulmonary and Systemic Circulations, Cardiac cycle, Blood vessels, Blood pressure, ECG and Ischemic heart diseases. Composition and functions of Lymph

UNIT-IV: NERVOUS AND MUSCULAR SYSTEM

(14 HRS)

Structure and function of Nerve cell and Nerve fibres, Synapses - Electrical and Chemical, Neurotransmitters, Resting and Action Potential, Transmission of Nerve impulses.

Structure of skeletal muscle, muscle proteins- myosin, actin, troponin and tropomyosin.
Mechanism of muscle contraction and relaxation.

UNIT-V: INTEGUMENTARY SYSTEM AND RADIOLOGICAL ANATOMY

(11 HRS)

The characteristics of skin, nail, and hair. Basic concept of skiagrams, special radiological investigation, IVP, CT scan, Ultrasound and MRI.

OUTCOMES: On successful completion of the course the students should have:

CO1	Basic knowledge on the basic structure of human body - bone, cartilage, ligaments and tendons
CO2	Understanding the structure and function human alimentary canal as well as the structure and function of kidney
CO3	Familiarity in the structure and functions of lungs and heart, mechanism of respiration as well as the pulmonary and systemic circulations
CO4	General awareness of nervous and muscular system and mechanism of muscle contraction
CO5	Knowledge in characteristics of skin, nail, and hair along with various methods and radiology techniques used in anatomy
CO6	Understanding the mechanism of vital organs of the human body
CO7	Understanding the structure and functions of human body - digestive system, excretory system, and other vital systems in the human body

Text books

1. Human Anatomy and Physiology - Ross and Wilson, International Edition 12th Ed., Elsevier, 2014.
2. Animal Physiology – N. Arumugam and A. Marimuthu, Saras Publications, 2014.

Reference books

1. Text Book of Human Physiology –Sarada Subramanyam, K. Madhyavankutty, 5th Edition, S Chand & Co Ltd., 2014.
2. Hand Book of Human Physiology, - Vidya Ratan, Jaypee Brothers Medical publishers Ltd., 7th edition, 2004.
3. Review of Medical Physiology, William. F.Ganong, 24th edition, Prentice – Hall International, Inc., 2012.
4. Essential of Medical Physiology – K. Sembulingam, 7th Edition, Jaypee Brothers Medical publishers Ltd., 2017.

SEMESTER – VI
CLINICAL BIOCHEMISTRY
SUBJECT CODE: U6BC22MT

L	T	P	C
5	0	0	5

Total Hours: 65

OBJECTIVES:

- To enable the students to learn the disorders of carbohydrate metabolism, lipid metabolism and amino acid metabolism.
- To impart basic knowledge on organ function tests of liver, pancreas, kidney and stomach.
- To acquaint the student with the concepts on diagnostic enzymology and tumour markers.

UNIT – I: DISORDERS OF CARBOHYDRATE METABOLISM (12 HRS)

Normal blood glucose level. Definition and causes of hypoglycaemia and hyperglycaemia. Renal threshold, Regulation of blood Glucose. Diabetes mellitus – Types, Diagnosis (blood sugar, HbA_{1c} and urinary sugar), Complications (chronic and acute) and Treatment.

Glucose tolerance test – oral and IV. Glycosuria – types. Lactose intolerance, Galactosemia, Fructose intolerance and Glycogen storage diseases.

UNIT – II: DISORDERS OF LIPID AND AMINO ACID METABOLISM (13 HRS)

Plasma lipids and lipoproteins – types. Hyperlipoproteinaemia – Types, I, II, III, IV and V. Hypolipoproteinaemia – Abeta lipoproteinaemia and Familial alpha-lipoprotein deficiency. LCAT deficiency. Atherosclerosis. Fatty liver.

Aminoaciduria and Proteinuria. Inborn errors of amino acid metabolism : Phenylketonuria, Alkaptonuria, Albinism, Tyrosinaemia, Cystinuria and Hartnup disease – Enzyme deficiency and Clinical features.

UNIT – III: LIVER FUNCTION TESTS AND PANCREATIC FUNCTION TESTS (14 HRS)

Functions of liver. Metabolism of bilirubin. Jaundice – classification, types and differential diagnosis. Liver function tests – van den Bergh test, Galactose tolerance test, Flocculation tests, Hippuric acid test, BSP test and Prothrombin time.

Composition of pancreatic juice. Estimation of amylase and lipase. Acute and chronic pancreatitis.

UNIT – IV: RENAL FUNCTION TESTS AND GASTRIC FUNCTION TESTS (14 HRS)

Functions of kidney. Renal function tests – Clearance tests – Urea, Creatinine and Inulin; Para amino hippuric acid test – Renal plasma flow and Filtration fraction; Concentration and dilution tests.

Collection of gastric contents. Examination of gastric contents. Fraction test meal – hyperchlorhydria, hypochlorhydria, achlorhydria and achylia gastrica. Histamine stimulation test. Tubeless gastric analysis.

UNIT – V: DIAGNOSTIC ENZYMOLOGY AND TUMOUR MARKERS (12 HRS)

Functional and non-functional plasma enzymes. Enzyme patterns in Liver disease (SGOT, SGPT and γ -GT), Myocardial infarction (CPK and LDH) and Pancreatitis (amylase and lipase). Isoenzymes – LDH.

Tumor markers – definition. Significance of Carcinoembryonic antigen (CEA), Alpha Fetoprotein (AFP) and human chorionic gonadotropin (hCG) as tumor markers.

OUTCOMES:

Upon completion of the course, the student

CO1	Understanding the disorders of carbohydrate metabolism
CO2	Importance of lipid and amino acid metabolism and disorders related to them.
CO3	Awareness on various liver function tests and pancreatic function tests
CO4	Knowledge on the renal function tests and gastric function tests
CO5	Applications of the enzymes used in diagnostic biochemistry and markers linked to tumour.
CO6	Comprehensive knowledge on the disorders of carbohydrate metabolism, lipid metabolism and amino acid metabolism.
CO7	Basic knowledge on organ function tests of liver, pancreas, kidney and stomach.

Text Books:

1. M.N. Chatterjee and Rana Shinde, Textbook of Medical Biochemistry, 8th Edition. Jaypee Brothers Medical Publishers (P) Ltd., 2012.
2. D.M. Vasudevan, Sreekumari S and Kannan Vaidyanathan. Textbook of Biochemistry for Medical Students, 8th Edition. Jaypee Brothers Medical Publishers (P) Ltd., 2016.
3. Ramnik Sood, Concise Book of Medical Laboratory Technology Methods and Interpretations. Jaypee Brothers Medical Publishers (P) Ltd., New Delhi, 2015.

Reference books:

1. Carl A. Burdis and Edward R. Ashwood. Tietz Textbook of Clinical Chemistry and Molecular Diagnostics, 5th Edition. Saunders, 2011.
2. Philip D. Mayne. Clinical Chemistry in diagnosis and treatment, 6th Edition. CRC Press, 1994.
3. TM.Devlin. Textbook of Biochemistry with clinical correlations, 7th Edition. John Wiley & Sons, 2010.

SEMESTER – VI

(ELECTIVE-II) – PAPER – II

BIOTECHNOLOGY

L	T	P	C
5	0	0	5

SUBJECT CODE: U6BC23ET

Total Hours: 65

OBJECTIVES:

1. To provide the basic knowledge on cloning methods
2. It provide the outline of the tissue culture techniques
3. It helps to know about applications of genetic engineering to the students.

UNIT – I: GENETIC ENGINEERING TOOLS

(13 Hrs)

Biotechnology: Definition and scope. rDNA technology; Genetic Engineering Tools -Restriction endonucleases – Types and Features; S1nucleases, DNA ligases, Reverse transcriptase, DNA polymerase, Terminal transferase, Linkers and Adaptors. Cloning vectors: plasmids – Basic feature, pBR322. Bacteriophage vectors-lambda phage, Cosmids, YAC, T-DNA based vectors and Expression vectors. Cloning hosts.

UNIT – II: METHODS OF GENE TRANSFER AND TECHNIQUES

(15 Hrs)

Methods of gene transfer - Transformation, Electroporation, Liposome-mediated gene transfer, and Microinjection. Recombinant selection and screening methods - Insertional inactivation. Techniques of cloning - Southern and Northern blotting techniques. Gene amplification – Principle of polymerase chain reaction and applications. RT-PCR. Principle of DNA sequencing Methods – Maxam and Gilbert sequencing.

UNIT – III: PLANT TISSUE CULTURE

(13 Hrs)

Plant tissue culture - Media composition and growth regulators.Types of Culture, initiation and differentiation.Callus and Suspension culture.Micro propagation, Somatic embryogenesis and Somoclonal variation.Protoplast isolation, Protoplast fusion and regeneration of plants.

UNIT – IV: ANIMAL CELL CULTURE

(13 Hrs)

Equipment and requirements for animal cell culture.Media for Animal cell culture - Natural and synthetic media.Substrate for animal cell culture.Establishment of cell culture.Primary culture, cell line and Stem cell culture.Application of Animal cell culture.

UNIT – V: APPLICATIONS OF BIOTECHNOLOGY

(11 Hrs)

Transgenic plants - Insect (Pest) resistance, Herbicide resistance, Stress tolerant.Transgenic animals – Transgenic mice, Gene knockout mice, Transgenic sheep - Dolly and Transgenic

pig.Molecular pharming – recombinant insulin and Tissue plasminogen activator (TPA).Introduction to SCP.Production of edible Mushrooms.GM food and GMO, Ethics in GM Food processing.

OUTCOMES: The knowledge derives from this course will give the skill-sets to the students for the

CO1	Information on various tools used in genetic engineering technology
CO2	Understanding the different methods of gene transfers in rDNA technology
CO3	Awareness on media composition and growth regulators as well as the types of culture, initiation and differentiation in plant tissue culture
CO4	Basic knowledge on animal cell culture techniques
CO5	Awareness on transgenic animals and plants in the application of Biotechnology
CO6	Understanding on culture media and tissue culture techniques
CO7	Basic knowledge on cloning methods, tissue culture techniques and applications of genetic engineering

Text books:

1. A.K. Srivastava, R.K. Singh and M.P. Yadav. Animal Biotechnology. Oxford & IBH, 2013.
2. H.D. Kumar. Molecular Biology and Biotechnology, Vivas publishing house (P) Ltd., 1997.
3. U. Satyanarayana, Biotechnology, 3rd Edition. Books and Allied (p) Limited, 2012.

Reference books:

1. D. Balasubramiam. Concepts in Biotechnology.Universal Press India, 2004.
2. M.K.Razdan, Introduction to Plant tissue culture. Oxford IBH Publisher, 2003.
3. Channarayappa. Molecular Biotechnology.Univ. Press, 2006.
4. A.K. Srivastava, R.K. Singh and M.P. Yadav. Animal Biotechnology. Oxford & IBH, 2013.

SEMESTER – VI
(ELECTIVE-III) – PAPER – III
IMMUNOLOGY

L	T	P	C
5	0	0	5

SUBJECT CODE: U6BC25ET

Total Hours: 65

OBJECTIVES:

1. To provide the basic concepts of immunology
2. This follows the course of immune response.
3. Knowledge on the various mechanisms by which microbial pathogens cause disease and the interaction with the host.

UNIT – I: BASIC CONCEPTS INVOLVED IN IMMUNOLOGY (12 Hrs)

Immunity- definition, classification, Innate immunity - physical, biochemical and genetic factors involved. Acquired immunity - Classification. Immune response: Humoral and Cell – mediated response tolerance. Organs of the immune system structure and function - Thymus, Bone marrow, spleen, lymph nodes, MALT. Cells of the immune system - Neutrophil, Eosinophil, Basophil, NK cell, Macrophage, Dendritic cells, Monocyte, T and B lymphocyte - Structure and function.

UNIT – II: ANTIGEN, ANTIBODY AND VACCINE (13 Hrs)

Antigen - definition, types, Properties - specificity, cross reactivities, antigenic determinants. Haptens. Adjuvants. Antibodies - General structure, properties, classes and subclasses.

Vaccination-; active and passive immunization, Immunity to bacteria and virus, Vaccine- definition, preparation, significance and types - rDNA vaccine, and DNA vaccine.

UNIT – III: ANTIGEN – ANTIBODY REACTION (12 Hrs)

Complement - properties, Activation pathways,. Antigen and Antibody interaction - Precipitation, Agglutination, Complement fixation, Opsonization, Phagocytosis, cytolysis, Flocculation. Assay of Ag and Ab reaction - Ouchterlony procedure.

UNIT – IV: TRANSPLANTATION, IMMUNODEFICIENCY DISORDERS (15 Hrs)

MHC - Structure and types. Transplantation - basic, classification, graft acceptance and graft rejection. Immunodeficiency disorders – classification, agammaglobulinaemia, SCID - outline of tumor cell - Diagnosis and treatment.

UNIT – V: HYPERSENSITIVITY, AUTOIMMUNE DISORDERS

(13 Hrs)

Allergy and Hypersensitivity – Types I, II, III and IV, Mechanism, Diagnosis and treatment. Autoimmune diseases - Definition, classification, mechanism of action - RA, Myasthenia gravis, Pernicious anemia, Type – I Diabetes Mellitus

OUTCOMES: On successful completion of the course the students should have:

CO1	Basic knowledge on immunology
CO2	Understanding the antigen, antibody and vaccine
CO3	Familiarity in reactions of antigen and antibody and importance of Complement
CO4	Awareness on the transplantation process and immunodeficiency disorders
CO5	Detail knowledge on Allergy, Hypersensitivity and autoimmune disorders
CO6	Understanding the terminology and techniques in microbiology and immunology.
CO7	Understanding the microbiology and immunology

Text Books:

1. I. Kannan. Immunology. MJP Publishers, Chennai-5, 2013.
2. Nandhini Shetty, Immunology Introductory, New Age international Private Ltd., 2007.

Reference Books:

1. Ivan Roitt and Jonathan Brastoff. Immunology, 8th Edition, David Male, 2012.
2. Thomas J. Kindt, Barbara A. Osborne and Richard A. Goldsby. Kuby Immunology, 6th Edition. W.H, Freeman and Company, New York, 2006.
3. Ivan M. Roitt and Peter J. Delves. Essential Immunology, 13th Edition. Blackwell Publishing, 2017.
4. Tizarrd. Immunology- An introduction, 4th Edition, Saunders College Publishing, 1995.

SEMESTER – VI

L	T	P	C
5	0	0	5

(ELECTIVE-II) – PAPER – II

PLANT BIOCHEMISTRY AND PLANT MOLECULAR BIOLOGY

SUBJECT CODE: U6BC24ET

Total Hours: 65

OBJECTIVES:

1. The objective is to provide a good working knowledge of the important biological processes in plants
2. To understand developments in plant biochemistry.
3. To provide basic knowledge in molecular mechanisms controlling plant growth, development, function and adaptation

UNIT – I: PHOTOSYNTHESIS

(13 Hrs)

Energy Generating Mechanism - Photosynthetic Pigment, Light and Dark reactions of photosynthesis, proton gradient and ATP synthesis of chloroplast. Bacterium and mitochondria, Mode of action of DCMU, Regulation of photosynthesis, bacteriorhodopsin, CAM metabolism, RUBISCO, photorespiration and crop productivity.

UNIT – II: NITROGEN METABOLISM AND PLANT HORMONES

(13 Hrs)

Nitrogen cycle Disotopes biochemistry of symbiotic and nonsymbiotic nitrogen fixation. Assimilation of ammonium.- carbon nitrogen ratio, uride metabolism, nitrate metabolism, genetics of nitrogen fixation, genetic manipulation of Nif genes, biosynthesis, mode of action, transport, distribution and physiological effect of auxin, gibberlin, cytokinin, Aba and ethylene.

UNIT – III: PLANT DISEASE AND SECONDARY METABOLITE

(13 Hrs)

Biochemistry of plant disease, defence mechanism of plants, biosynthesis, distribution and biological functions of industrially important secondary metabolite,(any 10) principles of plant diseased control.

UNIT – IV: PLANT PHYSIOLOGY

(13 Hrs)

Water relations of plant, mechanism of water absorption. Aquaporin symplast-apoplast concept. Ascent of sap, transpiration and stomatal mechanism. Source and sink relationship, translocation of inorganic and organic substances, bud and seed dormancy. Senescence, stress response in plant, phytochromes- properties, photochemicals, transformation, mode of action and physiological effect.

UNIT – V: PLANT MOLECULAR BIOLOGY AND BIOTECHNOLOGY (13 Hrs)

DNA polymorphism – importance of rflp and rapd in plant breeding management aspects of plant genetic engineering. Tacking, mapping and cloning of plant genes, selectable markers. Reporter genes and promoters used in plant vectors. Ti plasmids and crown gall tumor, genetic engineering of plant for disease resistance, cytoplasmic male sterility, edible oil, biodegradable plastics. Delay of fruits ripening. Methods and application of plant tissue culture.

OUTCOMES: Students will be able to

CO1	Basic knowledge on photosynthesis
CO2	Information on plant hormones and nitrogen metabolism
CO3	Awareness on plant disease and secondary metabolites
CO4	Understanding plant physiology and mechanism of water absorption
CO5	Familiarity with molecular mechanisms controlling plant growth, development, function and adaptation
CO6	Comprehensive knowledge on biological processes in plants
CO7	Understanding the developments in plant biochemistry

Text Books:

1. R.K. Sinha. Modern Plant Physiology. Narosa Publishing House, 2nd edition, 2014.
2. Heldt HW, Fiona H. Plant Biochemistry. Elsevier Academic Press, 3rd edition, 2005.

Reference Books:

1. Salisbury FB, Ross CW. Plant physiology. Australia : Cengage Learning publishers, 4th edition, 2009.
2. T.W. Goodwin. Introduction to Plant Biochemistry. New Delhi : CBS Publishers and Distributors, 2nd edition, 2003.

SEMESTER – VI
(ELECTIVE-III) – PAPER – III
BIONANOTECHNOLOGY

L	T	P	C
5	0	0	5

SUBJECT CODE: U6BC26ET

Total Hours: 65

OBJECTIVES:

1. To provide the basic knowledge on cloning methods
2. It provide the outline of the tissue culture techniques
3. It helps to know about applications of genetic engineering to the students.

UNIT – I: NANOBIMATERIALS

(14 Hrs)

Introduction-biocompatibility – anti-bacterial activity - principles involved-applications. Biomaterial nanocircuitry: protein based nanocircuitry: neurons for network formation. DNA nanostructures for mechanics and computing and DNA based computation: DNA based nanomechanical devices.

UNIT – II: NANOBIO TECHNOLOGY

(12 Hrs)

Interaction between biomolecules and nanoparticle surface, different types of inorganic materials used for the synthesis of hybrid nano-bio assemblies, application of nano in biology, nanoprobe for analytical applications- a new methodology in medical diagnostics and biotechnology, current status of nanobiotechnology, future perspectives of nanobiology, nanosensors.

UNIT – III: NANOMEDICINES

(13 Hrs)

Developing of nanomedicines nanosystems in use, protocols for nanodrug administration, nanotechnology in diagnostics applications, materials used in diagnostics and therapeutic applications- molecular nanomechanics, molecular devices, nanotribology, studying tribology at nanoscale, nanotribology applications.

UNIT – IV: MOLECULAR AND CELLULAR BIOLOGY

(13 Hrs)

Molecular and cellular biology applications, 2-D electrophoresis and mass spectrometry of proteins, Protein Microarrays (Fabrication – Fluorescence detection) - Binding Assays And Immunosensors- Integrated Nanobiotechnology Systems.

UNIT – V: BIOLOGICAL METHODS OF SYNTHESIS

(13 Hrs)

Use of Bacteria, Fungi, Actinomycetes for Nanoparticle Synthesis, Magnetotactic Bacteria for Natural Synthesis of Magnetic Nanoparticles: Mechanism Of Formation: Viruses As Components for the Formation of Nanostructured materials: Synthesis Process and application, Role of Plants in Nanoparticle Synthesis.

OUTCOMES: Upon successful completion of this course, students should be able to:

CO1	Basic knowledge innano-biomaterials used in Bionanotechnology
CO2	Knowledge on interaction between biomolecules and nanoparticle surface
CO3	Development of nanomedicines
CO4	Understanding the molecular and cellular biology techniques used in nanotechnology
CO5	Basic knowledge on nanoparticle synthesis
CO6	Understanding the fundamental principles of nanotechnology and their application to biomedical engineering
CO7	Knowledge on nanotechnology and its application in biological science

Text Books:

1. Bharat Bhusha, Springer Handbook of Nanotechnology, 4th edition, 2017.
2. A.K. Bandyopadhyay, Nanomaterials. New Age International Publishers, 2nd edition, 2010.

Reference Books:

1. Subbiah Balaji. Nanobiotechnology, MJP Publishers, 2010.
2. C.M.Niemeyer and C.A.Mirkin. Nanobiotechnology. Wiley India, 2013.

SEMESTER –VI
(SKILL BASED SUBJECT – IV)

L	T	P	C
3	0	0	2

PHARMACOLOGY AND PHARMACEUTICAL BIOCHEMISTRY

SUBJECT CODE: U6BC27ST

Total Hours: 39

OBJECTIVES:

- To impart knowledge on general pharmacology, metabolism and excretion of drugs and the biological mechanism of drug action.
- To understand the actions and uses of drugs acting on central and autonomous nervous system, cardiovascular system and chemotherapeutic drugs.
- To create awareness on novel therapeutics such as enzymes, antioxidants, gene therapy, recombinant vaccines and monoclonal antibodies.

UNIT – I: GENERAL PHARMACOLOGY, DRUG METABOLISM AND EXCRETION

(7 Hrs)

Introduction and definitions. The sources of drugs. Dosage forms. Routes of drug administration – Local, Oral or enteral and Parenteral routes.

Drug metabolism – Phase I reactions. P₄₅₀ monooxygenase system. Phase II reactions. First-pass metabolism. Pharmacologically active drug metabolites. Renal excretion of drugs and drug metabolites, Tubular excretion and reabsorption.

UNIT – II: BIOLOGICAL MECHANISM OF DRUG ACTION

(8 Hrs)

Pharmacodynamics and biological mechanism of drug action: Site and Principles of drug action; Mechanism of drug action – Enzymes, Ion channels, Transporters and Receptors (channel-linked, G protein-coupled, kinase-linked and receptors that regulate gene transcription). Agonist, Antagonist, Partial agonist and Inverse agonist.

UNIT – III: DRUGS ACTING ON CENTRAL AND AUTONOMOUS NERVOUS SYSTEM

(8 Hrs)

Classification and mechanism of analgesics-antipyretics–nonsteroidal anti-inflammatory drugs – NSAIDs and inhibition of prostaglandin synthesis. Structure, pharmacological actions and therapeutic uses of: Analgesics – Salicylates (aspirin); Antipyretics – para-amino phenol derivatives (Paracetamol); Nonsteroidal anti-inflammatory drugs – Propionic acid derivatives (Ibuprofen).

Classification of adrenergic drugs and adrenergic blocking drugs, Structure, pharmacological actions and therapeutic uses of: Adrenergic drugs – Catecholamines (Adrenaline), noncatecholamines (Ephedrine); Adrenergic blocking drugs – α -blockers (Ergot alkaloids); β -blockers (Propranolol).

UNIT – IV: CARDIOVASCULAR DRUGS AND CHEMOTHERAPY (8 Hrs)

Classification of antihypertensives. Structure, pharmacological actions and therapeutic uses of: β -adrenergic blockers (Atenolol); Vasodilators (Hydralazine); ACE inhibitors (Captopril).

Chemotherapy of Malaria, Bacterial infections, Tuberculosis and Malignancy – Structure, pharmacological actions and therapeutic uses of Primaquine, Ampicillin, Isonicotinic acid hydrazide (Isoniazid) and Methotrexate.

UNIT – V: NOVEL THERAPEUTICS (8 Hrs)

Enzymes in therapy: Hyaluronidase, Streptokinase, Chymotrypsin and Serratiopeptidase. Vitamins and Antioxidants in therapy: Retinol, Thiamine, Ascorbic acid, Selenium.

Gene therapy: Ex-vivo (therapy for adenosine deaminase deficiency); In-vivo (gene therapy strategies for cancer). Recombinant vaccine for cholera. Monoclonal antibodies (McAb) – Production of McAb; McAbs as targeting agents in therapy.

OUTCOMES:

Upon completion of the course, the student

CO1	Knowledge on general pharmacology, drug metabolism and excretion of drugs
CO2	Understanding the biological mechanism of drug action
CO3	Awareness on drugs acting on central and autonomous nervous system
CO4	Familiarity in cardiovascular drugs and chemotherapy mechanism
CO5	Awareness on novel therapeutics such as enzymes, antioxidants, gene therapy, recombinant vaccines and monoclonal antibodies.
CO6	Knowledge on general pharmacology, metabolism and excretion of drugs and the biological mechanism of drug action.
CO7	Understanding the actions and uses of drugs acting on central and autonomous nervous system, cardiovascular system and chemotherapeutic drugs.

Text books:

1. R.S. Satoskar, Nirmala N. Rege, Raakhi K. Tripathi and S.D. Bhandarkar. S.D. Pharmacology and Pharmacotherapeutics, 25th Edition. Elsevier, 2017.

2. K.D. Tripathi. Essentials of Medical Pharmacology, 7th Edition. Jaypee Brothers Medical Publishers, 2013.
3. S.D. Seth and Vimlesh Seth. Text Book of Pharmacology. 3rd Edition. Elsevier, 2008.
4. U. Satyanarayana. Biotechnology. Books & Allied Ltd., 2008.

Reference Books:

1. Humphrey P. Rang and Mauren M. Dale, James M. Ritter and Rod J. Flower. Rang & Dale's Pharmacology, 8th Edition. Churchill Livingstone, 2015.
2. James M. Ritter, Lionel D. Lewis, Timothy G.K. Mant and Albert Ferro. A Textbook of Clinical Pharmacology and Therapeutics. 5th Edition. Hodder Arnold, 2008.
3. Laurence L. Brunton, Bjorn Knollman and Randa Hilal-Dandan. Goodman and Gilman's The Pharmacological Basis of Therapeutics. 13th Edition. McGraw-Hill Education, 2017.

CORE PRACTICAL – III
BLOOD ANALYSIS AND ENZYMOLOGY
SUBJECT CODE: U6BC21MP

L	T	P	C
0	0	4	5

Total Hours: 104

Objective

1. The course also aims to outline the applications of enzymes in disease diagnosis.
2. It diverse diagnosis therapy as well as role of enzyme in industry.

I. COLORIMETRIC ESTIMATIONS

1. Estimation of Glucose by O-T Method
2. Estimation of Creatinine by Jaffe's method
3. Estimation of Cholesterol by Zak's Method
4. Estimation of Bilirubin by Malloy-Evelyn Method
5. Estimation of Haemoglobin by Drabkin's Method
6. Estimation of Albumin and A/G ratio in Serum
7. Estimation of DNA by diphenylamine method
8. Estimation of RNA by Orcinol method
9. Estimation of Fibrinogen

II. ENZYME ASSAY

1. Effect of pH, Temperature and Substrate concentration for Amylase and Urease
2. Assay of Activity of Serum Transaminases – SGOT, SGPT

III. SEPARATION TECHNIQUES(Group Experiments)

1. Separation DNA by Agarose Gel Electrophoresis
2. Separation of Proteins by SDS – PAGE

OUTCOMES:

CO1	Analysis of biochemical constituents of blood
CO2	Ability to perform enzyme assays
CO3	Familiarity in the Separation of DNA by Agarose Gel Electrophoresis and Separation of Proteins by SDS – PAGE

Reference Books:

1. D.T. Plummer. An Introduction to Practical Biochemistry. Tata McGraw-Hill, 3rd Edition, 1987 (Reprint 2015)

2. J. Jayaraman. Laboratory Manual in Biochemistry, 2ND Ed., New Age International Publishers, 2011.
3. T.N. Pattabiraman. Laboratory Manual in Biochemistry, 3rd Ed.. All India Publishers & Distributors, 3rd Edition, 2015.
4. H. Varley. Practical Clinical Biochemistry, 4th Edition, CBS Publishers, 2008.

ELECTIVE PRACTICAL – IV
FOOD ANALYSIS, MICROBIOLOGY AND SEPARATION
TECHNIQUES

L	T	P	C
0	0	3	4

SUBJECT CODE: U6BC22EP

Total Hours: 78

Objective

To impart basic understanding of microbial techniques by hands on experience on working with microorganisms.

FOOD ANALYSIS

1. Determination of ash and moisture content.
2. Estimation of Carbohydrate by Anthrone method.
3. Estimation of Protein by Biuret method.
4. Estimation of Ascorbic acid.
5. Estimation of Iron.
6. Estimation of Inorganic Phosphorous from Ash.
7. Estimation of pyruvate.
8. Titrable acidity of Milk.
9. Assay of catalase from the plant source.

CLINICAL MICROBIOLOGY

1. Isolation of pure culture.
2. Serial dilution.
3. Staining techniques – simple, gram's staining, capsule and fungal staining.

SEPARATION OF BIOLOGICAL COMPOUND

1. Separation of Carbohydrate and Aminoacid by Paper Chromatography.
2. Separation of Lipid by TLC.

ISOLATION OF BIOCHEMICAL COMPOUND

1. Isolation of DNA.
2. Isolation of RNA.
3. Isolation of Fat.

DEMONSTRATION

1. ELISA.
2. Denaturation of nucleic acid by UV absorption method.

OUTCOMES:

CO1	Analysis of basic components in food samples
CO2	Isolation of pure culture, Serial dilution and Staining techniques in microbiology
CO3	Familiarity in separation of biological compound such as Carbohydrate and Amino acid by Paper Chromatography and separation of Lipid by TLC

Reference Books:

1. D.T. Plummer. An Introduction to Practical Biochemistry. Tata McGraw-Hill, 3rd Edition, 1987 (Reprint 2015)
2. J. Jayaraman. Laboratory Manual in Biochemistry, 2ND Ed., New Age International Publishers, 2011.
3. T.N. Pattabiraman. Laboratory Manual in Biochemistry, 3rd Ed.. All India Publishers & Distributors, 3rd Edition, 2015.
4. H. Varley. Practical Clinical Biochemistry, 4th Edition, CBS Publishers, 2008.

ADHIPARASAKTHI COLLEGE OF ARTS & SCIENCE,

(Autonomous)

Permanently Affiliated to Thiruvalluvar University, Vellore

Accredited by NAAC with B⁺⁺ Grade

B.Sc BIOCHEMISTRY

Under CBCS

(Effective from the Academic Year 2018-2019)

Regulations

CBCS

Choice-Based Credit System is a flexible system of learning. 'Credit' defines the quantum of contents / syllabi prescribed for a course, and determines the number of hours of instruction required. The distinguishing features of CBCS are the following:

It permits the students to:

- ❖ Learn at their own pace
- ❖ Choose electives from a wide range of elective courses offered by the departments of the college.
- ❖ Undergo additional courses and acquire more than the required number of credits
- ❖ Adopt an inter – disciplinary approach in learning
- ❖ Make best use of the expertise of available faculty

1. Eligibility for Admission:

Candidates seeking admission to the first year of the Degree of Bachelor of Science Courses, shall be required to have passed the Higher Secondary Examinations [Academic or Vocational Stream] conducted by the Government of Tamil Nadu or an Examination accepted as equivalent thereto by the Syndicate of the Thiruvalluvar University.

The Upper age limit for admission to UG Degree Courses will be 21 (twenty one) years as on 1st July of the year of admission. For SC/ST/BC/MBC/DNC candidates and women candidates the age limit is relaxed by 3 years. For other communities, the Principals can relax up to three years based on merit. A relaxation of 5 years is permitted for Physically Handicapped as per G.O. Ms No.239, dated 03.09.1993.

Provided that candidates for admission into the specific main subject of study shall also possess such other qualifying conditions as may be prescribed by the University in the Regulations governing respective courses of study.

ELIGIBILITY FOR ADMISSION TO B.Sc. BIOCHEMISTRY

Candidate for the Degree of Bachelor of Science in Biochemistry shall be required to have passed the Higher Secondary Examination [10 + 2 year] conducted by the Government of Tamil Nadu, or an Examination accepted as equivalent there to by the Academic Council, subject to conditions as may be prescribed. Candidates should have studied one of the following Subjects at the +2 level.

- 1) Biochemistry
- 2) Biology [Zoology + Botany]
- 3) Zoology
- 4) Botany
- 5) Chemistry
- 6) Biotechnology
- 7) Nutrition and Dietetics
- 8) Nutritional Biochemistry
- 9) Or Any other subject related to Bioscience

2. Eligibility for the Award of Degree:

A Candidate shall be eligible for the award of the Degree only if he/she has undergone the prescribed course of study in the college for a period of not less than three academic year and passed the examinations of all the Six Semesters prescribed earning 140 credits [in parts - I, II, III, IV and V].

3. Duration:

- a. Each academic year shall be divided into two semesters. The first academic year shall comprise the first and second semesters, the second academic year, the third semester and fourth semesters and the third academic year, the fifth and sixth semesters respectively.
- b. The odd semesters shall consist of the period from June to November of each year and the even semesters from December to April of each year. There shall be not less than 90 working days for each semester.

4. Course of Study:

The main subject of study for Bachelor Degree Courses shall consist of the following:

PART – I	TAMIL / OTHER LANGUAGES
PART – II	ENGLISH
PART – III	CORE SUBJECTS
	ALLIED SUBJECTS
	PROJECT / ELECTIVES WITH THREE COURSES

PART – IV

1. [a]. Those who have not studied Tamil up to XII Std. and taken a Non-Tamil Language under Part – I shall take Tamil comprising of two courses [level will be at 6th standard].
[b]. Those who have studied Tamil up to XII Std. and taken a Non-Tamil Language under Part – I shall take Advanced Tamil comprising of two courses.
[c]. others who do not come under a/b can choose non-major elective comprising of two courses.
2. SKILL BASED SUBJECTS [ELECTIVE]:
Four courses are to be offered. The papers are to be accommodated in the second / third year of study for UG courses.
3. ENVIRONMENTAL STUDIES
4. VALUE EDUCATION

PART – V EXTENSION ACTIVITIES

Extension Activities:

A Candidate shall be awarded a maximum of 1 credit for Compulsory Extension Service.

All the students shall have to enroll for NSS / NCC / NSO [Sports and Games] Rotract / Youth Red Cross or any other service organization in the college and shall have to put in compulsory minimum attendance of 40 hours which shall be duly certified by the principal of the college before 31st Mach in a year. If a student LACKS 40 hours attendance in the First year, he/she shall have to compensate the same during the subsequent years.

Students those who complete minimum of attendance of 40 hours in one year will get Half Credit and those who complete the attendance of 80 or more hours in two years will get ONE CREDIT.

Literacy and population Education Field Work shall be compulsory components in the above Extensions service activities.

The following assessment procedure will be followed for Internal Marks:

Continuous Internal Assessment [CIA] Test

S.No	Reg. No	Name	Test I Marks For 75	Test II Marks For 75	Marks For 150	Marks Converted to 15/20	Assignments /Seminars [10] Records [05]	Marks For 25 / 25	Total Rounded to Marks for 25 / 25

Test I : Three hour duration for 75 marks

Test II : Three hours duration for 75 marks

Total marks	150		Theory		Practical
Test marks to be converted to	:	15 marks	/	20 marks	
Assignments / Seminars	:	10 marks	/	-	
Records	:	-	/	05 marks	
Total	:	25 marks	/	25 marks	

In the column Rounded to 25 / 25, any fraction may be rounded to the next number.

6. Requirements for proceeding to Subsequent Semester:

- Candidates shall register their names for the First Semester Examination after the admission in the UG Courses.
- Candidates shall be permitted to proceed from the First Semester up to Final Semester irrespective of their failure in any of the Semester Examination subject to the condition that the candidates should register for all the arrear subject of earlier semesters along the current [subsequent] Semester subjects.
- Candidates shall be eligible to go to subsequent semester, only if they earn sufficient attendance as prescribed therefore by the Academic Council from time to time. Provided in case of a candidate earning less than 65% of attendance in any one of the Semesters due to any extraordinary circumstances such as medical grounds, such candidate who shall produce Medical Certificate issued by the Authorised Medical Attendant [AMA], duly certified by the Principal pf the College, shall be permitted to proceed to the next semester and to complete the course of study. Such candidates shall have to repeat the missed Semester by rejoining after completion of Final Semester of the course, after paying the fee for the break of study as prescribed by the College from time to time.

7. Requirements to take the Semester Examinations

- a] A candidate will be permitted to take the Examination of any Semester, if
 - i] He/She secures not less than 75% of attendance out of the 90 instructional days during the semester. [In the case of married women students the minimum attendance requirement shall be 55% of total instructional days].
 - ii] He / She earns a Progress Certificate from the Head of the Institution, of having satisfactorily completed the prescribed course of study in the subject as required by these Regulations, and
 - iii] His / Her conduct has been satisfactory.

Provided that it shall be open to the Academic Council or any authority delegated with such powers by the Academic council to grant exemption to a candidate who has fail to earn 75% of the attendance prescribed for any valid reason[s] subject to the usual conditions.

- b] A candidate who has secured attendance less than 75% but 65% and above shall be permitted to take the Examination on the recommendation of the Head of the Institution to condone the lack of attendance as well as on the payment of the prescribed fees to the College.

8. Passing Minimum:

A Candidate shall be declared to have passed the whole examination, if he/she passes in all the papers and practicals wherever prescribed / as per the scheme of examinations by earning 140 CREDITS in parts – I, II, III, IV and V. He / She shall also fulfill the extension activities prescribed earning one credit to qualify for the Degree.

In fixing the passing minimum marks, the following will be observed:

- [a]. There shall be no Passing Minimum For Internal
- [b]. For External Examinations, Passing Minimum shall be of 40% [Forty Percentage] of the maximum marks prescribed for the paper.
- [c]. In the aggregate [External + Internal] the Passing Minimum shall be 40% for each paper / practical.
- [d]. Grading shall be based on overall marks obtained [Internal + External].

Grading:

Once the marks of the CIA and end-semester examinations for each of the course are available, they will be added. The mark thus obtained will then be graded as per details given below:

Marks	Grade Point	Letter Grade	Class
100	7.00	H	First Class with Distinction
90-99	6.00	O	First Class with Distinction
75-89	5.50	D	First Class with Distinction
60-74	4.75	A	First Class
50-59	4.00	B	Second Class
40-49	3.50	C	Third
Below 40	3.00	F	Fail

From the second semester onwards the total performance within a semester and continuous performance starting from the first semester are indicated respectively by **Grade Point Average [GPA]** and **Cumulative Grade Point Average [CGPA]**. These two are calculated by the following formulae:

$$\text{GPA} = \frac{\sum_{i=1}^n C_i G_i}{\sum_{i=1}^n C_i}$$

Where 'C_i' is the credit earned for the course 'i' in any semester; 'G_i' is the Grade Point obtained by the student for the course 'i' and 'n' is the number of courses passed in that semester.

CGPA=GPA of all the courses starting from the first semester to the current semester.

Note: The GPA and CGPA shall be calculated separately for the following three parts:

For purpose of declaring a candidate to have qualified for the Degree of Bachelor of Arts / Science / Commerce / Management / Literature in the First Class / Second Class / Third Class or First Class with Distinction, the marks and the corresponding CGPA earned by the candidate in part III alone will be the criterion, provided he / she has secured the prescribed passing minimum in LCs and ELCs.

Grade in Parts IV and V be shown separately and it shall not be taken into account for classification.

9. Classification of Successful Candidates:

PART – I TAMIL / OTHER LANGUAGES:

Successful candidates passing Examinations for the Language and securing the marks [i] 60 percent and above and [ii] 50 percent and above, but below 60 percent in the aggregate shall be declared to have passed the examination in the First and Second Class, respectively. All other successful candidates shall be declared to have passed the examination in the Third Class.

PART – II ENGLISH:

Successful candidates passing Examinations for English and securing the marks [i] 60 percent and above and [ii] 50 percent and above, but below 60 percent in the aggregate shall be declared to have passed the examination in the First and Second Class, respectively. All other successful candidates shall be declared to have passed the examination in the Third Class.

PART – III consisting of CORE SUBJECTS, ALLIED SUBJECTS, PROJECT / ELECTIVES

Successful candidates passing Examinations for Core Courses together and securing the marks [i] 60 percent and above and [ii] 50 percent and above but below 60 percent in the aggregate of the marks prescribed for the Core Courses together shall be declared to have passed the examination in the First and Second Class, respectively. All other successful candidates shall be declared to have passed the examination in the Third Class.

PART – IV: [Consisting of sub items 1 (a), (b) and (c), 2, 3, 4 and 5] as furnished in the Regulations 4 part – IV supra.

PART – V EXTENSION ACTIVITIES:

The only credit earned for Part V Extension activities of a Successful Candidate SHALL NOT BE taken into consideration for Classification / Ranking / Distinction.

10. RANKING

Candidates who pass all the examinations prescribed for the course in the First Appearance itself alone are eligible for Ranking;

Provided in the case of Candidates who pass all the examinations prescribed for the course with a break in the First Appearance due to the reasons as furnished in the Regulation 7.[iii] Supra are eligible for Classification / Distinction.

The marks obtained in improvement examination will not be taken into consideration for Ranking.

11. The Medium of Instruction and Examinations

The medium of Instruction and Examinations for the papers under part I and II shall be in language concerned. For Parts III and IV, the medium of Instruction and Examinations shall be English.

12. Submission of Record Notebooks for Practical Examinations

Candidates taking the Practical Examinations should submit bonafide Record Notebook prescribed for the Practical Examinations. Otherwise the candidate will not be permitted

to take the practical Examinations. However, in genuine case where the students could not submit the record notebook may be permitted to take the Practical Examinations provided the Head of the Department concerned certifies that the candidate has performed the experiments prescribed for the Course. For such of those candidates who do not submit Record Books, zero [0] marks will be awarded for record notebooks.

In case a candidate fails in the Practical Examination the marks awarded for the record at the time of first appearance for the Practical Examination should be made available by the University to the Examiners at the subsequent appearance by the candidate.

13. Improvement of marks in the subjects already passed

Candidates who have passed in theory paper / papers are allowed to appear again for theory paper / papers only once in order to improve his/her marks, by paying the fee prescribed from time to time. Such candidates are allowed to improve within a maximum period of 10 semesters counting from his/her first semester of his/her admission. If candidate improves his marks, then his improved mark will be taken into consideration for the award of Classification and Distinction only. Such improved marks will not be counted for the award of Prize / Medals and Rank. If the Candidate does not show improvement in the marks, his previous marks will be taken into consideration.

No candidate will be allowed to improve marks in the Practical and Field work.

14. Checklist for Inspection

- a. Qualification for
 - i. Teaching Faculty : as Prescribed by the UGC and the University
 - ii. Technical Faculty : as Prescribed by the UGC and the University
 - iii. Laboratory Staff : as Prescribed by the UGC and the University
- b. Infrastructure Facilities
 - i. Building : Number of Classrooms with specifications: 3 rooms measuring 20'X 25'. If the class strength is above 50, the space shall increase by 10 sq.ft per student.
Number of Staff rooms: One measuring 20' X 20'
 - ii. Furniture : One pair of table / chair per student
 - iii. Laboratory @ 10 Sq. ft. per student

PATTERN OF QUESTION PAPER

Part – A [50 words]

To Answer 10 questions

10 X 2 marks = 20 marks

Part – B [200 words]

To Answer 5 questions (either / or pattern)

5 X 5 marks = 25 marks

Part – C [500 words]

To Answer 3 questions out of 5 questions

3 X 10 marks = 30 marks

Total = 75 marks

ADHIPARASAKTHI COLLEGE OF ARTS & SCIENCE
G.B.NAGAR, KALAVAI-632506 (AUTONOMOUS STATUS)
AFFILIATED TO THIRUVALLUVAR UNIVERSITY, VELLORE

DEGREE COURSES

M.Sc. Biochemistry

(With effect from 2018-2019)

The course of study and the scheme of examination

Year/ Semester	Subject	Paper	Subject code	Title of the paper	Ins. Hrs/ week	Credit	Exam Hrs.	Max. Mark		
								CIA	ESE	Total
I Year I Semester	Core	Paper I	P1BC21MT	Chemistry of Macromolecules	5	4	3	25	75	100
	Core	Paper II	P1BC22MT	Cell Biology & Genetics	5	4	3	25	75	100
	Core	Paper III	P1BC23MT	Biophysical and Analytical Techniques	5	4	3	25	75	100
	Core Practical	Practical – I			5	--	--	--	--	--
	Core Practical	Practical – II			5	--	--	--	--	--
	Elective I (to choose 1 out of 2)	Paper I	P1BC24ET	Chemistry and Nanoscience for Biologists	5	4	3	25	75	100
			P1BC25ET	Genetic Engineering						
					30	16		100	300	400
I Year II Semester	Core	Paper IV	P2BC21MT	Bioenergetics & Intermediary Metabolism	5	5	3	25	75	100
	Core	Paper V	P2BC22MT	Enzyme & Enzyme technology	4	4	3	25	75	100
	Core	Paper VI	P2BC23MT	Advanced Biotechnology.	5	4	3	25	75	100
	Core Practical	Practical – I	P2BC21MP	Isolation and characterization studies and Quantitative Analysis	5	5	6	25	75	100
	Core Practical	Practical – II	P2BC22MP	Enzymology and Plant Biochemistry	5	5	6	25	75	100
	Elective II (to choose 1 out of 2)	Paper II	P2BC24ET	Plant Biochemistry & Plant Ecology	4	4	3	25	75	100
			P2BC25ET	Bioinformatics						
			P2HR21GS	Human Rights	2	2	3	25	75	100
					30	29		175	525	700
TOTAL					60	45		275	825	1100

Year/ Semester	Subject	Paper	Subject code	Title of the paper	Ins. Hrs/ week	Credit	Exam Hrs.	Max. Mark		
								CIA	ESE	Total
II Year III Semester	Core	Paper VII	P3BC21MT	Hormones & Signal transduction	5	4	3	25	75	100
	Core	Paper VIII	P3BC22MT	Research Methodology	5	4	3	25	75	100
	Core	Paper IX	P3BC23MT	Molecular Biology and Bioethics	5	4	3	25	75	100
	Core	Paper X	P3BC24ET	Phytochemistry and phytotherapy	3	3	3	25	75	100
	Core Practical	Practical – III			4	--	--	--	--	--
	Core Practical	Practical – IV			4	--	--	--	--	--
	Elective III (to choose 1 out of 2)	Paper III	P3BC25ET	Immunology and Stem Cell Technology	4	4	3	25	75	100
			P3BC26ET	Pharmaceutical Biochemistry						
					30	19		125	375	500
II Year IV Semester	Core	Paper X	P4BC21MT	Human Physiology and Nutrition	5	4	3	25	75	100
	Core	Paper XI	P4BC22MT	Advanced Clinical Biochemistry	5	4	3	25	75	100
	Core Practical	Practical – III	P4BC21MP	Biochemical Analysis of Blood, Antioxidant and Immunological Studies	5	5	6	25	75	100
	Core Practical	Practical – IV	P4BC22MP	Haematological Methods, Urine Analysis and Microbial Biochemistry	5	5	6	25	75	100
	Core		P4BC21PV	Project work with Viva-Voce	10	8	3	50	150	200
					30	26		150	450	600
Total					60	45		275	825	1100
Grand total hours & credit					180	90		550	1650	2200

SEMESTER - I
CHEMISTRY OF MACROMOLECULES
SUBJECT CODE: P1BC21MT

L	T	P	C
5	0	0	4

Total Hours: 65

OBJECTIVE:

1. To provide the knowledge on various bio-molecules and its significance.
2. To impart basic knowledge about role and function of macromolecules.
3. Comprehensive knowledge about composition of macromolecules

UNIT – I: HOMO AND HETEROGLYCANS

(13 Hrs)

Polysaccharides – occurrence, structure, properties and functions of homoglycans – starch, glycogen, cellulose, chitins. Heteropolysaccharides – structure and biological role of glycosaminoglycans – bacterial cell wall polysaccharides, Structure and biological importance of sugar derivatives, Phosphate esters, NTPs, Amino Sugars derivatives, Sugar acids, lactones, deoxy sugars and glycosides, Blood group substances. Glycoprotein – structure, types and biological applications. Lectin - structure and functions.

UNIT – II: PROTEINS

(14 Hrs)

Classification of proteins on the basis of solubility, shape and biological functions. Isolation and purification of proteins. Denaturation and renaturation of proteins. Primary structure – determination of amino acid sequence of proteins. Peptide bond - Ramachandran plot. Secondary structure – α -helix, β -sheets and β -turns. Pauling and Corey model for fibrous proteins. Collagen triple helix. Super secondary structures – helix-loop-helix. Tertiary structure – alpha and beta domains. Quaternary structure - structure of hemoglobin. Chemical synthesis of peptides – Merrifield method.

UNIT – III: NUCLEIC ACIDS

(14 Hrs)

Watson-Crick model of DNA structure. A, B and Z – DNA Cruciform structure - formation. slipped mispaired DNA, parallel stranded, anisomorphic DNA, palindrome DNA, secondary and tertiary structure of RNA, hnRNA, denaturation, strand separation, fractionation, isolation and purification of DNA, cot value curve, hypochromic effect, RNA – major classes and biological role. Structure of tRNA. DNA-protein interactions (Histone).

UNIT – IV: LIPIDS

(12 Hrs)

Lipids – classification, saturated and unsaturated fattyacids, phospholipids – classification, structure and functions of Ceramides and Sphingomyelins. Eicosanoids - structure and functions of prostaglandins, thromboxanes, leukotrienes, types and functions of plasma lipoproteins. Amphipathic lipids – membranes, micelles, emulsions and liposomes. Steroids – structure, properties, functions of cholesterol, ergosterol, phytosterol.

UNIT – V: VITAMINS AND PORPHYRINS

(12 Hrs)

Vitamins: Water soluble – thiamine, riboflavin, niacin, pyridoxine, folic acid, ascorbic acid – sources, structure, biochemical functions, deficiency diseases, daily requirements; fat soluble – vitamin A, vitamin D, vitamin E and vitamin K – sources, structure, biochemical functions, deficiency diseases, daily requirements. Porphyrin – definition, structure, significance and properties – Haem, Chlorophyll and Cytochrome.

OUTCOME: On successful completion of the course the students

CO1	Classification of carbohydrates along with their functions.
CO2	Awareness on the structure, classification and functions of amino acids and proteins.
CO3	Knowledge of nucleic acids along with their functions.
CO4	Nomenclature of lipids and their functions.
CO5	Basic knowledge on structure and biological functions of heterocyclic compounds and porphyrins and vitamins
CO6	Understanding the significance of the complex bio molecules such as polysaccharides, lipids, proteins, nucleic acids, vitamins and porphyrins.
CO7	Comprehensive knowledge about vitamins and porphyrins

Text Books:

1. D.L. Nelson and M.M. Cox. Lehninger's Principles of Biochemistry, 7th Edition, Freeman Publishers. 2017.
2. T. M. Devlin. Text book of Biochemistry with clinical correlation. Wiley publications, 7th edition, 2010.

Reference Books:

1. J. M. Berg, L. Stryer, J. L. Tymoczko, G.J. Gatto. Biochemistry, 9th edition, W. H. Freeman & Co, 2015.
2. D. Voet and J.G. Voet, Fundamentals of Biochemistry, 5th Edition. John Wiley, 2016.
3. G.L. Zubay. Biochemistry, WCB Publishers / Wm.C. Braun Publishers, 4th Edition. 1996.
4. Conn and Stumpf, Biochemistry, Wiley publishers, 5th Edition. 2006.

SEMESTER – I
CELL BIOLOGY AND GENETICS

L	T	P	C
5	0	0	4

Total Hours: 65

SUBJECT CODE: P1BC22MT

OBJECTIVE:

1. The study of cell biology and genetics
2. This course aims to improve the understanding cell, cellular organelles and genetics of living systems.
3. To give basic knowledge on molecular genetics

UNIT– I: CELLULAR ORGANISATION, DIVISION AND TRANSPORT
(13 Hrs)

Cell types – organization of prokaryotic and eukaryotic cells, Membrane assembly – importins and exportins. Membrane transport. Diffusion (passive and facilitated) active transport (symport, antiport, Na^+ , K^+ -ATPase), ion gradients, ion selective channels, group translocations, porins, endocytosis and exocytosis. The cell cycle: regulation by cyclins and cyclin-dependent kinases. Check points in cell cycle regulation.

UNIT – II: CELLULAR COMMUNICATION AND CELL DEATH
(12 Hrs)

Differentiation of cell membrane – microvilli, tight junctions, epithelia, cell and spot desmosomes – mechanical function, cell–cell interaction, cell adhesion proteins. Programmed cell death – Brief outline of apoptosis. Differences between apoptosis and necrosis.

UNIT – III: PROTEIN TRAFFICKING
(14 Hrs)

Selective transport of proteins to the nucleus and from the nucleus. Regulation of nuclear protein import and export. Targeting proteins to ER, smooth ER. ER export and import of proteins and lipids. Golgi - Protein sorting and export. Mechanism - Vesicular transport, cargo selection, coat proteins and vesicle budding, vesicle fusion. Mitochondria - Protein import and export. Chloroplast - protein import and sorting.

UNIT – IV: MOLECULAR GENETICS
(14 Hrs)

Genetics – Definition and scope of Genetics. Chromosomes, gene, dominant allele, recessive allele, genotype, phenotype. Phenomenon of dominance – Mechanism, complete, incomplete and codominance. Law of segregation – Mechanism. Law of independent assortment – Dihybrid cross, Back cross and test cross. Non mendelian inheritance.

UNIT – V: DNA MUTATION, REPAIR, RECOMBINATION AND TRANSPOSON

(12 Hrs)

Mutations and molecular mechanisms of mutations, effects of mutations in proto-oncogenes, Karyotyping. DNA repair mechanisms – direct repair, excision repair, mismatch repair, recombination repair, SOS response, eukaryotic repair systems. Recombination – the Holliday model, site-specific recombination, transposons and retrotransposons.

OUTCOMES: Upon completion of this course, the student will be able to:

CO1	Awareness on cellular organization, division and transport
CO2	Knowledge intercellular junction and cell death
CO3	Understanding intracellular vesicular trafficking
CO4	Knowledge on molecular genetics
CO5	Analysis of mutation and repair mechanism
CO6	Understanding the fundamental principles of cell biology
CO7	Comprehensive knowledge of cell structure functions genetic and mutations

TEXT BOOKS:

1. G. Karp. Cell and Molecular Biology, 8th Edition, Wiley International, 2016.
2. D. Frifelder and M. Malacinski. Essentials of Molecular Biology, 5th Edition. Jones & Bartlett, 2015.

REFERENCE BOOKS:

1. G M Cooper, Robert E Hausman. The cell : a molecular approach. Sunderland (Mass.): Sinauer Associates publishers, 7th edition, 2016.
2. Lodish HF. Molecular cell biology, New York: WH Freeman – Macmillan Learning, 8th edition, 2016.
3. B. Lewin. Genes XII, 12th Edition. Jones and Bartlett Publishers, 2017.
4. D. Voet and J.G. Voet, Fundamentals of Biochemistry, 5th Edition. John Wiley, 2016.
5. D. K. Papachristodoulou, A. Snape, W. H. Elliott, D. C. Elliott. Biochemistry and Molecular Biology. Oxford University Press, 5th edition, 2014.
6. RM. Twyman. Advanced Molecular Biology, 4th Edition, Viva Book, 1998.

SEMESTER – I

L	T	P	C
5	0	0	4

BIOPHYSICAL AND ANALYTICAL TECHNIQUES

SUBJECT CODE: P1BC23MT

Total Hours: 65

OBJECTIVES:

1. The course intends to familiarize students with the basic concepts and analytical techniques and methods in spectroscopy and separation methods.
2. This course helps to become a competent in experimental techniques.
3. It aims to intent the practical skill

UNIT – I: ELECTROCHEMICAL TECHNIQUES

(13 Hrs)

Redox reactions. Electrochemical techniques – principles, electrochemical cells – pH, Henderson Hasselbalch equation, buffer capacity, pH measurement, glass electrode.

Ion-sensitive and gas-sensing electrodes, oxygen electrode – principle and applications. Biosensors – Principles and applications of calorimetric, potentiometric and amperometric biosensors.

UNIT –II: ULTRACENTRIFUGATION AND RADIOACTIVITY

(14 Hrs)

Ultracentrifugation – basic principles. Preparative ultracentrifugation - differential centrifugation and density gradient centrifugation. Analytical centrifugation – Schlieren optical system – applications – determination of molecular mass and purity of macromolecules.

Nature of radioactivity - stable and radioactive isotopes – units and interaction of radioactivity with matter. Detection and measurement of radioactivity – GM counter, solid and liquid scintillation counter – tissue stabilizers, counting efficiency, primary and secondary flours, quenching – Cerenkov counting, autoradiography. Safety aspects of radiation hazards. Applications of radioisotopes in biological sciences.

UNIT – III: ELECTROPHORESIS

(12 Hrs)

General principles. Support media. Electrophoresis of proteins – SDS-PAGE, 2D-PAGE, PAGE, native gels, gradient gels, isoelectric focusing. Cellulose acetate electrophoresis. Detection, estimation and recovery of proteins in gels. Electrophoresis of nucleic acids – agarose gel electrophoresis, DNA sequencing gels, pulsed field gel electrophoresis.

UNIT – IV: CHROMATOGRAPHY**(12 Hrs)**

Chromatographic techniques – general principles of partition and adsorption chromatography, Ion exchange, molecular exclusion and gas liquid Chromatography, Chromatofocusing, immuno affinity, capillary electrochromatography. HPLC, HPTLC, Affinity chromatography.

UNIT – V: SPECTROSCOPY**(14 Hrs)**

Basic principles of electromagnetic radiation, energy, wavelength, wave number and frequency. Absorption and Emission spectra. Beer–Lambert’s law, Light absorption and its transmittance.

Principle and Biological Applications of spectroscopy. Colorimetry, UV, Visible, IR, ESR, NMR, Raman and Mass spectroscopy. ORD, CD, X-ray diffraction. Introduction to Turbidometry, Nephelometry and Luminometry.

OUTCOMES: At the end of this course students will be able to

CO1	Basic principles of electrochemical techniques
CO2	Knowledge on basic principles, operational methods, and biological applications centrifugation techniques and radioactivity.
CO3	Basic knowledge on electrophoretic techniques and their applications.
CO4	Basic principles, methods, instrumentation and biological applications of various chromatography techniques.
CO5	Basic knowledge on spectroscopic techniques, turbidometry, nephelometry and luminometry
CO6	Ability to have a basic understanding of the theoretical principles involved in Bioinstrumentation.
CO7	Practical skills and techniques required in biochemical analysis, to become competent in the basic experimental techniques of biochemistry.

Text Books:

1. Keith Wilson, John M Walker. Principles and techniques of biochemistry and molecular biology. Cambridge University Press. 7th edition, 2017.
2. Shawney. Practical Biochemistry. Narosa Publishing, 1995.
3. Upadhyaya A Upadhyaya K and Nath. Biophysical Chemistry: Principles and Techniques, 3rd Edition. Himalayan publications, 2009.

Reference Books:

1. D. Frifelder and M. Malacinski. Essentials of Molecular Biology, Jones & Bartlett, 5th Edition, 2015.

2. R.D. Braun. Introduction to Instrumental Analysis. Pharma Book Syndicate, 2006.
3. Chatwal and Anand. Instrumental Methods of Analysis. 5th Edition, Himalayan publication, 2007.
4. Jag Mohan. Organic Spectroscopy, Principles and Application. Narosa Publishing House, 2nd Edition, 2007.

SEMESTER – I
(ELECTIVE – I) - PAPER - I
CHEMISTRY AND NANOSCIENCE FOR BIOLOGISTS

L	T	P	C
5	0	0	4

SUBJECT CODE: P1BC24ET

Total Hours: 65

OBJECTIVES:

- To impart basic knowledge on atoms, molecules and chemical bonding.
- To provide an understanding on the role on metal ions in biological systems.
- To understand the nomenclature and reaction mechanisms of organic compounds.
- To create awareness on synthesis, characterization and applications of nanomaterials.

UNIT – I: BIOPHYSICAL CHEMISTRY **(13 Hrs)**

Basic concepts of orbitals, atoms and molecules. Quantum numbers, Shapes of s, p and d atomic orbitals. Pauli exclusion principle; Rules for filling electrons in various orbitals - Aufbau principle and Hund's rule. Electronic configuration of atoms.

Bonding – Electronegativity, Valency, Bonding and non-bonding electrons, Electronic theory of valence and Octet rule. Ionic bonding – Conditions for formation of ionic bond; Factors governing the formation of ionic bond; Examples and Characteristics of ionic compounds. Covalent bonding – Conditions for formation of covalent bond; Examples and Characteristics of covalent compounds. Introduction to Coordinate covalent bond, Polar covalent bond and H-bond.

UNIT – II: BIOINORGANIC CHEMISTRY **(12 Hrs)**

Brief introduction to bioinorganic chemistry. Role of metal ions in biological systems: Ca^{2+} (Blood clotting); Cu^{2+} (Ceruloplasmin); Fe^{2+} (Haemoglobin); Na^+ and K^+ (Na^+ - K^+ pump) and Mg^{2+} (ATPase and Chlorophyll).

Metal deficiency and diseases: Copper, Iron and Zinc. Toxic effects of metals: Cadmium Copper, Iron, Lead and Mercury.

UNIT – III: BIOORGANIC CHEMISTRY

(14

Hrs)

Classification of organic compounds based on functional groups and their nomenclature. Biologically important organic compounds (names and structures – Haem, Vitamin D, Indole acetic acid, NAD, FAD).

Homolytic and heterolytic cleavage of covalent bonds. Reactive species: electrophiles, nucleophiles and free radicals. Types of organic reactions with examples – Substitution, Addition, Elimination, Rearrangement and Polymerization reactions. Inductive effect and Resonance.

UNIT – IV: INTRODUCTION, SYNTHESIS AND CHARACTERIZATION OF NANOMATERIALS

(14

Hrs)

An overview of Nanoscience and Nanotechnology; Nanoparticle synthesis techniques: solid-state; vapour-phase (flame-based, spray pyrolysis). Solution processing: water-oil microemulsion (reverse micelle) method. Plants and microbes as nanofactories; Various Bacteria, Yeast and Fungi used for nanoparticle synthesis.

Characterization of Nanoparticles - Use of UV-Visible Spectroscopy, Fourier-Transform Infra-Red Spectroscopy, Atomic force microscope, Scanning electron microscope and Transmission electron microscope in characterization of nanomaterials.

UNIT – V: BIOLOGICAL AND BIOMEDICAL APPLICATIONS OF NANOMATERIALS

(12 Hrs)

Applications of metallic nanoparticles – Biological Applications of Silver nanoparticles and Gold nanoparticles. Manufacturing, Types and Applications of Biosensors in Nanotechnology. Quantum Dot technology and its use in cancer treatment. Nanotechnology in Advanced drug delivery systems. DNA-based nanostructures and nanomaterials and their applications.

Biomedical applications of chitosan nanoparticles, Dendrimers as drug carriers. Cardiovascular and orthopedic applications of nanomaterials.

OUTCOMES:

CO1	Basic knowledge on atoms, molecules and chemical bonding.
CO2	Understanding on the role on metal ions in biological systems
CO3	Understanding the nomenclature and reaction mechanisms of organic compounds.
CO4	Awareness on synthesis, characterization and applications of nanomaterials.
CO5	Basic knowledge on biomedical applications of nano material
CO6	Understanding about atoms, molecules and chemical bonding, the role on metal ions in biological systems and the nomenclature and reaction mechanisms of organic compounds.
CO7	Biosynthesis, characterization and applications of nanomaterials.

Text Books:

1. Arun Bahl, B.S. Bahl and G.D. Tuli. Essentials of Physical Chemistry. Sultan Chand & Sons, 2014.
2. P.L. Soni. Textbook of Inorganic Chemistry. Sultan Chand & Sons, 2013.
3. P.L. Soni and H.M. Chawla. Textbook of Organic Chemistry, Sultan Chand & Sons, 29th Revised Edition, 2014
4. Subbiah Balaji. Nanobiotechnology, MJP Publishers, 2010.

Reference Books:

1. W.J. Moore. Physical Chemistry, Longman, 5th Edition. 1972.
2. Robert R Crichton. Biological inorganic chemistry: a new introduction to molecular structure and function. Amsterdam: Academic Press, 3rd edition, 2018.

SEMESTER - I

L	T	P	C
5	0	0	4

(ELECTIVE – I) - PAPER – I

Total Hours: 65

GENETIC ENGINEERING

SUBJECT CODE: P1BC25ET

Objective

1. To provide the strong knowledge on cloning methods, tissue culture techniques
2. Understanding the applications of genetic engineering to the students.
3. To provide brief knowledge about the culture media and tissue culture technique

UNIT – I: INTRODUCTION TO GENE CLONING AND IPR (13 Hrs)

Introduction to gene cloning: early development of genetics, genomic DNA, cDNA, plasmid DNA-gene cloning-specialized tools and techniques-importance of gene cloning.

Isolation and purification of DNA; preparation of total cell DNA, plasmid DNA, bacteriophage DNA, plant cell DNA.

UNIT – II: CLONING AND EXPRESSION VECTORS (12 Hrs)

Plasmids- Bacteriophages (M13 and λ) PUC vectors yeast vectors, Agrobacterium, mediated gene transfer, YAC, BAC, Human artificial chromosomes, Ti plasmid, SV40, baculoviruses, adenoviruses, papilloma viruses and retroviruses.

UNIT – III: DNA MODIFYING ENZYMES (14 Hrs)

Modification of purified DNA: DNA modifying enzymes – nucleases, ligases, polymerases, topoisomerases, restriction enzymes – performing restriction digests, ligation- joining DNA molecules together – random labeling nick translation and end filling.

UNIT – IV: INTRODUCTION TO DNA INTO MAMMALIAN CELLS (12 Hrs)

Biolistics, electroporation, microinjection, liposome, transformation, transduction – mediated method and calcium phosphate method, transformation, transduction, screening methods - insertional inactivation, blue white selection.

UNIT – V: CONSTRUCTION OF LIBRARIES (14 Hrs)

Studying gene and genome structure – blotting techniques, PCR, in situ hybridization, DNA sequencing, chromosome walking and jumping, DNA foot printing, HR and HART, restriction analysis of DNA, RFLP, RAPD –principles, procedures and applications.

OUTCOMES:

CO1	Knowledge on gene cloning, isolation and purification of DNA,
CO2	Techniques of cloning and expression vector.
CO3	Awareness on DNA modifying enzymes
CO4	Understanding the tools of genetic engineering
CO5	Knowledge on construction of genetic libraries
CO6	Comprehensive understanding of the components of culture media and various tissue culture techniques
CO7	Understanding the technique of genetic engineering in plants and animals.

Text Books:

1. B. R. Glick, C. L. Patten. Molecular biotechnology: principles and applications of recombinant DNA. Washington, DC : ASM Press, 5th edition, 2017.
2. S. B. Primrose. Molecular Biotechnology, 2nd Ed. Blackwell Scientific publishers, Oxford, 1994.

Reference Books:

1. D. Rhodes. Genetic engineering: Basic concepts and novel applications. New York : Calistro Reference, 2015.
2. C. A Dehlinger. Molecular biotechnology. Burlington : Jones & Bartlett Learning, 1st edition, 2016.
3. D. Rhodes. Genetic engineering: Basic concepts and novel applications. New York : Calistro Reference, 2015.
4. Sambrook J, Fritsch E. F. and Maniatis. Molecular cloning, Vols. I, II, III, Cold spring harbor laboratory press, New York, 2nd Edition, 1989.

SEMESTER - 2

BIOENERGETICS & INTERMEDIARY METABOLISM

L	T	P	C
5	0	0	5

Total Hours: 65

SUBJECT CODE: P2BC21MT

OBJECTIVES:

1. To provide much information related to carbohydrate, fat and protein metabolism that takes place in our body.
2. This course give an outline in production of ATP.
3. Impart a Knowledge on transamination, deamination and urea cycle.

UNIT – I: BIOENERGETICS AND BIOLOGICAL OXIDATION (15 Hrs)

Thermodynamics - basic concepts - First, Second and Third law of thermodynamics. Free energy and entropy. High energy compounds. The electron transport chain – organization and role in electron capture.

Oxidative phosphorylation – electron transfer reactions in mitochondria. F_1F_0 ATPase – structure and mechanism of action. The chemiosmotic theory. Inhibitors of respiratory chain and oxidative phosphorylation – uncouplers and ionophores. Regulation of oxidative phosphorylation.

Mitochondrial transport system – malate-glycerophosphate shuttle, creatine–phosphate shuttle.

UNIT – II: CARBOHYDRATE METABOLISM (12 Hrs)

Glycolysis and gluconeogenesis – pathway, key enzymes and coordinate regulation. Citric acid cycle and regulation, Pentose phosphate pathway. Metabolism of glycogen and regulation. Metabolism of galactose and fructose, Glyoxylate cycle, Cori cycle. Futile cycles and Anaplerotic reactions.

UNIT – III: LIPID METABOLISM (13 Hrs)

Oxidation of fatty acids – α , β and ω . Metabolism of ketone bodies – formation, utilization, excretion and clinical significance. Biosynthesis of fatty acids. Metabolism of triglycerides, phospholipids and sphingolipids. Cholesterol – biosynthesis, regulation, transport and excretion. Metabolism of lipoproteins. Eicosanoid metabolism - Prostaglandin and Leukotrienes.

UNIT – IV: AMINO ACID METABOLISM (12 Hrs)

Overview of biosynthesis of Non-essential amino acids - cysteine, glycine, proline, serine, and tyrosine. Catabolism of amino acid nitrogen – transamination, deamination, ammonia formation and urea cycle. Disorders of urea cycle. Catabolism of carbon skeletons of aminoacids,.

Conversion of aminoacids to specialized products (melatonin, serotonin, epinephrine, norepinephrine, hippuric acid).

UNIT – V: NUCLEIC ACID METABOLISM

(13 Hrs)

Metabolism of purines – De novo and salvage pathways for biosynthesis and Purine catabolism. Biosynthesis and catabolism of pyrimidines, Xenobiotics. Disorders of purine and pyrimidine metabolism. Integration of metabolism.

OUTCOMES: On successful completion of the course the students should have understand clearly on

CO1	Knowledge on thermodynamics, oxidative phosphorylation and mitochondrial transport system
CO2	Understanding chemical reactions involved in the carbohydrate metabolism and production of ATP.
CO3	Process of lipid fatty acid oxidation, phospholipids and cholesterol metabolism
CO4	Knowledge on transamination, deamination and urea cycle.
CO5	Metabolism of purine and pyrimidine and understanding the integration of carbohydrate , protein, lipid metabolism.
CO6	Awareness of interrelationship between carbohydrate, fat and protein metabolism.
CO7	Knowledge on various disorders related to each metabolism.

Text Books:

1. V.W. Rodwell, D.A. Bender, K.M. Botham, P.J. Kennell and P.A. Weil. Harper's Illustrated Biochemistry, 30th Edition. McGraw Hill, 2015.
2. D.L. Nelson and M.M. Cox. Lehninger's Principles of Biochemistry, 7th Edition, Freeman Publishers, 2017.
3. J. M. Berg, J. L. Tymoczko, G. J. Gatto, Jr; L. Stryer. Biochemistry. New York NY, Freeman publishers, 8th edition, 2015.

Reference Books:

1. D. Voet and J.G. Voet, Fundamentals of Biochemistry, 5th Edition. John Wiley, 2016.
2. P.C. Champe. Lippincott's Biochemistry, 6th Edition. Raven Publishers, 2014.

SEMESTER – II

ENZYMOLOGY AND ENZYME TECHNOLOGY

SUBJECT CODE: P2BC22MT

L	T	P	C
4	0	0	4

Total Hours: 52

OBJECTIVES: The objectives of this course are to:

- Introduce students to various theoretical and practical aspects of enzymology; and
- Stimulate their interest in learning the structure, function and kinetics of enzyme and their role as catalyst and regulator of cell metabolism.
- Enzyme inhibition and regulation and advancement in industrial and clinical uses of enzymes.

UNIT I: CLASSIFICATION, PURIFICATION AND ACTIVE SITE OF ENZYMES (11 Hrs)

Definition, Nomenclature and classification of enzyme. Localization of enzyme. Isolation and purification of enzymes. Criteria of purity. Membrane bound enzymes. Specific activity. Enzyme Units – Katal, IU, Turnover number. Monomeric and oligomeric enzymes - Chymotrypsin, Lactate Dehydrogenase. Multienzyme complex – Pyruvate Dehydrogenase. Determination of active site of amino acid – chemical probe and affinity label method example: Tosyl-L-phenylalanine, chloromethyl ketone (TPCK), Diisopropyl phosphofluoridate (DIPF), Iodoacetamide and Iodoacetate. Site directed mutagenesis.

UNIT II: ENZYME KINETICS (14 Hrs)

Kinetics of uncatalyzed chemical reaction. Law of mass action and order of reaction. Kinetics of enzyme. Catalyzed reaction – transition state and activation energy. Kinetics of single substrate enzyme catalyzed reaction, MM equation. Lineweaver Burk plot, Eadie Hofstee plot, Hanes plot and Eisenthal-Cornish Bowden plot.

Kinetics of multisubstrate enzyme catalysed reaction – Ping pong, Bi-bi, random order and compulsory order mechanism. Assay of enzyme kinetics – Direct assay, Coupled assay, two point assay and kinetic assay.

UNIT III: MECHANISM OF ENZYME CATALYSIS AND COENZYME (14 Hrs)

Acid-base catalysis, covalent catalysis, proximity, orientation and role of metal ion in enzyme catalyst. Mechanism of serine proteases - Chymotrypsin, Lysozyme, Ribonuclease and Carbonic anhydrase. Coenzymic mechanism of – TPP, PLP and Biotin.

UNIT IV: ENZYME INHIBITION AND REGULATION

(11 Hrs)

Enzyme inhibition – Irreversible and reversible – Competitive, noncompetitive and uncompetitive inhibition, Kinetic differentiation and graphical method. Substrate inhibition. Regulation of enzyme – Feedback inhibition and feedforward stimulation. Allosteric enzyme. Qualitative description of concerted and sequential model for allosteric enzymes with reference to aspartate transcarbamoylase.

Instrumental techniques used in enzyme assay – Spectrophotometry, Fluorimetry, Luminometry and Radiometry.

UNIT V: CLINICAL AND INDUSTRIAL APPLICATIONS OF ENZYMES

(13 Hrs)

Application of enzymes in food, pharmaceutical, leather, detergents, meat and cheese production. Sources of industrial enzyme – Thermophilic enzymes, amylase, Glucose isomerases, cellulose-degrading enzymes and lipases. Clinical uses of enzymes – Enzyme as diagnostic agents, enzymes as analytical agents – Hexokinase, Glucose-6-phosphate dehydrogenase, Urease, Uricase and Cholinesterase. Enzyme as Therapeutic agents – Thrombolytic agents, Anti-inflammatory agents, Digestive agents. Therapeutic uses of asparaginase. Immobilization of enzymes and their applications.

OUTCOMES:

CO1	Basic knowledge on theoretical and practical aspects of enzymology
CO2	Understanding kinetics of enzyme
CO3	Knowledge on structure, functions and the mechanisms of action of co-enzymes.
CO4	Processes in enzyme inhibition and regulation and instrumental techniques used in enzyme assay.
CO5	Industrial and clinical application of enzymes
CO6	Comprehensive knowledge on the structure, functions and the mechanisms of action of enzymes.
CO7	Exposure to the applications of enzymes

Text Books:

1. Trevor Palmer and Philip Bonner. Enzymes: Biochemistry, Biotechnology, Clinical chemistry, 2nd Edition, East West, 2008.
2. T. Devasena. Enzymology. Oxford University Press, 2010.
3. Anusha Bhaskar and V.G. Vidhya. Enzyme Technology, MJP Publishers, 2009.

Reference Books:

1. Dixon and Webb. Enzymes, 2nd Edition. Longmans Green and Co Ltd., 1979.
2. D.L. Nelson and M.M. Cox. Lehninger's Principles of Biochemistry, 7th Edition, Freeman Publishers, 2017.
3. P.C. Champe. Lippincott's Biochemistry, 6th Edition. Raven Publishers, 2014.
4. V.W. Rodwell, D.A. Bender, K.M. Botham, P.J. Kennell and P.A. Weil. Harper's Illustrated Biochemistry, 30th Edition. McGraw Hill, 2015.
5. D. Voet and J.G. Voet, Fundamentals of Biochemistry, 5th Edition. John Wiley, 2016.

SEMESTER - II
ADVANCED BIOTECHNOLOGY
SUBJECT CODE: P2BC23MT

L	T	P	C
5	0	0	4

Total Hours: 65

OBJECTIVE:

1. To equip the students with innovative thinking by providing the strong information in gene cloning techniques,
2. Tissue culture techniques and large scale production of bioactive molecules.
3. Fermentation technology.

UNIT – I: TOOLS IN GENETIC ENGINEERING

(13 Hrs)

DNA modifying enzymes and their uses in genetic engineering - Restriction enzymes, DNA Polymerase - Klenow fragment, T4/T7 DNA Polymerase and thermostable DNA polymerases, Reverse Transcriptase, Terminal transferases, T4 Polynucleotide kinases, Alkaline phosphatase, DNA ligases and Nucleases - S1 nucleases, DNase I and Ribonucleases. Host cells and Vectors - Host Cell Types (Prokaryotic and eukaryotic). Plasmid vectors (pBR322, pUC18), Bacteriophage - Lambda and M13 vectors, Cosmids, Phagemids. Artificial chromosomes (BACs, YACs and HACs). Expression vectors for Prokaryotes & Eukaryotes.

UNIT – II: GENE TRANSFER METHODS

(14 Hrs)

Cloning strategies: DNA cloning - cohesive end and blunt end ligation, homopolymeric tailing and Use of adapters and linkers. Basic gene transfer methods - Transformation, Electroporation, Liposome-mediated gene transfer and Microinjection, Methods of gene transfer in plants - agro bacterium mediated gene transfer. Method of gene transfer in animal-micro projectile, retroviral and adenoviral mediated gene transfer. Reporter genes. In vitro fertilization (IVF) and Embryo transfer method.

UNIT – III: TECHNIQUES IN RECOMBINANT TECHNOLOGY

(14 Hrs)

Construction of genomic DNA libraries and cDNA libraries. Screening of recombinants - Antibiotic resistance, lacZ complementation (Blue-white selection), fluorescent markers (e.g. GFP). Screening of genomic libraries with oligo-probe. Southern, Northern, and Western blot. PCR and RT-PCR – basic process and applications. Hybridoma technology - Monoclonal antibodies - production and applications. DNA sequencing strategies – Sanger's and Maxam-Gilbert's methods.

UNIT – IV: TISSUE CULTURE TECHNIQUES AND APPLICATIONS (12 Hrs)

Plant tissue culture – media, growth regulators, callus culture, micropropagation, somatic embryogenesis, protoplast fusion and culture, artificial seed. Genetic engineering of plants for pest resistance, virus resistance, herbicide tolerance, golden rice production and delay of fruit ripening.

Animal tissue culture: Media - natural and synthetic media, primary culture and cell line. Transgenic animals. Therapeutic products for use in human health care - recombinant insulin; recombinant growth hormones, tPA, and Hepatitis B vaccine.

UNIT – V: INDUSTRIAL BIOTECHNOLOGY AND GENE THERAPY (12 Hrs)

Bioprocess technology: Fermentation: Design of a commercial fermenter; Solid substrate fermentation: Media for industrial fermentations; Batch culture and fed – batch culture. Down – stream processing. Synthesis, recovery and purification of ethanol and citric acid. Biogas production. Gene therapy (somatic) the principle and approaches. Gene therapy for ADA and cystic fibrosis.

OUTCOMES: On successful completion of the course the student should have understood the

CO1	Knowledge on innovative tools in genetic engineering
CO2	Understanding cloning strategies, IVF, Gene transfer method
CO3	Awareness of techniques in recombinant technology PCR, RTPCR, Blotting and hybridoma technology
CO4	Wide knowledge on tissue culture technique and its application
CO5	Industrial biotechnology and gene therapy
CO6	Broad knowledge on plant and animal tissue culture
CO7	Understanding bioprocess technology – fermentation methods and production of important compounds by using fermentation technology.

Text Books:

1. T.A. Brown. Gene cloning and DNA Analysis: An Introduction, 7th Edition, Willey Blackwell Science. 2016.
2. S.N. Jogdand. Gene Biotechnology, Revised Edition. Himalaya Publishing House, 2009.
3. U. Satyanarayana, Biotechnology, 3rd Edition. Books and Allied (p) Limited, 2012.
4. A.H. Patel. Industrial Microbiology. 2nd edition, 2016.
5. M.K.Razdan, Introduction to Plant tissue culture. Oxford IBH Publisher, 2003.

6. Michael Butler. Animal cell culture and technology. London [u.a.] : Taylor & Francis, 2nd edition, 2008.

Reference Books:

1. B. Lewin. Genes XII, 12th Edition. . Jones and Bartlett Publishers, 2017.
2. B.R. Glick and J.J. Pasternak. Molecular Biotechnology, 4th Edition, ASM Publishers, 2010.
3. S.B. Primrose. Molecular Biotechnology, 2nd Edition. Blackwell Scientific Publishers, 1992.
5. A.L. Demain and J.E. Davies. Manual of Industrial Microbiology and Biotechnology, 2nd Edition, ASM Press.
6. P.F. Stanbury, A. Whitaker and S.J. Hall. Principles of Fermentation Technology. 3rd Edition, Elsevier Publishers, 2016.

SEMESTER – II

(ELECTIVE – II) – PAPER – II

L	T	P	C
4	0	0	4

PLANT BIOCHEMISTRY AND PLANT ECOLOGY

SUBJECT CODE: P2BC24ET

Total Hours: 52

OBJECTIVES:

1. Stimulate their interest in biology at genetic, molecular, physiological, and organismal levels to integrate plant functionalities in a hierarchical manner, from individual cells to the biosphere.
2. Discuss evolution as the foundation of all biological systems .
3. Integrate evolutionary biology to describe patterns of plant diversity and ecological interaction.

UNIT I: PLANT CELL STRUCTURE AND WATER RELATION (13 Hrs)

Plant cell - Structure and physiological functions of cell wall and cell inclusions. Diffusion, osmosis, imbibitions, water potential, plasmolysis, absorption and translocation of water. Transpiration, stomatal movement, translocation of organic and inorganic substances. Nature, distribution and role of alkaloids, flavanoids, terpenoids, phenols in plant physiology.

UNIT II: PHOTOSYNTHESIS AND NITROGEN METABOLISM IN PLANTS (14 Hrs)

Photosynthetic apparatus in plants, photosystems I and II, light harvesting antenna complex, light and dark reactions, electron flow and photophosphorylation, cyclic and non-cyclic electron transport, oxygen evolution, C3, C4 and CAM cycle. Photorespiration, regulation of photosynthesis – RUBISCO. Nitrogen cycle, nitrogen fixation – symbiotic and non-symbiotic. Symbiotic nitrogen fixation in legumes by Rhizobia – enzymology of nitrogen fixation; regulation of nif and nod genes of nitrogen fixation.

UNIT III: PLANT ECOLOGY (14 Hrs)

Introduction to plant ecology, global patterns of vegetation, Natural selection and evolution. Phytogeography, phytogeographic realms, major plant communities, classification of plant communities, plant succession and examples.

UNIT IV: PLANT ADAPTATIONS (12 Hrs)

Plant adaptations – Hydrophytes, Xerophytes, Halophytes and epiphytes (morphological, anatomical and physiological adaptations). Ecology of pollination and seed dispersal.

UNIT V: MICROBIOLOGY AND MICROBIAL TECHNIQUES: (12 Hrs)

Principles of microbial nutrition, construction of culture media. Growth curve and factors affecting growth.

Current methods in microbial identification. Pure culture techniques. Theory and practice of sterilization. Isolation and screening of industrially important microbes, strain improvement for better yield, primary and secondary detection and assay of fermentation products.

Microbes in mineral recovery, microbial degradation of xenobiotics; sewage biodegradation.

OUTCOMES:

CO1	Knowledge on plant cell structure and transport mechanism
CO2	Understanding the photosynthesis and nitrogen metabolism in plants
CO3	Basic knowledge on plant ecology
CO4	Awareness on plant adaptation ecology, pollination and seed dispersal
CO5	Knowledge on microbiology and microbial techniques
CO6	Comprehensive knowledge on plant biochemistry
CO7	Awareness on plant ecology and plant adaptation.

Text Books:

1. R.K. Sinha. Modern Plant Physiology. Narosa Publishing House, 2nd edition, 2014.
2. Ernst-Detlef Schulze et al. Plant Ecology. Berlin Springer Berlin Springer, 2nd edition, 2018.

Reference Books:

1. Arnoud van der Valk. Herbaceous plant ecology: recent advances in plant ecology. Springer, Rev edition, 2014.
2. T.W. Goodwin. Introduction to Plant Biochemistry. New Delhi : CBS Publishers and Distributors, 2nd edition, 2003.
3. Peter J Lea; Richard C Leegood. Plant Biochemistry and Molecular Biology, Chichester, New York: John Wiley, 2nd Edition, 2001.
4. Gurevitch, Scheiner, and Fox. The Ecology of Plants. 2nd ed. Sinauer Associates, Sunderland, MA. 2006.

SEMESTER – II

L	T	P	C
4	0	0	4

(ELECTIVE – II) – PAPER – II

BIOINFORMATICS

Total Hours: 52

SUBJECT CODE: P2BC25ET

Objective

1. To provide the knowledge on bioinformatics tools for the management .
2. It helps to provide knowledge an utilization of bioinformatics skills in the research to the students.
3. This course impart idea to drug designing, 3D structural analysis of biomolecules

UNIT – I: COMPUTER PERIPHERALS AND HARDWARE DESCRIPTION (11 Hrs)

Computer system design. Recognition and Structure of Different Components of a Computer System and Their Respective Usage. I/O and Storage Devices with Data Communication with Introduction of Internet. Connections to the internet, internet service requirements and applications – e-mail - World Wide Web, URL, HTML, TCP/IP.

UNIT – II: OPERATING SYSTEMS (11 Hrs)

System and applications software, evolution of operating systems, layered structure of operating system, CUI and GUI's DOS internet and external commands, batch files: WIN 95/98: Anatomy of windows and features, multitasking.

Office applications : MS-Office 95/97/2000/2003/2007 including MS-Word, MS-Excel, MS Powerpoint.

Logic developments: generation of programming languages, emulation of common DOS commands using C and C++, data structures in C objects and classes, pointers, arrays (one and two dimensional) normal string and file handling in C.

UNIT – III: INTRODUCTION TO BIOINFORMATICS (10 Hrs)

Biological databases - sequence analysis - need and importance – pair-wise alignments – dot plot, dynamic programming – global (Needleman-Wunsch) and local (Smith-Waterman) alignment algorithms - scoring and substitution matrix – data base searching. Basics of Entrez, BLAST, and FASTA search procedures- multiple alignment. CLUSTAL – Njplot - Phylogenetic trees.

UNIT – IV: SECONDARY STRUCTURE PREDICTION**(10 Hrs)**

Secondary structure prediction of RNA and protein – detecting ORFs - restriction maps, algorithm for T_m calculations, primer design and probe synthesis – structural classification of proteins (SCOP and CATH) – structural genomics, functional genomics and proteomics – DNA microarrays – present status and future prospects.

UNIT – V: 3-D STRUCTURAL ANALYSIS OF BIOMOLECULES**(10 Hrs)**

Molecular Visualization Tools – RasMol, Chime, Weblab Viewer, Deep View, ISIS Draw, Chemdraw, MolMol, etc – computer modeling of proteins. Simulation studies and virtual reality – Simulation of ES Complex Interaction and stereodynamic concept - structural studies of substrate – Ligand Binding – Drug Designing - introduction to PERL and BIOPERL to facilitate Biological Analysis.

OUTCOME:

CO1	Knowledge on computers, hardware, internet, email and world wide web
CO2	Awareness of operating systems, MS office, MS word, logic development programming language
CO3	Exposure to bioinformatics tools, BLAST and FASTA
CO4	Analysis of secondary structure of RNA, DNA and protein through bioinformatics
CO5	Understanding the 3D structural analysis of biomolecules, study of substrate-ligand binding and drug designing
CO6	Comprehensive understanding of bioinformatics tools.
CO7	Methodologies and research oriented applications of bioinformatics

Text Books:

1. Lesk, A.M. Introduction to Bioinformatics. Oxford, 2002.

Reference Books:

1. Campbell and Heyer. Discovering Genomics, Proteomics and Bioinformatics. Cold Spring Harbour Laboratory Press & Benjamin Cummings, 2002.
2. Gibas and Per Jambeck. Developing Bioinformatics Computer Skills. O'Reilly & Associates, 2001.
3. Krane et al. Fundamental concepts of bioinformatics. Benjamin Cummings, 2002.
4. Bergeron BP. Bioinformatics computing, 1st Edition, Printice Hall, 2002.
5. Baxeavanis & Ouellette. Bioinformatics: A practical guide to analysis of genes and proteins. 2nd Edition, Wiley-Inter Sci, 2001.

SEMESTER - II
HUMAN RIGHTS

SUBJECT CODE: P2HR21GS

L	T	P	C
2	0	0	2

Total Hours: 26

OBJECTIVE :

To create awareness on Human Rights, UN Human Rights declarations and contemporary issues on Human Rights.

UNIT-I INTRODUCTION

(18 Hrs.)

Definition of Human Rights-Nature, Content, Legitimacy and Priority-Theories on Human Rights-Historical Development of Human Rights. Fundamental Rights in the Indian Constitution – Directive principles of State policy – Fundamental Duties – National Human Rights Commission.

UNIT-II INTERNATIONAL HUMAN RIGHTS

(17 Hrs.)

Human Rights and the UNO –Universal Declaration of Human Rights-International Covenant on Civil and Political Rights – International covenant on Economic and Cultural Rights and Optional Protocol. International Human Rights in Domestic courts

UNIT- III CONTEMPORARY ISSUES ON HUMAN RIGHTS

(14 Hrs.)

Contemporary issues on Human Rights: Children's Rights-Women's Rights – Dalit's Rights – Bonded labour and Wages-Refugees– Capital punishment.

UNIT-IV CONSUMER & ENVIRONMENT PROTECTION ACT.

(13 Hrs.)

Consumer protection Act 1986- Objects- Definitions- Central Consumer protection Council – Consumer Dispute Redressal Agencies. Environment Protection Act 1986-Objects-Definition-Powers of Central Government –Provisions of Act to the prevention and control of Environmental Pollution Act.

UNIT- V RIGHT TO INFORMATION ACT 2005.**(16 Hrs.)**

Introduction- History behind the Rights- Scope of the Rights- Main characteristics-Right to Information Act 2005- Exempt from Disclosure-Procedure for seeking information- Appellate Authorities- Reporting Procedure.

OUTCOME

CO1	Discuss the importance of Fundamental Rights and the theories of Human Rights Practices in India.
CO2	Analyse the Universal Declaration of Human Rights and compare the Cultural, Economical, political, civil Rights in International perspective.
CO3	Outline the Contemporary issues of children and women rights in India.
CO4	Explain the consumer dispute redressal agencies and significance of consumer protection council.
CO5	Describe the importance of Right to information Act and the role of Appellate Authority in seeking information.
CO6	Understand the historical growth of Human Rights.
CO7	Demonstrate an awareness of international Human rights and contemporary issues.

TEXT BOOK

T.S.Ravi ,”Human Rights”, Margham Publications Chennai Revised edition 2016

REFERENCES BOOKS:

1. J.Jayasankar. “Corporate laws” Margham publication Chennai 1st edition.2013.
2. “International Bill of Human Rights”, Amnesty International Pub.
3. Desai, A R, “Violation of Democratic Rights in India”

I M.Sc. BIOCHEMISTRY

L	T	P	C
5	0	0	5

Isolation and characterization studies and Quantitative Analysis.

M.Sc CORE PRACTICAL – I

SUBJECT CODE: P2BC21MP

Total Hours: 130

Objectives

1. To impart knowledge about the biochemical basis of various diseases and disorders
2. To study various diagnostic and therapeutic methodologies available for diseases and disorders.
3. To understand the basic concepts of antioxidants and cancer.

A. Basic calculations for the preparation of molar, normal, percentage (v/v; w/v), osmolar, ppm solutions, pH calculations (Problems to be worked out)

B. ISOLATION AND CHARACTERIZATION STUDIES:

1. Isolation and estimation of Glycogen from liver
2. Isolation and estimation of DNA from liver
3. Isolation and estimation of RNA from yeast
4. Denaturation of DNA and UV absorption studies

C. QUANTITATIVE AND QUALITATIVE ANALYSIS:

1. Determination of proteins by Lowry's method
2. Determination of Tryptophan
3. Estimation of sodium and potassium by flame photometry
4. Estimation of vitamin C
5. Estimation of calcium from ash
6. Estimation of phosphorous from ash
7. Estimation of iron from ash
8. Detection of adulterants in milk

C. TECHNIQUES:

1. Preparation of buffers, measurement of pH and titration curve
2. Preparation of Silver Nanoparticles using plant extract and Determination of λ_{max}
3. Separation of Sugars by Paper chromatography

4. Separation of Aminoacids by Thin Layer Chromatography
5. Separation of plant pigments by column chromatography
6. Extraction of carotene and chlorophyll
7. Section cutting by Microtome.

OUTCOMES:

CO1	Isolation and characterization of DNA and RNA and glycogen
CO2	Qualitative and quantitative analysis of minerals
CO3	Knowledge of the separation of biomolecules/cells/organelles by selecting appropriate techniques.

References (Practical Manuals):

1. A. Sadasivam and A. Manickam. Biochemical Techniques, 2nd Edition, New Age International Publishers, 2003.
2. J. Jayaraman. Laboratory Manual in Biochemistry. New Delhi : New Age International Publishers, 2nd edition, 2011.
3. H. Varley. Practical Clinical Biochemistry, 4th Edition, CBS Publishers, 2008.
4. R. Boyer. Modern Experimental Biochemistry, 3rd Edition, Benjamin Cummings, 2000.

L	T	P	C
5	0	0	5

I M.Sc. BIOCHEMISTRY

ENZYMOLOGY AND PLANT BIOCHEMISTRY

M.Sc CORE PRACTICAL –II

SUBJECT CODE: P2BC22MP

Total Hours:

Objective:

To impart knowledge on Haematological Methods, Urine Analysis and Microbial Biochemistry

A. ENZYMOLOGY – PURIFICATION AND KINETIC STUDIES

1. Subcellular fractionation of organelles from liver cells and identification by marker enzymes – Succinate dehydrogenase
2. a. Purification of acid phosphatase from potato
 - b. Effect of activator and inhibitor of acid phosphatase activity by EDTA
 - c. Effect of substrate concentration and acid phosphatase activity
 - d. Determination of optimum temperature
 - e. Determination of optimum pH
3. Activity of Salivary Amylase
 - a. Determination of optimum pH
 - b. Determination of optimum temperature
 - c. Determination of substrate concentration
 - d. Determination of Specific activity
4. Determination of Enzyme activity of total ATPase
5. Assay of SGOT
6. Assay of SGPT
7. Assay of LDH
8. Assay of CPK
9. Assay of Alkaline phosphatase

B. MOLECULAR BIOLOGY

1. Separation of serum proteins by SDS-PAGE

2. Separation of DNA by Agarose Gel Electrophoresis.
3. Extraction of DNA from bacteria and Separation by Agarose Gel Electrophoresis
4. PCR techniques – demonstration

C. PLANT BIOCHEMISTRY APPLICATIONS

1. Herbal extraction
2. Qualitative analysis of phytochemicals in Herbal plants.
3. In vitro antioxidant studies of plant extract by Hydroxyl radical and Hydrogen peroxide scavenging activity.
4. Anti-Hemolytic activity of plant extraction
5. Determination of Antimicrobial activity of plant extract by disc Diffusion method

OUTCOMES:

CO1	Ability to perform enzyme assays
CO2	Understanding molecular biology experiments
CO3	Phytochemical analysis and antioxidant activities

References (Practical Manuals):

1. A. Sadasivam and A. Manickam. Biochemical Techniques, 2nd Edition, New Age International Publishers, 2003.
2. J. Jayaraman. Laboratory Manual in Biochemistry. New Delhi : New Age International Publishers, 2nd edition, 2011.
3. H. Varley. Practical Clinical Biochemistry, 4th Edition, CBS Publishers, 2008.

SEMESTER – III

L	T	P	C
5	0	0	4

HORMONAL CONTROL AND SIGNAL TRANSDUCTION

SUBJECT CODE: P3BC21MT

Total Hours:

OBJECTIVES:

1. To provide the basic knowledge on endocrine hormones and their mechanism of action.
2. Awareness on endocrinal activities, mechanism and actions and signal transductions.
3. To equip the students to work as a endocrinologist

UNIT – I: HORMONES AND G-PROTEINS

(12 Hrs)

Hormones – Definition, Classification, feedback regulation. Mechanism of hormone action - Fundamental concept and definition of signals, ligands and receptor. Endocrine, Paracrine and Autocrine signaling. G protein - as intracellular transducer, structure, properties and functions, role in signal transduction. Intracellular signaling – adrenergic receptor – structure and metabolic effect. Hormones of the hypothalamus.

UNIT – II: HORMONAL SIGNALLING PATHWAY

(14 Hrs)

Second messenger, Adenylate cyclase, Protein kinase A, Atrial natriuretic factor - Protein kinase G, Inositol triphosphate, Diacylglycerol - Protein kinase C, Calcium and Calmodulin. Structure of Insulin receptor - Tyrosine kinase pathway.

Steroid hormonal mechanism – Structure of Steroid hormone intracellular protein receptors, and its structural organization - Hormone binding domain, antigenic domain and DNA binding domain, hormone response elements.

UNIT – III: HORMONES OF THE PITUITARY AND PANCREATIC GLANDS

(13 Hrs)

Anterior pituitary hormones: Biological actions, regulation and disorders of growth hormones, ACTH, gonadotrophins and prolactin. Posterior pituitary hormones – Biological actions and regulation of vasopressin. Diabetes insipidus . Oxytocin. Hypopituitarism.

Pancreatic hormones – synthesis, regulation, biological effects and mechanism of action of glucagon, somatostatin and insulin. Brief account of gastrointestinal hormones.

UNIT – IV: THYROID AND GONADAL HORMONES

(13 Hrs)

Thyroid hormones – Synthesis, secretion, regulation, transport, metabolic fate and biological actions. Antithyroid agents. Thyroid functions tests. Hyper and hypothyroidism.

Biosynthesis, regulation, transport, metabolism and biological actions of androgens. Hypogonadism and gynecomastia. Biosynthesis, regulation, transport, metabolism and biological effects of estrogen and progesterone. The Menstrual cycle. Amenorrhoea.

UNIT – V: ADRENAL AND PARATHYROID HORMONES

(13 Hrs)

Adrenal cortical hormones. Synthesis, regulation, transport, metabolism and biological effects. Adrenal function tests. Cushing's syndrome, aldosteronism, congenital adrenal hyperplasia, adrenal cortical insufficiency. Adrenal medullary hormones – Synthesis, secretion, metabolism, regulation and biological effects of catecholamine. Pheochromocytoma.

Hormonal regulation of Calcium and Phosphate metabolism. Secretion and biological actions of PTH, calcitonin and calcitriol. Hypercalcemia and hypocalcemia. Rickets and Osteomalacia.

OUTCOMES: On successful completion of the course the students should have:

CO1	Basic knowledge on endocrine hormones and their mechanism and structure of G-protein
CO2	Understanding the principles of cell signaling, Signal cascade, inhibitors of signal cascade.
CO3	Knowledge on hormones of pituitary and pancreatic gland
CO4	Basic knowledge on thyroid and gonadal hormone
CO5	Basic knowledge on glucocorticoid, mineralocorticoids and calcium regulating hormones and its disorders.
CO6	Broad understanding of various endocrine glands and their hormones.
CO7	Awareness on endocrinal activities, mechanism and actions and signal transductions.

Text books:

1. Smith et al. Principles of Biochemistry – Mammalian Biochemistry, 7th Edition. McGraw Hill, 2006.
2. Prakash S. Lohar. Endocrinology. MJP Publications, 2014.

Reference Books:

1. Thomas M Devlin. Text book of Biochemistry with clinical correlation. Wiley publications, 7th edition, 2010.
2. Wilson and Foster, Textbook of Endocrinology, Philadelphia, PA : Elsevier, 13th Edition, 2016.
3. V.W. Rodwell, D.A. Bender, K.M. Botham, P.J. Kennell and P.A. Weil. Harper's Illustrated Biochemistry, 30th Edition. McGraw Hill, 2015.

SEMESTER – III
RESEARCH METHODOLOGY
SUBJECT CODE: P3BC22MT

L	T	P	C
5	0	0	4

Total Hours: 65

OBJECTIVES:

- To impart knowledge on research problem and finding scientific articles with Internet.
- To provide knowledge on collection and analysis of data using statistical tools.
- To create awareness on bioinformatics and biological databases.
- To impart basic knowledge on animal experimentation and intellectual property rights.
- To develop sound knowledge on preparation of research reports.

UNIT – I: INTRODUCTION TO RESEARCH METHODOLOGY (13 Hrs)

Identifying a research problem and searching relevant literature. Boolean Searching. Use of Search Engines. Finding Scientific Articles – Google, PubMed, DELNET, INFLIBNET.

Role of Computers in Biology. Evolution of Internet. World Wide Web. Internet Addresses, Internet protocols and Web Browsers. Operating Systems and their types.

UNIT – II: BIOSTATISTICS (13 Hrs)

Nature of biological and clinical experiments. Data – primary and secondary data. Collection of data in research. Classification and Tabulation of Data: Measures of Central Tendency – Averages (Arithmetic mean, Median and Mode) and Dispersion (Range, Quartile deviation, Mean deviation and Standard deviation).

Chi-Square Test and goodness of fit. Student's t-test and its applications. One way ANOVA. Use of SPSS Software in research.

UNIT – III: BIOINFORMATICS AND BIOLOGICAL DATABASES (13 Hrs)

Bioinformatics – Introduction, Objective, Scope and Applications. Biological databases: Sequence databases – Nucleic acid databases (EMBL, GenBank and DDBJ) and Protein (SWISS-PROT, TrEMBL and PIR); Structure databases – Protein (PDB, SCOP and CATH).

Biological sequence analysis: Alignment – Sequence, Global, Local, Pair-wise and Multiple sequence. Database similarity search tools – BLAST and FASTA.

UNIT – IV: ANIMAL EXPERIMENTATION AND INTELLECTUAL PROPERTY RIGHTS

(13 Hrs)

Composition of Institutional Animal Ethics Committee (IAEC). CPCSEA Guidelines – Animal Care, Environment, Animal Husbandary, Food, Bedding, Water, Sanitation & Cleanliness, Waste Disposal, Record keeping, Transport of lab animals, Anesthesia and Euthanasia.

Intellectual Property Rights (IPR). Status and implications of IPR. Protecting biotechnological innovations. Protection of plant varieties. Patent protection in developing countries.

UNIT – V: RESEARCH REPORTS

(13

Hrs)

Components of a research report - Title, Authors, Abstract, Synopsis, Keywords, Introduction, Materials and Methods, Results, Discussion, Acknowledgement, Summary or Conclusions, References. Plagiarism. Significance of Impact Factor. Preparation of a research proposal for funding. Indian funding agencies for research. Importance of NET examination by CSIR.

Literature Citation: Name-Year System (Harvard System), Citation-Sequence System, Alphabet Number System; Journal Abbreviations. Format and use of Tables and figures in a research report.

OUTCOMES:

CO1	Knowledge on research problem and finding scientific articles with Internet.
CO2	Methodology on collection and analysis of data using statistical tools.
CO3	Awareness on bioinformatics and biological databases
CO4	Basic knowledge on animal experimentation and intellectual property rights.
CO5	Knowledge on preparation of research reports.
CO6	Broad knowledge on research problems, analysis of data using statistical tools, and tools used in bioinformatics
CO7	Animal experimentation and preparation of research reports.

Text books:

1. Gurumani, N. Research Methodology for Biological Sciences. MJP Publishers, Chennai 2006.
2. Gurumani, N. An Introduction to Biostatistics. MJP Publishers, Chennai 2011.
3. Rastogi, S.C., Mendiratta, N. and Rastogi, P. Bioinformatics - Methods and Applications, 4th Edition. Prentice Hall of India Private Limited, 2013.
4. CPCSEA Guidelines for Laboratory Animal Facility, CPCSEA, 2003.

5. Kumar, H.D. Modern Concept of Biotechnology. Vikas Publishing House Pvt. Ltd., 2007.

Reference Books:

- 1) Day, R.A, Gastel B. How to Write and publish a Scientific Paper. Cambridge University Press, 8th Edition. 2017.
- 2) Gupta, S.P. Statistical Methods. Sultan.Chand & Sons, 2011.
- 3) Lesk, A.M. Introduction to Bioinformatics, 3rd Edition. Oxford University Press. 2009.

SEMESTER – III

L	T	P	C
5	0	0	4

ADVANCED MOLECULAR BIOLOGY

Total Hours:

SUBJECT CODE: P3BC23MT

OBJECTIVES:

1. To provide the strong knowledge in the mechanism of synthesis of DNA, RNA and proteins.
2. Gene regulation, gene mutation and DNA repair in prokaryotes and eukaryotes.
3. To develop the knowledge about the ethics followed in drug safety, human gene therapy

UNIT – I: DNA REPLICATION IN PROKARYOTES AND EUKARYOTES (13 Hrs)

Central dogma of molecular biology, DNA as genetic material - Meselson and Stahl experiment, Types of replication, Evidence for Semiconservative replication - Replication in prokaryotes- Role of topoisomerase, helicase, SSB, primase and DNA polymerase I, II, and III. Eukaryotic replication - Role of ARS, α , β , γ , δ , ϵ polymerase, role of telomere. Inhibitors of replication and its uses, RNA primer, lagging strand synthesis, leading strand synthesis and Okazaki fragments, C value paradox. Regulation of prokaryotic and eukaryotic replication.

UNIT – II: TRANSCRIPTION

(14 Hrs)

Transcription - Definition, Sense strand and Antisense strand, Functional units in a typical eukaryotic gene-promoters, enhancers, introns and exons. Eukaryotic RNA polymerases - I, II and III - structure and functions. Role of Promoter box, Prokaryotic transcription, Rho - dependent and Independent termination, Post-transcriptional modifications in Prokaryotes and Eukaryotes. Catalytic RNA (ribozymes), RNA splicing, Self-splicing Introns - Group I and Group II. Antisense RNA. Inhibitors of transcription and its uses. Mechanism of Reverse Transcription (retrovirus).

UNIT – III: GENETIC CODE, TRANSLATION AND GENE EXPRESSION (13 Hrs)

Genetic code - Definition, Deciphering of the Genetic code, Codon dictionary, Salient features of genetic code. Structure of tRNA and aminoacyl tRNA synthetase. Binding of amino acids to tRNA, Wobble mechanism and its Significance, Composition of Prokaryotic and Eukaryotic ribosomes, Shine-Dalgarno sequence, Merlyn Kozak Sequence, Prokaryotic and Eukaryotic protein biosynthesis - Initiation, elongation, translocation and termination, Polysomes, Post-translational modifications in prokaryotes and eukaryotes, Role of endoplasmic reticulum, Role of signal peptide, Inhibitors of protein synthesis and its uses. Protein folding by molecular chaperones.

UNIT – IV: MUTATION AND REPAIR MECHANISM**(12 Hrs)**

Mutation and its types- Spontaneous mutation, point mutation, Frameshift mutation, mutagens - mutagenesis, hot spot and replication fidelity. Chromosome aberrations – balanced and unbalanced - causative agents and types. DNA repair mechanism - Excision repair (Base excision and Nucleotide excision), Mismatch repair, Recombination repair and SOS repair.

UNIT – V: GENE REGULATION, BIOSAFETY AND BIOETHICS**(13 Hrs)**

Prokaryotic gene regulation: - Operon model; lac operon - positive and negative control; trp operon - repression and attenuation. Transcriptional regulation in eukaryotes - hormonal (steroidal hormone receptors) and phosphorylation (STAT proteins). Epigenetic gene regulation by DNA methylation and acetylation. DNA methyltransferase, histone acetyltransferases, CpG islands. Potential hazards, Biosafety of GM foods and GMOs. Ethical issues in human gene therapy and human cloning. Ethics in Drug Safety.

OUTCOMES: On successful completion of the course the student should have

CO1	Understanding the DNA replication in prokaryotes and eukaryotes.
CO2	Knowledge on RNA polymerases, post transcriptional modification, reverse transcription.
CO3	Awareness on genetic code, protein biosynthesis, gene expressions
CO4	Understanding the type of mutation, DNA repair mechanism and mutagenesis
CO5	Knowledge on regulation of gene in prokaryotes, GM food, ethics in drug safety, human gene therapy
CO6	Comprehensive knowledge on the synthesis of genetic material, RNA and proteins.
CO7	Overview of gene repair mechanism, gene regulations, epigenetics and bioethics

Text books:

1. W.H. Elliot and D.C. Elliot, Biochemistry and Molecular Biology, 5th Edition, Oxford University Press, 2018.
2. D. Frifelder and M. Malacinski. Essentials of Molecular Biology, 5th Edition. Jones and Bartlett publishers, 2015

Reference Books:

1. Robert F. Weaver. Molecular biology, 4th Edition, McGraw-Hill, 2007.
2. R. M. Twyman. Advanced Molecular Biology. 1998.
3. B. Lewin. Genes XII, 12th Edition. . Jones and Bartlett Publishers, 2017.
4. G. Karp. Cell and Molecular Biology, 8th Edition. Wiley International, 2016.
5. Lodish, et al, Molecular Cell Biology, 7th Edition, Freeman, 2012.
6. Tom, L. Beauchamp and Childress, F. Principles of biomedical ethics, 7th Edition, Oxford University Press, 2012.

SEMESTER – III

L	T	P	C
3	0	0	3

PHYTOCHEMISTRY AND PHYTOTHERAPY

SUBJECT CODE: P3BC24MT

Total Hours: 39

OBJECTIVES:

To provide the acquire knowledge on medicinal use of plants and plant extracts for therapeutic purposes.

To create the Awareness inducing diseases in animal models and use of herbal plants for treating diseases animal models

This course helps to predict the secondary compounds present in plants.

UNIT – I : INDIAN SYSTEM OF MEDICINE

(13 Hrs)

Herbal medicines: History and scope – definition of medical terms. Role of natural products in alternative system of medicine - Siddha, Ayurvedha, Unani systems, Tribal medicine and nutraceuticals.

Herbal plant – Cultivation – organic farming, sexual and asexual methods, factors affecting cultivation and pest and pest control. Collection and processing – Harvesting, drying, packing, storage and preservation of herbal drugs.

UNIT – II: GROWTH REGULATORS AND STANDARDISATION OF HERBAL DRUG

(13 Hrs)

Structure and functions of plant growth regulators – Auxins, Gibberellins, Cytokinins, Abscissic acid.

Quality control of herbal drugs – evaluation of crude drugs as per WHO guidelines – organoleptic, microscopical (Leaf, stem), physical – (moisture content, viscosity, melting point, solubility, ash values and extract values) and microbial evolution of crude drug.

UNIT – III: SEPARATION AND CHARACTERIZATION OF PLANT DRUGS

(13 Hrs)

Classification of crude drugs. Chemical evaluation of crude drug – successive solvent extraction and preliminary phytochemical screening.

Methods of separating plant constituents – UV, TLC, HPLC, HPTLC and GC-MS, FTIR.

UNIT – IV: BIOLOGICAL EVALUATION OF HERBAL DRUGS

(13 Hrs)

Acute toxicity studies, induction of diseases in animal models and the mechanism of action of inducing agents: diabetes (streptozotocin), liver (paracetamol), heart (isoproterenol) and kidney (ethylene glycol) diseases and the standard drug used in these models (glibenclamide, silymarin, verapamil and cystone).

UNIT – V: ANTIOXIDANTS IN PHYTOTHERAPY

(13 Hrs)

In-vitro antioxidant assay of plant extracts – DPPH, H₂O₂, OH⁻, nitric oxide scavenging activity. Medicinal plants used for the treatment of diabetes (*Trigonella foenum*, *Gymnema sylvestre* and *Momordica charantia*), liver (*Andrographis paniculata*, *Phyllanthus niruri* and *Eclipta alba*),

heart (*Digitalis purpurea*, *Terminalia arjuna* and *Nux vomica*) and kidney diseases (*Aerva lanata*, *Musa paradisiaca* and *Citrus aurantium*).

OUTCOMES: on successful completion of the course the students should have:

CO1	Knowledge on Indian systems of medicines – Siddha, Ayurveda, Unani, tribal medicine, cultivation, collection and processing of herbal plant.
CO2	Standardization of herbal drug as per WHO guidelines, plant growth regulator and their function.
CO3	Basic knowledge on classification of crude drug, extraction, screening of phytochemicals using techniques like GCMS, HPTLC, FTIR, UV
CO4	Understanding the biological evaluation of herbal drugs by acute toxicity study & induction of diseases in animal models.
CO5	Knowledge on <i>in-vitro</i> antioxidant assay of plant extract - DPPH, H ₂ O ₂ , OH ⁻ , herbal plant used for treating different disorders.
CO6	Broad knowledge on cultivation of herbs, standardization, classification and screening of herbal drugs.
CO7	Awareness inducing diseases in animal models and use of herbal plants for treating diseases animal models.

Text books:

1. Kokate, C.K., Durohit, A.P and Gokhale, S.R. Pharmacognosy, 53rd Edition, Nirali Prakasham Publishers, Pune 2017.

Reference Books:

1. G.E. Trease and W.C. Evans. Pharmacognosy, 16th Edition, English Language Books Society, 2009.
2. Handa, S.S. and Kapoor, V.K. Pharmacognosy, 2nd Edition, Vallabh Prakashan Publishers, New Delhi. 2003.
3. Jain, S.K. Indian Medicinal Plants, 5th Edition, National Book Trust, New. Delhi, 2012.

SEMESTER – III

(ELECTIVE III) – PAPER – III

L	T	P	C
4	0	0	4

IMMUNOLOGY AND STEM CELL TECHNOLOGY

Total Hours: 52

SUBJECT CODE: P3BC25ET

OBJECTIVES:

1. To provide the basic concepts of immunology this follows the course of immune response.
2. The various mechanisms by which microbial pathogens cause disease and the interaction with the host.
3. This course helps to gain knowledge on immune system, immunity, transplantation and hypersensitivity.

UNIT I: IMMUNE SYSTEM AND IMMUNIZATION

(14 Hrs)

Immune System – Central and Peripheral Lymphoid Organs, Thymus, Bone marrow, Spleen, Lymph nodes and Other Peripheral lymphoid tissues - GALT. Cells of the Immune system – Lymphocytes, Mononuclear phagocytes, Dendritic cells, Granulocytes, NK cells and Mast cells. Antigen, Haptens, Adjuvants, Antigenicity, Antigenic determinants and Epitopes. Immunoglobulins: Structure, Classification, Functions, Allotypes and Idiotypes. Theories of antibody formation – Side chain and Clonal selection theory. Antibody diversity – Mechanisms contributing to diversity – Somatic recombination, Rearrangement and generation of antibody diversity. Immunization practices - Active and Passive immunization. Vaccines – Killed, Attenuated – Toxoids. Recombinant Vector vaccines – DNA vaccines, Synthetic peptide vaccines– Antiidiotype vaccines.

UNIT II: IMMUNITY AND COMPLEMENT SYSTEM

(14 Hrs)

Types of Immunity- Innate and Acquired Immunity, Antitoxic, Antibacterial and Antiviral immunity. Immune response – Primary and Secondary – Humoral and Cell mediated Immunity. Antigen recognition – T cell and B cell receptor complexes, Antigen processing and presentation. Interaction of T and B cells, Cytokines. Immunological memory, Cytotoxicity-Immunotolerance and Immunosuppression.

Complement system – Components, Nomenclature, activation of Complement – classical and alternative pathway, Complement receptors and Complement fixation test.

UNIT III: GENETIC BASIS OF IMMUNOLOGY, TRANSPLANTATION AND HYPERSENSITIVITY

(13 Hrs)

MHC Complex - MHC genes and product; HLA genes Class I and II antigens – Structure and function. Histocompatibility testing – Cross matching. MHC and disease association. Role of MHC antigens in Immune response, MHC antigens in transplantation.

Transplantation – Types, Genetics of transplantation – Graft versus Host reactions. Hypersensitivity – Definition, Classification, Mechanism, diagnosis and treatment.

UNIT IV: AUTOIMMUNE, IMMUNODEFICIENCY DISEASES AND IMMUNOLOGICAL TECHNIQUES (12 Hrs)

Autoimmunity and Autoimmune diseases - Mechanism, Diagnosis and Treatment. Immunodeficiency disorders – B cell, T cell and complement deficiencies, AIDS - pathogenesis, diagnosis and treatment.

Immunological techniques – Production of Polyclonal and Monoclonal antibodies. Immunoprecipitation, RIA, ELISA, Fluorescent immunoassay, Avidin-Biotin mediated assay, Immunohistochemistry – Diagnostic immune histo-chemistry markers – Carcinoembryonic antigen (CEA) and Alpha-fetoprotein (AFP), Immunoelectrophoresis, Immunoblotting.

UNIT V: STEM CELL TECHNOLOGY (12 Hrs)

Stem cells – Introduction, Definition and Basics of Stem cells. Classification of Stem cells - Different types of stem cells, Adult stem cells. Sources of stem cells fetus and various adult tissues. Properties of Stem cells - self renewal, Clonality, Plasticity and Pluripotent nature. Characteristics - Transdifferentiation, applications of Stem cells in Regenerative medicine and Human beings.

OUTCOME: On successful completion of the course the students should have:

CO1	Knowledge on immune system, immunization, vaccine production and structure of immunoglobulins.
CO2	Understanding the types of immunity, immune suppressive agent and complement system
CO3	Awareness on transplantation, hypersensitivity and basics of genetic immunology
CO4	Knowledge on autoimmune disorders, immune deficiency disease, and techniques used to diagnose antigen-antibody reactions, tumor marker.
CO5	Basic knowledge on stem cell technology.
CO6	Comprehensive knowledge on immune system, immunity, transplantation and hypersensitivity.
CO7	Awareness on autoimmune disorders and stem cell technology

Text books:

1. Judith A Owen et al., Kuby Immunology. New York : W.H. Freeman, 7. ed., International ed, 2013.
2. Immunology : Introductory Textbook by Nandhini Shetty, New age international ltd, 2nd edition, 2018.

References:

1. Cellular and Molecular Immunology by Abul Abbas Andrew H. Lichtman Shiv Pillai, Elsevier publishers, 9th Edition, 2017.
2. Immunological techniques by D.M.Weir, 4th edition, ELBS Churchill, 1994
3. Essentials of Stem Cell Biology by Robert Lanza and Anthony Atala, 3nd edition, Elsevier Science publishers, 2013.
4. Stem cell research and Therapeutics by Yanhong Shi, Springer Netherland, 2010.

SEMESTER – 3

L	T	P	C
4	0	0	4

(ELECTIVE III) – PAPER - III

Total Hours: 52

PHARMACEUTICAL BIOCHEMISTRY

SUBJECT CODE: P3BC26ET

Objective

1. To impart knowledge on general pharmacology, metabolism and excretion of drugs and the biological mechanism of drug action.
2. To create awareness on novel therapeutics such as enzymes, antioxidants, gene therapy, recombinant vaccines and monoclonal antibodies.
3. To understand the actions and uses of plant based drugs

UNIT – I: INTRODUCTION

(11 Hrs)

Drug - Structural feature and pharmacology activity, prodrug concept. Absorption – first-pass effect. Distribution, metabolism - Phase I, II reactions, action of cytochrome P₄₅₀ and elimination of drug. Receptor - localization, type and subtypes, models and their drug – receptor interaction, agonist & antagonist.

UNIT – II: ADVERSE REACTIONS OF DRUGS

(12 Hrs)

Adverse response to drugs, drug tolerance, drug intolerance, idiosyncrasy (pharmacogenesis), drug allergy. Tachyphylaxis, drug abuse, vaccination against infection, factor that modifies the effect of drug. Assay of drug potency - bioassay and immunoassay.

UNIT – III: BIOTECHNOLOGY AND PHARMACY

(14 Hrs)

Genetically engineered protein and peptide agents. Novel drug delivery systems – non conventional routes of administration. Anti-AIDS drug development, oncogenes ras target for drugs, multi-drug resistance.

UNIT – IV: MECHANISM OF ACTION OF DRUGS

(14 Hrs)

Mechanism of action of drugs used in therapy of: Respiratory system – cough, bronchial – asthma, pulmonary tuberculosis. GIT – Digestants, appetite suppressants. Hypolipidemia agents, vomiting, constipation and pepticulcer. Antimicrobial drugs – sulfonamides, trimethoprim, cotrimoxazole, penicillin, and macrolides. Aminoglycosides, cephalosporin and bacterial resistance. Insulin and oral diabetic drugs, antifertility and ovulation-inducing drugs.

UNIT – V: DRUGS OF PLANT ORIGIN**(14 Hrs)**

Drug dependence and abuse – management of self poisoning cancer. Chemotherapy – cytotoxic drug. Immunosuppressive gene therapy. New Biological Targets for Drug Development. Novel Drug Screening Strategies

OUTCOMES:

CO1	Knowledge on general pharmacology, metabolism and excretion of drugs and the biological mechanism of drug action.
CO2	Awareness on assay of drug potency, adverse responses to drugs and vaccination against infections
CO3	Understanding the novel drug delivery system, anti-AIDS drug development and multi-drug resistance
CO4	Basic knowledge on mechanism of action of drugs used in diseases of respiratory system, antimicrobial drugs, hypolipidemic drugs and oral diabetic drugs.
CO5	Knowledge on drugs of plant origin, immunosuppressive gene therapy and novel drugs screening strategies
CO6	Familiarity with general pharmacology, metabolism and excretion of drugs and the biological mechanism of drug action
CO7	Applications of novel therapeutics and plant based drugs.

Text books:

1. R.S. Satoskar. S.D. Bhandhakar and S.S. Anilapure Pharmacology and Pharmacotherapeutics. 24th Edition, Elsevier publishers, 2015.

Reference Books:

1. Goodman & Gilman's The Manual of Pharmacology and Therapeutics. 2nd Edition, 2014.
2. Foxtercox. Basic Pharmacology. Bulter Worth's, 1980.
3. William O. Foye. Principles of Medicinal Chemistry. B.I. Waverks Pvt. Ltd., New Delhi.

SEMESTER – IV
HUMAN PHYSIOLOGY AND NUTRITION

L	T	P	C
5	0	0	4

SUBJECT CODE: P4BC21MT

Total Hours: 65

OBJECTIVES:

1. To provide a comprehensive, balanced introduction to this exciting, evolving and multi-disciplinary field.
2. To Provide Basic knowledge on function of nervous system, muscle contraction, muscle protein
3. This course aim to understand the anatomy and physiology of circulatory and respiratory system

UNIT-I

(13 Hrs)

DIGESTIVE AND EXCRETORY SYSTEM:

Structure of GI tract, composition of salivary, gastric, pancreatic, intestinal and bile secretion. Role of enzymes and hormones involved in digestion and absorption of carbohydrates, lipids and proteins.

Structure and function of kidney, types of Nephrons, GFR, composition and formation of urine, Role of ADH hormone in reabsorption of water, Diabetes insipidus.

UNIT -II

(14 Hrs)

RESPIRATORY AND CIRCULATORY SYSTEM:

Structure and function of Lungs, transport of O₂ and CO₂ exchange of gases at alveoli and tissues, Role of haemoglobin in respiratory gas transport, Hypoxia, Mechanism of Respiration. Role of lungs in acid-base balance.

Structure and function of Heart, Design of circulatory system - Pulmonary, Systemic and coronary Circulations, Blood vessels, blood flow, blood pressure, Cardiac Cycle, Cardiac Output, Pacemaker, Ischemic heart diseases.

UNIT-III

(14 Hrs)

NERVOUS AND MUSCULAR SYSTEM:

Structure and function of Brain and Spinal Cord, Nerve cell & Nerve fibres, Resting and Action Potential, Transmission of Nerve impulses. Synapses - electrical and chemical, Neurotransmitters.

Types of Muscles and their functions, Sources of energy for muscular work - Collagen, Elastin and other fibrous protein, Mechanism of muscle contraction, Muscular Dystrophy.

UNIT- IV

(12 Hrs)

NUTRITIVE AND CALORIFIC VALUE OF FOOD:

Definition of food and Nutrition, unit of energy measurement - Calorie, Calorific value and its measurement by Bomb Calorimeter. BMR, factors affecting BMR. SDA, RQ of food stuff. Water as essential nutrient and electrolyte.

Physiological role, nutritional significance and sources of carbohydrates, proteins and lipids. Macronutrients and micronutrients, Vitamins - classification, sources, daily requirements and toxicity of vitamins.

UNIT- V

(12 Hrs)

DIETARY HABITS IN HUMAN NUTRITION:

Composition of human body, body weight and its control. BMI, Protein reserves of human body, Nitrogen balance studies, essential and non-essential Amino Acids, Essential fatty acids, Nutritive value of proteins, protein energy malnutrition - Kwashiorkor and Marasmus - their preventive and curative measures.

Nutrition at various stages of growth and development: Diets for infants, children, adolescent, pregnant and lactating women, geriatric nutrition (old age).

OUTCOMES: On successful completion of the course the students should have:

CO1	Knowledge on the mechanism of digestion and absorption of food, structure of kidney and formation of urine
CO2	Understanding the anatomical structures of human respiratory system, nervous system, cardiovascular and digestive and excretory system
CO3	Knowledge on anatomy and physiology of circulatory system and respiratory system
CO4	Basic knowledge on function of nervous system, muscle contraction, muscle protein
CO5	Awareness on food and nutrition, calorific value, BMR, water as essential nutrient and electrolytes, vitamins and minerals.
CO6	Broad knowledge on anatomical structure and functional activities of the internal vital organs
CO7	Awareness on nutritional disorders, kwashiorkor and marasmus, dietary requirement for infants, children and pregnant and lactating women, and geriatric nutrition

Text books:

1. Human Physiology: An Integrated Approach, Dee Unglaub Silverthorn, 7th Edition, Person Educational Ltd, 2016.
2. A Textbook Of Human Physiology, Subrahmanyam Sarada & Et Al., 6th Edition, S Chand, & Co Ltd, , 2010.

References:

1. William. F. Ganong. Review of medical Physiology, 25th edition, MC Graw-Hill Medical, 2015.
2. Nutrition – concepts and controversies. Frances Sizer Eleanor Whitney, 14th edition, Wadsworth, 2017.
3. Cataldo, DeBruyne, Whitney West. Nutrition and diet therapy. 11th edition, Wadsworth Publishing Company, 2013.
4. B Srilakshmi. Nutrition Science, 6th Edition New Age International, 2018.

SEMESTER – IV
ADVANCED CLINICAL BIOCHEMISTRY
SUBJECT CODE: P4BC22MT

L	T	P	C
5	0	0	4

Total Hours: 65

OBJECTIVES:

- To impart knowledge on the disorders of carbohydrate metabolism, nucleic acid metabolism, lipid metabolism and amino acid metabolism.
- To develop an understanding of organ function tests of liver, pancreas, kidney and stomach.
- To develop knowledge on the concepts on diagnostic enzymology and hormonal tests.
- To understand the basic concepts of antioxidants and cancer.

UNIT – I

(13 Hrs)

DISORDERS OF CARBOHYDRATE AND NUCLEIC ACID METABOLISM

Hypoglycaemia and Hyperglycaemia. Role of tissues and hormones in the regulation of blood sugar. Renal threshold, Diabetes mellitus – Clinical types and causes, Diagnostic criteria, Metabolic changes and complications (acute and late). Glucose tolerance test (Oral and IV). Glycogen storage diseases; Galactosemia; Fructose intolerance; Sorbitol intolerance; Fructosuria; Essential pentosuria; Haemolytic anaemia due to G6PDH deficiency; Lactic acidosis.

Inborn errors of nucleic acid metabolism: Gout; Orotic aciduria; Lesch-Nyhan syndrome; Xanthinuria; Immunodeficiency diseases associated with purine nucleoside catabolism (SCID – Severe combined immunodeficiency disorder).

UNIT – II

(13 Hrs)

DISORDERS OF LIPID AND PROTEIN METABOLISM

Plasma lipids and lipoprotein abnormalities: Hyperlipoproteinaemia and hypolipoproteinaemia. Obesity – Leptin & obesity; Refsum's disease; Gaucher's disease; Tay-Sachs disease; Niemann-Pick's disease; Ketoacidosis. Fatty liver. Atherosclerosis and risk factors.

Proteinuria – functional and organic. Plasma protein abnormalities – Hypoalbuminaemia; Analbuminaemia; Bisalbuminaemia; Hypergammaglobulinaemia; Hypogammaglobulinaemia; Agammaglobulinaemia; Afibrinogenaemia; Multiple myeloma. Haemoglobinopathies and Thalassaemia. Metabolic disorder, symptoms and diagnosis of Phenylketonuria, Tyrosinosis, Homocystinuria, Hartnup disease and Maple syrup urine disease.

UNIT – III

(12 Hrs)

ORGAN FUNCTION TESTS

Liver function tests. Liver diseases: Jaundice; Cirrhosis; Alcoholic liver disease; Hepatic tumor; Biliary tract diseases; Gall stones; Crigler-Najjar syndrome; Dubin Johnson syndrome. Estimation of pancreatic amylase and lipase. Pancreatitis and Steatorrhea.

Renal function tests. Acute and chronic renal failure; Glomerulonephritis; Nephrotic syndrome; Urinary tract obstruction; Nephrolithiasis. Fractional test meal. Pentagastrin test; Insulin stimulation test. Gastritis.

UNIT – IV

(14 Hrs)

DIAGNOSTIC ENZYMOLOGY AND HORMONAL TESTS

Serum enzyme activities in diseases: Principle, assay and clinical significance of Serum glutamate oxaloacetate transaminase, Serum glutamate pyruvate transaminase, Alkaline phosphatase, Acid phosphatase, γ -Glutamyl transpeptidase, Lactate dehydrogenase, Creatine kinase, Glucose 6-phosphate dehydrogenase, Cholinesterase.

Cortisol suppression test; Cortisol stimulation test; Water excretion test; Estimation of 17-ketosteroids; Thyroid function tests – Free T₄ and T₃, ¹³¹I-uptake, Thyroid-binding globulin test and TSH; Insulin – ELISA; C-peptide assay. Diagnosis of SIADH.

UNIT – V

(13 Hrs)

ANTIOXIDANTS AND CANCER

Free radicals - Endogenous and exogenous free radicals. Oxidative damages to lipids, proteins and DNA by free radicals. Antioxidants – Types (inorganic & organic, enzymatic & non-enzymatic) and Clinical significance in ageing and diseases.

Morphological and Biochemical characteristics of cancer cells. Carcinogenesis by radiation, chemicals and viruses. Experimental carcinogenesis; Multistep carcinogenesis; Oncogenes and proto-oncogenes, DNA and RNA viruses; Mechanisms of activation of proto-oncogenes. Tumour markers – Types, Characteristics and Clinical usefulness of AFP, CEA, HCG.

OUTCOMES:**Upon completion of the course, the student**

CO1	Knowledge on the disorders of carbohydrate metabolism, nucleic acid metabolism, lipid metabolism and amino acid metabolism.
CO2	Familiarity with disorders of fatty liver, atherosclerosis, obesity, anemia, inborn errors of metabolism and plasma protein abnormalities
CO3	Basic knowledge on organ function test of liver, pancreas, kidney and GIT
CO4	Knowledge on the concept of diagnostic enzymology and hormone assays
CO5	Awareness on the basic concepts of antioxidants, morphological and biochemical characteristics of cancer
CO6	Comprehensive knowledge on metabolic disorders and organ function tests
CO7	Awareness of diagnostic enzymology, hormone assays, antioxidants and cancer

Text Books:

1. M.N. Chatterjee and Rana Shinde, Textbook of Medical Biochemistry, 8th Edition. Jaypee Brothers Medical Publishers (P) Ltd., 2012.
2. Ramnik Sood, Concise Book of Medical Laboratory Technology Methods and Interpretations. Jaypee Brothers Medical Publishers (P) Ltd., New Delhi, 2015.

Reference books:

1. Carl A. Burdis and Edward R. Ashwood. Tietz Textbook of Clinical Chemistry and Molecular Diagnostics, 5th Edition. Saunders, 2011.
2. P. D. Mayne. Clinical Chemistry in diagnosis and treatment, 6th Edition. CRC Press, 1994.
3. T.M. Devlin. Textbook of Biochemistry with clinical correlations, 7th Edition. John Wiley & Sons, 2010.
4. A.C. Guyton and J.E. Hall. Text Book of Medical Physiology, 13th Edition. Saunders, 2015.

SEMESTER – IV

L	T	P	C
9	0	0	5

CORE PRACTICAL – III

Total Hours: 117

Biochemical Analysis of Blood, Antioxidant and Immunological Studies

SUBJECT CODE: P4BC21MP

Objective

1. To impart knowledge about the biochemical basis of various diseases and disorders
2. To study various diagnostic and therapeutic methodologies available for diseases and disorders.

A.BIOCHEMICAL ANALYSIS OF BLOOD

1. Estimation of blood glucose by O-toluidine method and GTT.
2. Estimation of blood glucose by GOD-POD method and using Semiautoanalyser.
3. Estimation of serum proteins by Lowry's Method.
4. Estimation of plasma fibrinogen.
5. Estimation of A/G Ratio in serum.
6. Estimation of blood urea and urea clearance test by DAM method.
7. Estimation of serum uric acid by phosphotungstate method.
8. Estimation of serum creatinine by alkaline picrate method.
9. Estimation of serum cholesterol by Zak's method.
10. Estimation of serum phospholipids.
11. Estimation of serum calcium.
12. Estimation of serum bilirubin by Evelyn and Malloy method.
13. Estimation of lipid peroxide in serum.

B.ASSAY OF ANTIOXIDANTS

1. Tocopherol
2. Ascorbic acid
3. Catalase
4. Superoxide Dismutase (SOD)
5. Lipid peroxide

C. SEPARATION TECHNIQUES

1. Activity Staining of SOD and Catalase by Native PAGE

D. IMMUNOLOGICAL TECHNIQUES

1. Blood grouping and RH Typing
2. Latex agglutination test for rheumatoid factor
3. Widal test
4. ELISA demonstration

OUTCOMES:

CO1	Proficiency in biochemical analysis of blood biomarkers
CO2	Ability to assay antioxidants
CO3	Basic knowledge on separating techniques and immunological techniques

References (Practical Manuals):

1. A. Sadasivam and A. Manickam. Biochemical Techniques, 2nd Edition, New Age International Publishers, 2003.
2. J. Jayaraman. Laboratory Manual in Biochemistry, 2nd Ed., New Age International Publishers, 2011.
3. H. Varley. Practical Clinical Biochemistry, 4th Edition, CBS Publishers, 2008.

SEMESTER – IV
CORE PRACTICAL – IV

L	T	P	C
9	0	0	5

Total Hours: 117

Haematological Methods, Urine Analysis and Microbial Biochemistry

SUBJECT CODE: P4BC22MP

Objective

1. To impart knowledge on Haematological Methods,
2. Urine Analysis and Microbial Biochemistry

A. HAEMATOLOGICAL METHODS

1. Collection and storage of blood
2. Total RBC count
3. Total WBC count
4. Total platelet count
5. Differential WBC count
6. Absolute eosinophil count
7. Determination of hemoglobin content (Drabkin's method)
8. Determination of clotting time.
9. Determination of prothrombin time
10. Determination of ESR.
11. Pathological examination of blood film.
12. Estimation of hemoglobin by cyanomethhemoglobin method

B. URINE ANALYSIS

1. Qualitative analysis of normal and pathological constituents in urine.
2. Microscopic analysis of urine
3. Estimation of titrable acidity of urine.
4. Analysis of urinary calculi.
5. Estimation of protein in urine by biuret method

6. Estimation Urea in urine and urea clearance test
7. Estimation uric acid in urine.
8. Estimation of calcium in urine
9. Estimation of creatinine in urine

MICROBIAL BIOCHEMISTRY

1. Isolation and identification of bacteria from effluent water
2. Sterilization technique - principle, methods, moist heat, dry heat, safety levels.
3. Preparation of media – liquid, solid, agar deep, slant and plate.
4. Pure culture technique – streak plate, pour plate.
5. Staining techniques – simple, differential and special staining

OUTCOMES:

CO1	Knowledge on collection and storage of blood, and analysis of blood cell components
CO2	Analysis of abnormal constituents in urine and quantitative analysis constituents in urine sample
CO3	Knowledge on isolation and identification of bacteria from effluent water and staining techniques.

References (Practical Manuals):

1. A. Sadasivam and A. Manickam. Biochemical Techniques, 2nd Edition, New Age International Publishers, 2003.
2. J. Jayaraman. Laboratory Manual in Biochemistry. Wiley Eastern, 1981.
3. H. Varley. Practical Clinical Biochemistry, 4th Edition, CBS Publishers, 2008.
4. N. Kannan. Laboratory Manual in General Microbiology, Panima Publishing Corporation, 2002.

SEMESTER – IV

L	T	P	C
10	0	0	8

PROJECT / DISSERTATION WITH VIVA-VOCE

Total Hours: 130

SUBJECT CODE: P4BC21PV

Objective

1. To develop an understanding of basic research in science.
2. To impart knowledge on the experimental studies and analysis of results.
3. To understand the basic concepts of research publications.

OUTCOMES:

CO1	Retrieve, evaluate, and interpret professional literature and use this information to develop theoretical framework, testable hypothesis and ability to use various research methods for research work.
CO2	Design realistic and feasible research projects and prepare necessary protocol.
CO3	Develop and communicate educational research, able to communicate with researchers and practitioners through writing and/or presentations.

**ADHIPARASAKTHI COLLEGE OF ARTS & SCIENCE,
(Autonomous)**

Permanently Affiliated to Thiruvalluvar University, Vellore

Accredited by NAAC with B⁺⁺ Grade

M. Phil., BIOCHEMISTRY

Under CBCS

(Effective from the Academic Year 2018-2019)

Regulations

CBCS

Choice-Based Credit System is a flexible system of learning. 'Credit' defines the quantum of contents / syllabi prescribed for a course, and determines the number of hours of instruction required. The distinguishing features of CBCS are the following:

It permits the students to:

- ❖ Learn at their own pace
- ❖ Choose electives from a wide range of elective courses offered by the departments of the college.
- ❖ Undergo additional courses and acquire more than the required number of credits
- ❖ Adopt an inter – disciplinary approach in learning
- ❖ Make best use of the expertise of available faculty

1. ELIGIBILITY FOR ADMISSION

Admission to the M.Phil. Biochemistry Degree Course shall be made as follows:

I Preference

A student who has passed M.Sc. Degree with 50% either with Biochemistry or Chemistry as Major Subject.

II Preference

A student who has passed M.Sc. Degree with 50% and having Chemistry or Biochemistry at the Allied level and any of the Main Subject as mentioned below:

1. Biology
2. Zoology
3. Botany
4. Biotechnology
5. Nutrition and Dietetics
6. Microbiology
7. Any discipline in Life Sciences.

2. The minimum duration for completion of M. Phil., in a discipline is two semesters and the maximum duration is four semesters.

3. The M.Phil., Degree is awarded if a student has

- Registered, undergone and secured the required minimum number of credits for the core and elective courses including dissertation specified in the corresponding programme within the stipulated time;
- Secured the required attendance;
- No dues to the College, Hostel or Library;
- No disciplinary action pending against him/her

4. Structure of the Programme

The M.Phil., Programme consists of :

Core courses are mandatory for all students.

Elective courses which students can choose from amongst the courses offered within the department of the College.

Dissertation (Mandatory)

5. The distribution of credits will be as below:

- i. Core Courses – Minimum two courses carrying 5 Credits each (10 or more credits)
- ii. Elective carrying 5 Credits each – No minimum.
- iii. Dissertation 21 Credits.

The total number of credits for core and electives shall be 15, consisting of

- 2 Core courses (10 Credits) plus one elective (5 Credits)

The research topic for the dissertation may be finalized even at the beginning of the M.Phil Programme, so that the collection of relevant literature and research design could be completed in the first semester leaving the entire Second Semester for the research work. The course registration for dissertation shall be in the First semester and a separate registration form shall be used for Registration.

6. Evaluation of the dissertation

6.1. The dissertation shall be jointly valued by the supervisor and one external examiner. The external examiner is to be drawn from:

- i. University department or affiliated college with in the Thiruvalluvar University, Vellore; or
- ii. Any accredited institution of higher education and/or research within Tamilnadu.

The viva-voce examination on the dissertation shall be jointly conducted by the supervisor and the external examiner. The distribution of marks shall be as under

- 20% marks for Periodical presentation (to be evaluated and awarded by the supervisor)
- 60% marks for the Dissertation
- 20% marks for viva-voce

6.2. The last date for submission of Dissertation shall be 31st August every year without penalty. Those who do not submit the dissertation in time may be given an extension of a maximum of two months with a penal fee prescribed by the college (i.e. up to 31st October). There shall be no further extension of time beyond this period. Any student failing to submit the dissertation within this period will be permitted to submit the dissertation only in the next academic year along with the subsequent batch of students.

7. Regulations of M.Phil., Programme

The rules and regulation governing course registration, attendance and discipline of students for M.Phil. Programme shall be the same as for the Master's Programme.

8. Evaluation

The process of evaluation, examination, grading, etc for the M.Phil. programme shall be the same as for Master's programme except for the dissertation; However, Final semester students of the M.Phil. should be allowed to appear for examinations in any arrear papers in the month of September/October each year.

PATTERN OF QUESTION PAPER

Section – A (300 word)	
To Answer 5 questions (either / or pattern)	5 X 6 marks = 30 marks
Section – B (900 words)	
To Answer 3 questions out of 5 questions	3 X 15 marks = 45 marks
	Total = 75 marks

ADHIPARASAKTHI COLLEGE OF ARTS & SCIENCE
G.B.NAGAR, KALAVAI-632506 (AUTONOMOUS STATUS)
AFFILIATED TO THIRUVALLUVAR UNIVERSITY, VELLORE
DEGREE COURSES

M.Phil. Biochemistry

(With effect from 2018-2019)

The course of study and the scheme of examination

Year/ Semester	Subject	Paper	Subject Code	Title of the Paper	Ins. Hrs/ Week	Credit	Exam Hrs	Marks		
								IA	Sem. Exam	Total
I Year/ I Semester	Core	Paper I	M1RM21SM	Research Methology	5	4	3	25	75	100
	Core	Paper II	M1BC21MT	Analytical Methods	5	5	3	25	75	100
	Core	Paper III	M1RE21GS	Research & Publication Ethics	3	2	3	25	75	100
	Elective	Guide Paper	M1BC22MT	Guide Paper	5	4	3	25	75	100
I Year/ II Semester	-	-	M2BC21DV	Dissertation with Viva Voce	-	21	-	20	80	100
TOTAL					-	36	-	120	380	500

SEMESTER

L	T	P	C
5	0	0	4

RESEARCH METHODOLOGY

Total Hours: 65

SUBJECT CODE: M1RM21SM

COURSE OBJECTIVES:

- To impart knowledge on research problem and finding scientific articles with Internet.
- To provide knowledge on collection and analysis of data using statistical tools.
- To create awareness on bioinformatics and biological databases.
- To impart basic knowledge on animal experimentation and intellectual property rights.
- To develop sound knowledge on preparation of research reports.

UNIT 1: RESEARCH METHODOLOGY

(13Hrs)

Meaning of research – Objectives of research – motivation of research – Types, approaches and significance – Methods versus methodology – Research in scientific methods – Research process – Criteria for good research – Problem encountered by research in India – Funding agencies.

UNIT II: RESEARCH DESIGN

(13Hrs)

Research Problem: Selecting the problem – Necessity of defining the problem – Techniques involved in defining the problem – Research design – Needs and features of good design – Different research design – Basic principles of experimental designs.

UNIT III: DATA COLLECTION AND DOCUMENTATION

13Hrs)

Data Collection methods – Data types – processing and presentation of data – Techniques of ordering data – Meaning of primary and secondary data – The uses of computers in research – The library and internet – Uses of search engines – virtual libraries – common software for documentation and presentation.

UNIT IV: DATA AND ERROR ANALYSIS

(13Hrs)

Statistical analysis of data – Standard deviation – Correlation – Comparison of sets of data – Chi squared analysis of data – Characteristics of probability distribution – Binomial, Poisson and normal distribution – Principle of least square fittings – Curve fitting – Measurement of errors – Types and sources of errors – Determination and control of errors.

UNIT V: RESEARCH COMMUNICATION

(13Hrs)

Meaning of research report – Logical format for writing thesis and paper – Essential of scientific report: abstract, introduction, review of literature, materials and methods and discussion – Write up steps in drafting report – Effective illustrations: tables and figures – Reference styles: Harvard and Vancouver systems

COURSE OUTCOMES:

Upon completion of the course, the student

CO1	Knowledge on objectives of research in scientific method and finding scientific articles.
CO2	Basic knowledge on Research problems and designing of research
CO3	Collection and analysis of data, and documentation using internet

CO4	Ability to perform statistical analysis of data
CO5	Basic knowledge on preparation of research report
CO6	Awareness on animal experimentation and intellectual property rights.
CO7	Knowledge on bioinformatics and biological databases.

Text books:

1. Gurumani, N. Research Methodology for Biological Sciences. MJP Publishers, Chennai 2006.
2. Gurumani, N. An Introduction to Biostatistics. MJP Publishers, Chennai 2011.
3. Rastogi, S.C., Mendiratta, N. and Rastogi, P. Bioinformatics - Methods and Applications, 4th Edition. Prentice Hall of India Private Limited, 2013.
4. CPCSEA Guidelines for Laboratory Animal Facility, CPCSEA, 2003.
5. Kumar, H.D. Modern Concept of Biotechnology. Vikas Publishing House Pvt. Ltd., 2007.

Reference Books:

- 1) Day, R.A, Gastel B. How to Write and publish a Scientific Paper. Cambridge University Press, 8th Edition. 2017.
- 2) Gupta, S.P. Statistical Methods. Sultan.Chand & Sons, 2011.
- 3) Lesk, A.M. Introduction to Bioinformatics, 3rd Edition. Oxford University Press. 2009.

SEMESTER – I

L	T	P	C
5	0	0	5

ANALYTICAL METHODS**Total Hours: 65****SUBJECT CODE: M1BC21MT****OBJECTIVES:**

1. The primary objectives of this course is to develop the skills to understand the theory and practice of bio analytical techniques
2. To provide scientific understanding of analytical techniques and detail interpretation of results.
3. To understand the strengths, limitations and creative use of techniques in research and for problem-solving.

UNIT I: MANOMETRY & CHROMATOGRAPHY (13Hrs)

Types of manometry. Principle, instrumentation and applications of Warburg's constant volume, SHE, Oxygen electrode. Chromatography - principle, instrumentation and application of column chromatography, ion exchange chromatography, Gel filtration, thin layer chromatography, affinity chromatography, Gas chromatography, HPLC and FPLC.

UNIT II: CENTRIFUGATION & ELECTROPHORESIS (13Hrs)

Centrifugation techniques – Preparative and analytical, Differential and density gradient centrifugation, analysis of subcellular fractions and determination of relative molecular mass, sedimentation velocity and sedimentation equilibrium. Electrophoresis - General principle of electrophoresis, Native and SDS PAGE, gradient gels, disc gel electrophoresis, isoelectric focusing, 2D PAGE, Agarose gel electrophoresis.

UNIT III: BLOTTING & IMMUNOLOGICAL TECHNIQUES (13Hrs)

Blotting techniques- Western, Southern and Northern blotting. Hybridization of DNA dot blot and fluorescent in situ hybridization FISH, RFLP. PCR, RT-PCR and applications. Yield quantification analysis. Production of antisera and precipitation reaction, precipitation in free solution, RIA, ELISA and Immunofluorescence. Microbial assay of Thiamin, Niacin, Riboflavin, mutant methodology and its applications.

UNIT IV: SPECTROSCOPIC TECHNIQUES (13Hrs)

Laws of absorption and absorption spectrum. Principle, instrumentation and applications of UV, visible spectrophotometer and spectrofluorimetry. Atomic spectroscopy.principle and applications of atomic flame and flameless spectrophotometer. Use of lasers for spectroscopy. Basic principles of turbidimetry. Basic principles and application of mass spectrometry. Basic principles and applications of NMR, ESR, ESI-MS, MALDI TOF, GC MS, CD- dichroism, X-ray diffraction.

UNIT V: RADIO ISOTOPE TECHNIQUES (13Hrs)

Units and types of radioactivity. Detection and measurement of radioactivity. radio active isotopes and their half life of isotopes. Solid and liquid scintillation counting, quenching and quench correction, scintillation cocktails and sample preparation. Cerenkov counting. Autoradiography. Applications of radioisotopes in research and therapy. Radiation hazards, radiation dosimetry.

OUTCOME:

CO1	Awareness on the basic principles of manometry and chromatography
CO2	Basic knowledge on electrophoretic and centrifugation technique and their applications
CO3	Familiarity with the basic principles, methods, instrumentation and biological applications of blotting and immunological techniques
CO4	Basic knowledge on spectroscopic techniques, principle and application of GC-MS, TOF, MALDI
CO5	Knowledge on the basic principles, operational methods, hazards and biological applications of radioactivity.
CO6	Comprehensive understanding of the theoretical principles involved in Bioinstrumentation and familiarity

	with working principals, tools and techniques of analytical techniques
CO7	Understanding the strengths, limitations and creative use of techniques in research and for problem-solving.

Text Books:

1. Keith Wilson, John M Walker. Principles and techniques of biochemistry and molecular biology. Cambridge University Press. 7th edition, 2017.
2. Shawney. Practical Biochemistry. Narosa Publishing, 1995.
3. Upadhyaya A Upadhyaya K and Nath. Biophysical Chemistry: Principles and Techniques, 3rd Edition. Himalayan publications, 2009.

Reference Books:

1. D. Frifelder and M. Malacinski. Essentials of Molecular Biology, Jones & Bartlett, 5th Edition, 2015.
2. R.D. Braun. Introduction to Instrumental Analysis. Pharma Book Syndicate, 2006.
3. Chatwal and Anand. Instrumental Methods of Analysis. 5th Edition, Himalayan publication, 2007.
4. Jag Mohan. Organic Spectroscopy, Principles and Application. Narosa Publishing House, 2nd Edition, 2007.

L	T	P	C
5	0	0	4

SEMESTER – I

Total Hours: 65

CLINICAL BIOCHEMISTRY AND PHYTOTHERAPY

SUBJECT CODE: M1BC22MT

COURSE OBJECTIVES:

- To impart knowledge on the disorders of carbohydrate metabolism, nucleic acid metabolism, lipid metabolism.
- To develop an understanding of organ function tests of liver and kidney.
- To develop knowledge on the concepts on diagnostic enzymology and hormonal tests.
- To understand the basic concepts of antioxidants and cancer.
- To learn the different herbs- drug interactional with various disease condition of animal models and human body.

UNIT-1: SPECIMEN COLLECTION AND ANALYSIS (13Hrs)

Specimen collection and processing – collection of blood, Anticoagulant, normal and abnormal constituents of blood. Collection and analysis of normal and abnormal urine – timed urine specimens, preservatives. Clinical significance of sugar, proteins, ketone bodies, bilirubin and porphyrins. Nanoparticles – preparation and its applications. Isolation and identification of phytochemicals in herbal extracts and antioxidant activities. Medicinal values of herbal plants.

UNIT II : DISORDERS OF CARBOHYDRATE AND LIPID METABOLISM (13Hrs)

Disorders of carbohydrate metabolism – blood sugar level, hyper and hypoglycemia, regulation of blood glucose, renal threshold, Diabetes Mellitus – etiologic classification and diagnostic criteria, glucose tolerance test, metabolic complication – acute and late complication. Hypoglycemic agent – Insulin receptor and Insulin c peptide assay. Induction of Diabetes mellitus.

Disorders of lipid metabolism:

Plasma lipid and lipoprotein abnormalities, hypocholesterolemic agent, fatty liver, obesity, atherosclerosis and risk factors.

UNIT III: DISORDERS OF PROTEIN METABOLISM AND CLINICAL ENZYMOLOGY (13Hrs)

Disorders of protein metabolism – Non protein nitrogenous constituent in blood – urea, uric acid and creatinine. Plasma protein abnormalities – deficiency. Hemoglobinopathies – sickle cell anemia, thalassemia. Serum enzyme activities in disease – principle and assay of Aspartate aminotransferase (AST), Alanine aminotransferase (ALT), Alkaline phosphatase (ALP), Acid phosphatase (ACP), streptokinase, asparaginase, α – hydroxyl butyrate dehydrogenase, ceruloplasmin, Sgammaglutamyl transpeptidase.

UNIT IV – HEPATIC AND RENAL FUNCTION TEST

(13Hrs)

Normal structure and functions of liver, disease of the liver, hepatitis – types, cirrhosis, alcoholic liver disease, hepatic tumour and biliary tract disease, Induction of hepatotoxicity, Liver function test and disorders of bilirubin metabolism. Renal function test and related disorder –

Acute and Chronic renal failure, urinary tract obstruction, analysis of urinary calculi and Induction of nephrotoxicity.

UNIT V – FREE RADICALS, CANCER AND DISORDERS OF NUCLEICACID METABOLISM (13Hrs)

Free radicals in health and disease – endogenous and exogenous free radicals. Oxidative damages to lipid, protein and DNA, the role of enzymatic and non- enzymatic antioxidant. Cancer – morphological and metabolic changes in tumour cells, Tumour marker – Alphafo protein, CEA, HCG, carcinogenic agent.

COURSE OUTCOMES:

Upon completion of the course, the student

CO1	Knowledge on collection, analysis and interpretation of blood and urine, and introduction to nanoparticles and phytochemicals.
CO2	Familiarity with the disorders of carbohydrate and lipid metabolism
CO3	Knowledge on disorders of protein metabolism and serum enzyme activities in diseases.
CO4	Familiarity with the organ function test.
CO5	Awareness on free radicals and cancer.
CO6	Overview on clinical biochemistry-based research
CO7	Methodology on phytochemical and phytotherapeutic research

Text Books:

1. M.N. Chatterjee and Rana Shinde, Textbook of Medical Biochemistry, 8th Edition. Jaypee Brothers Medical Publishers (P) Ltd., 2012.
2. Ramnik Sood, Concise Book of Medical Laboratory Technology Methods and Interpretations. Jaypee Brothers Medical Publishers (P) Ltd., New Delhi, 2015.

Reference books:

1. Carl A. Burdis and Edward R. Ashwood. Tietz Textbook of Clinical Chemistry and Molecular Diagnostics, 5th Edition. Saunders, 2011.
2. P. D. Mayne. Clinical Chemistry in diagnosis and treatment, 6th Edition. CRC Press, 1994.
3. T.M. Devlin. Textbook of Biochemistry with clinical correlations, 7th Edition. John Wiley & Sons, 2010.
4. A.C. Guyton and J.E. Hall. Text Book of Medical Physiology, 13th Edition. Saunders, 2015.

L	T	P	C
3	0	0	2

SEMESTER – I
RESEARCH AND PUBLICATION ETHICS
SUBJECT CODE: M1RE21GS

Total Hours: 39

Objectives:

1. To impart knowledge on research problem and finding scientific articles with Internet.
2. To provide the knowledge about the Software tool to identify predatory publications.
3. This course clarify about the Scientific misconducts, Redundant publications, Ethics, database and research merits

THEORY

- **RPE 01: PHILOSOPHY AND ETHICS (3 hrs.)**
 1. Introduction to philosophy: definition, nature and scope, concept, branches
 2. Ethics: definition, moral philosophy, nature of moral judgements and reactions
- **RPE 02: SCIENTIFIC CONDUCT (5hrs.)**
 1. Ethics with respect to science and research
 2. Intellectual honesty and research integrity
 3. Scientific misconducts: Falsification, Fabrication, and Plagiarism (FFP)
 4. Redundant publications: duplicate and overlapping publications, salami slicing
 5. Selective reporting and misrepresentation of data
- **RPE 03: PUBLICATION ETHICS (7 hrs.)**
 1. Publication ethics: definition, introduction and importance
 2. Best practices / standards setting initiatives and guidelines: COPE, WAME, etc.
 3. Conflicts of interest
 4. Publication misconduct: definition, concept, problems that lead to unethical behavior and vice versa, types
 5. Violation of publication ethics, authorship and contributorship
 6. Identification of publication misconduct, complaints and appeals
 7. Predatory publishers and journals

PRACTICE

- **RPE 04: OPEN ACCESS PUBLISHING(4 hrs.)**
 1. Open access publications and initiatives
 2. SHERPA/RoMEO online resource to check publisher copyright & self-archiving policies
 3. Software tool to identify predatory publications developed by SPPU

4. Journal finder / journal suggestion tools viz. JANE, Elsevier Journal Finder, Springer Journal Suggested, etc.

RPE 05: PUBLICATION MISCONDUCT (4hrs.)

A. Group Discussions (2 hrs.)

1. Subject specific ethical issues, FFP, authorship
2. Conflicts of interest
3. Complaints and appeals: examples and fraud from India and abroad

B. Software tools (2 hrs.)

1. Use of plagiarism software like Turnitin, Urkund and other open source software tools

• **RPE 06: DATABASES AND RESEARCH METRICS (7hrs.)**

A. Databases (4 hrs.)

1. Indexing databases
2. Citation databases: Web of Science, Scopus, etc.

B. Research Metrics (3 hrs.)

1. Impact Factor of journal as per Journal Citation Report, SNIP, SIR, IPP, Cite Score
2. Metrics: h-index, g index, i10 index, altmetrics

Outcome:

CO1	Overview of research publications, open access, ethics following in research articles
CO2	Methods to identify the Scientific misconducts, Redundant publications Journal finder / journal suggestion tools viz. JANE, Elsevier Journal Finder, Springer
CO3	To impart the knowledge on Use of plagiarism software like Turnitin, Urkund and other open source software tools, calculate the Metrics

SEMESTER-II

Dissertation with Viva Voce

M2BC21DV

OBJECTIVES:

- To develop an understanding of basic research in science.
- To impart knowledge on the experimental studies and analysis of results.
- To understand the basic concepts of research publications.

CO1	Retrieve, evaluate, and interpret professional literature and use this information to develop theoretical framework, testable hypothesis and ability to use various research methods for research work.
CO2	Design realistic and feasible research projects and prepare necessary protocol.
CO3	Prepare and submit manuscripts resulting from their independent research for publication in professional peer-reviewed journals.

ADHIPARASAKTHI COLLEGE OF ARTS & SCIENCE
(Autonomous)

Permanently Affiliated to Thiruvalluvar University, Vellore
Re – accredited by NAAC with ‘B’ Grade (CGPA – 2.83)

B.Sc., MICROBIOLOGY
Under CBCS

SYLLABUS

(Effective from the Academic Year 2021-2022)

ADHIPARASAKTHI COLLEGE OF ARTS & SCIENCE
(Autonomous)
Permanently Affiliated to Thiruvalluvar University, Vellore
Accredited by NAAC with B⁺⁺ Grade

B.Sc., MICROBIOLOGY
Under CBCS
(Effective from the Academic Year 2021-2022)

REGULATIONS

CBCS

Choice-Based Credit System is a flexible system of learning. ‘Credit’ defines the quantum of contents / syllabi prescribed for a course, and determines the number of hours of instruction required. The distinguishing features of CBCS are the following:

It permits the students to:

- ❖ Learn at their own pace
- ❖ Choose electives from a wide range of elective courses offered by the departments of the college.
- ❖ Undergo additional courses and acquire more than the required number of credits
- ❖ Adopt an inter – disciplinary approach in learning
- ❖ Make best use of the expertise of available faculty

1. Eligibility for Admission:

Candidates seeking admission to the first year of the Degree of Bachelor of Science Courses, shall be required to have passed the Higher Secondary Examinations [Academic or Vocational Stream] conducted by the Government of Tamil Nadu or an Examination accepted as equivalent thereto by the Syndicate of the Thiruvalluvar University.

The upper age limit for admission to UG Degree courses will be 21 (Twenty one) years as on 1st July of the year of admission. For SC/ST/BC/MBC/DNC candidates and women candidates the age limit is relaxed by 3 years. For other communities the Principals can relax upto 3 years based on merit. A relaxation of 5 years is permitted for Physically Handicapped as per G.O.Ms. No. 239, dated 03.09.1993.

Provided that candidates for admission into the specific main subject of study shall also possess such other qualifying conditions as may be prescribed by the University in the Regulations governing respective courses of study.

Candidate for the Degree of Bachelor of Science in Microbiology shall be required to have passed the Higher Secondary Examination [10 + 2 year] conducted by the Government of Tamil Nadu, or an Examination accepted as equivalent there to by the Academic Council, subject to conditions as may be prescribed. Candidates should have studied one of the following Subjects at the +2 level.

- 1) Microbiology
- 2) Biology [Zoology + Botany]
- 3) Zoology
- 4) Botany
- 5) Chemistry
- 6) Biotechnology
- 7) Nutrition and Dietetics
- 8) Or Any other subject related to Bioscience

2. Eligibility for the Award of Degree:

A Candidate shall be eligible for the award of the Degree only if he/she has undergone the prescribed course of study in the college for a period of not less than three academic year and passed the examinations of all the Six Semesters prescribed earning 140 credits [in part- I, II, III, IV and V].

3. Duration:

- a. Each academic year shall be divided into two semesters. The first academic year shall comprise the first and second semesters, the second academic year the third semester and fourth semesters and the third academic year the fifth and sixth semesters respectively.
- b. The odd semesters shall consist of the period from June to November of each year and the even semesters form December to April of each year. There shall be not less than 90 working days for each semester.

4. Course of Study:

The main subject of study for Bachelor Degree Courses shall consist of the following:

PART – I TAMIL / OTHER LANGUAGES

PART – II ENGLISH

PART – III CORE SUBJECTS

ALLIED SUBJECTS

PROJECT / ELECTIVES WITH THREE COURSES

PART – IV

1. [a]. Those who have not studied Tamil up to XII Std and taken a Non-Tamil Language under Part – I shall take Tamil comprising of two courses [level will be at 6th standard].

[b]. Those who have studied Tamil up to XII Std and taken a Non-Tamil Language under Part – I shall take Advanced Tamil comprising of two courses.

[c]. Those who do not come under a/b can choose non-major elective comprising of two courses.

2. SKILL BASED SUBJECTS [ELECTIVE]:

Four courses are to be offered. The papers are to be accommodated in the second / third year of study for UG courses.

3. ENVIRONMENTAL STUDIES

4. VALUE EDUCATION

5. SOFT SKILL

PART – V EXTENSION ACTIVITIES

5. Extension Activities:

A Candidate shall be awarded a maximum of 1 credit for Compulsory Extension Service.

All the students shall have to enroll for NSS / NCC/ NSO [Sports and Games] Rotract / Youth Red Cross or any other service organization in the college and shall have to put in compulsory minimum attendance of 40 hours which shall be duly certified by the principal of the college before 31st Mach in a year. If a student LACKS 40 hours attendance in the First year, he/she shall have to compensate the same during the subsequent years.

Students those who complete minimum of attendance of 40 hours in One year will get Half Credit and those who complete the attendance of 80 or more hours in two years will get ONE CREDIT.

Literacy and population Education Field Work shall be compulsory components in the above Extensions service activities.

The following assessment procedure will be followed for Internal Marks:
Continuous Internal Assessment [CIA] Test

S. No	Reg. No	Name	Test I Marks For 50	Test II Marks For 75	Test III Marks For 75	Marks For 200	Marks Converted to 20/20	Assignments /Seminars [5] Records [5]	Marks For 25/25	Total Rounded to Marks for 25 /25

Test I : One hour duration for 50 marks [Two Units of the Syllabus]

Test II : Two hours duration for 75 marks [Four Units of the Syllabus]

Test III: Three hours model test for 75 marks [Total Syllabus]

Total marks	200		Theory		Practical
Test marks to be converted to	:	20 marks	/	20 marks	
Assignments / Seminars	:	5 marks	/	-	
Records	:	-	/	5 marks	
Total	:	25 marks	/	25 marks	

In the column Rounded to 25 / 25, any fraction may be rounded to the next number.

6. Requirements for proceeding to Subsequent Semester:

- Candidates shall register their names for the First Semester Examination after admission in the UG Courses.
- Candidates shall be permitted to proceed from the First Semester up to Final Semester irrespective of their failure in any of the Semester Examination subject to the condition that the candidates should register for all the arrear subject of earlier semesters along the current [subsequent] Semester subjects.
- Candidates shall be eligible to go to subsequent semester, only if they earn sufficient attendance as prescribed therefore by the Academic Council from time to time. Provided in case of a candidate earning less than 65% of attendance in any one of the Semesters due to any extraordinary circumstances such as medical grounds, such candidate who shall produce Medical Certificate issued by the Authorised Medical Attendant [AMA], duly certified by the Principal of the college, shall be permitted to proceed to the next semester and to complete the course of study. Such candidates shall have to repeat the missed Semester by rejoining after completion of Final

Semester of the course, after paying the fee for the break of study as prescribed by the College from time to time.

7. Requirements to take the Semester Examinations

- a] A candidate will be permitted to take the Examination of any Semester, if
- i] He/She secures not less than 75% of attendance out of the 90 instructional days during the semester. [In the case of married women students the minimum attendance requirement shall be 55% of total instructional days].
 - ii] He / She earns a Progress Certificate from the Head of the Institution, of having satisfactorily completed the prescribed course of study in the subject as required by these Regulations, and
 - iii] His/ Her conduct has been satisfactory.

Provided that it shall be open to the Academic Council or any authority delegated with such powers by the Academic council to grant exemption to a candidate who has fail to earn 75% of the attendance prescribed for any valid reason[s] subject to the usual conditions.

- b] A candidate who has secured attendance less than 75% but 65% and above shall be permitted to take the Examination on the recommendation of the Head of the Institution to condone the lack of attendance as well as on the payment of the prescribed fees to the College.

8. Passing Minimum:

A Candidate shall be declared to have passed the whole examination, if he/she passes in all the papers and practicals wherever prescribed / as per the scheme of examinations by earning 140 CREDITS in parts – I, II, III, IV and V. He / She shall also fulfill the extension activities prescribed earning one credit to qualify for the Degree.

In fixing the passing minimum marks, the following will be observed:

- [a]. There shall be no Passing Minimum for Internal.
- [b]. For External Examinations, Passing Minimum shall be of 50% [Fifty Percentage] of the minimum marks prescribed for the paper.
- [c]. In the aggregate (External + Internal) the Passing Minimum shall be of 50% for each Paper/Practical/Project and Viva-voce.
- [d]. Grading shall be based on overall marks obtained (Internal + External)

Grading:

Once the marks of the CIA and end-semester examinations for each of the course are available, they will be added. The mark thus obtained will then be graded as per details given below:

Marks	Grade Point	Letter Grade	Class
100	7.00	H	First Class with Distinction
90-99	6.00	O	First Class with Distinction
75-89	5.50	D	First Class with Distinction
60-74	4.75	A	First Class
50-59	4.00	B	Second Class
40-49	3.50	C	Third
Below 40	3.00	F	Fail

From the second semester onwards the total performance within a semester and continuous performance starting from the first semester are indicated respectively by **Grade Point Average [GPA]** and **Cumulative Grade Point Average [CGPA]**. These two are calculated by the following formulae:

$$\text{GPA} = \frac{\sum_{i=1}^n C_i G_i}{\sum_{i=1}^n C_i}$$

Where 'C_i' is the credit earned for the course 'i' in any semester; 'G_i' is the Grade Point obtained by the student for the course 'i' and 'n' is the number of courses passed in that semester.

CGPA=GPA of all the courses starting from the first semester to the current semester.

Note: The GPA and CGPA shall be calculated separately for the following three parts:

For purpose of declaring a candidate to have qualified for the Degree of Bachelor of Arts / Science / Commerce / Management / Literature in the First Class / Second Class / Third Class or First Class with Distinction, the marks and the corresponding CGPA earned by the candidate in part III alone will be the criterion, provided he / she has secured the prescribed passing minimum in LCs and ELCs.

Grade in Parts IV & V shall be shown separately and it shall not be taken into account for classification.

9. Classification of Successful Candidates:

PART – I TAMIL / OTHER LANGUAGES:

Successful candidates passing Examinations for the Language and securing the marks [i] 60 percent and above and [ii] 50 percent and above but below 60 percent in the aggregate shall be declared to have passed the examination in the First and Second Class, respectively. All other successful candidates shall be declared to have passed the examination in the Third Class.

PART – II ENGLISH :

Successful candidates passing Examinations for English and securing the marks [i] 60 percent and above and [ii] 50 percent and above but below 60 percent in the aggregate shall be declared to have passed the examination in the First and Second Class, respectively. All other successful candidates shall be declared to have passed the examination in the Third Class.

PART – III consisting of CORE SUBJECTS, ALLIED SUBJECTS, PROJECT / ELECTIVES

Successful candidates passing Examinations for Core Courses together and securing the marks [i] 60 percent and above and [ii] 50 percent and above but below 60 percent in the aggregate of the marks prescribed for the Core Courses together shall be declared to have passed the examination in the First and Second Class, respectively. All other successful candidates shall be declared to have passed the examination in the Third Class.

PART – IV: [Consisting of sub items 1 (a), (b) and (c), 2, 3,4 and 5] as furnished in the Regulations 4 part – IV supra.

PART – V EXTENSION ACTIVITIES:

The only credit earned for Part V Extension activities of a Successful Candidate SHALL NOT BE taken into consideration for Classification / Ranking / Distinction.

10. RANKING

Candidates who pass all the examinations prescribed for the course in the First Appearance itself alone are eligible for Ranking;

Provided in the case of Candidates who pass all the examinations prescribed for the course with a break in the First Appearance due to the reasons as furnished in the Regulation 7.[iii] Supra are eligible for Classification / Distinction.

The marks obtained in improvement examination will not be taken into consideration for Ranking.

11. The Medium of Instruction and Examinations

The medium of Instruction and Examinations for the papers under part I and II shall be in language concerned. For parts III & IV, the medium of Instruction and Examinations shall be English.

12. Submission of Record Notebooks for Practical Examinations

Candidates taking the Practical Examinations should submit bonafide Record Notebook prescribed for the Practical Examinations. Otherwise the candidate will not be permitted to take the practical Examinations. However, in genuine case where the students could not submit the record notebook may be permitted to take the Practical Examinations provided the Head of the Department concerned certifies that the candidate has performed the experiments prescribed for the Course. For such of those candidates who do not submit Record Books, zero [0] marks will be awarded for record notebooks.

In case a candidate fails in the Practical Examination the marks awarded for the record at the time of first appearance for the Practical Examination should be made available by the University to the Examiners at the subsequent appearance by the candidate.

13. Improvement of marks in the subjects already passed

Candidates who have passed in theory paper/papers are allowed to appear again for theory paper/papers only once in order to improve his/her marks, by paying the fee prescribed from time to time. Such candidates are allowed to improve within a maximum period of 10 semesters counting from his/her first semester of his/her admission. If candidate improves his/her marks, then his/her improved mark will be taken into consideration for the award of Classification and Distinction only. Such improved marks will not be counted for the award of Prize/Medals and Rank. If the candidate does not show improvement in the marks, his/her previous marks will be taken into consideration.

No candidate will be allowed to improve marks in the Practical and Field work.

14. Checklist for Inspection

- a. Qualification for
 - i. Teaching Faculty : as Prescribed by the UGC and the University
 - ii. Technical Faculty : as Prescribed by the UGC and the University
 - iii. Laboratory Staff : as Prescribed by the UGC and the University
- b. Infrastructure Facilities
 - i. Building : Number of Classrooms with specifications: 3 rooms measuring 20'X 25'.
If the class strength is above 50, the space shall increase by 10 square feet /student.
Number of Staff rooms: One measuring 20' X 20'
 - ii. Furniture : One pair of table / chair per student

iii. Laboratory @ 10 Sq. ft. per student

PATTERN OF QUESTION PAPER

Part – A [50 words]

To Answer 10 questions

10 X 2 marks = 20 marks

Part – B [200 words]

To Answer 5 questions (either / or pattern)

5 X 5 marks = 25 marks

Part – C [500 words]

To Answer 3 questions out of 5 questions

3 X 10 marks = 30 marks

Total = 75 marks

MISSION & GOALS OF MICROBIOLOGY

We aim to provide a learning environment that excites and informs undergraduate majors and non-majors about microbiology and the many ways that it is relevant to everyday life. Through our Microbiology department is committed to providing a transformative education through the following elements:

1. Provide compelling and relevant undergraduate courses that teach science literacy and provide the fundamental knowledge for our majors to succeed in their careers.
2. Provide training through innovative, non-conventional coursework that stresses inquiry-based learning.
3. Courage and provide opportunities for students to participate in research.
4. Prepare our majors for future careers or further educational opportunities by providing a capstone experience.
5. Equalize opportunities for under-represented minorities and for students with diverse life experiences.
6. Improve the timely progression to graduation for majors of all backgrounds.

Om Sakthi
ADHIPARASAKTHI COLLEGE OF ARTS & SCIENCE (AUTONOMOUS)
G.B.NAGAR, KALAVAI-632506
AFFILIATED TO THIRUVALLUVAR UNIVERSITY, VELLORE
DEGREE COURSES
(Effective from the Academic Year 2021-2022)

B.Sc., MICROBIOLOGY
The course of study and the scheme of examination.

Year/ Semester	Part	Subject	Paper	Subject Code	Title of the Paper	Ins. Hrs/ Week	Credit	Exam Hrs	Marks		
									IA	Sem. Exam	Total
I Year/ I Semester	I	Language	Paper I	U1LT21FL	Tamil I	6	3	3	25	75	100
	II	English	Paper I	U1CE21SL	Communicative English I	4	3	3	25	75	100
	II	English	Paper I	U1PE01SL	Professional English I	2	2	3	25	75	100
	III	Core	Paper I	U1MB21MT	General Microbiology	6	3	3	25	75	100
	III	Core Practical	Practical I	-	-	3	-	-	-	-	-
	III	Allied I	Paper I	U1BC21AT	Biochemistry I	4	3	3	25	75	100
	III	Allied Practical	-	-	-	3	-	-	-	-	-
	IV	-	-	U1ES21GS	Environmental Studies	2	2	3	25	75	100
TOTAL						30	16	18	150	450	600
I Year/ II Semester	I	Language	Paper II	U2LT21FL	Tamil II	6	3	3	25	75	100
	II	English	Paper II	U2CE21SL	Communicative English II	4	3	3	25	75	100
	II	English	Paper II	U2PE01SL	Professional English II	2	2	3	25	75	100
	III	Core	Paper II	U2MB21MT	Microbial Physiology	6	4	3	25	75	100
	III	Core Practical	Practical I	U2MB22MP	General Microbiology and Microbial Physiology	3	2	6	25	75	100
	III	Allied I	Paper II	U2BC21AT	Biochemistry II	4	3	3	25	75	100
	III	Allied Practical	Practical I	U2BC21AP	Biochemistry	3	2	3	25	75	100
	IV	-	-	U2VE21GS	Value Education	2	2	2	-	50	50

TOTAL	30	21	26	175	575	750
GRAND TOTAL	60	37	44	325	1025	1350

Year/ Semester	Part	Subject	Paper	Subject Code	Title of the Paper	Ins. Hrs/ Week	Credit	Exam Hrs	Marks		
									IA	Sem. Exam	Total
II Year/ III Semester	I	Language	Paper III	U3LT21FL	Tamil III	6	3	3	25	75	100
	II	English	Paper III	U3LE21SL	English III	6	3	3	25	75	100
	III	Core	Paper III	U3MB21MT	Immunology	4	4	3	25	75	100
	III	Core Practical	-	-	-	2	-	-	-	-	-
	III	Allied II	Paper III	U3MB22AT	Bio-Statistics I	4	4	3	25	75	100
	III	Allied Practical	-	-	-	3	-	-	-	-	-
	IV	Skill Based Subject I	Paper I	U3MB24ST	Medical Laboratory Technology	3	3	3	25	75	100
	IV	Non-Major Elective I	Paper I	U3BC21NM	Diagnostic Biochemistry I	2	2	3	25	75	100
TOTAL						30	19	18	150	450	600
II Year/ IV Semester	I	Language	Paper IV	U4LT21FL	Tamil IV	6	3	3	25	75	100
	II	English	Paper IV	U4LE21SL	English IV	6	3	3	25	75	100
	III	Core	Paper IV	U4MB21MT	Microbial Genetics	4	4	3	25	75	100
	III	Core Practical	Practical II	U4MB21MP	Immunology	2	2	6	25	75	100
	III	Allied II	Paper IV	U4MB22AT	Bio-Statistics II	4	4	3	25	75	100
	III	Allied Practical	Practical II	U4MB22AP	Bio-Statistics	3	2	3	25	75	100
	IV	Skill Based Subject II	Paper II	U4MB25ST	Computer Applications in Biology	3	3	3	25	75	100
	IV	Non-Major Elective II	Paper II	U4BC21NM	Diagnostic Biochemistry II	2	2	3	25	75	100
TOTAL						30	23	27	200	600	800
GRAND TOTAL						60	42	45	350	1050	1400

Year/ Semester	Part	Subject	Paper	Subject Code	Title of the Paper	Ins. Hrs/ Week	Credit	Exam Hrs	Marks		
									IA	Sem. Exam	Total
III Year/ V Semester	III	Core	Paper V	U5MB21MT	Molecular Biology and Genetic Engineering	6	6	3	25	75	100
	III	Core	Paper VI	U5MB22MT	Medical Bacteriology	6	6	3	25	75	100
	III	Core	Paper VII	U5MB23MT	Medical Virology	6	6	3	25	75	100
	IV	Elective I	Paper I	U5MB24ET	Medical mycology, Parasitology and entomology	5	5	3	25	75	100
			Paper II	U5MB25ET	Human Physiology						
	IV	Skill Based Subject III	Paper III	U5MB26ST	Mushroom and Vermiculture Techniques	3	3	3	25	75	100
	III	Core Practical	Practical III	-	Medical Microbiology	4	-	-	-	-	-
TOTAL						30	26	15	125	375	500
III Year/ VI Semester	III	Core	Paper VIII	U6MB21MT	Food and Dairy Microbiology	6	6	3	25	75	100
	III	Core	Paper IX	U6MB22MT	Industrial Microbiology	6	6	3	25	75	100
	IV	Elective II	Paper III	U6MB23ET	Pharmaceutical Microbiology	5	5	3	25	75	100
			Paper IV	U6MB24ET	Tannery Technology						
	IV	Elective III	Paper V	U6MB25ET	Environmental Microbiology	5	5	3	25	75	100
			Paper VI	U6MB26ET	Biochemical Methodology						
	IV	Skill Based Subject IV	Paper IV	U6MB27ST	Agriculture and Biofertilizer Technology	3	3	3	25	75	100
	III	Core Practical	Practical III	U6MB21MP	Medical Microbiology	-	4	6	25	75	100
	III	Core Practical	Practical IV	U6MB22MP	Food, Environmental and Agricultural Microbiology	5	5	6	25	75	100
	V	Extension Activities	-	U6EA21GS	-	-	1	-	50	-	-
TOTAL						30	35	27	225	525	700
GRAND TOTAL						60	61	42	350	900	1200
OVER ALL TOTAL						180	140	131	1025	2975	3950

M.Sc., Applied Microbiology
(With effect from 2021-2022)
The course of study and the scheme of examination.

Year/ Semester	Part	Subject	Paper	Subject Code	Title of the Paper	Ins. Hrs/ Week	Credit	Exam Hrs	Marks		
									IA	Sem. Exam	Total
I Year/ I Semester	A	Core	Paper I	P1AM21MT	General Microbiology	5	5	3	25	75	100
	A	Core	Paper II	P1AM22MT	Food and Environmental Microbiology	5	5	3	25	75	100
	A	Core	Paper III	P1AM23MT	Immunotechnology	5	5	3	25	75	100
	A	Elective I	Paper I	P1AM24ET	Soil and Agricultural Microbiology	3	3	3	25	75	100
	A		Paper II	P1AM25ET	Bioprocess Technology						
	A	Core practical	Practical I	P1AM21MP	General, Food, Environmental Microbiology and Immunotechnology	12	4	6hrs /day 2 days	25	75	100
TOTAL						30	22	24	125	375	500
I Year / II Semester	A	Core	Paper IV	P2AM21MT	Medical Bacteriology and Virology	5	5	3	25	75	100
	A	Core	Paper V	P2AM22MT	Medical Mycology and Parasitology	5	5	3	25	75	100
	A	Core	Paper VI	P2AM23MT	Microbial Physiology and Genetics	5	4	3	25	75	100
	A	Elective II	Paper III	P2AM24ET	Hematology and Clinical Techniques	3	3	3	25	75	100
			Paper IV	P2AM25ET	Bioinformatics and Bioinstrumentation						
	A	-	-	P2HR21GS	Human Rights	2	2	3	25	75	100
	A	Core practical	Practical II	P2AM21MP	Medical Microbiology, Haematology and Microbial Physiology	10	4	6hrs /day 2 days	25	75	100
TOTAL						30	23	27	150	450	600
GRAND TOTAL						60	45	51	275	825	1100

M.Sc., Applied Microbiology

(With effect from 2021-2022)

The course of study and the scheme of examination.

Year/ Semester	Part	Subject	Paper	Subject Code	Title of the Paper	Ins. Hrs/ Week	Credit	Exam Hrs	Marks		
									IA	Sem. Exam	Total
II Year/ III Semester	A	Core	Paper VII	P3AM21MT	Cell Biology and Molecular Biology	5	5	3	25	75	100
	A	Core	Paper VIII	P3AM22MT	Microbial Gene Technology and Bioinformatics	5	5	3	25	75	100
	A	Core	Paper IX	P3AM23MT	Industrial Biotechnology and its Applications	4	4	3	25	75	100
	A	Core	Paper X	P3AM24MT	Research Methodology	4	4	3	25	75	100
	A	Elective III	Paper V	P3AM25ET	Herbal Technology	3	3	3	25	75	100
	A		Paper VI	P3AM26ET	Clinical Microbiology						
	A	Core Practical	Practical III	P3AM21MP	Cell Biology, Microbial Gene Technology and Industrial Biotechnology	9	4	6hrs /day 2 days	25	75	100
TOTAL						30	25	27	150	450	600
II Year / IV Semester	A	Core	Paper XI	P4AM21MT	Biological Techniques	5	4	3	25	75	100
	A	Elective IV	Paper VII	P4AM22ET	Nanobiotechnology and Bioremediation	3	3	3	25	75	100
	A		Paper VIII	P4AM23ET	Genetic Engineering						
	A	Core Practical	Practical IV	P4AM21MP	Biological Techniques	10	3	6hrs /day 2 days	25	75	100
	A	-	Project	P4AM21PV	Project work with Viva Voce	12	10	-	50	150	200
TOTAL						30	20	18	125	375	500
GRAND TOTAL						60	45	45	275	825	1100
OVERALL TOTAL						120	90	96	550	1650	2200

**`SEMESTER-I
MAJOR PAPER - I**

GENERAL MICROBIOLOGY

SUBJECT CODE – U1MB21MT

L	T	P	C
6	0	0	4

Total Hours : 78

OBJECTIVES:

1. The subject aims to understand the scope & history of the microbiology.
2. To understand the basic concept of Microscope, microbial staining techniques & to control the contaminants
3. Principles of physical and chemical methods used in the control of microorganisms and apply this understanding to the prevention and control of infectious diseases.

UNIT I: SCOPE AND HISTORY OF MICROBIOLOGY (15)

Definition and scope of Microbiology – History of Microbiology – Louis Pasteur, Joseph Lister, John Tyndal, Robert Koch, Leevenhoek and Winogradsky – Difference between the Prokaryotic and Eukaryotic microorganisms.

UNIT II: MICROSCOPY (17)

Microscope – Bright field, Dark field, Phase contrast, Fluorescent, Atomic Force Microscope (AFM) and Electron Microscope - SEM & TEM.

UNIT III: TAXONOMY (16)

Classification of microorganisms – General principles and nomenclature – Haeckel's three kingdom concept, Whittaker's five kingdom concept - General characteristic features of Bacteria, Fungi, Algae, Viruses.

UNIT IV: STAINING TECHNIQUES (15)

Stains and staining methods – Simple, Differential staining. Special staining – Acid fast staining, Capsule staining, Metachromatic granule staining, Flagella staining, Endospore staining

UNIT V: STERILIZATION, DISINFECTION AND ANTIMICROBIAL CHEMOTHERAPY (15)

Sterilization: Principles and methods – Physical and chemical – Antimicrobial chemotherapy - Antimicrobial drugs - Antibiotic sensitivity test (MIC, Kirby Bauer method). Antimicrobial drug resistance.

OUTCOMES:

CO1	Understand the role and importance of microbiologists in the field of science.
CO2	Acquire knowledge on classification, observation and control or removal of various microorganisms.
CO3	Develop a good insight on various contributions given by the eminent scientist who paved a way for the development of microbiology as one of the major disciplines.
CO4	Understand the basic principle behind the various types of microscopes for exploring the microbial world.
CO5	Describe the various classification systems and the characteristics of diverse microbial groups.
CO6	Appreciate various differential and special staining techniques to visualize various microbes.
CO7	Comprehend the various methods of sterilization and disinfection to control the contaminating microorganism and also to recognize the antibiotics used to control pathogenic microorganism and their drug resistance.

RECOMMENDED TEXT

1. Sale, A.J. "Fundamental Principles of Bacteriology". McGraw Hill Publishing Co. Ltd., New York. 7th Edition. (1992).
2. Dubey, R.C and Maheswari, D.K. A Text book of Microbiology. S. Chand & Company Ltd. New Delhi. 3rd Edition. (2005).
3. Stainer, R.Y., Ingraham, J.L., Wheelis, M.L. and Painter, P.R. "General Microbiology" – Mac Milan Education Ltd. London. 2nd Edition. (1986).
4. Michael J. Pelczar. "Microbiology", Tata McGraw Hill Publishing Co. Ltd., New Delhi. 6th Edition. (2006).

REFERENCE BOOKS

1. Bergey, D.H., Harrison, F.C., Breed, R.S., Hammer, B.W. & Huntoon, F.M. Bergey's Manual of Determinative Bacteriology, Lippincott Williams and Wilkins Publishers. 9th Edition, (1963).
2. Prescott M, Microbiology, Tata McGraw Hill Publishing Co. Ltd., New Delhi. 6th Edition, (1962)

L	T	P	C
2	0	0	2

SEMESTER-I**ENVIRONMENTAL STUDIES****SUBJECT CODE – U1ES21GS****OBJECTIVES:**

1. Students in Environmental Studies are motivated by concern for welfare of the many human and non-human communities that shape this planet.
2. Recognize the interconnectedness of multiple factors in environmental challenges
3. Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.

UNIT – I: INTRODUCTION TO ENVIRONMENTAL SCIENCES: NATURAL RESOURCES (05)

Environmental Sciences – Significance – Public awareness – Forest resources – Water resources – Mineral resources – Food resources - Environmental impact – fertilizer – Pesticide Problems.

UNIT – II: ECOSYSTEM, BIODIVERSITY AND ITS CONSERVATION (06)

Ecosystem – concept – structure and function – producers, consumers and decomposers – Food chain – Food web – Forest, Grassland, desert and aquatic ecosystem.

Biodiversity – Definition – genetic, species and ecosystem diversity – Values and uses of biodiversity – biodiversity at global, national (India) and local levels – Hotspots, threats to biodiversity – conservation of biodiversity – In-situ & Ex-situ.

UNIT – III: ENVIRONMENTAL POLLUTION AND MANAGEMENT (05)

Environmental Pollution – Causes – Effects and control measures of Air, Water, Marine, soil, solid waste, Thermal, Nuclear pollution and Disaster Management – Floods, Earth quake, Cyclone and Landslides. Role of individuals in prevention of pollution – pollution, Case studies - – Bhopal gas tragedy, Minamata disease, Mercury factory (Kodaikanal), London fog.

UNIT – IV: SOCIAL ISSUES & ENVIRONMENT (05)

Urban issues – Energy – water conservation – Environmental Ethics – Global warming – Resettlement and Rehabilitation issues – Environmental legislations – Environmental protection Act. 1986 – Air, Water, Wildlife and forest conservation Act.

UNIT – V: HUMAN POPULATION & ENVIRONMENT (05)

Population growth and Explosion – Human rights and Value Education – Environmental Health – HIV/AIDS – Role of IT in Environment and Human Health – Women and child welfare – Public awareness – Case studies. Visit to a local area / local polluted site / local simple ecosystem – Report submission

OUTCOMES:

CO1	Critical Thinking: demonstrate critical thinking skills in relation to environmental affairs
CO2	Communication: demonstrate knowledge and application of communication skills and the ability to write effectively in a variety of contexts.
CO3	Interdisciplinary Synthesis: demonstrate an ability to integrate the many disciplines and fields that intersect with environmental concerns.
CO4	Ecological Literacy: demonstrate an awareness, knowledge, and appreciation of the intrinsic values of ecological processes and communities.
CO5	Sustainability: demonstrate an integrative approach to environmental issues with a focus on sustainability.

Text Books:

1. Kumaraswamy, K. Alagappa Moses, A and M. Vasanthy, (2005), Environmental Studies, Publication Division, Bharathidasan University, Tiruchirappalli. (in Tamil), pp. 1-282.
2. Kumaraswamy, K. (Ed) (2008) GIS for Natural Resources and Disaster Management, Department of Geography, Bharathidasan University, Tiruchirappalli.
3. Rajamannar. Environmental Studies, EVR College Pub, Trichy. 2004.
Kalavathy, S. Environmental Studies, Bishop Heber College Pub., Trichy. 2004.
4. Textbook of Environmental Studies, 2013 by Erach Bharucha.

SEMESTER–II

MAJOR PAPER - II

MICROBIAL PHYSIOLOGY

SUBJECT CODE – U2MB21MT

L	T	P	C
6	0	0	5

Total Hours : 78

OBJECTIVES:

1. The aim of the subject is to gain the knowledge on anatomy, nutrition, cultivation, microbial growth.

2. To understanding the fundamental biology of microorganisms and their interactions between themselves, other organisms and the environment.
3. The major features of growth and metabolism of microorganisms including determination of growth curve environmental influence on the microbial growth and primary and secondary metabolism, and microbial relationships.

UNIT I: ANATOMY OF BACTERIA (16)

Anatomy of Bacteria – Ultra structure and function of cell wall, flagella, capsule, pili, cytoplasmic inclusion, sporulation.

UNIT II: NUTRITION (16)

Nutritional types of microorganisms. Nutritional requirements. Uptake of nutrients into the cell. Transport of nutrients by Active and Passive ways.

UNIT III: CULTIVATION AND PRESERVATION (15)

Cultivation of microbes – Bacteria, Viruses. Culture techniques. Media preparation – Types of media - Pure Culture techniques – Anaerobic cultivation - Preservation of cultures.

UNIT IV: MICROBIAL GROWTH (15)

Growth curve – Growth kinetics - Measurement of cell number – Measurement of cell mass. Factors influencing the growth of microorganisms – Solutes and Water activity, Temperature, pH, Oxygen concentration, Osmotic pressure, Moisture, Radiation.

UNIT V: METABOLISM (16)

Carbohydrate metabolism - Embden Meyerhoff pathway, Pentose Phosphate Pathway, Entner Doudroff Pathway, Kreb's cycle – Electron transport and Oxidative phosphorylation and photophosphorylation. Fermentation – Homo – Hetero lactic acid fermentation.

OUTCOME:

CO1	Understand the basic anatomy and metabolic functions of bacteria.
CO2	Acquire knowledge on media preparation, isolation, cultivation, growth measurement and preservation.
CO3	Describe the basic microbial structure and functions.
CO4	Understand the nutrients required for the growth and development of bacteria.
CO5	Comprehend the various aseptic techniques for isolation of pure cultures and their preservation.
CO6	Elucidate the physical and chemical growth requirements of bacteria and get equipped with different methods of growth measurements.

CO7	Compare aerobic and anaerobic respiration of bacteria.

RECOMMENDED TEXT

1. Sale, A.J. "Fundamentals Principles of Bacteriology", McGraw Hill Publishing Co. Ltd., New York. 7th Edition, (1992).
2. Dubey, R.C and Maheswari, D.K. A Text book of Microbiology. S. Chand & Company Ltd. New Delhi. 3rd Edition. (2005).
3. Stainer, R.Y., Ingraham, J.L., Wheelis, M.L. and Painter, P.R. "General Microbiology" – Mac Milan Education Ltd. London. 3rd Edition. (1986).
4. Michael J. Pelczar. "Microbiology", Tata McGraw Hill Publishing Co. Ltd., New Delhi. 5th Edition. (2006).

REFERENCE BOOKS

1. Bergey, D.H., Harrison, F.C., Breed, R.S., Hammer, B.W. & Huntoon, F.M. Bergeys Manual of Determinative Bacteriology, Lippincott Williams and Wilkins Publishers. 9th Edition. (1963).
2. Prescott. M, Microbiology, Tata Mc Graw Hill Publishing Co. Ltd., New Delhi. 6th Edition, (1962).

SEMESTER-II VALUE EDUCATION

L	T	P	C
2	0	0	2

SUBJECT CODE – U2VE21GS

Total Hours : 26

OBJECTIVES:

- 1.The aim of the subject is to educate the values of family, society, cultivate the personal skills & to motivate on positive thinking.
2. Understand the benefits and obstacles of self acceptance
- 3.Positive thinking and positive imaging

UNIT –I: INTRODUCTION AND OUTLINE OF VALUE EDUCATION (05)

Value Education – Definition and Scope. Family values – Responsibility of family, Status of Women in family & society, Caring for needy and elders. Ethical Values – Mass media Ethics, Influence of Ethics in family. Issue of Globalization - Modern warfare, Terrorism, Mutual respect of different Cultures and religions.

UNIT – II: PERSONAL SKILLS (05)

Self Esteem – Definition, Factors Influencing Self Esteem, Qualities of High and low self esteem. Self Concept – Definition, Characteristics of self concept. Role of self concept in Personal growth. Self acceptance – Definition, Benefits and obstacles of self acceptance.

UNIT – III: POSITIVE THINKING, MOTIVATION AND PERSONALITY DEVELOPMENT (06)

Positive thinking – Definition, Positive and Negative Attitude, Power of Positive thinking, Positive Imaging. Motivation – Definition, Difference between Inspiration and Motivation, Internal and External Motivation. Demotivation, Demotivating factors. Personality Development – Definition, characteristic and elements of personality, Development of Personality.

UNIT – IV : COPING AND DEVELOPING COPING MECHANISMS (05)

Coping – Definition, Positive and Negative Coping, kinds of coping, Typical responses to Coping. Shyness - Definition, Types and symptoms of shyness. How to overcome shyness. Depression – Definition, Symptoms, Causes and Impact of Depression, How to Overcome depression. Failure – Definition, Coping with failure, Developing Competence.

UNIT – V: LEADERSHIP TEAMWORK AND WORK ENVIRONMENT (05)

Leadership – Definition, Characteristics of leadership, Various kinds of leaders, Factors Influencing leadership styles. Characteristics of successful leader. Teamwork – Definition, Characteristic of Team work, Team learning. Life skills required for work environment and ways to build a better work environment.

OUTCOMES:

CO1	Understand the influence of ethics in family
CO2	Characteristics self concept and personal growth
CO3	Characteristics and elements of personality development
CO4	Depression, symptoms, causes and impact
CO5	Characteristics of successful leader and team work
CO6	Life skill required for better work environments
CO7	How to overcome depression and failure

Reference Books:

1. We shall overcome - A textbook on life coping skills. 6th Edition - 2012 By Dr.S.Xavier Alphonse, S.J. ICRDCE Publication, Chennai – 8.
2. T. Anchukandam and J. Kuttainimathathil (ED) Grow Free Live Free, Krisitu Jyoti Publications, Bangalore (1995).
3. Mani Jacob (ED) Resource Book for Value Education, institute for Value Education, New Delhi 2002
4. DBNI ,NCERT,SCERT,Dharma Bharti National Institute of Peace and Value Education,Secunderabad ,2002
5. Daniel and Selvamony-Value Education Today,(Madras Christian College, Tambaram and ALACHI,New Delhi,1990)

6. S.Ignachmuthu-Values for Life –Better Yourself Books,Mumbai,1991.
7. M.M.M. Mascaronhas Centre for Research Education Science and Training for Family. Life Promotion –Family Life Education,Bangalore, 1993.

SEMESTER–II

CORE PRACTICAL – I

L	T	P	C
0	0	3	2

Total Hours : 39

GENERAL MICROBIOLOGY AND MICROBIAL PHYSIOLOGY

SUBJECT CODE – U2MB22MP

Objectives

The aim of the subject is to gain the practical knowledge on sterilization, staining, culture techniques , preservation and identification of Fungi.

1. Sterilization methods - Moist heat and dry heat sterilization and filtration.
2. Staining methods – Simple and Gram’s staining.
3. Special staining – Capsule, AFB, Spore staining.
4. Motility Study - Hanging drop and wet mount.
5. Culture techniques – Streak plate, Pour plate and Spread plate Technique.
6. Media preparation – Liquid and solid media preparation.
7. Biochemical characterization – IMViC, Catalase, Oxidase, TSI.
8. Identification of fungi – Lacto Phenol Cotton Blue staining.
9. Antibiotic sensitivity testing.
10. Micrometry.
11. Preservation and maintenance of culture.

OUTCOME:

CO1	Acquire practical skills to perform routine laboratory tasks effectively and safely.
CO2	Demonstrate various staining techniques for the observation of bacteria and fungi.
CO3	Exemplify various culture media preparation and pure culture techniques for the isolation of microorganism.

CO4	Analyze the biochemical characteristics for the identification of microorganisms.
CO5	Evaluate the antimicrobial susceptibility test and assess the drug resistance status of microbes.
CO6	Able to measure the size of the microorganisms
CO7	Enable to preserve and maintain microbial culture.

REFERENCE BOOKS

1. Mackie and McCartney, Practical Medical Microbiology, Elsevier; 14th Edition, (2007).
2. Subhash Chandra Parija. Textbook of Practical Microbiology, Ahuja Publishing House, 5th Edition, (2007).

SEMESTER–III

MAJOR PAPER – III

IMMUNOLOGY

L	T	P	C
4	0	0	4

Total Hours : 52

SUBJECT CODE – U3MB21MT

OBJECTIVES:

1. The aim of the subject is to study the history of Immunology, importance of human immune system, antigen antibody reaction & schedule for vaccine
2. The students will be able to identify the cellular and molecular basis of immune responsiveness.
3. The students will be able to describe immunological response and how it is triggered and regulated.

UNIT I: HISTORY AND IMMUNOHAEMATOLOGY (10)

History of Immunology, Types of immunity. Blood groups and Blood transfusions, Host parasite relationships, Microbial infections.

UNIT II: IMMUNE SYSTEM (11)

Structure and function of the cells, tissues and organs of immune system. Complement system-function and pathways.

UNIT III: ANTIGEN AND ANTIBODY (10)

Antigen - types, properties, Hapten, Adjuvants. Immunoglobulins: Structure, types, properties and their functions - Theory of antibody production.

UNIT IV: IMMUNIZATION AND CYTOKINES (11)

Vaccines and immunization - Types and characteristics. Monoclonal antibody - Hybridoma technology. Cell mediated immune response - Lymphokines, Cytokines.

UNIT V: ANTIGEN-ANTIBODY REACTIONS (10)

Antigen and Antibody interaction, invitro agglutination, complement fixation, precipitation, ELISA, RIA, Flow cytometry and immunofluorescence – Hypersensitivity and its types - Skin test (Invivo).

OUTCOME:

CO1	Compare and contrast innate and adaptive immunity
CO2	Describe the organs and cell types present in the immune response
CO3	illustrate the structure and functions of antigen and antibodies to regulate the immune response
CO4	Elucidate the reasons for the immunization and aware of different vaccination
CO5	Exemplify the adverse effect of immune system including Ag-Ab interaction, allergy and hypersensitivity.
CO6	Illustrate the various mechanism that regulate the immune response and maintain tolerance
CO7	Describe the roles of the immune system in both maintaining health and contributing to disease

RECOMMENDED TEXT

1. Roitt, I.M. Essentials of Immunology, Blackwell Scientific Publishers. 2nd Edition. (1998).
2. Kuby, J. Immunology, Freeman and Company, New York. 2nd Edition. (1994).
3. Leffel, Donnenberg, A: and Rose, W. Handbook of human immunology, Boca Raton Fla: C.R.C. Press. 2nd Edition. (1997).

REFERENCE BOOKS

1. Abbas, A.K. Lichtman, A.M. and Pober, J.S. Cellular and Molecular immunology, Philadelphia : W.B. Saunders. 3rd Edition. (1997).

SEMESTER–III

SKILL BASED PAPER - I

MEDICAL LABORATORY TECHNOLOGY

SUBJECT CODE – U3MB24ST

L	T	P	C
3	0	0	3

Total Hours : 39

OBJECTIVES:

1. The aim of the course is to introduce basic concepts of medical laboratory works. The content of this course will help the students to collect the blood, staining and processing of blood sample.
2. Understand and perform basic cytology and haematology procedures
3. Perform grossing, cutting & staining procedures in histopathology

UNIT I: BLOOD COLLECTION (07)

Blood: Definition, Characters and composition. Collection of Blood: Capillary blood and venous blood, preservation/storage of blood. Anticoagulants: Definition- Types: Wintrob's /EDTA/ Heparin/Citrate.

UNIT II: COUNTING OF BLOOD CELLS (08)

Counting of Blood cells: Neubauer Counting Chamber – Total RBC Count and WBC count, Diluting fluids, macrodilution/Microdilution technique, False low and High counts, normal values – correction for TWBC – Absolute Eosinophil count – Differential Leucocyte count, Platelet count, Reticulocyte count.

UNIT III: COAGULATION MECHANISM & COUNTING OF BLOOD CELLS (08)

Haemoglobin: Composition, estimation. Coagulation mechanism, Coagulation factors, bleeding time and clotting time. PCV & ESR.

UNIT IV: STAINING METHODS (08)

Preparations of stains and staining techniques – Wright stain, Leishman stain, Giemsa stain, Jaswanth Singh – Bhattacharji stain, Fields stain – Peroxidase stain. Examination of blood smear – peripheral smear report: size/colour/shapes/inclusions/immature cells for leukemia. Blood parasites: Malarial parasites/Microfilaria. Microscopic Examination of Urine. Collection, Physical, Chemical and microscopic examination of CSF, Stool, Sputum and seminal fluid.

UNIT V: HAEMATOLOGICAL TECHNIQUES (08)

ABO-Grouping: History/Discovery – slide / Tube Technique – Rh Typing: Slide Tube Technique, Bovine Replacement technique – Coombs Test: Direct, Indirect – Donar screening – Cross matching: Major/Minor.

OUT COME

CO1	Apply knowledge and technical skills associated with medical laboratory technology for delivering quality clinical investigations support
CO2	Perform routine clinical laboratory procedures within acceptable quality control parameters in hematology, biochemistry, immunohematology and microbiology
CO3	Recognize the impact of laboratory tests in a global and environmental context
CO4	Acquire knowledge and understand the formation of blood cells, structure, functions and methods of estimating different parameters
CO5	Understand the detailed aspects of blood coagulations, disorders of hemostasis, principles and methods of assessment of coagulation.
CO6	Demonstrate collection, preservation and examination of body fluids to report the abnormalities.
CO7	Understand the principles of immunohaematology, blood collection, infectious marker determination, compatibility testing and coomb's testing

RECOMMENDED TEXT BOOKS

1. Manogharan, A., Sethuraman. S., Essentials of clinical haematology. Jaypee Brothers, Medical Publisher Pvt, Ltd., New Delhi. 3rd Edition, (2003).
2. Christopher. A. Ludlam. Clinical Haematology. Longman Singapore Publisher Pvt. Ltd., 2nd Edition, (1990).
3. Linch, D.C., Yats, A.P., Watts, M.J., Guide of Haematology. Tomothi Home Publisher. 2nd Edition, (1986).

REFERENCE BOOKS

1. Mukerjee, K. Medical laboratory Technoglogy, Tata McGraw Hill Publishing Company Limited, New Delhi. 2nd Edition, (2003).
2. Sood, R. Medical Laboratory Technology Methods and Interpretations. Jaypee Brothers Medical Publishers (P) Ltd., New Delhi. 2nd Edition, (2004).
3. Mukerjee, K. Medical laboratory Technoglogy, Tata McGraw Hill Publishing Company Limited, New Delhi. 2nd Edition, (2010).

SEMESTER III

NON MAJOR ELECTIVE-I

DIAGNOSTIC BACTERIOLOGY AND MYCOLOGY –I

SUBJECT CODE –U3MB21NM

L	T	P	C
2	0	0	2

Total Hours : 26

OBJECTIVES:

1. To study of the action of bacteria in health and in disease, inside and outside the animal body
2. To explain the function of structures of bacterial cells that are important for causing disease.

UNIT – I: SPECIMEN COLLECTION AND PROCESSING (05)

Common laboratory procedures in diagnosis of microbial diseases: Collection and transport of specimen – direct isolation and identification of pathogens from clinical samples – serological tests – antibiotic sensitivity test. Collection of data and maintenance of laboratory records.

UNIT – II: MEDICALLY IMPORTANT BACTERIA – I (05)

Morphological and cultural characteristics, Laboratory diagnosis, Prevention and control of Bacteria: *Staphylococcus aureus*, *Streptococci pyogens*, and *Streptococcus pnemoniae*.

UNIT – III: MEDICALLY IMPORTANT BACTERIA – II (06)

Morphological and cultural characteristics, Laboratory diagnosis, Prevention and control of Bacteria: *Haemophilus influenzae*, *Clostridium tetani* and *Mycobacterium tuberculosis*.

UNIT – IV: MEDICALLY IMPORTANT BACTERIA – III (05)

Morphological and cultural characteristics, Laboratory diagnosis, Prevention and control of Bacteria: Enterobacteriaceae: *Escherichia coli*, *Salmonella typhi*, *Shigella dysentriae* and *Vibrio cholerae*.

UNIT – V: MEDICALLY IMPORTANT FUNGI (05)

Morphology, detection and recovery of fungi from clinical specimens: Dermatophytes: *Trichophyton*, *Epidermophyton*, *Candida albicans* and *Aspergillus*.

OUT COMES:

CO1	Understand the common laboratory methods in the diagnosis of bacterial and fungal diseases
CO2	Able to learn the bacterial systematic, various methods of isolation and techniques to identify from human body fluids.
CO3	Understand about the medically important fungi
CO4	Explore the various treatment methods for bacterial and fungal infections.
CO5	Students well versed in working clinical laboratories.

Text Books:

1. Anathanarayanan, R. and Jayaram Panicker C.K. (1994). Text Book of Microbiology. Orient Longman.
2. Baron, E.J. and Tenenbaum S.M. (1995). Scientific Company. Diagnostic Microbiology. Blackwell Scientific Company.
3. Text Book of Microbiology, Ananthanarayan & Paniker's, 9th Edition (2017).
4. Textbook of medical mycology by, Jagdish chander, 4th Edition (2017)
5. Textbook of medical Microbiology, Jawawettes, 9th Edition (2017).

Reference Book:

1. Microbiology Prescott. Tata McGraw Hill Publishing Co Ltd – New Delhi. 6th Edition (1962)
2. Salle, A.J. (1992). Fundamental Principles of Bacteriology. 7th Edition, Mc. Graw Hill Publishing Co. Ltd., New York.

SEMESTER –III**ALLIED PAPER - III****PRINCIPLES OF MICROBIOLOGY****SUBJECT CODE – U3MB21AT**

L	T	P	C
4	0	0	4

Total Hours : 52

OBJECTIVES:

1. The aim of the subject is to understand the scope and history of microbiology, basic concept of microscope, staining techniques and control the contamination
2. To introduce basic principles and application relevance of clinical disease for students who are in preparation for physicians.
3. They study the epidemiology, pathogenesis, processing, clinical diagnosis and prevention including vaccine development of the different microorganisms.

UNIT I: HISTORY OF MICROBIOLOGY AND MICROSCOPY (10)

Definition & Scope of Microbiology, Spontaneous generation, Biogenesis, contribution of Louis Pasteur, Leewenhock, John Tyndall, Robert Koch. Microscopy – Simple, Compound, Light microscopy, Dark field , Phase contrast, Fluorescence & Electron microscopy.

UNIT II: NOMENCLATURE AND ANATOMY OF ORGANISMS (11)

Five kingdom concept, Binomial nomenclature of microbes, species concept and classical approach. Anatomy of prokaryotes & eukaryotes, ultra structure & function of cell wall & cell organelles.

UNIT III: CULTURE METHODS AND STAINING (10)

Culture techniques, media preparation, preservation of cultures, aerobic & anaerobic culture techniques. Staining methods – Simple, Differential – Gram's Staining & Acid fast staining, Special staining - Spore stain, Capsule stain and Metachromatic granules.

UNIT IV: ANTIMICROBIAL CHEMOTHERAPY (11)

Antimicrobial chemotherapy – Antibiotics – source, classification, mode of action – Antimicrobial resistance – Antimicrobial susceptibility tests– Kirby Bauer disc diffusion method.

UNIT V: MICROBIAL GROWTH AND STRUCTURAL CHARACTERISTICS (10)

Measurement of microbial growth. Batch & continuous culture, Growth determination and growth curve. Structure characteristics of Algae – *Chlorella vulgaris*, Fungi – Mucor & Protozoa – *Entamoeba histolytica*.

OUTCOMES:

CO1	Understand the scope, foundation and importance of microbiology
CO2	Explore the various culture and staining methods involved in identification of bacteria.
CO3	Knowledge about the nomenclature of bacteria and the instruments uses for viewing the bacteria
CO4	Compare and contrast various chemotherapy methods involved in the treatment of bacterial diseases
CO5	Learn about the various methods involved assessing microbial susceptibility

CO6	Elucidate the microbes and their role.

RECOMMENDED TEXT

1. Dubey, R.C and Maheswari, D.K. A Text book of Microbiology. S. Chand & Company Ltd. New Delhi, 4th Edition, (2005).
2. Stainer, R.Y., Ingraham, J.L., Wheelis, M.L. and Painter, P.R. “General Microbiology” – Mac Milan Education Ltd., London, 3rd Edition, (1986).
3. Michael J. Pelczar. “Microbiology”, Tata McGraw Hill Publishing Co. Ltd., New Delhi, 5th Edition, (2006).
4. General Microbiology, Hans G. Schlegel, 7th Edition, (2018).
5. General Microbiology, Pelczar, 5th Edition, (2018).

REFERENCE BOOKS

1. Prescott. M, Microbiology, Tata McGraw Hill Publishing Co. Ltd., New Delhi, 6th Edition, (1962).
2. Sale, A.J. “Fundamentals Principles of Bacteriology”, McGraw Hill Publishing Co. Ltd., New York, 7th Edition, (1992).
3. General Microbiology, Prescott, 9th Edition (2017).
4. A Textbook of Microbiology, S. Chand, 5th Edition (2017).

SEMESTER-IV

MAJOR PAPER - IV

MICROBIAL GENETICS

SUBJECT CODE – U4MB21MT

L	T	P	C
4	0	0	4

Total Hours : 52

OBJECTIVES:

1. The aim of the subject is to know the history of microbial genetics, importance of plasmids, DNA replications & their repair mechanisms, mutations, gene transfer & synthesis of proteins.
2. Teach students various techniques used in microbial genetics
3. Understanding of fundamental concepts in microbial genetics.

UNIT I: HISTORY, DNA AND RNA (10)

Genetics - Historical introduction - Discovery of DNA structure, Watson and Crick model of DNA – Forms of DNA - DNA and RNA as genetic material - Genetic code - Wobble hypothesis.

UNIT II: PLASMID AND DNA REPLICATION (10)

Organization and functioning of prokaryotic genome - Plasmids – Characters of plasmid – Conjugative, Mobilizable, Control of copy number, Incompatibility. Types – F plasmid, Col plasmid, R plasmid - Replication of DNA in Prokaryotes.

UNIT III: GENE TRANSFER MECHANISMS (10)

Gene transfer mechanisms - Transformation, Griffith experiment, Competence, General process transduction; Transduction - Generalized and Specialized; Conjugation - $F^+ \times F^-$, $Hfr \times F^-$, $F' \times F^-$.

UNIT IV: TRANSPOSONS, MUTATION AND DNA REPAIR (11)

Transposon - Discovery, Insertion sequences, Complex and compound transposons. Mutations - Types of Mutations – Spontaneous and induced mutations – Isolation of mutants - Carcinogenicity testing – DNA repair mechanism.

UNIT V: TRANSCRIPTION, TRANSLATION AND OPERON (11)

Transcription and Translation in Prokaryotes and Eukaryotes. Operon concepts – Lac Operon – Positive control and catabolite repression - Trp operon – Attenuation.

OUTCOMES:

CO1	Explain detailed the structure of nucleic acids.
CO2	Describe in detail the molecular processes such as plasmids and replication of prokaryotic
CO3	Comprehend the various methods for gene transfer mechanisms.
CO4	Describe the concepts of transposons mutation and DNA repair mechanism
CO5	Understand the molecular mechanisms involved in transcription and translation
CO6	Understand the properties, structure and function of genes in living organisms at the molecular level
CO7	Know the terms and terminologies related to molecular biology and microbial genetics

RECOMMENDED TEXT

1. Lodish, H. Baltimore Daerk . A. Zipsury, S.L. Marsudaisa. P. Darnel. J. Molecular cell biology, 3rd Edition, (1995).
2. Gardner –Simon Snustad. Principles of genetics, John Wiley & Sons. Inc. New York, 8th Edition, (1985).

REFERENCE BOOKS

1. Maloy S.R, Cronan J.E, Freifelder D, Microbial genetics. Jones & Barlett publishers, 4th Edition, (1994).
2. Lewin B. Genes VII. Oxford University press, 4th Edition, (2000).

SEMESTER-IV

L	T	P	C
3	0	0	3

Total Hours : 39

SKILL BASED PAPER – II

COMPUTER APPLICATIONS IN BIOLOGY

SUBJECT CODE – U4MB23ST

OBJECTIVES:

1. To understand the basic concepts of computer and its History
2. To know about hardware and software of the computer
3. To familiarize the essential concepts in C programming and HTML

UNIT I: COMPUTER – HISTORY, ANATOMY (07)

Introduction to Computer. History of Computer, Basic Anatomy of Computer.

UNIT II: HARDWARE AND SOFTWARE, OPERATING SYSTEM (08)

Input and Output devices, hardware and software. Operating system. MS Windows, Desktop publishing: MS Word, Data bases and graph generation: MS-Excel, project presentation: MS-Powerpoint.

UNIT III: C LANGUAGE (08)

Programming in C (Basic) Introduction, simple programs, Decision making and looping, functions, structures, input and output filling system.

UNIT IV: WEB DESIGN (08)

Basic of WEB Design using HTML: Basic HTML, text styles, list and special characters, adding pointers and links, adding pictures, backgrounds and music, tables and frames.

UNIT V: APPLICATIONS IN MICROBIOLOGY (08)

Computers in Taxonomy and Systemic Data Analysis in Microbiology. Computer applications in fermentation technology, Computers in Drug designing.

OUTCOMES:

CO1	Familiar with parts of computer
CO2	Understand the input and output devices
CO3	Basic ideas of storage devices, computer network and operating system
CO4	Identify the role of operating system. To understand and design of control unit

CO5	Defining I/O systems, Device Management policies and secondary storage
CO6	Understand the concept of C and develop looping structure
CO7	To design presenting of ppt, calculating using Excel and tables, font, alignment using word

RECOMMENDED TEXT

1. Dave Taylor. HTML. Tata McGraw – Hill Publishing Company Ltd, New Delhi, 3rd Edition, (1995).
2. Paul MCFedries. Microsoft Office 97. Sams publishing techmedia, New Delhi, 4th Edition, (1997).
3. Rajagopalan. Understanding Computers Tata McGraw – Hill Publishing Company Ltd, New Delhi, 3rd Edition, (1987).

REFERENCE BOOKS

1. Sharon Crawford. Windows 98 No Experience Required. BPB publications, New Delhi, 4th Edition, (1998).
2. Yashwant Canetrar, Let us C. BPP Publishers, New Delhi, 3rd Edition, (1980).

SEMESTER–IV
NON MAJOR ELECTIVE - II
DIAGNOSTIC VIROLOGY AND PARASITOLOGY –I
SUBJECT CODE –U4MB21NM

L	T	P	C
2	0	0	2

Total Hours : 26

OBJECTIVES:

1. The aim of the subject is to introduce the general properties of Virus, parasite and vectors in causing human diseases.
2. The aim of the subject is to introduce general properties of medically important viruses, fungi and parasite
3. Students know the various diagnostic methods to identify the organisms

UNIT 1: PROPERTIES AND DIAGNOSIS OF VIRUSES (05)

General properties of virus. Detection of viral antigens from clinical sample – serological diagnosis of viral infections.

UNIT II: MEDICALLY IMPORTANT VIRUSES I (05)

Morphology and laboratory diagnosis of Pox virus, Adeno virus, Herpes simplex virus, Paramyxovirus (Chicken pox and Mumps) and Orthomyxovirus (Influenza)

UNIT III: MEDICALLY IMPORTANT VIRUSES II (06)

Morphology and laboratory diagnosis of Picorna virus, Hepatitis B virus, Rabies virus, HIV virus.

UNIT IV: MEDICALLY IMPORTANT PARASITES I (05)

Life cycle and Laboratory diagnosis of Parasitic diseases like *Giardia lamblia*, *Leishmania donovani* and *Plasmodium vivax*.

UNIT V: MEDICALLY IMPORTANT PARASITES II (05)

Life cycle and laboratory diagnosis of parasitic diseases like *Taenia solium*, *Ascaris lumbricoides*, *Echinococcus granulosus* and *Wuchereria bancrofti*.

OUTCOME

CO1	Gain the adequate knowledge about the general properties of viruses and parasites.
CO2	Understanding the detection of viral antigens from clinical samples.
CO3	Learn about various laboratory diagnosis of fungal and protozoan infection.
CO4	Illustrate the life cycle of parasites in causing human diseases.
CO5	Explore the treatment methods and the ways of preventing from diseases

Text books:

1. Morag C. and Timbury M.C. (1994). Medical Virology, 10th Edition. Churchill Livingstone London.
2. Dimmock. N. J., Primrose S.B. (1994). Introduction to Modern Virology 4th Edition. Blackwell Scientific Publications. Oxford.
3. Parija, S.C. (1996). Textbook of Medical parasitology. Orient Longman.
4. Jagdish Chandra (2003). Test Book of Medical Mycology. Orient Longman.
5. Text Book of Microbiology, Ananthanarayan & Paniker's, 9th Edition (2017).

Reference Book:

1. Baker, F.J. and Breach, Medical microbiological techniques. Butter worths, London, 2nd Edition, (1990).

2. Parasitology, Protozoology & Helminthology 13th Edition (Hardcover, K D Chatterjee) (2009).
3. Textbook of Medical Parasitology : Protozoology & Helminthology, 4th Edition (2013), by Subhash Chandra parija.

**SEMESTER-IV
ALLIED PAPER - II
MICROBIAL TECHNOLOGY – 11
SUBJECT CODE – U4MB21AT**

L	T	P	C
4	0	0	4

Total Hours : 52

OBJECTIVES:

1. The aim of the subject is to know the basic knowledge of different fields in microbiology
2. To know the characteristics and classification of soil, aquatic, air and food related organisms.
3. To know the basic knowledge about Immunology and Molecular Biology

UNIT I: SOIL MICROBIOLOGY (10)

Characteristics and classification of soil. Soil Microorganisms; interaction between microorganisms with plants. Biofertilisers - Biopesticides.

UNIT II: AQUATIC AND AIR MICROBIOLOGY (10)

Aquatic Microbiology, Sewage Treatment – Physical and Biological. Microbes in air, distribution and source of airborne organisms.

UNIT III: FOOD MICROBIOLOGY (11)

Food Microbiology, Microbial spoilage of food, food preservation – high temperature, low temperature and food additives. Microbes in milk and their source. Industrial production – Yoghurt and Cheese.

UNIT IV: IMMUNOLOGY (11)

Antigen and its types, Antibody and its types. Ag –Ab reactions – Agglutination – Precipitation – Western Blot – ELISA.

UNIT V: MOLECULAR BIOLOGY (10)

Molecular Biology – Definition of a Gene, structure, cloning techniques, Genomic Library and Screening of recombinants. Gene Therapy methods.

OUT COMES:

CO1	Learn the adequate knowledge about the characteristics of soil, Biofertilizer and Biopesticides.
CO2	Explore the Sewage treatment methods and distribution, source of air borne diseases.
CO3	Understand the food spoilage and preservation methods and production of milk products.
CO4	Gain the adequate knowledge about the Ag-Ab reactions.
CO5	Illustrate the molecular techniques, gene cloning and gene therapy methods.

RECOMMENDED TEXT

1. Alexander. (1997). Introduction to Soil Microbiology. John Wiley and Sons. N.Y. Subba Rao, N.S. 3rd Edition, (1995).
2. Subba Rao, N.S. Biofertilizers in Agriculture and Forestry, Oxford and IBH publication Co. Pvt. Ltd., New Delhi, 3rd Edition, (1997).
3. Kuby. J, Immunology, W.H. Freeman and Company, Newyork, 2nd Edition, (1994).
4. Frazier W.C. and Westhoff D.C. Food Microbiology, Tata Mc Graw Hill Publishing Company Ltd., New Delhi, 4th Edition, (1998).
5. Frazier W.C. and Westhoff D.C. Food Microbiology, Tata Mc Graw Hill Publishing Company Ltd., New Delhi, 5th Edition, (2013).
6. Soil & Environmental Microbiology, N. S. Subba Rao, 5th Edition (2016).

REFERENCE BOOKS

1. Old, R.S. and Primrose, S.B. Principles of Gene manipulation. An introduction to genetic Engineering. Blackwell Scientific Publication, London, 5th Edition, (1995).
2. T.A. Brown. Gene cloning – an introduction – Chapman & hall London, 3rd Edition, (1995).
3. Text Book of Microbiology, Ananthanarayan & Paniker's, 9th Edition (2017).
4. A text book of Biotechnology, R. C. Dubay, 5th Edition (2014).

SEMESTER-IV
CORE PRACTICAL - II
IMMUNOLOGY
SUBJECT CODE – U4MB21MP

L	T	P	C
0	0	2	2

Total Hours : 26

Objective:

The aim of the subject is to know the basic practical knowledge about blood grouping, RPR, RA, CRP, WIDAL, VDRL, SRID, ODD, CCI, RIC, DLC, ELISA TWBC, TRBC

1. Blood Grouping and Rh Typing.
2. Coomb's Test.
3. Rheumatoid Arthritis Test.
4. Rapid Plasma Reagin Test.
5. C-Reactive protein Test.
6. Anti streptolysin 'O' Test.
7. Treponema pallidum Heamagglutination.
8. Pregnancy Test.
9. WIDAL Test
10. VDRL Test.
11. Single Radial Immuno Diffusion.
12. Ouchterlony Double Diffusion.
13. Immunoelectrophoresis.
14. Counter Current Immunoelectrophoresis.
15. Rocket Immunoelectrophoresis.
16. Total WBC Count.
17. Total RBC Count.
18. Platelet Count.
19. Differential Leucocyte Count.
20. ELISA – Demo.

OUTCOMES:

CO1	Identify the blood grouping and its types
CO2	Carry out serological diagnostic tests such as RA, ASO, CRP and WIDAL.
CO3	Detection of various immune cells morphology such as WBC, RBC and platelets using various staining methods like Leishman staininh and giemsa staining.
CO4	Give the knowledge about the precipitation reaction such as SRID and ODD methods.

REFERENCE BOOKS

1. Mackie and McCartney Practical Medical Microbiology, Elsevier; 14th Edition, (2007).
2. Dev, N.C., Dev, T.C. Practical Microbiology Protozoology and Parasitology: Including Bacteriology, Virology, Mycology, Immunology, Serology, and Automated Methods. New

Book Agency, 2nd Edition, (2011).

**SEMESTER-IV
ALLIED PRACTICAL - II
MICROBIOLOGY
SUBJECT CODE – U4MB21AP**

L	T	P	C
0	0	3	2

Total Hours : 39

Objectives:

1. The student will be able to evaluate methods used to identify infectious agents in the clinical microbiology lab.
2. The student will be able to recall isolation of microorganisms from soil, water, air etc.
3. Students know the isolation of enzymes from microbes
1. Cleaning of Glasswares, Sterilization techniques.
2. Gram's Staining, Motility (Hanging Drop Preparation)
3. Acid Fast Staining for Tuberculosis pathogen identification
4. Wet Mount Preparation of Fungal Material – LPCB Staining
5. Preparation of Media.
6. Slant Preparation
7. Serial Dilution Techniques
8. Pure Culture Techniques -Streak Plate, Pour Plate and Spread Plate Techniques.
9. Enumeration of Soil Microorganisms.
10. Enumeration of Sewage Microorganisms.
11. Assessment of Milk Quality by MBRT Method.
12. Assessment of Air Quality
13. Root Nodules – Rhizobium Isolation and Identification methods.
14. Microbial Products – Microbial Enzyme Production – Demonstration.
15. Medically Important Pathogens – Microphotographs demonstration.

OUTCOME:

CO1	Demonstrate the practical skills in microscopy and their handling techniques and staining
CO2	Know various Culture media and their applications and also understand various physical and chemical means of sterilization
CO3	Know General bacteriology and microbial techniques for isolation of pure cultures of bacteria, fungi and algae
CO4	Master aseptic techniques and be able to perform routine culture handling tasks safely and

CO5	Comprehend the various methods for identification of unknown microorganisms
CO6	Know the various Physical and Chemical growth requirements of bacteria and get

REFERENCE BOOKS

1. Mackie and Mc Cartney Practical Medical Microbiology, Elsevier; 14th Edition, (2007).
2. Dev, N.C., Dev, T.C. Practical Microbiology Protozoology and Parasitology: Including Bacteriology, Virology, Mycology, Immunology, Serology, and Automated Methods. New Book Agency, 2nd Edition, (2011).

SEMESTER-V
MAJOR PAPER - V
MOLECULAR BIOLOGY AND GENETIC ENGINEERING
SUBJECT CODE – U5MB21MT

L	T	P	C
6	0	0	6

Total Hours : 78

OBJECTIVES:

1. The aim of the subject is to gain the knowledge on genetic materials, cloning systems, basic techniques of Molecular biology & their applications in various fields.
2. Nucleic acids and proteins and how these molecules interact within the cell to promote proper growth, division, and development.
3. This course will emphasize the molecular mechanisms of DNA replication, repair, protein synthesis etc.

UNIT I : INTRODUCTION TO MOLECULAR BIOLOGY (15)

Nucleic acids: Structure of DNA and RNA, Types and forms – DNA, t-RNA, r-RNA, m-RNA – Definition and functions.

UNIT II: GENE CLONING SYSTEM (16)

Gene cloning system – Cloning strategies - Vectors – Plasmid (Ti-plasmid, pBR322, pSC101, pUC), Bacteriophage (M13 Bacteriophage vectors & Lambda DNA) & Cosmid - Enzymes (Restriction Endonuclease, Ligase & DNA Polymerases). Preparation of Genomic library & cDNA library.

UNIT III: APPLICATION OF GENETIC ENGINEERING IN MEDICAL & AGRICULTURAL FIELD (16)

Gene therapy – Gene therapy methods, Gene therapy for cancer. Methods of gene drug delivery, Genetic counseling. Application in agricultural field – Biopesticides. Monoclonal antibody (Hybridoma technology)

UNIT IV: HYBRIDIZATION & AMPLIFICATION TECHNOLOGY (16)

Nucleic acid and protein hybridization technique – Southern, Northern and Western methods of hybridization. DNA amplification techniques – PCR.

UNIT V: APPLICATION OF GENETIC ENGINEERING IN PHARMACEUTICALS (15)

Application in Pharmaceuticals - Interferons, Insulin, Growth hormones. Social impact of recombinant DNA technology.

OUTCOME:

CO1	Students gain the knowledge on genetic materials, types of DNA and their functions
CO2	Understand the students about gene cloning systems and preparation of genomic library and cDNA library
CO3	Know the applications of Genetic Engineering in Medical and Agricultural field
CO4	To provide adequate knowledge about hybridization and amplification technology
CO5	To give detailed explanation of application of genetic engineering in pharmaceuticals
CO6	The students gain the knowledge on Genetic Engineering
CO7	Handle and independently work on lab protocols involving molecular techniques

RECOMMENDED TEXT

1. Old, R.S. and Primrose, S.B. Principles of Gene manipulation. An introduction to Genetic Engineering. Blackwell Scientific Publication, London, 5th Edition, (1995).
2. Brown. T.A., Gene cloning – an introduction – Chapman & Hall, London, 3rd Edition, (1995).
3. Mukesh Pasupuleti, Molecular Biotechnology. MJB publishers, Chennai, 3rd Edition, (2005)

REFERENCE BOOKS

1. Glick, B.R. and Pasternat, J.J. Molecular Biotechnology, ASM press. Washington DC, 2nd Edition, (1994).
2. Benjamin Lewin, Genes VI, Oxford University Press, 2nd Edition, (1997).

L	T	P	C
6	0	0	6

SEMESTER-V
MAJOR PAPER - VI
MEDICAL BACTERIOLOGY
SUBJECT CODE – U5MB22MT

Total Hours : 78

OBJECTIVES:

1. The aim of the subject is to know the human and animal bacterial pathogens, their role in causing diseases and to control them.
2. The student will be able to identify common infectious agents and the diseases that they cause.
3. The student will be able to evaluate methods used to identify infectious agents in the clinical microbiology lab.

UNIT- I: NORMAL FLORA AND VIRULANCE FACTOR (15)

Normal flora of human body. Collection and transport of clinical samples laboratory diagnosis of bacterial infections, virulence factors of bacteria, Hospital waste disposal. Host parasite relationship. Probiotics.

UNIT II: HUMAN BACTERIAL PATHOGENS I (16)

Gram positive bacteria: Classification, morphology, cultural characteristics, pathogenicity, epidemiology, laboratory diagnosis, treatment, prevention and control of diseases caused by: *Staphylococcus aureus*, *Streptococcus pyogenes*, *Streptococcus pneumoniae*, *Corynebacterium diphtheriae*, *Mycobacterium* (tuberculosis, leprae), *Clostridium* (perfringens, tetani, botulinum) , *Bacillus anthracis*, *Listeria monocytogenes*.

UNIT III: HUMAN BACTERIAL PATHOGENS II (16)

Gram negative bacteria: *Escherichia coli*, *Salmonella typhi*, *Shigella*, *Vibrio cholerae*, *Klebsiella pneumoniae*, *Neisseria* [Gonococci and Meningococci], *Pseudomonas aeruginosa*.

UNIT IV: HUMAN BACTERIAL PATHOGENS III (16)

Gram negative bacteria: Human pathogens - *Haemophilus influenzae*, *Treponema pallidum*, *Rickettsia*, *Chlamydiae*. Pleomorphic -*Mycoplasma pneumoniae*.

UNIT V : ZOONOSES AND NOSOCOMIAL INFECTIONS (15)

Zoonotic diseases and their control; Hospital acquired infections and their control; Pyrexia of unknown origin. Ethical committee and their functions.

OUTCOME

CO1	Aware about the pathogenicity of medically important microorganisms associate with humans
CO2	Gain adequate knowledge in the laboratory diagnosis of the pathogens, methodologies and safety precautions
CO3	Better understanding of human bacterial pathogens with its different cultural characteristics and epidemiology
CO4	Explore the treatment methods and the ways of preventing from human pathogens
CO5	Competent enough to use medical bacteriology skills to analyze the problems involving microorganisms and to stop the spreading of disease to the environment.
CO6	Able to learn the bacterial systematic, microscopy, various methods of isolation and techniques to identify the bacteria in human body fluids.

Text Books

1. Ananthanarayanan R. and Jayaram Panicker C.K. (1994). Text book of Microbiology. Orient Longman
2. Salle, A.J. (1992). Fundamental Principles of Bacteriology. 7th Edition, Mc. Graw Hill Publishing Co. Ltd., New York.
3. Baron, E.J. and Tenenbaum S.M. (1995). Scientific company. Diagnostic Microbiology. Blackwell Scientific Company.
4. Vasanthakumari . R. Text Book Of Microbiology, BI Publication Pvt Ltd.
5. Morag C Timbury . Notes on Medical Microbiology
6. Jawatz, Medical Microbiology 19th Edition.

Reference Books

1. John G. Holt and David Hendricks Bergey, (1993). Bergeys Manual of determinative Bacteriology, 9th Edition, Lippincott Williams and Wilkins Publishers.
2. Ananthanarayanan R. and Jayaram Panicker C.K. (2015). Text book of Microbiology. Orient Longman.

L	T	P	C
6	0	0	6

Total Hours : 65

SEMESTER- V

MAJOR PAPER VII

MEDICAL VIROLOGY

SUBJECT CODE –U5MB23MT

OBJECTIVES:

1. The aim of the subject is to introduce the general properties of viruses their cultivations, human viral diseases and their life cycle inside the host. This course will help the students to understand bacterial viruses and miscellaneous viruses.
2. Explain viral replication strategies; and compare and contrast replication mechanisms used by viruses relevant for human disease.
3. Explain host antiviral immune mechanisms at a cellular and molecular level

UNIT I: PROPERTIES AND CULTIVATION OF VIRUSES (12)

General properties of viruses- Morphology, viral replication, cultivation of viruses, viral assay, Classification and nomenclature of Viruses. Laboratory diagnosis of viral infection.

UNIT II: BACTERIAL VIRUSES (13)

Bacteriophages- Morphology, Life cycles, uses of bacteriophages.

UNIT III: HUMAN VIRAL DISEASES I (14)

Influenza, Adenovirus, Rhinovirus Chicken pox (Varicella), Herpes simplex, Measles (Rubella), Mumps, Small pox (Variola).

UNIT IV: HUMAN VIRAL DISEASES II (13)

Dengue fever, Rabies, Polio, Viral hepatitis. Emerging viral hemorrhagic fever, SARS (Severe Aero Respiratory Syndrome), Papova virus, Parvo virus, Corona Virus, Arena, Filo, Reo, Rota viruses.

UNIT V: MISCELLANEOUS VIRUSES (13)

HIV, Oncogenic virus, Zika virus, Slow viruses, Rota viruses & Ebola virus. Avian / Bird/ Chicken flu, Chickungunya, Swine Flu, Mad Cow Diseases.

OUTCOME

CO1	Apply rules for description of the classification and nomenclature of viruses
CO2	Understand the structure and life cycle of Bacteriophages
CO3	Classify the human viral diseases
CO4	Categorize newly emerged human viral diseases

CO5	Collect and assemble the miscellaneous viruses
CO6	Understand the human pathogenic viruses
CO7	Compare the pathogenic mechanisms of different viral diseases in humans

Text Books

1. Ananthanarayanan R. and Jayaram Panicker C.K. (1994). Text book of Microbiology. Orient Longman
2. Jayaram Panicker C.K. (1994). Text book of Microbiology. Orient Longman.
3. Baron, E.J. and Finegold S.M. (1995). Scientific company. Diagnostic Microbiology. Blackwell Scientific Company.
4. Dimmock. N.J., Primrose S.B. Introduction to Modern Virology. Blackwell Scientific Publications. Oxford, 4th Edition. (1994).
5. Vasanthakumari . R. Text Book of Microbiology, BI Publication Pvt Ltd.
6. Jawatz, Medical Microbiology 19th Editions (2017).
7. Ananthanarayanan R. and Jayaram Panicker C.K. (2015). Text book of Microbiology. Orient Longman.

Reference Book

1. David greenwood 18th edition. Medical microbiology. A guide to microbial infections
2. John G. Holt and David Hendricks Bergey, (1993). Bergeys Manual of determinative Bacteriology, 9th Edition, Lippincott Williams and Wilkins Publisher.
3. Fenner and White's Medical Virology, 5th Edition, Christopher J. Burrell and Colin R. Howard. (2017).

L	T	P	C
5	0	0	5

Total Hours : 65

SEMESTER- V ELECTIVE PAPER –I MEDICAL MYCOLOGY, PARASITOLOGY& ENTOMOLOGY SUBJECT CODE –U5MB24ET

OBJECTIVES:

1. The aim of the subject is to introduce the general properties of fungi, parasite and insect vectors in causing human diseases.
2. Describe basic morphology, life cycle, pathogenesis, lab diagnosis and treatment of parasites and fungi.
3. To provide students with foundation of Parasitology knowledge and perform effectively in Parasitology diagnostic methods.

UNIT I: GENERAL PROPERTIES OF FUNGI (13)

General properties of fungi - Morphology, Fungal reproduction, Taxonomy and Nomenclature, Laboratory diagnosis of fungal infection.

UNIT II: FUNGAL PATHOGENS (14)

Superficial mycoses - *Tinea Versicolor*, *Tinea nigra*, *Piedra*, Cutaneous – Dermatophytoses, Sub cutaneous mycosis- Mycetoma, Systemic mycoses – *Blastomycosis*, *Paracoccidiomycosis*, *Histoplasmosis*, *Coccidiomycosis*, Opportunistic mycoses-Aspergillosis, Candidiasis, Cryptococcosis.

UNIT III: PROTOZOAN PATHOGENS (13)

Giardia lamblia, *Balantidium coli*, *Trypanosoma cruzi*, *Trichomonas vaginalis*, *Entamoeba histolytica*, and *Leishmania donovani*

UNIT IV HELMINTHIC PATHOGENS (13)

Pinworm, Round worm, Hookworm, Beef and Pork tape worm and Liver fluke disease (*Fasciola hepatica*).

UNIT V VECTORS OF MEDICAL IMPORTANCE (12)

Vectors - life cycle – diseases- epidemiology and management of Mosquitoes, House flies, Sand flies, Human lice, Tsetse flies and Reduviid bugs.

OUTCOMES:

CO1	Describe the fungal morphology, reproduction and lab diagnosis
CO2	Explain the various fungal pathological events during the progression of an infectious disease
CO3	Discuss morphology, lifecycle, pathology and lab diagnosis of human pathogenic protozoan
CO4	Discuss morphology, lifecycle, pathology and lab diagnosis of human pathogenic helminthes
CO5	Apply the epidemiological sciences in studying the underlying mechanisms of spread of disease and controls required to combat the spread of medically importance vectors
CO6	Discuss the principle involved in the diagnostic test used for detection of fungi
CO7	Explain the various pathological, lab diagnosis and preventive measures of medically important fungi, parasite and pest.

TEXT BOOKS

3. Prescott M, Microbiology, Tata McGraw Hill Publishing Co. Ltd., New Delhi, 6th Edition, (1962).
4. Anathanarayanan, R. and Jayaram panicker C.K. Text Book of Microbiology, Orient Longman, 8th Edition, (1994).
5. Parija, S.C. Textbook of Medical Parasitology. Orient Longman, 3rd Edition, (1996).
6. Jagdish Chandra, Text Book of Medical Mycology. Orient Longman, 4th Edition, (1996).
7. Vasanthakumari . R. Text Book Of Microbiology, BI Publication Pvt Ltd.
8. John Thorne Crissey, Manual of medical Mycology (1995) by Black well science.
9. Jawatz, Medical Microbiology 19th Edition.
10. Jagdish Chandra (2003). Test Book of Medical Mycology. Orient Longman.
11. Mani M S (1982) General Entomology. Oxford & IBH publishing Co.

REFERENCE BOOKS

1. Baker, F.J. and Brech, Medical Microbiological techniques. Butter worths, London, 2nd Edition, (1990).
2. Chatterjee, M.D. Parasitology. Chatter Joe Medias Publishers, Culcutta, 12th Edition, 3rd Edition, (1980)
3. Textbook of Medical Parasitology : Protozoology & Helminthology, 4th Edition (2013), by Subhash Chandra pariya.
4. IMMS .A.D (1994) A General text book of Entomology. Asia publishing house.

SEMESTER-V
ELECTIVE PAPER - II
HUMAN PHYSIOLOGY
SUBJECT CODE – U5MB25ET

L	T	P	C
5	0	0	5

Total Hours : 65

OBJECTIVES:

1. The aim of the subject is to know about the anatomy and physiology of human system
2. Define the main structures composing human body. Tells chemical structure of human body
3. To provide a course of study in mammalian, principally human, systems physiology, building

UNIT 1: CARDIO-VASCULAR SYSTEM (13)

Human Cardio-vascular system – Heart – circulatory system – cardiovascular pathway – cardiac cycle – Blood Pressure.

UNIT II: GASTRO-INTESTINAL SYSTEM (13)

Human Gastro-intestinal system – digestive system - esophagus – stomach – small intestine - large intestine - pancreas – liver and gall bladder.

UNIT III: RESPIRATORY SYSTEM (13)

Human Respiratory system. Upper respiratory tract – Lower respiratory tract – Breathing and lung mechanics.

UNIT IV: NERVOUS SYSTEM (13)

Human Nervous system. Neurons – Brain – Central Nervous System – Peripheral Nervous System – Autonomic Nervous system – Spinal Cord.

UNIT V: GENITO-URINARY SYSTEM (13)

Human Genito-urinary system. Urinary system – organs – formation of urine – Male reproductive system – female reproductive system – female reproductive cycle.

OUTCOMES:

CO1	Have an enhanced knowledge and appreciation of mammalian physiology
CO2	Understand the functions of important physiological systems including the cardio-respiratory, renal, reproductive and metabolic systems
CO3	Understand how these separate systems interact to yield integrated physiological responses to challenges such as exercise, fasting and ascent to high altitude, and how they
CO4	Be able to perform, analyse and report on experiments and observations in physiology
CO5	Be able to recognise and identify principal tissue structures

RECOMMENDED TEXT

1. Text Book of Medical physiology, Arthur C. Gyton and John E. Hall, Har Court Asia Pvt. Ltd., W.B. Saunders Company, Singapore, 10th Edition, (2000).

REFERENCE BOOKS

1. Kuty, K.M., Subrahamanvam, S. and Singh, H.D. A Textbook of Human Physiology. S. Chand & Co Ltd., 2nd Edition, (2010).

2. Sreekumar, S. Basic Physiology. S. Chand & Co. Ltd., 1st Edition, (2010).

SEMESTER-V
SKILL BASED PAPER - III
MUSHROOM AND VERMICULTURE TECHNIQUES
SUBJECT CODE – U5MB26ST

L	T	P	C
3	0	0	3

Total Hours : 39

OBJECTIVES:

1. The aim of the subject is to cultivate the edible mushrooms, to know the mushroom diseases and role of earthworms in soil.
2. To strengthen the promotion of mushroom cultivation by establishing a well-equipped laboratory and offices.
3. To provide the Unit with appropriately trained personnel for the promotion of mushroom production in the country. To increase the production and consumption of mushrooms.

UNIT I: EDIBLE AND NONEDIBLE MUSHROOM (07)

Morphology of common edible mushroom, nutritional, medicinal value of mushroom, spawn, types of spawn, spawning. Edible and non-edible mushrooms.

UNIT II: CULTIVATION OF MUSHROOM (08)

Mass cultivation of *Agaricus bisporous*, *Volvariella volvaceae*, Preparation of substrates (compost), casing, harvesting, storage.

UNIT III: DISEASES AND RECIPES OF MUSHROOM (08)

Diseases (Bacterial, fungal, viral and pests) and recipes of mushrooms – soup, omlette, samosa, pickles, curry.

UNIT IV: ROLE OF EARTHWORM IN SOIL (08)

Soil biota, ecological classification of earthworms, physical and chemical effects of earthworms on soils, role of earthworms in soil, Drilospheres, microorganisms and their relationship with earthworms.

UNIT V: VERMICOMPOSTING (08)

Vermicomposting: types – vermiculture in India. Vermicompost and preparation, vermiwash – preparation and use.

OUTCOMES:

CO1	Understand the Morphology of common edible mushroom and process involved in mushroom cultivation and differentiate edible and non-edible mushroom
CO2	Develop skills for cultivating and identifying mushrooms, using them for commercial purposes
CO3	Acquire knowledge and technical skills associated with mushroom cultivation and bed preparation for different types of mushrooms.
CO4	Will understand the pathology associated with mushrooms and their pre-harvest & post-harvest management.
CO5	Acquire basic knowledge on Soil biota, ecological classification of earthworms
CO6	Understand the preparation method and marketing strategies of vermicompost
CO7	Can start own enterprise on mushrooms and Vermicompost

RECOMMENDED TEXT

1. Kannian, “Handbook of Edible Mushrooms” TNAU Publication, 4th Edition, (2001).
2. Kale Radha, D, Earthworm: Cinderella of organic farming. Prism Books Pvt. Ltd., Bangalore, 4th Edition, (1998).

REFERENCE BOOKS

1. Changs. T. & W.A. Hayanes, “Biology and cultivation of mushrooms” Acad Press, New York, 5th Edition, (1978).
2. Edwards, C.A. & Bohlen, P.J, “Biology and Ecology and Earthworms, Chapman and Hall, London, 3rd Edition, (1996).
3. Ismail.S.A., Vermicology: The Biology Earthworm Orient Longman, 5th Edition, (1997).

SEMESTER–VI
MAJOR PAPER - VIII
FOOD AND DAIRY MICROBIOLOGY
SUBJECT CODE – U6MB21MT

L	T	P	C
6	0	0	6

Total Hours : 78

OBJECTIVES:

1. The aim of the subject is to know the basic concept of food and dairy microbiology, preservation, contamination of food and production of fermented food products.
2. To understand the key concepts in food and dairy microbiology, to gain knowledge on various methods of microbial analysis of food and dairy products
3. To learn various statistical methods of data analysis.

UNIT I: CHARACTERISTICS OF MICROBES IN FOOD & PRESERVATION
METHODS (15)

Food as a substrate for microorganisms. Important microorganisms in food microbiology; Mold, Yeasts and Bacteria - general characteristics – classification and importance. Principles of food preservation – Asepsis – Removal of microorganisms, anaerobic conditions – high temperature – low temperature – drying and food additives.

UNIT II: CONTAMINATION & SPOILAGE OF FOOD (16)

Contamination and spoilage – vegetables and fruits – meat and meat products – fish and sea foods – poultry, Spoilage of canned foods.

UNIT III: FOOD BORNE INFECTIONS & ITS PREVENTIVE MEASURES (16)

Food borne infections and intoxications: Bacterial - *Staphylococcus*, *Clostridium*, *Escherichia coli* and *Salmonella* infections, Non-bacterial - Hepatitis, Amoebiasis and Mycotoxins. Preventive measures and food sanitation. HACCP.

UNIT IV: DAIRY MICROBIOLOGY(16)

Microbiology of milk. Contamination, spoilage and preservation of milk and milk products. Microbiological analysis of milk and milk products.

UNIT V: FERMENTED FOODS (15)

Fermented foods – Bread, pickles and sauerkraut, fermented dairy products – cheese and yoghurt. Oriented fermented foods – Soy sauce, Tempeh and Idli.

OUTCOMES:

CO1	Apply basic principles for preservation of food
CO2	Exemplify the microbial spoilage of vegetables, fruits, meat and fishes
CO3	Illustrate various food borne infection that transmit through the contaminated food
CO4	Recall the contamination, spoilage and preservation of milk
CO5	Explain stages of various food fermentation processes
CO6	Compare and contrast contamination and spoilage of different type food
CO7	Recall the successes of various chemical food preservatives

RECOMMENDED TEXT

1. Adams, M.R. and Moss. M.O. Food Microbiology. New International (P) Ltd. Publishers, 3rd Edition, (1995).
2. Frazier, W.C. and Westhoff, D.C. Food Microbiology. Mc Graw Hill NY, 4th Edition, (1988)

REFERENCE BOOKS

1. Robinson R.K. Dairy Microbiology. Elsevier Applied Science, London, 3rd Edition, (1990)
2. Banwart. G.J. Basic Food Microbiology, Chapman & Hall, New York, 4th Edition, (1988).
3. Hobbs. B.C. & Roberts. D. Food Poisoning & Food Hygiene, Edward Arnold, London, 5th Edition, (1993).

SEMESTER–VI
MAJOR PAPER - IX
INDUSTRIAL MICROBIOLOGY
SUBJECT CODE – U6MB22MT

L	T	P	C
6	0	0	6

Total Hours : 78

OBJECTIVES:

1. The aim of the subject is to know the industrially important microbes & their role in the production of various fermented products.
2. The aim of the course is to give the students broad theoretical and practical skills in industrial microbiology.
3. The students will be able to discuss the role of microorganisms in industry, as well as to carry out experiments to produce microbial metabolites.

UNIT I: INDUSTRIAL STRAINS AND ITS DEVELOPMENT (15)

Historical development of Industrial Microbiology. Screening Techniques – Primary and secondary screening methods. Strain Development strategies - Mutation. Preservation of Microorganisms. Preparation of inoculum.

UNIT II: MICROBIAL BIOCONVERSIONS, PRODUCTION MEDIA AND FERMENTOR (16)

Microbial transformation – Types of bioconversions. Production media – characteristics, raw materials and screening. Fermentor – configurations, characteristics and its types. Types of fermentation – Solid and Submerged.

UNIT III: STERILIZATION & DOWNSTREAM PROCESSING (15)

Industrial sterilization – Principle, equipments, sterilization of fermentor, production media and air. Recovery and purification of intracellular and extracellular fermentation products – Downstream processing.

UNIT IV: FERMENTATION PRODUCTS AND ITS APPLICATIONS (16)

Microbial production of alcoholic beverages – Ethanol, Beer and Wine, Organic acids – Citric acid, Lactic acid and Acetic acid, Aminoacids – Lysine and Glutamic acid, Enzymes – Amylase

and Protease. Application of enzymes in various industries – Food, leather, textile, detergent and paper industries.

UNIT V: ALGAL BIOTECHNOLOGY AND WASTE MANAGEMENT (16)

Production of SCP – Yeast, Algae and Bacteria, Biofuel – Methane and hydrogen. Industrial effluent treatment.

OUTCOMES:

CO1	Ability the principles of physiological understanding in improvement of industrially importance microorganism.
CO2	Appreciate the different types of fermentation processes and biochemistry of various fermentations
CO3	Understand the rationale in medium formulation & design for microbial fermentation, sterilization of medium and air
CO4	Appreciate how microbiology is applied in manufacture of industrial importance fermentation products
CO5	Discuss the production of industrially importance algae and waste management
CO6	Get equipped with a theoretical and practical understanding of industrial microbiology
CO7	Know how to source for microorganisms of industrial importance from the environment

RECOMMENDED TEXT

1. Patel, A.H. Industrial Microbiology. Macmillan India Limited, 4th Edition, (2000).
2. Dubey, R.C and Maheswari, D.K. A Text book of Biotechnology. S. Chand & Company Ltd. New Delhi, 3rd Edition, (2005).

REFERENCE BOOKS

1. Demain, A.L. and Davies, J.E. Manual of Industrial Microbiology and Biotechnology. ASM Press, 3rd Edition, (1999).
2. Stanbury, P.F., Whitaker, A. and Hall, S.J. Principles of Fermentation Technology, Pergamon Press, 4th Edition, (1995).
3. Glick BR, Pasternak. J. Molecular Biotechnology, ASM Press, Washington DC, 3rd Edition, (1994).

**SEMESTER-VI
ELECTIVE PAPER - III
PHARMACEUTICAL MICROBIOLOGY
SUBJECT CODE – U6MB23ET**

L	T	P	C
5	0	0	5

Total Hours : 65

OBJECTIVES:

1. The aim of the subject is know the industrially important strains, fermentors, production of drugs, recombinant vaccines & growth hormones.
2. Preservation of pharmaceutical products using antimicrobial agents, evaluation of microbial stability off formulations.
3. Growth of animal cells in culture, general procedure for cell culture, Primary, established and transformed cell cultures.

UNIT I: INDUSTRIAL STRAINS & FERMENTATION MEDIA (12)

Pharmaceutical strains of microorganism – Screening methods – Inoculum development methods – Fermentation media.

UNIT II : FERMENTOR & ITS TYPES (13)

Fermentation – Equipments – Laboratory pilot plant fermentors – Fermentation processes – Aerobic and anaerobic processes, surface and submerged fermentations – Batch and Continuous fermentations.

UNIT III: INDUSTRIAL PRODUCTS FROM MICROBES (14)

Production of antibiotics – Penicillin, Streptomycin – Assay methods. Antiseptics & Disinfectants – standardization. Production of vitamins – Riboflavin, Ascorbic acid, Cyanocobalamine – Assay methods.

UNIT IV: RECOMBINANT PROTEIN FROM MICROBES (13)

Production of Human replacement protein – Insulin, Interferon, TPA & Growth Hormones. Production of Vaccines, toxoids and antisera against common infectious disease – Standardisation and quality control.

UNIT V: STERILITY TESTING PROCEDURE (13)

Sterility testing of pharmaceutical products – Injectables, IV fluids, etc. – Pyrogen testing.

OUTCOMES:

CO1	Identify microorganisms of relevance to healthcare and the pharmaceutical industry and their sources.
CO2	Understand various disinfection and sterilization techniques ,evaluate the sterility testing, microbial assays, pharmacopoeial standards of sterilization process

CO3	Understand the mechanism of action of Non-therapeutic antimicrobial and therapeutic antimicrobial agents.
CO4	Recognize the biochemical and genetic basis for antibiotic resistance and ways of controlling spread of antibiotic resistance.
CO5	Evaluate microbial content testing and sterility testing
CO6	Acquire a knowledge of valuable pharmaceutical products
CO7	Get equipped with a theoretical and practical understanding of pharmaceutical microbiology

RECOMMENDED TEXT

1. Hugo, W.B., Russell, A.D., Pharmaceutical Microbiology, Blackwell Scientific Publications/Oxford, 4th Edition, (1992).
2. Patel, A.H. Industrial Microbiology. Macmillan India Limited, 4th Edition, (2000).

REFERENCE BOOKS

1. Russell and Ayilffe, G.A.J. Principles in practice of disinfection, preservation and Sterilization, Oxford, 3rd Edition, (1982).
2. Gregory, P.H., Microbiology of the Atmosphere, Leonard Hill, 2nd Edition, (1961).

**SEMESTER-VI
ELECTIVE PAPER - IV
TANNERY TECHNOLOGY
SUBJECT CODE – U6MB24ET**

L	T	P	C
5	0	0	5

Total Hours : 65

OBJECTIVES:

1. Work in the leather, chemical and footwear industries
2. Pursue higher studies
3. Contribute in teaching, research and other developmental activities of Leather technology and its allied fields

UNIT I: NATURE AND COMPOSITION OF TANNERY (13)

Types of tannery available in India. Their nature and composition. Present methods of collection and utilization.

UNIT II: RECOVERY FROM TANNERY EFFLUENT (13)

Recovery of salt from tannery effluent. Its treatment and re use. Theoretical and practical aspects of recovery of chrome. Protein and biogas from tannery effluent. Recovery of fat, proteins, chemical and glue and their use. Pet treats, finished splits, gloves, washers etc.

UNIT III: VEGETABLE TANNINS (13)

Chemistry of vegetable tannins, extraction criteria for vegetable tannis, Solid – liquid ratio for extraction, chemical modification and blending of vegetable tannis.

UNIT IV: TANNING SALTS (13)

Types of mineral tanning salts, chemistry of Basic chromium sulphate preparation, basicity and masking system, factors influencing exhaustion of chromium (III) during tanning.

UNIT V: TREATMENT OF TANNERY EFFLUENTS (13)

Treatment of Tannery effluents by Microbes.

OUTCOMES:

CO1	Bright career in opportunities in technical and designing areas
CO2	Designers are working with footwear companies as technical designers or stylist designers
CO3	The ability to perform design of leather products by means of design experiences integrated throughout the professional component of the curriculum.
CO4	An ability to function on teams, that must integrate contributions from different areas of leather technology towards the solution of multi-disciplinary projects.
CO5	An ability to identify, formulate, and solve Leather technology problems.
CO6	An understanding of professional practice issues in leather technology including
CO7	Possess ability to estimate costs, estimate quantities and evaluate materials for leather manufacturing.

RECOMMENDED TEXT

1. Scaria. K.J., Mahendrakumar, M and Divakaran, S. “ Animal by products – Their bioprocessing and utilization” CLRI, Madras, 2nd Edition, (1961).
2. Taiganides, E.P. “Animal Wasters”. Applied Science Publishers Ltd., Essex., 3rd Edition, (1977).

REFERENCE BOOKS

1. Mann, I. “Process of utilization of Animal by products” /FAO Rome, 3rd Edition, (1962).

2. "Low Cost Waste Treatment", NEERI, Nagpur, (1972).
3. Cawe, M.C. et al., Tannery Center Technique der Cuir, Lyon, France.

**SEMESTER-VI
ELECTIVE PAPER - V
ENVIRONMENTAL MICROBIOLOGY
SUBJECT CODE – U6MB25ET**

L	T	P	C
5	0	0	5

Total Hours : 65

OBJECTIVES:

1. The aim of the subject is to know the interaction of microorganisms in environment, biogeochemical cycle and degradation of pollutant by microorganisms.
2. Understand the role of microorganisms as agents of environmental change.
3. Recognize microorganisms as indicators of alteration of an ecosystem .

UNIT I: MICROBIAL INTERACTIONS (13)

Habitat and Microorganisms in air, soil, terrestrial, freshwater, marine and extreme environments. Microbial interactions : Symbiosis, Commensalism, Synergism, Mutualism, Antagonism and Parasitism. Rumen flora.

UNIT II: AIR MICROBIOLOGY (13)

Microbes in air - sources and distribution - Air pollutants - Assessment of air quality - Air borne diseases, prevention and control. Green House Effect- Global Warming.

UNIT III: AQUATIC MICROBIOLOGY (13)

Aquatic Microbiology - Ecosystem – Freshwater (Ponds, Lakes, Streams) - Marine (Estuaries, Mangrooves, Deep sea) - Eutrophication.- Microbiological assessment of water quality - Water Purification - Water borne diseases, prevention and control - Waste treatment (solid and liquid waste).

UNIT IV: BIOGEOCHEMICAL CYCLES (14)

Biogeochemical cycles: Carbon, Nitrogen, Phosphorus, Sulfur and Iron cycles.

UNIT V: BIODEGRADATION (12)

Biodegradation of organic matter, Xenobiotic compounds, Genetically Engineered Microorganisms (GEM) and its role in bioremediation. Phytoremediation.

OUTCOMES:

CO1	Gain the basic knowledge on microbial community and composition along with environmental parameters.

CO2	Illustrate the effect of green house gases to the environment and impact of global warming
CO3	Compare and contrast the various biogeochemical cycles involved in the environment
CO4	Familiar with the process of degrading xenobiotics compounds present in the environment
CO5	Perceive the importance of ecosystem and its alteration by human activities.
CO6	Proficiency in the assessment of air quality and airborne diseases
CO7	Comprehend the various methods involved in waste water treatment.

RECOMMENDED TEXT

1. Atlas Ronald, M., Bartha and Richard Microbial Ecology. Benjamin/Cummings Publishing Company, California, 2nd Edition, (1987).
2. Prescott L.M. Harley J.P. and Klein D.A. Microbiology, McGraw Hill, New York, 5th edition, (2003).
3. Daniel C. Environmental Aspects of Microbiology, Brightsun Publications, Chennai. 2nd Edition, (1997).

REFERENCE BOOKS

1. Dirk, J. Elsas, V., Trevors, J.T., Wellington, E.M.H. Modern Soil Microbiology, Marcel Dekker INC., New York, Hong Kong, 2nd Edition, (1997).
2. Ec Eldowney S, Hardman D.J., Waite D.J., Waite S. Pollution: Ecology and Biotreatment – Longman Scientific Technical, 3rd Edition, (1993).
3. Grant W.D and Long, P.L. Environmental Microbiology. Blackie Glasgow and London, 2nd Edition, (1981).
4. Alexander M. Introduction to soil microbiology. John Wiley & Sons, Inc., New York, 2nd Edition, (1997).

L	T	P	C
5	0	0	5

SEMESTER–VI
ELECTIVE PAPER - VI
BIOCHEMICAL METHODOLOGY
SUBJECT CODE – U6MB26ET

Total Hours : 65

OBJECTIVES:

1. Ability to understand fundamental concepts of biology, chemistry and biochemistry
2. Ability to apply basic principles of chemistry to biological systems and molecular biology
3. Ability to relate various interrelated physiological and metabolic events

UNIT I: COLORIMETRY AND SPECTROMETRY (13)

Colorimetry and Spectrometry: Principles, Instrumentation –Beer Lambert's law – Analysis – Qualitative and Quantitative – Uses.

UNIT II: CENTRIFUGATION (13)

Centrifugation: Principles – Instrumentation – Types – Methods and Applications.

UNIT III: CHROMATOGRAPHY (13)

Chromatography: Principles – Types (Paper, TLC, HPLC, GC, Column – Affinity) and methods – Qualitative and Quantitative – Applications.

UNIT IV: ELECTROPHORESIS (13)

Electrophoresis – Principles, Types. Staining and detection methods – Isoelectrophoresis – isoelectric focusing – Applications.

UNIT V: MACROMOLECULES (13)

Fundamental building blocks – Atoms – Bonds and molecules. Macromolecules – Chemical nature and functions of Carbohydrate, Lipids, Proteins and Nucleic acids.

OUT COME:

CO1	They acquire knowledge in the quantitative and qualitative estimation of biomolecules
CO2	This skill based course will teach the students the various instrumentations that are used in the analytical laboratories.
CO3	This course covers both fundamental and applications of the instruments that are routinely
CO4	At the end of the course, the student has the basic knowledge on the theory, operation and function of analytical instruments.
CO5	They learn about various analytical techniques that are routinely used for separation of
CO6	The course teaches students the advantages of separation science as applied to
CO7	Through this course the students are exposed to importance of biological macromolecules

RECOMMENDED TEXT

1. Keith Wilson and John Walker, Practical Biochemistry, Cambridge University Press, 4th Edition, (1994).
2. David Freifelder. Physical Biochemistry, W. H. Freeman and Company, San Francisco, 2nd

Edition, (1983).

REFERENCE BOOKS

1. Boyer. Practical Biochemistry, Cambridge Univ. Press, New York, 4th Edition, (1992).
2. Kathleen Talaro and Arthur Talaro, Foundation in Microbiology, WCB Publishers, 2nd Edition, (1993).

SEMESTER–VI
SKILL BASED PAPER - IV
AGRICULTURE AND BIOFERTILIZER TECHNOLOGY
SUBJECT CODE – U6MB27ST

L	T	P	C
3	0	0	3

Total Hours : 39

OBJECTIVES:

1. The aim of the subject is to gain the knowledge about the biofertilizers and biopesticides that are applied in the field of agricultural microbiology.
2. To exploit the microbial diversity in various agro-ecologies for biofertilizer application in diversified systems. To study the impact of soil management practices on microbial functions and soil health.
3. To improve biofertilizer technology to ensure high quality and improved delivery.

UNIT I: BIOFERTILIZER (08)

General account on the microbes used as biofertilizers for crop plants and their advantages. Symbiotic nitrogen fixers – *Rhizobium*, *Frankia*, *Azolla*, BGA and *Lichens* – Isolation, characterization, mass production, field application and crop response.

UNIT II: NITROGEN FIXERS & CROP RESPONSE (08)

Non-symbiotic Nitrogen fixers – *Azotobacter* and *Azospirillum* - Isolation, characterization, mass production, field application and crop response.

UNIT III: PHOSPHATE SOLUBILIZERS (07)

Phosphate solubilizers – phosphate solubilizing microbes – Isolation, characterization, mass production and field application. Phosphate solubilization mechanisms.

UNIT IV: MYCORRHIZAE (08)

Mycorrhizal bioinoculants – Classification – Ectomycorrhizae – Endomycorrhizae – Ectendomycorrhizae. Isolation of VAM. Mass Inoculum production of VAM. Field application of Ectomycorrhizae and VAM.

UNIT V: BIOPESTICIDES (08)

Biopesticides – Bacteria, Virus and Fungi. Soil Microorganisms - Phyllosphere, , Rhizosphere.

OUTCOMES:

CO1	Understand various biofertilizer organisms and their applications especially the biofertilizers and their production techniques
CO2	Know the Microorganisms responsible for nitrogen fixers and crop response
CO3	Describe the importance of phosphate solubilization mechanisms
CO4	Discuss the isolation, classification and field applications of Mycorrhizae
CO5	Comprehend the various organisms used to biopesticides
CO6	The subject is to gain the knowledge about the biofertilizers and biopesticides that are applied in the field of Agricultural microbiology
CO7	The subject will motivate the student on small scale production of biofertilizers

RECOMMENDED TEXT

1. Alexander. Introduction to Soil Microbiology. John Wiley and Sons. 3rd Edition, (1997).
2. Sharma, P.D. Microbiology & Plant Pathology. Rastogi Publications, 3rd Edition, (2012).

REFERENCE BOOKS

1. Subba Rao, N.S. Biofertilizers in Agriculture and Forestry. 3rd Edition. Oxford and IBH publication Co. Pvt. Ltd., New Delhi. 3rd Edition, (1995).
2. Paul, E.A. and Clark. F.E. Soil Microbiology and Biochemistry. Academic press, New York. 2nd Edition, (1989).

SEMESTER-VI
CORE PRACTICAL - III
MEDICAL MICROBIOLOGY
SUBJECT CODE – U6MB21MP

L	T	P	C
0	0	4	4

Total Hours : 52

Objectives:

The aim of the subject is to gain the knowledge about the isolation, identification & conformation of microorganisms & collection of clinical specimens from patients.

1. Simple Staining Technique.
2. Gram's Staining Technique.
3. Acid Fast Staining Technique.

4. Capsule Staining Technique.
5. Endospore Staining Technique.
6. Wet Mount Technique.
7. Motility demonstration by Hanging drop technique.
8. Wet mount examination of stool.
9. Methods of Enriched and Enrichment culture technique.
10. Biochemical tests – IMViC test, Catalase, Oxidase & Urease test, TSI test.
11. Enumeration of bacteria in urine.
12. Collection, Transport & Processing of Clinical Specimens – Throat swab.
13. Collection, Transport & Processing of Clinical Specimens – Ear discharge, Pus.
14. Collection, Transport & Processing of Clinical Specimens – Urine, Sputum.
15. Antimicrobial Sensitivity Test.
16. LPCB Staining of Fungi.
17. Germ Tube Test for Yeast.
18. Sugar Fermentation Test for Yeast.

REFERENCE BOOKS

1. Mackie and McCartney Practical Medical Microbiology, Elsevier; 14th Edition, (2007).
2. Dev, N.C., Dev, T.C. Practical Microbiology Protozoology and Parasitology: Including Bacteriology, Virology, Mycology, Immunology, Serology, and Automated Methods. New Book Agency, 2nd Edition, (2011).
3. Bailey & Scott's. Diagnostic Microbiology, MacMillon Publishers, 13th Edition, (2013).

SEMESTER–VI
CORE PRACTICAL - IV
FOOD, AGRICULTURAL & ENVIRONMENTAL MICROBIOLOGY
SUBJECT CODE – U6MB22MP

L	T	P	C
0	0	5	5

Total Hours :65

Objectives:

The aim of the subject is to gain the practical knowledge about identification of water, milk & air quality, Enumeration of bacteria & fungi from air & soil, Isolation of bacteria and fungi from spoiled food and molting leaves.

1. Water Analysis by MPN method – Presumptive coliform test
2. Confirmed coliform test
3. Completed coliform test
4. Isolation of bacteria from air by air sampler technique
5. Isolation of fungi from air by air sampler technique
6. Enumeration of bacteria from air by settle plate method
7. Enumeration of fungi from air by settle plate method
8. Enumeration of bacteria in milk by SPC method
9. Methylene Blue Reduction Test (MBRT)
10. Litmus Milk Reduction
11. Isolation of *Lactobacillus* from curd
12. Gram staining of curd
13. Morphological study of *Azolla*

14. Enumeration of bacteria from soil
15. Isolation of *Rhizobium* from soil
16. Isolation of bacteria from spoiled food
17. Isolation of fungi from spoiled food
18. Isolation of fungi from molting leaves

REFERENCE BOOKS

1. Mackie and Mc Cartney. Practical Medical Microbiology, Elsevier; 14th Edition, (2007).
2. Dev, N.C., Dev, T.C. Practical Microbiology. Protozoology and Parasitology: Including Bacteriology, Virology, Mycology, Immunology, Serology, and Automated Methods. New Book Agency, 2nd Edition, (2011).
3. Bailey & Scott's. Diagnostic Microbiology. Macmillon Publishers, 13th Edition, (2013).

ADHIPARASAKTHI COLLEGE OF ARTS & SCIENCE

(Autonomous)

Permanently Affiliated to Thiruvalluvar University, Vellore

Re – accredited by NAAC with ‘B’ Grade (CGPA – 2.83)

M.Sc., APPLIED MICROBIOLOGY Under CBCS

SYLLABUS

(Effective from the Academic Year 2021-2022)

ADHIPARASAKTHI COLLEGE OF ARTS & SCIENCE

(Autonomous)

Permanently Affiliated to Thiruvalluvar University, Vellore

Accredited by NAAC with B⁺⁺ Grade

M.Sc., APPLIED MICROBIOLOGY

Under CBCS

(Effective from the Academic Year 2021-2022)

REGULATIONS

CBCS

Choice-Based Credit System is a flexible system of learning. 'Credit' defines the quantum of contents / syllabi prescribed for a course, and determines the number of hours of instruction required. The distinguishing features of CBCS are the following:

It permits the students to:

- ❖ Learn at their own pace
- ❖ Choose electives from a wide range of elective courses offered by the departments of the college.
- ❖ Undergo additional courses and acquire more than the required number of credits
- ❖ Adopt an inter – disciplinary approach in learning
- ❖ Make best use of the expertise of available faculty

1. Eligibility for Admission:

No student shall be eligible for admission to a Master's degree programme in any of the faculties unless he/she has successfully completed a three year undergraduate degree or earned prescribed number of credits for an undergraduate degree through the examinations conducted by a University / autonomous institutions or possesses such qualifications recognized by Thiruvalluvar University as equivalent to an undergraduate degree.

Provided that candidates for admission into the specific main subject of study shall also possess such other qualifying conditions as may be prescribed by the University in the Regulations governing respective courses of study.

Admission to the M.Sc. Applied Microbiology Degree Course shall be made as follows:

I Preference

A student who has passed B.Sc. Degree with 50% either with Microbiology or Biology/Botany/Zoology as Major Subject 5% relaxation shall be given to SC /ST applicants.

II Preference

A student who has passed B.Sc. Degree with 50% and having Microbiology or Biology at the Allied level and any of the Main Subject as mentioned below:

- 1) Industrial Microbiology
- 2) Biotechnology
- 3) Biochemistry
- 4) Bioinformatics
- 5) Life science
- 6) Nutrition and Dietetics
- 7) Home Science
- 8) Chemistry with botany/zoology as allied subjects
- 9) Any Biology related subject.

2. Eligibility for the Award of Degree:

A Candidate shall be eligible for the award of the Degree only if he/she has undergone the prescribed course of study in the college for a period of not less than two academic year and passed the examinations of all the Four Semesters prescribed earning 90 credits and fulfilled such conditions as have been prescribed therefore.

3. Duration of the course:

The duration of course shall be two years consisting of four semesters.

4. Examination:

There shall be four semester examinations: The first semester examination at the middle of the first academic year and the second semester examination at the end of the first academic year. Similarly the third and fourth semester examinations shall be held at the middle and the end of the second academic year, respectively.

A candidate who does not pass the examination in any subject or subjects in one semester will be permitted to appear in such failed subject or subject along with the papers of following semesters.

The following assessment procedure will be followed for Internal Marks:

Continuous Internal Assessment [CIA] Test

S. No	Reg. No	Name	Test I Marks For 50	Test II Marks For 75	Test III Marks For 75	Marks For 200	Marks Converted to 20/20	Assignments /Seminars [5] Records [5]	Marks For 25/25	Total Rounded to Marks for 25 /25

Test I : One hour duration for 50 marks [Two Units of the Syllabus]

Test II : Two hours duration for 75 marks [Four Units of the Syllabus]

Test III: Three hours model test for 75 marks [Total Syllabus]

Total marks 200		Theory		Practical	
Test marks to be converted to	:	20 marks	/	20 marks	
Assignments / Seminars	:	5 marks	/	-	
Records	:	-	/	5 marks	
Total	:	25 marks	/	25 marks	

In the column Rounded to 25 / 25, any fraction may be rounded to the next number.

a. Requirements for proceeding to Subsequent Semester

i. Candidates shall register their names for the First Semester Examination after admission in the PG Courses.

ii. Candidates shall be permitted to proceed from the First Semester up to Final Semester irrespective of their failure in any of the Semester Examination subject to the condition that the candidates should register for all the arrear subject of earlier semesters along the current [subject] Semester subjects.

iii. Candidates shall be eligible to go to subsequent semester, only if they earn sufficient attendance as prescribed therefore by the Academic council from time to time. Provided in case of a candidate earning less than 65% of attendance in any one of the Semesters due to any extraordinary circumstances such as medical grounds, such candidate who shall produce Medical Certificate issued by the Authorised Medical Attendant [AMA], duly certified by the Principal of the college shall be permitted to proceed to the next semester and to complete the course of study. Such candidates shall have to repeat the missed Semester by rejoining after completion of Final Semester of the course, after paying the fee for the break of study as prescribed by the College from time to time.

6. Passing Minimum:

A candidate shall be declared to have passed the whole examination, if he/she passes in all the papers and practical wherever prescribed/as per the scheme of examinations by earning 90 CREDITS.

In fixing the passing minimum marks the following will be observed.

[a]. There shall be no Passing Minimum for Internal.

[b]. For External Examinations, Passing Minimum shall be of 50% [Fifty Percentage] of the minimum marks prescribed for the paper.

[c]. In the aggregate (External + Internal) the Passing Minimum shall be of 50% for each Paper/Practical/Project and Viva-voce.

[d]. Grading shall be based on overall marks obtained (Internal + External).

7. Classification of Successful Candidates:

Candidates who secured not less than 60% of aggregate marks [Internal + External] in the whole examination shall be declared to have passed the examination in the First Class.

All other successful candidates shall be declared to have passed in Second Class. Candidates who obtain 75% of the marks in the aggregate [Internal + External] shall be deemed to have passed the examination in First Class with Distinction, provided they pass all the examinations [theory papers, practical, project and Viva-voce] prescribed for the course in the First appearance.

8. Requirements to take the Semester Examinations

a] A candidate will be permitted to take the Examination of any Semester, if

i] He/She secures not less than 75% of attendance out of the 90 instructional days during the semester. [In the case of married women students the minimum attendance requirement shall be 55% of total instructional days].

ii] He / She earns a Progress Certificate from the Head of the Institution, of having satisfactorily completed the prescribed course of study in the subject as required by these Regulations, and

iii] His/ Her conduct has been satisfactory.

Provided that it shall be open to the Academic council or any authority delegated with such powers by the Academic council to grant exemption to a candidate who has failed to earn 75% of the attendance prescribed for any valid reason[s] subject to the usual conditions.

b] A candidate who has secured attendance less than 75% but 65% and above shall be permitted to take the Examination on the recommendation of the Head of the Department to condone the lack of attendance as well as on the payment of the prescribed fees to the College.

c] A candidate who has secured attendance less than 65% but 55% and above in every semester, as to compensate the shortage of attendance in the subsequent semester besides, earning the required percentage of attendance in that semester and take the examinations of both the semester papers together at the end of the later semester.

d] A candidate who has secured less than 55% of attendance in any semester will not be permitted to take the regular examinations. He/She has to re-do the course after the completion of the final semesters by rejoining the semester in which the attendance is less than 55%.

e] A candidate who has secured less than 65% of attendance in the final semester as to compensate his/her attendance shortage in a manner to be decided by the Head of the Department concerned after rejoining the course.

9. Grading System:

In addition to the above marking system grading system is also adopted as detailed below.

The marks (sum of IA and UE marks) in each course are assigned with a letter grade on a five points scale using the following letter grade points and a range of marks.

SEVEN POINT SCALE [As per UGC notification 1998]

Marks	Grade Point	Letter Grade	Class
95-100	7.00	H	First Class with Distinction
90-94	6.00	O	First Class with Distinction
75-89	5.50	D	First Class with Distinction
60-74	4.75	A	First Class
54-59	4.00	B	Second Class
50-54	3.50	C	Second Class
Below 50	3.00	F	Fail

From the second semester onwards the total performance within a semester and continuous performance starting from the first semester are indicated respectively by **Grade Point Average [GPA]** and **Cumulative Grade Point Average [CGPA]**. These two are calculated by the following formulae:

$$\text{GPA} = \frac{\sum_{i=1}^n C_i G_i}{n}$$

$$\frac{\sum_{i=1}^n C_i G_i}{n}$$

Where 'C_i' is the credit earned for the course 'i' in any semester; 'G_i' is the Grade Point obtained by the student for the course 'i' and 'n' is the number of courses passed in that semester.

CGPA=GPA of all the courses starting from the first semester to the last semester.

10. RANKING

Candidate who pass all the examinations prescribed for the course in the First Appearance itself alone are eligible for Ranking.

Provided in the case of Candidates who pass all the examinations prescribed for the course with a break in the First Appearance due to the reasons as furnished in the Regulation 7.[iii] Supra are eligible for Classification / Distinction.

The mark obtained in improvement examination will not be taken into consideration for Ranking.

11. The Medium of Instruction and Examinations

The medium of Instruction and Examinations shall be in English.

12. Submission of Record Notebooks for Practical Examinations

Candidates taking the Practical Examinations should submit bonafide Record Notebook prescribed for the Practical Examinations. Otherwise the candidate will not be permitted to take the practical Examinations. However, in genuine case where the students could not submit the record notebook may be permitted to take the Practical Examinations provided the Head of the Department concerned certifies that the candidate has performed the experiments prescribed for the Course. For such of those candidates who do not submit Record Books, zero [0] marks will be awarded for record notebooks.

In case a candidate fails in the Practical Examination the marks awarded for the record at the time of fist appearance for the Practical Examination should be made available by the College to the Examiners at the subsequent appearance by the candidate.

13. Improvement of marks in the subjects already passed

Candidates who have passed in theory paper/papers are allowed to appear again for theory paper/papers only once in order to improve his/her marks, by paying the fee prescribed from time to time. Such candidates are allowed to improve within a maximum period of 10 semesters

counting from his/her first semester of his/her admission. If candidate improves his/her marks, then his/her improved mark will be taken into consideration for the award of Classification and Distinction only. Such improved marks will not be counted for the award of Prize/Medals and Rank. If the candidate does not show improvement in the marks, his/her previous marks will be taken into consideration.

No candidate will be allowed to improve marks in the Practical and Field work.

14. Checklist for Inspection

- a. Qualification for
 - i. Teaching Faculty : as Prescribed by the UGC and the University
 - ii. Technical Faculty : as Prescribed by the UGC and the University
 - iii. Laboratory Staff : as Prescribed by the UGC and the University
- b. Infrastructure Facilities
 - i. Building : Number of Classrooms with specifications: 3 rooms measuring 20' X 25'
Number of Staff rooms: One measuring 20' X 20'
 - ii. Furniture : One pair of table / chair per student
 - iii. Laboratory @ 10 Sq. ft. per student

PATTERN OF QUESTION PAPER

Section – A (300 words)

To Answer 5 questions (either / or pattern) 5 X 6 marks = 30 marks

Section – B (900 words)

To Answer 3 questions out of 5 questions 3 X 15 marks = 45 marks

Total = 75 marks

ANNEXURE – I

ELIGIBILITY FOR ADMISSION TO M.Sc. APPLIED MICROBIOLOGY

Admission to the M.Sc. Applied Microbiology Degree Course shall be made as follows:

I Preference

A student who has passed B.Sc. Degree with 50% either with Microbiology or Biology/Botany/Zoology as Major Subject 5% relaxation shall be given to SC /ST applicants.

II Preference

A student who has passed B.Sc. Degree with 50% and having Microbiology or Biology at the Allied level and any of the Main Subject as mentioned below:

12. Industrial Microbiology
13. Biotechnology
14. Biochemistry
15. Bioinformatics
16. Life science
17. Nutrition and Dietetics
18. Home Science
19. Chemistry with botany/zoology as allied subjects
20. Any Biology related subject.

MISSION & GOALS OF MICROBIOLOGY

We aim to provide a learning environment that excites and informs undergraduate majors and non-majors about microbiology and the many ways that it is relevant to everyday life. Through our Microbiology Department is committed to providing a transformative education through the following elements:

1. Provide compelling and relevant undergraduate courses that teach science literacy and provide the fundamental knowledge for our majors to succeed in their careers.
2. Provide training through innovative, non-conventional coursework that stresses inquiry-based learning.
3. Courage and provide opportunities for students to participate in research.
4. Prepare our majors for future careers or further educational opportunities by providing a capstone experience.
5. Equalize opportunities for under-represented minorities and for students with diverse life experiences.
6. Improve the timely progression to graduation for majors of all backgrounds.

GENERAL CAREER OPPORTUNITIES FOR MICROBIOLOGISTS:

1. Microbiologists can work in the area of food, pharmacy, agrochemistry biotechnology, biorefinery, environment, pollution control and bioremediation.
2. In the field of agriculture, microbiologists act as environmental and health specialists to study the role of microbes in plant disease, pest control, nutrition and soil fertility.
3. In the field of medicine and health care, the work is usually associated with diagnosis, prevention and treatment of illnesses associated with microbes.
4. Universities and colleges employ microbiologists as researchers and teachers.

SEMESTER I

L	T	P	C
5	0	0	5

MAJOR PAPER I

Total Hours : 65

GENERAL MICROBIOLOGY

SUBJECT CODE: P1AM21MT

OBJECTIVES:

1. The subject aims to understand the scope, history of microbiology, basic concept of microscope, microbial nutrition, anatomy and physiology of prokaryotes and Eukaryotes.
2. Students know the bacterial anatomy and physiology and also algae and Archaea
3. Understand about the microbial nutrients and microbiology related instruments.

UNIT I: DISCOVERY AND EVOLUTION OF MICROORGANISMS (13)

Basic concepts - Spontaneous generation - Germ theory of diseases- Cell theory – Contributions of Antony van leuwenhoek – Joseph Lister – Robert Koch – Louis Pasteur – Edward Jenner – John Tyndall – Sergei N. Winogradsky – Salmon Awakeman – Alexander Flemming – Paul Erlich – Fannie Hessie – Elie Metchnikoff – Kary Mullis. Development of pure culture methods.

UNIT II: INSTRUMENTATION (13)

Microscopy – its principle and application. Simple, compound, dark field, phase contrast, fluorescent and electron microscope – SEM & TEM. Principles, operation and maintenance of autoclave, oven, centrifuge – refrigerated, ultraspeed, spectrophotometry, lyophilizer and deep freezer.

UNIT III: MICROBIAL PHYSIOLOGY (14)

Microbial nutrition – Nutritional groups, Common nutrient requirements, Growth factors – Microbial growth – Growth curve – Measurement of microbial growth. Growth kinetics – Batch, Continuous and Synchronous cultures. Factors influencing the growth of microorganisms.

UNIT IV: BACTERIAL MORPHOLOGY (12)

Microbial cell – Ultra structure of Prokaryotic and Eukaryotic cell. Sub cellular structures and Cell envelope, Slime layer, Capsules, Cell wall, Pili, Flagells, Cell – inclusions, Endospores, Cell membrane, Liposomes.

UNIT V: OVERVIEW OF ALGAE & ARCHAEA (13)

Distribution of Algae – Thallus structure – Reproduction in algae – Life cycle patterns in Algae. Archaeobacteria – Adaptations to extreme environment.

OUTCOMES:

CO1	Understand the basic concepts of general microbiology.
CO2	Understand various methods and analytical approaches to identify and differentiate
CO3	Develop knowledge on evolution of microorganisms and its discovery.
CO4	Understand the basic mechanism and applications of microscope and analytical
CO5	Elucidate the physical and chemical growth requirements of bacteria and get equipped
CO6	Understand the structural similarities and differences among prokaryotes and eukaryotes.
CO7	Explain the distribution, reproduction and life cycle pattern of algae and archaeal adaptations.

Text Books:

1. Sale, A.J. (1992) "Fundamentals Principles of Bacteriology", 7th Edition. McGraw Hill Publishing Co. Ltd., New York.
2. Dubey, R.C and Maheswari, D.K. (2005) A Text book of Microbiology. S. Chand & Company Ltd. New Delhi.
3. Stainer, R.Y., Ingraham, J.L., Wheelis, M.L. and Painter, P.R. (1986). "General Microbiology" – Mac Milan Education Ltd. London.
4. Michael J. Pelczar. (2006). "Microbiology", Tata McGraw Hill Publishing Co. Ltd., New Delhi.
5. Bold, H.D and Wynne, M.J.(1978). Introduction to the algae: Structure and Reproduction. Prentice Hall, New Jersey.
6. General Microbiology, Hans G. Schlegel, 7th Edition, (2018).
7. General Microbiology, Pelczar, 5th Edition, (2018).

Reference Books:

1. John G. Holt and David Hendricks Bergey, (1993). Bergeys Manual of Determinative Bacteriology, 9th Edition, Lippincott Williams and Wilkins Publishers.
2. Joanne Willey and Linda Sherwood. (2011). Prescott M, Microbiology, 6th Edition, Tata McGraw Hill Publishing Co. Ltd., New Delhi.
3. General Microbiology, Prescott, 9th Edition (2017).
4. A Textbook of Microbiology, S. Chand, 5th Edition (2017).

SEMESTER-I
MAJOR PAPER - II
FOOD AND ENVIRONMENTAL MICROBIOLOGY
SUBJECT CODE – P1AM22MT

L	T	P	C
5	0	0	5

Total Hours : 65

OBJECTIVES:

The aim of the subject is to know the basic concept in preservation of food, production of fermented food and food borne infection, presence of microorganism in air and water and to treat the waste water effluent

1. Explain the interactions between microorganisms and the food environment and factors influencing their growth and survival.
2. This paper acquaints students with various industrial and food products, their production etc.

UNIT I: SPOILAGE AND PRESERVATION OF FOOD (12)

Microorganism and food. Intrinsic and extrinsic factors. Microbial spoilage of milk, meat, poultry, fish, fruits, vegetables, cereals, pulses. Preservation of food by physical and chemical methods.

UNIT II: FOOD BORNE DISEASES AND FERMENTED FOODS (14)

Food borne diseases (Bacterial and non bacterial agents) and preventive measures. Fermented milk products – lactic acid bacteria, fermented vegetables (Sauerkraut, cucumber pickles). Fermented meat – fermented fish – fermented beverages – beer and wine. Mold fermentation.

UNIT III: AEROBIOLOGY (12)

Aerobiology – A brief introduction – droplet nuclei – aerosols – airborne transmission of microbes and diseases. Assessment of air quality. Air pollution and preventive methods.

UNIT IV: AQUATIC MICROBIOLOGY (14)

Aquatic microbiology – Aquatic habitats – Freshwater – lakes, ponds and streams: marine habitats – estuaries, deep seas, hydrothermal vents, salt pans, coral reefs and mangroves and their microbial communities, zonation. Food chains and food web.

UNIT V: WASTE TREATMENT (13)

Waste treatment – types of waste, characterization of solid and liquid waste – treatment of solid waste – composting – vermiform composting, Saccharification. Treatment of liquid waste – primary, secondary and tertiary.

OUTCOMES:

CO1	Gain the adequate knowledge about the different types of food microbial spoilage and food preservation methods involved.
CO2	Aware about the food borne bacterial and nonbacterial agents involved and fermentation process on food products.
CO3	Impart the knowledge on airborne disease transmission, assessment and prevention methods.
CO4	Understand the knowledge on aquatic habitats, microbial communities and their roles in

	environments.
CO5	Students will gain knowledge of significance on waste water treatment process.
CO6	Through the lights to the impart adequate knowledge on food spoilage and environmental related problems.
CO7	Illustrate about the food preservation and fermented food products.

RECOMMENDED TEXT

1. Adams M.R., and Moss M.O. Food Microbiology, The royal Society of Chemistry, Cambridge, 5th Edition, (1995).
2. Frazier, W.C. and Westhoff, D.C. Food Microbiology, Tata Mc Graw Hill publishing Company Ltd., New Delhi. 3rd Edition, (1998).
3. Robinson R.K. The Microbiology of Milk, Elsevier Applied Science, London. 2nd Edition, (1990).
4. May J.M. Modern Food Microbiology, CBS publishers and distributors, New Delhi, 2nd Edition, (1987).

REFERENCE BOOKS

1. Banwart. G.J. Basic Food Microbiology, Chapman & Hall, New York, 2nd Edition, (1988).
2. Hobbs. B.C. & Roberts. D. Food Poisoning & Food Hygiene, Edward Arnold, London. 3rd Edition, (1993).

SEMESTER-I
MAJOR PAPER - III
IMMUNOTECHNOLOGY
SUBJECT CODE – P1AM23MT

L	T	P	C
5	0	0	5

Total Hours : 65

OBJECTIVES:

1. The aim of the subject is to study the history of Immunology, importance of human immune system, antigen antibody reaction & schedule for vaccine.
2. The students will be able to identify the cellular and molecular basis of immune responsiveness.
3. The students will be able to describe the roles of the immune system in both maintaining health and contributing to disease

UNIT I: CELLS AND ORGANS OF IMMUNE SYSTEM (12)

Introduction to immune system - History of immunology – Infection, immunity, types of immunity - Innate and adaptive. Lymphoid organs - primary and secondary lymphoid organs. Cells of immune system.

UNIT II: STRUCTURE AND FUNCTION OF ANTIGENS AND ANTIBODIES (13)

Structure and function of antigens - epitopes, haptens and adjuvants. Receptors - MHC - Class I, II. T-cell receptor complex (TCR). Structure and functions of antibodies - Types of immunoglobulins. Antibody synthesis and diversity - Monoclonal antibody production.

UNIT III: COMPLEMENT, CYTOKINES AND ANTIGEN ANTIBODY REACTIONS (14)

Complement system - pathways - classical and alternative. Cytokines - types, functions. Interleukin and Interferon. Antigen antibody reactions – Agglutination, Precipitation, Complement fixation test, RIA, IFT, ELISA.

UNIT IV: IMMUNE RESPONSE (13)

Immune response - Cell mediated immune response - Antigen processing and presentation - Humoral immune response. Antigen Auto immune diseases, immuno deficiency diseases, hypersensitivity reactions – types.

UNIT V: IMMUNOPROPHYLAXIS (13)

Prophylaxis - Active immunization - Vaccine and toxoid - bacterial, viral. Vaccines - Heat killed, attenuated, rDNA and DNA vaccine, synthetic peptide vaccine, anti-idiotypic vaccine – Vaccination schedule. Passive immunization.

OUTCOMES:

CO1	Manifest an understanding of key concepts in immunology.
CO2	Understand the overall organization of the immune system includes organs and cells.
CO3	To give the salient features of antigen and antibody & its functions
CO4	Learn about the antigen antibody reaction & its uses in diagnostics and various studies
CO5	To give the knowledge about the overall immune response and immune deficiency diseases.
CO6	Explain about the vaccination and their preparation and its functions
CO7	The students to understand the immune prophylaxis and Immune therapy.

RECOMMENDED TEXT

1. Roit, Essential immunology, Blackwell scientific publications, Oxford, 2nd Edition, (1994).
2. Kuby. J. Immunology, W.H. Freeman and Company, Newyork, 2nd Edition, (1994).
3. Leffel, Donnen Barg, A & Rose. W. Handbook of Immunology, Boca Raton, Fla, C.R.C. Press, 3rd Edition, (1997).

REFERENCE BOOKS

1. Paul, Fundamental immunology, 3rd Edition. (1998).
2. Chapel, H. & Halbey, M. Essentials of Clinical immunology, ELBS, 2nd Edition, (1986).
3. Richard M, Hyde. Immunology 3rd edition. National medical series, Williams & Wilkins, Harward publishing company, 3rd Edition, (1995).
4. Clark, W.R., The experimental foundations of modern immunology, John Wiley and Sons, Newyork, 3rd Edition, (1991).

SEMESTER-I
ELECTIVE PAPER - I
SOIL AND AGRICULTURAL MICROBIOLOGY
SUBJECT CODE – P1AM24ET

L	T	P	C
3	0	0	3

Total Hours : 39

OBJECTIVES:

1. The aim of the subject to study the properties of soil, mechanism of nitrogen fixation, biofertilizers and to deal with plant pathogens.
2. It also deals with the microbiology of soil fertility, such as microbial degradation of organic matter and soil nutrient transformations.
3. To gain knowledge on several beneficial and harmful microorganisms.

UNIT I: PROPERTIES OF SOIL AND MICROBIAL INTERACTION (08)

Soil – Physical, chemical properties of soil, soil water, soil atmosphere, soil pH, soil structure. Soil microflora. Microbial interaction – interaction between microbes – plants, animals. Phyllosphere, Rhizosphere .

UNIT II: BIOGEOCHEMICAL CYCLES AND COMPOSTING (08)

Biogeochemical cycle – carbon, nitrogen, sulphur, phosphorus, iron, silicon, calcium. Organic matter decomposition. Composting – vermicomposting.

UNIT III: BIOLOGICAL NITROGEN FIXATION (07)

Nitrogen fixation by free living and associated symbiotic bacteria, mechanism of nitrogen fixation. Nitrogen fixation by free living BGA, symbiotic BGA. Lichens and Mycorrhizae – endo, ecto, VAM; Phosphate solubilizer.

UNIT IV: BIOFERTILIZERS AND BIOPESTICIDES (08)

Biofertilizers – Isolation, Identification, Classification, Physiology and function, cultivation and mass production, Inoculum preparation and Agronomic importance of *Rhizobium*, *Azotobacter*, *Azospirillum*, and BGA. Biopesticides – Bacteria, virus, protozoa and fungi.

UNIT V: PLANT PATHOGENS (08)

Plant Diseases: Fungal- (Powdery mildew of pea, Leaf spot and Blast of rice, Tikka of groundnut and Red rot of sugarcane), Bacterial - (Citrus canker, Leaf blight of rice, and Little leaf of brinjal), Viral- (Tobacco mosaic, Yellow Vein mosaic of bhendi, Tungro of rice and Potato spindle tuber), Nematode –(Root knot of vegetables).

OUTCOMES:

CO1	Gain the insights of various properties of soil, soil micro-flora and microbial interactions
CO2	Understand the techniques involved in the production of organic manure.
CO3	Aware of various biogeochemical cycles involved in the plant nutrient cycling
CO4	Gain the business knowledge in the production of biofertilizers and biopesticides
CO5	Impart the knowledge of biological nitrogen fixation that will create awareness and the importance of organic farming.
CO6	Acquire the treatment and control methods of various plant related diseases
CO7	Through the lights to the importance of soil microorganisms in improving soil quality, composting processing and society oriented products production.

RECOMMENDED TEXT

1. Alexander. M. Introduction to Soil Microbiology. John Wiley and Sons. 3rd Edition, (1997).
2. Sharma.P.D. Microbiology and Plant Pathology. Rastogi Publication. 3rd Edition, (1989).

REFERENCE BOOKS

1. Paul, E.A. and Clark. F.E. Soil Microbiology and Biochemistry. Academic Press New York. 2nd Edition, (1989).
2. Subba Rao, N.S. Biofertilizers in Agriculture and Forestry. Oxford and IBH publication Co. Pvt. Ltd., New Delhi. 3rd Edition, (1995).

SEMESTER-I
ELECTIVE PAPER - II
BIOPROCESS TECHNOLOGY
SUBJECT CODE – P1AM25ET

L	T	P	C
3	0	0	3

Total Hours : 39

OBJECTIVES:

1. To acquaint students with technical and biological aspect of microbial utilisation for production of metabolites
2. Has thorough knowledge of the underlying principles of main bioprocess unit operations like fermentation, downstream processing
3. Has thorough knowledge about genetic engineering for recombinant protein expression and production from various cell systems

UNIT I: SCREENING OF MICROORGANISMS AND STRAIN DEVELOPMENT (08)

Industrially important microbes and their development. Screening methods for industrial microbes – detection and assay of fermentation products – classification of fermentation types – strain selection and improvement. Mutation and recombinant DNA techniques for strain development.

UNIT II: FERMENTOR – TYPES AND FUNCTION (08)

Fermentor – types and functions. Fermentors – Basic functions, design and components - asepsis and containment requirements – body construction and temperature control – aeration and agitation systems – sterilization of fermentor, air supply and medium: aseptic inoculation methods – sampling methods, valve systems – a brief idea on monitoring and control devices and types of fermentors.

UNIT III: FOOD MICROBIOLOGY (08)

Food Microbiology. Microbiology of fermented milk – starter cultures, butter milk, cream, yoghurt, kefir, kumiss, acidophilus milk and cheese. Microbes as sources of food (*Spirulina*, *Saccharomyces cereviceae*, *Rhizopus* sp.). Food and water borne infections and food microbial poisoning. Food sanitation in food manufacture and in the retail trade; food control agencies and its regulations.

UNIT IV: FERMENTATION TECHNOLOGY (08)

Large scale fermentation. Fermentation in batch culture; Microbial growth kinetics, measurement of growth (cell number, direct and indirect methods) growth and nutrient, growth and product formation, heat evolution, effect of environment (temperature, pH, high nutrient concentration) media formulation. Sterilization, kinetics of thermal death of microorganisms, batch and continuous sterilization. (All in relation to fermentation).

UNIT V: IPR AND PATENTS (07)

Legal protection and IPR, GATT and IPR, forms of IPR, IPR in India, WTO ACT, Convention on Biodiversity (CBD), Patent Co-operation Treaty (PCT), forms of patents and patentability, process of patenting, Indian and international agencies involved in IPR and patenting, Global scenario of patents and India's position, patenting of biological materials.

OUTCOMES:

CO1	Student will be able to Designing of bioreactors and control necessary for maximising production.

CO2	Able to appraise bioprocessing and bioproducts manufacturing and valorization using entrepreneurship principles.
CO3	understands how lab scale methods transform into large scale, and how main unit operations in downstream processing function
CO4	Graduates Graduates acquire professional leadership roles in bioprocess engineering and related fields leading to successful career
CO5	Graduates establish commitment and contributes toward sustainable and bio-based economy development for better society
CO6	Graduates engage in lifelong learning in conducting practical engineer tasks
CO7	Able to conduct practice-based tasks related to bioprocessing in a responsible, safe, voluntary, selfmotivated and ethical manner

RECOMMENDED TEXT

1. Glick, B.R. and Pasternak, J.J. (1994). Molecular Biotechnology, 2nd Edition. ASM Press.
2. Stanbury, P.F., Whitaker, A. and Hall, S.J. (1998). Principles of Fermentation Technology, 3rd Edition. Pergamon Press.

REFERENCE BOOKS

1. Demain, A.L. and Davis, J.E. (1999). Manual of Industrial Microbiology and Biotechnology, 3rd Edition. ASM Press.
2. Mittal, D.P. (1999). Indian Patents law, Taxmann, Allied services Pvt. Ltd.
3. Venkataraman, L.E. (1983). A monograph on *Spirulina platensis*, CFTRI, Mysore.

SEMESTER-I
CORE PRACTICAL - I
GENERAL, FOOD, ENVIRONMENTAL MICROBIOLOGY AND
IMMUNOTECHNOLOGY
SUBJECT CODE – P1AM21MP

L	T	P	C
0	0	12	4

Total Hours :156

Objectives:

The aim of the subject is to know the practical knowledge about Micrometry, all staining methods, growth curve, Enumeration of bacteria, fungi from soil, water, quality of milk & Isolation of biofertilizer organisms.

1. Cleaning of glasswares and sterilization.
2. Preparation and use of glassware cleaning solutions, sterilization.
3. Micrometry – counting and measurements.
4. Pure and auxenic culture techniques – serial dilution – pour plate, spread plate, streak plate
Methods and stab culture techniques.
5. Bacterial staining methods – Simple, Grams, Acid Fast, Capsule and Spore.
6. Fungal staining methods – Lactophenol Cotton Blue.
7. Motility of Bacteria.
8. Determination of growth – growth curve- generation time – synchronous and asynchronous

growth – estimation of growth – microscopic – plate – membrane filter – turbidometry – dry weight – wet weight – chlorophyll.

9. Enumeration of bacteria from milk, water and food sample.
10. Qualitative analysis of milk – MBRT.
11. Extracellular Enzyme activities – Protease and Lipase.
12. Quantification of Microorganisms in air – Solid and Liquid Impingement techniques.
13. Physical, chemical and microbial assessment of water – BOD, COD, MPN Index.
14. Isolation of Nitrogen fixing bacteria – *Rhizobium sp*, *Azotobacter sp*.
15. Isolation of phosphate solubilizing bacteria.
16. Isolation of *Lactobacillus sp* from curd, yoghurt.
17. Agglutination Test
 - a. ABO Blood Grouping – Rh Typing.
 - b. Anti-Streptolysin O Test.
 - c. Rheumatoid Arthritis Test.
 - d. Pregnancy Test.
 - e. ELISA Test (Demonstration)
18. Precipitation Assay
 - a. Single Radial Immuno Diffusion Test.
 - b. Ouchterlony Double Diffusion Test.

REFERENCE BOOKS

1. Mackie and Mc Cartney Practical Medical Microbiology, Elsevier; 14th Edition, (2007).
2. Dev, N.C., Dev, T.C. Practical Microbiology Protozoology and Parasitology: Including Bacteriology, Virology, Mycology, Immunology, Serology, and Automated Methods. New Book Agency, 2nd Edition, (2011).
3. Bailey & Scott's. Diagnostic Microbiology, Mac Millon Publishers, 13th Edition, (2013).

SEMESTER-II
MAJOR PAPER - IV
MEDICAL BACTERIOLOGY AND VIROLOGY
SUBJECT CODE – P2AM21MT

L	T	P	C
5	0	0	5

Total Hours : 65

OBJECTIVES:

1. The aim of the subject is to know the human and animal bacterial and viral pathogens, their role in causing diseases and to control them.
2. It covers all biology of bacteria, viruses and other pathogens related with infectious diseases in humans.
3. It will also provide opportunities for a student to develop diagnostic skills in microbiology, including the practical application and interpretation of laboratory tests for the diagnosis of infectious diseases.

UNIT I: BASIC IN MEDICAL MICROBIOLOGY (12)

Medically important microbes. Microbial disease - sources, route of transmission. Pathogenesis - adhesion, invasion, host cell damage, release of pathogens. Microbial virulence and virulence factors - signs and symptoms of microbial diseases. Treatment, prevention and control of microbial infections.

UNIT II: PROCESSING OF CLINICAL SPECIMENS (12)

Diagnosis of microbial diseases - collection, transport and preliminary processing of specimens from skin, respiratory tract, gastrointestinal tract, urinary tract, CNS, blood and abscesses. Clinical, microbiological, immunological and molecular diagnosis of microbial diseases.

UNIT III: MEDICALLY IMPORTANT BACTERIA (16)

Bacteriology – Characteristics, classification, pathogenesis, diagnosis, treatment, prevention and control of disease caused by: *Staphylococci*, *Streptococci*, *Salmonella*, *Shigella*, *Bacillus*, *Clostridium*, *Corynebacterium*, *Vibrio*, *Mycobacteria*, *Spirochaetes*, *Rickettsia*.

UNIT IV: MEDICALLY IMPORTANT VIRUSES (14)

General properties of Viruses. DNA viruses - Pox, Herpes, Hepatitis, Adeno. RNA Viruses - Picorna, Orthomyxo, Paramyxo, Rhabdo and HIV viruses.

UNIT V: MISCELLANEOUS VIRUSES, VACCINE AND ANTIVIRAL AGENTS (11)

Prions, Viroids, antiviral agents, Interferons, Viral Vaccines - Heat- killed, Attenuated, rDNA and DNA Vaccines.

OUTCOMES:

CO1	Identify common infectious agents and the diseases that they cause.
CO2	Explain general and specific mechanisms by which an infectious agent causes disease.
CO3	Understand the basic microbial structure and function and study the comparative characteristics of Medically important microbes and also understand the Microbial virulence and virulence factors
CO4	Understand the collection, transport and preliminary processing of specimens and Clinical, microbiological, immunological and molecular diagnosis of microbial diseases.
CO5	Acquired knowledge on Characteristics, classification, pathogenesis, diagnosis, treatment, prevention and control of disease caused by medically important bacteria
CO6	Explain viruses including their classification, morphology, and laboratory diagnosis and disease prevention measures
CO7	Explain the use of vaccines and delivery systems to control viral infections. And also discuss the modern antivirals developed to control virus diseases

RECOMMENDED TEXT

1. Salle, A.J. Fundamental Principles of Bacteriology, McGraw Hill Publishing Co., Ltd., 7th Edition, (1989).
2. Anthanarayanan, R. and Jayaram Panicker. Text Book of Microbiology, Orient Longman. 3rd Edition, (1994).
3. Baron, E.J. and Finegold, S.M. Scientific company, Diagnostic Microbiology, Blackwell Scientific Company. 4th Edition, (1995).

REFERENCE BOOKS

1. David Greenwood, Richard CD, Slack, John Forest, Peutherer, Medical Microbiology, ELBS with Churchill Livingstone. 14th Edition. (1992).
2. Ronald, M. Atlas. Microbiology. Fundamentals and applications, Maxwell Macmillan international edition. 2nd Edition, (1989).
3. Topley and Wilson's. Principles of bacteriology, virology and immunity, volume III bacterial diseases, Edward Arnold, London. 3rd Edition, (1990).

SEMESTER-II
MAJOR PAPER - V
MEDICAL MYCOLOGY AND PARASITOLOGY
SUBJECT CODE – P2AM22MT

L	T	P	C
5	0	0	5

Total Hours : 65

OBJECTIVES:

1. The aim of the subject is to know the human fungal and parasitic pathogens, their role in causing diseases and to control them.
2. Basic morphology, life cycle, pathogenesis, lab diagnosis and treatment of parasites and fungi.
3. Perform appropriate laboratory techniques used in the processing of specimens and identification of parasites and fungi.

UNIT I: MEDICAL MYCOLOGY (10)

Medical Mycology – Morphology, Taxonomy, Classification of Fungi. Detection and recovery of fungi from clinical specimens. Antifungal agents.

UNIT II: FUNGAL DISEASES (14)

Dermatophytes, agents of superficial mycosis, dimorphic fungi causing systemic mycosis, fungi causing Eumycotic mycetoma. Immunity to fungal infections.

UNIT III: MEDICAL PARASITOLOGY – PROTOZOANS (14)

Medical parasitology – Introduction to medical parasitology – classification, Host-parasite relationship, pathogenic mechanisms, Transmission, lifecycle etc., Protozoans- *Entamoeba*, *Toxoplasma*, *Haemoflagellates*, *Giardia*, *Trichomonas*, *Balantidium*, Malarial parasites.

UNIT IV: MEDICAL PARASITOLOGY – HELMINTHS (14)

Helminths – Classification – Cestodes – *Taenia solium*, *Taenia saginata*, *Echinococcus*, *Trematodes* – *Fasciola hepatica*, *F. Buski*, *Schistosoma*, Nematodes – *Ascaris*, *Trichuris*, *Wuchereria*.

UNIT V: LABORATORY DIAGNOSIS OF PARASITES (13)

Parasites causing infections in AIDS patients. Laboratory techniques in parasitology. Examination of faeces for ova and cysts, worm burden. Concentration method – floatation and sedimentation techniques. Iron haematoxylin staining. Blood smear examination. Antiparasitic agents.

OUTCOMES:

CO1	Comprehend the fungal morphology, classification and lab diagnosis from the clinical specimens
CO2	Explain the various fungal diseases include morphology, pathogenesis and lab diagnosis
CO3	Gain the knowledge on medically important parasites such as protozoan
CO4	Discuss morphology, lifecycle, pathology and lab diagnosis of human pathogenic helminthes
CO5	Provide chance to increase knowledge and diagnostic skills, including the use and construal of laboratory tests in the diagnosis of parasitic diseases
CO6	Understand the consequence of pathogenic human fungal diseases.
CO7	Afford the theoretical basis for appreciative pathogenic human parasites.

RECOMMENDED TEXT

1. Parija. S. C. Text Book of Medical Parasitology, Orient Longman. 3rd Edition, (1996).
2. Sivamani P. Textbook of Mycology. 3rd Edition, (2002).
3. Ananthanarayanan, R. and Jayaram Paniker (1994). Text Book of Microbiology, Orient Longman. 2nd Edition, (1989).

REFERENCE BOOKS

1. Baker, F.J., and Brech. Medical Microbiological Techniques, Butterworths, London. 2nd Edition, (1990).
2. Chatterjee, M.D., Parasitology. Joe media publishers, Culcatta. 12th Edition, (1980).
3. Jagadish Chander. Textbook of Medical Mycology, Orient Longman. 2nd Edition, (1996).

SEMESTER-II
MAJOR PAPER - VI
MICROBIAL PHYSIOLOGY AND GENETICS
SUBJECT CODE – P2AM23MT

L	T	P	C
5	0	0	5

Total Hours : 65

OBJECTIVES:

1. The student gain the knowledge on medically important microorganism and the diagnosis them in the laboratory.
2. This course deals with characteristics, properties and biological significance of the biomolecules of life.
3. In depth knowledge of the energetic and regulation of different metabolic processes in microorganisms.

UNIT I: NUTRITION AND CULTIVATION (12)

Nutritional types of microorganisms – Nutritional requirements - Transport of nutrients by active and passive ways. Cultivation of microbes – bacteria, virus. Culture techniques. Media preparation - Types of media - Isolation of pure culture - Preservation of cultures.

UNIT II: GROWTH AND ANTIMICROBIAL CHEMOTHERAPHY (12)

Growth curve - Growth kinetics – Measurement of cell number – Measurement of cell mass. Antimicrobial drugs and antimicrobial sensitivity test – Kirby Bauer test, MIC, MBC.

UNIT III: METABOLIC PATHWAYS AND ENZYMES (15)

Carbohydrate metabolism - Embden Meyerhoff pathway, Pentose Phosphate Pathway, Entner Doudroff Pathway, Kreb's cycle – Electron Transport and Oxidative phosphorylation and Photophosphorylation. Classification of enzymes, coenzymes, isoenzymes.

UNIT IV: DNA, RNA AND OPERON (13)

DNA structure and Types. DNA and RNA as genetic material. Genetic code. Replication of DNA. Operon concept – lac and trp operon.

UNIT V: GENE TRANSFER MECHANISMS AND MUTAGENESIS (13)

Gene Transfer Mechanism – Conjugation, Transformation and Transduction. Mutation – Spontaneous and Induced - Types of mutants – Detection and Isolation of Mutants – Carcinogenicity testing – DNA repair mechanism.

OUTCOME:

CO1	Understand the basics of physiology and genetic makeup of microbial cells.
CO2	Understand the molecular concept of structure and functions of DNA, replication and its transfer mechanism in living microorganisms.
CO3	Recall the nutritional requirements and its uptake by the bacteria cell. Exemplify various culture media preparation and pure culture techniques for the isolation of microorganism and its preservation.
CO4	Determine the generation time of bacteria and also assess the cell number, mass and drug resistance status of microbes.
CO5	Explain the carbohydrate metabolism and different classes of enzymes.
CO6	Describe the structure and functions of DNA and also explain the genetic material of a living cell.
CO7	Discuss the molecular mechanism underlying gene transfer, mutation, detection of mutations and DNA repair mechanism.

RECOMMENDED TEXT

1. Salle. A, Fundamentals principles of bacteriology, McGraw Hill Publishing Co. Ltd., 7th Edition, (1992).
2. Dubey. R.C. & Maheshwari. D.K. A textbook of Microbiology. S.Chand and Company Ltd., New Delhi. 2nd Edition, (2005).

REFERENCE BOOKS

1. Stainer. General Microbiology, Mac Millon Education Ltd., London. 2nd Edition, (1986).
2. Malay, S.R. Cronan, J.E. Friefielder. D., Microbial Genetics. Jones and Barlet publishers. 3rd Edition, (1994).

**SEMESTER-II
ELECTIVE PAPER - III
HAEMATOLOGY AND CLINICAL TECHNIQUES
SUBJECT CODE – P2AM24ET**

L	T	P	C
3	0	0	3

Total Hours : 39

OBJECTIVES:

1. The aim of the course is to introduce the basic concept of medical laboratory works that help the students in processing of blood sample & staining them
2. Hematology is that branch of medicine concerned with the clinical and laboratory investigation, diagnosis and medical management of diseases of the blood and blood forming tissues.

3. Hematologists research, diagnose, and treat various blood disorders, including anemia, blood clots, bleeding disorders, and blood cancers.

UNIT I: BLOOD COLLECTION (08)

Blood: Definition, Characters and composition. Collection of Blood: Capillary blood – From Adult/Infants, examinations employed, Advantages and disadvantages. Venous blood - From Adult/Infants, examinations employed. Anticoagulants: Definition- Types: Wintrob's/EDTA/Heparin/Citrate, Concentration Examinations done.

UNIT II: COUNTING OF BLOOD CELLS (10)

Counting of Blood cells: Neubauer Counting Chamber – Total RBC Count and WBC count, Diluting fluids, macrodilution/Microdilution technique, False low and High counts, normal values – correction for TWBC – Absolute Eosinophil count – Differential Leucocyte count: Granulocytes/Agranulocytes – Morphology and function, staining technique-Platelet count: Morphological characters and functions, direct/indirect method - reticulocyte count, dry/wet smear technique. Haemoglobin: Composition, normal values-determinations: Tallqvist/Acid Haematin/Alkaline Haematin, Haldane's Carboxy/Drabkin's/Dare, Spence's/Specific gravity/gasometric, chemical.

UNIT III: COAGULATION MECHANISM AND HAEMATOLOGICAL INDICES (07)

Coagulation mechanism: factors: bleeding time and clotting time. Haematological indices – packed cell volume: Wintrob's/Micro HCT method/Mean Corpuscular Volume - Mean Corpuscular Haemoglobin Concentration – Volume index – Volume Thickness index – Mean Corpuscular Diameter – Saturation index. Erythrocyte sedimentation rate – principle – determination: Wintrob's/Westergren. Activated Partial Thromboplastin time (APT)

UNIT IV: STAINING METHODS (07)

Preparations of stains and staining techniques – Wright stain, Leishman stain, Giemsa stain, Jaswanth Singh – Bhattacherji stain, Fields stain – Peroxidase stain. Examination of blood smear – peripheral smear report: size/colour/shapes/inclusions/immature cells for leukemia. Blood parasites: Malarial parasites/Microfilaria.

UNIT V: HAEMATOLOGICAL TECHNIQUES (07)

ABO-Grouping: History/Discovery – slide / Tube Technique – Rh Typing: Slide Tube Technique, Bovine Replacement technique – Coombs Test: Direct, Indirect – Donor screening – Cross matching: Major/Minor-Collection of blood / Preservation/ Storage.

OUTCOMES:

CO1	Differentiate various hematological procedures and the use of basic equipment essential to working in a Clinical Hematology Laboratory

CO2	Distinguish normal and abnormal hematological laboratory findings to predict the diagnosis of hematological disorders and diseases
CO3	Identify Collection of Blood and interpret anticoagulant.
CO4	Assume responsibility in the collection and handling of blood specimens
CO5	Correlate the importance of hematological tests in the diagnosis and prognosis of diseases
CO6	Describe the mechanisms of hemostasis and thrombosis and correlate it with the interpretation of coagulation tests and the role of coagulants and anticoagulants in the treatment of various diseases.
CO7	Discuss the basis of blood grouping and blood transfusion and discuss complications of blood transfusion.

RECOMMENDED TEXT

1. Manogharan, A., Sethuraman. S., Essentials of clinical haematology. Jaypee Brothers, Medical Publisher Pvt, Ltd., New Delhi. 3rd Edition, (2003).
2. Christopher. A. Ludlam. Clinical Haematology. Longman Singapore Publisher Pvt. Ltd., 2nd Edition, (1990).
3. Linch, D.C., Yats, A.P., Watts, M.J., Guide of Haematology. Tomothi Home Publisher. 2nd Edition, (1986).

REFERENCE BOOKS

1. Mukerjee, K. Medical laboratory Technology, Tata McGraw Hill Publishing Company Limited, New Delhi. 2nd Edition, (2003).
2. Sood, R. Medical Laboratory Technology Methods and Interpretations. Jaypee Brothers Medical Publishers (P) Ltd., New Delhi. 2nd Edition, (2004).

SEMESTER-II **HUMAN RIGHTS**

SUBJECT CODE: P2HR21GS

L	T	P	C
2	0	0	2

Total Hours : 26

OBJECTIVES :

- 1.To create awareness on Human Rights, UN Human Rights declarations and contemporary issues on Human Rights.
- 2.Demonstrate a good understanding of the provisions under the Constitution of India dealing with human rights.
- 3.Demonstrate a good understanding of the practical application of human rights law to specific human rights problems in India.

UNIT-I INTRODUCTION (05)

Definition of Human Rights-Nature, Content, Legitimacy and Priority-Theories on Human Rights-Historical Development of Human Rights. Fundamental Rights in the Indian Constitution – Directive principles of State policy – Fundamental Duties – National Human Rights Commission.

UNIT-II INTERNATIONAL HUMAN RIGHTS (05)

Human Rights and the UNO –Universal Declaration of Human Rights-International Covenant on Civil and Political Rights – International covenant on Economic and Cultural Rights and Optional Protocol. International Human Rights in Domestic courts

UNIT- III CONTEMPORARY ISSUES ON HUMAN RIGHTS (05)

Contemporary issues on Human Rights: Children's Rights-Women's Rights – Dalit's Rights – Bonded labour and Wages–Refugees– Capital punishment.

UNIT-IV CONSUMER & ENVIRONMENT PROTECTION ACT (06)

Consumer protection Act 1986- Objects- Definitions- Central Consumer protection Council – Consumer Dispute Redressal Agencies. Environment Protection Act 1986-Objects-Definition-Powers of Central Government –Provisions of Act to the prevention and control of Environmental Pollution Act.

UNIT- V RIGHT TO INFORMATION ACT 2005 (05)

Introduction- History behind the Rights- Scope of the Rights- Main characteristics-Right to Information Act 2005- Exempt from Disclosure-Procedure for seeking information- Appellate Authorities- Reporting Procedure.

OUTCOMES:

CO1	Demonstrate a good understanding of the provisions under the Constitution of India dealing with human rights
CO2	Display a good understanding of the nature and scope of special legislations dealing with protection of human rights of marginalized and vulnerable sections
CO3	Demonstrate a good understanding of the practical application of human rights law to specific human rights problems in India
CO4	Analyze complex human rights problems and apply relevant provisions of human rights

	law in india to a hypothetical situation/case study and a theoretical knowledge of the underpinnings of the human rights framework in India, its operation and issues associated with its implementation
CO5	In depth insight into the constitutional, statutory and institutional aspects of human rights protection in India
CO6	Covers constitutional provisions dealing with human rights and special legislations dealing with protection of vulnerable and marginalized groups
CO7	Discussion on institutional framework in India dealing with protection and enforcement of human rights

TEXT BOOK

T.S.Ravi ,”Human Rights”, Margham Publications Chennai 1st edition 2013

REFERENCES BOOKS:

1. J.Jayasankar. “Corporate laws” Margham publication Chennai 1st edition.2013.
2. “International Bill of Human Rights”, Amnesty International Pub.
3. Desai, A R, “Violation of Democratic Rights in India”

**SEMESTER-II
CORE PRACTICAL - II
MEDICAL MICROBIOLOGY, HAEMATOLOGY AND MICROBIAL
PHYSIOLOGY
SUBJECT CODE – P2AM21MP**

L	T	P	C
0	0	10	4

Total Hours :130

Objectives:

The aim of the practical subject is to know the bacteriological methods, isolation and identification of the pathogen, mycological methods, examination of parasites, haematological techniques and biochemical analysis

1. Collection and transport of pathological specimens for microbiological examinations.
2. Bacteriological methods: Microscopic examination – blood – faeces – pus – sputum – throat swab and nose swab – urine – body fluids.
3. Isolation and identification of the pathogen – culture and biochemical tests. Antimicrobial assay – sensitivity test – Strokes and Kirby Bauer methods – Disc diffusion – agar dilution – broth dilution – MBC/MIC.
4. Mycological methods: Macroscopic observation – Microscopic observation – Culture.

5. Identification of *Mucor*, *Rhizopus*, *Aspergillus*, *Penicillium*, *Candida*, *Trichophyton*, *Microsporum*, *Epidermophyton* – SDA/Corn Meal Agar – Slide culture method – Germ tube method- Sugar assimilation/fermentation tests.
6. Examination of parasites in clinical specimens – ova/cysts in feces.
7. Haematology: Total RBC count, Total WBC count, Differential leucocyte count (DLC) – Haemoglobin estimation, ESR determination, Bleeding time, Clotting time.
8. Biochemical analysis: Serum cholesterol and protein estimation.

CO1	Examine bacterial, fungal and parasitical clinical specimens.
CO2	Perform basic hematological laboratory testing, assess laboratory data and report findings according to laboratory protocol.
CO3	Interpretation of common laboratory investigations in various hematological diseases.

REFERENCE BOOKS

1. Mackie and Mc Cartney, Practical Medical Microbiology, Elsevier; 14th Edition, (2007).
2. Dev, N.C., Dev, T.C. Practical Microbiology Protozoology and Parasitology: Including Bacteriology, Virology, Mycology, Immunology, Serology, and Automated Methods. New Book Agency, 2nd Edition, (2011).
3. Bailey & Scott's. Diagnostic Microbiology, Mac Millon Publishers, 13th Edition, (2013).

SEMESTER–III MAJOR PAPER - VII CELL BIOLOGY & MOLECULAR BIOLOGY

L	T	P	C
5	0	0	5

Total Hours : 65

SUBJECT CODE: P3AM21MT

OBJECTIVES:

1. The aim of the subject is to know the anatomy & physiology of prokaryotes & eukaryotes, importance of plasmid & synthesis of proteins.
2. Students examine the basic properties of cells and cell organelles, in addition to the properties of differentiated cell systems and tissues.
3. The course aims to equip students with a basic knowledge of the structural and functional properties of cells.

UNIT I: HISTORY AND CYTOLOGICAL TECHNIQUES (12)

Introduction – Definition & History of Cell Biology. Organization of Prokaryotic and Eukaryotic Cell. Molecular Composition of cells – water, carbohydrates, lipids, proteins, nucleic acids. Cytological techniques – Tissue Sectioning & Processing – Staining (Haematoxylin, Eosin, PAS, Giemsa stains).

UNIT II: COMPONENTS OF CELL (14)

Components of cell – Cell wall and Plasma membrane, Cytoplasmic organelles – Endoplasmic reticulum, Golgi apparatus, Lysosomes, Plastids, Ribosomes, Mitochondria, Nucleus, Microtubules, Microfilaments, Microbodies (Peroxisomes and Glyoxysomes) – Vacuoles.

UNIT III: MEMBRANE TRANSPORT (12)

Overview of Membrane transport – peripheral, integral and molecular model of cell membrane – fluid mosaic model and membrane fluidity, solute transport across membrane – passive transport, active transport by ATP powered pumps, types of transport systems.

UNIT IV: CELL DIVISION (14)

Cell Divisions and Cell Cycle – Amitosis, Mitosis, Meiosis and their Significance – Cancer, Ageing of cells and Stem cell studies.

UNIT V: TRANSCRIPTION AND TRANSLATION (13)

Protein synthesis - Transcription and Translation in prokaryotes and eukaryotes. Translational control – ribosome binding, codon usage, antisense RNA; Post - transcriptional and translational modification (epigenetics).

OUTCOMES:

CO1	Students will understand the structures and purposes of basic components of prokaryotic and eukaryotic cells and understand the cytological techniques of tissues
CO2	Explain the components of cell and their functions
CO3	Explain the communications of cells with other cells and to the environment
CO4	Compare and contrast the events of cell cycle and its regulation
CO5	To impart detailed understand of key events of molecular biology comprising of mechanism of DNA Replication, Transcription and translation in prokaryotes and Eukaryotes
CO6	Illustrate that fundamental structural units define the function of all living things
CO7	Cell biology gives them a strong foundation on the basic unit of life

Text Books:

1. Verma, P.S. & V.K. Agarwall, (1986). Cytology, S. Chand & Company Ltd.
2. Singh, S.P & B.S. Tomar. Edition, revised. *Publisher, Rastogi Publications*, 2007. ISBN, 8171339093, 9788171339099. Cell Biology.
3. Malacinski, G.M. and Freifelder, D. (1998) Essentials of Molecular Biology, 3rd edition, John and Bartlett Publishers.
4. Cell Biology, Genetics, Molecular Biology, Evolution & Ecology, Dr. P.S. Verma & Dr. V. K. Agarwall, 14th Edition. (2017).
5. Cell Biology and Molecular Biology, S.C. Rastogi, New age International publishers, 3th Edition (2017).

Reference Books:

1. Lewin B. (2000). Genes VII. Oxford University Press.
2. Maloy SR, Cronan Jr. JE, Freifelder D (1994). Microbial genetics. Jones and Bartlett publishers.
3. Singer M, Berg P. (1990). Genes and Genomes. University Science Books.
6. Stryer L. (2002). Biochemistry. 5th edition, W.H.Freeman and company.
7. Watson JD, Hopkins NH, Roberts JW, Steitz JA, Weiner AM. (1998). Molecular biology of the gene, 4th edition, Benjamin/Cummings publishing company.

SEMESTER–III
MAJOR PAPER - VIII
MICROBIAL GENE TECHNOLOGY AND BIOINFORMATICS
SUBJECT CODE – P3AM22MT

L	T	P	C
5	0	0	5

Total Hours : 65

OBJECTIVES:

1. The aim of the subject is to gain the knowledge on genetic material, cloning system, basic techniques of molecular biology and their applications in various fields and also gain the knowledge about basics of bioinformatics
2. To understand and apply the principles and techniques of Molecular Biology
3. To make the students to understand the concept of gene and bioinformatics.

UNIT I: GENE ANALYSIS AND TECHNIQUES (13)

Gene Analysis and Techniques: Extraction & Isolation of chromosomal & Plasmid DNA from bacteria. Quantification of Nucleic acids – Radiolabelling of Nucleic acids – End labelling – Nick translation – primer extension — Blotting techniques.

UNIT II: DNA MANIPULATING ENZYMES (13)

Restriction enzymes: Nomenclature – Classification – restriction & Methylation – Type II restriction endonuclease – Restriction mapping– DNA manipulating enzymes – nucleases – polymerases – DNA ligases.

UNIT III: VECTORS AND GENE LIBRARIES (11)

Vectors — types of vectors – Plasmids, Bacteriophages – Cosmid – Shuttle Vectors- Expression vectors – Artificial chromosomes – BAC and YAC. Cloning strategies – cDNA & Genomic libraries

UNIT IV: DNA SEQUENCE ANALYSIS AND PCR (13)

DNA sequence analysis; Maxam – Gilbert (chemical) sequencing, Sangar – Coulson (DiDeoxy/enzymatic) sequencing. Automated DNA sequencing. PCR – methods and its application, Advantages. DNA fingerprinting. Microarray and its applications.

UNIT V: BIOINFORMATICS (15)

Historical aspects – Symbols used in Data bases , Nomenclature of DNA and Protein sequences, Biological Databases, Hard-link Relationships between Databases and Data Retrieval Tools, Methods to study Genomics and proteomics.

OUTCOMES:

CO1	Explain various stages for extraction of chromosomal DNA and plasmid DNA
CO2	Compare and contrast the restriction endonucleases and other DNA manipulative enzymes
CO3	Recall the cloning strategies of various vectors
CO4	Elucidate for sequence analysis of DNA and aware the DNA fingerprinting
CO5	Apply basic techniques for study of Bioinformatics
CO6	Recall the study of genomics and proteomics
CO7	Design a model for blotting techniques

RECOMMENDED TEXT

1. Brown, T.A. Gene cloning – An introduction. Chapman & Hall, London. 3rd Edition, (1995).
2. David Freifielder. Molecular Biology. Narosa Publications. New Delhi. 2nd Edition, (2005).
3. Old, R.W., and Primrose, S.B. Principles of Gene Manipulation. Blackwell Scientific Publications. 3rd Edition, (2005).
4. Primrose, S.B. Molecular Biotechnology, Blackwell Scientific Publications. 2nd Edition, (1994).

REFERENCE BOOKS

1. Burrell, MM. Enzymes of Molecular Biology, Humana Press, 2nd Edition, (1993).
2. Calendar, R. Bacteriophages Vols. I, II and III. Plenum Press. 2nd Edition, (1988).
3. Chirikjian, J.D., Biotechnology – Theory and Techniques, Vol. I, Jones and Burtlett Publishers. 3rd Edition, (1995).
4. Gerd Gellissen. Production of Recombinant Proteins: Novel Microbial and Eukaryotic Expression Systems. Wiley VCH Publishers, 2nd Edition, (2005).
5. Glazer & Nikaido. Microbial Biotechnology. WH Freeman & Co. Newyork. 3rd Edition, (1995).
6. Harinder P S, Makkar, Gerrit J, Viljoen. Applications of Gene – Based Technologies for improving Animal Production and Health in developing. Springer Publications. 2nd Edition, (2005).
7. Innis MA. PCR Strategies, Academic Press. 3rd Edition. (1995).
8. Kreuzer & Massey, rDNA & Biotechnology. A guide for teachers, ASM press, Washington. 2nd Edition. (2001).
9. Lewin B. Genes VII. Oxford University Press, New York. 3rd Edition, (2003).
10. Baxevanis, A.D. and B.F.F. Ouellette, Wiley, O. Bioinformatics – A practical guide to the analysis of genes and proteins. Interscience, New York. 2nd Edition, (2001).

Websites:

1. www.w3.org/WhatIs.html
2. www.un.org/database
3. www.ncbi.nlm.nih.gov/Database
4. www.nist.gov/srd/

SEMESTER–III
MAJOR PAPER - IX
INDUSTRIAL BIOTECHNOLOGY AND ITS APPLICATIONS
SUBJECT CODE – P3AM23MT

L	T	P	C
4	0	0	4

Total Hours : 52

OBJECTIVES:

1. The aim of the subject is to know the industrially important microbes & their role in the production of various fermented products
2. The course aims to provide fundamental insights to exploit enzymes and microbes for the manufacturing of products which have a huge industrial significance.
3. The purpose of this course is to teach students about the ability to apply biotechnology to industrial processes in transforming the manufacturing industry.

UNIT I: INDUSTRIALLY IMPORTANT MICROORGANISMS AND ITS DEVELOPMENT (10)

Industrially important microorganisms: Screening techniques – Primary and secondary screening techniques. Detection & assay of fermentation products. Strain improvements – Mutations, Protoplast fusion & rDNA techniques.

UNIT II: FERMENTATION MEDIA AND FERMENTOR (11)

Fermentation media – substrates, sterilization and screening. Antifoam agents. Fermentors – Basic functions, designs, components, body construction, aeration, agitation. Sterilization of fermentor. Types of fermentor and fermentation. Scale up of fermentation. Downstream processing.

UNIT III: FERMENTATION (11)

Antibiotic fermentations – Penicillin and Streptomycin. Anaerobic fermentation – Acetone - Butanol, Beer, Ethanol. Vitamins – Vitamin B₁₂ and Riboflavin. Growth Hormones - Gibberellins. Enzymes – Amylase and Protease. Organic acids – Citric acid and Acetic acid.

UNIT IV: ALGAL BIOTECHNOLOGY (10)

Algal biotechnology: Biotechnological potential of microalgae - food, feed . Pharmaceutically valuable of microalgae, production of pigments and H₂ gas from BGA. Production of SCP from *Spirulina* and Yeast.

UNIT V: APPLICATIONS OF GENETIC ENGINEERING (10)

Recombinant DNA products and applications – Insulin, Interferon, Hepatitis B antigen vaccine, Growth hormones, Vaccine, TPA and Gene therapy.

OUTCOME:

CO1	Discuss the role of microorganisms in industry, as well as to carry out experiments to produce microbial metabolites.
CO2	Recognize deeper understanding of the industrial Biotechnology and its applications.
CO3	Give an account of design and operations of various bioreactors and downstream processes; Identify the different types of fermentors
CO4	Explain the various fermentation strategies and the growth kinetics of industrial microorganisms
CO5	Discuss the methods for the production of certain products (metabolites) using different microorganisms
CO6	Select the best conditions and optimization protocol needed for various microbial

	products
CO7	Understand and to be able to demonstrate knowledge on the biotechnological potential of micro and macroalgae, with an emphasis on human nutrition, aquaculture, the phycocolloid industry and as environmental tools.

RECOMMENDED TEXT

1. Patel, A.L., Industrial Microbiology. Macmillan India Limited. 4th Edition, (2000).
2. Casida, L.E. Industrial Microbiology, New Age International Publishers. 3rd Edition, (2010).
3. Demain, A.L. and Davies, J.E. Manual of Industrial Microbiology and Biotechnology. ASM Press. 4th Edition, (1999).
4. Glick BR, Pasternak J.J. Molecular Biotechnology, ASM Press, Washington DC. 4th Edition, (1994).
4. Subba Rao, N.S. Biofertilizers in Agriculture and Forestry. Oxford and IBH publication Co. Pvt. Ltd., New Delhi. 3rd Edition, (1995).

REFERENCE BOOKS

1. Balasubramanian, D., Bryce CFA, Green J, Jayaraman K. Concepts in Biotechnology, University Press, India, 5th Edition, (1996).
2. Faber. K Biotransformation in organic chemistry, Springer Verlag. 2nd Edition, (1992).
3. Misener. S. & Krawetz. S.A. Phylogenetic analysis of DNA Sequences, Oxford University Press, Oxford. 3rd Edition, (2000).

SEMESTER–III
MAJOR PAPER - X
RESEARCH METHODOLOGY
SUBJECT CODE – P3AM24MT

L	T	P	C
4	0	0	4

Total Hours : 52

OBJECTIVES:

1. The aim of the subject is to gain the knowledge on objective of research, review of literature and to apply biostatistics for writing the thesis.
2. Understanding the nature of problem to be studied and identifying the related area of knowledge.
3. Reviewing literature to understand how others have approached or dealt with the problem. Collecting data in an organized and controlled manner so as to arrive at valid decisions.

UNIT I: OBJECTIVES OF RESEARCH & REVIEW OF LITERATURE (12)

Research – Objectives of research – Types of Research - Steps in Research – Need for review of literature – Review Process and Bibliography - Research reading – Literature citation – Name-year system , Citation sequence System, Alphabet number system.

UNIT II: EXPERIMENTAL DESIGN & THESIS WRITING (12)

Experimental design – basic principles and common designs. Primary source – articles, reviews, abstract, current contents, reference card. Research report – components, formatting and typing – Format of a table – Format of figures.

UNIT III: BIOSTATISTICS (09)

Importance of statistics in research. Presentation of data – tabulation – frequency distribution. Measures of central tendency – Average – Mean – Median – Mode. Standard deviation. Test based on normal T test, Chi square, ANOVA.

UNIT IV: IPR AND BIOSAFETY (09)

IPR – Introduction, Protection of IPR in India- Patent, Copyright, Trademark, Design, Trade Secrets, Plant variety and Farmer's Rights Protection. Issues relating to IPR – Copyleft, Traditional Knowledge, Biodiversity, Biopiracy.

UNIT V: LABORATORY SAFETY (10)

Laboratory Safety – Introduction, Biohazardous agents, Risk groups and Biosafety levels, Laboratory acquired infections, Routes of Exposure. Safety measures – Access to the laboratory, personal safety, cleanliness of laboratory, basic requirements of a laboratory, Basic and essential biosafety equipment, Disposal of biohazardous waste. Chemical Hazards and Fire Hazards.

OUTCOMES:

CO1	Discuss about the objectives of research and review of literature
CO2	Gain knowledge in experimental design and thesis writing
CO3	Biostatistics uses the application of statistical methods to conduct research in the areas of microbiology
CO4	Create awareness on the Biosafety. Bioethics and patenting of Biodiversity processes
CO5	Understanding about the intellectual properties rights in India
CO6	Explore about the traditional knowledge prevailing in India
CO7	Propose the required numerical skills necessary to carry out research

RECOMMENDED TEXT

1. Gurumani. N. Research Methodology for Biological Sciences, MJB publishers, Chennai. 2nd Edition, (2006).
2. Kothari. C.R. Research Methodology, Methods and Techniques, Wishwa Prakasam Publications, 2nd Edition. (1985).
3. Gupta, S.P. Statistical Methods. MJB publishers, Chennai. 2nd Edition, (2009).

REFERENCE BOOKS

1. Robert Ross. Research: An Introduction. Harper and Row Publications. 2nd Edition, (2002).
2. Saravavel, P. Research Methodology. Kitlab Mahal, 6th Edition. (2005).
3. Rajammal, P.A. Devadass, A. Hand book of Methodology of Research, Vidyalaya Press. 1st Edition, (2003).
4. Maharajan, B.K. Methods in Biostatistics. Jaypee Publishers. 2nd Edition, (2003).
5. Snedecor, G.W. and Cochran, W. Statistical methods, Oxford and IBH, New Delhi. 2nd Edition, (2002).

SEMESTER-III
ELECTIVE PAPER - V
HERBAL TECHNOLOGY
SUBJECT CODE – P3AM25ET

L	T	P	C
3	0	0	3

Total Hours : 39

OBJECTIVES:

1. The aim of the subject is to gain the knowledge on the medicinally important herbal extract preparation and to treat the diseases.
2. Understand raw material as source of herbal drugs from cultivation to herbal drug product.
3. Know the herbal cosmetics, natural sweeteners, nutraceuticals.

UNIT I: HERBAL PREPARATIONS (08)

Introduction of Pharmacognasy - Methods of preparation: infusion - decoction - tincture - capsules and powder - ointment - infused oils: hot infused oils, cold infused oils - tonic wine - syrups - creams - compresses - gargles and mouth wash - juice. Future of Pharmacognasy.

UNIT II: EXTRACTION AND PHYTOCHEMICAL ANALYSIS (08)

Method of extraction - Expression method, steam distillation method, solvent extraction (polar and non-polar solvents), maceration, percolation, hot continuous extraction and adsorption in purified fats. Criteria for phytochemical identification and application (alkaloids, terpenoids, steroids and anthocyanins).

UNIT III: MEDICINAL PLANTS (08)

Botanical sources, morphology, histology, powder characteristics, important constituents, identification tests and therapeutic uses of: Ginger, Cinchona, Cinnamon, Adathoda, Clove, Nux Vomica. Preliminary tests for unorganized drugs: Agar, Gelatin, Acacia, fixed oils, fats and waxes.

UNIT IV: HUMAN AILMENTS (07)

Herbal medicines for human ailments - Drugs acting on cardiac diseases, respiratory diseases, drug acting on nervous system - Urogenital system and herbal drugs - Psychoactive plants.

UNIT V: PROPAGATION OF MEDICINAL PLANTS (08)

Propagation of Medicinal plants: Steps and methods in Micropropagation and Macropropagation, conservation of rare medicinal plants. Role of biotechnology in medicinal plants banks - Cultivation of medicinal and aromatic plants - Herbal processing - Packaging - Herbal sale and marketing.

OUTCOMES:

CO1	Explain methods for selection and processing of herbal drugs as raw materials for herbal drug preparation
CO2	Acquire basic knowledge on herbal medicine preparation
CO3	Identification of herbals and Methods of preparation and also explain future prospects of herbal drug based industry
CO4	Apply the Method of extraction and phytochemical identification and application of herbal drugs
CO5	Analyze botanical sources, morphology, histology, powder characteristics, important constituents, identification tests and therapeutic uses of some medicinal plants
CO6	Acquire knowledge and understand Herbal medicines for human ailments
CO7	understand the cultivation methods of herbal and aromatic plants and also they would know about herbal processing , packing and sale and marketing

RECOMMENDED TEXT

1. Atal, C.K., Kapoor, B.M., Cultivation and Utilization of Medicinal plants, Regional Research Laboratory, (CSIR) Jammu-Tawi, (1982).
2. Gokhale, S.B., Kokate, C.K. and Purohit, A.P. Pharmacognasy, Nirali Prakashan, Pune, 8th Edition, (1997).
3. Swain, T. Comparative Phytochemistry, Academic Press, London, 2nd Edition, (1966).

REFERENCE BOOKS

1. George Edward trease and w.c.evans. Pharmagnosy 12th edition, English Lang Books Soceity, Baelliere Tindall.
2. Handa.S.S Nad Kapoor, V.K. Pharmacognosy. Vallabh prakashan publishers, New Delhi. 2nd Edition, (2002).
3. Kolkate, C.K., Durohit, A.P and Gokhale, S.R., Pharmacognosy. Nial;I Prakasham publishers, Pune. 12th Edition, (2005).
4. Shah, S.C. and Qudary. (1998). A Textbook of Pharmacognosy. Jaypee Publishers, 2nd Edition, (2002).
5. Willis T.E. Textbook of Pharmocognosy. CBS publishers and distributors. New Delhi. 5th Edition, (2002).

L	T	P	C
3	0	0	3

TOTAL HOURS : 39

SEMESTER III

CLINICAL MICROBIOLOGY

ELECTIVE III – PAPER VI

SUBJECT CODE: P3AM26ET

OBJECTIVES:

- 1.The aim of the subject is to know the human bacterial pathogens and their role in causing human diseases.
- 2.Classify human pathogenic bacteria, fungi, parasite and Viruses
- 3.To know the fungal diseases of humanbeing

UNIT I: MEDICALLY IMPORTANT BACTERIA (10)

Introduction – Classification study of common disease producing bacteria, fungi, parasites and viruses. Bacterial Diseases: *Staphylococcus*, *Streptococcus*, *Pneumococci*, *Neisseriae*, *Mycobacterium*, *Corynebacterium*, *Salmonella*, *Shigella*, *Escherichia*, *Pseudomonas*, *Proteus*, *Vibrios*, *Clostridium*, *Bacillus*, *Spirochaetes*, *Brucella*, *Haemophilus*, *Rickettsiae*.

UNIT II : MEDICALLY IMPORTANT FUNGI (08)

Fungal Diseases: *Dermatophytes*, *Trychophyton*, *Microsporium*, *Epidermophyton*, *Candida albicans*, *Mycotic mycetoma*, *Histoplasma*, *Cryptococcus*.

UNIT III: MEDICALLY IMPORTANT VIRUS (08)

Viral Diseases: Pox, Herpes, Adeno, Papavo, Hepatitis, Myxo, Paramyxo, Arbo, Rabies, Picorna Viruses, HIV, EBOLA virus.

UNIT IV: MEDICALLY IMPORTANT PARASITES (08)

Parasitic Diseases: Amoebiasis, Malaria, Kala Azar, Trichomoniasis, Giardiasis, Intestinal nematodal infections, Filariasis, Taenia infections, Schistosomiasis.

UNIT V: DIAGNOSIS, PREVENTION AND CONTROL OF MICROBIAL DISEASES (05)

Common Laboratory procedures in diagnosis of above disease. Collection of specimen, direct isolation and serological tests. Prevention and control of diseases. Collection of data and maintenance of laboratory records.

OUTCOMES:

CO1	Elucidate the common disease producing bacteria, fungi, parasite and viruses.
CO2	Understand the various kinds of fungal diseases of human beings
CO3	Isolation and identification viral diseases and causative agents
CO4	To know the students various life cycle of parasitic diseases and its preventive measures
CO5	Diagnosis, preventive and control of various microbial diseases
CO6	Collection of data and maintenance of Laboratory records
CO7	Common laboratory procedure for diagnosis of microbial diseases

Text Books:

1. Hugo WB and Russell AD. (1989) Pharmaceutical Microbiology IV edition. Blackwell Scientific Publication, Oxford.
2. Topley & Wilsons. (1990) Principles of Bacteriology, Virology and Immunity, VII edition. Vol. III Bacterial Diseases, Edward Arnold, London.
3. Anathanarayanan, R. and Jayaram Panicker C.K. (1994). Text Book of Microbiology. Orient Longman.
4. Baron, E.J. and Tenenbaum S.M. (1995). Scientific Company. Diagnostic Microbiology. Blackwell Scientific Company.
5. Ananthanarayan & Paniker's, 9th Edition (2017).
6. Textbook of medical mycology by, Jagdish chander, 4th Edition (2017)
7. Textbook of medical Microbiology, Jawawettes, 9th Edition (2017).

Reference books:

1. Ronald M. Atlas. (1989). Microbiology. Fundamentals and applications. 2nd Edition, Maxwell Macmillan International Editions.

2. David Greenwood, Richard, C.D., Slack, John Forest Peutherer. (1992). Medical Microbiology, 14th edition. ELBS with Churchill Livingstone.
3. Microbiology Presscott. Tata McGraw hill Publishing Co Lit – New Delhi. 6th Edition (1962)
4. Salle, A.J. (1992). Fundametal Principles of Bacteriology. 7th Edition, Mc. Graw Hill Publishing Co. Ltd., New York.

SEMESTER–III
CORE PRACTICAL - III
CELL BIOLOGY, MICROBIAL GENE TECHNOLOGY AND
INDUSTRIAL BIOTECHNOLOGY
SUBJECT CODE – P3AM21MP

L	T	P	C
0	0	9	4

Total Hours :117

Objectives:

The aim of the subject is to gain the knowledge on cell and molecular biology, microbial gene technology, industrial biotechnology.

Cell & Molecular Biology:

1. Separation of Protein by SDS-Page.
2. Isolation of Plasmid from Bacteria
3. Purification of Plasmid
4. Preparation of Competent *E.Coli* Cell
5. Trasformation of Plasmid DNA to the *E.coli* cells.
6. Staining of Plant Cell
7. Observation of different stages of cell cycle.

Microbial Gene Technology:

1. Isolation of DNA from Microbial System
2. Isolation of RNA from Microbial System
3. Quantification of DNA by Diphenylamine Method
4. Quantification of RNA by Orcinol Method
5. Quantification of DNA by UV Absorption Method
6. Size Characterization of DNA by Agarose Gel Electrophoresis
7. PCR Amplification

Industrial Biotechnology:

1. Isolation of antibiotic resistance microbes
2. Enzyme immobilization technique
3. Isolation of protoplast

4. Isolation of Sphaeroplast
5. Separation of Protein by Thin Layer Chromatography
6. Production of Protease from Microorganism
7. Optimization of protease production using various pH and Temperature
8. Separation of protein by Column chromatography
9. Separation of protein by Ion-exchange chromatography
10. Antibiotic Assay by MIC
11. Separation of protein by Gel Exclusion Chromatography

OUTCOMES:

CO1	Conduct experiments related to industrial microbiology and produce microbial metabolites and solve the difficulties related to the microbial production of certain metabolites
CO2	Gain working knowledge of isolation and identification of DNA
CO3	Critically analyze and interpret quantification of DNA and RNA by different methods
CO4	Identify and demonstrate separation of protein by different chromatographic techniques.

REFERENCE BOOKS

1. Mackie and Mc Cartney Practical Medical Microbiology, Elsevier; 14th Edition, (2007).
2. Dev, N.C., Dev, T.C. Practical Microbiology Protozoology and Parasitology: Including Bacteriology, Virology, Mycology, Immunology, Serology, and Automated Methods. New Book Agency, 2nd Edition, (2011).
3. Bailey & Scott's. Diagnostic Microbiology, Mac Millon Publishers, 13th Edition, (2013).

SEMESTER-IV
MAJOR PAPER - XI
BIOLOGICAL TECHNIQUES
SUBJECT CODE – P4AM21MT

L	T	P	C
5	0	0	4

Total Hours : 65

OBJECTIVES:

1. The aim of the subject is to handle the basic instruments and techniques in the field of applied microbiology.
2. Expose the students to the basic principles of photometry, colorimetry, chromatography, conductometry, centrifugation and electrophoretic techniques.
3. Acquire basic knowledge of designing biological experiments. afford the students with the techniques of detecting contaminants in stored products.

UNIT I: MICROSCOPY (15)

Microscopy and Related Techniques – Light Microscopy: Microscopic optics, components of microscopes. Basic principles and method of Bright field, Dark field, Phase contrast microscopes. Immunofluorescence – In situ hybridization. Electron microscopy – principle,

techniques and applications of Transmission Electron microscope (TEM) and Scanning Electron Microscope (SEM), Photomicrography and videomicrography.

UNIT II: ANALYTICAL TECHNIQUES (13)

Spectroscopic methods – UV-Visible, Atomic Absorption Spectrophotometer, Atomic Emission Spectroscopy. Centrifugation – Principles, various types including centrifugation. Radioactive analysis: Principles of radioactivity, GM counter & LS counter. Uses of radioisotopes, radiocarbon dating. Biosensors and its applications.

UNIT III: CHROMATOGRAPHY (12)

Principles & Applications of Chromatographic Techniques, classification, Adsorption (Paper and TLC), Ion-exchange, Gel permeation, Affinity chromatography for separation of compounds. Column Chromatography – GC, HPLC methods and their applications.

UNIT IV: ELECTROPHORESIS (11)

Electrophoresis Techniques – Principle, components, factors affecting electrophoretic mobility, support medium, buffers, detection and assay system. Gel electrophoresis (Agarose and Polyacrylamide Gel) – Protein – Nucleic acid – Immunoelectrophoresis –Two dimensional PAGE – Isoelectric Focussing.

UNIT V: MOLECULAR TECHNIQUES (14)

Molecular Biological Techniques

- a) Microbiological techniques – purification, storage, measurement of microbial growth.
- b) Isolation of nucleic acid – plasmid and chromosomal DNA. Polymerase chain reaction.
- c) Gene cloning techniques – Restriction digestion and Phosphatase treatment of cloning vectors. Cloning technique, separation and staining of DNA, quantification of DNA, gene transfer mechanisms – chemical and electroporation.
- d) Methods of detection of clones – Nucleic acid transfer by blotting, Hybridization - plaque, colony hybridization. Histochemical detection of beta-galactosidase, antibody screening including colour development reaction.

OUT COMES:

CO1	Gain working knowledge of different kinds of microscopy
CO2	Understand the principle and working mechanisms of spectrophotometer, centrifuge and biosensors
CO3	Identify the amino acids from different sources by using chromatography
CO4	Identify antigen, antibodies and proteins from clinical samples by using electrophoresis
CO5	Demonstrate different kinds of molecular techniques like PCR, Blotting

CO6	Subject handle the basic instruments and techniques in the field of applied microbiology
CO7	The students are well versed handling the instruments in various fields of microbiology

RECOMMENDED TEXT

1. Glick, B.R. and Pasternak, J.J. Molecular Biotechnology, ASM Press. 2nd Edition, (1994).
2. Wilson, K. and Walker. Practical Biochemistry. Principles and Techniques, Cambridge University Press. 3rd Edition, (1995).
3. Demain, A.L., and Davies, J.E., Manual of Industrial Microbiology & Biotechnology, ASM Press. 2nd Edition, (1999).

REFERENCE BOOKS

1. Cynthia Gibas & Per Jambek Developing Bioinformatics Computer Skills, Shroff Publishers & Distributors Pvt. Ltd., O'Reilly) Mumbai, (2001).
2. John G. Webster. Bioinstrumentation. University of Winsconsin, John Wiley & Sons, Inc, 2nd Edition, (2004).
3. Misener, S. and Krawetz, S.A. Bioinformatics Methods and protocols. Human Press, Totowa, New Jersey, 3rd Edition, (2000).
4. Rashidi, H.H., and Buehler, L.K. Bioinformatics Basics: Applications in Biological Science and Medicine, CRC Press, London, 3rd Edition, (2002).
5. Sambrook, J. and Ruseell, D.W. Molecular Cloning – A Laboratory Manual (3rd edition, Vol. 1,2,3) Cold Spring Laboratory Press, New York, 2nd Edition, (2001)
6. Savile Pradbury. Basic measurement techniques for light microscopy, Oxford University Press, Royal Microscopical Society, 2nd Edition, (1991).
7. Surzeki, S. Basic techniques in Molecular Biology, Springer, 2nd Edition, (2000).
8. Westermeier, R Electrophoresis in practice – VCH – Federal Republic of Germany, 3rd Edition, (1993).
9. Willett, J.E., Gas chromatograph, John Wiley & Sons, 4th Edition, (1991).

SEMESTER-IV
ELECTIVE PAPER - VII
NANOBIOTECHNOLOGY AND BIOREMEDIATION
SUBJECT CODE – P4AM22ET

L	T	P	C
3	0	0	3

Total Hours : 39

OBJECTIVES:

1. The aim of the subject is to synthesis of nanoparticles, degradation of pollutants by using microbes and plants.
2. The main objective of this subject was to analyze the principles of bioremediation assisted by nanomaterials and nanoparticles.

3. The use of nanoparticles and nanotechnology to enhance the microbial activity to remove pollutants.

UNIT I: INTRODUCTION (08)

History . Nanoparticles – types, functions – silver, gold. Physical and chemical properties of nanoparticles. Tools for measuring nanostructures – Scanning Tunelling Microscope (STM), Atomic Force Microscope (AFM) and Transmission Electron Microscope (TEM).

UNIT II: BIOSYNTHESIS OF NANOPARTICLES (08)

Biosynthesis of nanoparticles – Gold, Silver, Alloy and other nanoparticles. Mechanism of nanoparticle formation by microorganisms. Nanowires, Nanotubes, Quantum dots, Nanocrystals

UNIT III: APPLICATION OF NANOPARTICLES (08)

Nanotechnology in health sectors. Uses of nanoparticles in Drug delivery – Nanolabelled drug delivery systems, Oral delivery systems, Topical delivery systems - DNA and Protein Microarrays. Nanobiosensor. Applications – space, oil field, medical, military.

UNIT IV: BIOREMEDIATION (08)

Definition of bioremediation – Types of pollutants in air, water and soil. Microbial remediation of polluted soil, air, water and metals. Bioaccumulation, Biomagnification, Biostimulations, Bioaugmentation. Microbial degradation of organic matter and xenobiotic compounds.

UNIT V: PHYTOREMEDIATION AND GEM (07)

Phytoextraction – Phytodegradation – Rhizofiltration – Phytostabilization – Phytovolatilisation. Phytoremediation. Role of GEM in bioremediation.

OUTCOMES:

CO1	Understand the concept of Nanoparticles formation and its functions.
CO2	Better knowledge in the measurement of nanoparticles
CO3	Explore the applications of nanoparticles in various fields
CO4	Classify pollutants in air , water and soil
CO5	Design a model for rhizofiltration
CO6	Exemplify the beneficial role of Genetically engineered microbes in bioremediation
CO7	Illustrate various method used in bioaugmentation

RECOMMENDED TEXT

1. Parthasarathy, B.K. Introduction to Nanotechnology, Isha Publication, 2nd Edition, (2007).
2. Sree Krishna, V. Comprehensive Nanobiotechnology, New Age International Publishers,

2nd Edition, (2011).

REFERENCE BOOKS

1. Moo-Young, M. Anderson W.A and Chakrabarty, A.M. Environmental biotechnology; Principles and applications. Boston, Mass; Kluwer Academic publishers, 3rd Edition, (1996).
2. Wainwright, M. An introduction to environmental biotechnology, Boston, Mass Klumer Academic publishers, 3rd Edition, (1999).

SEMESTER-IV
CORE PRACTICAL - IV
BIOLOGICAL TECHNIQUES
SUBJECT CODE – P4AM21MP

L	T	P	C
0	0	10	3

Total Hours :130

OBJECTIVES:

The aim of the subject is to gain the knowledge on chromatography PCR. Gel documentation system, Plasmid DNA, ELISA, TLC & Western blotting.

1. Analysis of Microorganism using Bright Field Microscope
2. Analysis of Microorganism using Dark Field Microscope
3. Measurement of Microorganism using Micrometry
4. Separation of pigments using paper chromatography
5. Separation of compounds from crude extract using TLC
6. Blotting Techniques – Western Blotting (Demonstration)
7. ELISA Technique
8. Isolation and separation of chromosomal DNA
9. Isolation and separation of plasmid DNA
10. Separation of protein using electrophoresis technique (SDS-PAGE)
11. PCR – Demonstration
12. Molecular weight analysis of DNA and Protein using Gel Documentation System – Demonstration

OUTCOMES:

CO1	Analyze the microorganisms in different microscopic techniques
CO2	Gain knowledge in the field of chromatography
CO3	Explore the techniques involved in isolating genetic materials from bacteria
CO4	Understanding the methodology for separating protein
CO5	Easy in doing molecular weight analysis of DNA and Proteins.

REFERENCE BOOKS

1. Mackie and Mc Cartney Practical Medical Microbiology, Elsevier; 14th Edition, (2007).
2. Dev, N.C., Dev, T.C. Practical Microbiology Protozoology and Parasitology: Including Bacteriology, Virology, Mycology, Immunology, Serology, and Automated Methods. New Book Agency, 2nd Edition, (2011).
3. Bailey & Scott's. Diagnostic Microbiology, Mac Millon Publishers, 13th Edition, (2013).

L	T	P	C
3	0	0	3

TOTAL HOURS : 39

SEMESTER IV

ELECTIVE IV – PAPER VIII

GENETIC ENGINEERING

SUBJECT CODE: P4AM23ET

OBJECTIVES:

1. The aim of the subject is handling various types of Electrophoresis
2. Elucidate restriction endonucleases and its applications
3. Describe PCR and its methods and applications

UNIT I: GENE ANALYSIS (07)

Gene Analysis Techniques – Isolation of DNA and RNA from microbes – Handling and quantification of nucleic acids – Radio labeling of nucleic acids – End labeling – Nick Translation – Labeling by primer extension. Pulse Field Gel Electrophoresis – Modifications and applications. Nucleic acid hybridization – Southern, Northern, Western, South-Western and Dot slot blotting.

UNIT II: DNA MANIPULATING ENZYMES (08)

Restriction enzymes – Nomenclature – Classification, Restriction and Methylation – Type II Restriction endonucleases – Uses of restriction endonucleases – restriction mapping and its applications – DNA modifying enzymes – Nucleases – Polymerases – DNA Ligases.

UNIT III: DNA SEQUENCING AND PCR (08)

DNA sequence analysis – Maxam & Gilbert (Chemical) sequencing – Sanger-Coulson (Dideoxy Enzymatic) sequencing. Automated DNA sequencing. Genomic sequencing and physical mapping of genomes – Polymerase Chain Reaction – Methods and applications. Site directed mutagenesis.

UNIT IV: BIOLOGY OF GENETIC ENGINEERING (08)

Biology of genetic engineering. Prokaryotic and Eukaryotic hosts – *E. coli* and Yeasts. Plasmid used for *E. coli* – vectors based on bacteriophage and M13 phage vectors. Expression vectors – Promoter probe vectors, transformation and transfection – packing bacteriophage DNA *in vivo*. Alternative DNA delivery synthesis – Artificial chromosomes.

UNIT V: CLONING, SCREENING AND APPLICATION (08)

Cloning from mRNA – Synthesis of cDNA – Cloning cDNA in plasmid and bacteriophage vectors. Cloning from genomic DNA. Genomic libraries, preparation of DNA fragments for cloning ligation, packaging and amplification of libraries. Genetic selection and screening methods. Application of rDNA technology, vaccines, drugs, microbial enzymes and proteins.

OUTCOME:

CO1	Elucidate various types of blotting techniques
CO2	Illustrate enzyme and their role in rDNA technology
CO3	Explain DNA sequence analysis and its types
CO4	List out vectors and their usage in genetic engineering
CO5	Applications of rDNA technology in various field
CO6	Describe about genomic libraries and its use in gene cloning techniques
CO7	Explain artificial chromosome and its types

Text Books:

1. Glick, B.R. and Pasternak, J.J. (1994). Molecular Biotechnology, ASM Press.
2. Brown, T.A.(1995). Gene cloning – a introduction – Chapman & hall London.
3. Old RW, Primrose SB. (1994) Principles of Gene Manipulation. Blackwell Scientific Publications.
4. Primrose SB. (1994). Molecular Biotechnology, 2nd edition, Blackwell Scientific Publications.

Reference Books:

1. Lewin B. (2003). Genes VII. Oxford University Press, New York.
2. DNA Cloning, Vols. 1,2,3 and 4, IRL Press

ADHIPARASAKTHI COLLEGE OF ARTS & SCIENCE
(Autonomous)

Permanently Affiliated to Thiruvalluvar University, Vellore
Re – accredited by NAAC with ‘B’ Grade (CGPA – 2.83)

M.Phil., MICROBIOLOGY
Under CBCS

SYLLABUS

(Effective from the Academic Year 2021-2022)

ADHIPARASAKTHI COLLEGE OF ARTS & SCIENCE

(Autonomous)
Permanently Affiliated to Thiruvalluvar University, Vellore
Accredited by NAAC with B⁺⁺ Grade

M. Phil., MICROBIOLOGY
Under CBCS
(Effective from the Academic Year 2021-2022)

REGULATIONS

CBCS

Choice-Based Credit System is a flexible system of learning. ‘Credit’ defines the quantum of contents / syllabi prescribed for a course, and determines the number of hours of instruction required. The distinguishing features of CBCS are the following:

It permits the students to:

- ❖ Learn at their own pace
- ❖ Choose electives from a wide range of elective courses offered by the departments of the college.
- ❖ Undergo additional courses and acquire more than the required number of credits
- ❖ Adopt an inter – disciplinary approach in learning
- ❖ Make best use of the expertise of available faculty

1. Eligibility for Admission

Admission to the M.Phil., Microbiology Degree Course shall be made as follows:

I Preference

A student who has passed B.Sc. Degree with 50% either with Microbiology or Biology/Botany/Zoology as Major Subject.

II Preference

A student who has passed M.Sc., Degree with 50% and having Microbiology or Biology at the Allied level and any of the Main Subject as mentioned below:

- 1) Industrial Microbiology
- 2) Biotechnology
- 3) Biochemistry
- 4) Bioinformatics
- 5) Life sciences
- 6) Nutrition and Dietetics
- 7) Home Science
- 8) Chemistry with botany/zoology as allied subjects
- 9) Any Biology related subject.

a. The minimum duration for completion of M.Phil., in a discipline is two semesters and the maximum duration is four semesters.

b. The M.Phil., Degree is awarded if a student has

- Registered, undergone and secured the required minimum number of credits for the core and elective courses including dissertation specified in the corresponding programme within the stipulated time;
- Secured the required attendance;
- No dues to the College, Hostel or Library;
- No disciplinary action pending against him/her

4. Structure of the Programme

The M.Phil., Programme consists of :

Core courses which are mandatory for all students.

Elective courses which students can choose from amongst the courses offered within the department of the college.

Dissertation (Mandatory)

5. The distribution of credits will be as below:

- i. Core Courses – Minimum two courses carrying 5 Credits each (10 or more credits)
- ii. Elective carrying 5 Credits each – No minimum.
- iii. Dissertation 21 Credits.

The total number of credits for core and electives shall be 15, consisting of

- 2 Core courses (10 Credits) plus one elective (5 Credits)

The research topic for the dissertation may be finalized even at the beginning of the M.Phil Programme, so that the collection of relevant literature and research design could be completed in the first semester leaving the entire Second Semester for the research work. The course registration for dissertation shall be in the First semester and a separate registration form shall be used for Registration.

6. Evaluation of the dissertation

The dissertation shall be jointly valued by the supervisor and one external examiner. The external examiner is to be drawn from:

- i. University department or affiliated college within the city of Vellore; or
- ii. Any accredited institution of higher education and/or research within Tamilnadu.

The viva-voce examination on the dissertation shall be jointly conducted by the supervisor and the external examiner. The distribution of marks shall be as under

- 20% marks for Periodical presentation (to be evaluated and awarded by the supervisor)
- 60% marks for the Dissertation
- 20% marks for viva-voce

The last date for submission of Dissertation shall be 31st August every year without penalty. Those who do not submit the dissertation in time may be given an extension of a maximum of two months with a penal fee prescribed by the college (i.e. up to 31st October). There shall be no further extension of time beyond this period.

Any student failing to submit the dissertation within this period will be permitted to submit the dissertation only in the next academic year along with the subsequent batch of students.

7. Regulations of M.Phil Programme

The rules and regulation governing course registration, attendance and discipline of students for M.Phil. Programme shall be the same as for the Master's Programme.

8. Evaluation

The process of evaluation, examination, grading, etc for the M.Phil. programme shall be the same as for Master's programme except for the dissertation; However, Final semester

students of the M.Phil. should be allowed to appear for examinations in any arrear papers in the month of September/October each year.

Illustration: M.Phil., CUMULATIVE GRADE STATEMENT

Semester and Course	Course Number/ Code	Credits Earned	Marks Secured (Max. 100)	Grade Point	Letter Grade	Result
First Semester						
Core	Research Methodology/ M1RM01SM	5	70	5.05	A+	PASS
Core	Advanced Microbiology/ M1MB01MT	5	60	4.00	A	PASS
Elective	Guide Paper/ M1MB02MT	5	75	5.50	O	PASS
Grade Point Average (GPA) / Weighted Average Marks (WAM)		15	68.33	4.85		
Second Semester						
Dissertation and Viva-voce	M2MB01DV	21	64	4.49	A	PASS
Grade Point Average (GPA) / Weighted Average Marks (WAM)		21	64	4.49		
Cumulative Grade Point Average (CGPA) 36 Overall Weighted Percentage Marks (OWPM)			65.81	4.64	A+	First Class

Question paper pattern:

Section – A (300 words)

To Answer 5 questions (either / or pattern)

5 X 6 marks = 30 marks

Section – B (900 words)

To Answer 3 questions out of 5 questions

3 X 15 marks = 45 marks

Total = 75 marks

The Course of study and the scheme of Examinations

Year/ Semester	Subject	Paper	Subject Code	Title of the Paper	Ins. Hrs/ Week	Credit	Exam Hrs	Marks		
								IA	Sem. Exam	Total
I Year/ I Semester	Core	Paper I	M1RM21SM	Research Methodology	5	4	3	25	75	100
	Core	Paper II	M1MB21MT	Advanced Microbiology	5	5	3	25	75	100
	Core	Paper III	M1RE21GS	Research & Publication ethics	3	2	3	25	75	100
	Elective	Guide Paper	M1MB22MT	Guide Paper	5	4	3	25	75	100
I Year/ II Semester	-	-	M2MB01DV	Dissertation with Viva Voce	-	21	-	25	75	100
TOTAL					-	36	-	125	375	500

RESEARCH GOALS

The Department of Microbiology strives to obtain national and international recognition of its faculty by encouraging them to build strong, externally funded research programs. The Department must continue to support opportunities for developments that will bring benefit to the research activities of the department. To maintain and expand our vigorous participation in research, the Department strives to:

1. Provide state-of-the-art research laboratory facilities and equipment.
2. Recruit new faculty to rebuild the number of tenure-line research-oriented faculty, hiring the most talented applicants who also have the potential to collaborate with colleagues inside and outside the Department. The strategic Plan in the following areas:
 - Marine Studies
 - BioHealth Sciences
 - Data Science
 - Environmental Health
 - Integrated Systems Biology
 - Synthetic Biology
 - Natural Resource Stewardship
3. Mentor new faculty to help ensure rapid establishment of a well-funded research program and innovative participation in teaching.
4. Disseminate and promote research results to the public.

L	T	P	C
5	0	0	5

TOTAL HOURS : 65

RESEARCH METHODOLOGY

Subject Code : M1RM21SM

OBJECTIVES:

1. Understanding the nature of problem to be studied and identifying the related area of Knowledge
2. Collecting data in an organized and controlled manner so as to arrive at valid decisions.
3. Analyzing data appropriate to the problem.

UNIT 1: RESEARCH METHODOLOGY (13)

Meaning of research – Objectives of research – motivation of research – Types, approaches and significance – Methods versus methodology – Research in scientific methods – Research process – Criteria for good research – Problem encountered by research in India – Funding agencies.

UNIT II: RESEARCH DESIGN (13)

Research Problem: Selecting the problem – Necessity of defining the problem – Techniques involved in defining the problem – Research design – Needs and features of good design – Different research design – Basic principles of experimental designs.

UNIT III: DATA COLLECTION AND DOCUMENTATION (13)

Data Collection methods – Data types – processing and presentation of data – Techniques of ordering data – Meaning of primary and secondary data – The uses of computers in research – The library and internet – Uses of search engines – virtual libraries – common software for documentation and presentation.

UNIT IV: DATA AND ERROR ANALYSIS (13)

Statistical analysis of data – Standard deviation – Correlation – Comparison of sets of data – Chi squared analysis of data – Characteristics of probability distribution – Binomial, Poisson and normal distribution – Principle of least square fittings – Curve fitting – Measurement of errors – Types and sources of errors – Determination and control of errors.

UNIT V: RESEARCH COMMUNICATION (130)

Meaning of research report – Logical format for writing thesis and paper – Essential of scientific report: abstract, introduction, review of literature, materials and methods and discussion – Write up steps in drafting report – Effective illustrations: tables and figures – Reference styles: Harvard and Vancouver systems.

OUTCOMES:

CO1	Elucidate various types of research
CO2	Explain basic principle of experimental design
CO3	Illustrate common software for documentation and presentation
CO4	List out measurement of errors and sources of error
CO5	Evaluate write up steps in grafting report
CO6	Explain logical formet for writing thesis
CO7	Characteristics of probability distribution and their types

REFERENCE BOOKS

1. Research Methodology, Methods and Techniques – C.R. Kothari – Wishwa Prakasam Publications, II Edition.
2. Research: An Introduction – Robert Ross – Harper and Row Publications.
3. Research Methodology – P. Saravanavel – Kitlab Mahal, Sixth Edition.
4. A Hand book of Methodology of Research – Rajammal P.A. Devadass – Vidyalyaya Press.
5. Introduction to Computers – N. Subramanian.
6. Statistical methods – G.W. Snedecor and W. Cochran – Oxford and IBH, New Delhi.
7. Research Methodology Methods and Statistical Techniques – Santosh Gupta.
8. Statistical Methods – S.P> Gupta
9. Scientific social surveys and research – P. Young – Asia Publishers, Bombay.
10. How to write and publish a scientific paper – R.A. Day – Cambridge Univeristy Press.
11. Thesis and Assignment Writing – Anderson – Wiley Eastern Ltd.

L	T	P	C
5	0	0	5

ADVANCED MICROBIOLOGY

Subject Code : M1MB21MT

OBJECTIVES:

1. The aim of the subject is to gain the knowledge about pure culture techniques, Microscopy, Soil microbiology, Industrial microbiology and Bioremediation.
2. The characteristics of soil environment. Microbial and fauna of soil, microbial activities in soil, nitrogen cycle, carbon cycle etc.
3. The use of nanoparticles and nanotechnology to enhance the microbial activity to remove pollutants.

UNIT I: DISCOVERY, ISOLATION & PRESERVATION OF CULTURES (13)

Discovery of microbes, abiogenesis Vs biogenesis, Culture media – types of culture media, special media. Methods of isolating pure cultures, methods of maintenance and preservation of pure cultures. Unculturable microbes, quorum sensing.

UNIT II: MICROSCOPY (13)

Microscopy – light microscopy [bright field, dark field, phase contrast, fluorescence, UV microscopy], Electron microscopy [SEM, TEM], and Acoustic microscopy, Microbial stains – Acidic dyes, Basic dyes, Neutral dyes; Staining procedures – simple, differential, acid fast and negative staining.

UNIT III: SOIL MICROBIOLOGY (13)

Microorganisms in soil fertility, rhizosphere, mycorrhiza, biological nitrogen fixation, biofertilizers, biological control, biopesticides.

UNIT IV: INDUSTRIAL MICROBIOLOGY (13)

Microbes in industry, industrial fermentation, Bioreactors, batch fermentation, continuous fermentation and fed-batch fermentation. Production of antibiotics (Penicillin) and vaccines. Food microbiology.

UNIT V: BIOREMEDIATION (13)

Sewage treatment – Physical, biological and chemical process.

Bioremediation: Approaches to bioremediation – environmental modification, microbial seeding, bioengineering; Bioremediation of contaminated soil, squifiers, air pollutants, marine oil pollutants.

OUTCOMES:

CO1	Describe the various methods for isolating microbes and methods for maintenance and preservation of pure cultures
CO2	Compare and contrast light and electron microscopes
CO3	Elucidate the microbes and their role in agriculture
CO4	Recall the success of various industrial fermentation process
CO5	Illustrate various approaches in bioremediation of soil, air and water
CO6	Design a model of fermentor
CO7	Exemplify the microbes and their role in food and Pharmaceutical industries

REFERENCE BOOKS

1. General microbiology – Powar & Danginwala Himalaya publications.
2. Microbiology – Concepts and Applications – Paul A. Ketchum, Jhon – Wiley & Sons.
3. Basic and Practical Microbiology – R.M. Atlas, Macmillan Publishing Company.
4. Microbiology – Prescott, Harley & Klein, McGraw Hill Companies Inc.
5. Textbook of Biotechnology – R.C. Dubey. S. Chand & Co.
6. Microbiology – Pelczar, Chan & Krieg. Tata McGraw-Hill Publishing Company.
7. Industrial Microbiology – LE. Casida, New Age International [P] Ltd. Publishers.
8. Gene manipulation – An introduction to genetic engineering – Old & Primrose, Blackwell Scientific Publication.

L	T	P	C
3	0	0	2

SEMESTER – I
RESEARCH AND PUBLICATION ETHICS
SUBJECT CODE: MIRE21GS

Total Hours: 39

Objectives:

1. To impart knowledge on research problem and finding scientific articles with Internet.
2. To provide the knowledge about the Software tool to identify predatory publications.
3. This course clarify about the Scientific misconducts, Redundant publications, Ethics, database and research merits

THEORY

- **RPE 01: PHILOSOPHY AND ETHICS (3 hrs.)**
 1. Introduction to philosophy: definition, nature and scope, concept, branches
 2. Ethics: definition, moral philosophy, nature of moral judgements and reactions
- **RPE 02: SCIENTIFIC CONDUCT (5hrs.)**
 1. Ethics with respect to science and research
 2. Intellectual honesty and research integrity
 3. Scientific misconducts: Falsification, Fabrication, and Plagiarism (FFP)
 4. Redundant publications: duplicate and overlapping publications, salami slicing
 5. Selective reporting and misrepresentation of data
- **RPE 03: PUBLICATION ETHICS (7 hrs.)**
 1. Publication ethics: definition, introduction and importance
 2. Best practices / standards setting initiatives and guidelines: COPE, WAME, etc.
 3. Conflicts of interest
 4. Publication misconduct: definition, concept, problems that lead to unethical behavior and vice versa, types
 5. Violation of publication ethics, authorship and contributorship
 6. Identification of publication misconduct, complaints and appeals
 7. Predatory publishers and journals

PRACTICE

- **RPE 04: OPEN ACCESS PUBLISHING(4 hrs.)**
 1. Open access publications and initiatives
 2. SHERPA/RoMEO online resource to check publisher copyright & self-archiving policies
 3. Software tool to identify predatory publications developed by SPPU

4. Journal finder / journal suggestion tools viz. JANE, Elsevier Journal Finder, Springer Journal Suggested, etc.

• **RPE 05: PUBLICATION MISCONDUCT (4hrs.)**

A. Group Discussions (2 hrs.)

1. Subject specific ethical issues, FFP, authorship
2. Conflicts of interest
3. Complaints and appeals: examples and fraud from India and abroad

B. Software tools (2 hrs.)

1. Use of plagiarism software like Turnitin, Urkund and other open source software tools

• **RPE 06: DATABASES AND RESEARCH METRICS (7hrs.)**

A. Databases (4 hrs.)

1. Indexing databases
2. Citation databases: Web of Science, Scopus, etc.

B. Research Metrics (3 hrs.)

1. Impact Factor of journal as per Journal Citation Report, SNIP, SIR, IPP, Cite Score
2. Metrics: h-index, g index, i10 index, altmetrics

OUTCOMES:

C O	Overview of research publications, open access, ethics following in research articles
C O 2	Methods to identify the Scientific misconducts, Redundant publications Journal finder / journal suggestion tools viz. JANE, Elsevier Journal Finder, Springer
	To impart the knowledge on Use of plagiarism software like Turnitin, Urkund and other open source software tools, calculate the Metrics

QUESTION PAPER PATTERN

M.Phil MICROBIOLOGY (Total marks – 75 marks)

Section A

Answer all the questions. All questions carry equal marks.

Either/or pattern – 5 questions (5X6=30 marks).

Section B

Answer any 3 of the following questions out of 5 questions. (3X15=45 marks).

L	T	P	C
5	0	0	5

TOTAL HOURS : 65

RECOMBINANT DNA TECHNOLOGY

Subject Code : M1MB22MT

Objectives

1. The aim of the subject is to gain the knowlwdge on genetic materials, cloning system, basic techniques of Molecular biology and their application in various field.
2. To illustrate creative use of modern tools and techniques for manipulation and analysis of genomic sequences.
3. To expose students to application of recombinant DNA technology in biotechnological research.

UNIT I: (13)

Principles of genetic engineering for *E. coli*. Basic cloning techniques – generation of DNA fragments – Restriction enzymes – joining DNA molecules. Vector systems for *E. coli* – plasmids (general and specific purpose). Bacteriophages, lambda, M₁₃, cosmids. DNA transfer system.

UNIT II: (13)

Construction of genomic libraries and cDNA libraries – identification of specific genes. Selection for an expressed phenotype – Hybridization – Techniques with nucleic acid probes – Immunological techniques.

UNIT III: (13)

Molecular characterization of cloned genes – Restriction analysis – DNA sequencing – Analysis of transcripts. Site specific mutagenesis. Overexpression of genes in *E. coli*.

UNIT IV: (13)

Genetic engineering of Gram positive bacteria – methods for the genetic manipulation of Bacilli – gene expression. Genetic engineering of *Streptomyces* – methods of gene manipulation – gene expression – use of *Streptomyces* as a host for the excretion of heterologous products.

UNIT V: (13)

Genetic engineering of yeast. Molecular techniques for gene manipulation in *Saccharomyces cerevisiae*. Molecular transformation – selection markers – vectors – Expression

of heterologous proteins. Genetic engineering of filamentous fungi for industry – antibiotics. Protein production – fungal enzymes. Mammalian proteins.

OUTCOMES:

CO1	Explain the concept of recombination techniques likes cloning and vectors
CO2	Discuss about the construction of genomic, cDNA library and hybridization techniques
CO3	Comprehend the various methods of mutagenesis and gene expressions
CO4	Understands the concepts of gene manipulation techniques
CO5	To gain the knowledge about the industrial production of antibiotics, enzymes and proteins
CO6	Explain the concept of recombination, linkage mapping and elucidate the gene transfer mechanisms in prokaryotes and eukaryotes
CO7	Describe the importance of recombinant DNA technology in various field

REFERENCE BOOKS

1. T. A. Brown - 1995. Gene cloning - a introduction – Chapman & hall London.
2. Calendar, R. (1988). Bacteriophages Vols. I, II and III. Plenum Press.
3. Chirikjian JD Eds (1995). Biotechnology – Theory and Techniques, Vol. I, Jones and Burtlett publishers.
4. David Freifelder (2005). Molecular Biology 2nd edition. Narosa pub. New Delhi.
5. DNA Cloning, Vols. 1,2,3 and 4, IRL press.
6. Primrose SB. (1994). Molecular Biotechnology, 2nd edition, Blackwell Scientific publications.
7. Old RW, Primrose SB. (1994) principles of Gene Manipulation. Blackwell Scientific publications.
8. Tuan RS. (1997). Recombinant gene expression protocols. Humana press.
9. Watson JD, Gilman M, Witkowski J, Zoller M. (1992). Recombinant DNA Scientific American Books.

L	T	P	C
5	0	0	5

TOTAL HOURS : 65

BIOPROCESS TECHNOLOGY

Subject Code : M1MB22MT

Objectives:

1. The aim of the subject is to know the industrially important strains, fermentors, production of various fermented products.
2. To acquaint students with technical and biological aspect of microbial utilisation for production of metabolites.
3. The *course* discuss on the basic operational in *bioprocess technology*, unit, dimension, mass transfer at the equilibrium phase, stoichiometry of microbial growth etc

UNIT I: (13)

Isolation of cultures – screening of new products from microorganisms – Inoculum development – Scale up of microbial, mammalian and plant cell processes – selection of scale up criteria – Strain improvement – screening and selection for strain improvement – protoplast fusion and Mutagenesis.

UNIT-II

Bioreactions – bioreactors in Bioprocessing of cells – Enzyme bioreactors – biosensors in Bioprocessing – shake flask and solid state fermentations – archaeobacterial bioprocessing – Bioprocessing by cell synchronization – Recent advances in yeast bioprocessing – Multiinteracting microbial Bio-processing – variables in bioprocessing.

UNIT-III

Basic concepts in Medium design – design procedure growth limiting nutrient in designed medium – cell growth and product formation – immobilization and cell culture – cell computer control of fermentation processes.

UNIT-IV

Bioproducts – Modern estimation and bioassay – sterilization – Medium sterilization – batch and continuous sterilization – sterilization of fermentor – feeds, liquid wastes and filter sterilization – Bioprocess of treatment of liquid wastes and water.

UNIT-V

Bioproducts recover – conventional recovery methods, Cell disruption, foam separation, centrifugation, cell disruption – Liquid-liquid extraction, counter current distribution chromatography. Newer methods – cross filtration and cassette separation. Dispersive separations.

OUTCOMES:

CO1	Ability the principles of physiological understanding in improvement of industrially importance microorganism.
CO2	Appreciate the different types of bioreactors and various fermentations types
CO3	Understand the rationale in medium formulation & design for microbial fermentation, sterilization of medium and air
CO4	Appreciate how microbiology is applied in manufacture of industrial importance fermentation products
CO5	Discuss the recovery and purification of industrial importance of products
CO6	Get equipped with a theoretical and practical understanding of industrial microbiology
CO7	Know how to source for microorganisms of industrial importance from the environment

Reference Books:

1. Balasubramanian D, Bryce CFA, DHARMALINGAM K, Green J, Jayaraman K. (1996). Concepts in Biotechnology, University Press, India
2. Baxevanis AD and BFF Ouellette, Wiley O.(ed) (2001) Bioinformatics – A practical guide to the analysis of genes and proteins. Interscience, New York.
3. Faber.K (1992) Biotransformation in organic chemistry, Springer Vuilag
4. Misener.S. & Krawetz. S.A. (2000) Phylogenetic analysis of DNA Sequences, Oxford University Press, Oxford

L	T	P	C
5	0	0	5

TOTAL HOURS : 65

BIOREMEDIATION

SUBJECT CODE : M1MB22MT

Objectives:

1. The aim of the subject is to gain the knowledge on degradation of pollutants by using microorganisms and plants. Help the students to make composting and vermicomposting.
2. The aim of the subject is to gain the knowledge on degradation of pollutants by using microorganisms and plants. Help the students to make composting and vermicomposting.
3. Understand the influence of contaminant characteristics to bioremediation (e.g. chemical structure, toxicity, and solubility).

UNIT-I

Bioremediation – definition – Efficacy testing – side effects testing. Approaches to bioremediation. Environmental modification. Microbial seeding. Bioengineering approaches to the bioremediation of pollutants.

UNIT-II

Bioremediation of contaminated soils. Diversity and magnitude of soil contaminants – criteria for bioremediation – biological mechanism of transformation – strategies for bioremediation – case studies of bioremediation strategies.

UNIT-III

Bioremediation of various ecosystem – contaminated aquifers – Bioremediation of oil pollutants – Biodegradation enhancement – stimulation of oil spills degradation. Bioremediation of air pollutants.

UNIT-IV

Xenobiotics – cometabolism and detoxification reactions. Biochemistry of xenobiotic metabolism. Bioleaching – Recovery of metals from ores – oxidation of minerals – testing for biodegradability – biomagnification. Bioaccumulation – removal of heavy metals from effluents.

UNIT-V

Composting of organic wastes – substrates suitable for composting – properties of compostable wastes – microbial characteristics of the composting process – progression – compost systems – Batch, continuous. Vermicomposting. Waster use in farming.

OUTCOMES:

CO1	Understanding about the various methods of bioremediation
CO2	Elucidate the diversified bacterial community involved in the field of bioremediation
CO3	Compare and contrast various process of composting methodologies
CO4	Gain knowledge the of xenobiotics compound degradation.
CO5	Explore the biological mechanism of pollutant transformation
CO6	Understanding about the importance of pollution free environment
CO7	Acquire knowledge about microorganisms and plants involved cleaning of environmental pollution.

Reference Books:

1. Moo-Young, M. Anderson W.A and Chakrabarty, A.M 1996. Environmental biotechnology; Principles and applications. Boston, Mass; Kluwer Academic publishers.
2. Wainwright, M. 1999. An introduction to environmental biotechnology, Boston, Mass Klumer Academic publishers.

L	T	P	C
5	0	0	5

TOTAL HOURS : 65

AGRICULTURAL MICROBIOLOGY

SUBJECT CODE : M1MB22MT

Objectives:

1. The aim of the subject is to gain the knowledge about the biofertilizers and biopesticides that are applied in the field of agricultural microbiology.
2. To exploit the microbial diversity in various agro-ecologies for biofertilizer application in diversified systems. To study the impact of soil management practices on microbial functions and soil health.
3. To improve biofertilizer technology to ensure high quality and improved delivery.

UNIT-I

Soil habitat – abiotic – description of physical and chemical characteristics – biotic diversity in soil microbial population – bacteria, archaea, fungi – eukaryotic algae and cyanobacteria, protozoa and viruses – nematodes.

UNIT-II

Microbial ecology – nature of soil organisms and their interactions – positive and negative interactions – mycorrhizal symbiosis – management of mycorrhizae – inoculum production and use – applied aspects of ecto and endo mycorrhizae. Rhizosphere and spermosphere.

UNIT-III

Fate of nitrogen in soil – biological dinitrogen fixation – symbiotic and non-symbiotic – significance. Nitrogenase enzyme complex – associative dinitrogen fixation – process – physiology and genetics of dinitrogen fixation – influence of environmental parameters –new developments in nitrogen fixation.

UNIT-IV

Microbial control of insect pests – control of soil borne microbial pathogens and nematodes – interaction of pesticides with soil microorganisms. Effects of microorganisms on pesticides. Effect of plant protection chemicals on soil microorganisms. Microbial herbicides.

UNIT-V

Strategies in bioconversion – utilization of farm wastes and residues in agriculture – microorganisms as a source of protein for animal nutrition – bioconversion of lignicellulose into protein – rich food and feed. Production of biogas, ethanol from biomass. Mushroom cultivation.

OUTCOMES:

CO1	Describe which physical and chemical factors that affects the microbes in soil
CO2	Apply basic techniques for identifying Rhizosphere soil microorganisms
CO3	Explain the various stages of biological nitrogen fixation
CO4	Demonstrate the beneficial effect of soil microbes in Agriculture
CO5	Elucidate the strategies for bioconversion
CO6	Recall the success of biogas production
CO7	Illustrate the basic techniques for mushroom cultivation

Reference Books:

1. Alexander. (1997). Introduction to Soil Microbiology. John Wiley and Sons.
N.Y.Subba Rao, N.S. (1995).

2. Soil Microorganisms and Plant growth, Oxford and IBH publishing Co. Pvt. Ltd.
3. Paul, E.A. and Clark. F.E. (1989). Soil Microbiology and Biochemistry. Academic press New York.
4. Subb Rao, N.S. (1995). Biofertilizers in Agriculture and Forestry. 3rd Edition. Oxford and IBH publication Co. Pvt. Ltd., New Delhi.

L	T	P	C
5	0	0	5

TOTAL HOURS : 65

MOLECULAR BIOLOGY

SUBJECT CODE : M1MB22MT

Objectives

1. The aim of the subject is to gain the knowledge on genetic materials, cloning systems, basic techniques of Molecular biology & their applications in various fields.
2. Nucleic acids and proteins and how these molecules interact within the cell to promote proper growth, division, and development.
3. This course will emphasize the molecular mechanisms of DNA replication, repair, protein synthesis etc.

UNIT-I

Molecular nature of gene – gene function. Nucleic acids – physical and Chemical structure of DNA – forms of DNA helix – size. Denaturation – Renaturation. Circular and superhelical DNA.

UNIT-II

DNA as genetic material. DNA replication – Repair – Mutagenesis, Mutations and mutants.

UNIT-III

Transcription in prokaryotes – transcription apparatus – operons: time control – major shifts in prokaryotic transcription. DNA – protein interactions.

UNIT-IV

Transcription in Eukaryotes – RNA polymerase – promoters – Transcription factors – Transcription activators. Chromatic structure and its effects on transcription. Post transcriptional events – Splicing – Capping and polyadenylation and other events.

UNIT-V

Translation – Initiation – Elongation and termination. Ribosomes and transfer RNA. Recombination – Transposition.

OUTCOMES:

CO1	Students gain the knowledge on genetic materials, types of DNA and their functions
CO2	Understand the students about gene DNA replication and mutation
CO3	Know the transcription and translation processes in prokaryotes
CO4	Recall transcription and translation process in eukaryotes, post translation and transcription processes
CO5	Gain the knowledge about ribosomes and transposition
CO6	The students gain the knowledge on Molecular biology
CO7	Molecular Biology gives you in-depth knowledge of biological processes through the investigation of the underlying molecular mechanisms.

Reference Books:

1. Old, R.S. and Primrose, S.B. (1995) Principles of Gene manipulation. An introduction to genetic Engineering. 5th Edition. Blakwell Scientific Publication, London.
2. Click, B.R. and Pasternat J.J. (1994) Molecular Biotechnology, ASM press. Washington DC.
3. Benjamin Lewin (1997) Genes VI, Oxford University Press.
4. Maloy S.R., Cronan J.E., freifelder D (1994), Microbial genetics. Jones & Barlett publishers.



OM SAKTHI
ADHIPARASAKTHI COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)
G.B Nagar, Kalavai – 632 506. Vellore District
Affiliated to Thiruvalluvar University,
Approved by AICTE, New Delhi
Accredited by NAAC B Grade.



DEPARTMENT OF COMPUTER SCIENCE AND APPLICATIONS

B.Sc(C.S)-SYLLABUS

(Effective from 2018-2019)

ADHIPARASAKTHI COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS)

Permanently Affiliated to Thiruvalluvar University, Vellore

Accredited by NAAC with B⁺⁺ Grade (CGPA-2.83)

B.SC - COMPUTER SCIENCE

Under CBCS

[Effective from the Academic year 2018-2019]

REGULATIONS

CBCS:

Choice –Based Credit System is a flexible system of learning. „Credit“ defines the quantum of contents / syllabi prescribed for a course and determine the number of hours of instruction required. The distinguished features of CBCS are the following:

It permits the students to:

- ❖ Learn at their own pace
- ❖ Choose electives from a wide range of elective courses offered by the departments of the colleges
- ❖ Undergo additional courses and acquire more than the required number of credits
- ❖ Adopt an inter – disciplinary approach in learning
- ❖ Make best use of the expertise of available faculty.

1. Eligibility for Admission:

Candidates seeking admission to the first year of the UG Degree Course should have passed the Higher Secondary Course Examination [Academic or Vocational] conducted by the Govt. of Tamilnadu with Mathematics / Business Mathematics/ Statistics/ Computer Science as a subject or an Examination of any other University accepted as Equivalent thereto by the Syndicate subject to such candidates shall be permitted to take the B.Sc Degree Examination of this University after the Completion of the Course of Three academic years in the University/ Colleges affiliated to this University and shall Qualify for the B.Sc Degree.

2. Eligibility for the Award of Degree:

A candidate shall be eligible for the award of the degree only if he/she has undergone the prescribed course of study in the college for a period of not less than three academic year and passed the examinations of all the six semesters prescribed earning 140 credits [in Parts-I,II,III,IV and V] .

The Upper age limit for admission to UG Degree Courses will be 21 (twenty one) years as on 1st July of the year of admission. For SC/ST/BC/MBC/DNC candidates and women candidates the age limit is relaxed by 3 years. For other communities, the Principals can relax up to three years based on merit. A relaxation of 5 years is permitted for Physically Handicapped as per G.O. Ms No.239, dated 03.09.1993.

3. Duration:

- a. Each academic year shall be divided into two semesters. The first academic year shall comprise the first and second semesters, the second academic year the third semester and fourth semesters and the third academic year the fifth and sixth semesters respectively.
- b. The odd semesters shall consist of the period from June to November of each year and the even semesters from December to April of each year. There shall be not less than 90 working days for each semester

4. The Course of Study:

The main subject of study for Bachelor Degree Courses shall consist of the following:

PART – I TAMIL / OTHER LANGUAGES

PART – II ENGLISH

PART – III CORE SUBJECTS

ALLIED SUBJECTS

PROJECT / ELECTIVES WITH THREE COURSES

PART – IV

1. [a]. Those who have not studied Tamil up to XII Std. and taken a Non-Tamil Language under Part – I shall take Tamil comprising of two courses [level will be at 6th standard].
[b]. Those who have studied Tamil up to XII Std. and taken a Non-Tamil Language under Part – I shall take Advanced Tamil comprising of two courses.
[c]. others who do not come under a/b can choose non-major elective comprising of two courses.
2. SKILL BASED SUBJECTS [ELECTIVE]:
Four courses are to be offered. The papers are to be accommodated in the second / third year of study for UG courses.

3. ENVIRONMENTAL STUDIES

4. VALUE EDUCATION

PART – V EXTENSION ACTIVITIES

5. Extension Activities:

A Candidate shall be awarded a maximum of 1 credit for compulsory Extension Service.

All the students shall have to enroll for NSS/ NCC [Sports and Games] Rotract/Youth Red Cross or any other service organization in the College and shall have to put in compulsory minimum attendance of 40 hours which shall be duly certified by the principal of the college before 31st march in a year. If a student LACKS 40 hours attendance in the first year he/she shall have to compensate the same during the subsequent years.

Students those who complete minimum of attendance of 40 hours in one year get half Credit and those who complete the attendance of 80 or more hours in two years will ONE CREDIT.

Literacy and population Education field Work shall be compulsory components in the above Extensions service Activities.

The following assessment procedure will be followed for Internal Marks: Continuous Internal Assessment (CIA) Test

S. No	Reg. No	Name	<u>Test I</u> Marks for 75	<u>Test II</u> Marks for 75	Marks for 150	Marks converted to 15/20	<u>Assignments/ Seminars [10]</u> <u>Records [05]</u>	Marks for 25/25	Total Rounded to Marks for 25/25

Test I : One hour duration for 75 marks.

Test II : Two hours duration for 75 marks.

Total marks 150

Theory

Practical

Test marks to be converted to	: 15 marks	/	20 marks
Assignments / Seminars	: 10 marks	/	-
Records	: -	/	05 marks
Total	: 25 marks	/	25 marks

In the column rounded to 25/25, any fraction may be rounded to the next number.

6. Requirements for proceeding to Subsequent Semesters:

(i). Candidates shall register their name for the first semester Examination after the admission in the U.G. Courses.

(ii) Candidates shall be permitted to proceed from the first semester up to the final semester irrespective of their failure in any of the semester examinations subject to the condition that the candidates should register for all the arrear subject of earlier semesters along the current (subsequent) semester subjects.

(iii). Candidates shall be eligible to go to subsequent semester, only if they earn, sufficient attendance as prescribed there for by the Academic Council from time to time. provided in case of a candidate earning less than 65 % of attendance in any one of the semester due to any extraordinary circumstances such as medical grounds, such candidates who shall produce Medical Certificate issued by the Authorized Medical Attendant (AMA), duly certified by principal of the college, shall be permitted to proceed to the next semester and to complete the course of study. Such candidates shall have to repeat the missed semester by rejoining after completion of final semester of the course, after paying the fee for the break of study as prescribed by the college from time to time.

7. Requirement to take the Semester Examinations:

a). A candidate will be permitted to take the Examination for any Semester, if

i). he / she secures not less than 75% of attendance out of the 90 instructional days during the semester.

[In the case of married women students the minimum attendance requirement shall be 55% of the total instructional days].

ii). he / she earns a progress Certificate from the Head of the Institution of having satisfactorily completed the Course of Study prescribed in the subjects as required by the regulations. and

iii). his / her conduct has been satisfactory.

Provided that it shall be open to the Academic Council, or any authority delegated with such powers by the Academic Council to grant exemption to a candidate who has failed to earn 75% of the attendance prescribed for any valid reason(s) subject to the usual conditions.

b). A candidates who has secured attendance less than 75% but 65% and above shall be permitted to take the Examination on the recommendation of the Head of the Institution to condone the lack of attendance as well as on the payment of the prescribed fees to the College.

8. Passing Minimum:

A Candidate shall be declared to have passed the whole Examination, if he/she passes in all the papers and practical wherever prescribed / as per the scheme of examinations by earnings by earning 140 credit in Parts – I, II, III, IV and V. He / She shall also fulfill the extension activities prescribed earning one credit to quality for the Degree.

In fixing the passing minimum marks, the following will be observed:

- (a). There shall be no passing Minimum for Internal.
- (b) For External Examination, Passing Minimum shall be of 40 % (Forty percentages) of the maximum marks prescribed for the paper .
- (c) In the aggregate (External + Internal), the passing minimum shall be of 40 % for each Paper/Practical/Project and Viva-Voce.
- (d) Grading shall be based on overall marks obtained [Internal +External]

Grading:

Once the marks of the CIA and end-semester examinations for each of the course are available, they will be added. The mark thus obtained will then be graded as per details given below

Marks	Grade Point	Letter Grade	Class
100	7.00	H	First Class with Distinction
90-99	6.00	O	First Class with Distinction
75-89	5.50	D	First Class with Distinction
60-74	4.75	A	First Class
50-59	4.00	B	Second Class
40-49	3.50	C	Third Class
Below 40	3.00	F	Fail

From the second semester onwards, the total performance within a semester and continuous performance starting from the first semester are indicated respectively by **Grade Point Average [GPA]** and **Cumulative Grade Point Average [CGPA]**. These two are calculated by the following formulae:

$$\text{GPA} = \frac{\sum_{i=1}^n C_i G_i}{\sum_{i=1}^n C_i}$$

Where „C_i“ is the Credit earned for the Course i in any semester; „G_i” is the Grade point obtained by the student for the course i and „n” is the number of courses passed in that semester.

CGPA = GPA of all the courses starting from the first semester to the current semester.

Note: The GPA and CGPA shall be calculated separately for the following three parts:

For purposes of declaring a candidate to have qualified for the Degree of Bachelor of Arts/Science/Commerce/Management/ Literature in the First Class / Second Class / Third Class or First Class with Distinction, the marks and the Corresponding CGPA earned by the candidate in part III alone will be the criterion, provided he / she has secured the prescribed passing minimum in LCs and ELs.

Grade in Part IV & V shall be shown separately and it shall not be taken into account for classification.

9. Classification of successful candidates:

Part-I TAMIL/ OTHER LANGUAGES:

Successful candidates passing Examination for the Language and securing the marks (i) 60 percent and above and (ii) 50 percent and above but below 60 percent in the aggregate shall be declared to have passed the examination in the First and Second class, respectively. All other successful candidates shall declare to have passed the examination in the Third Class.

PART –II ENGLISH;

Successful candidates passing examinations for English and securing the marks (I) 60 percent and above and (ii) 50 percent and above but below 60 percent in the aggregate shall be declared to have passed the examination in the First and Second class respectively. All other successful candidates shall be declared to have passed the examination in Third class

PART – III Consisting of CORE SUBJECTS, ALLIED SUBJECTS, PROJECT/ELECTIVES

Successful candidates passing examination for core courses together and securing the marks (i) 60 percent and above and (ii) 50 percent and above but below 60 percent in the aggregate of the marks prescribed for the core courses together a shall be declared to have passed the examination in the first and second class, respectively. All other successful candidates shall be declared to have passed the examination in the third class.

Part -IV: [Consisting of sub items 1 (a), (b) and (c), 2, 3, 4 and 5] as furnished in the regulations 4 Part –IV supra.

Part –V Extension Activities

The Only Credit earned for Part V Extension activities of a successful candidate shall not be taken into consideration for Classification/ Ranking and Distinction.

10. Ranking:

Candidates who pass all the examinations prescribed for the course in the first appearance itself alone are eligible for Ranking

Provided in the case of candidates who pass all the examinations prescribed for the course with a break in the First Appearance due to the reasons as furnished in the Regulations 7.[iii] supra are eligible for Classification / Distinction.

The marks obtained in improvement examinations will not be taken into consideration for ranking.

11. The Medium of Instruction and Examinations:

The medium of instruction and Examinations for the papers under part I and II shall be in the language concerned. For Part III and Part IV the medium of instruction and examination shall be English.

12. Submission of Record Notebooks for Practical Examinations:

Candidates taking the Practical Examinations should submit bonafide Record Notebook prescribed for the Practical Examinations. Otherwise the candidate will not be permitted to take the practical Examinations. However, in genuine case where the students could not submit the record notebook may be permitted to take the Practical Examinations provided the Head of the Department concerned certifies that the candidate has performed the experiments prescribed for the Course. For such of those candidates who do not submit Record Books, zero [0] marks will be awarded for record notebooks.

In case a candidate fails in the Practical Examination the marks awarded for the record at the time of first appearance for the Practical Examination should be made available by the University to the Examiners at the subsequent appearance by the candidate.

13. Improvement of marks in the subjects already passed:

Candidates who have passed in theory paper / papers are allowed to appear again for theory paper / papers only once in order to improve his/her marks, by paying the fee prescribed from time to time. Such candidates are allowed to improve within a maximum period of 10 semesters counting from his/her first semester of his/her admission. If candidate improves his marks, then his improved mark will be taken into consideration for the award of Classification and Distinction only. Such improved marks will not be counted for the award of Prize / Medals and Rank. If the Candidate does not show improvement in the marks, his previous marks will be taken into consideration.

No candidate will be allowed to improve marks in the Practical and Field work.

14. Checklist for Inspection:

A. Qualification for

Technical Faculty: as prescribed by the UGC and the University
Laboratory Staff : as prescribed by the UGC and the University.

B. Infrastructure Facilities

- i) Building: Number of classroom with specifications: 3 rooms measuring 20" x 25".
If the class strength is above 50 the space shall increase by 10 sq.ft, per student.
Number of staff rooms: one measuring 20" x 20"

- ii). Furniture: One pair of table / chair per student.

PATTERN OF QUESTION PAPER:

PART- A (50 Words)

To Answer 10 Question	10 X 2 Marks	= 20 Marks

PART-B (200 Words)

To Answer 5 Questions (either or Pattern)	5 X 5 Marks	= 25 Marks

PART-C (500 Words)

To Answer 3 Questions out of 5 questions	3X 10Marks	= 30 Marks

TOTAL = 75 Marks

DISTRIBUTION OF MARKS FOR SEMESTER PRACTICALS:

Program (written) : 40 Marks

Execution & Result : 15 Marks

Record : 10 Marks

Viva- Voce : 10 Marks

TOTAL : 75 Marks

The Course of Study and the Scheme of Examinations:

Year/ Semester	Part	Subject	Paper	Sub. Code	Title of the Paper	Ins. Hrs/ Week	Credit	Exam Hrs	Marks		
									IA	Sem Exam	Total
I Year I Sem	I	Language	Paper I	U1LT21FL	Tamil I	6	3	3	25	75	100
	II	English	Paper I	U1LE21SL	English I	6	3	3	25	75	100
	III	Core	Paper I	U1CS21MT	Digital Logic and Design	5	5	3	25	75	100
	III	Core Practical	Practical I	U1CS21MP	Multimedia Lab	4	2	3	25	75	100
	III	Allied I	Paper I	U1MA21AT	Mathematics-I	7	4	3	25	75	100
	IV	---	--	U1ES21GS	Environmental Studies	2	2	3	25	75	100
						30	19		150	450	600
I Year II Sem	I	Language	Paper II	U2LT21FL	Tamil II	6	3	3	25	75	100
	II	English	Paper II	U2LE21SL	English II	6	3	3	25	75	100
	III	Core	Paper II	U2CS21MT	Programming in C	5	5	3	25	75	100
	III	Core Practical	Practical II	U2CS21MP	Programming in C Lab	4	2	3	25	75	100
	III	Allied I	Paper II	U2MA21AT	Mathematics-II	7	4	3	25	75	100
	IV	---	----	U2VE21GS	Value Education (General Awareness)	2	2	2	-	50	50
						30	19		125	425	550
TOTAL						60	38		275	875	1150
II Year III Sem	I	Language	Paper III	U3LT21FL	Tamil III	6	3	3	25	75	100
	II	English	Paper III	U3LE21SL	English III	6	3	3	25	75	100
	III	Core	Paper III	U3CS21MT	Object Oriented Programming Using C++	5	5	3	25	75	100
	III	Core	Paper III	U3CS21MP	Object Oriented Programming Using C++ Lab	2	2	3	25	75	100
	III	Core Practical	Practical III	U3CS22MP	Data Structures and Computer Algorithms Lab	2	2	3	25	75	100
	III	Allied II	Paper III	U3CS22AT	Statistical Methods and their applications I	4	3	3	25	75	100
	IV	Skill based Elective I	Paper I	U3CS23ST	Data Structures and Computer Algorithms	3	3	3	25	75	100
	IV	Non Major Elective I	Paper I	U3CS21NM	Introduction to Information Technology(B.Com, B.B.A)	2	2	3	25	75	100
	IV	Non Major Elective I	Paper I	U3BA21NM	Management Concepts						
						30	23		200	600	800
II Year IV Sem	I	Language	Paper IV	U4LT21FL	Tamil IV	6	3	3	25	75	100
	II	English	Paper IV	U4LE21SL	English IV	6	3	3	25	75	100
	III	Core	Paper IV	U4CS21MT	Java Programming	3	5	3	25	75	100
	III	Core Practical	Practical IV	U4CS21MP	Java Programming Lab	3	3	3	25	75	100
	III	Allied II	Paper IV	U4CS22AT	Statistical Methods and their applications II	4	3	3	25	75	100
	III	Allied Practical		U4CS22AP	Statistical Methods and their applications I & II	3	2	3	25	75	100
	IV	Skill Based Elective II	Paper II	U4CS23ST	Microprocessors and Microcontrollers	3	3	3	25	75	100

	IV	Non -Major Elective II	Paper II	U4CS21NM	Internet and its Applications(B.Com,B.B.A)	2	2	3	25	75	100
	IV	Non -Major Elective II	Paper II	U4BA21NM	General Commercial Knowledge						
						30	24		200	600	800

III year V Sem	III	Core	Paper V	U5CS21MT	Relational Database Management System	6	5	3	25	75	100
	III	Core	Paper VI	U5CS22MT	Open Source Programming	6	5	3	25	75	100
	III	Core Practical	Practical V	U5CS21MP	RDBMS Lab	5	4	3	25	75	100
	III	Core Practical	Practical VI	U5CS22MP	Open Source Programming Lab	5	4	3	25	75	100
	III	Elective I	Paper I	U5CS23ET	Data and Communication Networks	5	4	3	25	75	100
				U5CS24ET	Computer Graphics						
	IV	Skill Based Elective III	Paper III	U5CS25ST	Operating System	3	3	3	25	75	100
						30	25		150	450	600
III year VI Sem	III	Core	Paper VII	U6CS21MT	Visual Programming	4	5	3	25	75	100
	III	Core	Paper VIII	U6CS22MT	Web Technology	5	5	3	25	75	100
	III	Core Practical	Practical VIII	U6CS21MP	Visual Programming Lab	4	4	3	25	75	100
	III	Core Practical	Practical VII	U6CS22MP	Web Technology Lab	4	4	3	25	75	100
	III	Elective II	Paper II	U6CS22ET	Software Project Management	5	4	3	25	75	100
				U6CS23ET	Artificial Intelligence						
	III	Elective III	Paper III	U6CS24ET	Data mining and Warehousing	5	4	3	25	75	100
				U6CS25ET	Multimedia Systems						
	IV	Skill Based Elective IV	Paper IV	U6CS26ST	Cloud Computing	3	3	3	25	75	100
	V	Extension Activities		U6CS21EA		-	1	-	-	-	50
						30	30		175	525	750
TOTAL						60	55		325	975	1350
GRAND TOTAL						180	140		1000	3050	4100
TOTAL						60	47		400	1200	1600

Course Goals for Computer Science Undergraduates:

Computer science is a broad field that draws its foundation from a number of disciplines, requiring students to utilize concepts from different fields. At the core of our curriculum, students must learn to integrate computer science theory with practice. In a field that evolves as rapidly as computer science, the Department of Computer Science focuses on preparing students for long term learning that enables them to not only understand today's technologies, but also understand how to tackle challenges of the future.

At a broad level, the learning goals for the undergraduate majors are as follows:

- Recognizing the broad relevance of computational thinking in everyday life, as well as its applicability within other domains.
- Developing a high-level understanding of systems as a whole. This understanding should transcend component implementation details to emphasize the structure of computer systems and the processes involved in their construction and analysis.
- Understanding how theoretical underpinnings of the discipline influence practice.
- Understanding fundamental computer science principles that allow for easy adaptation as computer science evolves.
- Recognizing recurring themes such as abstraction, complexity, and concurrency and understand how they have broad application to the field of computer science.
- Understanding multiple programming paradigms and learning to program in more than one.
- Applying knowledge in multiple software projects and at least one substantial one. Doing so helps demonstrate practical applications of principles learned in different courses.
- Demonstrating knowledge and understanding of essential facts, concepts, principles, and theories relating to computer science and software applications.
- Deploying appropriate theory, practices, and tools for the specification, design, implementation, and maintenance as well as the evaluation of computer-based systems.
- Recognizing and being guided by the social, professional, legal and ethical as well as cultural issues involved in the use of computer technology.
- Communicating scientific understanding in oral and written forms.



Om Sakthi

ADHIPARASAKTHI COLLEGE OF ARTS AND SCIENCE

(Permanently affiliated to Thiruvalluvar University, Accredited by NAAC with B Grade)

(Autonomous)

G.B. Nagar, Kalavai – 632 506, Ranipet District. Ph:04173-242226, 242644



B.Sc Computer Science

PROGRAMME SPECIFIC OUTCOMES

PSO1	To understand the concepts of Mathematics and Computer Science and apply problem solving and logical thinking in Software Development, Web designing, computer networking, etc.
PSO2	Learn to use tools and technologies for solving real world problems. Develop software applications for variety of business and social problems.
PSO3	Enhance the communication skills to transfer information efficiently between different clients in the professional practice.
PSO4	Ability to identify and analyze user needs and take them into account in the selection, creation, evaluation, and administration of computer-based systems
PSO5	Ability to use current techniques, skills, and tools necessary for computing practices.
PSO6	Demonstrate mastery of Computer Science in the following core knowledge areas • Data Structures and Programming Languages • Databases, Software Engineering and Development • Computer Hardware and Architecture
PSO7	Design, correctly implement and document solutions to significant computational problems.

SEMESTER – I
ENGLISH - I
SUBJECT CODE: U1LE21SL

L	T	P	C
5	0	0	3

Total Hours: 65

OBJECTIVES:

This course aims at enhancing the language skills, fundamental grammar, communication skills and soft skills necessary for the first and second year students.

To enrich the morals, grammar and communication in English.

UNIT 1-PROSE

(10Hrs)

1. The Tree Speaks- Rajagopalachari.C
- 2.Snake in the Grass – R.K.Narayan

UNIT 2 –POETRY

(10 Hrs)

1. River, Once - Parthasarathy
2. Paper Boat- Rabindranath Tagore

UNIT 3 -SHORT STORY & ONE ACT PLAY

(20 Hrs)

1. Little Girls Wiser Than Men- Leo Tolstoy
2. The Bishop’s Candlestick-Morman Mckinnel

UNIT- 4 GRAMMAR & COMPOSITION

(25 Hrs)

1. Correct usage of Words
2. Vocabulary – Synonyms & Antonyms
3. Abbreviations
4. English for Excellence – Parts of Speech -Modern Avenue
5. Functional English: Creative Writing, College Grammar, Letter of Application and Writing a Resume

UNIT-5 COMMUNICATION SKILLS:

1. Listening Conversation- (i) Agreeing and Disagreeing.
(ii) Seeking and Giving Permission
(iii) Greetings
(iv) Introducing Oneself to others

COURSE OUTCOMES :

CO1	To develop skills in functional literacy, including appropriate spelling, punctuation and grammar.
CO2	To develop skills in reading (understanding, comprehending, interpreting, analyzing) texts for work
CO3	To develop skills in producing (constructing, creating, writing) texts for work, learning, community and/or everyday personal contexts
CO4	To improve vocabulary and develop the writing skills.
CO5	To explain the application of learning theories in the classroom situation.
CO6	To discuss the concept and theories of intelligence and creativity.
CO7	To speak and write choosing from a wider range of vocabulary

Reference Books:

1. Board of Editors, „Medley I“, Emerald Publishers: 2017
2. Radhakrishna Pillai.G, „Spoken English for You“, Emerald Publishers:1987

SEMESTER - I

PAPER - I

DIGITAL LOGIC AND DESIGN

SUBJECT CODE: U1CS21MT

L T P C

5 0 0 5

TOTAL HOURS:65

OBJECTIVES:

1. Learn how to design digital circuits, by simplifying the Boolean functions.
2. Learn to design combinational and sequential circuits.
3. To study about asynchronous sequential logic.

UNIT-I: BINARY SYSTEMS

(13 Hrs)

Digital Computers and Digital Systems – Binary Numbers - Number Base Conversion – Octal and Hexadecimal Numbers – Compliments – Binary Codes – Binary Storage and Registers – Binary Logic – Integrated Circuits

UNIT-II: BOOLEAN ALGEBRA AND LOGIC GATES

(13 Hrs)

Basic definitions of Boolean Algebra – Axiomatic Definition of Boolean Algebra – Basic Theorems and Properties of Boolean Algebra – Boolean Functions – Canonical and Standard forms – Other Logic Operations – Digital Logic Gates.

UNIT-III: SIMPLIFICATION OF BOOLEAN FUNCTIONS

(13 Hrs)

The Map Method – Two and Three Variable Maps - Four Variable Map – Five Variable Map – Product of Sums Simplifications - NAND and NOR implementation – Don't Care Conditions.

UNIT-IV: COMBINATIONAL LOGIC

(13 Hrs)

Introduction – Adders – Subtractors - Code Conversion – Binary Adder – Encoder – Decoders Multiplexer and De-multiplexer

UNIT-V: SEQUENTIAL CIRCUITS

(13 Hrs)

Flip flops – Registers – shift registers – Ripple counters – Synchronous Counters – The Memory Unit.

COURSE OUTCOMES:

CO1	Apply the Boolean minimization techniques for combinational circuits such as adder, sub tractor, encoder etc.
CO2	Explain the applications of digital electronics
CO3	Solve asynchronous sequential circuits for simple application
CO4	Apply the concept of sequential circuits for counters, shift registers etc.
CO5	Discuss the universality of NAND gates. Construct NOT, OR, AND, NOR, EXOR and EX-NOR gates using NAND gates and show the output.
CO6	Discuss the universality of NOR gates. Construct NOT, OR, AND, NOR, EXOR and EX-NOR gates using NOR gates and show the output
CO7	Explain K-map for three and four variables, identification of pairs, quads and octets and solving sum-of-products equations

TEXT BOOK:

1. M Morris Mano, “Digital Logic and Computer Design”, Pearson, 2nd edition, 2010.

REFERENCE BOOKS:

1. Louis Neshelsky, “Introduction to Digital Technology”, John Wiley & Sons, 4th Ed, 2006
2. Thomas.L.Floyd, “Digital Logic Design”, PHI, 2nd edition, 2004.

SEMESTER - I				
PRACTICAL – II	L	T	P	C
MULTIMEDIA LAB	0	0	4	2
SUBJECT CODE: U1CS21MP	TOTAL HOURS:52			

OBJECTIVES:

1. Students will gain a working knowledge of Photoshop and develop their skills in editing and altering photographs for through a basic understanding of the tool bar, layers, and the adjustments panel.
2. The vast possibilities of traditional tools, and develop an understanding of sophisticated layering techniques.

Image transformation and transition effects using Photoshop:

1. Photo Effects:

- a) Write a Program to generate Discoloring and changing background.
- b) Program to generate applying soft light effect using Photoshop.

2. Photo Retouching:

- a) Program to Implement Color correction and Blending Images.
- b) Program to demonstrate Smooth skin effects, adding blur effects to background.

3. Text Effect:

- a) Write a Program to Create Meta-tie text, Shining text, Illumines text and transparent glass text.
- b) Write a Program to create Marquee and Digital banner using Photoshop.

4. Image Editing:

- a) Program to demonstrate resize, change color depth, resolution and brightness.
- b) Write a program to edit using Lasso and clone stamp tools (masking).

5. Web Graphics:

- a) Program to create a gif image using image ready for web.
- b) Write a program to create a web navigation Image.

Using Flash Animation Software:

6. Write a program to show text floating into screen from outside the screen.
7. Program to generate Animated Banner using image ready software.
8. Write a program to correction an image using animated lightening strike.
9. Write a program to generate Mobile wall paper using flash
10. Create a Program for digital clock Animation using flash.

COURSE OUTCOMES:

CO1	Apply various tools to create and edit images.
CO2	Apply layers, filter effects and blending modes , share and save your images in various formats.
CO3	Learn various retouching and repairing techniques to correct images.
CO4	Demonstrate the techniques to use text reflection effect .
CO5	Demonstrate how to insert image inside the text.
CO6	Design and develop creative applications using GIMP.
CO7	To Understand the concept of multimedia software

SEMESTER – I
ALLIED – I
MATHEMATICS - I
SUBJECT CODE: U1MA21AT

L	T	P	C
7	0	0	4
TOTAL HOURS : 91			

OBJECTIVES :

- 1.To study about the connectives between two proportions.
- 2.To verify the validity of an argument.
- 3.To find the shortest distance between two skew lines

UNIT I : SYMBOLIC LOGIC (15 Hrs)

Proposition, Logical operators: conjunction, disjunction, negation, conditional and bi-conditional operators, converse, inverse, Contra positive, logically equivalent, tautology and contradiction. Arguments and validity of arguments.

UNIT II : DIFFERENTIATION (08 Hrs)

Differentiation- n^{th} derivative-partial differentiation- jacobian(simple problem).

UNIT III : MATRICES (20 Hrs)

Multiplication of Matrices, Singular and Non – Singular Matrices, Adjoint of a Matrix, Inverse of Matrix, Symmetric and Skew – Symmetric, Hermitian and Skew - Hermitian matrices, Orthogonal and Unitary Matrices-Simple problems.

UNIT IV: NUMERICAL METHODS (24 Hrs)

Interpolation: Introduction, Interpolation methods, Finite differences, forward and backward difference table, Newton's forward and backward difference interpolation formulas, Lagrange's formula and their inverse interpolation formula.

UNIT – V: THEORY OF EQUATIONS (18 hrs)

Descarts Rule of Signs – Approximate Solutions of Polynomials by Horner's method – Newton Raphson method of Solution of Cubic Polynomial. **Chapter 7.**

COURSE OUTCOMES :

CO1	Define proposition and argument, explain propositional connectives
CO2	Understand the idea of differentiation from first principles
CO3	Perform common matrix operations such as addition, scalar multiplication, multiplication, and transposition and transposition
CO4	Apply numerical methods to obtain approximate solutions to mathematical problems
CO5	Finding the integer solutions of an equation or of a system of equations
CO6	Understand the foundations of mathematics
CO7	Use mathematical ideas to model real-world problems

TEXT BOOKS:

1. P.R. Vittal , Mathematical Foundations – Margham Publication Chennai.
2. A.Singara velu ,Numerical methods, A.R.Publications
3. P. R .Vittal Algebra , Analytical Geometry and Trigonometry Margham Publications, Chennai. (III Edition) 2004 for Unit V.

REFERENCE BOOKS:

1. U. Rizwan, Mathematical Foundation – SciTech, Chennai.
2. V. Sundaram & Others, Discrete Mathematical Foundation – A.P. Publication, Sirkali.

SEMESTER - I	L	T	P	C
ENVIRONMENTAL STUDIES	2	0	0	2
SUBJECT CODE : U1ES21GS	TOTAL HOURS: 26			

OBJECTIVES:

1. Students in Environmental Studies are motivated by concern for welfare of the many human and non-human communities that shape this planet.
2. Recognize the interconnectedness of multiple factors in environmental challenges
Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.

UNIT – I: INTRODUCTION TO ENVIRONMENTAL SCIENCES: NATURAL RESOURCES (5 Hrs)

Environmental Sciences – Significance – Public awareness – Forest resources – Water resources – Mineral resources – Food resources - Environmental impact – fertilizer – Pesticide Problems.

UNIT – II: ECOSYSTEM, BIODIVERSITY AND ITS CONSERVATION (6 Hrs)

Ecosystem – concept – structure and function – producers, consumers and decomposers – Food chain – Food web – Forest, Grassland, desert and aquatic ecosystem. Biodiversity – Definition – genetic, species and ecosystem diversity – Values and uses of biodiversity – biodiversity at global, national (India) and local levels – Hotspots, threats to biodiversity – conservation of biodiversity – In-situ & Ex-situ.

UNIT – III: ENVIRONMENTAL POLLUTION AND MANAGEMENT (5 Hrs)

Environmental Pollution – Causes – Effects and control measures of Air, Water, Marine, soil, solid waste, Thermal, Nuclear pollution and Disaster Management – Floods, Earth quake, Cyclone and Landslides. Role of individuals in prevention of pollution – pollution, Case studies - – Bhopal gas tragedy, Minamata disease, Mercury factory (Kodaikanal), London fog.

UNIT – IV: SOCIAL ISSUES & ENVIRONMENT (5 Hrs)

Urban issues – Energy – water conservation – Environmental Ethics – Global warming – Resettlement and Rehabilitation issues – Environmental legislations – Environmental protection Act. 1986 – Air, Water, Wildlife and forest conservation Act.

UNIT – V: HUMAN POPULATION & ENVIRONMENT (5 Hrs)

Population growth and Explosion – Human rights and Value Education – Environmental Health – HIV/AIDS – Role of IT in Environment and Human Health – Women and child welfare – Public awareness – Case studies. Visit to a local area / local polluted site / local simple ecosystem – Report submission

COURSE OUTCOMES:

CO1	Recognize the importance of environment and public awareness required for sustainability.
CO2	Understand the availability of various resources, their availability and conservation.
CO3	Develop knowledge on structure and functions of the ecosystem, productivity and energy flow.
CO4	Comprehend the importance and conservation needs of biodiversity by framing policies.
CO5	Able to link causal effects of human activities and develop mitigation strategies for different pollution.
CO6	Demonstrate an integrative approach to environmental issues
CO7	Demonstrate and ability to integrate the many disciplines and filed that intersect with environmental concerns

TEXT BOOKS:

1. Kumaraswamy, K. Alagappa Moses, A and M. Vasanthy, Environmental Studies, Publication Division, Bharathidasan University, Tiruchirappalli, 2005.
2. Kumaraswamy, K. (Ed) GIS for Natural Resources and Disaster Management, Department of Geography, Bharathidasan University, Tiruchirappalli, 2008..
3. Rajamannar. Environmental Studies, EVR College Pub, Trichy. 2004.
4. Kalavathy, S. Environmental Studies, Bishop Heber College Pub., Trichy. 2004.

SEMESTER II
ENGLISH – II
SUBJECT CODE: U2LE21SL

L	T	P	C
5	0	0	3

TOTAL HOURS: 65

OBJECTIVES:

To uplift the student's ability to improve personality development and to have fluency in English.

UNIT -1 PROSE

(10Hrs)

1. Early Influences - A.P.J. Abdul Kalam
2. The Unity of Indian Culture- Humayan Kabir

UNIT -2 POETRY

(10 Hrs)

1. The Soul's Prayer.- Sarojini Naidu
2. Nutting – William Wordsworth

UNIT-3 SHORT STORY AND ONE ACT PLAY

(18 Hrs)

1. The Doll's House - Katherine Mansfield
2. Hijack- Charles Wills
- 3.

UNIT -4 GRAMMAR AND COMMUNICATION SKILLS

(20 Hrs)

1. Lexical Skills
2. Functional Grammar
3. Functional English
4. Offering Help
5. Inviting Someone
6. Making Request

UNIT- 5 SOFT SKILLS

(7 Hrs)

1. Willingness to Learn
2. Communicating through Eye Contact
3. Good Attitude

COURSE OUTCOMES:

CO1	To refer to the dictionary for meaning, usage and grammar.
CO2	To interact confidently in situations like debates and group discussions and seminars.
CO3	Exercise dramatic and life skills.
CO4	Analyze poetic texts using appropriate terms such as diction, tone, imagery, figures of speech, motif, etc.
CO5	To interpret a poem based on contextual evidence
CO6	To identify the main ideas, details and speakers' attitudes and emotions by listening to different types of spoken texts.
CO7	Speak intelligibly (pronunciation, stress, intonation)

REFERENCE BOOKS:

1. Board of Editors, „Medley II“, Emerald Publishers: 2017
2. Board of Editors, „Transactions in English“, Emerald Publishers:2011
3. Radhakrishna Pillai.G, „Spoken English for You“, Emerald Publishers:1987

SEMESTER -II	L	T	P	C
PAPER – II				
PROGRAMMING IN C	5	0	0	5
SUBJECT CODE: U2CS21MT	TOTAL HOURS: 65			

OBJECTIVES:

- 1.To learn programming using a structured programming language.
- 2.To provide C programming exposure.
- 3.To introduce foundational concepts of computer programming to students of different Branches of Engineering and Technology

UNIT- I: (13 Hrs)

C Fundamentals character Set- Identifiers and Keywords – Data types – Constants- variables- declarations- Expressions-statements- Arithmetic, Unary, relational and Logical, Assignments and Conditional Operators- Library Functions.

UNIT - II: (13 Hrs)

Data input output functions – Simple C Programs- Flow of Control – if, if-else, while, Do...While, for loop, nested control structures- Switch, break and continue, go to statements- comma operator.

UNIT - III: (12 Hrs)

Functions – Definitions – Prototypes - Passing arguments - Recursion. Storage Classes- Automatic, External, Static, Register Variable.

UNIT – IV: (14 Hrs)

Arrays – Defining and processing- Passing arrays to functions- Multi dimension arrays- Arrays and String. Structures – User Defined data types- Passing structures to Functions – Self Referential Structures- Unions – Bit wise Operations.

UNIT - V: (13 Hrs)

Pointer – Declarations - Passing pointers to functions - operation on pointers - pointers and Arrays - Arrays of pointers - structures and pointers - files: creating processing, opening and closing a data file.

COURSE OUTCOMES:

CO1	Write C program for simple applications
CO2	Formulate algorithm for simple problems
CO3	Analyze different data types and arrays
CO4	Perform simple search and sort
CO5	Use programming language to solve problems
CO6	Able to implement the algorithms and draw flowcharts for solving Mathematical and Engineering problems
CO7	To be able to develop C programs on linux platform.

TEXT BOOK:

1. Ashok.N.Kamthane, “Programming with ANSI and Turbo C”, Pearson Edu, 1st Ed, 2009.

REFERENCE BOOKS:

1. B.W. Kernighan and D.M.Rithchi, “The C Programming Language”, PHI, 4th Ed, 2006.
2. H.Scildt, “C - The Complete Reference”, TMI 4th Edition 2007.
3. Kanethar Y, “Let us C”, BPB Pub New Delhi, 5th Edition 2004.

SEMESTER- II				
PRACTICAL – II	L	T	P	C
PROGRAMMING IN C LAB	0	0	4	2
SUBJECT CODE: U2CS21MP	TOTAL HOURS: 52			

OBJECTIVES:

1. To understand the basic programming constructs and articulate how they are used to develop a program with a desired runtime execution flow.
2. To articulate where computer programs fit in the provision of computer-based solutions to real world problems.

I. Summation of Series

1. Sin(x)
2. Cos(X)
3. Exp(X) (Comparison with built in functions)

II. String Manipulation

1. Counting the no of Vowels, Consonants, Words, white Spaces in a line of Text and array of Lines.
2. Substring detection, count and Removal
3. Finding and Replacing Substrings

III. Recursion

1. GCD of two numbers
2. Maximum and Minimum

IV. Matrix Manipulation

1. Addition, Subtraction and Multiplication
2. Determinant of a Matrix

V. Sorting and Searching

1. Bubble Sort
2. Binary Search

VI. File Manipulation

1. File Copying
2. Files using command line arguments

COURSE OUTCOMES:

CO1	Read, understand and trace the execution of programs written in C language.
CO2	Write and compile programs using C programs.
CO3	Write program with the concept of Structured Programming
CO4	Identify suitable data structure for solving a problem
CO5	Demonstrate the use of conditional statement.
CO6	Write the C code for a given algorithm
CO7	Implement Programs with pointers and arrays, perform pointer arithmetic, and use the pre-processor.

SEMESTER – II	L	T	P	C
ALLIED – I	7	7	0	5
MATHEMATICS - II	TOTAL HOURS:91			
SUBJECT CODE: U2MA21AT				

OBJECTIVES :

- 1.To Test the consistency of a system of equation using matrix
- 2.To solve an algebraic equation & find the solution using numerical methods
- 3.To Evaluate an integral using numerical integration by various rules

UNIT – I : MATRICES (15 Hrs)

Solution of Simultaneous Linear Equations by Cramer's rule-Matrix Inversion Method- characteristic equations and Cayley – Hamilton theorem

UNIT – II : INTEGRATION (08 Hrs)

Integration –single and double integration (simple problems)-Bernoulli's method-definite integral.

UNIT III: NUMERICAL METHODS (20 Hrs)

Solutions of Algebraic and Transcendental equations: Bisection method, Regula Falsi method, Newton's Raphson method, Iterative method.

UNIT IV: NUMERICAL METHODS (CONTINUED) (24 Hrs)

Numerical Differentiation: Newton's forward and backward difference formulas for differentiation.

Numerical Integration: Trapezoidal rule to evaluate the definite integral, Simpson's One – Third rule, Simpson's Three – Eight rule, Weddle's rule.

UNIT – V: ANALYTICAL GEOMETRY OF THREE DIMENSION (24 Hrs)

Planes-general equation of plane- intercept form-plane passing through three points, Straight lines- straight line as intersection of two plane – symmetrical form – line passing through two given points , Spheres – equation of sphere – centre – radius – sphere through four points [Simple Problem only]

COURSE OUTCOMES:

CO1	Express a system of simultaneous linear equations in matrix form.
CO2	Compute indefinite and definite integrals using by the method of substitution and evaluates double integrals.
CO3	Apply numerical methods for differential equation
CO4	Learn numerical differentiation and integration
CO5	Know how to find the roots of transcendental equations
CO6	Learn how to interpolate the given set of values
CO7	Evaluate an integral using numerical integration by various rules

TEXT BOOK:

1. P.R. Vittal , Mathematical Foundations – Margham Publication Chennai.
2. A.Singara velu, Numerical methods, A.R.Publications .

REFERENCE:

1. U. Rizwan, Mathematical Foundation – SciTech, Chennai.
2. V. Sundaram & Others, Discrete Mathematical Foundation – A.P. Publication.

SEMESTER - II	L	T	P	C
VALUE EDUCATION	2	0	0	2
SUBJECT CODE: U2VE21GS	TOTAL HOURS: 26			

OBJECTIVES:

1. To make the students responsible citizens in the personal and social life.
2. To develop proper attitude towards self and fellow being on one's own country and people of other countries thereby enriching humanity.

UNIT – I: (6 Hrs)

INTRODUCTION AND OUTLINE OF VALUE EDUCATION

Value Education – Definition and Scope. Family values – Responsibility of family, Status of Women in family & society, caring for needy and elders. Ethical Values – Mass media Ethics, Influence of Ethics in family. Issue of Globalization - Modern warfare, Terrorism, Mutual respect of different Cultures and religions.

UNIT –II: (5 Hrs)

PERSONAL SKILLS

Self Esteem – Definition, Factors Influencing Self Esteem, Qualities of High and low self esteem. Self Concept – Definition, Characteristics of self concept. Role of self concept in Personal growth. Self acceptance – Definition, Benefits and obstacles of self acceptance.

UNIT –III: (5 Hrs)

POSITIVE THINKING, MOTIVATION AND PERSONALITY DEVELOPMENT

Positive thinking – Definition, Positive and Negative Attitude, Power of Positive thinking, Positive Imaging. Motivation – Definition, Difference between Inspiration and Motivation, Internal and External Motivation. Demotivation, Demotivating factors. Personality Development – Definition, characteristic and elements of personality, Development of Personality.

UNIT –IV: (5 Hrs)

COPING AND DEVELOPING COPING MECHANISM

Coping – Definition, Positive and Negative Coping, kinds of coping, typical responses to Coping. Shyness - Definition, Types and symptoms of shyness. How to overcome shyness. Depression – Definition, Symptoms, Causes and Impact of Depression, How to Overcome depression. Failure – Definition, Coping with failure, Developing Competence.

UNIT –V: (5 Hrs)

LEADERSHIP TEAMWORK AND WORK ENVIRONMENT

Leadership – Definition, Characteristics of leadership, various kinds of leaders, Factors Influencing leadership styles. Characteristics of successful leader. Teamwork – Definition, Characteristic of Team work, Team learning. Life skills required for work environment and ways to build a better work environment

COURSE OUTCOMES:

CO1	Acquire the basic knowledge on value education.
CO2	Understand the importance of principles of life and components of values.
CO3	To learn about philosophy of Life and Individual qualities and family values.
CO4	Creating and improving awareness of values and their importance and role.
CO5	To know about ethics and social values.
CO6	To learn more of Risk and Safety assessment with case studies.
CO7	To learn more of Responsibilities and Rights as Professional and facing Global Challenges.

TEXT BOOK:

1. S.Xavier Alphonse, We shall overcome - A textbook on life coping skills. ,S.J. ICRDCE Publication, 6th Edition,2012.
2. Lakshminarayanan K. R and Uma Mageswari, M.Value Education. Nalnilam publication, 2009.

REFERENCE BOOKS:

1. T.Anchukandam and J.Kuttainimathathil (ED) “Grow Free Live Free”, Krisitu Jyoti Publications,Bangalore, 2nd Edition, 2000.
2. Mani Jacob (ED) “Resource Book for Value Education”, Institute for Value Education, New Delhi 3rd Edition, 2002.
3. Dharma Bharti, “DBNI, NCERT, SCERT”, National Institute of Peace and Value Education, Secunderabad, 2nd Edition, 2002.
4. Daniel and Selvamony, “Value Education Today”,Madras Christian College, Tambaram and ALACHI, New Delhi, 2nd Edition, 1990.
5. S.Ignachmuthu – values for life – Better yourself books, Mumbai,1991.
6. M.M.M.Mascaronhas, Centre for Research Education Science and Training for Family. Life Promotion – Family Life Education, Bangalore, 1993.

SEMESTER - III
ENGLISH – III
SUBJECT CODE: U3LE21SL

L	T	P	C
5	0	0	3

Total Hours: 65

OBJECTIVES:

To motivate students in pursuing multidisciplinary learning vocabulary and communication skills.

UNIT -1 PROSE

(12 hours)

1. The Right to Public Amnesia – Santhosh Desai
2. On saying “Please” – .A.G. Gardiner.
3. With the Photographer- Stephen Leacock.

UNIT -2 POETRY

(12 hours)

1. Time and Love -William Shakespeare
2. Obituary – A.K. Ramunujam
3. The Professor – Nissim Ezekiel

UNIT -3 DRAMA & BIOGRAPHY

(16 hours)

1. Lady Macbeth’s Soliloquy- Act I scene V
2. Mother Teresa -F.G.Herod

UNIT -4 GRAMMAR AND COMMUNICATION SKILLS

(19 hours)

1. Lexical Skills
2. Functional Grammar
3. Functional English
4. Asking for Advice
5. Expressing Gratitude
6. Complementing and Congratulating

UNIT-5 SOFT SKILLS

(6 hours)

1. Accountability
2. Aptitude verses Attitude
3. Diversity

COUREE OUTCOMES :

CO1	Expose the different genres to acquire knowledge and apply that in the creative writing.
CO2	Interpret Shakespeare's works critically in their written form through performance.
CO3	Analyze various types of novels with reference to thematics and other approaches
CO4	Appreciate the working of various literary devices like irony in fiction.
CO5	Acquire familiarity with a wide variety of forms, styles, structures, and modes in English.
CO6	Identify and understand the significance of these forms in shaping a text's meaning.
CO7	To become proficient in English for global competency.

Reference Books:

1. Board of Editors, „Medley III“, Emerald Publishers: 2018
2. Board of Editors, „Spring Board“, Foundation Books Publishers:2012
3. Radhakrishna Pillai.G, „Spoken English for You“, Emerald Publishers:1987

SEMESTER - III**PAPER - III**

L	T	P	C
3	0	0	5
TOTAL HOURS: 39			

OBJECT ORIENTED PROGRAMMING USING C++**SUBJECT CODE: U3CS21MT****OBJECTIVES:**

1. To learn advanced features of the C++ programming language as a continuation of the previous course.
2. To learn the characteristics of an object oriented programming language: Data abstraction and information hiding, inheritance and dynamic binding.
3. To learn the basic principles of object oriented design and software engineering in terms of software reuse and managing complexity.

UNIT I: (8 Hrs)

Principles of Object Oriented Programming (OOP) : Evolution of C++ - Programming Paradigms - Key Concepts of OOP - Advantages of OOP - Usage of OOP and C++ .Input and Output in C++-Streams-Stream classes Unformatted console I/O operations-Member functions of istream class-manipulators-manipulators with parameters.

UNIT II: (7 Hrs)

Introduction to C++: Tokens, Keywords, Identifiers, Variables, Operators, Expressions and Control Structures: If, If..Else, Switch - Repetitive Statements- for, while, do..while - Pointers and Arrays.

UNIT III: (8 Hrs)

Functions in C++ - Main Function - Function Prototyping - Parameters Passing in Functions - Values Return by Functions - Inline Functions - Function Overloading.

Classes and Objects-Constructors and Destructors- and Operator Overloading - Type of Constructors.

UNIT IV: (8 Hrs)

Inheritance: Single Inheritance - Multilevel inheritance - Multiple inheritance - Hierarchical Inheritance - Hybrid Inheritance. Pointers - Virtual Functions and Polymorphism

UNIT V: (8 Hrs)

Working with Files: Classes for File Stream Operations - Opening and Closing a File - End-of-File Detection - File Pointers - Updating a File - Error Handling during File Operations - Command-line Arguments

COURSE OUTCOMES:

CO1	Articulate the principles of object-oriented problem solving and programming.
CO2	Outline the essential features and elements of the C++ programming language.
CO3	To learn the syntax and semantics of the C++ programming language.
CO4	To learn programming fundamentals, including statement and control flow and recursion.
CO5	Applying the concepts of class, method, constructor, instance, data abstraction, function abstraction, inheritance, overriding, overloading, and polymorphism
CO6	To learn how containment and inheritance promote code reuse in C++.
CO7	To learn how to implement files and command line arguments in C++

TEXT BOOK:

1. Ashok N.Kamthane, "Object Oriented Programming with ANSI & Turbo C ++", Pearson Education, 3rd Edition, 2010.

REFERENCE BOOK:

1. E.Balagurusamy, OBJECT-ORIENTED PROGRAMMING WITH C++, Tata Mc- Graw hill Publication, 4th Edition, 2009.
2. Maria Litvin & Gray Litvin , C++ for you, Vikas publication, 2nd Edition, 2008.
3. John R Hubbard, Programming with C, TMH publication, 2nd Edition, 2002.

SEMESTER - III PRACTICAL - III OBJECT ORIENTED PROGRAMMING USING C++ LAB SUBJECT CODE: U3CS21MP	<table border="0"> <tr> <td>L</td> <td>T</td> <td>P</td> <td>C</td> </tr> <tr> <td>0</td> <td>0</td> <td>2</td> <td>2</td> </tr> </table> TOTAL HOURS: 39	L	T	P	C	0	0	2	2
L	T	P	C						
0	0	2	2						

OBJECTIVES:

- 1.To learn programming constructs of C++.
- 2.To implement the linear and non-linear data structure using STL.

1. Program to implement Control Structures.
2. Program to implement Classes, Object and member functions.
3. Program to implement Inline Functions.
4. Program to implement Constructors and Destructors.
5. Program to implement the concept of Function overloading.
6. Program to implement the concept of Operator overloading.
7. Program to implement the concept of Inheritance.
8. Program to implement Virtual Functions
9. Program to implement File handling concepts.
10. Programs using Strings.

COURSE OUTCOMES:

CO1	Implement Basic programming constraints in C++.
CO2	Implement Object Oriented Programming Concepts in C++.
CO3	Develop applications using stream I/O and file I/O.
CO4	To Demonstrate practical experience in developing object-oriented solutions.
CO5	To Analyze a problem description and design and build object-oriented software using good coding practices and techniques.
CO6	Implement Basic programming constraints in C++.
CO7	Implement Object Oriented Programming Concepts in C++.

L	T	P	C
0	0	2	2

TOTAL HOURS: 39

SEMESTER - III

PRACTICAL - III

DATA STRUCTURE AND COMPUTER ALGORITHMS LAB

SUBJECT CODE: U3CS22MP

OBJECTIVES:

- 1.To learn programming constructs of C++.
- 2.To implement the linear and non-linear data structure using STL

1. Write a program to Implement Factorial and Fibonacci series using Recursion.
2. Write a program to Implement PUSH, POP operations of STACK using Arrays.
3. Write a program to Implement FRONT, REAR operations of QUEUE using Arrays.
4. Write a program to Create, Insert and Delete Values in Singly Linked List.
5. Write a program to Demonstrate Binary Tree traversals.
6. Write a program to Implement Quick sorting.
7. Write a program to Implement Merge Sorting.
8. Write a program to Implement Knap sack problem using Dynamic programming.
9. Write a program to Implement Shortest Path using Dijkstra,s Algorithm.
10. Write a program to Implement Traveling Salesperson problem.
11. Write a program to Solve Eight Queens Problem Using Backtracking.

COURSE OUTCOMES:

CO1	Apply generic programming technique to implement any data structure
CO2	Apply appropriate search trees for an application
CO3	Use graphs in problem solving

SEMESTER – III ALLIED – II STATISTICAL METHODS AND THEIR APPLICATIONS - I SUBJECT CODE – U3CS22AT	<table border="0"> <tr> <td>L</td> <td>T</td> <td>P</td> <td>C</td> </tr> <tr> <td>4</td> <td>0</td> <td>0</td> <td>3</td> </tr> <tr> <td colspan="4">TOTAL HOURS: 52</td> </tr> </table>	L	T	P	C	4	0	0	3	TOTAL HOURS: 52			
L	T	P	C										
4	0	0	3										
TOTAL HOURS: 52													

OBJECTIVE:

- 1.To understand and computing statistical aspects
- 2.To represent a statistical data using Diagrams & Graphs.
3. To find Arithmetic Mean, Median, Mode, Co-efficient of variation.

UNIT- I **(11 Hrs)**

Introduction – Scope and limitations of statistical methods- Classification of data- Tabulation of data – Diagrammatic and graphical representation of data – Diagrams: Line, Bar and Pie diagrams- Graphs: Histogram, Frequency Polygon, Frequency, Ogive and Laurents Curves.

UNIT – II **(10 Hrs)**

Measures of location: Arithmetic Mean, Median, Mode, Geometric mean and Harmonic mean and their properties.

UNIT – III **(10 Hrs)**

Measures of dispersion: Range, Quartile deviation, Mean deviation, Standard deviation, Combined Standard deviation, Co-efficient of variation.

UNIT – IV **(11 Hrs)**

Measures of Skewness : Karl Pearson's, Bowley's, Kelly's and coefficient of skewness and Kurtosis based on moments.

UNIT – V **(10 Hrs)**

Correlation – Karl Pearson – Spearman's rank correlation – Concurrent deviation methods. Regression Analysis : Simple Regression Equations.

COURSE OUT COMES:

CO1	Analyze statistical data graphically using frequency distributions
CO2	Analyze statistical data using measures of central tendency
CO3	Recognize, describe, and calculate the measures of the spread of data: variance, standard deviation, and range

CO4	Explain the statistical concepts of skewness, Kurtosis & moments
CO5	Discuss basic ideas of linear regression and correlation
CO6	Students will formulate complete and concise
CO7	Students will frame problems using multiple mathematical and statistical representations of relevant structures and relationships

Text Book :

1. Dr. S.P. Gupta-Sultan chand & sons,Statistical Methods .

Reference Books :

1. S.C. Gupta and V.K. Kapoor- Sultan Chand, Fundamental of Mathematical statistics-
2. Snedecor G. W. & Cochran W.G. Oxford ,Statistical Methods .
3. Mode – E.B. – Prentice Hall, Elements of Statistics.

L	T	P	C
3	0	0	3

SEMESTER-III

SKILL BASED ELECTIVE - I

TOTAL HOURS: 39

DATA STRUCTURES AND COMPUTER ALGORITHMS

SUBJECT CODE: U3CS23ST

OBJECTIVES:

- 1.To learn generic data structures using templates
- 2.To increase the student's intuitive understanding of search trees
- 3.To learn advanced tree data structures

UNIT I: (8 Hrs)

Definition of a Data structure - ADT - Primitive and Composite data types, Arrays: Representation, Types and operations on arrays - ordered lists.

UNIT II: (8 Hrs)

Stack ADT: Operations - Array Implementation - Applications (Infix to postfix)
Queue ADT: Operations - Types - Priority Queue. List ADT: Linked List - Doubly Linked List - Circular Linked List - Polynomial addition.

UNIT III: (7 Hrs)

Trees: Binary Search Trees - AVL Trees - B-Trees. Graphs: Definitions - Undirected & Directed Graphs - Traversal - Shortest Path – Hashing.

UNIT IV: (8 Hrs)

Algorithm: What is an Algorithm? – Specifications - Space and Time Complexities - Asymptotic Notations - Primality Testing. Sorting and Searching: Linear & Binary Search - Merge, Quick and External Sorting.

UNIT V: (8 Hrs)

Greedy Method: General, Knapsack, Minimum spanning trees - Traveling Salesperson Problem - Backtracking: General - 8 Queen's Problem.

COURSE OUTCOMES:

CO1	Implement data structure using C++
CO2	Suggest appropriate tree/graph data structure for any given data set
CO3	Apply hashing concepts for a given problem
CO4	Modify or suggest new data structure for an application
CO5	Appropriate choose the sorting algorithm
CO6	Appropriate choose the sorting algorithm
CO7	Applying Backtracking Technique

TEXT BOOK:

1. N. DALE, “C++ Plus data structure”, Narosha Publisher, Edition -2000
2. M.A. Weiss, “Data Structures and Algorithm Analysis in C++”, 2nd Edition, Pearson Education Asia, 2002

REFERENCE BOOKS:

1. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, “Fundamentals of Computer Algorithms”, Galgotia Publications, 2011

L	T	P	C
2	0	0	2

SEMESTER- III **TOTAL HOURS: 26**
NON MAJOR ELECTIVE- I
INTRODUCTION TO INFORMATION TECHNOLOGY
SUBJECT CODE: U3CS21NM

OBJECTIVES:

- 1.Learned the concepts of a computer-based information Processing system
- 2.Developed an understanding of the terminologies unique to the computer science field.
- 3 Acquired the ability to use selected commercial application packages.

UNIT I: **(6 Hrs)**

Introduction: History of Computer - Parts of Computer System - Hardware Devices - Software - Operating System - Examples of Operating systems - Computer Networking - Visual Editor.

UNIT II: **(4 Hrs)**

Microsoft Word - Microsoft Excel - Microsoft PowerPoint.

UNIT III: **(6 Hrs)**

Introduction to Multimedia - Images - Sound - Video Desktop Publishing Basics - Page layout Programs - Text Generation - Graphics for DTP - Print Production.

UNIT IV: **(5 Hrs)**

Introduction to Internet - Working of Internet - Internet Services - Internet Addressing - E-Mail Basics - Web Development Tools - Introduction to HTML

UNIT V: **(5 Hrs)**

Information System - Management Information concepts - Planning Issues and the MIS - Organizing Issues and the MIS - Control Issues and the MIS - Decision Support Systems.

COURSE OUTCOMES:

CO1	Understand model, components of computer and how it works.
CO2	Understand the concepts, structure, types and design of operating Systems.
CO3	Recognize when to use each of the Microsoft Office programs to create professional and academic documents.
CO4	Students will have a working knowledge of paragraph formatting, macro and mail-merge in MS-Word.

CO5	Students will have a working knowledge of basic functions and formulas in MS-Excel.
CO6	Create presentation by adding slides, applying animations, set times to slides, linking to another file.
CO7	Understand the concept of Internet technologies and how it works.

TEXT BOOK:

1. Sanjay Saxsena, “A First Course in Computer”, Vikas Publishing House, 2nd Edition, 2000.

REFERENCE BOOKS:

1. Ron Mansfield, “Working in Microsoft Office”, Tata Mcgraw Hill, 3rd Edition, 2009.
2. Linda Tway, Sapphiro Pacific Lajolla, “Multimedia in Action”, Academic Press, 5th Edition, 2008.
3. Neil randal “Teach yourself the internet in a week”, Prentice Hall of India, 2nd Edition, 1996.

SEMESTER-III
NON MAJOR ELECTIVE - I
MANAGEMENT CONCEPTS
SUBJECT CODE: U3BA21NM

L T P C
2 0 0 2
TOTAL HOURS: 26

OBJECTIVES:

1. Make the students aware of the management concepts and practices
2. To help the students gain understanding of the functions and responsibilities of managers.

UNIT I: (5 Hrs)

Management – Definition – Importance – Role and Function of a Manager.

UNIT II: (5 Hrs)

Planning – Nature – Purpose – Steps – Types – Merits and Demerits of Planning – MBO.

UNIT III: (6Hrs)

Organisms – Purpose – Departmentation – Span of Control – Delegation – Centralization and Decentralization – Line and Staffs – Committee.

UNIT IV: (5Hrs)

Directions – Leadership – Motivation – Communication Process of Communication – Barriers of Communication.

UNIT V: (5Hrs)

Controlling – Concept of Control – Methods of Control – Co-ordination – Need – Principles – Approaches to achieve effective Co-ordination.

COURSE OUTCOMES:

CO1	Understand the basic concepts, significance of management and role , functions of manager.
CO2	List the insight about planning its steps, types, and its pros and cons.
CO3	Describe organization, departmentation, span of control, centralization decentralization and its purpose.
CO4	Explain leadership styles and communication process and its barriers.
CO5	Concepts of control its process and different control methods.
CO6	Know the needs , principles and approaches of effective employee coordination.
CO7	Understanding the principles of management and its significance in organizational growth.

TEXT BOOKS:

1. J. Jayasankar-Principles of Management-Margam Publications,(2nd Edition 2013)
2. Dinkar Pagare-Principles of Management-Sulthan Chand & Sons, (2nd Edition 2005)

REFERENCE BOOKS

1. Gupta, C. B. Management concept & practices. New Delhi: Sultan Chand & Sons. (3rd Edition 2009)
2. Prasad, L. M. Principles and practice of management. New Delhi: Chand & Sons. (4thnd Edition 2012)
3. Tripathi, P. C. & Reddy P. N. Principles of management. New Delhi: Tata McGraw Hill(2nd Edition 2006)

SEMESTER IV
ENGLISH – IV
SUBJECT CODE: U4LE21SL

L T P C
5 0 0 3
Total Hours: 65

OBJECTIVE :

To impart morals, grammar and communication in English and soft skills.

UNIT -1 PROSE

(12 hours)

1. What is Courage - J.B.Priestly
2. Nobel Lecture- C. Malala Yousafzai
3. I won't Let him Go- Mathavan Kutty

UNIT -2 POETRY

(12 hours)

1. Stopping by Woods on a Snowy Evening – Robert Frost
2. Refugee Mother and Child -Chinua Achebe
3. An October Morning - Jayanta Mahapatra

UNIT -3 DRAMA & BIOGRAPHY

(16 hours)

- Selected Scenes from Shakespeare** - 1. Hamlet (Soliloquy) Act III Scene I
2. Funeral Oration – Julius Caesar Act III Scene II

BIOGRAPHY

1. Rabindranath Tagore – E.M. Carter

UNIT -4 GRAMMAR AND COMMUNICATION SKILLS

(19 hours)

1. Lexical Skills
2. Functional Grammar and Functional English
3. E-Mail and Presentation Skills
4. Curriculum Vitae, Covering Letter and Facing an Interview

UNIT-5 SOFT SKILLS

(6 hours)

1. Personal Energy
2. Honesty and Reliability

COURSE OUTCOMES :

CO1	Identify the distinct literary genres of the tragedies, comedies, and histories present in Shakespeare's work.
CO2	To enhance their close reading skill.
CO3	Analyze plays for their structure and meaning, using correct terminology.
CO4	Learn to use correct articulation of English sounds.
CO5	Use intonation and stress properly
CO6	Enhance their ability to understand, appreciate, and discuss works of literature through extensive reading and discussion of short stories, novels and plays.
CO7	Analyze works of fiction and drama for plot structure, setting, characterization, theme, and narrative point of view.

Reference Books:

- Board of Editors, „Medley IV“, Emerald Publishers: 2018
- Board of Editors, „Easy English“, MacMillan Publishers: 2013
- Radhakrishna Pillai.G, „Spoken English for You“, Emerald Publishers: 1987

L	T	P	C
3	0	0	5

SEMESTER- IV
PAPER -IV
JAVA PROGRAMMING
SUBJECT CODE: U4CS21MT

TOTAL HOURS: 39

OBJECTIVES:

- To familiarize the Object Oriented Programming (OOP) concepts, such as abstraction, encapsulation, instances, initializations, polymorphism, overloading, inheritance and generic programming.
- To learn the OOP specific programming languages such as C++ and Java.
- To write programs to solve problems using the OOP language constructs rather than structural programming.

UNIT I: (8 Hrs)

Introduction to Java - Features of Java - Object Oriented Concepts - Data Types - Variables - Arrays - Operators - Control Statements-Input and output-Scanner and System class-print(),println(), and printf() methods.

UNIT II: (8 Hrs)

Classes - Objects - Constructors - Overloading method - Access Control - Static and fixed methods - Inner Classes - String Class - Inheritance - Overriding methods - Using super- Abstract class – Type Wrapper classes for primitive types- Autoboxing and Auto Unboxing – Recursion.

UNIT III: (8 Hrs)

GUI components – Common GUI Event types and Listener Interfaces- JoptionPane – JLabel, Jtextfield, JButton,JCheckBox,JTextarea, JComboBox, JList, JPanel – Mouse Event Handling - Adapter Classes- Key Event Handling.

UNIT IV: (7 Hrs)

Layout Managers – FlowLayout, BorderLayout, GridLayout - Graphics and Java 2D – Graphics contexts and Graphics objects – Color control – Font Control – Drawing Lines, Rectangles and Ovals – JSlider – Using menus with Frames.

UNIT V: (8 Hrs)

Packages - Access Protection - Importing Packages - Interfaces - Exception Handling - Throw and Throws - Thread - Synchronization - Runnable Interface - Inter thread Communication – Multithreading - I/O Streams - File Streams - Applets – Introduction to Java API Packages(java.lang and java.util)

COURSE OUTCOMES:

CO1	Design problem solutions using Object Oriented techniques.
CO2	Apply the concepts of data abstraction, encapsulation, polymorphism, overloading, and inheritance for problem solutions.
CO3	Use the OOP concepts of C++ and Java appropriately in problem solving.
CO4	Use the syntax and semantics of java programming language and basic concepts of OOP
CO5	Develop reusable programs using the concepts of inheritance, polymorphism, interfaces and packages.
CO6	Apply the concepts of Multithreading and Exception handling to develop efficient and error free codes
CO7	Design event driven GUI and web related applications which mimic the real word scenarios.

TEXT BOOK:

1. C.Muthu, “Programming in Java” , TMH Publication ,2nd Edition, 2008.

REFERENCE BOOKS:

1. Deitel & Deitel, “Java How to Program”, PHI Publication, 6th Edition, 2005.
2. Herbert Schildt, “Java – The Complete Reference” MGH, 8th Edition, 2012.
3. Ivor Horton, “Beginning Java 2”, MGH, 3rd Edition, 2004.
4. Steven Holzner, “Java 2 Black book”, Coriolis Group books, 2nd Edition, 2006.

SEMESTER – IV	L T P C
PRACTICAL- IV	0 0 3 3
JAVA PROGRAMMING LAB	TOTAL HOURS: 39
SUBJECT CODE: U4CS21MP	

OBJECTIVES:

- To understand the basic concepts of Java, Class syntax, data types, flow of control, classes, methods, objects, arrays, exception handling, recursion, and graphical user interfaces (GUIs).

- Writing and testing applets for potential inclusion in web pages.

Understanding how to access enterprise data bases from the application programs.

1. Finding area and Perimeter of a circle. Use Scanner class.
2. Determining the order of numbers generated randomly using Random Class.
3. String Manipulation (Substring removal, string replacement etc.,)
4. Drawing Rectangles, Ovals etc using Applet.
5. Implementing Thread based applications & Exception Handling.
6. Application using synchronization such as Thread based, Class based and synchronized statements.
7. Implementing GUI based applications using swing components (Jlabel, Jbutton, JtextField)
8. Implementing GUI based application using Layout managers and menus.
9. Application using file streams (sequential file)
10. Application using file streams (Random file)

COURSE OUTCOMES:

CO1	To use the basics of Java programming, multi-threaded programs.
CO2	To implement the Exception handling concepts.
CO3	The skills to apply OOP in Java programming in problem solving
CO4	Implement Object oriented features using Java
CO5	Apply the concept of polymorphism and inheritance
CO6	Implement exception handling
CO7	Develop network and window application using awt and swings.

L	T	P	C
4	0	0	3

TOTAL HOURS : 52

SEMESTER – IV
ALLIED – II
STATISTICAL METHODS AND THEIR APPLICATIONS II
SUBJECT CODE: U4CS22AT

OBJECTIVE :

- 1.To apply statistical techniques in real life situations
- 2.To Fit a Curve for given data, find Probabilities, Distributions
- 3.To Test the data by using Sample test & Analysis of variance.

UNIT I (11 Hrs)

Curve Fitting by the methods of least squares $y = ax + b$, $y = ax^2 + bx + c$,
 $y = ax^b$, $y = ae^{bx}$

UNIT II (11 Hrs)

Sample Space – events – probability - Addition and multiplication theorem -
Conditional probability - Baye's Theorem (Without Problems) – Mathematical Expectation
(Definition & Simple problems on discrete series) .

UNIT III (10 Hrs)

Standard Distribution – Binomial, Poission, normal distribution and fitting of these
distributions.

UNIT IV (10 Hrs)

Test of significance for small sample-t Test and large sample test- χ^2 Test-Test of
significance based on mean, S.D Correlation.

UNIT V (10 Hrs)

F test-Analysis of variance (ANOVA)-one and two way classification.

COURSE OUTCOMES:

CO1	Create and interpret a line of best fit
CO2	Understand and use the terminology of probability and calculate probabilities
CO3	Recognize the binomial probability distribution and apply it appropriately
CO4	Conduct and interpret chi-square goodness-of-fit hypothesis tests
CO5	Discuss two uses for the F distribution
CO6	Finding Probabilities and Distributions
CO7	Test the data by using Sample test & Analysis of variance

TEXT BOOK:

Dr. S.P.Guptha – Statistical methods – sultan Chand & sons.

REFERENCE BOOKS:

P.R. Vittal.,- Elements of statistical methods.

J.k. Sharma - Business Statistics – Pearson Education.

B.Agarwal - Basic statistics – Wiley Eastern.R.S.N. Po ao and Bhagavathi – statistics.

SEMESTER - IV	L T P C
ALLIED PRACTICAL	3 0 0 2
	TOTAL HOURS : 26

STATISTICAL METHODS AND THEIR APPLICATIONS I & II

SUBJECT CODE: U4CS22AP

OBJECTIVES:

- 1.To Fit a Curve for giving data, find Probabilities, Distributions
- 2.To Test the data by using Sample test & Analysis of variance

ALLIED PRACTICAL

1. Diagrams and Graphs – Percentage subdivided Bar diagram, Pie diagram, Histogram, Ogive curve.
- 2.Measures of location – Finding Mean, Median & Mode for a continuous frequency distributions.
3. Measures of dispersion – Finding Q.D, M.D, S.D & C.V for a continuous frequency distributions.
4. Skewness and Kurtosis – Finding Karl Pearson's, Bowley's skewness and moments.
5. Correlation and Regression.
6. Curve Fitting: $y = ax + b$, $y = ax^2 + bx + c$, $y = ax^b$, $y = ae^{bx}$.
7. Fitting of distributions – Binomial, Poisson, Normal.
8. Test of significance for small sample and large sample test – t Test & χ^2 test.
9. F test, Analysis of variance: One way classification, Two way classification.

COURSE OUTCOMES:

CO1	Evaluation measures of central tendency and dispersion
CO2	The students with various basic concepts on sampling distributions and large sample tests based on normal distribution.
CO3	Understand the basic terms used in design of experiments

REFERENCE BOOKS:

1. S.P. Gupta, Statistical Methods.
2. S.C. Gupta & V.K. Kapoor Fundamentals of Applied Statistics..

L	T	P	C
3	0	0	3

SEMESTER - IV
SKILL BASED ELECTIVE - II **TOTAL HOURS: 39**
MICROPROCESSOR AND MICROCONTROLLERS
SUBJECT CODE: U4CS23ST

OBJECTIVES:

1. It gives a practical training of interfacing the peripheral devices with the 8085 microprocessor.
2. The course objective is to introduce the basic concepts of microprocessor and to develop in students the assembly language programming skills.
3. It gives real time applications of Microprocessor as well as microcontroller.

UNIT I: **(8 Hrs)**

8085 MICROPROCESSOR-Introduction to Microprocessor- 8085 Architecture and its operations- 8085 pin description-8085 instruction Set and Classification -8085 addressing modes.

UNIT II: **(8 Hrs)**

8085 PROGRAMMING-Writing assembly level Programs - Multi-byte addition- Multibyte Subtraction-BCD addition -BCD subtraction-BCD Multiplication-BCD division – BCD to Binary And Binary to BCD conversion-BCD to Hex and Hex to BCD conversion – ASCII to BCD and BCD to ASCII Conversion – ASCII to Binary and Binary to ASCII Conversion.

UNIT III: **(8 Hrs)**

FEATURES AND INTERFACING OF PROGRAMMABLE DEVICES FOR 8085 BASED SYSTEMS-Intel 8255 Programmable Peripheral Interface: Features of 8255 – Block diagram of Intel 8255- Operating Modes and control words of 8255 – Programming Examples – Interfacing LEDs – Interfacing Seven Segment Displays – Traffic Light control.

UNIT IV: **(8 Hrs)**

8086 MICROPROCESSOR AND ADVANCED MICROPROCESSOR-Introduction to 8086 Microprocessor- Architecture of 8086 – Pin details of 8086. Advanced Microprocessor: 80186 Architecture- 80286 Architecture –Pentium Microprocessor: Architecture of Pentium. Other Versions of Pentium: Pentium Pro Processor - Pentium II Processor - Pentium III Processor- Pentium 4 Processor

UNIT V:**(7 Hrs)**

8051 MICROCONTROLLER-Introduction to 8051 Microcontroller - Intel's MCS - 51 series Microcontrollers - Intel 8051 Architecture –Memory organization – Internal RAM Structure- Power Control in 8051 – Stack operation.

COURSE OUTCOMES:

CO1	Understanding the concept of 8085 Instruction set and Classification
CO2	To write programs to find out the smallest / largest number stored in memory, a program related to conversion from Binary to BCD and Hexadecimal to decimal using the 8085 assembly language.
CO3	Ability to understand the Hardware and Interfacing 8255
CO4	Solve basic arithmetic operations using the 8085 assembly language.
CO5	Demonstrate the concept of Programmable Interface Devices
CO6	Demonstrate the concept of 8051 Microcontroller
CO7	To provide a theoretical & a practical introduction to microcomputer and microprocessors, assembly language programming techniques, design of hardware interfacing circuit.

TEXT BOOK:

1. Ramesh Goankar “Microprocessors and Microcontroller”, Prentice Hall, 5th edition, 2002. (Unit I & Unit II)
2. N.Senthilkumar M.Saravannan, S.Jeevananthan “Microprocessor and Microcontrollers” Oxford University Press, 1/E, 2010 (unit III, Unit IV & Unit V)

REFERENCE BOOKS:

1. Douglas V. Hall “Microprocessors and Interfacing “, Tata McGraw Hill, 2/E, 2006.
2. Krishna kant “Microprocessors and Microcontrollers Architecture Programming and system design 8086,8086,8051,8096, PHI Learning Pvt Ltd. New Delhi, 2/E, 2010.
3. Barry B. Brey, “The Intel Microprocessor-8086/8088, 80186,286, 386, 486, Pentium Processor”, Prentice Hall of India Pvt Ltd, 8th Edition, 1998.
4. Yu-chang Lin and Clean, “Microprocessor Systems the 8086/8088 family architecture, Programming and Design”, Prentice Hall of India Pvt Ltd, 2nd edition, 2001.

L	T	P	C
2	0	0	2

SEMESTER -IV

TOTAL HOURS: 26

NON MAJOR ELECTIVE - II
INTERNET AND ITS APPLICATIONS
SUBJECT CODE: U4CS21NM

OBJECTIVES:

1. Understand the importance of the Internet in the real world.
- 2.3. Understand the client-server model of the Internet.
3. Understand the e-mail provider and search engine..

UNIT I: (5 Hrs)

Introduction to Computers- Programming Language types- History of Internet- Personal Computers- History of World Wide Web- Micro software .NET Java-Web resources.

UNIT II: (6 Hrs)

Web Browsers- Internet Explorer- connecting to Internet- Features of Internet explorer6- Searching the Internet- online help and tutorials- File Transmission Protocol (FTP) -Browser settings.

UNIT III: (5 Hrs)

Attaching a file, Electronic mail -Creating an E-mail ID- Sending and Receiving mails-attaching a file- Instance messaging - other web browsers.

UNIT IV: (5 Hrs)

Introduction to HTML headers- Linking- Images-special characters and line breaks- unordered lists- simple HTML programs.

UNIT V: (5 Hrs)

E-marketing -consumer tracking- Electronic advertising- search engine-CRM- credit card payments- Digital cash and e-wallets- micro payments- smart card .

COURSE OUTCOMES:

CO1	Able to understand the meaning of the term Internet and its functioning.
CO2	Can have a knowledge of the various applications of internet.
CO3	Able to understand the usage of web browsers and its applications.
CO4	Able to understand the working principles of search engines.
CO5	Able to understand the concept of Email and its functionalities.
CO6	Able to design web pages using html tags.
CO7	Able to understand the need of E-marketing and various digital payments.

TEXT BOOK:

- 1.H.M.Deitel, P.J. Deitel and A.B.Goldberg, “Internet and World Wide Web”, PHI, 5th Edition, 2012.

REFERENCE BOOKS:

1. Harley hahn, “The Internet- Complete Reference”, Tata McGraw Hill, 2nd Edition, 2008.
2. Thomas A.Powell, “The Complete Reference HTML”, TMH, 2nd Edition, 2006.
3. Douglas Comer, “The Internet Book”, Pearson Education, 3rd Edition, 2007.

SEMESTER - IV	L	T	P	C
	2	0	0	2

NON MAJOR ELECTIVE - II TOTAL HOURS: 26

GENERAL COMMERCIAL KNOWLEDGE

SUBJECT CODE: U4BA21NM

OBJECTIVES:

- 1.To enable the students in terms of understanding the various concepts
- 2.Students to understand the office accommodation and office environment.

UNIT I: (5 Hrs)

Commerce trade, industry-meaning-scope and importance of commerce-economics basis of commerce.

UNIT II: (5 Hrs)

Forms of business organization-sole trading-partnership firms-merits and demerits of partnership firm.

UNIT III: (5 Hrs)

Joint stock companies-features- memorandum and articles-shares and debentures-types-co-operatives-features-types and advantages.

UNIT IV: (5 Hrs)

Office organization-what in an office? Functions of office-office accommodation and environment-office layout-office manual.

UNIT V: (6 Hrs)

Handling of mail, filling and indexing-inward/out ward of mail-filling and indexing-system, essential and classification-methods-horizontal VS vertical filling-centralized and decentralized-indexing.

COURSE OUTCOMES:

CO1	Understand the basic concepts of commerce, trade and industry.
CO2	Identify the various forms of business organization.
CO3	Classify various types of shares and debentures.
CO4	Describe the office functioning and working environment.
CO5	Analyze filing and indexing system in the office management.
CO6	To handle inward and outward mails in the office.
CO7	Understanding the various concepts related to two business organizations and office management.

TEXT BOOKS

1. C.D. Balaji and G. Prasad-Business Organization, Margham Publications,1st Edition 2015.
2. Pillai R.S.N, Bhagwathi. V-Office Management-Sulthan chand and company, 1st edition 2003.

REFERENCE BOOKS:

1. Dr.C.B.Guptha-Office organization-. Sulthan chand and sons,3rd edition 2007.
2. Arora, S. P. Office Organization and Management. New Delhi: Vikas Publishing House,2ND edition, 2003.

SEMESTER – V

PAPER - V

L	T	P	C
6	0	0	5
TOTAL HOURS: 78			

RELATIONAL DATABASE MANAGEMENT SYSTEM

SUBJECT CODE: U5CS21MT

OBJECTIVES:

- 1.To learn the fundamentals and issues in database systems
- 2.To appreciate the design of databases using relational models
- 3 To learn data definition and query languages

UNIT – I

(15 Hrs)

Introduction: Database System Applications – Purpose of Database Systems – View of Data – Database Languages – Transaction Management – Database Architecture – Database users and Administrators.

Relational Model: Structure of Relational Databases – Database Design – ER Model – Overview of the Design Process – The Entity-relationship Model – Constraints – Entity Relationship Diagrams.

UNIT – II

(16 Hrs)

Relational Algebra Operations – Relational Languages: The Tuple Relational Calculus – The Domain Relational Calculus – SQL: Background – Data Definition – Basic Structure of SQL Queries – Set Operations – Aggregate Functions – Null Values – Nested Sub-Queries – Views – Modification of the Database.

UNIT – III

(16 Hrs)

Data Normalization: Pitfalls in Relational Database Design – Decomposition – Functional Dependencies – Normalization – First Normal Form – Second Normal Form – Third Normal Form – Boyce-Codd Normal Form – Fourth Normal Form – Fifth Normal Form – Denormalization – **Database Security:** Data Security Requirements – Protecting the Data within the Database – Granting and Revoking Privileges – Data Encryption.

UNIT –IV

(17 Hrs)

PL/SQL: A Programming Language: History – Fundamentals – Block Structure – Comments – Data Types – Other Data Types – Declaration – Assignment operation – Bind variables – Substitution Variables – Printing – Arithmetic Operators. **Control Structures and Embedded SQL:** Control Structures – Nested Blocks – SQL in PL/SQL – Data Manipulation – Transaction Control statements. **PL/SQL Cursors and Exceptions:** Cursors – Implicit & Explicit Cursors and Attributes – Cursor FOR loops – SELECT...FOR UPDATE – WHERE CURRENT OF clause – Cursor with Parameters – Cursor Variables – Exceptions – Types of Exceptions.

UNIT –V**(14 Hrs)**

PL/SQL Composite Data Types: Records – Tables – Varrays. Named Blocks: Procedures – Functions – Packages – Triggers – Data Dictionary Views.

COURSE OUTCOMES:

CO1	Classify modern and futuristic database applications based on size and complexity
CO2	Map ER model to Relational model
CO3	Write queries using normalization criteria
CO4	Compare and contrast various indexing strategies in different database systems
CO5	Appraise how advanced databases differ from traditional databases
CO6	Use of function and procedure in SQL
CO7	Use of Cursor and Trigger

TEXT BOOK:

1. Singh, “Database systems: Concepts, Design & applications”, Pearson Education, 2nd Edition, 2009.

REFERENCE BOOKS:

1. Abraham Silberschatz, H.F.Korth and S.Sudarshan-Database System Concepts McGraw Hill Publication, 3rd Edition, 2008.
2. Gerald V.Post, “DBMS-Designing and Business Applications”, McGraw Hill Publications, 2nd Edition, 2006.
3. Michael Abbey and Michael.J.Corey-Oracle, “A Beginners guide”, TMH, 4th Edition, 2009.

L	T	P	C
6	0	0	5

TOTALHOURS: 78

SEMESTER -V
PAPER - VI
OPEN SOURCE PROGRAMMING
SUBJECT CODE: U5CS22MT

OBJECTIVES

1. This course provides an overview of the historical and modern context and operation of free and open source software (FOSS) communities and associated software projects.
2. The practical objective of the course is to teach students how they can begin to participate in a FOSS project in order to contribute to and improve aspects of the software that they feel are wrong.
3. Students will learn some important FOSS tools and techniques for contributing to projects and how to set up their own FOSS projects.

UNIT-I **(15 Hrs)**

Introduction : Linux Essential Commands – File system Concept – Standard Files – The Linux Security Model – Vi Editor – Partitions Creation – Shell Introduction – String Processing – Investigation and Managing Processes – Network Clients – Installing Application.

UNIT- II **(16 Hrs)**

Introduction to MY SQL – The show Databases and Table – The USE command – Create Database and Tables – Describe Table – Select, Insert, Update, and Delete statement – Some Administrative detail – Table Joins – Loading and Dumping a Database.

UNIT-III **(16 Hrs)**

PHP Introduction – General Syntactic Characteristics – PHP Scripting – Commenting your code – Primitives, Operations and Expressions – PHP Variables – Operations and Expressions Control -statement – Array – Functions - Basic Form Processing – File and Folder Access – Cooking – Sessions – Database Access with PHP(MY SQL).

UNIT IV **(15 Hrs)**

Perl Backgrounder – Perl Overview – Perl Parsing Rules – Variables and Data – Statements and Control Structures – Subroutines - Packages and Modules - Working with Files – Data Manipulation.

UNIT –V**(16 Hrs)**

Python Syntax and Style – Python Objects – Numbers – Sequences – Strings – Lists and Tuples – Dictionaries – Conditionals and Loops – Files – Input and Output – Errors and Exceptions – Functions – Modules – Classes and OOP – Execution Environment.

COURSE OUTCOMES:

CO1	Ability to learn Linux Operating system and its environment.
CO2	Ability to gather information about Free and Open Source Software projects from software releases and from sites on the internet.
CO3	Ability to build and modify the mysql commands(insert,delete,update,alter,etc)
CO4	Ability to contribute perl software to and interact with Free and Open Source Software development projects
CO5	Learn the Python language, its structure, syntax concepts, libraries and application.
CO6	Learn how to write computer programming using Python language
CO7	Understand the installation of various packages in open source operating systems

REFERENCES:

1. Remy Card, Eric Dumas and Frank Mevel, “The Linux Kernel Book”, Wiley Publications, 2003
2. “Learning PHP, MySQL, Java Script, CSS and HTML5”, Robin Nixon, O’Reilly Publications, 3rd Edition, 2014.
3. Steve Suchring, “MySQL Bible”, John Wiley, 2002
4. Rasmus Lerdorf and Levin Tatroe, “Programming PHP”, OReilly, 2002
5. Martin C. Brown, “Perl: The Complete Reference”, Second edition, Tata McGraw-Hill, Indian Reprint, 2009.
6. Wesley J. Chun, “Core Python Programming”, Prentice Hall, 2001
7. Open Source Software, P.Rizwan Ahmed, Margham Publication, Chennai, 2015

SEMESTER - V	L	T	P	C
PRACTICAL - V	0	0	5	4
RDBMS LAB	TOTAL HOURS: 65			

SUBJECT CODE: U5CS21MP

OBJECTIVES:

- 1.To give a good formal foundation on the relational model of data.
- 2.To present SQL and procedural interfaces to SQL
- 3.To give an introduction to systematic database design approaches covering conceptual design, logical design and an overview of physical design.

1. Create a table Student-master with the following fields client_no, name, address, city, state, pincode, remarks, bal_due with suitable data types.
 - a) Create another table supplier_table from client_master. Select all the fields and rename client_no with supplier_no and name with supplier_name.
 - b) Insert data into client_master
 - c) Insert data into supplier_master from client_master.
 - d) Delete the selected row in the client_master.
2. Create a table sales_order with s_order_no and product_no as primary key. Set other fields to store client number, delivery address, delivery date, order status.
 - a) Add a new column for storing salesman number using ALTER Command.
 - b) Set the s_order_no as foreign key as column constraints.
 - c) Set the s_order_no as foreign key as table constraints.
 - d) Enforce the integrity rules using CHECK.
3. Create a table Order_Info with the following fields Orderid, Orderdate, Commplan, Custid, Shipdate, total with suitable data types. Create another table Customer with Custid, Name, Address, City, Pincode with suitable data types. Write commands to relating data through Join concepts using the table Order_Info and Customer.
4. Create a table master book to contain the information of magazine code, magazine name, and publisher. Weekly/biweekly/monthly, price. Write PL/SQL block to perform insert, update, and delete operations on the above table.

5. Create a table to contain phone number, user name, address of the phone user. Write a function to search for a address using phone numbers.
6. Create a table stock to contain the item code, item name, current stock, date of last purchase. Write a stored procedure to seek for an item using item code and delete it, if the date of last purchase is before 1 year from the current date. If not, update the current stock.
7. Create a table to store the salary details of the employees in a company. Declare the Cursor to contain employee number, employee name and net salary. Use Cursor to update the employee salaries.
8. Create a table to contain the information about the voters in a particular constituency. Write a proper trigger to update or delete a row in the table.
9. Create a table to store the details of the Alumni in an institution. Write a PL/SQL block to change address of particular alumni. Write proper exceptions and appropriate error messages.

USING FUNCTIONS, PROCEDURES AND PACKAGES:

10. Create a table student_master with the following fields name, regno, dept and year with suitable data types. Use Select command to do the following.
 - a) Select the student's name column.
 - b) Eliminate the duplicate entry in table.
 - c) Sort the table in alphabetical order.
 - d) Select all the Students of a particular department.
11. Create a table sales_order_details with the s_order_no as primary key and with the following fields: product_no, description, qty_ordered, qty_disp, product_rate, profit_percent, sell_price, supplier_name.
 - a) Select each row and compute sell_price*.50 and sell_price*1.50 for each row selected.
 - b) Select product_no, profit_percent, Sell_price where profit_per is not between 10 and 20 both inclusive.
 - c) Select product_no, description, profit_percent, sell_price where profit_percent is not between 20 and 30.
 - d) Select the supplier name and product_no where supplier name has „r“ or „h“ as second character.

12. Create table Order_master with following fields Order_no, Odate, Vencode, Ostatus, Del_date with suitable data types. Create another table Order_detail with Order_no, Itemcode, Qty_ord, Qty_deld with suitable data types. Write Commands to set Operations using the table Order_master and Order_detail.

COURSE OUTCOMES

CO1	Understand, appreciate and effectively explain the underlying concepts of database technologies
CO2	Design and implement a database schema for a given problem-domain
CO3	Normalize a database
CO4	Populate and query a database using SQL DML/DDDL commands
CO5	Declare and enforce integrity constraints on a database using a state-of-the-art RDBMS

SEMESTER – V	L	T	P	C
PRACTICAL VI	0	0	5	4
OPEN SOURCE PROGRAMMING LAB	TOTAL HOURS: 65			
SUBJECT CODE: U5CS22MP				

OBJECTIVES

1. Open source laboratory introduces the students to develop technical solutions for problems using the open source software is readily available at free of cost.
 2. The objective of this course is to enhance the knowledge of students to address the IT requirements both from the operating system and application requirement perspective.
-
1. Write a shell script to find out whether the given number is prime number or not.
 2. Write a shell program to find out factorial of the given number.
 3. Create a student database table in **MYSQL** and manipulate records (insert, delete, update) records in a web browser.
 4. Use essential **MySQL** record selection query to extract records in a MySQL database
 5. Develop a program using cookies and session using **PHP**.
 6. Develop a program using **PHP** to display Date and Time Functions.
 7. Write a Python Program to find the sum of Sine series.
 8. Write a Python Program to calculate the Marks of 5 Subjects and Display the Grade.
 9. Write a **PERL** program to implement the following,
 - a. Variables and Data – Statements and Control Structures.
 10. Write a **PERL** program to implement the following,
 - a. Subroutines - Packages and Modules.

COURSE OUTCOMES:

CO1	Select and install the various open source software as per the requirement.
CO2	Construct the development environment as per the requirement.
CO3	Identify the associated plug-in is as per the requirement.
CO4	Learn the languages like PHP, Perl, Python to develop an application as per requirement.
CO5	implement various applications using build systems
CO6	Understand and implement the mini projects using open source softwares.
CO7	Understand the kernel configuration and virtual environment

SEMESTER - V**ELECTIVE - I**

L	T	P	C
5	0	0	4
TOTAL HOURS: 65			

(To choose 1 out of the given 2)

DATA AND COMMUNICATION NETWORKS**SUBJECT CODE: U5CS23ET****OBJECTIVES:**

1. To understand the division of network functionality into layers.
2. To appreciate the top down and bottom up view of computer network architecture
3. To know the functionality of each layer in computer networks

UNIT-I**(13 Hrs)**

Introduction to Data Communication-Basic Concepts-Protocols and Standards-Applications of Data Communications. Open Systems and OSI Model. TCP/IP Architecture-Data Transmission Basics.

UNIT-II**(13 Hrs)**

Data Link Control and Protocol concepts- Flow Control, Error Control. Asynchronous Protocols, Synchronous Protocols. Local Area Networks-Wide Area Networks.

UNIT-III**(14 Hrs)**

Error Detection and Correction- Types of Errors. Data Compression-Image Compression, Video Compression, Audio Compression. ISDN Services-ISDN Topology, ISDN Protocols, Broadband ISDN.

UNIT-IV**(12 Hrs)**

Internetworking-Principles of Internetworking. Routing Principles-Internetwork Protocols(IP). Transport service-Transport Protocols-Transmission Control Protocols.

UNIT-V**(13 Hrs)**

Network Applications-Client server Model, DNS-TELNET-File Transfer and Remote File Access-Network Management, Network Security-Web security.

COURSE OUTCOMES:

CO1	Ability to trace the flow of information from one node to another node in the network
CO2	To understand network communication using the layered concept, Open System Interconnect (OSI) and the Internet Model.
CO3	Ability to choose functionalities at each layer for different applications.
CO4	Evaluate the protocols in network layer from QoS perspective
CO5	To understand the concept of flow control, error control and LAN protocols; to explain the design of, and algorithms used in, the physical, data link layers.
CO6	To know the functions performed by a Network Management System and to analyze connection establishment and congestion control with respect to TCP Protocol.
CO7	understand the principles and operations behind various application layer protocols like HTTP, SMTP, FTP.

Text Books:

1. Brijendra Singh, “Data Communications and Computer Networks”, PHI Learning Private Limited, New Delhi, Second Edition, 2005.
2. L. Mathu Krithigha Venkatesh, “Data Communication and Networking”, Margham Publications, Chennai.

Reference Books:

1. Ulysess D. Black, “Data Communications and Distributed Networks”, Prentice Hall of India, Third Edition, 1997.
2. Prakash C.Gupta, “Data Communications”, Prentice Hall of India, Second edition, 2014.

SEMESTER V
ELECTIVE - I
COMPUTER GRAPHICS
SUBJECT CODE: U5CS24ET

L	T	P	C
5	0	0	4
TOTAL HOURS:65			

OBJECTIVES:

- 1.To provide students with a foundation in graphics applications programming.
- 2.To introduce students with fundamental concepts and theory of computer graphics.
- 3.To give basics of application programming interface (API) implementation based on graphics pipeline approach.

UNIT-I **(13 Hrs)**

Introduction to computer Graphics - Video display devices- Raster scan Systems - Random Scan Systems - Interactive input devices - Hard copy devices - Graphics software - Output primitives - line drawing algorithms - initializing lines - line function - circle Generating algorithms.

UNIT-II **(13 Hrs)**

Attributes of output Primitives - line attributes - Color and Grayscale style - Area filling algorithms - Character attributes inquiry functions - Two dimensional transformation - Basic transformation - Composite transformation - Matrix representation - other transformations.

UNIT-III **(13 Hrs)**

Two - dimensional viewing - window- to view port co-ordinate transformation - clipping algorithms - Interactive input methods - Physical input devices - logical classification of input devices - interactive picture construction methods.

UNIT- IV **(13 Hrs)**

Three - dimensional concepts - Three dimensional display methods - parallel Projection - Perspective Projection - Depth Cueing - Visible line and surface identification - Three dimensional transformation.

UNIT-V **(13 Hrs)**

Three dimensional viewing - Projection - Viewing transformation - implementation of viewing operations - Hidden surface and Hidden line removal - backface removals.

COURSE OUTCOMES:

CO1	To understand the concept of graphical transformation
CO2	Extract scene with different clipping methods and its transformation to graphics display device.
CO3	Use of geometric transformations on graphics objects and their application in composite form.
CO4	Learn the principles and commonly used paradigms and techniques of computer graphics
CO5	Develop a facility with the relevant mathematics of computer graphics
CO6	Understand the basics of computer graphics, different graphics systems and applications of computer graphics.
CO7	Render projected objects to naturalize the scene in 2D view and use of illumination models for this.

Text Book:

1. D.Hearn and M.P.Baker, “Computer Graphics (C version)”, Pearson Education, 2nd Edition, 2011.

Reference Book:

1. W.M. Newman and R.F. Sproull, “Principles of Interactive Computer Graphics”, McGraw Hill International 4th Edition – 2002.
2. Basab Dutta Ganguly “Computer Graphics” Nandhu Publishers, 2nd Edition, 2014.
3. Adries Van Dam, F. Hughes John, Steven K. James D, “Computer Graphics Principles & Practice in C” Pearson, 2nd Edition, 2007.

L	T	P	C
3	0	0	3

SEMESTER - V

TOTAL HOURS:39

SKILL BASED SUBJECT III

OPERATING SYSTEM

SUBJECT CODE: U5CS25ST

OBJECTIVES:

- 1.To learn the concepts of operating systems.
- 2.To learn about the various issues in operating systems.
- 3.To familiarize with the important mechanisms in OS

UNIT-I

(8 Hrs)

Introduction - Types of Operating Systems - Operating System Services - System calls and System Programs

UNIT-II

(8 Hrs)

Process Management - Process Concepts - Process Scheduling - Operation On Process Inter Process Communication - Cpu Scheduling - Scheduling Algorithms - Deadlocks

UNIT-III

(8 Hrs)

Memory Management - Single and multiple partitioned allocation – Paging - Segmentation - Virtual Memory Management - Demand paging and Page Replacement Algorithms

UNIT-IV

(8 Hrs)

Information management - File concept - Access methods - Directory structure - allocation methods - free space management - disk scheduling.

UNIT-V

(7 Hrs)

UNIX: Unix system - Introduction - User interface - File System - Interprocess Communication – A Case Study

COURSE OUTCOMES:

CO1	Articulate the main concepts, key ideas, strengths and limitations of operating systems
CO2	Explain the core issues of operating systems
CO3	Know the usage and strengths of various algorithms of operating systems
CO4	Understand the basics of operating systems like kernel, shell, types and views of operating systems
CO5	Describe the various CPU scheduling algorithms and remove deadlocks.
CO6	Explain various memory management techniques and concept of thrashing
CO7	Recognize file system interface, protection and security mechanisms.

Text Book:

1. Abraham Silberschatz and P. B. Galvin – “Operating system concepts” - Addison Wesley Publication, 8th Edition, 2011.

Reference Books:

1. Achyut s Godbole , “Operating Systems” , TMH Publications ,3rd Edition, 2005.
2. John J. Donovan , “Systems Programming”, TMH Publications , 3rd Edition, 2001.
3. D.M. Dhamdhrer, “Systems Programming and Operating Systems”, TMH, 2nd Revised Edition, 2002.

SEMESTER VI

L	T	P	C
4	0	0	5

PAPER VII**TOTAL HOURS: 52****VISUAL PROGRAMMING****SUBJECT CODE: U6CS21MT****OBJECTIVES:**

1. Implement the event driven programming using Visual Basic 6.0 forms and controls
2. Use programming fundamental features like variables, control structures, procedures, etc.
3. Create menu to make the application more interactive

UNIT-I**(10 Hrs)**

Customizing a form- Writing a simple program - Tool box- Creating control-Name property- Command button-Access keys-Image control-Text boxes-Labels-Message boxes-0Grid _Editing tools-Variables data types-String number.

UNIT-II**(10 Hrs)**

Displaying information-Determinate loops, indeterminate loops -Conditionals - Built in function-Function and Procedure.

UNIT-III**(11 Hrs)**

Arrays-List-Sorting and searching -Record - Control arrays-Grid control-Project with multiple form -Do events and sub main –Error trapping.

UNIT-IV**(11 Hrs)**

VB objects- Dialogue boxes-Common control-Menus-MDI forms-Testing-Debugging and Optimization -Working with Graphics.

UNIT-V**(10 Hrs)**

File and handling-File system control-File system objects.

COURSE OUTCOMES:

CO1	Design, create, build, and debug Visual Basic applications.
CO2	Explore Visual Basic's Integrated Development Environment (IDE).
CO3	Implement syntax rules in Visual Basic programs.
CO4	Explain variables and data types used in program development.
CO5	Apply arithmetic operations for displaying numeric output.
CO6	Write and apply decision structures for determining different operations.
CO7	Write and apply loop structures to perform repetitive tasks.

Text Book:

1. Gary Cornell ,“ Visual Basic 6.0 From the ground up”, Tata McGraw Hill, 2nd Edition, 2002.

Reference Books:

1. Noel Jerke, “Visual Basic (The Complete Reference)”, Tata McGraw Hill, 3rd Edition, 2008.
2. Deitel& Deitel ,T.R. Nieto, ”Visual Basic 6”, PHI , Pearson Edition, 2005.

L	T	P	C
5	0	0	5

SEMESTER - V
PAPER VIII
WEB TECHNOLOGY
SUBJECT CODE: U6CS22MT

TOTAL HOURS:65

OBJECTIVES:

1. To write syntactically correct HTTP messages and describe the semantics of common HTTP methods and header fields
2. Describe the actions, including those related to the cache, performed by a browser in the process of visiting a Web address
3. Install a web server and perform basic administrative procedures, such as tuning communication parameters, denying access to certain domains.

UNIT-I

(13 Hrs)

Internet Basic - Introduction to HTML - List - Creating Table - Linking document Frames - Graphics to HTML Doc - Style sheet - Style sheet basic - Add style to document - Creating Style sheet rules - Style sheet properties - Font - Text - List - Color and background color - Box - Display properties.

UNIT-II

(12 Hrs)

Introduction to Javascript - Advantage of Javascript - Javascript Syntax - Datatype - Variable - Array - Operator and Expression - Looping Constructor - Function - Dialog box.

UNIT-III

(13 Hrs)

Javascript document object model - Introduction - Object in HTML - Event Handling - Window Object - Document object - Browser Object - Form Object - Navigator object Screen object - Build in Object - User defined object - Cookies.

UNIT-IV

(14 Hrs)

ASP. NET Language Structure - Page Structure - Page event, Properties & Compiler Directives. HTML server controls - Anchor, Tables, Forms, Files. Basic Web server Controls- Lable, Textbox, Button, Image, Links, Check & Radio button, Hyperlink. Data List Web Server Controls - Check box list, Radio button list, Drop down list, List box, Data grid, Repeater.

UNIT-V**(13 Hrs)**

Request and Response Objects, Cookies, Working with Data - OLEDB connection class, command class, transaction class, data adaptor class, data set class. Advanced Issues - Email, Application Issues, Working with IIS and page Directives, Error handling. Security - Authentication, IP Address, Secure by SSL and Client Certificates.

COURSE OUTCOMES

CO1	Students are able to develop a dynamic webpage by the use of java script and DHTML.
CO2	Students will be able to write a well formed / valid XML document.
CO3	Students will be able to connect a java program to a DBMS and perform insert, update and delete operations on DBMS table.
CO4	Students will be able to write a server side java application called Servlet to catch form data sent from client, process it and store it on database.
CO5	Students will be able to write a server side java application called JSP to catch form data sent from client and store it on database.
CO6	To study the framework and building blocks of .net integrated development environment.
CO7	To design and develop web based enterprise systems for the enterprises using technologies like jsp, servlet and asp.net

Text Books:

1. I. Bayross, "Web Enable Commercial Application Development Using HTML, DHTML, Javascript", Pen CGI, BPB Publications, 4/E, 2013.
2. G. Buczek, ASP.NET Developers Guide, TMH, 2/E, 2002.

Reference Books:

1. Deitel & Deitel, "Internet & World Wide Web How to program", Pearson Education, 3rd Edition, 2006.
2. J. Jaworski, "Mastering Javascript", BPB Publications, 3rd Edition, 1999.
3. T. A. Powell, "Complete Reference HTML", TMH, Third Edition, 2002.
4. Web Technologies HTML, Java Script, PHP, Java, JSP, ASP.NET, XML & AJAX Black Book", Kogent Learning Solutions, Dream Tech Press, 2nd Edition, 2015.

**SEMESTER VI
PRACTICAL VII**

**L T P C
0 0 4 4**

TOTAL HOURS:52

**VISUAL PROGRAMMING LAB
SUBJECT CODE: U6CS21MP**

OBJECTIVES:

1. Visual Basic provides an environment called the IDE (Integrated Development Environment) that provides a platform for visual programming.
2. With the user diversion towards graphical user interfaces, computer programming languages are also changing..
3. Visual Basic is graphical user interface programming language which has a bulk of inbuilt user friendly tools for understanding programming language concepts.

1. Building simple application
2. Working with Intrinsic controls and ActiveX controls
3. Application with multiple forms
4. Application with dialogs
5. Application with menus
6. Application using data control
7. Application using format dialogs
8. Drag and Drop events
9. Database Management
10. Creating ActiveX controls

COURSE OUTCOMES:

CO1	Can able to create Visual basic applications using forms, controls, and events
CO2	Develop windows applications using Visual Basic language.
CO3	Create applications with database connectivity.

SEMESTER - VI
PRACTICAL VIII
WEB TECHNOLOGY LAB
SUBJECT CODE: U6CS22MP

L	T	P	C
0	0	4	4

TOTAL HOURS: 52

OBJECTIVES:

1. Try and develop the most important technologies that are being used today by webdevelopers to build a wide variety of web applications.
 2. To develop Java based web programming.
 3. To build web applications using proven developer tools and message formats.
-
1. Create a simple page introducing yourself how old you are, what you do, What you like and dislike. Modify the introduction to include a bullet list of what you do and put list the 5 things you like most and dislike as numbered lists. Create another page about your favorite hobby and link it to (and from) your main page. Center something, and put a quote on one of your pages.
 2. Put an existing image on a web page. Create a table, use a heading and at least one use of row span/col. span. Color a page and some text within the page. Link to another site
 3. Create a new file called index.html.
 - Put the normal HTML document structure tags in the file.
 - Give it a title.
 - At the bottom of the page (i.e. the last thing between the body tags) put the following:
 - A horizontal rule.
 - A Link to your e-mail Address (With your name between the tag) ; remember to put the link to your E- Mail address within address tags.
 - A line break.
 - The date. (I have this same structure at the bottom of this page).
 - Above this block (which is called the footer), put a title in heading tags.
 - Add some text describing yourself (you can split this into multiple headings and Paragraphs if you wish).

4. Write a script to create an array of 10 elements and display its contents.
5. Write a function in Java script that takes a string and looks at it character by character.
6. Create a simple calculator using form fields. Have two fields for number entry & one field for the result. Allow the user to be able to use plus, minus, multiply and divide.
7. Create a document and add a link to it. When the user moves the mouse over the link, it should load the linked document on its own. (User is not required to click on the link).
8. Create a document, which opens a new window without a toolbar, address bar or a status bar that unloads itself after one minute.
9. Create a document that accepts the user's name in a text field form and displays the same the next time when the user visits the site informing him that he has accessed the site for the second time, and so on.
10. Create a Web form for an online library. This form must be able to accept the Membership Id of the person borrowing a book, the name and ID of the book and the name of the book's author. On submitting the form, the user

(the person borrowing the book) must be thanked and informed of the date when the book is to be returned. You can enhance the look of the page by using various ASPNET controls.

COURSE OUTCOMES:

CO1	Apply the Object Oriented features of Java for programming on the internet Implement socket programming and Client side scripting in Java
CO2	Implement socket programming and Client side scripting in Java
CO3	Design a Web application using various technologies such as Java, XML, AJAX, Servlets, PHP, JSP, Django and Jena.
CO4	Create applications using web services such as WSDL and SOAP
CO5	Develop application using Dreamweaver/Flex/Silver Light etc
CO6	Design and implement dynamic websites with good aesthetic sense of designing and latest technical know-how's.
CO7	Have a Good grounding of Web Application Terminologies, Internet Tools, E – Commerce and other web services.

SEMESTER - VI
ELECTIVE - II

L	T	P	C
5	0	0	4

TOTAL HOURS: 65

SOFTWARE PROJECT MANAGEMENT
SUBJECT CODE: U6CS22ET

OBJECTIVES:

1. To understand the roles of the project manager
2. To understand the threats and opportunities in project management
3. To gain Expertise in size, effort and cost estimation techniques

UNIT I: (12 Hrs)

Introduction to Software Projects – An Overview of Project Planning – Project Evaluation – Selection of an appropriate Project approach – Software effort Estimation.

UNIT II: (14 Hrs)

Activity Planning – Project Schedules – Sequencing and Scheduling Projects – Network Planning Model – forward and backward pass-Identifying the Critical path-Activity float-Shortening Project Duration – Identifying Critical Activities-precedence networks.

UNIT III: (12 Hrs)

Risk Management – Resource Allocation – Monitoring and Control – Managing People and Organizing Teams – Planning for Small Projects.

UNIT IV: (12 Hrs)

Software Configuration Management – Basic Functions – Responsibilities – Standards – Configuration Management – Prototyping – Models of Prototyping.

UNIT V: (15 Hrs)

Case Studies - Application of SPM concepts in Hospital information systems or information systems of any small and medium scale Industry – SPM in Hospital information management System, Small and Medium Scale Enterprises – Application of SPM in Marketing (For Unit V, students are expected to do a survey and study and submit a report).

COURSE OUTCOMES:

CO1	Comprehend the roles of the project manager.
CO2	Identify the threats and opportunities in project management.
CO3	Gain knowledge about size, effort and cost estimation techniques.
CO4	Apply the techniques available to keep the project,,s aims and objectives, under control.
CO5	Analyze the different approaches of non-technical problems.
CO6	Appreciate the management issues like team structure, group dynamics.
CO7	Determine an appropriate project management approach through an evaluation of the business context and scope of the project.

Text Book:

1. Mike Cotterell, Bob Hughes, “Software Project Management”, Inclination/Thomas Computer Press, 2nd Edition, 2001.

Reference Books:

1. Darrel Ince, H.Sharp and M.Woodman, “Introduction to Software Project Management and Quality Assurance”, Tata McGraw Hill, 3/ E, 2006.
2. Ramesh Gopalasamy, “Managing Global Software Projects”, 4th Edition, 2005.
3. S. A. Kelkar, “Software Project Management: A Concise Study”, PHI Learning Pvt. Ltd., 5th Edition, Dec-2012.

Web Site:

1. PMBOK, Project management body of knowledge www.pmi.org

SEMESTER – VI

L	T	P	C
5	0	0	4

TOTAL HOURS: 65

ELECTIVE – II

ARTIFICIAL INTELLIGENCE

SUBJECT CODE: U6CS23ET

OBJECTIVES:

- 1.To study the concepts of Artificial Intelligence
- 2.Methods of solving problems using Artificial Intelligence
- 3.Introduce the concepts of Expert Systems and machine learning

UNIT 1 (13 Hrs)

Introduction - Intelligent Agents - Problem Solving - by Searching - Informed Search and Exploration - Constraint Satisfaction Problems - Formulating Problems - Searching for solutions - Adversarial Search.

UNIT 2 (12 Hrs)

Knowledge and Reasoning - Logical Agents - First-Order Logic - Inference in First-Order Logic - Knowledge Representation.

UNIT 3 (13 Hrs)

Planning - Planning and Acting in the Real World - Uncertain knowledge and reasoning- Uncertainty - Probabilistic Reasoning - Probability Reasoning Over Time - Making simple Decisions - Making Complex Decisions

UNIT 4 (14 Hrs)

Learning - Logical formulation of Learning - Learning from Observations - Knowledge in Learning - statistical Learning methods - Reinforcement Learning -A* algorithm – AO algorithm.

UNIT 5 (13 Hrs)

Communicating, Perceiving, and Acting – Communication - Probabilistic Language Processing - Perception-Robotics.

COURSE OUTCOMES

CO1	Solve basic AI based problems
CO2	Define the concept of logic reference
CO3	Apply planning to make complex decisions
CO4	Learning and knowledge algorithms
CO5	Communication and language processing
CO6	Artificial Intelligence Concepts and Algorithms
CO7	Expert system Models

TEXT BOOK:

1. Elaine Rich and Kevin Knight, Artificial Intelligence, 2nd Edition, Tata McGraw-Hill, New Delhi, 1991.

REFERENCE BOOKS

1. Stuart Russell and Peter Norving, Artificial Intelligence: A Modern Approach, 2nd Edition, Prentice Hall of India, New Delhi. 2003.
2. Herbert A. Simon, The Sciences of the Artificial Intelligence, 3rd Edition, MIT Press. N.J.Nilson, Principles of AI, Springer Verlag. 1998.

SEMESTER VI ELECTIVE III (To choose 1 out of the given 2) DATA MINING AND WAREHOUSING SUBJECT CODE: U6CS24ET	<table border="0"> <tr> <td>L</td> <td>T</td> <td>P</td> <td>C</td> </tr> <tr> <td>5</td> <td>0</td> <td>0</td> <td>4</td> </tr> </table> TOTAL HOURS: 65	L	T	P	C	5	0	0	4
L	T	P	C						
5	0	0	4						

OBJECTIVES:

- 1.To make the students to understand data mining principles and techniques
- 2.To discover the knowledge imbibed in the high dimensional system.
- 3.To study algorithms for finding the hidden interesting patterns in data.

UNIT-I **(14 Hrs)**

Introduction - What is Data mining , Data mining - important Data mining - various kind of data - Data mining Functionalities – Various kinds of Patterns Pattern Interesting Classification of Data mining Systems Data mining Task Primitives Integration of Data Mining System Major issues in Data Mining

UNIT-II **(13 Hrs)**

Data processing – process - the data - descriptive data - summarization –measuring - central tendency dispersion - of - data – graphic - displays of – basic descriptive – data – summaries – data – cleaning – data – integration – and transformation data reduction

UNIT- III **(13 Hrs)**

Data Warehouse - OLAP Technology - An overview - Data Warehouse – Multidimensional – Data Model - Data warehouse Architecture - Data Warehouse Implementation

UNIT-IV **(12 Hrs)**

Mining --Frequent-Patterns Associations Correlations --Basic-Concepts Road Map- Efficient – Scalable - Frequent Item set - Mining-methods-Mining--Various Kinds of Association-rules.

UNIT-V **(13 Hrs)**

Applications Trends - Data mining Applications - Data mining – System Products- Research Prototype-Additional Themes-on Data Mining-Social impact of-Data mining Trends in-Data mining.

COURSE OUTCOMES:

CO1	Technical knowhow of the Data Mining principles and techniques for real time applications.
CO2	To write programs for classification and clustering
CO3	To evaluate various mining techniques on complex data objects
CO4	To develop applications using Big Data Mining Tools.
CO5	Understand the functionality of the various data mining and data warehousing component
CO6	Appreciate the strengths and limitations of various data mining and data warehousing models
CO7	To understand the various Data preprocessing Methods

Text Book:

1. Jiawei Han and Micheline Kamber, “Data Mining (Concepts and Techniques)”, Second Edition, (Chapter 1,2,3,5,11).

Reference Books:

1. Karguta, Joshi, Sivakumar & Yesha, “Data Mining (Next Generation Challenges and Future Directions)”, Printice Hall of India,2007.
2. Ian H. Witten & Eibe Frank, “Data Mining (Practical Machine Learning Tools and Techniques”, Morgan Kaufmann Publishers, Second Edition.
3. Alex Benson, Stephen V. Smith, “Data Warehousing, Data mining & OLAP”, Tata McGraw – Hill, Edition 2004.

SEMESTER - VI	L	T	P	C
ELECTIVE - III	5	0	0	4
MULTIMEDIA SYSTEM				
SUBJECT CODE: U6CS25ET	TOTAL HOURS: 65			

OBJECTIVES:

- 1.To learn and understand technical aspect of Multimedia Systems
- 2.To understand the standards available for different audio, video and text applications.
- 3.To Design and develop various Multimedia Systems applicable in real time.

UNIT I: (13 Hrs)

What is Multimedia: Definitions- CD-Rom and the Multimedia Highway- Where to use Multimedia- Introduction to Making Multimedia: The stages of a Project- what you Need- Multimedia Skills and Training; The team-Macintosh and Windows Production Platforms: Macintosh Versus PC – The Macintosh Platform- the Window Multimedia PC Platform- Networking Macintosh and Windows Computers- Hardware Peripherals: Connection – Memory and Storage Devices-Input Devices- Output Hardware- Communication Devices.

UNIT II: (13 Hrs)

Basic Tool : Text Editing and Word Processing Tools- OCR Software- Painting and Drawing Tools- 3D Modeling and Animation Tools- Image-Editing Tools- Sound Editing Tools- Animation- Video and digital Movie Tools- Helpful Accessories – Making Instant Multimedia: Linking Multimedia Objects- Office Suites- Word Processors –Spreadsheets- Databases- Presentation Tools. Multimedia Authoring Tools: Types of Authoring Tools- Card and Page Based Authoring Tools- Icon Based Authoring Tools- Time -Based Authoring Tools- Object Oriented Authoring Tools- Cross- Platform Authoring Notes.

UNIT III: (13 Hrs)

Text: The Power of Meaning-About Fonts and Faces- Using Text in Multimedia- Computers and Text- Font Editing and Design Tools- Hypermedia and Hypertext- Sound: The power of Sound- Multimedia System Sounds- MIDID Versus Digital Audio- Digital Audio- Making MIDI Audio- Audio file Formats- Working With Sound on the Macintosh- Notation interchange File Format (NIFF)- Adding Sound to Your Multimedia Project- Toward Professional Sound: The Red Book Standard- Production Tips.

UNIT IV: (13 Hrs)

Images: Making Still Images- Color- Image- File Formats. Animation: The Power of Motion- Principles of Animation= Making Animations that Work- Video: Using Video- How Video Works- Broadcast Video Standards- Integrating Computers and Television – Shooting and Editing Video – Video Tips- Recording Formats-Digital Video.

UNIT V: (13 Hrs)

Planning and Costing: Project Planning- Estimating- RFPS and BID Proposals- Designing and Producing: Designing – Reducing – Content and Talent: Acquiring Content- Using Content Created by others- Using Content Created for a Project- Using Talent- Delivering: Testing – Preparing for Delivery- Delivering on CD-ROM- Compact Disc Technology- Wrapping IT Up- Delivering on the World Wide Web.

COURSE OUTCOMES:

CO1	To acquire the fundamental principles of multimedia, including digitization and data compression for non-textual information
CO2	To understand issues in representing, processing, and transmitting multimedia data
CO3	To understand core multimedia technologies and standards
CO4	To gain hands-on experience in image, sound and video editing and in some aspects of multimedia authoring (incorporating images, sound, video, and animation)
CO5	To design, capture, store and integrate sound, images and video to deliver multimodal information.
CO6	To perform various multimedia platforms
CO7	To prepare the project for planning estimates

Text Book:

1. Tay Vaughan – Multimedia Making it Work – Six Edition – Tata McGraw – Hill Edition -2002.
2. John F Koegel Buford – Multimedia Systems- Addison Wesley – First India Reprint 2000.
3. Walterworth John A- Multimedia Technologies and Application – Ellis Horwood ltd London ,1991.

SEMESTER - VI
SKILL BASED / PAPER - IV
CLOUD COMPUTING
SUBJECT CODE: U6CS26ST

L	T	P	C
3	0	0	3
TOTAL HOURS: 39			

OBJECTIVES:

- 1.To understand the concept of cloud and utility computing.
- 2 To understand the various issues in cloud computing.
- 3.To familiarize themselves with the state of the art in cloud

UNIT I: UNDERSTANDING CLOUD COMPUTING (8 Hrs)

Cloud Computing – History of Cloud Computing – Cloud Architecture – Cloud Storage – Why Cloud Computing Matters – Advantages of Cloud Computing – Disadvantages of Cloud Computing – Cloud Services.

UNIT II: DEVELOPING CLOUD SERVICES (8 Hrs)

Types of Cloud Service Development – Software as a Service – Platform as a Service – Web Services – On-Demand Computing – Discovering Cloud Services Development Services and Tools – Amazon Ec2 – Google App Engine – IBM Clouds.

UNIT IV: VIRTUALIZATION (8 Hrs)

Implementation levels of virtualization – Virtualization Structures – Tools and Mechanisms – Virtualization of CPU, Memory, I/O Devices – Virtualization Clusters and Resource Management – Virtualization for Data Centre Automation

UNIT IV: PROGRAMMING MODEL (7 Hrs)

Parallel and Distributed Programming Paradigms – Map Reduce, Twister and Iterative Map Reduce – Hadoop Library from Apache – Mapping Applications - Programming Support - Google App Engine, Amazon AWS - Cloud Software Environments -Eucalyptus, Open Nebula, Open Stack, Aneka, CloudSim.

UNIT V: SECURITY IN THE CLOUD (8 Hrs)

Security Overview - Cloud Security Challenges and Risks - Software-as-a-Service Security- Security Governance - Risk Management - Security Monitoring - Security Architecture Design - Data Security - Application Security - Virtual Machine Security - Identity Management and Access Control - Autonomic Security.

COURSE OUTCOMES:

CO1	Articulate the main concepts, key technologies, strengths and limitations of cloud computing
CO2	Identify the architecture, infrastructure and delivery models of cloud computing
CO3	Explain the core issues of cloud computing such as security, privacy and interoperability
CO4	Choose the appropriate technologies, algorithms and approaches for the related issues
CO5	Describe the principles of Parallel and Distributed Computing and evolution of cloud computing from existing technologies
CO6	Implement different types of Virtualization technologies and Service Oriented Architecture systems
CO7	Analyse the issues in Resource provisioning and Security governance in clouds

TEXT BOOK:

1. Michael Miller, “Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online”, Que Publishing, August 2008.
2. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, “Distributed and Cloud Computing, From Parallel Processing to the Internet of Things”, Morgan Kaufmann Publishers, 2012.
3. John W.Rittinghouse and James F.Ransome, “Cloud Computing: Implementation, Management, and Security”, CRC Press, 2010.

REFERENCES:

1. Toby Velte, Anthony Velte, Robert Elsenpeter, “Cloud Computing, A Practical Approach”, TMH, 2009.
2. Kumar Saurabh, “Cloud Computing – insights into New-Era Infrastructure”, Wiley India, 2011.
3. George Reese, “Cloud Application Architectures: Building Applications and Infrastructure in the Cloud” O'Reilly.

ADHIPARASAKTHI COLLEGE OF ARTS AND SCIENCE
(AUTONOMOUS)

Permanently Affiliated to Thiruvalluvar University, Vellore

Accredited by NAAC with B Grade

M.Phil., COMPUTER SCIENCE

Under CBCS

[Effective from the Academic year 2018-2019]

REGULATIONS

CBCS :

Choice – Based Credit System is a flexible system of learning. ‘Credit’ defines the quantum of contents/ syllabi prescribed for a course and determine the number of hours of instruction required. The distinguished features of CBCS are the following:

It permits the students to:

- ❖ Learn at their own pace
- ❖ Choose electives from a wide range of elective courses offered by the departments of the affiliated colleges
- ❖ Undergo additional courses and acquire more than the required number of credits
- ❖ Adopt an inter – disciplinary approach in learning
- ❖ Make best use of the expertise of available faculty.

1. Eligibility for Admission:

A Student who have passed M.Sc (Comp. Sci).,M.Sc(IT).,M.Sc(C.S.T) & MCA with 50% are eligible to admit in M.Phil Computer Science

- 2. The minimum duration for the completion of M.Phil., in a discipline is two semester and the maximum duration is four semesters.**

3. The M.Phil., Degree is awarded if a student has
- Registered, undergone and secured the required minimum number of credits for the core and elective courses including dissertation specified in the corresponding programme within the stipulated time
 - Secured the required attendance
 - No dues to the University, Hostel or Library
 - No disciplinary action pending against him/her

4. Structure of the Programme

The M.Phil Programme consists of

Core courses which are mandatory for all students

Elective courses which students can choose from amongst the courses offered within the department or in other departments of the colleges.

Dissertation (Mandatory)

5. The distribution of credits will be as below

- i. Core courses – Minimum two courses carrying 5 Credit each (10 or more credits)
- ii. Elective carrying 5 Credits each – No minimum
- iii. Dissertation 21 Credits

The total number of credits for core and elective shall be 15 consists of 2 Core courses (10 Credits) plus one elective (5 Credits)

The research topic for the dissertation may be finalized even at the beginning of the M.Phil programme, so that the collection of relevant literature and research design could be completed in the first semester leaving the entire second semester for the research work. The course registration for dissertation shall be in the first semester and separate registration form shall be used for registration.

6. Evaluation of the dissertation

6.1 The dissertation shall be jointly valued by the supervisor and one external examiner.

The external examiner is to be drawn from

University department or affiliated college within the city of Chennai or

Any accredited institution of higher education and/or research within Tamilnadu

The viva-voce examination on the dissertation shall be jointly conducted by the Supervisor and the external examiner. The distribution of marks shall be as under

20% marks for Periodic presentation (to be evaluated and awarded by the supervisor)

60% marks for the Dissertation

20% marks for viva-voce

6.2 The last date for submission of Dissertation shall be 31 August every year without penalty. Those who do not submit the dissertation in time may be given extension of a maximum of two months with a penal fee prescribed by the college (i.e upto 31st October). There shall be no further extension of time beyond this period. Any student failing to submit the dissertation within this period will be permitted to submit the dissertation only in the next academic year along with the subsequent batch of students.

7. Regulations of M.Phil Programme

The rules and regulation governing course registration, attendance and discipline of students for M.Phil Programme shall be the same as for the Maste's programme.

8. Evaluation

The process of evaluation, examination, grading, etc for the M.Phil, programme shall be the same as for Master's Programme except for the dissertation. However, final semester students of the M.Phil should be allowed to appear for examinations in any arrear papers in the month of September / October each year.

ADHIPARASAKTHI COLLEGE OF ARTS & SCIENCE**G.B.NAGAR, KALAVAI-632506 (AUTONOMOUS STATUS)****AFFILIATED TO THIRUVALLUVAR UNIVERSITY, VELLORE****DEGREE COURSES****M.Phil. Computer Science****(With effect from 2018-2019)****The course of study and the scheme of examination**

Year/ Semester	Subject	Paper	Subject Code	Title of the Paper	Ins. Hrs/ Week	Credit	Exam Hrs	Marks		
								IA	Sem. Exam	Total
I Year/ I Semester	Core	Paper I	M1RM21SM	Research Methodology	6	5	3	25	75	100
	Core	Paper II	M1CS21MT	Artificial Neural Networks	6	4	3	25	75	100
	Core	Paper III	M1RE21GS	Research and Publication Ethics	6	4	3	25	75	100
	Elective	Guide Paper	M1CS22MT	Guide Paper	6	2	3	25	75	100
I Year/ II Semester	-	-	M2CS21DV	Dissertation with Viva Voce	-	21	-	25	75	100
TOTAL					-	36	-	100	300	400



Om Sakthi
ADHIPARASAKTHI COLLEGE OF ARTS AND SCIENCE
(Permanently affiliated to Thiruvalluvar University, Accredited by NAAC with B Grade)
(Autonomous)

G.B. Nagar, Kalavai – 632 506, Vellore District. Ph:04173-242226, 242644



M.Phil (Computer Science)

PROGRAMME SPECIFIC OUTCOMES

PSO1	Design and develop computer programs/computer-based systems in the areas related to algorithms, networking, web design, cloud computing, IoT and data analytics of varying complexity
PSO2	Ability to have a complete understanding of techniques, and extensive knowledge of the literature, applicable to the selected research areas.
PSO3	Capability to apply reasoning and problem solving using research tools.
PSO4	Proficiency to identify the problems and create and interpret knowledge in their chosen area.
PSO5	Capacity to have critical evaluation in current research techniques and methodologies.
PSO6	Mastery over analytical skills which are based on mathematical and statistical knowledge acquired.
PSO7	Acquaint with the contemporary trends in industrial/research settings and thereby innovate novel solutions to existing problems

L	T	P	C
5	0	0	5

TOTAL HOURS: 52

SEMESTER – I
PAPER - 1
RESEARCH METHODOLOGY
SUBJECT CODE: M1RM21SM

OBJECTIVES:

- 1.To impart knowledge on research problem and findings scientific article with internet
- 2.To provide knowledge on collection and analysis of data using statistical tools.
- 3.To create awareness on bioinformatics and biological databases.

UNIT 1: RESEARCH METHODOLOGY

Meaning of research – Objectives of research – motivation of research – Types, approaches and significance – Methods versus methodology – Research in scientific methods – Research process – Criteria for good research – Problem encountered by research in India – Funding agencies. (10 Hrs)

UNIT II: RESEARCH DESIGN

Research Problem: Selecting the problem – Necessity of defining the problem – Techniques involved in defining the problem – Research design – Needs and features of good design – Different research design – Basic principles of experimental designs. (10 Hrs)

UNIT III: DATA COLLECTION AND DOCUMENTATION

Data Collection methods – Data types – processing and presentation of data – Techniques of ordering data – Meaning of primary and secondary data – The uses of computers in research – The library and internet – Uses of search engines – virtual libraries – common software for documentation and presentation. (12 Hrs)

UNIT IV: DATA AND ERROR ANALYSIS

Statistical analysis of data – Standard deviation – Correlation – Comparison of sets of data – Chi squared analysis of data – Characteristics of probability distribution – Binomial, Poisson and normal

distribution – Principle of least square fittings – Curve fitting – Measurement of errors – Types and sources of errors – Determination and control of errors. (10 Hrs)

UNIT V: RESEARCH COMMUNICATION

Meaning of research report – Logical format for writing thesis and paper – Essential of scientific report: abstract, introduction, review of literature, materials and methods and discussion – Write up steps in drafting report – Effective illustrations: tables and figures – Reference styles: Harvard and Vancouver systems. (10 Hrs)

TEXT BOOKS:

1. Research Methodology, Methods and Techniques – C.R. Kothari – Wishwa Prakasam Publications, II Edition.
2. Research: An Introduction – Robert Ross – Harper and Row Publications.

COURSE OUTCOMES:

CO1	To impart knowledge on research problems and findings, scientific article with internet
CO2	To provide knowledge on collection and analysis of data using statistical tools.
CO3	To create awareness on Bioinformatics and biological databases.
CO4	To impart basic knowledge on computer experimentation and intellectual property rights.
CO5	To develop a sound knowledge in preparation of research reports.
CO6	To understand the various concepts of Reports
CO7	Ability to understand the concepts for Information experimentation and intellectual property rights.

REFERENCE:

- 1 Research Methodology – P. Saravanavel – Kitlab Mahal, Sixth Edition.
- 2 A Hand book of Methodology of Research – Rajammal P.A. Devadass – Vidyalaya Press.
3. Introduction to Computers – N. Subramanian.
4. Statistical methods – G.W. Snedecor and W. Cochran – Oxford and IBH, New Delhi.
5. Research Methodology Methods and Statistical Techniques – Santosh Gupta.

L	T	P	C
5	0	0	5
T			

TOTAL HOURS: 52

SEMESTER – I
PAPER - 2
ARTIFICIAL NEURAL NETWORKS
SUBJECT CODE: M1CS21MT

OBJECTIVES

- 1.To understand the various concepts of Neural Networks.
- 2.To understand the different ways of AI Learning methods and models
- 3.To learn to represent knowledge based approaches

UNIT I:

Introduction to Neural Networks- Basics Concepts of Neural Networks –Inference and Learning – Classification Models- Association Models- Optimization Models – Self Organization Models.
(10 Hrs)

UNIT II:

Supervised and Unsupervised Learning – Statistical Learning – AI Learning – Neural Network Learning – Rule Based Neural Networks – Network Training – Network Revision- Issues- Theory of Revision – Decision Tree Based NN – Constraint Based NN.
(12 Hrs)

UNIT III:

Incremental Learning- Mathematical Modeling- Application of NN- Knowledge based Approaches
(10 Hrs)

UNIT IV:

Heuristics- Hierarchical Models- Hybrid Models- Parallel Models- Differentiation Models- Control Networks- Symbolic Methods- NN Methods.
(10Hrs)

UNIT V:

Structures and Sequences – Spatiotemporal NN – Learning Procedures – Knowledge based Approaches.
(10Hrs)

COURSE OUTCOMES:

CO1	Understand the mathematical foundations of neural network models
CO2	Model Neuron and Neural Network, and to analyze ANN learning, and its applications
CO3	Perform Pattern Recognition, Linear classification.
CO4	Develop different single layer/multiple layer Perception learning algorithms
CO5	Identify the deep learning algorithms which are more appropriate for various types of learning tasks in various domains.
CO6	Grasping the use of neural nets for pattern recognition problems
CO7	Design and implement neural network systems to solve real world problems

TEXT BOOKS:

1. Lamin fu Neural Networks in Computer Intelligence – MCGRAW Hill International Edition 1994

REFERENCE:

1. Robert J. Schalkoff – Artificial Neural Networks MCGRAW Hill 1997

L	T	P	C
3	0	0	2

SEMESTER – I
RESEARCH AND PUBLICATION ETHICS
SUBJECT CODE: M1RE21GS

Total Hours: 39

OBJECTIVES:

1. To impart knowledge on research problem and finding scientific articles with Internet.
2. To provide the knowledge about the Software tool to identify predatory publications.
3. This course clarify about the Scientific misconducts, Redundant publications, Ethics, database and research merits

THEORY

- **RPE 01: PHILOSOPHY AND ETHICS (3 hrs.)**
 1. Introduction to philosophy: definition, nature and scope, concept, branches
 2. Ethics: definition, moral philosophy, nature of moral judgements and reactions
- **RPE 02: SCIENTIFIC CONDUCT (5hrs.)**
 1. Ethics with respect to science and research
 2. Intellectual honesty and research integrity
 3. Scientific misconducts: Falsification, Fabrication, and Plagiarism (FFP)
 4. Redundant publications: duplicate and overlapping publications, salami slicing
 5. Selective reporting and misrepresentation of data
- **RPE 03: PUBLICATION ETHICS (7 hrs.)**
 1. Publication ethics: definition, introduction and importance
 2. Best practices / standards setting initiatives and guidelines: COPE, WAME, etc.
 3. Conflicts of interest
 4. Publication misconduct: definition, concept, problems that lead to unethical behavior and vice versa, types
 5. Violation of publication ethics, authorship and contributorship
 6. Identification of publication misconduct, complaints and appeals
 7. Predatory publishers and journals

PRACTICE

- **RPE 04: OPEN ACCESS PUBLISHING(4 hrs.)**

1. Open access publications and initiatives
2. SHERPA/RoMEO online resource to check publisher copyright & self-archiving policies
3. Software tool to identify predatory publications developed by SPPU
4. Journal finder / journal suggestion tools viz. JANE, Elsevier Journal Finder, Springer Journal Suggested, etc.

- **RPE 05: PUBLICATION MISCONDUCT (4hrs.)**

A. Group Discussions (2 hrs.)

1. Subject specific ethical issues, FFP, authorship
2. Conflicts of interest
3. Complaints and appeals: examples and fraud from India and abroad

B. Software tools (2 hrs.)

1. Use of plagiarism software like Turnitin, Urkund and other open source software tools

- **RPE 06: DATABASES AND RESEARCH METRICS (7hrs.)**

A. Databases (4 hrs.)

1. Indexing databases
2. Citation databases: Web of Science, Scopus, etc.

B. Research Metrics (3 hrs.)

1. Impact Factor of journal as per Journal Citation Report, SNIP, SIR, IPP, Cite Score
2. Metrics: h-index, g index, i10 index, altmetrics

Outcomes:

CO1	Overview of research publications, open access, ethics following in research articles
CO2	Methods to identify the Scientific misconducts, Redundant publications Journal finder / journal suggestion tools viz. JANE, Elsevier Journal Finder, Springer
CO3	To impart the knowledge on Use of plagiarism software like Turnitin, Urkund and other open source software tools, calculate the Metrics



Om Sakthi
Adhiparasakthi college of Arts and Science
(Autonomous)

G.B Nagar, Kalavai – 632 506. Vellore District

Re-accredited by NAAC with B Grade(CGPA– 2.83)

Permanently Affiliated to Thiruvalluvar University



DEPARTMENT
OF
COMPUTER SCIENCE AND APPLICATIONS

B.C.A – SYLLABUS
[Effective From 2018 - 2019]

ADHIPARASAKTHI COLLEGE OF ARTS AND SCIENCE
(AUTONOMOUS)

Affiliated to Thiruvalluvar University, Vellore

Re-accredited by NAAC with B Grade (CGPA-2.83)

B.C.A – COMPUTER APPLICATIONS

Under CBCS

[Effective from the Academic year 2018-2019]

REGULATIONS

CBCS:

Choice –Based Credit System is a flexible system of learning. „Credit“ defines the quantum of contents / syllabi prescribed for a course and determine the number of hours of instruction required. The distinguished features of CBCS are the following:

It permits the students to:

- ❖ Learn at their own pace
- ❖ Choose electives from a wide range of elective courses offered by the departments of the affiliated colleges
- ❖ Undergo additional courses and acquire more than the required number of credits
- ❖ Adopt an inter – disciplinary approach in learning
- ❖ Make best use of the expertise of available faculty.

1. Eligibility for Admission:

Candidates seeking admission to the first year of the UG Degree Course should have passed the Higher Secondary Course Examination [Academic or Vocational] conducted by the Govt. of Tamilnadu with Mathematics / Business Mathematics/ Statistics/ Computer Science as a subject or an Examination of any other University accepted as Equivalent thereto by the Syndicate subject to such candidates shall be permitted to take the B.C.A Degree Examination of this University after the Completion of the Course of Three academic years in the University/ Colleges affiliated to this University and shall Qualify for the B.C.A Degree.

2. Eligibility for the Award of Degree:

A candidate shall be the eligible for the award of the degree only if he/she has undergo the prescribed course of study in the College affiliated to the university for a period of not less than three academic year and passed the examinations of all the six semesters prescribed earning 140 credits [in Parts-I, II, III, IV and V]

The Upper age limit for admission to UG Degree Courses will be 21 (twenty one) years as on 1st July of the year of admission. For SC/ST/BC/MBC/DNC candidates and women candidates the age limit is relaxed by 3 years. For other communities, the Principals can relax up to three years based on merit. A relaxation of 5 years is permitted for Physically Handicapped as per G.O. Ms No.239, dated 03.09.1993.

3. Duration:

- a. Each academic year shall be divided into two semesters. The first academic year shall comprise the first and second semesters, the second academic year the third semester and fourth semesters and the third academic year the fifth and sixth semesters respectively.
- b. The odd semesters shall consist of the period from June to November of each year and the even semesters from December to April of each year. There shall be not less than 90 working days for each semester

4. The Course of Study:

The main subject of study for Bachelor Degree Courses shall consist of the following:

PART – I	TAMIL / OTHER LANGUAGES
PART – II	ENGLISH

PART – III CORE SUBJECTS

ALLIED SUBJECTS

PROJECT / ELECTIVES WITH THREE COURSES

PART – IV

1. [a]. Those who have not studied Tamil up to XII Std. and taken a Non-Tamil Language under Part – I shall take Tamil comprising of two courses [level will be at 6th standard].

[b]. Those who have studied Tamil up to XII Std. and taken a Non-Tamil Language under Part – I shall take Advanced Tamil comprising of two courses.

[c]. others who do not come under a/b can choose non-major elective comprising of two courses.

2. SKILL BASED SUBJECTS [ELECTIVE]:

Four courses are to be offered. The papers are to be accommodated in the second / third year of study for UG courses.

3. ENVIRONMENTAL STUDIES

4. VALUE EDUCATION

PART – V EXTENSION ACTIVITIES

5. Extension Activities:

A Candidate shall be awarded a maximum of 1 credit for compulsory Extension Service.

All the students shall have to enroll for NSS/ NCC [Sports and Games] Rotract/Youth Red Cross or any other service organization in the College and shall have to put in compulsory minimum attendance of 40 hours which shall be duly certified by the principal of the college before 31st march in a year. If a student LACKS 40 hours attendance in the first year he/she shall have to compensate the same during the subsequent years.

Students those who complete minimum of attendance of 40 hours in one year get half Credit and those who complete the attendance of 80 or more hours in two years will ONE CREDIT.

Literacy and population Education field Work shall be compulsory components in the above Extensions service Activities.

**The following assessment procedure will be followed for Internal Marks:
Continuous Internal Assessment (CIA) Test**

S. No	Reg. No	Name	<u>Test I</u> Marks for 75	<u>Test II</u> Marks for 75	Marks for 150	Marks converted to 15/20	<u>Assignments / Seminars</u> [10] <u>Records</u> [05]	Marks for 25/25	Total Rounded to Marks for 25/20

Test I : Three hours duration for 75 Marks

Test II : Three hours duration for 75 Marks

Total marks 150

Theory

Practical

Test marks to be converted to : 15 marks / 20 marks

Assignments / Seminars : 10 marks / ----

Records : ---- / 05 marks

Total : 25 marks / 25 marks

In the column rounded to 25/20, any fraction may be rounded to the next number.

6. Requirements for proceeding to Subsequent Semesters:

(i). Candidates shall register their name for the first semester Examination after the admission in the U.G. Courses.

(ii) Candidates shall be permitted to proceed from the first semester up to the final semester irrespective of their failure in any of the semester examinations subject to the condition that the candidates should register for all the arrear subject of earlier semesters along the current (subsequent) semester subjects.

(iii). Candidates shall be eligible to go to subsequent semester, only if they earn, sufficient attendance as prescribed there for by the academic council from time to time. provided in case of a candidate earning less than 65 % of attendance in any one of the semester due to any extraordinary circumstances such as medical grounds, such candidates who shall produce Medical Certificate issued by the Authorized Medical Attendant (AMA), duly certified by principal of the college, shall be permitted to proceed to the next semester and to complete

the course of study. Such candidates shall have to repeat the missed semester by rejoining after completion of final semester of the course, after paying the fee for the break of study as prescribed by the college from time to time.

7. Requirement to take the Semester Examinations:

- a). A candidate will be permitted to take the University Examination for any Semester, if
- i). He / she secures not less than 75% of attendance out of the 90 instructional days during the semester.

[In the case of married women students the minimum attendance requirement shall be 55% of the total instructional days].

- ii). he / she earns a progress Certificate from the Head of the Institution of having satisfactorily completed the Course of Study prescribed in the subjects as required by the regulations. And
- iii). his / her conduct has been satisfactory.

Provided that it shall be open to the academic council, or any authority delegated with such powers by the Syndicate to grant exemption to a candidate who has failed to earn 75% of the attendance prescribed for any valid reason(s) subject to the usual conditions.

- b). A candidates who has secured attendance less than 75% but 65% and above shall be permitted to take the Examination on the recommendation of the Head of the Institution to condone the lack of attendance as well as on the payment of the prescribed fees to the college

8. Passing Minimum:

A Candidate shall be declared to have passed the whole Examination, if he/she passes in all the papers and practical wherever prescribed / as per the scheme of examinations by earnings by earning 140 credit in Parts – I, II, III, IV and V. He / She shall also fulfill the extension activities prescribed earning one credit to quality for the Degree.

In fixing the passing minimum marks, the following will be observed:

- (a) There shall be no passing Minimum for Internal.
- (b) For External Examination, Passing Minimum shall be of 40 % (Forty percentages) of the maximum marks prescribed for the paper for each paper/Practical/Project and Viva-Voce.
- (c) In the aggregate (External + Internal), the passing minimum shall be of 40 % for the paper for each paper/Practical/Project and Viva-Voce.
- (d) Grading shall be based on Overall Marks Obtained [Internal +External].

Grading:

Once the marks of the CIA and end-semester examinations for each of the course are available, they will be added. The mark thus obtained will then be graded as per details given below

Marks	Grade Point	Letter Grade	Class
100	7.00	H	First Class with Distinction
90-99	6.00	O	First Class with Distinction
75-89	5.50	D	First Class with Distinction
60-74	4.75	A	First Class
50-59	4.00	B	Second Class
40-49	3.50	C	Third Class
Below 40	3.00	F	Fail

From the second semester onwards, the total performance within a semester and continuous performance starting from the first semester are indicated respectively by **Grade Point Average [GPA]** and **Cumulative Grade Point Average [CGPA]**. These two are calculated by the following formulae:

$$\text{GPA} = \frac{\sum_{i=1}^n C_i G_i}{\sum_{i=1}^n C_i}$$

Where „C_i“ is the Credit earned for the Course i in any semester; „G_i“ is the Grade point obtained by the student for the course i and „n“ is the number of courses passed in that semester.

CGPA = GPA of all the courses starting from the first semester to the current semester.

Note: The GPA and CGPA shall be calculated separately for the following three parts:

For purposes of declaring a candidate to have qualified for the Degree of Bachelor of Arts/Science/Commerce/Management/ Literature in the First Class / Second Class / Third Class or First Class with Distinction, the marks and the Corresponding CGPA earned by the candidate in part III alone will be the criterion, provided he / she has secured the prescribed passing minimum in LCs and ELs.

Grade in Part IV Extension shall be shown separately and it shall not be taken into account for classification. The marks for the course on “Environmental Studies” will be given in a separate certificate.

9. Classification of successful candidates:

PART - I TAMIL / OTHER LANGUAGES:

Successful candidates passing Examination for the Language and securing the marks (i) 60 percent and above and (ii) 50 percent and above but below 60 percent in the aggregate shall be declared to have passed the examination in the First and Second class, respectively. All other successful candidates shall declare to have passed the examination in the Third Class.

PART – II ENGLISH:

Successful candidates passing examinations for English and securing the marks (I) 60 percent and above and (ii) 50 percent and above but below 60 percent in the aggregate shall be declared to have passed the examination in the First and Second class respectively. All other successful candidates shall be declared to have passed the examination in Third class

PART – III consisting of CORE SUBJECTS, ALLIED SUBJECTS,PROJECT/ELECTIVES

Successful candidates passing examination for core courses together and securing the marks (i) 60 percent and above and (ii) 50 percent and above but below 60 percent in the aggregate of the marks prescribed for the core courses together shall be declared to have passed the examination in the first and second class, respectively. All other successful candidates shall be declared to have passed the examination in the third class.

Part -IV: [Consisting of SUB ITEMS 1 (a), (b) and (c), 2, 3, 4 and 5] as furnishes in the regulations 4 Part –IV supra.

Part –V Extension Activities

The Only Credit earned for Part V Extension activities of a successful candidate. Shall not be taken into Consideration for Classification.

10. Ranking:

Candidates who pass all the examinations prescribed for the course in the first appearance itself alone are eligible for Classification/ Ranking / Distinction;

Provided in the case of candidates who pass all the examinations prescribed for the course with a break in the First Appearance due to the reasons as furnished in the Regulations 7.[iii] supra are eligible for Classification / Distinction.

The marks obtained in improvement examinations will not be taken into consideration for ranking.

11. The Medium of Instruction and Examinations:

The medium of instruction and Examinations for the papers under part I and II shall be in the language concerned. For Part III and Part IV the medium of instruction and examination shall be English / Tamil.

12. Submission of Record Notebooks for Practical Examinations:

Candidates taking the Practical Examinations should submit bonafide Record Notebook prescribed for the Practical Examinations. Otherwise the candidate will not be permitted to take the practical Examinations. However, in genuine case where the students could not submit the record notebook may be permitted to take the Practical Examinations provided the Head of the Department concerned certifies that the candidate has performed the experiments prescribed for the Course. For such of those candidates who do not submit Record Books, zero [0] marks will be awarded for record notebooks.

In case a candidate fails in the Practical Examination the marks awarded for the record at the time of first appearance for the Practical Examination should be made available by the University to the Examiners at the subsequent appearance by the candidate.

13. Improvement of marks in the subjects already passed:

Candidates who have passed in theory paper / papers are allowed to appear again for theory paper / papers only once in order to improve his/her marks, by paying the fee prescribed from time to time. Such candidates are allowed to improve within a maximum period of 10 semesters counting from his/her first semester of his/her admission. If candidate improves his marks, then his improved mark will be taken into consideration for the award of Classification and Distinction only. Such improved marks will not be counted for the award of Prize / Medals and Rank. If the Candidate does not show improvement in the marks, his previous marks will be taken into consideration.

No candidate will be allowed to improve marks in the Practical and Field work.

14. Checklist for Inspection

A. Qualification for

Teaching Faculty : as prescribed by the UGC and the University

Laboratory Staff : as prescribed by the UGC and the University.

B. Infrastructure Facilities

- i) Building: Number of classroom with specifications: 3 rooms measuring 20”x 25 “
 If the class strength is above 50 the space shall increase by 10 sq, ft, per student.
 Number of staff rooms: one measuring 20” x 20”
- ii). Furniture: One pair of table / chair per student.

PATTERN OF QUESTION PAPER:

PART- A (50 Words)		
To Answer 10 Question	10 X 02 Marks	= 20 Marks
PART-B (200 Words)		
To Answer 5 Questions (either or Type)	05 X 05 Marks	= 25 Marks
PART-C (500 Words)		
To Answer 3 Questions out of 5 questions	03 X 10 Marks	= 30 Marks
Total		= 75 Marks

DISTRIBUTION OF MARKS FOR SEMESTER PRACTICALS:

Program (written)	: 40 Marks
Execution & Result	: 15 Marks
Record	: 10 Marks
Viva- Voce	: 10 Marks
TOTAL	: 75 Marks

BCA - The Course of Study and the Scheme of Examinations

Year/ Sem	Part	Subject	Paper	Sub. Code	Title of the Paper	Ins. Hrs/ Week	Credit	Exam Hrs	Marks		
									CIA	ESE	TOT
I Year I Sem	I	Language	Paper I	U1LT21FL	Tamil I	6	3	3	25	75	100
	II	English	Paper I	U1LE21SL	English I	6	3	3	25	75	100
	III	Core	Paper I	U1CA21MT	Digital Logic and Design	5	5	3	25	75	100
	III	Core Practical	Practical I	U1CA21MP	Multimedia Lab	4	2	3	25	75	100
	III	Allied	Paper I	U1MA21AT	Mathematics I	7	4	3	25	75	100
	IV	---	--	U1ES21GS	Environmental Studies	2	2	3	25	75	100
						30	19		150	450	600
I Year II Sem	I	Language	Paper II	U2LT21FL	Tamil II	6	3	3	25	75	100
	II	English	Paper II	U2LE21SL	English II	6	3	3	25	75	100
	III	Core	Paper II	U2CA21MT	Programming in C	5	5	3	25	75	100
	III	Core Practical	Practical II	U2CA21MP	Programming in C Lab	4	2	3	25	75	100
	III	Allied	Paper II	U2MA21AT	Mathematics II	7	4	3	25	75	100
	IV	---	----	U2VE21GS	Value Education (General Awareness)	2	2	2	-	50	50
						30	19		125	425	550
TOTAL						60	38		275	875	1150
II Year III Sem	III	Core	Paper III	U3CA21MT	Object Oriented Programming Using C++	4	4	3	25	75	100
	III	Core	Paper IV	U3CA22MT	Data Structures and Computer Algorithms	5	4	3	25	75	100
	III	Core	Paper V	U3CA23MT	Computer Architecture	4	4	3	25	75	100
	III	Core Practical	Practical III	U3CA21MP	Object Oriented Programming Using C++ Lab	3	2	3	25	75	100
	III	Core Practical	Practical IV	U3CA22MP	Data Structures and Computer Algorithms Lab	2	2	3	25	75	100
	III	Allied	Paper III	U3BA21AT	Financial Accounting I	7	3	3	25	75	100
	IV	Skill Elective I	Paper I	U3CA24ST	Enterprise Resource Planning	3	3	3	25	75	100
		Non major Elective I	Paper I	U3BA21NM	Management Concepts	2	2	3	25	75	100
						30	24		200	600	800
II Year IV Sem	III	Core	Paper VI	U4CA21MT	Computer Networks	5	4	3	25	75	100
	III	Core	Paper VII	U4CA22MT	Operating System	4	4	3	25	75	100
	III	Core	Paper VIII	U4CA23MT	Visual Programming	5	4	3	25	75	100
	III	Core Practical	Practical V	U4CA21MP	Visual Programming Lab	4	2	3	25	75	100
	III	Allied	Paper IV	U4BA21AT	Financial Accounting II	7	3	3	25	75	100
	IV	Skill Elective II	Paper II	U4CA24ST	E-Commerce	3	3	3	25	75	100

		Non major Elective II	Paper II	U4BA21NM	General Commercial Knowledge	2	2	3	25	75	100
						30	22		175	525	700
TOTAL						60	46		375	1125	1500
III Year V Sem	III	Core	Paper IX	U5CA21MT	Relational Database Management System	6	5	3	25	75	100
	III	Core	Paper X	U5CA22MT	Open Source Programming	6	5	3	25	75	100
	III	Core Practical	Practical VI	U5CA21MP	RDBMS Lab	5	4	3	25	75	100
	III	Core Practical	Practical VII	U5CA22MP	Open Source Programming Lab	5	4	3	25	75	100
	III	Elective I	Paper I	U5CA23ET	Data Mining and Warehousing	5	5	3	25	75	100
				U5CA24ET	Microprocessors and Microcontrollers						
	IV	Skill Elective III	Paper III	U5CA25ST	Mobile Computing	3	3	3	25	75	100
						30	26		150	450	600
III Year VI Sem	III	Core	Paper XI	U6CA21MT	Java Programming	4	5	3	25	75	100
	III	Core	Paper XII	U6CA22MT	Web Technology	5	5	3	25	75	100
	III	Core Practical	Practical VIII	U6CA21MP	Java Lab	4	4	3	25	75	100
	III	Core Practical	Practical IX	U6CA22MP	Web Technology Lab	4	4	3	25	75	100
	III	Elective II	Paper II	U6CA23ET	Computer Graphics	5	4	3	25	75	100
				U6CA24ET	Artificial Intelligence						
	III	Elective III	Paper III	U6CA25ET	Software Project Management	5	4	3	25	75	100
				U6CA26ET	Management Information systems.						
	IV	Skill Elective IV	Paper IV	U6CA27ST	Cloud Computing	3	3	3	25	75	100
V	Extension Activities		U6CA21EA			1		50		50	
						30	30		225	525	750
	TOTAL					60	56		375	975	1350
GRAND TOTAL						180	140		1025	2975	4000

COURSE GOAL:

The objectives of the Programme shall be to provide sound academic base from which an advanced career in Computer Application can be developed. Conceptual grounding in computer usage as well as its practical business application will be provided. The BCA degree prepares the students for manpower requirement of the fast developing IT / Software industry.

Students that join the department of BCA at the college come from varied backgrounds have them enabled to familiarize with the course, orientation classes are held to make students feel at ease with the content of the degree curriculum as well as to develop rapport with their peers and classmates. The multi-cultural nature of the students helps them develop interpersonal relationships as well as improve their communication skills for a better work environment in the future. Communicate effectively in both verbal and written form.

To provide the students about computing principles and business practices in software solutions, outsourcing services, public and private sectors. They could do analyze and synthesis computing systems through quantitative and qualitative techniques and apply technical and professional skills to excel in business through practical skills which provide solutions to industry, society and business.

Students get to participate in friendly group activities. Clubs and other forms of group exercises help keep students engaged in co-curricular activities. Student-teacher relationship is cordial and friendly and the campus life is equally fun.



Om Sakthi
ADHIPARASAKTHI COLLEGE OF ARTS AND SCIENCE
(Permanently affiliated to Thiruvalluvar University, Accredited by NAAC with B Grade)
(Autonomous)
G.B. Nagar, Kalavai – 632 506, Ranipet District. Ph:04173-242226, 242644



B.C.A

PROGRAMME SPECIFIC OUTCOMES:

PSO1	An ability to analyze, design, simulate and implement computer hardware / software and use basic analog/digital circuits, VLSI design for various computing and communication system.
PSO2	An ability to analyze problem, design algorithm, identify and define the computing requirements appropriate to its solution and implement the same. Students will be able to demonstrate and apply their knowledge of C++, VB.Net and Database programming to develop effective Software solutions needed for the government organizations, industrial, societal and environmental application areas.
PSO3	Students will be able to understand data communication concepts and its applications. Network architecture, transmission of data, OSI models, layers and protocols study equipped students with know-how on troubleshooting in computer hardware and network related issues.
PSO4	Develop programming skills, networking skills, learn applications, packages, programming languages and modern techniques of IT
PSO5	Gives overview of the topics in IT like networking, computer graphics, web development, trouble shooting, and hardware and software skills.
PSO6	A few of them being like software programmer, system and network administrator, web designer faculty for computer science and computer applications
PSO7	Learn programming language such as Java, c++, HTML, SQL, etc...

SEMESTER I
ENGLISH - I
SUBJECT CODE: U1LE21SL

L	T	P	C
5	0	0	3

TOTAL HOURS: 65

OBJECTIVES :

This course aims at enhancing the language skills, fundamental grammar, communication skills and soft skills necessary for the first and second year students.

To enrich the morals, grammar and communication in English.

UNIT 1-PROSE

(10 hours)

1. The Tree Speaks- Rajagopalachari.C
2. Snake in the Grass – R.K.Narayan

UNIT 2 –POETRY

(10 hours)

1. River, Once - Parthasarathy
2. Paper Boat- Rabindranath Tagore

UNIT 3 - SHORT STORY & ONE ACT PLAY

(20 hours)

1. Little Girls Wiser Than Men- Leo Tolstoy
2. The Bishop's Candlestick-Morman Mckinnel

UNIT 4 - GRAMMAR & COMPOSITION

(25 hours)

1. Correct usage of Words
2. Vocabulary – Synonyms & Antonyms
3. Abbreviations
4. English for Excellence – Parts of Speech -Modern Avenue
5. Functional English: Creative Writing, College Grammar, Letter of Application and Writing a Resume

UNIT 5 - COMMUNICATION SKILLS:

1. Listening Conversation- (i) Agreeing and Disagreeing.
(ii) Seeking and Giving Permission
(iii) Greetings
(iv) Introducing oneself to others

COURSE SOUTCOME:

CO1	To develop skills in functional literacy, including appropriate spelling, punctuation and grammar.
CO2	To develop skills in reading (understanding, comprehending, interpreting, analyzing) texts for work
CO3	To develop skills in producing (constructing, creating, writing) texts for work, learning, community and/or everyday personal contexts
CO4	To improve vocabulary and develop the writing skills.
CO5	To explain the application of learning theories in the classroom situation.
CO6	To discuss the concept and theories of intelligence and creativity.
CO7	To speak and write choosing from a wider range of vocabulary

REFERENCE BOOKS:

1. Board of Editors, „Medley I“, Emerald Publishers: 2017
2. Radhakrishna Pillai.G, „Spoken English for You“, Emerald Publishers:1987

SEMESTER – I

PAPER – I	L	T	P	C
DIGITAL LOGIC AND DESIGN	5	0	0	5
SUBJECT CODE: U1CA21MT	TOTAL HOURS: 65			

OBJECTIVES:

1. Learn how to design digital circuits, by simplifying the Boolean functions.
2. Learn to design combinational and sequential circuits.
3. To study about asynchronous sequential logic.

UNIT- I: BINARY SYSTEMS (13 Hrs)

Digital Computers and Digital Systems – Binary Numbers - Number Base Conversion – Octal and Hexadecimal Numbers – Compliments – Binary Codes – Binary Storage and Registers – Binary Logic – Integrated Circuits

UNIT-II: BOOLEAN ALGEBRA AND LOGIC GATES (13 Hrs)

Basic definitions of Boolean Algebra – Axiomatic Definition of Boolean Algebra – Basic Theorems and Properties of Boolean Algebra – Boolean Functions – Canonical and Standard forms – Other Logic Operations – Digital Logic Gates.

UNIT-III: SIMPLIFICATION OF BOOLEAN FUNCTIONS (13 Hrs)

The Map Method – Two and Three Variable Maps - Four Variable Map – Five Variable Map – Product of Sums Simplifications - NAND and NOR implementation – Don't Care Conditions.

UNIT-IV: COMBINATIONAL LOGIC (13 Hrs)

Introduction – Adders – Subtractors - Code Conversion – Binary Adder – Encoder – Decoders Multiplexer and De-multiplexer

UNIT-V: SEQUENTIAL CIRCUITS (13 Hrs)

Flip flops – Registers – shift registers – Ripple counters – Synchronous Counters – The Memory Unit.

COURSE OUTCOMES:

CO1	Apply the Boolean minimization techniques for combinational circuits such as adder, sub tractor, encoder etc.
CO2	Explain the applications of digital electronics
CO3	Solve asynchronous sequential circuits for simple application
CO4	Apply the concept of sequential circuits for counters, shift registers etc.
CO5	Discuss the universality of NAND gates. Construct NOT, OR, AND, NOR, EXOR and EX-NOR gates using NAND gates and show the output.
CO6	Discuss the universality of NOR gates. Construct NOT, OR, AND, NOR, EXOR and EX-NOR gates using NOR gates and show the output
CO7	Explain K-map for three and four variables, identification of pairs, quads and octets and solving sum-of-products equations

TEXT BOOK:

1. M. Morris Mano, “Digital Logic and Computer Design”, Pearson, 2nd edition, 2010.

REFERENCE BOOKS:

1. Louis Neshelsky, “Introduction to Digital Technology”, John Wiley & Sons, 4th Ed, 2006
2. Thomas.L.Floyd, “Digital Logic Design”, PHI, 2nd edition, 2004.

SEMESTER - I				
PRACTICAL - I	L	T	P	C
MULTIMEDIA LAB	0	0	4	2
SUBJECT CODE:U1CA21MP	TOTAL HOURS: 52			

OBJECTIVES:

1. Students will gain a working knowledge of Photoshop and develop their skills in editing and altering photographs for through a basic understanding of the tool bar, layers, and the adjustments panel.
2. The vast possibilities of traditional tools, and develop an understanding of sophisticated layering techniques.

Image transformation and transition effects using Photoshop:

1. Photo Effects:

- a) Write a Program to generate Discoloring and changing background.
- b) Program to generate applying soft light effect using Photoshop.

2. Photo Retouching:

- a) Program to Implement Color correction and Blending Images.
- b) Program to demonstrate Smooth skin effects, adding blur effects to background.

3. Text Effect:

- a) Write a Program to Create Meta-tie text, Shining text, Illumines text and transparent glass text.
- b) Write a Program to create Marquee and Digital banner using Photoshop.

4. Image Editing:

- a) Program to demonstrate resize, change color depth, resolution and brightness.
- b) Write a program to edit using Lasso and Clone stamp tools (masking).

5. Web Graphics:

- a) Program to create a gif image using image ready for web.
- b) Write a program to create a web navigation Image.

Using Flash Animation Software:

6. Write a program to show text floating into screen from outside the screen.
7. Program to generate Animated Banner using image ready software.
8. Write a program to correction an image using animated lightening strike.
9. Write a program to generate Mobile wall paper using flash
10. Create a Program for digital clock Animation using flash.

COURSE OUTCOMES:

CO1	Apply various tools to create and edit images.
CO2	Apply layers, filter effects and blending modes , share and save your images in various formats.
CO3	Learn various retouching and repairing techniques to correct images.
CO4	Demonstrate the techniques to use text reflection effect .
CO5	Demonstrate how to insert image in the text.
CO6	Design and develop creative applications using GIMP.
CO7	To Understand the concept of multimedia software

SEMESTER - I				
ALLIED – I	L	T	P	C
MATHEMATICS - I	7	0	0	4
SUBJECT CODE: U1MA21AT	TOTAL HOURS: 91			

OBJECTIVES:

- 1.To study about the connectives between two proportions.
- 2.To verify the validity of an argument.
- 3.To find the shortest distance between two skew lines

UNIT I: SYMBOLIC LOGIC (15 Hrs)

Proposition, Logical operators: conjunction, disjunction, negation, conditional and bi-conditional operators, converse, inverse, Contra positive, logically equivalent, tautology and contradiction. Arguments and validity of arguments. [**Chapter-1**]

UNIT II: DIFFERENTIATION (08 Hrs)

Differentiation- n^{th} derivative-partial differentiation- Jacobian (simple problem).

UNIT III: MATRICES (20 Hrs)

Multiplication of Matrices, Singular and Non – Singular Matrices, Adjoint of a Matrix, Inverse of Matrix, Symmetric and Skew – Symmetric, Hermitian and Skew - Hermitian matrices, Orthogonal and Unitary Matrices-Simple problems. [**Chapter-8**]

UNIT IV: NUMERICAL METHODS (24 Hrs)

Interpolation: Introduction, Interpolation methods, Finite differences, forward and backward difference table, Newton's forward and backward difference interpolation formulas, Lagrange's formula and their inverse interpolation formula. [**Chapter-2**]

UNIT-V: TWO DIMENSIONAL ANALYTICAL GEOMETRY (24 Hrs)

Straight Lines- equation of Straight line with slope m and the given point – passing through two given points – intercept form – parallel to axes – perpendicular axes, Pair of Straight lines- condition for two lines to be parallel and perpendicular, circles-general equation of circle – centre-radius-equation of circle passing through three points. [**Chapter -30**]

COURSE OUTCOMES:

CO1	Define proposition and argument, explain propositional connectives
CO2	Understand the idea of differentiation from first principles
CO3	Perform common matrix operations such as addition, scalar multiplication, multiplication, and transposition and transposition
CO4	Apply numerical methods to obtain approximate solutions to mathematical problems
CO5	Finding the integer solutions of an equation or of a system of equations
CO6	Understand the foundations of mathematics
CO7	Use mathematical ideas to model real-world problems

TEXT BOOKS:

1. P.R. Vittal, “Mathematical Foundations” – Margham Publication, Chennai.
2. A.Singara velu, “Numerical Methods”, A.R.Publications

REFERENCE BOOKS:

1. U. Rizwan, “Mathematical Foundation” – SciTech, Chennai.
2. V. Sundaram & Others, “Discrete Mathematical Foundation” – A.P. Publication, Sirkali.

SEMESTER - I	L	T	P	C
ENVIRONMENTAL STUDIES	2	0	0	2
SUBJECT CODE: U1ES21GS	TOTAL HOURS: 26			

OBJECTIVES: Students in Environmental Studies are motivated by concern for welfare of the many human and non-human communities that shape this planet.

- Recognize the interconnectedness of multiple factors in environmental challenges
- Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.

**UNIT – I: INTRODUCTION TO ENVIRONMENTAL SCIENCES:
NATURAL RESOURCES (5 Hrs)**

Environmental Sciences – Significance – Public awareness – Forest resources – Water resources – Mineral resources – Food resources - Environmental impact – fertilizer – Pesticide Problems.

UNIT – II: ECOSYSTEM, BIODIVERSITY AND ITS CONSERVATION (6 Hrs)

Ecosystem – concept – structure and function – producers, consumers and decomposers – Food chain – Food web – Forest, Grassland, desert and aquatic ecosystem.

Biodiversity – Definition – genetic, species and ecosystem diversity – Values and uses of biodiversity – biodiversity at global, national (India) and local levels – Hotspots, threats to biodiversity – conservation of biodiversity – In-situ & Ex-situ.

UNIT – III: ENVIRONMENTAL POLLUTION AND MANAGEMENT (5 Hrs)

Environmental Pollution – Causes – Effects and control measures of Air, Water, Marine, soil, solid waste, Thermal, Nuclear pollution and Disaster Management – Floods, Earth quake, Cyclone and Landslides. Role of individuals in prevention of pollution – pollution, Case studies - – Bhopal gas tragedy, Minamata disease, Mercury factory (Kodaikanal), London fog.

UNIT – IV: SOCIAL ISSUES & ENVIRONMENT (5 Hrs)

Urban issues – Energy – water conservation – Environmental Ethics – Global warming – Resettlement and Rehabilitation issues – Environmental legislations – Environmental protection Act. 1986 – Air, Water, Wildlife and forest conservation Act.

UNIT – V: HUMAN POPULATION & ENVIRONMENT

(5 Hrs)

Population growth and Explosion – Human rights and Value Education – Environmental Health – HIV/AIDS – Role of IT in Environment and Human Health – Women and child welfare – Public awareness – Case studies. Visit to a local area / local polluted site / local simple ecosystem – Report submission

COURSE OUTCOMES:

CO1	Recognize the importance of environment and public awareness required for sustainability.
CO2	Understand the availability of various resources, their availability and conservation.
CO3	Develop knowledge on structure and functions of the ecosystem, productivity and energy flow.
CO4	Comprehend the importance and conservation needs of biodiversity by framing policies.
CO5	Able to link causal effects of human activities and develop mitigation strategies for different pollution.
CO6	Demonstrate an integrative approach to environmental issues
CO7	Demonstrate and ability to integrate the many disciplines and filed that intersect with environmental concerns

TEXT BOOKS:

1. Kumaraswamy, K. Alagappa Moses, A and M. Vasanthy, “Environmental Studies”, Publication Division, Bharathidasan University, Tiruchirappalli, Edition 2005.
2. Kumaraswamy, K. “GIS for Natural Resources and Disaster Management”, Department of Geography, Bharathidasan University, Tiruchirappalli, Edition 2008.
3. Rajamannar, “Environmental Studies”, EVR College Publication, Trichy, Ed- 2004.
4. S.Kalavathy, “Environmental Studies”, Bishop Heber College Pub., Trichy, Ed- 2004.

SEMESTER - II
ENGLISH - II
SUBJECT CODE: U2LE21SL

L T P C
5 0 0 3
TOTAL HOURS: 65

OBJECTIVES: To uplift the student's ability to improve personality development and to have fluency in English.

UNIT – 1 PROSE (10 hours)

1. Early Influences - A.P.J. Abdul Kalam
2. The Unity of Indian Culture- Humayan Kabir

UNIT -2 POETRY (10 hours)

1. The Soul's Prayer.- Sarojini Naidu
2. Nutting – William Wordsworth

UNIT-3 SHORT STORY AND ONE ACT PLAY (18 hours)

1. The Doll's House - Katherine Mansfield
2. Hijack- Charles Wills

UNIT -4 GRAMMAR AND COMMUNICATION SKILLS (20 hours)

1. Lexical Skills
2. Functional Grammar
3. Functional English
4. Offering Help
5. Inviting Someone
6. Making Request

UNIT- 5 SOFT SKILLS (7 hours)

1. Willingness to Learn
2. Communicating through Eye Contact
3. Good Attitude

COURSE OUTCOME:

CO1	To refer to the dictionary for meaning, usage and grammar.
CO2	To interact confidently in situations like debates and group discussions and seminars.
CO3	Exercise dramatic and life skills.
CO4	Analyze poetic texts using appropriate terms such as diction, tone, imagery, figures of speech, motif, etc.
CO5	To interpret a poem based on contextual evidence
CO6	To identify the main ideas, details and speakers' attitudes and emotions by listening to different types of spoken texts.
CO7	Speak intelligibly (pronunciation, stress, intonation)

REFERENCE BOOKS:

1. Board of Editors, „Medley II“, Emerald Publishers: 2017
2. Board of Editors, „Transactions in English“, Emerald Publishers:2011
3. Radhakrishna Pillai.G, „Spoken English for You“, Emerald Publishers:1987

SEMESTER - II

PAPER – II	L	T	P	C
PROGRAMMING IN C	5	0	0	5
SUBJECT CODE: U2CA21MT	TOTAL HOURS: 65			

OBJECTIVES:

- 1.To learn programming using a structured programming language.
- 2.To provide C programming exposure.
- 3.To introduce foundational concepts of computer programming to students of different Branches of Engineering and Technology

UNIT- I: (13 Hrs)

C Fundamentals character Set- Identifiers and Keywords – Data types – Constants- variables- declarations- Expressions-statements- Arithmetic, Unary, relational and Logical, Assignments and Conditional Operators- Library Functions.

UNIT - II: (13 Hrs)

Data input output functions – Simple C Programs- Flow of Control – if, if-else, while, Do...While, for loop, nested control structures- Switch, break and continue, go to statements- comma operator.

UNIT - III: (13 Hrs)

Functions – Definitions – Prototypes - Passing arguments - Recursion. Storage Classes- Automatic, External, Static, Register Variable.

UNIT – IV: (13 Hrs)

Arrays – Defining and processing- Passing arrays to functions- Multi dimension arrays- Arrays and String. Structures – User Defined data types- Passing structures to Functions – Self Referential Structures- Unions – Bit wise Operations.

UNIT - V: (13 Hrs)

Pointer – Declarations - Passing pointers to functions - operation on pointers - pointers and Arrays - Arrays of pointers - structures and pointers - files: creating processing, opening and closing a data file.

COURSE OUTCOMES:

CO1	Write C program for simple applications
CO2	Formulate algorithm for simple problems
CO3	Analyze different data types and arrays
CO4	Perform simple search and sort
CO5	Use programming language to solve problems
CO6	Able to implement the algorithms and draw flowcharts for solving Mathematical and Engineering problems
CO7	To be able to develop C programs on linux platform.

TEXT BOOK:

1. Ashok.N.Kamthane, “Programming with ANSI and Turbo C”, Pearson, 1st Ed, 2009.

REFERENCE BOOKS:

1. B.W.Kernighan and M.Rithchi, “The C Programming Language”, PHI, 4thEd, 2006.
2. H.Scildt, “C - The Complete Reference”, TMI, 4th Edition 2007.
3. Y.Kanetthar, “Let us C”, BPB Pub - New Delhi, 5th Edition 2004.

SEMESTER - II				
PRACTICAL - II	L	T	P	C
PROGRAMMING IN C LAB	0	0	4	2
SUBJECT CODE: U2CA21MP	TOTAL HOURS: 52			

OBJECTIVES:

- 1.To understand the basic programming constructs and articulate how they are used to develop a program with a desired runtime execution flow.
2. To articulate where computer programs fit in the provision of computer-based solutions to real world problems.

I. Summation of Series

1. Sin(x)
2. Cos(X)
3. Exp(X) (Comparison with built in functions)

II. String Manipulation

1. Counting the no of Vowels, Consonants, Words, white Spaces in a line of Text and array of Lines.
2. Substring detection, count and Removal
3. Finding and Replacing Substrings

III. Recursion

1. GCD of two numbers
2. Maximum and Minimum

IV. Matrix Manipulation

1. Addition, Subtraction and Multiplication
2. Determinant of a Matrix

V. Sorting and Searching

1. Bubble Sort
2. Binary Search

VI. File Manipulation

1. File Copying
2. Files using command line arguments

COURSE OUTCOMES:

CO1	Read, understand and trace the execution of programs written in C language.
CO2	Write and compile programs using C programs.
CO3	Write program with the concept of Structured Programming
CO4	Identify suitable data structure for solving a problem
CO5	Demonstrate the use of conditional statement.
CO6	Write the C code for a given algorithm
CO7	Implement Programs with pointers and arrays, perform pointer arithmetic, and use the pre-processor.

SEMESTER - II
ALLIED - II
MATHEMATICS - II
SUBJECT CODE:U2MA21AT

L	T	P	C
7	0	0	4
TOTAL HOURS: 91			

OBJECTIVES:

- 1.To Test the consistency of a system of equation using matrix
2. To solve an algebraic equation & find the solution using numerical methods
3. To Evaluate an integral using numerical integration by various rules

UNIT – I: MATRICES (15 Hrs)

Solution of Simultaneous Linear Equations by Cramer's rule-Matrix Inversion Method-characteristic equations and Cayley – Hamilton theorem [Chapter 8]

UNIT – II: INTEGRATION (08 Hrs)

Integration – single and double integration (simple problems) - Bernoulli's method - definite integral. [Chapter 17]

UNIT III: NUMERICAL METHODS (20 Hrs)

Solutions of Algebraic and Transcendental equations: Bisection method, Regula Falsi method, Newton's Raphson method, Iterative method. [Chapter 1]

UNIT IV: NUMERICAL METHODS (CONTINUED) (24 Hrs)

Numerical Differentiation: Newton's forward and backward difference formulas for differentiation. **Numerical Integration:** Trapezoidal rule to evaluate the definite integral, Simpson's One – Third rule, Simpson's Three – Eight rules, Weddle's rule. [Chapter 3]

UNIT – V: ANALYTICAL GEOMETRY OF THREE DIMENSIONS (24 Hrs)

Planes-general equation of plane- intercept form-plane passing through three points, Straight lines- straight line as intersection of two plane – symmetrical form – line passing through two given points , Spheres – equation of sphere – centre – radius – sphere through four points [Simple Problem only] [Chapter 29 and Chapter 31]

COURSE OUTCOMES:

CO1	Express a system of simultaneous linear equations in matrix form.
CO2	Compute indefinite and definite integrals using by the method of substitution and evaluates double integrals.
CO3	Apply numerical methods for differential equation
CO4	Learn numerical differentiation and integration
CO5	Know how to find the roots of transcendental equations
CO6	Learn how to interpolate the given set of values
CO7	Evaluate an integral using numerical integration by various rules

TEXT BOOKS:

1. P.R.Vittal, "Mathematical Foundations", Margham Publication Chennai, 9th Ed, 2014.
2. A.Singara velu, "Numerical methods", A.R.Publications, 15th Edition, 2013.

REFERENCE BOOKS:

1. U.Rizwan, "Mathematical Foundation", SciTech , Chennai, 3rd Edition, 2010.
2. V.Sundaram & Others, "Discrete Mathematical Foundation", A.P. Publication, Sirkali, 12th Edition, 2011.

SEMESTER - II	L	T	P	C
VALUE EDUCATION	2	0	0	2
SUBJECT CODE: U2VE21GS	TOTAL HOURS: 26			

OBJECTIVES:

At the end of the course, the student- teachers will be able to

- Realize the significance of Values in Self-development.
- Familiarize the nature of conflicts and their resolutions.
- Imbibe the knowledge, attitudes and skills needed to achieve and sustain a global culture of peace and values.
- Adopt peace and value education in the curriculum.

UNIT – I: INTRODUCTION AND OUTLINE OF VALUE EDUCATION (5 Hrs)

Value Education – Definition and Scope. Family values – Responsibility of family, Status of Women in family & society, Caring for needy and elders. Ethical Values – Mass media Ethics, Influence of Ethics in family. Issue of Globalization - Modern warfare, Terrorism, Mutual respect of different Cultures and religions.

UNIT – II: PERSONAL SKILLS (5 Hrs)

Self Esteem – Definition, Factors Influencing Self Esteem, Qualities of High and low self esteem. Self Concept – Definition, Characteristics of self concept. Role of self concept in Personal growth. Self acceptance – Definition, Benefits and obstacles of self acceptance.

UNIT-III: POSITIVE THINKING, MOTIVATION AND PERSONALITY DEVELOPMENT (5 Hrs)

Positive thinking – Definition, Positive and Negative Attitude, Power of Positive thinking, Positive Imaging. Motivation – Definition, Difference between Inspiration and Motivation, Internal and External Motivation. Demotivation, Demotivating factors. Personality Development – Definition, characteristic and elements of personality, Development of Personality.

UNIT – IV: COPING AND DEVELOPING COPING MECHANISMS (5 Hrs)

Coping – Definition, Positive and Negative Coping, kinds of coping, Typical responses to Coping. Shyness - Definition, Types and symptoms of shyness. How to overcome shyness. Depression – Definition, Symptoms, Causes and Impact of Depression, How to Overcome depression. Failure – Definition, Coping with failure, Developing Competence.

UNIT – V: LEADERSHIP TEAMWORK AND WORK ENVIRONMENT (6 Hrs)

Leadership – Definition, Characteristics of leadership, various kinds of leaders, Factors Influencing leadership styles. Characteristics of successful leader. Teamwork – Definition, Characteristic of Team work, Team learning. Life skills required for work environment and ways to build a better work environment.

COURSE OUTCOMES:

CO1	Acquire the basic knowledge on value education.
CO2	Understand the importance of principles of life and components of values.
CO3	To learn about philosophy of Life and Individual qualities and family values.
CO4	Creating and improving awareness of values and their importance and role.
CO5	To know about ethics and social values.
CO6	To learn more of Risk and Safety assessment with case studies.
CO7	To learn more of Responsibilities and Rights as Professional and facing Global Challenges.

REFERENCE BOOKS:

1. Dr.S.Xavier Alphonse, “We shall overcome - A textbook on life coping skills”, 6th Edition, S.J. ICRDCE Publication, Chennai, 2012.
2. T.Anchukandam and J.Kuttainimathathil (ED) “Grow Free Live Free”, Krisitu Jyoti Publications, Bangalore, 1st Edition, 1995.
3. Mani Jacob, “Resource Book for Value Education”, Institute for Value Education, New Delhi, 2002.
4. DBNI, NCERT, SCERT, Dharma Bharti National Institute of Peace and Value Education, Secunderabad, 2002.
5. Daniel and Selvamony-Value Education Today, Madras Christian College, Tambaram and ALACHI, New Delhi,1990
6. S.Ignachimuthu-“Values for Life – Better Yourself Books”, Mumbai, 1991.
7. M.M.M. Mascaronhas, “Centre for Research Education Science and Training for Family. Life Promotion –Family Life Education”, Bangalore, 1993.

L	T	P	C
4	0	0	4

SEMESTER - III
PAPER - III
OBJECT ORIENTED PROGRAMMING
USING C++
SUBJECT CODE: U3CA21MT

TOTAL HOURS: 65

OBJECTIVES:

1. To learn advanced features of the C++ programming language as a continuation of the previous course.
2. To learn the characteristics of an object oriented programming language: Data abstraction and information hiding, inheritance and dynamic binding.
3. To learn the basic principles of object oriented design and software engineering in terms of software reuse and managing complexity.

UNIT-I (13 Hrs)

Principles of Object Oriented Programming (OOP): Evolution of C++ - Programming Paradigms - Key Concepts of OOP - Advantages of OOP - Usage of OOP and C++. Input and Output in C++ - Streams - Stream classes - Unformatted console I/O operations-Member functions of istream class-manipulators-manipulators with parameters

UNIT-II (13 Hrs)

Introduction to C++; Tokens, Keywords, Identifiers, Variables, Operators, Expressions and Control Structures: If, If..Else, Switch – Repetitive Statements- for, while, do-while - Pointers and arrays

UNIT-III (13 Hrs)

Functions in C++ - Main Function - Function Prototyping - Parameters Passing in Functions - Values Return by Functions - inline Functions - Function Overloading- Classes and Objects; Constructors and Destructors; and Operator Overloading - Type of Constructors

UNIT – IV (13 Hrs)

Inheritance: Single Inheritance - Multilevel inheritance - Multiple inheritances - Hierarchical Inheritance - Hybrid Inheritance. Pointers - Virtual Functions and Polymorphism

UNIT-V (13 Hrs)

Working with Files: Classes for File Stream Operations - Opening and Closing a File - End-of-File Detection - File Pointers - Updating a File - Error Handling during File Operations - Command-line Arguments

COURSE OUTCOMES:

CO1	Articulate the principles of object-oriented problem solving and programming.
CO2	Outline the essential features and elements of the C++ programming language.
CO3	To learn the syntax and semantics of the C++ programming language.
CO4	To learn programming fundamentals, including statement and control flow and recursion.
CO5	Applying the concepts of class, method, constructor, instance, data abstraction, function abstraction, inheritance, overriding, overloading, and polymorphism
CO6	To learn how containment and inheritance promote code reuse in C++.
CO7	To learn how to implement files and command line arguments in C++

TEXT BOOK:

1. Ashok.N.Kamthane, "Object Oriented Programming with ANSI & Turbo C++", Pearson Education, 3rd Edition, 2010.

REFERENCE BOOKS:

1. E. Balagurusamy, "**OBJECT-ORIENTED PROGRAMMING WITH C++**", Tata McGraw Hill Publication, 4th Ed, 2009.
2. Maria Litvin & Gray Litvin, "C++ for you", Vikas publication, 2nd Edition, 2008.
3. John R Hubbard, "Programming with C", TMH publication, 2nd Edition, 2002.

SEMESTER - III

L	T	P	C
5	0	0	4

PAPER – IV

TOTAL HOURS: 65

DATA STRUCTURES AND COMPUTER ALGORITHMS

SUBJECT CODE: U3CA22MT

OBJECTIVES:

- 1.To learn generic data structures using templates
- 2.To learn to represent data using graph data structure
- 3.To implement graph algorithms using appropriate data structures

UNIT: I

(12 Hrs)

Definition of a Data structure - ADT - Primitive and Composite data types, **Arrays:** Representation, Types and operations on arrays - ordered lists.

UNIT: II

(13 Hrs)

Stack ADT: Operations - Array Implementation - Applications (Infix to postfix) **Queue ADT:** Operations - Types - Priority Queue. **List ADT:** Linked List - Doubly Linked List - Circular Linked List - Polynomial addition.

UNIT: III

(13 Hrs)

Trees: Binary Search Trees - AVL Trees - B-Trees. **Graphs:** Definitions - Undirected & Directed Graphs - Traversal - Shortest Path – Hashing.

UNIT: IV

(14 Hrs)

Algorithm: What is an Algorithm? – Specifications - Space and Time Complexities - Asymptotic Notations - Primality Testing. **Sorting and Searching:** Linear & Binary Search - Merge, Quick and External Sorting.

UNIT: V

(13 Hrs)

Greedy Method: General, Knapsack, Minimum spanning trees - Traveling Salesperson Problem - **Backtracking:** General - 8 Queen's Problem.

COURSEOUTCOMES:

CO1	Implement data structure using C++
CO2	Suggest appropriate tree/graph data structure for any given data set
CO3	Apply hashing concepts for a given problem
CO4	Modify or suggest new data structure for an application
CO5	Appropriate choose the sorting algorithm
CO6	Appropriate choose the sorting algorithm
CO7	Applying Backtracking Technique

TEXT BOOKS:

1. N. DALE, “C++ Plus data structure”, Narosha Publisher, 2nd Edition -2000
2. M.A. Weiss, “Data Structures and Algorithm Analysis in C++”, 2nd Edition, Pearson Education Asia, 2002

REFERENCE BOOK:

1. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, “Fundamentals of Computer Algorithms”, Galgotia Publications, 5th Edition, 2011.

SEMESTER - III
PAPER - V
COMPUTER ARCHITECTURE
SUBJECT CODE: U3CA23MT

L	T	P	C
4	0	0	4

TOTAL HOURS: 65

OBJECTIVES:

- 1.To trace the execution sequence of an instruction through the processor
- 2.To compare different approaches used for implementing a functional unit
- 3.To understand the fundamentals of memory and I/O systems and their interaction with the processor

UNIT - I **(13 Hrs)**

Introduction - Organization and Architecture, Structure and Function - A Brief History of Computers-System Buses - Computer Components, Computer Function, Interconnection Structures, Bus Interconnection.

UNIT - II **(13 Hrs)**

Internal Memory - Computer Memory System Overview, Semiconductor Main Memory, Cache Memory. External Memory - Magnetic Disk, RAID, Optical Memory, Magnetic Tape. Input / Output - External Devices, I/O Modules, Programmed I/O, Interrupt-Driven I/O, DMA.

UNIT - III **(13 Hrs)**

Computer Arithmetic - ALU, Integer Representation, Integer Arithmetic, Floating - Point Representation, Floating - Point Arithmetic. Instruction Sets: Characteristics and Functions - Types of operands, Types of Operations. Instruction Sets - Addressing, Instruction Formats.

UNIT – IV **(13 Hrs)**

CPU Structure and Function - Processor Organization, Register Organization, Instruction Cycle, Instruction Pipelining. RISC - Instruction Execution Characteristics, The use of a Large Register File, Compiler Based Register Optimization, Reduced Instruction Set Architecture, RISC Pipelining.

UNIT-V **(13 Hrs)**

Superscalar Processors – Overview - Micro-Operation, Control of the CPU, H/W Implementation. Micro programmed Control - Basic Concepts, Microinstruction Sequencing, and Microinstruction Execution.

COURSE OUTCOMES:

CO1	Identify the functional units of a computer system and their operation
CO2	Point out the various metrics of performance
CO3	Critically analyze the different types of ISA styles
CO4	Explain the data path and control path implementation of a processor
CO5	Discuss the implementations of various functional units
CO6	Point out the characteristics of the memory and I/O systems and discuss their design
CO7	To view all system devices diagrams with CPU

TEXT BOOK:

1. William Stallings, "Computer Organization and Architecture ", PHI, 4th Edition, 1997.

REFERENCE BOOKS:

1. V.Carl Hamacher, ZvoKog G.Vranesic, Safwat G.Zaky, "ComputerOrganization", McGraw-Hill, ISE, 3rd Edition, 2001.
2. M.Morris Mano, "Computer Systems Architecture", PHI, 8th Edition, 2010.

SEMESTER - III
PRACTICAL - III

L	T	P	C
0	0	3	2

TOTAL HOURS: 52

OBJECT ORIENTED PROGRAMMING
USING C++ LAB
SUBJECT CODE: U3CA21MP

OBJECTIVES:

- 1.To learn programming constructs of C++.
- 2.To Implement graph traversal and searching algorithms
- 3 Be exposed to searching and sorting algorithms

1. Program to implement Control Structures.
2. Program to implement Classes, Object and member functions.
3. Program to implement Inline Functions.
4. Program to implement Constructors and Destructors.
5. Program to implement the concept of Function overloading.
6. Program to implement the concept of Operator overloading.
7. Program to implement the concept of Inheritance.
8. Program to implement Virtual Functions
9. Program to implement File handling concepts.
10. Programs using Strings.

COURSE OUTCOMES:

CO1	Implement Basic programming constraints in C++.
CO2	Implement Object Oriented Programming Concepts in C++.
CO3	Develop applications using stream I/O and file I/O.
CO4	To Demonstrate practical experience in developing object-oriented solutions.
CO5	To Analyze a problem description and design and build object-oriented software using good coding practices and techniques.

SEMESTER - III	L T P C
PRACTICAL - IV	0 0 2 2
	TOTAL HOURS: 52

**DATA STRUCTURES AND COMPUTER
ALGORITHMS LAB**

SUBJECT CODE: U3CA22MP

OBJECTIVES:

- 1.To learn programming constructs of C++.
- 2.To implement the linear and non-linear data structure using STL
- 3 To Understand different operations of search trees

1. Write a program to implement Factorial and Fibonacci series using Recursion.
2. Write a program to Implement PUSH, POP operations of STACK using Arrays.
3. Write a program to Implement FRONT, REAR operations of QUEUE using Arrays.
4. Write a program to Create, Insert and Delete values in Singly Linked List.
5. Write a program to demonstrate Binary tree traversals.
6. Write a program to Implement Quick sorting.
7. Write a program to Implement Merge Sorting.
8. Write a program to Implement Knap sack problem using Dynamic programming.
9. Write a program to Implement Shortest Path using Dijkstra,s Algorithm.
10. Write a program to Implement Traveling Salesperson problem.
11. Write a program to solve 8 – Queens"s problem using backtracking.

COURSE OUTCOMES:

CO1	Apply generic programming technique to implement any data structure
CO2	Apply appropriate search trees for an application
CO3	Use graphs in problem solving

SEMESTER - III**ALLIED - III**

L	T	P	C
7	0	0	3

TOTAL HOURS: 91

FINANCIAL ACCOUNTING - I**SUBJECT CODE: U3BA21AT****OBJECTIVES:**

- 1.To give an insight into the basics of Accounting Concepts and Principles to prepare accounts.
- 2.Students to understand the role of accounting plays in the overall setup of a business.

UNIT-I**(20 Hrs)**

Introduction : Basic Accounting Concepts and Conventions - Groups interested in accounting
- Accounting Equation - Journal - Ledger - Subsidiary Books - Trial Balance .

UNIT-II**(20 Hrs)**

Final Accounts: Meaning - Preparation of Final Accounts - Trading Account - Profit and loss
a/c Manufacturing a/c- Balance Sheet - Distinction between Trial Balance and Balance Sheet.

UNIT-III**(20 Hrs)**

Depreciation Accounting: Meaning of Depreciation - Methods of Providing Depreciation -
Fixed Percentage on Original Cost - Fixed Percentage on Diminishing Balance.

UNIT-IV**(11Hrs)**

Average Due Date: Meaning - Practical uses of average due date - basic problems in Average
Due Date (Simple problems only).

UNIT-V**(20 Hrs)**

Single Entry System: Definition - Salient features - Limitations - Differences between Single
Entry System and Double Entry System – only Net Assets method (excluded conversion
method).

COURSE OUTCOMES:

CO1	Understand the basic concepts and conventions of accounting.
CO2	Able to prepare final accounts with adjustments.
CO3	Solve depreciation accounting under straight line method and diminishing balance method.
CO4	Identify the basic problems in average due date.
CO5	Differentiate single entry system and double entry system.
CO6	Understand the role of accounting plays in the overall setup of a business
CO7	Learn the accounting rules and principles.

TEXT BOOK:

1. T.S.Reddy and A.Murthy, “Financial Accounting”, PHI Publications, 4th Edition 2012.

REFERENCE BOOKS:

1. Gupta R.L, “Advanced Accountancy”, S.Chand, Delhi, 3rd Edition, 2005.
2. S.P. Jain, and K.L. Narang, “Financial Accounting”, Atlantic Publications, 4th Ed, 2007

Note: The Proportion between theory and problems shall be 20:80

SEMESTER - III	L	T	P	C
SKILL BASED SUBJECT- I	3	0	0	3
PAPER I	TOTAL HOURS: 39			
ENTERPRISE RESOURCE PLANNING				
SUBJECT CODE: U3CA24ST				

OBJECTIVE:

- 1.This course covers concepts in **enterprise resource planning (ERP)**.
- 2.The main focus of this course is to show how **ERP** systems integrate business processes
- 3 Functional areas and support business management and performance analysis.

UNIT – I (9 Hrs)

Business function and Business process: Functional areas and Business Process - functional area of operations - Business process - Marketing Sales – supply chain management – Accounting and finance – Human Resource – Functional areas of information system – The development of ERP system SAP R/3 – New directions in ERP – significance and benefits of ERP software and systems

UNIT - II (8 Hrs)

Marketing information system and sales order process in ERP: sales and Distribution in ERP –Pre sales activities – sales order processing – inventory Sourcing - Delivery – Billing – payment – Customer relationship Management – benefits of CRM

UNIT – III (9 Hrs)

Production and supply chain management information system: Production overview – The production planning process – The SAP ERP Approach to production planning – Sales forecasting – sales and operation Planning – Demand management – Material requirement planning in SAP ERP – ERP and supplier - supply chain

UNIT – IV (7 Hrs)

Accounting in ERP: Accounting activities – using ERP for accounting Information – operational decision making problem – credit management –Industrial credit management in SAP ERP – product profitability analysis – Management reporting with ERP system – Document flow for customer Service

UNIT – V (6 Hrs)

Human resource process in ERP: HR with ERP – Advance HR features – Time management – Payroll – Travel management – Training and Development – Management by objectives – ERP process modeling

COURSE OUTCOMES:

CO1	Business processes common to most businesses order processing, inventory management, procurement, etc.
CO2	Master data common to most businesses--customer, vendor, inventory, etc.
CO3	Process modeling--creating diagrams to depict the sequence of tasks completed in a business process.
CO4	How a business process often spans different functional areas of the business: accounting, marketing, material management, etc.
CO5	How enterprise systems, such as SAP, integrate business functional areas into one enterprise-wide information system.
CO6	The issues involved in implementing an ERP system.
CO7	Create reengineered business processes for successful ERP implementation

TEXT BOOK:

1. Ellen Monk and Bret Wagner, "Concepts in Enterprise Resource Planning", MGH, 4th edition, 2011.

REFERENCE BOOK:

1. K.Balasubramaniyan, S.Usha Priya, K.Hema, "Enterprise Wide Information Systems", 3rd Edition, 2006.

SEMESTER - III
NON MAJOR ELECTIVE - I
PAPER - I

L T P C
2 0 0 2
TOTAL HOURS: 26

MANAGEMENT CONCEPTS
SUBJECT CODE: U3BA21NM

OBJECTIVES:

1. Make the students aware of the management concepts
2. To understand the basic theories and concepts of management.

UNIT-I **(5 Hrs)**

Management – Definition – Importance – Role and Function of a Manager.

UNIT-II **(5 Hrs)**

Planning – Nature – Purpose – Steps – Types – Merits and Demerits of Planning – MBO.

UNIT-III **(6 Hrs)**

Organisms – Purpose – Departmentation – Span of Control – Delegation – Centralization and Decentralization – Line and Staffs – Committee.

UNIT-IV **(5 Hrs)**

Directions – Leadership – Motivation – Communication Process of Communication – Barriers of Communication.

UNIT-V **(5 Hrs)**

Controlling – Concept of Control – Methods of Control – Co-ordination – Need – Principles – Approaches to achieve effective Co-ordination.

COURSE OUTCOMES:

CO1	Understand the basic concepts, significance of management and role , functions of manager.
CO2	List the insight about planning its steps, types, and its pros and cons.
CO3	Describe organization, departmentation, span of control, centralization decentralization and its purpose.
CO4	Explain leadership styles and communication process and its barriers.
CO5	Concepts of control its process and different control methods.
CO6	Know the needs , principles and approaches of effective employee coordination.
CO7	Understanding the principles of management and its significance in organizational growth.

TEXT BOOKS:

1. J. Jayasankar, “Principles of Management”, Margam Publications, 2nd Edition, 2013.
2. Dinkar Pagare, “Principles of Management”, Sulthan Chand & Sons, 2nd Edition, 2005.

REFERENCE BOOKS:

1. Gupta C. B, “Management concept & practices”, Sultan Chand & Sons, 3rd Edition, 2009.
2. Prasad L. M, “Principles and practice of management”, Chand & Sons, 4th Edition, 2012.
3. Tripathi P. C. & Reddy P. N, “Principles of management”, Tata McGraw Hill, 2nd Edition, 2006.

SEMESTER - IV
PAPER - VI
COMPUTER NETWORKS
SUBJECT CODE: U4CA21MT

L	T	P	C
5	0	0	4
TOTAL HOURS: 65			

OBJECTIVES:

- 1.To understand the division of network functionality into layers.
- 2.To familiarize the functions and protocols of each layer of TCP/IP protocol suite.
- 3.To understand the flow of information from one node to another node in the network.

UNIT-I (13 Hrs)

Computer networks – Network hardware- Network software- Protocol Hierarchies – Layering – Interfaces– OSI reference Model – TCP/IP reference model – physical layer – transmission media - Wireless transmission – switching.

UNIT – II (13 Hrs)

Data link layer: services of DLL – framing – flow control – error control – Error detection codes – Error correction codes – DLL protocol – stop and Wait protocol –sliding window protocol - HDLC

UNIT-III (13 Hrs)

Network layer: services of network layer - routing – shortest path routing Algorithm – congestion control –Inter network routing – IP protocol –IP address – subnets – internet control protocol

UNIT-IV (13 Hrs)

Transportation layer: services of transportation layer – addressing –Establishing and releasing connection – flow control – buffering –Multiplexing –TCP and UDP –Model – connection management – TCP congestion control – UDP

UNIT-V (13 Hrs)

Application layer – DNS – name space – resource – records – name Servers - Email – architecture and services – user agent – message Format and transfer– WWW client and Server sides

COURSE OUTCOMES:

CO1	Ability to trace the flow of information from one node to another node in the network.
CO2	Identify the purpose and use of Network Hardware Devices
CO3	Finding the Shortest Route to routing packets
CO4	Develop own protocol
CO5	Ability to choose functionalities at each layer for different applications
CO6	Evaluate the protocols in network layer from QoS perspective
CO7	Purpose and need of Client and Server and its uses

TEXT BOOK:

1. Andrew Tanenbaum, “Computer Networks”, PHI, 3rd Edition, 2010.

REFERENCE BOOKS:

1. William Stalling, “Computer Networks”, PHI, 6th Edition, 2011.
2. Behrouz. A. Forouzan, “Computer Networks - A Top Down Approach”, PHI, 3rd Edition, 2008.
3. Larry L. Peterson, Bruce & Davie, “Computer Networks - A System Approach”, TMH, 2nd Edition, 2006.

SEMESTER - IV
PAPER - VII
OPERATING SYSTEM
SUBJECT CODE: U4CA22MT

L	T	P	C
4	0	0	4

TOTAL HOURS: 52

OBJECTIVES:

1. To learn the concepts of operating systems.
2. To learn about the various issues in operating systems.
3. To familiarize with the important mechanisms in operating systems.

UNIT-I (09 Hrs)

Introduction - types of operating systems - operating system services - system calls and system programs

UNIT-II (10 Hrs)

Process management - Process concepts - process scheduling - operation on process Inter process communication - CPU scheduling - scheduling algorithms - Deadlocks

UNIT-III (13 Hrs)

Memory Management - Single and multiple partitioned allocation – paging -segmentation - Virtual Memory Management - Demand paging and Page Replacement Algorithms

UNIT-IV (10 Hrs)

Information management - File concept - Access methods - Directory structure - allocation methods - free space management - disk scheduling.

UNIT-V (10 Hrs)

UNIX:UNIX system – Introduction - User interface - File System – Inter process Communication - A Case Study.

COURSE OUTCOMES:

CO1	Articulate the main concepts, key ideas, strengths and limitations of operating systems
CO2	Explain the core issues of operating systems
CO3	Know the usage and strengths of various algorithms of operating systems
CO4	Understand the basics of operating systems like kernel, shell, types and views of operating systems
CO5	Describe the various CPU scheduling algorithms and remove deadlocks.
CO6	Explain various memory management techniques and concept of thrashing
CO7	Recognize file system interface, protection and security mechanisms.

TEXT BOOK:

1. Abraham Silberschatz and P. B. Galvin – “Operating system concepts” - Addison Wesley Publication, 8th Edition, 2011.

REFERENCE BOOKS:

1. Achyut s Godbole, “Operating Systems” , TMH Publications ,3rd Edition, 2005.
2. John J. Donovan, “Systems Programming”, TMH Publications , 3rd Edition, 2001.
3. D.M. Dhamdhare, “Systems Programming and Operating Systems”, TMH, 2nd Edition, 2002.

SEMESTER - IV
PAPER - VIII
VISUAL PROGRAMMING
SUBJECT CODE: U4CA23MT

L	T	P	C
5	0	0	4

TOTAL HOURS:65

OBJECTIVES:

1. Implement the event driven programming using Visual Basic 6.0 forms and controls
2. Use programming fundamental features like variables, control structures, procedures, etc.
3. Create menu to make the application more interactive.

UNIT -I **(13 Hrs)**

Customizing a form - Writing a simple program - Tool box - Creating control - Name property - Command button - Access keys - Image control - Text boxes – Labels - Message boxes – Grid -Editing tools - Variables data types - String number.

UNIT -II **(13 Hrs)**

Displaying information - Determinate loops, Indeterminate loops – Conditionals - Built in function - Function and Procedure.

UNIT -III **(13 Hrs)**

Arrays – List - Sorting and searching record - Control arrays - Grid control - Project with multiple forms - Do events and sub main – Error trapping.

UNIT –IV **(13 Hrs)**

VB objects - Dialogue boxes - Common control – Menus - MDI forms – Testing - Debugging and Optimization - Working with Graphics.

UNIT -V **(13 Hrs)**

File and handling - File system control - File system objects.

COURSE OUTCOMES:

CO1	Design, create, build, and debug Visual Basic applications.
CO2	Explore Visual Basic's Integrated Development Environment (IDE).
CO3	Implement syntax rules in Visual Basic programs.
CO4	Explain variables and data types used in program development.
CO5	Apply arithmetic operations for displaying numeric output.
CO6	Write and apply decision structures for determining different operations.
CO7	Write and apply loop structures to perform repetitive tasks.

TEXT BOOK:

1. Gary Cornell, "Visual Basic 6.0 from the ground up", Tata McGraw Hill, 2nd Edition, 2002.

REFERENCE BOOKS:

1. Noel Jerke, "Visual Basic (The Complete Reference)", Tata McGraw Hill, 3rd Edition, 2008.
2. Deitel & Deitel, T.R. Nieto, "Visual Basic 6", PHI, Pearson Edition, 2005.

SEMESTER - IV
PRACTICAL - V
VISUAL PROGRAMMING LAB
SUBJECT CODE: U4CA21MP

L	T	P	C
0	0	4	2

TOTAL HOURS: 52

OBJECTIVES:

1. Visual Basic provides an environment called the IDE (Integrated Development Environment) that provides a platform for visual programming.
2. With the user diversion towards graphical user interfaces, computer programming languages are also changing..
3. Visual Basic is graphical user interface programming language which has a bulk of inbuilt user friendly tools for understanding programming language concepts.

1. Building simple application
2. Working with Intrinsic controls and ActiveX controls
3. Application with multiple forms
4. Application with dialogues
5. Application with menus
6. Application using data control
7. Application using format dialogues
8. Drag and Drop events
9. Database Management
10. Creating ActiveX controls

COURSE OUTCOMES:

CO1	Can able to create Visual basic applications using forms, controls, and events
CO2	Develop windows applications using Visual Basic language.
CO3	Create applications with database connectivity.

SEMESTER - IV
ALLIED - II
PAPER - IV
FINANCIAL ACCOUNTING - II
SUBJECT CODE: U4BA21AT

L	T	P	C
7	0	0	3
TOTAL HOURS: 91			

OBJECTIVES:

- 1.To understand the students branch accounts, departmental accounts, partnership accounts.
- 2.Students to understand the mechanized accounting system and role of computers

UNIT-I (20 Hrs)

Branch Accounts: Dependent Branches - Stock and Debtors System- independent branch (foreign branches excluded).

UNIT-II (21Hrs)

Departmental Accounts: Basis for allocation of expenses - Inter Departmental Transfer at cost or selling price - Treatment of expenses which cannot be allocated.

UNIT-III (22 Hrs)

Hire Purchase System: Meaning and Legal Position - Accounting aspects - Hire Purchase Trading account. Installment Purchase System: Meaning and Legal Position - Distinction between Hire Purchase System and Installment Purchase System - Accounting Treatment (Simple problems only).

UNIT-IV (18 Hrs)

Partnership Accounts: Admission of a partner - Retirement of a Partner - Death of a Partner - Dissolution of Partnership.

UNIT-V (10 Hrs)

Mechanized System of Accounting: Advantages - Limitations - EDP.

COURSE OUTCOMES:

CO1	Understand the different types of branch accounts.
CO2	Learn the techniques of preparing departmental accounting.
CO3	Evaluate the difference between hire purchase system and installment purchase system.
CO4	Discuss the role of accounting plays in partnership firms.
CO5	Analyze the mechanized system of accounting.
CO6	Describe the role of computers in accounting system.
CO7	Learn the techniques of preparing partnership accounts.

TEXT BOOK:

1. T.S.Reddy and A.Murthy, “Financial Accounting”, PHI Publications, 4th Edition, 2012.

REFERENCE BOOKS:

1. Gupta R.L, “Advanced Accountancy”, S.Chand, Delhi, 3rd Edition 2005.
2. S.P. Jain, and K.L. Narang, “Financial Accounting”, Atlantic Publications, 4th Ed 2007

Note: The Proportion between theory and problems shall be 20:80

SEMESTER - IV	L	T	P	C
SKILL BASED SUBJECT	3	0	0	3
PAPER - II				
E-COMMERCE				
SUBJECT CODE: U4CA24ST	TOTAL HOURS: 39			

OBJECTIVES

- 1.To understand the interest and opportunity of e-commerce
- 2.To know how to plan and how to manage e-commerce solutions
- 3.To apply processes of e-commerce and to analyze and understand the human, technological and business environment associated with e-commerce

UNIT-I (7 Hrs)

Electronic Commerce Framework, Traditional vs. Electronic business applications, the anatomy of E-commerce applications, major categories of E – commerce – B2B, B2C,C2B and C2C.

UNIT-II (7 Hrs)

Network infrastructure for E-Commerce - Components of the I-way - Global information distribution networks - public policy issues shaping the I-way, Communication media – Types of networks – Communication Satellite.

UNIT-III (7 Hrs)

Network security and firewalls - Client server network security - Firewall and Network Security - Data and Message security - Encrypted documents and Electronic mail, Digital Signature, Certificates, Envelops.

UNIT-IV (10 Hrs)

E – commerce and World Wide Web – E – payment systems – Electronic Data Interchange (EDI) – EDI applications in business, Intranet application in business. E-Payment Systems: Online payment – Payment cards – Electronic Wallets – Digital Cards – types – Stored Value Cards – Internet Technologies – Banking – Net, Mobile.

UNIT-V (8 Hrs)

WORLD WIDE WEB – PROCESS: Web hosting services – Web Servers, Domain Naming Systems (DNS) – types – POP, IMAP – Accredited Registrars – country coded and top level domains – Internet Regulatory Organizations.

COURSE OUTCOMES:

CO1	Define and analyze the principles of E-commerce and basics of World Wide Web.
CO2	Define and analyze the concept of electronic data interchange and its legal, social and technical aspects.
CO3	Define and analyze the security issues over the web, the available solutions and future aspects of e-commerce security.
CO4	Define and analyze the concept of E-banking, electronic payment system
CO5	Describe the major types of E-commerce.
CO6	Explain the process that should be followed in building an E-commerce presence.
CO7	Identify the key security threats in the E-commerce environment.

TEXT BOOK:

1. R. Kalakota and A. B. Whinston, "Frontiers of Electronic Commerce", Addison Wesley, 1996.

REFERENCE BOOKS:

1. R.Kalakota and A.B.Whinston, "Readings in Electronic Commerce", Addison Wesley, 1997.
2. David Kosiur, "Understanding Electronic Commerce", Microsoft Press, 1997.
3. Soka, "From EDI to Electronic Commerce", McGraw Hill, 1995.
4. Saily Chan, "Electronic Commerce Management", John Wiley, 1998.

SEMESTER - IV	L	T	P	C
NON MAJOR ELECTIVE -II	2	0	0	2
PAPER - II	TOTAL HOURS: 26			
GENERAL COMMERCIAL KNOWLEDGE				
SUBJECT CODE: U4BA21NM				

OBJECTIVES:

- 1.To enable the students in terms of understanding the various concepts related to business organizations and office management.
2. Students to understand the office accommodation and office environment.

UNIT I: (5 Hrs)

Commerce trade, Industry – Meaning - scope and importance of commerce – Economics basis of commerce.

UNIT II: (5 Hrs)

Forms of business organization-sole trading-partnership firms-merits and demerits of partnership firm.

UNIT III: (5 Hrs)

Joint stock companies-features- memorandum and articles-shares and debentures-types-co-operatives-features-types and advantages.

UNIT IV: (5 Hrs)

Office organization-what in an office? Functions of office-office accommodation and environment-office layout-office manual.

UNIT V: (6 Hrs)

Handling of mail, filling and indexing-inward/out ward of mail-filling and indexing-system, essential and classification-methods-horizontal VS vertical filling-centralized and decentralized-indexing.

COURSE OUTCOMES:

CO1	Understand the basic concepts of commerce, trade and industry.
CO2	Identify the various forms of business organization.
CO3	Classify various types of shares and debentures.
CO4	Describe the office functioning and working environment.
CO5	Analyze filing and indexing system in the office management.
CO6	To handle inward and outward mails in the office.
CO7	Understanding the various concepts related to two business organizations and office management.

TEXT BOOKS:

1. C.D. Balaji and G. Prasad, “Business Organization”, Margham Publications, 1st Ed. 2015
2. Pillai R.S.N, Bhagwathi, “V-Office Management”, Sulthan chand, 1st Ed 2003.

REFERENCE BOOKS:

1. Dr.C.B.Guptha, “Office organization”, Sulthan Chand and Sons, 3rd Edition, 2007.
2. Arora, S. P. “Office Organization and Management” Vikas Publishing House, 2nd Ed, 2003.
3. Nair, R.K. & Banerjee, “A. K. Office Management”, Pragati Prakashan, 5th Ed, 2012.

SEMESTER - V

PAPER - IX

L	T	P	C
6	0	0	5

TOTAL HOURS: 78

RELATIONAL DATABASE MANAGEMENT SYSTEM

SUBJECT CODE: U5CA21MT

OBJECTIVES:

- 1.To learn the fundamentals and issues in database systems
- 2.To understand the importance of transaction management in databases
- 3.To learn advanced representations of databases suited for real-time applications

UNIT – I (16 Hrs)

Introduction: Database System Applications – Purpose of Database Systems – View of Data – Database Languages – Transaction Management – Database Architecture – Database users and Administrators.

Relational Model: Structure of Relational Databases – Database Design – ER Model – Overview of the Design Process – The Entity-relationship Model – Constraints – Entity Relationship Diagrams.

UNIT – II (16 Hrs)

Relational Algebra Operations – Relational Languages: The Tuple Relational Calculus – The Domain Relational Calculus – SQL: Background – Data Definition – Basic Structure of SQL Queries – Set Operations – Aggregate Functions – Null Values – Nested Sub-Queries – Views – Modification of the Database.

UNIT – III (16 Hrs)

Data Normalization: Pitfalls in Relational Database Design – Decomposition – Functional Dependencies – Normalization – First Normal Form – Second Normal Form – Third Normal Form – Boyce-Codd Normal Form – Fourth Normal Form – Fifth Normal Form – Denormalization – **Database Security:** Data Security Requirements – Protecting the Data within the Database – Granting and Revoking Privileges – Data Encryption.

UNIT –IV (17 Hrs)

PL/SQL: A Programming Language: History – Fundamentals – Block Structure – Comments – Data Types – Other Data Types – Declaration – Assignment operation – Bind variables – Substitution Variables – Printing – Arithmetic Operators. **Control Structures**

and Embedded SQL: Control Structures – Nested Blocks – SQL in PL/SQL – Data Manipulation – Transaction Control statements. **PL/SQL Cursors and Exceptions:** Cursors – Implicit & Explicit Cursors and Attributes – Cursor FOR loops – SELECT...FOR UPDATE – WHERE CURRENT OF clause – Cursor with Parameters – Cursor Variables – Exceptions – Types of Exceptions.

UNIT –V

(13 Hrs)

PL/SQL Composite Data Types: Records – Tables – Varrays. Named Blocks: Procedures – Functions – Packages – Triggers – Data Dictionary Views.

COURSE OUTCOMES:

CO1	Classify modern and futuristic database applications based on size and complexity
CO2	Map ER model to Relational model
CO3	Write queries using normalization criteria
CO4	Compare and contrast various indexing strategies in different database systems
CO5	Appraise how advanced databases differ from traditional databases
CO6	Use of function and procedure in SQL
CO7	Use of Cursor and Trigger

TEXT BOOK:

1. S.K.Singh, “Database systems: Concepts, Design & applications”, Pearson Education, 2nd Edition, 2009.

REFERENCE BOOKS:

1. Abraham Silberschatz, H.F.Korth and S.Sudarshan-Database System Concepts McGraw Hill Publication, 3rd Edition, 2008.
2. Gerald V.Post, “DBMS-Designing and Business Applications”, McGraw Hill Publications, 2nd Edition, 2006.
3. Michael Abbey and Michael.J.Corey-Oracle, “A Beginners guide”, TMH, 4th Edition, 2009.

SEMESTER - V	L T P C
PAPER - X	6 0 0 5
OPEN SOURCE PROGRAMMING	TOTAL HOURS: 78
SUBJECT CODE: U5CA22MT	

OBJECTIVES:

1. This course provides an overview of the historical and modern context and operation of free and open source software (FOSS) communities and associated software projects.
2. The practical objective of the course is to teach students how they can begin to participate in a FOSS project in order to contribute to and improve aspects of the software that they feel are wrong.
3. Students will learn some important FOSS tools and techniques for contributing to projects and how to set up their own FOSS projects.

UNIT-I **(16 Hrs)**

Introduction : Linux Essential Commands – File system Concept – Standard Files – The Linux Security Model – Vi Editor – Partitions Creation – Shell Introduction – String Processing – Investigation and Managing Processes – Network Clients – Installing Application.

UNIT- II **(15 Hrs)**

Introduction to MY SQL – The show Databases and Table – The USE command – Create Database and Tables – Describe Table – Select, Insert, Update, and Delete statement – Some Administrative detail – Table Joins – Loading and Dumping a Database.

UNIT-III **(16 Hrs)**

PHP Introduction – General Syntactic Characteristics – PHP Scripting – Commenting your code – Primitives, Operations and Expressions – PHP Variables – Operations and Expressions - Control statement – Array – Functions - Basic Form Processing – File and Folder Access – Cookies – Sessions – Database Access with PHP(MY SQL).

UNIT - IV **(15 Hrs)**

Perl Backgrounder – Perl Overview – Perl Parsing Rules – Variables and Data – Statements and Control Structures – Subroutines - Packages and Modules - Working with Files – Data Manipulation.

UNIT –V

(16 Hrs)

Python Syntax and Style – Python Objects – Numbers – Sequences – Strings – Lists and Tuples – Dictionaries – Conditionals and Loops – Files – Input and Output – Errors and Exceptions – Functions – Modules – Classes and OOP – Execution Environment.

COURSE OUTCOMES:

CO1	Ability to learn Linux Operating system and its environment.
CO2	Ability to gather information about Free and Open Source Software projects from software releases and from sites on the internet.
CO3	Ability to build and modify the mysql commands(insert,delete,update,alter,etc)
CO4	Ability to contribute perl software to and interact with Free and Open Source Software development projects
CO5	Learn the Python language, its structure, syntax concepts, libraries and application.
CO6	Learn how to write computer programming using Python language
CO7	Understand the installation of various packages in open source operating systems

REFERENCE BOOKS:

1. Remy Card, Eric Dumas and Frank Mevel, “The Linux Kernel Book”, Wiley Publications, 2003
2. Robin Nixon, “Learning PHP, MySQL, Java Script, CSS and HTML5”, O’Reilly Publications, 3rd Edition, 2014.
3. Steve Suchring, “MySQL Bible”, John Wiley, 2002
4. Rasmus Lerdorf and Levin Tatroe, “Programming PHP”, O’Reilly, 2002
5. Martin C. Brown, “Perl: The Complete Reference”, Second edition, Tata McGraw-Hill, Indian Reprint, 2009.
6. Wesley J. Chun, “Core Python Programming”, Prentice Hall, 2001
7. P.Rizwan Ahmed, “Open Source Software”, Margham Publication, Chennai, 2015

SEMESTER - V
PRACTICAL - VI
RDBMS Lab

L	T	P	C
0	0	5	4
TOTAL HOURS: 65			

SUBJECT CODE: U5CA21MP

OBJECTIVES:

- 1.To present SQL and procedural interfaces to SQL comprehensively
- 2.To give an introduction to systematic database design approaches covering conceptual design, logical design and an overview of physical design
- 3.To present the concepts and techniques relating to query processing by SQL engines To present the concepts and techniques relating to ODBC and its implementations. To introduce the concepts of transactions and transaction processing

1. Create a table Student-master with the following fields client_no, name, address, city, state, pincode, remarks, bal_due with suitable data types.
 - a) Create another table supplier_table from client_master. Select all the fields and rename client_no with supplier_no and name with supplier_name.
 - b) Insert data into client_master
 - c) Insert data into supplier_master from client_master.
 - d) Delete the selected row in the client_master.
2. Create a table sales_order with s_order_no and product_no as primary key. Set other fields to store client number, delivery address, delivery date, order status.
 - a) Add a new column for storing salesman number using ALTER Command.
 - b) Set the s_order_no as foreign key as column constraints.
 - c) Set the s_order_no as foreign key as table constraints.
 - d) Enforce the integrity rules using CHECK.
3. Create a table Order_Info with the following fields Orderid, Orderdate, Commplan, Cusid, Shipdate, total with suitable data types. Create another table Customer with Custid, Name, Address, City, Pincode with suitable data types. Write commands to relating data through Join concepts using the table Order_Info and Customer.
4. Create a table master book to contain the information of magazine code, magazine name, and publisher. Weekly/biweekly/monthly, price. Write PL/SQL block to perform insert, update, and delete operations on the above table.

5. Create a table to contain phone number, user name, address of the phone user. Write a function to search for a address using phone numbers.
6. Create a table stock to contain the item code, item name, current stock, date of last purchase. Write a stored procedure to seek for an item using item code and delete it, if the date of last purchase is before 1 year from the current date. If not, update the current stock.
7. Create a table to store the salary details of the employees in a company. Declare the Cursor to contain employee number, employee name and net salary. Use Cursor to update the employee salaries.
8. Create a table to contain the information about the voters in a particular constituency. Write a proper trigger to update or delete a row in the table.
9. Create a table to store the details of the Alumni in an institution. Write a PL/SQL block to change address of particular alumni. Write proper exceptions and appropriate error messages.

USING FUNCTIONS, PROCEDURES AND PACKAGES:

10. Create a table student_master with the following fields name, regno, dept and year with suitable data types. Use Select command to do the following.
 - a) Select the student's name column.
 - b) Eliminate the duplicate entry in table.
 - c) Sort the table in alphabetical order.
 - d) Select all the Students of a particular department.
11. Create a table sales_order_details with the s_order_no as primary key and with the following fields: product_no, description, qty_ordered, qty_disp, product_rate, profit_percent, sell_price, supplier_name.
 - a) Select each row and compute sell_price*.50 and sell_price*1.50 for each row selected.
 - b) Select product_no, profit_percent, Sell_price where profit_per is not between 10 and 20 both inclusive.
 - c) Select product_no, description, profit_percent, sell_price where profit_percent is not between 20 and 30.
 - d) Select the supplier name and product_no where supplier name has „r“ or „h“ as second character.

12. Create table Order_master with following fields Order_no, Odate, Vencode, Ostatus, Del_date with suitable data types. Create another table Order_detail with Order_no, Itemcode, Qty_ord, Qty_deld with suitable data types. Write Commands to set Operations using the table Order_master and Order_detail.

COURSE OUTCOMES:

CO1	Understand, appreciate and effectively explain the underlying concepts of database technologies
CO2	Design and implement a database schema for a given problem-domain
CO3	Normalize a database
CO4	Populate and query a database using SQL DML/DDL commands
CO5	Declare and enforce integrity constraints on a database using a state-of-the-art RDBMS

SEMESTER - V	L T P C
PRACTICAL - VII	0 0 5 4
OPEN SOURCE PROGRAMMING LAB	TOTAL HOURS: 65
SUBJECT CODE: U5CA22MP	

OBJECTIVES:

1. Open source laboratory introduces the students to develop technical solutions for problems using the open source software readily available at free of cost.
2. The objective of this course is to enhance the knowledge of students to address the IT requirements both from the operating system and application requirement perspective.
1. Write a shell script to find out whether the given number is prime number or not.
2. Write a shell program to find out factorial of the given number.
3. Create a student database table in **MYSQL** and manipulate records (insert, delete, and update) records in a web browser.
4. Use essential **MySQL** record selection query to extract records in a MySQL database
5. Develop a program using cookies and session using **PHP**.
6. Develop a program using **PHP** to display Date and Time Functions.
7. Write a **Python** Program to find the sum of Sine series.
8. Write a **Python** Program to calculate the Marks of 5 Subjects and Display the Grade.
9. Write a **PERL** program to implement the following,
 - a. Variables and Data – Statements and Control Structures.
10. Write a **PERL** program to implement the following,
 - a. Subroutines - Packages and Modules.

COURSE OUTCOMES:

CO1	Select and install the various open source software as per the requirement.
CO2	Construct the development environment as per the requirement.
CO3	Identify the associated plug-in is as per the requirement.
CO4	Learn the languages like PHP, Perl, Python to develop an application as per requirement.
CO5	implement various applications using build systems
CO6	Understand and implement the mini projects using open source softwares.
CO7	Understand the kernel configuration and virtual environment

SEMESTER - V

L T P C

ELECTIVE - I

5 0 0 5

(To choose 1 out of the given 2)

TOTAL HOURS: 65

PAPER - I

DATA MINING AND WAREHOUSING

SUBJECT CODE: U5CA23ET

OBJECTIVES:

1. To make the students to understand data mining principles and techniquesTo discover the knowledge imbibed in the high dimensional system.
2. To study algorithms for finding the hidden interesting patterns in data.
3. To study the overview of developing areas – Web mining, Text mining and Big DataMining Tools of Data mining.

UNIT-I

(13 Hrs)

Introduction - What is Data mining – Important of Data mining - various kind of data mining Functionalities – Various kinds of Patterns Pattern Interesting Classification of Data mining Systems Data mining Task Primitives Integration of Data Mining System Major issues in Data Mining

UNIT-II

(13 Hrs)

Data Processing - Process the Data Descriptive Data Summarization – Measuring Central Tendency Dispersion of Data Graphic Displays – Basic Descriptive Data Summaries Data Cleaning Data Integration and Transformation data Reduction. Data Discrimination - Concept Hierarchy Generation

UNIT-III

(13 Hrs)

Data Warehouse: OLAP Technology - An overview - Data Warehouse Multidimensional Data Model - Data Warehouse Architecture - Data Warehouse Implementation from Data Warehouse to Data mining

UNIT-IV

(13 Hrs)

Mining-Frequent patterns - Associations Correlation - Basic Concepts: Road Map, Efficient Scalable Frequent, Item set -Mining methods- Mining Various Kinds of Association mining to correlation-Constraint based mining

UNIT-V

(13 Hrs)

Applications Trends - Data mining Applications Data mining – System Products Research Prototype - Additional Themes on Data Mining - Social impact of Data mining Trends in Data mining

COURSE OUTCOMES:

CO1	Technical knowhow of the Data Mining principles and techniques for real time applications.
CO2	To write programs for classification and clustering
CO3	To evaluate various mining techniques on complex data objects
CO4	To develop applications using Big Data Mining Tools.
CO5	Understand the functionality of the various data mining and data warehousing component
CO6	Appreciate the strengths and limitations of various data mining and data warehousing models
CO7	To understand the various Data preprocessing Methods

TEXT BOOK:

1. Jiawei Han and Micheline Kamber, “Data Mining - Concepts and Techniques”, Morgan Kaufmann Publishers, Second Edition (Chapter 1, 2, 3, 5, 11), 2011.

REFERENCE BOOKS:

1. Karguta, Joshi, Sivakumar & Yesha, “Data Mining Next Generation Challenges and Future Directions”, Prentice Hall of India, 2007.
2. Ian H. Witten & Eibe Frank, “Data Mining Practical Machine Learning Tools and Techniques”, Morgan Kaufmann Publishers, Second Edition, 2010
3. Alex Benson, Stephen V. Smith, “Data Warehousing, Data mining & OLAP”, Tata McGraw – Hill, 2nd Edition 2004.

SEMESTER - V
PAPER - I

L	T	P	C
5	0	0	5

TOTAL HOURS: 65

MICROPROCESSORS AND MICROCONTROLLERS

SUBJECT CODE: U5CA24ET

OBJECTIVES:

1. It gives a practical training of interfacing the peripheral devices with the 8085 microprocessor.
2. The course objective is to introduce the basic concepts of microprocessor and to develop in students the assembly language programming skills.
3. It gives real time applications of Microprocessor as well as microcontroller.

UNIT I: 8085 MICROPROCESSOR

(10 Hrs)

Introduction to Microprocessor- 8085 Architecture and its operations- 8085 pin description- 8085 instruction Set and Classification -8085 addressing modes.

UNIT II: 8085 PROGRAMMING

(13 Hrs)

Writing assembly level Programs - Multi-byte addition - Multi-byte Subtraction-BCD addition -BCD subtraction-BCD Multiplication-BCD division – BCD to Binary And Binary to BCD conversion-BCD to Hex and Hex to BCD conversion – ASCII to BCD and BCD to ASCII Conversion – ASCII to Binary and Binary to ASCII Conversion.

UNIT III: FEATURES AND INTERFACING OF PROGRAMMABLE DEVICES FOR 8085 BASED SYSTEMS

(12 Hrs)

Intel 8255 Programmable Peripheral Interface: Features of 8255 – Block diagram of Intel 8255- Operating Modes and control words of 8255 – Programming Examples – Interfacing LEDs – Interfacing Seven Segment Displays – Traffic Light control.

UNIT IV: 8086 MICROPROCESSOR AND ADVANCED MICROPROCESSOR (15 Hrs)

Introduction to 8086 Microprocessor - Architecture of 8086 – Pin details of 8086. Advanced Microprocessor: 80186 Architecture - 80286 Architecture – Pentium Microprocessor: Architecture of Pentium. Other Versions of Pentium: Pentium Pro Processor - Pentium II Processor - Pentium III Processor- Pentium 4 Processor

UNIT V: 8051 MICROCONTROLLER

(15 Hrs)

Introduction to 8051 Microcontroller - Intel's MCS -51 series Microcontrollers - Intel 8051 Architecture –Memory organization – Internal RAM Structure- Power Control in 8051 – Stack operation.

COURSE OUTCOMES:

CO1	Understanding the concept of 8085 Instruction set and Classification
CO2	To write programs to find out the smallest / largest number stored in memory, a program related to conversion from Binary to BCD and Hexadecimal to decimal using the 8085 assembly language.
CO3	Ability to understand the Hardware and Interfacing 8255
CO4	Solve basic arithmetic operations using the 8085 assembly language.
CO5	Demonstrate the concept of Programmable Interface Devices
CO6	Demonstrate the concept of 8051 Microcontroller
CO7	To provide a theoretical & a practical introduction to microcomputer and microprocessors, assembly language programming techniques, design of hardware interfacing circuit.

TEXT BOOKS:

1. Ramesh Goankar “Microprocessors and Microcontroller”, Prentice Hall, 5th edition, 2002. (Unit I & Unit II)
2. N.Senthilkumar M.Saravannan, S.Jeevananthan “Microprocessor and Microcontrollers”, Oxford University Press, 1/E, 2010 (unit III, Unit IV & Unit V)

REFERENCE BOOKS:

1. Douglas V. Hall “Microprocessors and Interfacing “, Tata McGraw Hill, 2/E, 2006.
2. Krishna kant “Microprocessors and Microcontrollers Architecture Programming and system design 8086,8086,8051,8096, PHI Learning Pvt Ltd. New Delhi, 2/E, 2010.
3. Barry B. Brey, “The Intel Microprocessor-8086/8088, 80186,286, 386, 486, Pentium Processor”, Prentice Hall of India Pvt Ltd, 8th Edition, 1998.
4. Yu-chang Lin and Clean, “Microprocessor System the 8086/8088 family architecture, Programming and Design”, Prentice Hall of India Pvt Ltd, 2nd edition, 2001.

SEMESTER - V
SKILL BASED SUBJECT
PAPER - III
MOBILE COMPUTING
SUBJECT CODE: U5CA25ST

L	T	P	C
3	0	0	3

TOTAL HOURS:39

OBJECTIVES:

1. Study the details of lower layers of mobile architectures
2. To learn to develop applications for various mobile OS
3. Study the details for Android

UNIT-I (9 Hrs)

Introduction- Applications-vehicles- Mobile and Wireless devices- History of wireless communications- Mobile Communication Market – A Simplified and reference model – Overview – Wireless Transmission – Signals – Antennas – Signal Propagation – Multiplexing– Modulation – Spread Spectrum.

UNIT-II (7 Hrs)

Medium Access Control – motivation for a MAC- SDMA – FDMA – TDMA – Comparison of S/T/F/ CDMA. – Telecommunication Systems –GSM – System Architecture – Protocols – DECT – TETRA.

UNIT-III (7 Hrs)

Satellite system – History – Applications – BASICS – GEO – LEO – MEO – Routing– Localization – Handover – Examples – Broad cast Systems– Cyclic Repetition of data – Digital Video and Audio Broadcasting.

UNIT-IV (8 Hrs)

Mobile Network Layer – Mobile IP – Goals, assumptions- Entities and term logy – IP Packet Delivery – Tunneling and encapsulation – Optimization - Dynamic Host Configuration Protocol – ad hoc networks – Routing- Destination sequence distance vector – Dynamic source routing –Alternative metrics.

UNIT-V: (8 Hrs)

Mobile Transport layer- Traditional TCP – Congestion control – Slow start –Fast retransmit / fast recovery – Implication on mobility - Indirect TCP – Snooping TCP – Mobile TCP – Fast retransmit / fast recovery – transmission / time-out freezing.

COURSE OUTCOMES:

CO1	To explain the features of smart mobiles and other smart devices
CO2	To develop applications for Android and iOS
CO3	To explain protocols related to routing in mobile networks
CO4	Able to think and develop new mobile application.
CO5	Able to debate on any new technical issue related to this new paradigm and come up with a solution(s).
CO6	Able to develop new ad hoc network applications and/or algorithms/protocols.
CO7	Able to explain & develop any existing or new protocol related to mobile environment

TEXT BOOK:

1. Jochen Schiller, “Mobile Communication”, Addison Wesley, 3rd Edition, 2005.

REFERENCE BOOKS:

1. Honeyman P Huston L.B, “Communications and Consistency in Mobile File Systems”, IEEE Personal communication 2(6), 3rd Edition, Dec 1996.
2. Biplob k Sikdar ,Sipra dasbit, “Mobile Computing” Printice Hall India, 2nd Edition, 2002.
3. William Stallings, “Wireless Communications & Networks”, Pearson Education, 2/E, 2004.
4. Uwe Hansmann, Lothar Merk , Martin S. Nicklons & Thomas Stober, “ Principles of Mobile Computing” , spinger, 3rd Edition, 2003.

SEMESTER- VI
PAPER - XI
JAVA PROGRAMMING
SUBJECT CODE: U6CA21MT

L	T	P	C
4	0	0	5
TOTAL HOURS: 52			

OBJECTIVES:

1. To familiarize the Object Oriented Programming (OOP) concepts, such as abstraction, encapsulation, instances, initializations, polymorphism, overloading, inheritance and generic programming.
2. To learn the OOP specific programming languages such as C++ and Java.
3. To understand and know the importance of OOP in real-world problems.

UNIT- I

(9 Hrs)

Introduction to Java - Features of Java - Object Oriented Concepts - Data Types - Variables - Arrays - Operators - Control Statements-Input and output-Scanner and System class-print(), println(), and printf() methods.

UNIT- II

(10 Hrs)

Classes - Objects - Constructors - Overloading method - Access Control - Static and fixed methods - Inner Classes - String Class - Inheritance - Overriding methods - Using super- Abstract class – Type Wrapper classes for primitive types- Auto boxing and Auto Un boxing – Recursion.

UNIT- III

(9 Hrs)

GUI components – Common GUI Event types and Listener Interfaces - JOptionPane – JLabel, JTextfield, JButton, JCheckBox, JTextarea, JComboBox, JList, JPanel – Mouse Event Handling - Adapter Classes- Key Event Handling.

UNIT- IV

(12 Hrs)

Layout Managers – Flowlayout, BorderLayout, GridLayout - Graphics and Java 2D – Graphics contexts and Graphics objects – Color control – Font Control – Drawing Lines, Rectangles and Ovals – JSlider – Using menus with Frames.

UNIT- V

(12 Hrs)

Packages - Access Protection - Importing Packages - Interfaces - Exception Handling - Throw and Throws - Thread - Synchronization - Runnable Interface - Inter thread Communication – Multithreading - I/O Streams - File Streams - Applets .

COURSE OUTCOMES:

CO1	Design problem solutions using Object Oriented techniques.
CO2	Apply the concepts of data abstraction, encapsulation, polymorphism, overloading, and inheritance for problem solutions.
CO3	Use the OOP concepts of C++ and Java appropriately in problem solving.
CO4	Use the syntax and semantics of java programming language and basic concepts of OOP
CO5	Develop reusable programs using the concepts of inheritance, polymorphism, interfaces and packages.
CO6	Apply the concepts of Multithreading and Exception handling to develop efficient and error free codes
CO7	Design event driven GUI and web related applications which mimic the real world scenarios.

TEXT BOOK:

1. C.Muthu, “Programming in Java”, TMH Publication, 2nd Edition, 2008.

REFERENCE BOOK:

1. Deitel & Deitel, “Java How to Program”, PHI Publication, 6th Edition, 2005.
2. Herbert Schildt, “Java – The Complete Reference” MGH, 8th Edition, 2012.
3. Ivor Horton, “Beginning Java 2”, MGH, 3rd Edition, 2004.
4. Steven Holzner, “Java 2 Black book”, Coriolis Group books, 2nd Edition, 2006.

SEMESTER - VI
PAPER - XII
WEB TECHNOLOGY
SUBJECT CODE: U6CA22MT

L	T	P	C
5	0	0	5
TOTAL HOURS: 65			

OBJECTIVES:

1. To write syntactically correct HTTP messages and describe the semantics of common HTTP methods and header fields
2. Discuss differences between URIs, URNs, and URLs, and demonstrate a detailed understanding of http-scheme URLs, both relative and absolute
3. Describe the actions, including those related to the cache, performed by a browser in the process of visiting a Web address

UNIT-I

(13 Hrs)

Internet Basic - Introduction to HTML - List - Creating Table - Linking document Frames - Graphics to HTML Doc - Style sheet - Style sheet basic - Add style to document - Creating Style sheet rules - Style sheet properties - Font - Text - List - Color and background color - Box - Display properties.

UNIT-II

(12 Hrs)

Introduction to JavaScript - Advantage of JavaScript - JavaScript Syntax - Data type - Variable - Array - Operator and Expression - Looping Constructor - Function - Dialog box.

UNIT-III

(13 Hrs)

JavaScript document object model - Introduction - Object in HTML - Event Handling - Window Object - Document object - Browser Object - Form Object - Navigator object Screen object - Build in Object - User defined object - Cookies.

UNIT-IV**(14 Hrs)**

ASP. NET Language Structure - Page Structure - Page event, Properties & Compiler Directives. HTML server controls - Anchor, Tables, Forms, Files. Basic Web server Controls- Label, Textbox, Button, Image, Links, Check & Radio button, Hyperlink. Data List Web Server Controls - Check box list, Radio button list, Drop down list, List box, Data grid, Repeater.

UNIT-V**(13 Hrs)**

Request and Response Objects, Cookies, Working with Data - OLEDB connection class, command class, transaction class, data adaptor class, data set class. Advanced Issues - Email, Application Issues, Working with IIS and page Directives, Error handling.

COURSE OUTCOMES:

CO1	Students are able to develop a dynamic webpage by the use of java script and DHTML
CO2	Students will be able to write a well formed / valid XML document.
CO3	Students will be able to connect a java program to a DBMS and perform insert, update and delete operations on DBMS table.
CO4	Students will be able to write a server side java application called Servlet to catch form data sent from client, process it and store it on database.
CO5	Students will be able to write a server side java application called JSP to catch form data sent from client and store it on database.
CO6	To study the framework and building blocks of .net integrated development environment.
CO7	To design and develop web based enterprise systems for the enterprises using technologies like jsp, servlet and asp.net

TEXT BOOKS:

1. I. Bayross, "Web Enable Commercial Application Development Using HTML, DHTML, Javascript", Pen CGI, BPB Publications, 4/E, 2013.
2. G. Buczek, ASP.NET Developers Guide, TMH, 2/E, 2002.

REFERENCE BOOKS:

1. Deitel & Deitel, "Internet & World Wide Web How to program", Pearson Education, 3rd Edition, 2006.
2. J. Jaworski, "Mastering Javascript", BPB Publications, 3rd Edition, 1999.
3. T. A. Powell, "Complete Reference HTML", TMH, 3rd Edition, 2002.
4. "Web Technologies HTML, Java Script, PHP, Java, JSP, ASP.NET, XML & AJAX Black Book", Kogent Learning Solutions, Dream Tech Press, 2nd Edition, 2015.

SEMESTER -VI
PRACTICAL - VIII
JAVA LAB
SUBJECT CODE: U6CA21MP

L	T	P	C
0	0	4	4

TOTAL HOURS: 52

OBJECTIVES:

1 To understand the basic concepts of Java, Class syntax, data types, flow of control, classes, methods, objects, arrays, exception handling, recursion, and graphical userinterfaces (GUIs).

2.Writing and testing applets for potential inclusion in web pages.

Understanding how to access enterprise data bases from the application programs.

1. Finding area and Perimeter of a circle. Use Scanner class.
2. Determining the order of numbers generated randomly using Random Class.
3. String Manipulation (Substring removal, string replacement etc.,)
4. Drawing Rectangles, Ovals etc using Applet.
5. Implementing Thread based applications & Exception Handling.
6. Application using synchronization such as Thread based, Class based and synchronized statements.
7. Implementing GUI based applications using swing components (Jlabel, Jbutton, JtextField)
8. Implementing GUI based application using Layout managers and menus.
9. Application using file streams(sequential file)
10. Application using file streams(Random file)

COURSE OUTCOMES:

CO1	To use the basics of Java programming, multi-threaded programs.
CO2	To implement the Exception handling concepts.
CO3	The skills to apply OOP in Java programming in problem solving
CO4	Implement Object oriented features using Java
CO5	Apply the concept of polymorphism and inheritance
CO6	Implement exception handling
CO7	Develop network and window application using awt and swings.

SEMESTER -VI
PRACTICAL - IX
WEB TECHNOLOGY LAB
SUBJECT CODE: U6CA22MP

L	T	P	C
0	0	4	4

TOTAL HOURS: 52

OBJECTIVES:

1. Try and develop the most important technologies that are being used today by web developers to build a wide variety of web applications.
 2. To develop Java based web programming.
-
1. Create a simple page introducing yourself how old you are, what you do, what you like and dislike. Modify the introduction to include a bullet list of what you do and put list the 5 things you like most and dislike as numbered lists. Create another page about your favorite hobby and link it to (and from) your main page. Center something, and put a quote on one of your pages
 2. Put an existing image on a web page. Create a table, use a heading and at least one use of row span/col. span. Color a page and some text within the page. Link to another site
 3. Create a new file called index. Html.

Put the normal HTML document structure tags in the file.

- Give a title.
- At the bottom of the page (i.e. the last thing between the body tags) put the following:
- A horizontal rule.
- A Link to your e-mail Address (With your name between the tag); remember to put the link to your E- Mail address within address tags.
- A line break.
- The date.
- Add some text describing yourself (you can split this into multiple headings and paragraphs if you wish).

4. Write a script to create an array of 10 elements and display its contents.
5. Write a function in Java script that takes a string and looks at it character by character.
6. Create a simple calculator using form fields. Have two fields for number entry & one field for the result. Allow the user to be able to use plus, minus, multiply and divide.
7. Create a document and add a link to it. When the user moves the mouse over the link, it should load the linked document on its own. (User is not required to click on the link).
8. Create a document, which opens a new window without a toolbar, address bar or a status bar that unloads itself after one minute.
9. Create a document that accepts the user's name in a text field form and displays the same the next time when the user visits the site informing him that he has accessed the site for the second time, and so on.
10. Create a Web form for an online library. This form must be able to accept the Membership Id of the person borrowing a book, the name and ID of the book and the name of the book's author. On submitting the form, the user (the person borrowing the book) must be thanked and informed of the date when the book is to be returned. You can enhance the look of the page by using various ASPNET controls.

COURSE OUTCOMES:

CO1	Apply the Object Oriented features of Java for programming on the internet
CO2	Implement socket programming and Client side scripting in Java
CO3	Design a Web application using various technologies such as Java, XML, AJAX, Servlets, PHP, JSP, Django and Jena.
CO4	Create applications using web services such as WSDL and SOAP
CO5	Develop application using Dreamweaver/Flex/Silver Light etc
CO6	Design and implement dynamic websites with good aesthetic sense of designing and latest technical know-how's.
CO7	Have a Good grounding of Web Application Terminologies, Internet Tools, E – Commerce and other web services.

SEMESTER - VI	L	T	P	C
ELECTIVE - II				
(To choose 1 out of the given 2)	5	0	0	4
PAPER - II	TOTAL HOURS: 65			
COMPUTER GRAPHICS				
SUBJECT CODE: U6CA23ET				

OBJECTIVES:

:

- 1.To provide students with a foundation in graphics applications programming
- 2.To introduce students with fundamental concepts and theory of computer graphics
- 3.To give basics of application programming interface (API) implementation based on graphics pipeline approach.

UNIT-I **(14 Hrs)**

Introduction to computer Graphics - Video display devices- Raster scan Systems - Random Scan Systems - Interactive input devices - Hard copy devices - Graphics software - Output primitives - line drawing algorithms - initializing lines - line function - circle Generating algorithms.

UNIT-II **(13 Hrs)**

Attributes of output Primitives - line attributes - Color and Grayscale style - Area filling algorithms - Character attributes inquiry functions - Two dimensional transformation - Basic transformation - Composite transformation - Matrix representation - other transformations.

UNIT-III **(14 Hrs)**

Two - dimensional viewing - window- to view port co-ordinate transformation - clipping algorithms - Interactive input methods - Physical input devices - logical classification of input devices - interactive picture construction methods.

UNIT- IV **(13 Hrs)**

Three - dimensional concepts - Three dimensional display methods - parallel Projection - Perspective Projection - Depth Cueing - Visible line and surface identification three dimensional transformations.

UNIT-V **(11 Hrs)**

Three dimensional viewing - Projection - Viewing transformation - implementation of viewing operations - Hidden surface and Hidden line removal - backface removals.

COURSE OUTCOMES:

CO1	To understand the Concepts of graphical transformation
CO2	Extract scene with different clipping methods and its transformation to graphics display device.
CO3	Use of geometric transformations on graphics objects and their application in composite form.
CO4	Learn the principles and commonly used paradigms and techniques of computer graphics
CO5	Develop a facility with the relevant mathematics of computer graphics
CO6	Understand the basics of computer graphics, different graphics systems and applications of computer graphics.
CO7	Render projected objects to naturalize the scene in 2D view and use of illumination models for this.

TEXT BOOK:

1. D.Hearn and M.P.Baker, “Computer Graphics (C version)”, Pearson Education, 2nd Edition, 2011.

REFERENCE BOOKS:

1. W.M. Newman and RF.Sproull, “Principles of Interactive Computer Graphics”, McGraw Hill International, 4th Edition – 2002.
2. Basabdutta Ganguly, “Computer Graphics”, Nandhu Publishers, 2nd Edition, 2014.
3. Adries Van Dam, F.Hughes John, Steven K. James D, “Computer Graphics Principles & Practice in C” Pearson, 2nd Edition, 2007.

SEMESTER – VI
PAPER - II (2)
ARTIFICIAL INTELLIGENCE
SUBJECT CODE: U6CA24ET

L	T	P	C
5	0	0	4

TOTAL HOURS: 65

OBJECTIVES:

- 1.To study the concepts of Artificial Intelligence
- 2.Methods of solving problems using Artificial Intelligence
- 3.Introduce the concepts of Expert Systems and machine learning

UNIT – I (13 Hrs)

Introduction - Intelligent Agents - Problem Solving - by Searching - Informed Search and Exploration - Constraint Satisfaction Problems - Formulating Problems - Searching for solutions - Adversarial Search.

UNIT – II (13 Hrs)

Knowledge and Reasoning - Logical Agents - First-Order Logic - Inference in First-Order Logic - Knowledge Representation.

UNIT – III (13 Hrs)

Planning - Planning and Acting in the Real World - Uncertain knowledge and reasoning- Uncertainty - Probabilistic Reasoning - Probability Reasoning Over Time - Making simple Decisions - Making Complex Decisions.

UNIT – IV (14 Hrs)

Learning - Logical formulation of Learning - Learning from Observations - Knowledge in Learning - statistical Learning methods - Reinforcement Learning. A* algorithm – AO algorithm.

UNIT – V (12 Hrs)

Communicating, Perceiving, and Acting – Communication - Probabilistic Language Processing - Perception-Robotics.

COURSE OUTCOMES:

CO1	Solve basic AI based problems
CO2	Define the concept of logic reference
CO3	Apply planning to make complex decisions
CO4	Learning and knowledge algorithms
CO5	Communication and language processing
CO6	Artificial Intelligence Concepts and Algorithms
CO7	Expert system Models

TEXT BOOK:

1. Elaine Rich and Kevin Knight, 1991, Artificial Intelligence, 2nd Edition, Tata McGraw-Hill, New Delhi.

REFERENCE BOOKS:

1. Stuart Russell and Peter Nerving, “Artificial Intelligence: A Modern Approach”, 2nd Edition, Prentice Hall of India, New Delhi, 2003.
2. Herbert A. Simon, 1998, “The Sciences of the Artificial Intelligence”, 3rd Edition, MIT Press.
3. Nils.J.Nilsson, “Principles of AI”, Morgan Kaufmann Publishers, 1/E, 2003.

SEMESTER -VI
ELECTIVE - III
(To choose 1 out of the given 2)

L	T	P	C
5	0	0	4
TOTAL HOURS: 65			

PAPER - III

SOFTWARE PROJECT MANAGEMENT

SUBJECT CODE: U6CA25ET

OBJECTIVES:

- 1.To understand the roles of the project manager
- 2.To understand the threats and opportunities in project managementTo gain Expertise in size, effort and cost estimation techniques
- 3.To understand the techniques available to keep the project,,s aims and objectives,under control.

UNIT I **(11 Hrs)**

Introduction to Software Projects – An Overview of Project Planning – Project Evaluation – Selection of an appropriate Project approach – Software effort Estimation

UNIT II **(15 Hrs)**

Activity Planning – Project Schedules – Sequencing and Scheduling Projects – Network Planning Model – forward and backward pass-Identifying the Critical path-Activity float-Shortening Project Duration – Identifying Critical Activities-precedence networks.

UNIT III **(12 Hrs)**

Risk Management – Resource Allocation – Monitoring and Control – Managing People and Organizing Teams – Planning for Small Projects.

UNIT IV **(12 Hrs)**

Software Configuration Management – Basic Functions – Responsibilities – Standards – Configuration Management – Prototyping – Models of Prototyping.

UNIT V **(15 Hrs)**

Case Studies - Application of SPM concepts in Hospital information systems or information systems of any small and medium scale Industry – SPM in Hospital information management System, Small and Medium Scale Enterprises – Application of SPM in Marketing.

(For Unit V, students are expected to do a survey and study and submit a report)

COURSE OUTCOMES:

CO1	Comprehend the roles of the project manager.
CO2	Identify the threats and opportunities in project management.
CO3	Gain knowledge about size, effort and cost estimation techniques.
CO4	Apply the techniques available to keep the projects aims and objectives, under control.
CO5	Analyze the different approaches of non-technical problems.
CO6	Appreciate the management issues like team structure, group dynamics.
CO7	Determine an appropriate project management approach through an evaluation of the business context and scope of the project.

TEXT BOOK:

1. Mike Cotterell, Bob Hughes, “Software Project Management”, Inclination/Thomas Computer Press, 2nd Edition, 2001.

REFERENCE BOOKS:

1. Darrel Ince, H.Sharp and M.Woodman, “Introduction to Software Project Management and Quality Assurance”, Tata McGraw Hill, 3/ E, 2006.
2. Ramesh Gopalasamy, “Managing Global Software Projects”, 4th Edition, 2005.
3. S. A. Kelkar, “Software Project Management: A Concise Study”, PHI Learning Pvt. Ltd., 5th Edition, Dec-2012.

SEMESTER -VI
PAPER - III
MANAGEMENT INFORMATION
SYSTEMS
SUBJECT CODE: U6CA26ET

L	T	P	C
5	0	0	4

TOTAL HOURS: 65

OBJECTIVES:

1. Developed a product or process by applying knowledge of programming, web, database, human computer interaction, networking and security tools
2. Participated effectively as a member of a development team and undertaken leadership roles when appropriate
- 3 Taken graduate courses or continuing education classes to improve skills and abilities

UNIT-I: (13 Hrs)

Introduction to MIS: MIS concept – Definition – Role of MIS – Impact of MIS – MIS and the User – Management as a Control system – MIS: a support to Management - Management Effectiveness and MIS – Organization as a system – MIS: organization effectiveness.

UNIT-II: (14 Hrs)

Strategic Management of Business: The concept of corporate planning – Essentiality of Strategic Planning – Development of Business Strategies – Types of Strategies – Short-range Planning – Tools of Planning – Strategic Analysis of Business. Information Security Challenges in E-Business

UNIT-III: (14 Hrs)

Decision Making: Decision-making concepts – Decision-making process – Decision Analysis by Analytical Modeling – Behavioral Concepts in Decision-making – Organizational Decision-making – MIS and Decision-making. Information and Knowledge: Information Concepts.

UNIT-IV: (11 Hrs)

Applications in Manufacturing Sector: Personnel, Financial, Production, Raw Material and Marketing Managements. Applications in Service Sector: Service management System.

UNIT-V:**(13 Hrs)**

Enterprise Management Systems: Enterprise Management Systems – ERP system – ERP Model and Modules – Benefits of ERP – ERP Product Evaluation – ERP Implementation.

COURSE OUTCOMES:

CO1	An ability to apply knowledge of computing and mathematics appropriate to the programs.
CO2	Student outcomes and to the discipline
CO3	An ability to analyze a problem, and identify and define the computing requirements
CO4	An ability to design, implement, and evaluate a computer-based system, process, component
CO5	An ability to function effectively on teams to accomplish a common goal
CO6	An understanding of professional, ethical, legal, security and social issues and responsibilities
CO7	An ability to communicate effectively with a range of audiences

TEXT BOOK:

1. Waman S Jawadekar , “Managemnet Information Systems Text and Cases”, PHI, 3rd Edition, 2002.

REFERENCE BOOKS:

1. Kenneth C. Laudon & Jane P. Laudon , “Management Information Systems Managing The Digital Firm”, PHI, 9th Edition, 2009.
2. Haag, Cummings, McCubbrey, “Management Information Systems for the Information Age”, TMH, 4th Edition, 2006.
3. S.A. Kelkar, “Management Information Systems a Concise Study”, PHI, 2nd Edition, 2005.

SEMESTER - VI
PAPER - IV
CLOUD COMPUTING
SUBJECT CODE: U6CA27ST

L	T	P	C
3	0	0	3
TOTAL HOURS: 65			

OBJECTIVES:

- 1.To understand the concept of cloud and utility computing.
- 2 To understand the various issues in cloud computing.
- 3.To familiarize themselves with the state of the art in cloud

UNIT I: UNDERSTANDING CLOUD COMPUTING (13 Hrs)

Cloud Computing – History of Cloud Computing – Cloud Architecture – Cloud Storage – Why Cloud Computing Matters – Advantages of Cloud Computing – Disadvantages of Cloud Computing – Cloud Services.

UNIT II: DEVELOPING CLOUD SERVICES (13 Hrs)

Types of Cloud Service Development – Software as a Service – Platform as a Service – Web Services – On-Demand Computing – Discovering Cloud Services Development Services and Tools – Amazon Ec2 – Google App Engine – IBM Clouds.

UNIT IV: VIRTUALIZATION (12 Hrs)

Implementation levels of virtualization – Virtualization Structures – Tools and Mechanisms – Virtualization of CPU, Memory, I/O Devices – Virtualization Clusters and Resource Management – Virtualization for Data Centre Automation

UNIT IV: PROGRAMMING MODEL (13 Hrs)

Parallel and Distributed Programming Paradigms – Map Reduce, Twister and Iterative Map Reduce – Hadoop Library from Apache – Mapping Applications - Programming Support - Google App Engine, Amazon AWS - Cloud Software Environments -Eucalyptus, Open Nebula, Open Stack, Aneka, CloudSim.

UNIT V: SECURITY IN THE CLOUD (14 Hrs)

Security Overview - Cloud Security Challenges and Risks - Software-as-a-Service Security- Security Governance - Risk Management - Security Monitoring - Security Architecture Design - Data Security - Application Security - Virtual Machine Security - Identity Management and Access Control - Autonomic Security.

COURSE OUTCOMES:

CO1	Articulate the main concepts, key technologies, strengths and limitations of cloud computing
CO2	Identify the architecture, infrastructure and delivery models of cloud computing
CO3	Explain the core issues of cloud computing such as security, privacy and interoperability
CO4	Choose the appropriate technologies, algorithms and approaches for the related issues
CO5	Describe the principles of Parallel and Distributed Computing and evolution of cloud computing from existing technologies
CO6	Implement different types of Virtualization technologies and Service Oriented Architecture systems
CO7	Analyse the issues in Resource provisioning and Security governance in clouds

TEXT BOOKS:

1. Michael Miller, "Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online", Que Publishing, 2008.
2. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.
3. John W.Rittinghouse and James F.Ransome, "Cloud Computing: Implementation, Management, and Security", CRC Press, 2010.

REFERENCE BOOKS:

1. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach", TMH, 2009.
2. Kumar Saurabh, "Cloud Computing – insights into New-Era Infrastructure", WileyIndia, 2011.

**ADHIPARASAKTHI COLLEGE OF ARTS AND SCIENCE
(AUTONOMOUS)**

Permanently Affiliated to Thiruvalluvar University, Vellore

Re-accredited by NAAC with B Grade (CGPA-2-83)

M.C.A -COMPUTER APPLICATIONS

Under CBCS

[Effective from the Academic year 2018-2019]

REGULATIONS

CBCS:

Choice- Based Credit System is flexible system of Learning “Credit” defines the quantum of contents/ syllabus prescribed for a course and determine the number of hours of instruction required. The distinguishing features of CBCS are the following

It permits the students to:

- Learn at their own pace
- Choice electives from a wide range of electives courses offered by the departments of the Colleges
- Undergo additional courses and acquire more than the required number of credits.
- Adopt an inter-disciplinary approach in learning.
- Make best use of the expertise of available faculty

1. Eligibility for Admission:

A Candidates who have passed the under mentioned degree examinations of this university or an examination of other institution by this university as equivalent thereto provided they have undergone the course under 10+2+3 or 11+1+3 or 11+2+2 pattern shall be eligible for admission to the MCA degree Course

- (A) B.C.A / B.E.S/B.Sc in Computer Science / Mathematics/ Physics/ Statistics/ Applied Sciences OR
(B) B.Com / Bachelor of Bank Management / B.B.A/ B.L.M/ B.A Corporate Secretary Ship / B.A Economics/ any other Bachelor’s Degree in any discipline with Business Mathematics and Statistics or Mathematics / Statistics in Main / Allied level or (C) B.Sc Chemistry with Mathematics and Physics as allied subjects or (D) B.E/B.Tech/ M.B.A or (e) A Bachelor’s degree in any discipline with mathematics as one of the subjects at the higher secondary level [i.e. in +2 level of the 10+2 pattern]

2. Eligibility for the Award of Degree:

A candidates shall be eligible for the award of the degree only if he/she has undergone the prescribed course of study in the college for a period of not less than three academic years and passed the

examinations of all the six semesters prescribed earning 140 credits and fulfilled such conditions as have been prescribed therefore.

3.Duration:

The course duration shall be three years consisting of Six Semesters

4. Examinations:

The duration of Semester Examination for theory and practical subjects shall be 3 hours. The Maximum mark for each theory is 100 with 25 for continuous Internal Assessment [CIA] and 75 Semester Examinations. The Maximum marks for each practical is 100 with 25 for Internal Assessment and 75 for Semester Examination.

The following assessment procedure will be followed for Internal Marks:

Continuous Internal Assessment [CIA] Test

S. No	Reg No	Name	Test I Marks For 75	Test II Marks For 75	Marks For 150	Marks Converted to 15/20	Assignments /Seminars[10] Records[05]	Marks For 25/25	Total Rounded to Marks for 25/25

Test I: Three hours duration for 75 marks

Test II: Three hours duration for 75 marks

Total marks 150

		Theory		practical
Test marks converted to	:	15 marks	/	20 marks
Assignment/Seminars	:	10 marks	/	-
Records	:	-	/	05 marks
Total	:	25 marks	/	25 marks

In the column Rounded to 25/25, any fraction may be rounded to the next number.

For project work the marks assigned shall be

Project Report	:	150 Marks
Internal Assessment:	:	50 Marks

For the conduct of Semester Examination in practical subjects, the college will appoint two external examiners. The College will set the questions and distribute to the Colleges. The examiners will conduct the examinations and award the marks on the same day and forward to the University. The Principal / Head of the Department will coordinate to provide the laboratory and other facilities for conducting the examination.

Project work shall be carried out individually in an R&D section of any industry or University or in the Institute in which the candidate is studying. The Project work / Dissertation report shall be submitted through the guides / Supervisors to the Head of the Department and then to the University not later than the 31st May / 31st December. If he/ she fail to submit the Project Work / Dissertation within the stipulated date for particular semester, he/she may be permitted with the approval of the HOD to submit the Project work / Dissertation report during the succeeding semesters, within the maximum period of Five years from the date of admission to the First Semester. Project Work/ Dissertation evaluation and Viva- Voce shall be conducted by two external examiners.

5. Requirements for Proceeding to Subsequent Semester:

- Candidates shall register their name for the first semester Examination after the admission in the P.G. Courses.
- Candidates shall be permitted to proceed from the first semester up to the final semester irrespective of their failure in any of the semester examinations subject to the condition that the candidates should register for all the arrear subject of earlier semesters along the current (subsequent) semester subjects.

- (iii) Candidates shall be eligible to go to subsequent semester, only if they earn sufficient attendance as prescribed there for by the academic council from time to time. provided in case of a candidate earning less than 65 % of attendance in any one of the semester due to any extraordinary circumstances such as medical grounds, such candidates who shall produce Medical Certificate issued by the Authorized Medical Attendant (AMA), duly certified by principal of the college, shall be permitted to proceed to the next semester and to complete the course of study. Such candidates shall have to repeat the missed semester by rejoining after completion of final semester of the course, after paying the fee for the break of study as prescribed by the college from time to time.

6. Passing Minimum:

A Candidate shall be declared to have passed the whole Examination, if he/she passes in all the papers and practical wherever prescribed / as per the scheme of examinations by earnings by earning 90 credits.

In fixing the passing minimum marks, the following will be observed:

- a) There shall be no passing Minimum for Internal.
- b) For External Examination, Passing Minimum shall be of 50 % (Fifty percentages) of the maximum marks prescribed for the paper for each paper/Practical/Project and Viva-Voce.
- c) In the aggregate (External + Internal), the passing minimum shall be of 50 % for the paper for each paper/Practical/Project and Viva-Voce.
- d) Grading shall be based on Overall Marks Obtained [Internal +External].

7. Classification of Successful Candidates :

Candidates who secured not less than 60% of aggregate marks [Internal + External] in the whole examination shall be declared to have passed the examination in the first Class. All other successful candidates shall be declared to have passed in Second Class. Candidates who obtain 75% of the marks in the aggregate [Internal + External] shall be deemed to have passed the examination in First Class with Distinction, provided they pass all the examinations [Theory papers, practical, and project and Viva- voce] prescribed for the course in the first appearance.

8. Requirements to take the Semester Examinations:

- a) A Candidate will be permitted to take the Examination for any semester, If
 - i) He / she secure not less than 75 % of attendance out of the 90 instructional days during the semester.
[In the case married women students the minimum attendance requirements shall be 55% of the total instruction days]
 - ii) He/ she earns a progress certificate from the Head of the Institution of having satisfactory completed the course of Study prescribed in the subjects as required by the regulations, and
 - iii) His / her conduct has been satisfactory.

Provided that it shall be open the academic council or any authority delegated with such powers by the academic council to grant exemption to a candidate who has failed to earn 75% of the attendance prescribed for any valid reasons(s) subject to the usual conditions.

- b) A candidate who secured attendance less than 75% but 65% and above shall be permitted to take the examination on the recommendation of the Head of the Institution to condone the lack of

attendance as well as on the payment of the prescribed fees to the college.

- c) A candidate who has secured attendance less than 65 % but 55% and above in Any semester, has to compensate the shortage of attendance in the subsequent Semester besides, earning the required percentage of attendance in that semester and Take the examination of both the semester papers together at the end of the latter Semester.
- d) A Candidate who secured less than 55% of attendance in any semester will not be permitted to take the regular examinations. He/ She to re-do the course after the completion of the final Semesters by rejoining the semester in which the attendance is less than 55%.
- e) A Candidate who secured less than 65% of attendance in, the final semester has to compensate his / her attendance shortage in a manner to be decided by the Head of the department concerned after rejoining the course.

9. Grading System :

In addition to the above marking system, grading system is also adopted as detailed below:

[a] The Marks (Sum of IA and UE marks) in each course is assigned with a letter grade on a seven points scale using the following letter grade points and ranges of marks.

SEVEN POINT SCALE [AS per UGC notification 1998]

Marks	Grade Point	Letter Grade	Class
95-100	7.00	H	First Class with Distinction
90-94	6.00	O	First Class with Distinction
75-89	5.50	D	First Class with Distinction
60-74	4.75	A	First Class
55-59	4.00	B	Second Class
50-54	3.5	C	Second Class
Below 50	3.00	F	Fail

From the Second Semester onwards the total performance with in a semester and continuous performance starting from the first semester are indicated respectively by

Grade Point Average [GPA] and **Cumulative Grade Point Average [CGPA]**

These two are calculated by the Following formulae:

$$GPA = \frac{\sum_{i=1}^n C_i G_i}{\sum_{i=1}^n C_i}$$

Where C_i is the credit earned for the Course i in any Semester G_i is the Grade point obtained by the student for the course i and 'n' is the number of courses **passed** in that semester. **CGPA = GPA** of all the courses starting from the first Semester to the Last Semester.

10. Ranking:

Candidates who pass all the examinations prescribed for the course in the first appearance itself alone are eligible for Ranking / Distinction. Provided in the case of candidates who pass all the examinations prescribed for the course with a break in the first appearance due to the reasons as furnished in the Regulation 7 (iii) Supra are only eligible for classification / Distinction. The mark obtained in improvement examination will not be taken in to consideration for ranking.

11. The Medium of Instruction and Examinations:

The medium of instruction and Examinations shall be in English.

12. Submission of Record Notebooks for Practical Examinations:

Candidates taking the practical examinations should submit bonafide record note books prescribed for the practical examinations. Otherwise the candidates will not be permitted to take the Practical Examinations. However, in genuine cases where the students could not submit the record note book may be permitted to take the practical examination provided the Head of the Departments Concerns from the institutions certifies that the candidate has performed the experiments prescribed for the course. For such Candidate who do not submit Record Note Books, Zero [0] marks awarded for record note books. In case a candidate fails in the practical Examination the marks awarded for the record at the time of first appearance for the practical examination should be made available by the college to the examiners at the subsequent appearance by the candidate.

13. Improvements of the Marks in the Subjects already passed

Candidates who have passed in theory paper/ papers are allowed to appear again for theory paper/papers only once in order to improve his/her marks, by paying the fee prescribed from time to time. Such candidates are allowed to improve within a maximum period of 12 semesters counting from his/her first semester of his/her admission. If candidate improves his marks that his improved marks will be taken into consideration for the award of classification & distinction only. Such improved marks will not be counted for the award of Prizes/ Medals & Ranks. If the candidate does not show improvement in the marks, his previous marks will be taken into consideration. No

Candidate will be allowed to improve marks in the Practical's, Mini Project, and Major Project & Viva voce.

14. Checklist for Inspection:

A. Qualification for

Teaching Faculty: as prescribed by the UGC and the University
Laboratory Staff: as prescribed by the UGC and the University.

B. Infrastructure Facilities

Building: Number of classroom with specifications: 3 rooms measuring 20' x 25' "
If the class strength is above 50 the space shall increase by 10 sq. ft. per student.
Number of staff rooms: one measuring 20' x 20' "

Furniture: One pair of table / chair per student

PATTERN OF QUESTION PAPER:

PART- A (300 Words)

To Answer 5 Questions (either or Pattern) 5 X 6 Marks = 30 Marks

PART-B (900 Words)

To Answer 3 Questions out of 5 questions 3 X 15 Marks = 45 Marks

Total = 75 Marks

STRUCTURE OF THE COURSE AND EVALUATION PATTERN: (PRACTICAL)

Semester Practical Exam		
1.	xperiment 1	25
2.	xperiment 1	25
3.	ecord	10
4.	iva – Voce	15
	Total	75 Marks

Year/ Sem	Subject	Paper	Sub. Code	Title of the Paper	Hr./ week	Credit	Exam Hrs.	Max. Marks		
								IA	Sem Exam	Total
I Year I Sem	Core	Paper I	P1CA21MT	Programming in C	5	5	3	25	75	100
	Core	Paper II	P1CA22MT	Digital logic and Computer Organization	5	5	3	25	75	100
	Core	Paper III	P1CA23MT	Principles of Information Technology	4	3	3	25	75	100
	Core	Paper IV	P1CA24MT	Data Structures	5	4	3	25	75	100
	Core	Paper V	P1CA25MT	Discrete Mathematics	4	4	3	25	75	100
	Core Practical	Practical I	P1CA21MP	C and Data Structures – Lab	3	2	3	25	75	100
	Core Practical	Practical II	P1CA22MP	Office Automation -Lab (MSWord, PowerPoint, MS Access, Excel)	3	2	3	25	75	100
					29	25	21	175	525	700
I Year II Sem	Core	Paper VI	P2CA21MT	Object Oriented Programming in C++	5	5	3	25	75	100
	Core	Paper VII	P2CA22MT	Design and Analysis of Algorithms	5	5	3	25	75	100
	Core	Paper VIII	P2CA23MT	Computer Graphics	5	4	3	25	75	100
	Core	Paper IX	P2CA24MT	Accounting and Financial Management	5	4	3	25	75	100
	Core Practical	Practical III	P2CA21MP	C++ and Algorithms – Lab	4	2	3	25	75	100
	Core Practical	Practical IV	P2CA22MP	Computer Graphics – Lab	4	2	3	25	75	100
					28	22	18	150	450	600
II Year III Sem	Core	Paper X	P3CA21MT	Advanced Operating System	5	5	3	25	75	100
	Core	Paper XI	P3CA22MT	Advanced Database Systems	5	5	3	25	75	100
	Core	Paper XII	P3CA23MT	Software Engineering	5	4	3	25	75	100
	Core	Paper XIII	P3CA24MT	Object Oriented Analysis and Design	4	4	3	25	75	100
	Elective	Paper I	P3CA25ET	Soft Computing	4	3	3	25	75	100
			P3CA26ET	Digital Image Processing						
	Core Practical	Practical V	P3CA21MP	RDBMS (Oracle) – Lab	4	2	3	25	75	100
	Core Practical	Practical VI	P3CA22MP	Advanced Operating System Lab	4	2	3	25	75	100
					31	25	21	175	525	700
II Year IV Sem	Core	Paper XIV	P4CA21MT	Principles of Compiler Design	5	4	3	25	75	100
	Core	Paper XV	P4CA22MT	Advanced Java Programming	5	4	3	25	75	100
	Core	Paper XVI	P4CA23MT	Resource Management Techniques	5	4	3	25	75	100
	Core	Paper XVII	P4CA24MT	C# and .Net Framework	5	4	3	25	75	100
	Elective	Paper II	P4CA25ET	E-Commerce	4	3	3	25	75	100
			P4CA26ET	Software Testing						
	Core Practical	Practical VII	P4CA21MP	Advanced Java Programming Lab	3	2	3	25	75	100
	Core Practical	Practical VIII	P4CA22MP	C# and .Net Lab	3	2	3	25	75	100
					30	23	21	175	525	700
III Year V Sem	Core	Paper XVIII	P5CA21MT	Big Data Analytics	5	4	3	25	75	100
	Core	Paper XIX	P5CA22MT	WAP & XML	5	4	3	25	75	100
	Core	Paper XX	P5CA23MT	VB.NET & ASP.NET Programming	5	4	3	25	75	100
	Core	Paper XXI	P5CA24MT	Network Security	5	3	3	25	75	100
			P5HR21GS	Human Rights	2	2	3	25	75	100
	Elective	Paper III	P5CA25ET	Internet of Things	4	3	3	25	75	100
			P5CA26ET	Decision Support System						
	Core Practical	Practical IX	P5CA21MP	VB.NET & ASP.NET Programming Lab	3	2	3	25	75	100
	Core Practical	Practical X	P5CA22PV	Mini Project	3	3	3	25	75	100
					32	25	24	200	600	800
III Year / VI Sem			P6CA21PV	Project Work with Viva Voce	30	20		50	150	200
				Total	180	140		925	2775	3700

I SEMESTER

**SEMESTER I
PAPER I**

L	T	P	C
5	0	0	5

TOTAL HOURS: 65

PROGRAMMING IN C

SUBJECT CODE: P1CA21MT

OBJECTIVES:

1. Learn to think logically and write pseudo code or draw flow charts for problems.
2. Be exposed to the syntax of C.
3. Be familiar with programming in C.

UNIT – I:

C language fundamentals: Program structure – identifiers – data types-integer – float- double – Char – Constants – variables - Operators and expressions - managing input and output operations.
(14Hrs)

UNIT – II:

C control structures: Decision making with IF statement - IF...ELSE statement - nested IF statement - FOR statement – DO...While statement - WHILE...DO statement – GOTO statement- SWITCH statement.
(12 Hrs)

UNIT -III

C functions: Mathematical functions - String functions - User defined functions.
(12 Hrs)

UNIT - IV:

Arrays : Arrays - Passing arrays to a function - Structure - Definitions - assigning structure variable - assigning initial values - Structures and functions – Union.
(13 Hrs)

UNIT - V:

Pointers and file operations: Understanding pointers – Pointers and functions - Understanding files - I/O functions formatted Working with structures - reading and writing disk files.
(14 Hrs)

COURSE OUTCOMES:

CO1	Write C program for simple applications
CO2	Formulate algorithm for simple problems
CO3	Analyze different data types and arrays
CO4	Perform simple search and sort
CO5	Use programming language to solve problems
CO6	Able to implement the algorithms and draw flowcharts for solving Mathematical and Engineering problems
CO7	To be able to develop C programs on linux platform.

TEXT BOOKS:

1. Balagurusamy E, “ Programming in ANSI C” , TMG , 3/E, 2008.
2. Rajaraman V, “Programming in C “, PHI, 2/E, 2001.

REFERENCES:

1. B.W.Kernighan and D.M.Ritchie, “The C Programming Language: ANSI C”, Pearson Education Pvt. Ltd. 2/E 1998.
2. B.S.Gottfried, “Programming with C “, Schaum Outline Series, TMH, 2/E, 2010.

**SEMESTER I
PAPER II**

L	T	P	C
5	0	0	5

TOTAL HOURS: 65

DIGITAL LOGIC AND COMPUTER ORGANIZATION

SUBJECT CODE: P1CA22MT

OBJECTIVES:

- 1.To understand the various number systems
- 2.To become familiar with Boolean algebra
- 3.To study the different types of combinational and sequential circuits

UNIT-I:

Number system-converting numbers from one base to another – Complements – binary codes-integrated circuits-Boolean algebra-properties of Boolean algebra -Boolean functions- Canonical and standard form-logic operations-Logic gates-K map up to 6 variables-Don't care condition-Sum of products and product of sum simplification-Tabulation method. **(14 Hrs)**

UNIT-II:

Adder-subtractor-code converter-Analyzing a combinational Circuit-Multilevel NAND and NOR circuits-properties of XOR and equivalence function-Binary parallel Adder-Decimal Adder –Magnitude Comparator-Decoder-Multiplexer-ROM-PLA. **(12 Hrs)**

UNIT-III:

Flip flops-Triggering of flip flops-Analyzing a sequential circuit-State Reduction-Excitation tables-Design of sequential circuits-Counters-Design with state equation-Registers-Shift registers-Ripple and Synchronous Counters. **(13 Hrs)**

UNIT-IV:

Memory unit-Bus Organization-Scratch Pad Memory-ALU-Design of ALU-Status Register-Effects of Output carry-Design of shifter-Processor unit-Microprogramming-Design of Specific Arithmetic Circuits **(12 Hrs)**

UNIT-V:

Accumulator-Design of Accumulator-Computer configuration-Instruction and Data formats-Instruction sets-Timing and Control-Execution of Instruction-Design of computer-H/W control-PLA control and Micro program control. **(14 Hrs)**

COURSE OUTCOMES:

CO1	Perform conversions and arithmetic operations in various number systems
CO2	Simplify using laws of Boolean algebra and Karnaugh map method
CO3	Design various combinational and sequential circuits
CO4	Differentiate between various addressing modes
CO5	Trace the flow of execution of an instruction in a processor
CO6	An understanding of the design and functioning of a machines central processing unit (CPU) including the datapath components (ALU, register) and the control unit
CO7	Analyze the performance of processors and caches

TEXT BOOKS:

1. M. MorrisMano, “Digital Logic and Computer Design”, PHI, 4/E, 2007.

REFERENCES:

1. M.M .Mano and C.R.Kime, “Logic and Computer Fundamentals”, Pearson 2/E, 2001.
2. Thomas C.Barteel, “Digital Computer Fundamentals”, Tata McGraw Hill, 6/E, 1985
3. V. Rajaraman and Radhakrishnan, “Digital logic and Computer Organization”, PHI 3/E, 2007

SEMESTER I

L	T	P	C
4	0	0	3

PAPER III

TOTAL HOURS: 52

PRINCIPLES OF INFORMATION TECHNOLOGY

SUBJECT CODE: P1CA23MT

OBJECTIVES:

- 1.To enable the students to have thorough knowledge of computer hardware, software, its components and operating system.
- 2.To provide basic conceptual knowledge about the computer systems and information technology

UNIT-I:

Computer Basics: Evolution-Generations-Classifications-Components-Applications of Computers-CPU-Instruction Format, Instruction Cycle, Instruction Set - Data Representation - Coding Schemes-Memory Hierarchy-RAM-ROM-Types of Secondary Storage Devices-Types of Input and Output Devices.

(10 Hrs)

UNIT-II:

Software: Introduction – Categories - Installing and Uninstalling - Piracy - Terminologies. Operating Systems: Evolution-Types and Functions of Operating Systems - Basic of Microsoft Windows and UNIX Operating Systems.

(10 Hrs)

UNIT-III:

Microsoft Word 2000: Introduction - Working with Word 2000 - Checking Spelling and Grammar - Adding Graphics-Printing. Microsoft Excel 2000: Introduction - Working with Excel 2000 - Formulas and Functions - Inserting Charts - Printing. Power Point 2000: Introduction-Working with PowerPoint 2000 - Designing Presentation – Printing.

(12Hrs)

UNIT-IV:

Data Communication and Computer Networks: Introduction - Data communication –Transmission Media – Modulation – Multiplexing – Switching - Computer Network - Network Topologies - Communication Protocol - Network Devices **Internet:** Introduction – Evolution - Connect to Internet - Internet Applications - Data over Internet. Internet Tools: Introduction - Web Browser-Browsing Internet Using Internet Explorer - Electronic Mail (E-Mail) - Search Engines - Instant Messaging. **Computer Security:** Introduction - Computer Security: Definition - Malicious Programs – Cryptography - Digital Signature – Firewall - Users Identification and Authentication -Security Awareness and Policies. **(10 Hrs)**

UNIT-V:

Database Fundamentals: Introduction-Logical and Physical Data Concepts-Database Management System (DBMS)-DBMS Architecture-Database Models-Normalization-Types of Databases-Data Warehousing and Data Mining. **Structured Query Language (SQL):** Introduction - DDL and DML commands - Querying Multiple Table - Nesting Select Statements. Database Management with **Microsoft Access 2000:** Introduction - Starting Access – Tables - Queries - Forms - Reports. **(10 Hrs)**

COURSE OUTCOMES:

CO1	To perform the data representations using input and output devices
CO2	Access install and uninstall operating systems
CO3	To process entire MS_Office like word, excel and PowerPoint
CO4	To growth for communication process using some security
CO5	To view entire DBMS commands, tables and reports.
CO6	After the successful completion of the course the students should have through knowledge about concepts of information technology
CO7	After the successful completion of the course the students should have through knowledge about principles of information technology

TEXT BOOKS:

1. ITL Education Solutions, “Introduction to Information Technology”, Pearson, 2/E, 2010
2. V. Raja Raman, “Introduction to Information Technology”, PHI, 2/E, 2007

REFERENCES:

1. Dennis P.Curtin, Kim Foley, KunelSen, Cathleen Morin, “Information Technology” ,TMG, 1/E,2000

**SEMESTER I
PAPER IV**

L	T	P	C
5	0	0	4
TOTAL HOURS: 65			

DATA STRUCTURES

SUBJECT CODE: P1CA24MT

OBJECTIVES:

- 1.Be familiar with basic techniques of algorithm analysis.
- 2.Be exposed to the concept of ADTs.
- 3.Learn linear data structures-List, Stack and Queue.

UNIT-I:

Introduction to data structures – overview – types – primitive and non-primitive data structures and operations. Arrays – types – strings – array of structures – sparse and dense matrices – row major and column major arrays- pointers and arrays – array of pointers – pointers and strings. Recursion – types – rules – recursion versus iterations – Tower of Hanoi – advantages and disadvantages.

(12Hrs)

UNIT-II:

Stacks – operations – pointers and stack – representation of arithmetic expressions – infix, prefix and postfix notations – evaluation of postfix expression – conversion of expression – applications. Queues – operations – disadvantage – implementation – types and applications.

(14 Hrs)

UNIT-III:

List – operations – linked list – memory allocation and de-allocation – operations – singly linked list – linked list with and without header – operations – circular linked list – doubly linked list – circular doubly linked list – applications. Storage management – allocation techniques – storage allocations – storage release – compaction – garbage collection.

(14 Hrs)

UNIT-IV:

Tree – terms – binary trees – types – representation – operation and traversal – conversion of expression – binary search tree – threaded binary tree – B tree – B+ tree; Graphs – terminologies – representation – traversal – spanning trees.

13 Hrs)

UNIT-V:

Sorting – methods: insertion – selection – bubble – quick – tree – merging list – heap – radix – partition exchange. Searching – linear and binary search – hashing – hashing method – hashing function – division – mid square – folding – length – dependent – digit analysis methods.

(12 Hrs)

COURSE OUTCOMES:

CO1	Able to analyze algorithms and determines their time complexity.
CO2	Understand the concept of data type ,data structure and linear structure.
CO3	Able to apply data structures to solve various problems
CO4	Able to understand non-linear data structures.
CO5	Able to apply different Sorting, Searching and Hashing algorithms
CO6	Demonstrate different methods for traversing trees
CO7	Design and implement an appropriate hashing function for an application

TEXT BOOKS:

1. Ashok N Kamthane, “Introduction to Data structures in C”, Pearson Education, 1/E, 2010.
2. Samanta D, “Classic data structures”, PHI, 2/E, 2009

REFERENCES:

1. Jean – Paul Tremblay and Paul G. Sorenson, “An Introduction to Data Structures with Applications”, Tata McGraw Hill Publishing Company Lt, New Delhi ,2/E, 1995.
2. ISRD Group, “Data Structures using C”, TMG, 1/E, 1995.

SEMESTER I
PAPER V
DISCRETE MATHEMATICS
SUBJECT CODE: P1CA25MT

TOTAL HOURS: 52

OBJECTIVES:

To study Elementary logic, some methods of proof. Relations, basic definitions and properties, representations of a relation, special types of relations. Boolean algebras, Boolean functions, logic networks.

UNIT -I:

Introduction – Matrix Operators – Inverse of a square Matrix Elementary Operations and Rank of a Matrix – Simultaneous Equations Inverse by Partitioning - Eigen Values and Eigen Vectors.

(10 Hrs)

UNIT –II:

Set Theory: Introduction – Sets – Notions and Description of Sets – Subsets –Venn – Diagram – Operations on Sets – Properties of Set Operations –Verification of the Basic Laws of Algebra by Venn Diagrams –The principles of Duality –Relations: Cartesian Product of Two Sets –Relations – Representation of a Relation –Operations –on Relation –Equivalence Relations – Equivalence Relation – Closure and Wars hall’s algorithm – One-to-one, Onto Functions – Special Types of functions – Invertible Functions –Composition of Functions

(12 Hrs)

UNIT –III:

Logic: Introduction – TF Statement – Connectives – Atomic and Compound statements – Well Formed Formulae – Truth Table of a Formula – Tautology – Tautology Implications and Equivalence of Formulae –Replacement Process –Functionally Complete Sets of Connectives and Duality Law – Normal Forms – Principles of Normal Forms –Theory of Inference –Open Statement – Quantifiers – Valid Formulae and Equivalence –Theory of Inference for Predicate Calculus –Statements involving more than one Quantifier.

(10 Hrs)

UNIT –IV:

Finite Automata – Definition of Finite Automation – Representation of finite Automaton – Acceptability of a String by Non-Deterministic Finite Automata –Equivalence of FA and NFA – Procedure for finding an FA equivalent to a given NFA –Properties of Regular Sets –Finite State Machines – The monoid of a Finite NFA –Properties of Regular Sets – Finite State Machines –The monoid of a Finite State Machine –Machine of a monoid –phrase Structured Grammars.

(10Hrs)

UNIT –V:

Chomsky Hierarchy of Languages – Finite Automata and Regular Languages – Derivation Trees; For Context-free Grammars –Normal Forms for Context-free grammars- Acceptance, Polish Notation – Simple Precedence Grammar - Pushdown Automation – Instantaneous Description of a PDA- Important Properties of Move Relation- Acceptance by PDA – Equivalence of two types of Acceptance by PDA- Context-free Languages and PDAs- Turing Machines- The language accepted by a TM- Turing Machine as a Computer integer- Functions - Techniques for Turing Machine Construction.

(10 Hrs)

COURSE OUTCOMES:

CO1	To verify the validity of an argument.
CO2	To find the shortest distance between two skew lines.
CO3	To study about the connectives between two proportions
CO4	To find solution for an equation numerically.

TEXT BOOKS:

1. M.K. Venkatraman, Sridharan, N. Chandrasekaran – “Discrete Mathematics”, National Publishing Company, 1/E, 2000.
2. R.M. Somasundaram, “Discrete Mathematical Structures”, PHI, 1/E, 2003.

REFERENCES:

1. Hopcraft and Ullman, “Introduction to Automata Theory, Languages & Computation”, Pearson Education, 2/E, 2006.
2. Tremblay and Manohar, “Discrete Mathematical structures with applications to computer science”, Tata McGraw-Hill, 1/E, 1997.

L	T	P	C
0	0	3	2

SEMESTER I

TOTAL HOURS: 39

PRACTICAL I

C AND DATA STRUCTURES - LAB

SUBJECT CODE: P1CA21MP

OBJECTIVES:

- 1.To develop skills in design and implementation of data structures and their applications
- 2.To learn and implement linear, non linear and tree data structures
- 3.To study, implement and analyze the sorting technique.

1. Implementation of arrays
2. Singly linked list
3. Circular linked list
4. Implementation of Stacks
5. Implementation of Queues
6. Implementation of Circular queue
7. Evaluation of Expressions
8. Binary Tree traversal
9. Binary search tree
10. Shortest path (Dijkstra's)

COURSE OUTCOMES:

CO1	Design and implement linear, and tree and its applications
CO2	Design sorting technique, its algorithm design and analysis
CO3	Work with basic data structures that are suitable for the problems to be solved efficiently

L	T	P	C
0	0	3	2

SEMESTER I
PRACTICAL II
OFFICE AUTOMATION –LAB
(M.S. WORD, POWERPOINT, MS ACCESS, EXCEL)

TOTAL HOURS: 39

SUBJECT CODE: P1CA22MP

OBJECTIVE:

1.Office tools course would enable the students in crafting professional word documents, excel spreadsheets, power point presentations using the Microsoft suite of office tools .

2.To familiarize the students in preparation of documents and presentations with office automation tools.

1. Creation of New document with various format options
2. Creation of documents with table and their Manipulations
3. Creation of documents with mail merge options
4. Creation of slides with vary slide transitions
5. Creation of slides with pictures and their groupings
6. Create a worksheet with various mathematical functions
7. Create a worksheet with various financial functions
8. Draw suitable charts for the data
9. Create a database with forms and reports for student data
10. Create a database with forms and reports for an employee data
11. Database manipulations for student and employee data
12. Use of import and export options in database Manipulations.

COURSE OUTCOMES:

CO1	To perform documentation
CO2	To perform accounting operations
CO3	To perform presentation skills

II SEMESTER

OBJECT ORIENTED PROGRAMMING IN C++**SUBJECTCODE: P2CA21MT****OBJECTIVES:**

- 1.To learn how C++ supports Object Oriented principles such as abstraction, polymorphism etc
2. To understand and apply the principles hiding, localization and modularity in software development.
- 3.Use the generic programming features of C++ including the STL

UNIT - I:

Introduction to OOP: Overview of C++ classes - structures -union -friend function- friend class - inline function - constructors - static members - scope resolution operator - passing objects to functions - function returning objects.

(14Hrs)**UNIT - II:**

Arrays - pointers - this pointer - references - dynamic memory allocation - function overloading - default arguments-overloading constructors-pointers to functions.

(12 Hrs)**UNIT - III:**

Operator overloading - member operator function -friend operator function -type conversion - inheritance -types of inheritance - virtual base - polymorphism-virtual functions.

(13 Hrs)**UNIT- IV:**

Class templates and generic classes - function templates and generic functions - overloading a function template - power of templates - exception handling - derived class exception - exception handling functions

(13**Hrs)****UNIT- V:**

Streams - formatted I/O with its class functions and manipulators - creating own manipulators- file I/O -conversion functions - standard template library.

(13 Hrs)

COURSE OUTCOMES:

CO1	Able to understand and design the solution to a problem using object-oriented Programming concepts.
CO2	Able to use proper class protection mechanism to provide security.
CO3	Able to Understand and Apply the concepts of Classes & Objects, friend function, constructors & destructors in program design.
CO4	Able to Design & implement various forms of inheritance, and calling base class constructors.
CO5	Able to Apply & Analyze function/operator overloading, runtime polymorphism, Generic Programming.
CO6	Able to demonstrate the use of virtual functions to implement polymorphism.
CO7	Understand and implement the advanced features of C++ including templates, exceptions and file handling for providing programmed solutions to complex problems

TEXT BOOK:

1. E. Balaguruswamy, “ Object Oriented Programming with C++” Tata McGraw, 3/E, 2006

REFERENCES:

1. Hubbard, “Programming With C++”, Schaum Series, TMH, 2/E, 2006
2. Bjarne, Stroustrup, “The C++ Programming Language”, Addison Wesley, 2/E, 1999.
3. Sarang, Proonachandra, “Object Oriented Programming with C++”, PHI 2/E, 2006.
4. A.K. Jagadev, A.M. Rath, and S. Dehuri, “Object Oriented Programming with C++”, PHI 2/E, 2007.

**SEMESTER II
PAPER VII**

L	T	P	C
5	0	0	5

TOTAL HOURS: 65

DESIGN AND ANALYSIS OF ALGORITHMS

SUBJECTCODE: P2CA22MT

OBJECTIVES:

- 1 To enable the students to learn the object oriented techniques
2. To enable the system analysis and design.

UNIT – I:

Introduction -Algorithm - Specification - Performance Analysis -Divide and Conquer - general Method - Binary Search - Finding the Maximum & Minimum - Merge Sort - Quick Sort
(13Hrs)

UNIT – II:

The Greedy Method - General Method -Knapsack Problem - Tree vertex splitting -Dynamic Programming - General Method - Multistage Graphs - All Pairs Shortest paths - Single Source Shortest paths - The Traveling Sales Person Problem –Flow shop scheduling
(13Hrs)

UNIT – III:

Basic Traversal and Search Techniques - Binary Trees - Graphs - Connected Components and Spanning Trees - Bi-Connected Components
(12 Hrs)

UNIT – IV:

Backtracking - General Method - 8 Queens Problem - Graph Coloring - Branch and Bound Method – 0/1 Knapsack problem
(14 Hrs)

UNIT – V:

NP-Hard and NP Complete Problem-Basic Concepts-Cooke’s theorem-NP Hard problem-Clique Decision problem-Job shop scheduling-Code Generation with common sub expressions-Approximation Algorithms - Introduction - Absolute Approximations – E-Approximations
(13 Hrs)

COURSE OUTCOMES:

CO1	Understood the trends and principles of object oriented methodologies.
CO2	Problem solving skills using developing object based models
CO3	Analyze worst-case running times of algorithms using asymptotic analysis.
CO4	Argue the correctness of algorithms using inductive proofs and invariants.
CO5	Explain what competitive analysis is and to which situations it applies. Perform competitive analysis.
CO6	Describe the greedy paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize greedy algorithms, and analyze them.
CO7	Analyze randomized algorithms. Employ indicator random variables and linearity of expectation to perform the analyses. Recite analyses of algorithms that employ this method of analysis.

TEXT BOOK:

1. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, “Computer Algorithms” , Galgotia Publications Ltd., 2/E, 2002

REFERENCES:

1. Sara Baase and Allen Van Gelde, “Computer Algorithms: Introductions to Design and Analysis” Pearson Education, 3/E, 2002
2. Aho, Hopcraft and Ullman, “The Design and Analysis of Computer Algorithm”, Pearson Education, 2/E, 2001
3. Basu S.K, ”Design Methods and Analysis of Algorithm”, PHI 2/E, 2006
4. Gilles Brassard and Paul Bratley, “Fundamentals of Algorithmic”, PHI 1/E, 1995

SEMESTER II

L	T	P	C
5	0	0	4

PAPER VIII

TOTAL HOURS: 65

COMPUTER GRAPHICS

SUBJECT CODE: P2CA23MT

OBJECTIVES:

- 1.To provide knowledge and understanding in the fundamental principles of Computer Graphics and Mathematical concepts related to Computer graphical operations.
- 2.To provide in-depth knowledge of display systems, image synthesis and shape modeling of 3D applications.

UNIT I:

Video Display Devices: - Raster Scan Systems – Input Devices- Hard Copy Devices- Graphics Software- Output Primitives- Attributes of Output Primitives.
(14 Hrs)

UNIT II:

Two Dimensional Transformations- Clipping – Window – View Port Mapping
(12 Hrs)

UNIT III:

User Dialogue – Input of Graphical Data- Input Functions- Input Device Parameters-Picture Constructions Techniques- Virtual Reality Environments
(13 Hrs)

UNIT IV:

Three Dimensional Concepts - 3D Transformations – 3D Viewing
(13 Hrs)

UNIT V:

Visible Surface Detection: Back Face Detection – Depth Buffer Method- Scan Line Method – A Buffer Method- Properties of Light- Intuitive Color Concepts – RGB Color Models – Computer Animation
(13 Hrs)

COURSE OUTCOMES:

CO1	Draw projections and solids and development of surfaces.
CO2	Prepare isometric and perspective sections of simple solids.
CO3	Demonstrate computer aided drafting.
CO4	Gain proficiency in various algorithms of 2D Computer graphics and trend their use in various real-life systems.
CO5	Understand the concept of image formation, digitization and the role human visual system plays in perception of image data.
CO6	Enhance the perspective of Modern computer system with modeling, analysis and interpretation of 3D visual information.
CO7	Design and create practical solutions using morphological operators for common image processing problems and assess the results.

TEXT BOOK:

1. D.Hearn and M.P.Baker, “Computer Graphics”, PHI, 2/E, 1996

REFERENCES:

1. W.M.Neuma and R.F. Sproull, “Principle of Interactive Computer Graphics”, McGraw Hill, 2/E, 1979
2. Foley, Van Dam, Feiner, Hughes, “Computer Graphics”, Addison Wesley , 2/E, 2000
3. ISRD Group, “Computer Graphics”, TMG ,2/E, 2006

SEMESTER II

TOTAL HOURS: 65

PAPER IX

ACCOUNTING AND FINANCIAL MANAGEMENT

SUBJECTCODE: P2CA24MT

OBJECTIVES:

- 1.To give an insight into the basics of Accounting Concepts and Principles to prepare the accounts.
- 2.Students to understand the role of accounting plays in the overall setup of a business.

UNIT – I:

Financial Accounting: Meaning and Scope of Accounting- Principles – Concepts- Conventions- Accounting Standards- Final Accounts- Trail Balance- Trading Account- Profit and Loss Account- Balance Sheet- Accounting Ratio Analysis – Funds Flow Analysis- Cash Flow Analysis **(14 Hrs)**

UNIT – II:

Accounting: Meaning – Objective- Elements of Cost – Cost Sheet – Marginal Costing and Cost Volume Profit Analysis – Break Even Analysis- Applications – Limitation Standard Costing and Variance Analysis – Material – Labor- Overhead- Sales – Profit – Variances **(12 Hrs)**

UNIT III:

Budgets and Budgeting Control : Budgets and Budgetary Control- Meaning – Types sales Budget- Production Budget- Cost of Production Budget- Flexible Budgeting Cash Budget- Master Budget- Zero Base Budgeting- Computerized Accounting. **(13Hrs)**

UNIT IV:

Investment Decision and Cost of Capital: Objective and Functions of Financial Management – Risk-Return Relationship- Time Value of Money Concepts- Capital Budgeting- Methods of Appraisal- Cost of Capital Factors Affecting Cost of Capital – Computation for Each Source of Finance and Weighted Average Cost of Capital **(13 Hrs)**

UNIT V:

Financing Decision and Working Capital Management: Capital Structure- Factors Affecting Capital Structure- Dividend Policy- Types of Dividend Policy- Concepts of Working Capital- Working Capital Polices- Factors affecting Working Capital- Estimation of Working Capital Requirements. **(13 Hrs)**

COURSE OUTCOMES:

CO1	Understand the basic principles concept and conventions of accounting.
CO2	Analyze the cost volume profit analysis.
CO3	Able to prepare different type of budgets like sales budget, purchase budget, flexible budget, material budget, cash budget etc.
CO4	Discuss the functions of financial management.
CO5	Understand the cost of control and investment decisions.
CO6	Describe the factors affecting capital structure and working capital
CO7	Able to prepare final account with adjustments.

TEXT BOOKS:

1. S.N.Maheswari, “Financial and Management Accounting”, SultanChand & Sons, 4/E,2003
2. M. Pandey, “Financial Management”, Vikas Publications, 4thReprint, 2002

REFERENCES:

1. S.P. Iyengar, “Cost and Management Accounting”, Sultan Chand & Co,1993
2. I.M. Pandey , “Elements of Management Accounting”, Vikas Publishing House ,1993
3. Bose Chandra, “Fundamentals of Financial Management”, PHI, 2007

SEMESTER II
PRACTICAL III
C++ AND ALGORITHMS - LAB
SUBJECTCODE: P2CA21MP

TOTAL HOURS: 52

OBJECTIVE:

- 1.To develop skills in object oriented programming
- 2.To learn generic data structures using templates
- 3.To learn virtual functions and file handling in C++

1. Classes and Objects.
2. Function Overloading.
3. Constructors.
4. Friend Function.
5. Inline Function.
6. Operator Overloading.
7. Conversion Function.
8. Inheritance.
9. Polymorphism.
10. Files.
11. Sorting Algorithms
 - a) Selection Sort.
 - b) Straight Insertion.
 - c) Heap sort.
 - d) Quick sort.
12. Searching
 - a) Binary search.
 - b) Linear search.

COURSE OUTCOMES:

CO1	To construct programs in object-oriented paradigm.
CO2	To Implement data structure using C++.
CO3	To implement File handling in object-oriented environment.
CO4	To implement generic data structures using templates.
CO5	To implement virtual functions and file handling in C++.
CO6	To construct programs in object-oriented paradigm.
CO7	To Implement data structure using C++.

SEMESTER II

L	T	P	C
0	0	4	2

TOTAL HOURS : 52

PRACTICAL IV

COMPUTER GRAPHICS-LAB

SUBJECTCODE: P2CA22MP

OBJECTIVE:

- 1.To study the graphics techniques and algorithms
- 2.To understand the concept of geometric, mathematical and algorithmic concepts necessary for programming computer graphics

1. Develop a Program for 2D Translation.
2. Develop a program for 2D Scaling.
3. Develop a Program for 2D Rotation.
4. Develop a Program for 3D Translation.
5. Develop a program for 3D Scaling.
6. Develop a Program for 3D Rotation.
7. Draw a Line using Line Drawing Algorithms.
8. Draw a Circle using Circle Drawing Algorithm.
9. Develop A Program Using Graphics Primitives.
10. Develop a Program for Line Clipping.
11. Develop a Program for Window to Viewport.

COURSE OUTCOMES:

CO1	Function as designers, applying Mathematics knowledge for various calculations, involving tools for analyzing the world, accessing and interpreting the information and representing what they know to others.
CO2	Gain knowledge about the creation of text, image, graphic and animation files.
CO3	Implementation of various scan & clipping algorithms

III SEMESTER

SEMESTER III

PAPER X

L	T	P	C
5	0	0	5
TOTAL HOURS: 65			

ADVANCED OPERATING SYSTEM

SUBJECT CODE: P3CA21MT

OBJECTIVES:

- 1.This course presents the Introduction about operating systems, process management,
- 2.CPU scheduling, memory management, secondary storage management.

UNIT -I:

Operating System: Introduction– types of operating system-operating system services - Process structure and PCB Microkernel's-Threads -Inter process communication -CPU scheduling approaches-Process synchronization-Semaphores. **(14Hrs)**

UNIT -II:

Memory management: Paging-Segmentation-Virtual memory-Demand paging –Page replacement algorithms-Allocation algorithms.

Distributed Operating System: Issues - Communication Primitives – Remote procedure call – Logical clocks – Vector clocks – Distributed mutual exclusion – Non token based algorithms Token based algorithms **(13 Hrs)**

UNIT -III:

Distributed deadlock detection: Issues in deadlock detection and resolution Centralized and deadlock detection algorithms- Issues in load distributing – Load distributing algorithms – Performance comparison; Distributed File System design issues –Mechanisms for building DFS **(12 Hrs)**

UNIT- IV

Real Time and Mobile Operating Systems: Basic Model of Real Time Systems - Characteristics-Applications of Real Time Systems – Real Time Task Scheduling - Handling Resource Sharing - Mobile Operating Systems – Micro Kernel Design - Client Server Resource Access – Processes and Threads. **(12 Hrs)**

UNIT - V:

Linux and Unix system: Introduction Linux and Unix and file system, Shell programming-Shell programming basic, various types of shell, shell programming in bash, conditional and looping statement, shell variables, shell keywords, and use of grep in shell programming. **(14Hrs)**

COURSE OUTCOMES:

CO1	Understand the basics of operating systems like kernel, shell, types and views of operating systems.
CO2	Understand the high-level structure of the Linux kernel both in concept
CO3	Define, restate, discuss, and explain the policies for scheduling, deadlocks, memory management, synchronization, system calls, and file systems.
CO4	Understand and analyses theory and implementation of: processes, resource control (concurrency etc.), physical and virtual memory, scheduling, I/O and files
CO5	General architecture of computers
CO6	Use disk management and disk scheduling algorithms for better utilization of external memory.
CO7	Describe the various CPU scheduling algorithms and remove deadlocks.

TEXT BOOK:

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, “Operating System Concepts”, John Wiley & Sons, 5/E, 2000
2. Mukesh Singhal, Niranjana G.Shivaratri, “Advanced Concepts in Operating Systems”, TMH 1/E, 1994
3. Yashvant P.Kanetkar, UNIX shell programming, BPB publications 1/E, 2002.

REFERENCES:

1. L. A. Dhotre, “Operating System” Technical Publications, Pune, 1/E, 2008
2. William Stallings, “Operating Systems Internals and Design Principles”, Pearson Education, 4/E, 2003.

L	T	P	C
5	0	0	5

SEMESTER III

TOTAL HOURS: 65

PAPER XI ADVANCED DATABASE SYSTEMS SUBJECT CODE: P3CA22MT

OBJECTIVES:

- 1.This course presents the introduction of database management systems.
- 2.ER model, structure of relational database, indexing and advance data base concepts.

UNIT I INTRODUCTION TO DATABASE SYSTEM

Basic concepts and Definition – Data dictionary- Database – Database System – Database Administrator – File oriented System versus Database Systems – Database language. **Database System Architecture:** Introduction – Schema, Sub-schema and Instances – Structure, Components and Function of DBMS – Data models – Types of database systems.

(14Hrs)

UNIT II RELATIONAL MODEL AND DATABASE DESIGN

Relational Query Languages: Structured Query Language (SQL) – Query By Example (QBE). **Entity Relationship Model:** Basic E-Concepts – Conversion of E-R model into Relations – E-R Diagram Symbols. **Normalization:** Normal Forms – Boyce coded normal forms (BCNF) – Multi-Valued Dependencies and Fourth Normal Form (4NF) – Join Dependencies and Fifth Normal Form (5NF).

(14Hrs)

UNIT III TRANSACTION PROCESSING AND CONCURRENCY CONTROL

Transaction concepts – Concurrency control – Locking Methods – Timestamp Methods – Optimistic Methods. **Database Recovery System:** Database Recovery concepts – Types of database failures – Types of database Recovery – Recovery Techniques.

(12Hrs)

UNIT IV OBJECT - BASED DATABASES

Object Oriented Data Model - Concept of Object Oriented Database (OODB) – Object Oriented DBMS (OODBMS). **Object Relational Database:** ORDBMS Query language (SQL3) – ORDBMS Design.

(12 Hrs)

UNIT V ADVANCE AND EMERGING DATABASE CONCEPTS

Parallel database systems: Architecture – Key Elements – Query Parallelism. **Distributed database System:** Distributed database – Architecture – DDBS Design – Distributed query processing. **Emerging Database Technologies:** Internet Databases – Digital Libraries – Multimedia Databases – Mobile Databases – Spatial Databases – Clustering based Disaster proof Databases .

(13Hrs)

COURSE OUTCOMES:

CO1	This course presents the introduction of database management systems, explains ER model, structure of relational database, indexing and advance data base concepts.
CO2	Understood the basic principles of database management systems, parallel & distributed database. Gained knowledge over various database models, schemes and SQL statements.
CO3	Classify modern and futuristic database applications based on architecture
CO4	Understanding the concept of ER model to Relational Query language
CO5	Understanding the concepts of Transaction Processing and Concurrency
CO6	Understanding the features object based databases
CO7	Ability to understanding Advance And Emerging Database Concepts

TEXT BOOKS:

1. S K Singh, "Database Systems Concepts, Design and Applications", Pearson Education, 1/E, 2009.
2. Nilesh Shah, "Database Systems using ORACLE", Prentice Hall of India, 2/E, 2005.

REFERENCES:

1. Abraham Silberschatz, "Database Systems and Concepts", Tata McGraw Hill, 6/E, 2010.
2. CJ Date, "An Introduction to Database Systems", Addison Wesley Publishing Company, New York, 8/E, 2004

SEMESTER III PAPER XII <u>SOFTWARE ENGINEERING</u> SUBJECT CODE: P3CA23MT	<table border="0"> <tr> <td>L</td> <td>T</td> <td>P</td> <td>C</td> </tr> <tr> <td>5</td> <td>0</td> <td>0</td> <td>4</td> </tr> </table> TOTAL HOURS: 65	L	T	P	C	5	0	0	4
L	T	P	C						
5	0	0	4						

OBJECTIVES:

- 1.To understand and practice the various fields such as analysis, design, development,
2. Testing of to provide an insight into the processes of software development .
3. To develop skills to construct software of high quality with high reliability Software Engg .

UNIT-I:

Introduction - Evolving Role of Software - Changing Nature of Software – Software Myths; a Generic View of Process: Layered Technology - Process Models: Waterfall Model - Evolutionary Process Models

(13 Hrs)

UNIT-II:

Requirements Engineering: Tasks - Initiating the Requirements Engineering Process - Eliciting Requirements - Building the Analysis Model - Requirements Analysis - Data Modeling Concepts.

(13 Hrs)

UNIT-III:

Data Engineering: Design Process and Design Quality - Design Concepts - The Design Model Creating an Architectural Design: Software Architecture - Data Design -Architectural Design - Mapping Data Flow into Software Architecture; Performing User Interface Design: Golden Rules.

(13Hrs)

UNIT-IV:

Testing Strategies: Strategic Approach to Software Testing- Test Strategies for Conventional and Object Oriented Software - Validation Testing - System Testing -Art of Debugging. Testing Tactics: Fundamentals - White Box- Basis Path - Control Structure - Black Box Testing Methods

(13 Hrs)

UNIT-V:

Project Management: Management Spectrum - People - Product - Process - Project. Estimation: Project Planning Process - Resources - Software Project Estimation -Decomposition Techniques - Empirical Estimation Models. Project Scheduling: Project Scheduling - Scheduling. Quality Management: Quality Concepts - Software Quality Assurance - Formal Technical Reviews.

(13Hrs)

COURSE OUTCOMES:

CO1	Identify the key activities in managing a software project.
CO2	Compare different process models.
CO3	Concepts of requirements engineering and Analysis Modeling.
CO4	Apply systematic procedure for software design and deployment.
CO5	Compare and contrast the various testing and maintenance.
CO6	Manage project schedule, estimate project cost and effort required.
CO7	The students should be able to specify software requirements, design the software using tools

TEXT BOOK:

1. Roger S Pressman, “Software Engineering - A Practitioner’s Approach”, McGraw Hill International Edition, 6/E, 2005.

REFERENCES:

1. Ian Somerville, “Software Engineering”, Pearson Education, 7/E, 2006.
2. Mall Rajib, “Software Engineering”, PHI, 2/E, 2006.

SEMESTER III

L	T	P	C
4	0	0	4

TOTAL HOURS: 52

PAPER XIII **OBJECT ORIENTED ANALYSIS AND DESIGN** **SUBJECT CODE: P3CA24ET**

OBJECTIVES:

- 1.To provide a brief, hands-on overview of object-oriented concepts and its life cycle for software development.
- 2.To learn for modelling the software and to design them using UML diagrams.
- 3.To understand the problem domain and to identify the objects from the problem

UNIT-I

System Development – Object Basis – Development Life cycle- Methodologies -Patterns – Frameworks-Unified Approach
(10 Hrs)

UNIT-II

UML- Use-Case models-Object Analysis-Object relationships, Attributes and Methods
(10 Hrs)

UNIT-III

Object Oriented Design Process - Design Axioms - Designing Classes Object storage and Object interoperability.
(10 Hrs)

UNIT-IV

View Layer: Designing Interface Objects – User Interface Design as a creative process – View layer classes – Macro level process – Micro level process – View Layer Interface. **(10Hrs)**

UNIT-V

Software Quality Assurance: Testing Strategies- impact of Object orientation on testing-Test cases – Test plans – Continuous testing- Debugging Principles-System usability – Measuring user satisfaction.
(12 Hrs)

COURSE OUTCOMES:

CO1	Able to understand the object oriented concepts and to apply object oriented life cycle model for a project
CO2	Able to design static and dynamic models using UML diagrams.
CO3	Able to perform object oriented analysis to identify the objects from the problem specification.
CO4	Identify, analyse, and model structural and behavioural concepts of the system.
CO5	Analyse, design, document the requirements through use case driven approach.
CO6	Develop, explore the conceptual model into various scenarios and applications.
CO7	Apply the concepts of architectural design for deploying the code for software.

TEXT BOOK:

1. Ali Bahrami, “Object Oriented Systems Development”, McGraw Hill, 2/E, 2008.

REFERENCE:

1. Grady Booch, “Object Oriented Analysis and Design”, Pearson Education, 2/E, 2009

L	T	P	C
4	0	0	3

SEMESTER III

TOTAL HOURS: 52

ELECTIVE - I

(To choose either A or B)

(A)SOFT COMPUTING

SUBJECT CODE: P3CA25ET

OBJECTIVES:

- 1.To learn the key aspects of Soft computing
- 2.To understand the features of neural network and its applications
- 3.To know about the components and building block hypothesis of Genetic algorithm.

UNIT -I:

Introduction to soft computing and neural networks: Evolution of Computing –soft computing constituents AI computational intelligence. Adaptive networks: Architecture-back propagation feed forward networks – Extended back propagation feed forward networks. Supervised learning: Perceptions – Adaline – back propagation multilayer perceptions – Radial basic function networks. **(10 Hrs)**

UNIT -II:

Learning from Reinforcement: Failure is the surest path to success – The temporal Difference learning-Q-learning. Unsupervised learning Neural networks: Kohonen self – organizing networks – Hebbian learning – the Hopfield networks. Adaptive Resonance Architecture: Noise saturation – Noise saturation dilemma – Building blocks of Resonance. **(10Hrs)**

UNIT -III:

Fuzzy sets and fuzzy logics: Operations of fuzzy sets – Fuzzy Arithmetic – Fuzzy relations – Fuzzy rules and fuzzy reasoning – fuzzy inference system. **(12Hrs)**

UNIT -IV:

Fuzzy Logic: Classical logic an over view – multi-valued logics – Fuzzy prepositions – fuzzy quantifiers – Linguistic Hedges. Fuzzy Decision Making: Individual Decision making – Fuzzy ranking method – Fuzzy linear programming - Neuro fuzzy modeling – Adaptive Neuro fuzzy inference systems. **(10 Hrs)**

UNIT -V:

Coactive Neuro fuzzy modeling: Classification and regression trees – Data Clustering algorithm – Rule base architecture identification. Miscellaneous applications: Medicine – Economics – Fuzzy system & genetic algorithms – Fuzzy regression. **(10 Hrs)**

COURSE OUTCOMES:

CO1	To evolution of computing networks
CO2	To perform Learning and noise using networks.
CO3	To apply various Fuzzy concepts
CO4	To view the various types of fuzzy learning problems
CO5	To perform the various types of fuzzy regression and algorithms
CO6	Gain Knowledge to develop Genetic Algorithm and Support vector machine based machine Implement machine learning through neural networks
CO7	Learning system Write Genetic Algorithm to solve the optimization problem

TEXT BOOKS:

1. Jhy – Shing Roger Jang, Cheun-Tsai Sun, Eiji Mizutani, “Neuro fuzzy and Soft Computing”, Prentice – Hall of India, 3/E, 2003
2. George J. Klir and Bo Yaun, “Fuzzy sets and Fuzzy Logics and theory and applications”, Prentice – Hall of India, 2/E, 1995
3. Santhiah Kumar, “Neural Networks – A Classroom Approach”, Tata McGraw Hill 2/E, 2004

REFERENCES:

1. James A. Freeman and David M. Skapura, “Neural Networks Algorithms, Applications and Programming Techniques”, Pearson education – 2/E, 2003
2. Limin Fu, “Neural networks in Computer Intelligence”, McGraw-Hill – 4/E, 1994.
3. Bart Kasko, “Neural Networks & Fuzzy System”, Prentice Hall of India 4/E, 1991.

SEMESTER III

L	T	P	C
4	0	0	3

TOTAL HOURS: 52

(B)DIGITAL IMAGE PROCESSING

SUBJECT CODE: P3CA26ET

OBJECTIVES:

1. Overview of digital image processing including visual perception, image formation,
2. Spatial transformation transformations, image enhancement,
3. Color image representation and processing, edge detection, image segmentation, and morphological image processing.

UNIT-I:

Introduction: Digital Image Representation, Fundamental steps in Image processing, Elements of Digital Image processing systems. Digital Image Fundamentals: Elements of Visual Perception, Sampling and Quantization, Basic Relationships between Pixels. **(10Hrs)**

UNIT-II:

Image Transformation and Enhancement: Image transforms and their properties-Fourier transform, Discrete Fourier transform, Fast Fourier transform, Walsh Transform, Hadamard Transform, Discrete Cosine Transform, Haar, Slant, Hotelling Transforms. Image Enhancement- Spatial Domain, Frequency Domain methods, Enhancement by point processing, Spatial Filtering. **(12Hrs)**

UNIT-III:

Image Compression - Redundancy, fidelity Criteria, Image Compression models, Elements of Information Theory, Error-Free Compression, Loss Compression, Image file formats. **(10 Hrs)**

UNIT-IV:

Image Segmentation: Image Segmentation - Detection of Discontinuities, Edge linking and boundary detection, Thresholding, Region-Oriented Segmentation. **(10 Hrs)**

UNIT-V:

Image Representation: Image Representation and Description - Representation schemes, Boundary Descriptors, Regional descriptors, Morphology. **(10Hrs)**

COURSE OUTCOMES:

CO1	Know and understand the basics and fundamentals of digital image processing, such as digitization, sampling, quantization, and 2D-transforms.
CO2	Operate on images using the techniques of smoothing, sharpening and enhancement.
CO3	Understand the restoration concepts and filtering techniques
CO4	Learn the basics of segmentation, features extraction, compression and recognition methods for color models.
CO5	Describe various segmentation techniques for image analysis.
CO6	Outline the various feature extraction techniques for image analysis.
CO7	Discuss the concepts of image registration and fusion.

TEXT BOOK:

1. Rafael C.Gonzalez, Richard.E.Woods, “Digital Image Processing”, PHI, 2/E, 1998

REFERENCES:

1. Anil K.Jain, “Fundamentals of Digital Image Processing”, PHI, 2/E, 1995
2. B. Chanda and DuttaMajumdar, “ Digital Image Processing and Analysis”, PHI, 3/E,2000

SEMESTER III

L	T	P	C
0	0	4	2

TOTAL HOURS: 52

PRACTICAL V
RDBMS (ORACLE) - LAB

SUBJECT CODE:P3CA21MP

OBJECTIVES:

- 1.The major objective of this lab is to provide a strong formal foundation in database concepts, technology and practice
- 2.the participants to groom them into well-informed database application developers.

SQL

1. Simple Queries using DDL, DML and DCL.
2. SQL Aggregate Functions.
3. SET Operations.
4. Views.
5. Multiple Tables and Nested Queries.

PL/SQL

6. PL/SQL Block.
7. Function and Procedures.
8. Packages.
9. Triggers.
10. Cursors.

FORMS AND REPORTS

11. Develop a package for the payroll of a company.
12. Design and implementation of Library Information System.
13. Develop a package for a bank to maintain its customer details.
14. Develop a Student's Mark sheet processing package.

COURSE OUTCOMES:

CO1	Populate and query a database using SQL DML/DDl commands
CO2	Declare and enforce integrity constraints on a database using a state-of-the RDBMS
CO3	To use the basics of PL/ SQL Block with SQL Statements

SEMESTER III

L	T	P	C
0	0	4	2

TOTAL HOURS: 52

PRACTICAL VI

ADVANCED OPERATING SYSTEM LAB

SUBJECT CODE:P3CA22MP

OBJECTIVES:

- 1.This lab complements the operating systems course.
- 2.Students will gain practical experience with designing and implementing concepts of operating systems such as system calls, CPU scheduling, process management, memory management, file systems and deadlock handling using C language in Linux environment.

1. Process Scheduling
2. Process Synchronization.
3. Page Replacement Algorithms
4. Simulation of Paging and Segmentations
5. Consumer Problem
6. Unix Shell Programming
 - a. Menu Creation.
 - b. Fibonacci Series
 - c. Sum of digits
 - d. Grep Command
 - e. Counting chars, Words, Lines
 - f. Palindrome
 - g. Prime number
 - h.

COURSE OUTCOMES:

CO1	Analyze the services, architectures and principles used in the design of modern operating systems.
CO2	Execute Linux commands for files and directories, creating and viewing files, File comparisons and Disk related commands
CO3	Utilize the concept of virtualization for creating a virtual machine and installing operating system on virtual machine

IV SEMESTER

SEMESTER IV

L	T	P	C
5	0	0	4

TOTAL HOURS: 65

PAPER XIV

PRINCIPLES OF COMPILER DESIGN

SUBJECT CODE: P4CA21MT

OBJECTIVES:

1. Learn the design principles of a Compiler.
2. Learn the various parsing techniques and different levels of translation
3. Learn how to optimize and effectively generate machine codes

UNIT-I:

Lexical analysis: Regular expression-non deterministic automata Deterministic automata Equivalent to NFAs-minimizing the states of DFA-implementation of lexical analyzer.
(13 Hrs)

UNIT-II:

Syntax analysis: Top down parsing concepts-recursive descent parsing -predictive parsers - non recursive predicate parsing - bottom-up parsing - handle pruning - shift reduce parsing-operator parsing - LR parsers-parser generators -YACC.
(14 Hrs)

UNIT-III:

Intermediate code generation: Syntax directed definitions - construction of syntax trees - top down translation - bottom up evaluation of inherited attributed - recursive evaluators-assigning space at compiler construction time - type checking - overloading of functions and operators - polymorphic function.
(13Hrs)

UNIT -IV:

Storage organization: Storage organization-storage allocation strategies parameter passing- symbol tables- dynamic storage allocation-intermediate languages-representation of declarations- assignment statement- Boolean expression- back patching - procedure calls.
(12 Hrs)

UNIT-V:

Code generation and Code optimization: Design of code generators –runtime storage management - basic blocks - flow graphs - register allocation and assignment - DAG representation of basic blocks- peephole optimization- code optimization- the principle sources of optimization -optimization of basic blocks- global data flow analysis - loop optimizations.
(13 Hrs)

COURSE OUTCOMES:

CO1	Design and implement a prototype compiler.
CO2	Apply for various optimization techniques for dataflow analysis
CO3	Use the different compiler construction tools.
CO4	Understand the major phases of compilation and to understand the knowledge of Lex tool & YACC tool
CO5	Develop the parsers and experiment the knowledge of different parsers design without automated tools
CO6	Construct the intermediate code representations and generation
CO7	Convert source code for a novel language into machine code for a novel computer

TEXT BOOK:

1. Alfred Aho, RaviSethi, JeffreyD.Ullman, “Compilers - Principles, Techniques and Tools”, Pearson, 1/E, 1986.

REFERENCES:

1. Chattopadhyay Santhanu, “Compiler Design”, PHI, 2/E, 2006.
2. Holub Allen, “Compilers in C”, PHI, 2/E, 1997.

ADVANCED JAVA PROGRAMMING
SUBJECT CODE: P4CA22MT

OBJECTIVES:

- 1.To provide an overview of working principles of internet, web related functionalities.
- 2.To understand and apply the fundamentals core java, packages, database connectivity for computing .
- 3.To enhance the knowledge to server side programming.

UNIT I: INTRODUCTION TO ENTERPRISE JAVA

Distributive Systems - Multi-Tier Architecture of J2EE - Clients and Client Tier - Web Tier - EJB Tier - EIS Tier - J2EE best practices - Enterprise Applications Strategy - Session Management.
(12 Hrs)

UNIT II: DATABASE PROGRAMMING IN JAVA

Overview of the JDBC Process - JDBC Concepts - JDBC Driver types - Database Connection - JDBC/ODBC Bridge - Statement Objects - The Connection Interface - Result Set - Interacting with the database - Transaction Processing. **(14Hrs)**

UNIT III: REMOTE METHOD INVOCATION

Distributed Application Architecture - Client proxy and Server Proxy - Remote Interface and Passing Objects - RMI process - Defining and using Remote objects - Remote Object Activation - Object Serialization and RMI **(13 Hrs)**

UNIT IV: JAVA SERVLETS

Basics - Benefits of Servlets – Initialization - Deployment - Reading Client Data - Reading HTTP Request Headers - Cookies - Session Tracking - Database Connections. Java Server Pages (JSP) - Overview - JSP tags - Components of a JSP page - Expressions - Scriptlets - Directives - Declarations - Working with JSP - JSP and JDBC.
(12Hrs)

UNIT V: JQUERY AND AJAX

Introduction - Adding JQuery to Web Pages - JQuery Editor - JQuery Selectors and Elements - Animations and Events handling in JQuery. AJAX: Overview - AJAX and JQuery - Java ME - Java for Mobile Devices. **(14 Hrs)**

COURSE OUTCOMES:

CO1	To introduce the entire java enterprise
CO2	To overview the JDBC concepts of java
CO3	To apply RMI process using proxy server
CO4	To overview the entire JSP cookies and servlets
CO5	To perform various types of java query and AJAX
CO6	Implement Java programs
CO7	Make use of hierarchy of Java classes to provide a solution to a given set of requirements found in the Java API

TEXT BOOKS:

1. Jim Keogh, "The Complete Reference J2EE", Tata McGraw-Hill, 2/E, 2010.
2. Jamie Jaworskie, "Java 2 Platform Unleashed", Tech media SAMS, 4/E, 2008.

REFERENCES:

1. Phil Kanna, "The Complete Reference JSP 2.0", Tata McGraw-Hill, 2/E, 2003.
2. David Sawyer McFarland, "JavaScript and JQuery - The missing manual", 2/E, 2011

RESOURCE MANAGEMENT TECHNIQUES**SUBJECT CODE: P4CA23MT****OBJECTIVES:**

- 1.The primary objective of this course is to provide mathematical background
- 2.The sufficient experience on various topics of discrete mathematics like matrix algebra, logic and proofs, combinatory, graphs, algebraic structures, formal languages and finite state automata.
- 3.Design and solve Boolean functions for defined problems.

UNIT- I:

Linear Programming Models : Mathematical Formulation –Graphical Solution of linear Programming models – Simplex Method -Artificial Variable Techniques . (12 Hrs)

UNIT - II:

Transportation and Assignment Models : - Methods for finding initial Basic feasible solution – Optimum solution-degeneracy- Hungarian Algorithm-Variants of the Assignment Problem. (14 Hrs)

UNIT- III:

Integer Programming Models: Formulation- Gomory's IPP Method –Gomory's mixed integer method. (13 Hrs)

UNIT - IV:

Scheduling by PERT and CPM : Network Construction-Critical Path Method – Project Evaluation and Review Technique. (12 Hrs)

UNIT- V:

Queuing Models : Characteristics of Queuing Models – Poisson Queues - (M/M/1) : (FIFO/ ∞ / ∞), (M/M/1) : (FIFO /N/ ∞) models. (14 Hrs)

COURSE OUTCOMES:

CO1	Solve problems as graphs and simplex tables
CO2	Be able to build and solve transportation and assignment problems
CO3	Construct linear integer programming models and discuss the solution techniques
CO4	Use CPM and PERT techniques, to plan, schedule, and control project activities
CO5	To analyze a network of queues with Poisson external arrivals, exponential service requirements and independent routing.
CO6	The students will have a fundamental knowledge of the operation research concepts
CO7	Acquire skills in analyzing queueing models

TEXT BOOK:

1. Taha H.A, “Operation Research: An Introduction”, Pearson Education, 8/E, 2006.

REFERENCES:

1. S.P. Gupta, “ An Introduction to Operation Research”, Pearson Education, 8/E, 2006
2. R. Sivarethina mohan, “ An Introduction to Operation Research”, TMG, 1/E, 2006
3. P.K. Gupta, Gandhi Swaroop, Manmohan, “Problem in Operation Research”, Sultan and Chands, 4/E, 2004
4. P.R.Vittal and Malini , “An Introduction to Operation Research”, Pearson Education, 8/E, 2006

SEMESTER IV

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TOTAL HOURS: 65

PAPER XVII
C# AND .NET FRAMEWORK

SUBJECT CODE:P4CA24MT

OBJECTIVES:

- 1.Understand the foundations of CLR execution.
- 2.Learn the technologies of the .NET framework.
- 3.Know the object oriented aspects of C#.

UNIT I:

NET Platform – Introduction to Microsoft .NET Framework – Benefits of .NET Framework – CTS – CLS – Assemblies – Framework Base classes – Languages in the .NET Framework – Your First c# application
(13 Hrs)

UNIT II:

Overview of C# - Literals, variables and Data types – Operators and Expression – Decision Making and Branching – Looping- Methods – Arrays and Strings - Structures and Enumerations.
(13 Hrs)

UNIT III:

Classes and Objects – Inheritance and Polymorphism – Interfaces and Multiple Inheritance – Managing Errors and Exceptions – Preprocessors – Working with C# IO files [Directories, Files and Streams]
(14 Hrs)

UNIT IV:

Implementing ICloneable and IComparable Interfaces – Delegates and Events – Multithreading and Synchronization - Attributes – Reflection – Namespace – Properties – Indexers
(13 Hrs)

UNIT V:

Introduction to Window Forms – Win forms – Message Box – Designing a Form – Adding C# controls to Windows Forms-working with Controls – Graphics Class – ActiveX Data Objects (ADO)
(12 Hrs)

COURSE OUTCOMES:

CO1	Understand the foundations of CLR execution.
CO2	Learn the technologies of the .NET framework.
CO3	Know the object oriented aspects of C#.
CO4	List the major elements of the .NET frame work
CO5	Explain how C# fits into the .NET platform.
CO6	Analyze the basic structure of a C# application
CO7	Working with Windows Form and Controls in C#

TEXT BOOKS:

1. B.RamaKrishnaRao, “Programming with C#”, PHI 1/E, 2007
2. E.Balagurusamy, “Programming in C#”, Tata McGraw Hill, 3/E, 2006
3. Herbert Schildt, “The Complete reference C#”, Tata McGraw Hill, 2/E, 2002

REFERENCE:

1. DevPrakash, “Understanding C#”, Cyber Tech Publications, 1/E, 2001

SEMESTER IV

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4	0	0	3
T			
TOTAL HOURS: 52			

ELECTIVE - II (To choose either A or B)

(A)E-COMMERCE

SUBJECT CODE: P4CA25ET

OBJECTIVES:

- 1.Acquaint students with a fundamental understanding of the environment and strategies in the New Economy.
- 2.Provide analytical tools to understand opportunities in unserved or underserved New Economy markets.
- 3.Provide a fundamental understanding of the different types and key components on business models in the New Economy.

UNIT-I:

Electronic Commerce Environment and Opportunities: Background- Electronic Commerce Environment - Electronic Marketplace Technologies - Modes of Electronic Commerce: Overview - Electronic Data Interchange- Migration to open EDI-Electronic Commerce with WWW/Internet - Commerce Net Advocacy.
(10 Hrs)

UNIT-II:

Approaches to Safe Electronic Commerce : Secure Transport Protocols - Secure Transactions - Secure Electronic Payment Protocol - Secure Electronic Transaction-Certificates for Authentication - Security on Web Servers & Enterprise Networks-Electronic Cash and Electronic Payment Schemes : Internet Monetary Payment and Security Requirements - Payment and Purchase Order Process - On-line E-Cash.

(12 Hrs)

UNIT-III:

Internet/Intranet Security Issues and Solutions: Need for Computer Security-Specific Intruder Approaches- Security Strategies- Security Tools- Encryption -Enterprise Networking and Access to the Internet - Antivirus Programs - Security Teams.

(10 Hrs)

UNIT-IV:

MasterCard/Visa Secure Electronic Transaction: Introduction - Business Requirements - Concepts- Payment Processing- E-mail and Secure E-mail Technologies for Electronic Commerce: Introduction- The means of Distribution- A Model for Message Handling - How Does E-mail Work ? - MIME: Multipurpose Internet Mail Extensions - MOSS: Message Object Security Services - Comparisons of Security Methods - MIME and Related Facilities for EDI over the Internet.

(10 Hrs)

UNIT-V:

Internet & Website Establishment: Technologies for Web Servers- Internet Tools Relevant to Commerce - Internet Applications for Commerce - Internet Charges-Internet Access & Architecture - Searching Internet. Applications: EP - Web Based EP - Intellectual Property Issues in EP, Multimedia/Hypermedia Development.
(10 Hrs)

COURSE OUTCOMES:

CO1	Define and analyze the principles of E-commerce and basics of World Wide Web.
CO2	Define and analyze the concept of electronic data interchange and its legal, social and technical aspects.
CO3	Define and analyze the security issues over the web, the available solutions and future aspects of e-commerce security.
CO4	Define and analyze the concept of E-banking, electronic payment system
CO5	Describe the major types of E-commerce.
CO6	Explain the process that should be followed in building an E-commerce presence.
CO7	Identify the key security threats in the E-commerce environment.

TEXT BOOK:

1. Daniel Minoli & Emma Minoli, "Web Commerce Technology Handbook", Tata McGraw-Hill Publishing Company Ltd., 16th Reprint, 1999.

REFERENCES:

1. Ravi Kalakota and Andrew B. Whinston, "Frontiers of Electronic Commerce", Pearson Education Pvt. Ltd., 4/E, 2006.
2. Joseph P.T., "E-commerce - Indian Perspective", PHI, 2/E, 2006.

(B) SOFTWARE TESTING**SUBJECT CODE:P4CA26ET****OBJECTIVES:**

- 1.To know the behavior of the testing techniques and to design test cases to detect the errors in the software
- 2.To get insight into the levels of testing in the user environment.
3. To understand standard principles to check the occurrence of defects and its removal.

UNIT-I PRINCIPLES OF TESTING

Context of testing - The Incomplete Car - Dijkstra's Doctrine - A test in time - The cat and the saint - Test the tests first - The pesticide paradox - The convoy and the rags - The Policemen on the bridge - The ends of the pendulum - Men in black - Automation syndrome - Phase of software project - Quality, Quality Assurance and Quality Control - Testing, Verification and Validation -Process model to represent different phases - Life cycle models.

(10 Hrs)**UNIT-II BLACK BOX AND WHITE BOX TESTING**

White box testing - Challenges - Static testing - Structural testing - Black box testing. **(12 Hrs)**

UNIT-III INTEGRATION, SYSTEM AND ACCEPTANCE TESTING

Integration testing - Types - Phase of testing - Scenario testing - Defect bash - System and Acceptance testing: Overview - Functional vs. Non-Functional testing - Functional system testing - Non-functional testing-Acceptance testing.

(10 Hrs)**UNIT-IV PERFORMANCE AND REGRESSION TESTING**

Introduction - Factors Governing - Methodology for Performance testing - Tools and Process for Performance Testing - Regression Testing - Types of Regression testing - How to do Regression Testing?

(12 Hrs)**UNIT-V INTERNATIONALIZATION AND ADHOC TESTING**

Introduction to Internationalization - Primer on Internationalization - Test phases for Internationalization testing - Enabling testing - Locale testing - Internationalization Validation- Fake language testing - Language testing - Localization testing - Tools used for Internationalization - Challenges and Issues - Overview of Ad Hoc testing - Buddy, Pair, Exploratory, Iterative, Agile and Extreme Testing - Defect Seeding.

(12 Hrs)

COURSE OUTCOMES:

CO1	Able to test the software by applying various testing techniques. Able to debug the project and to test the entire computer based systems at all levels.
CO2	Able to test the applications in the specialized environment using various automation tools.
CO3	List a range of different software testing techniques and strategies and be able to apply specific (automated) unit testing method to the projects.
CO4	Distinguish characteristics of structural testing methods.
CO5	Demonstrate the integration testing which aims to uncover interaction and compatibility problems as early as possible
CO6	Discuss about the functional and system testing methods.
CO7	Demonstrate various issues for object oriented testing.

TEXT BOOK:

1. Srinivasan Desikan, Gopalaswamy Ramesh, “Software Testing: Principles and Practices”, Pearson Publications, 1/E, 2006.

REFERENCES:

1. Renu Rajani, Pradeep Oak, “Software Testing- Effective Methods, Tools and Techniques”, Tata McGraw Hill, 2/E, 2004.
2. Boris Beizer, “Software Testing Techniques”, Dream Tech Press, 2/E, 2003.

PRACTICAL VII
ADVANCED JAVA PROGRAMMING LAB

SUBJECT CODE:P4CA21MP

OBJECTIVES:

1. Learn the basic concepts of Object-Oriented and how they are handled in Java Covers
2. It Understand Exceptions How and when they should be handled

1. Writing Java programs by making use of class, interface, package, etc for the following
 - a. Different types of inheritance study
 - b. Uses of 'this' keyword
 - c. Polymorphism
 - d. Creation of user specific packages
 - e. User specific exception handling
2. Writing window based GUI applications using frames and applets such as Calculator application, Fahrenheit to Centigrade conversion etc
3. Application of threads
4. Reading and writing text files
5. Writing an RMI application to access a remote method
6. Writing a Servlets program with database connectivity for a web based application such as students result status.
7. Create a Personal Information System using Swing
8. Event Handling in Swing

COURSE OUTCOMES:

CO1	This course presents several advanced topics of the Java programming language
CO2	This course including Servlets, Object Serialization and Enterprise JavaBeans
CO3	In order to build robust client server applications you need to understand the basics of many of these topics.

PRACTICAL VIII**C# AND .NET Lab****SUBJECT CODE:P4CA22MP****OBJECTIVES:**

- 1.List the major elements of the .NET Frame work and explain how C# fits into the .NET platform.
- 2.Explain the basic concepts and terminology of object-oriented programming.

1. Bank Transaction using Class
2. Inheritance
3. Interface
4. Delegates and Events
5. Exception Handling
6. Develop Programs using window Form Controls
7. Develop Program using GDI
8. Dialog Box
9. Evaluation of Objective Type questions using files
10. Database application using ADO.NET

COURSE OUTCOMES:

CO1	List the major elements of the .NET Framework and explain how C# fits into the .NET platform.
CO2	Explain the basic concepts and terminology of object-oriented programming.
CO3	Data Access Using ADO.NET
CO4	Analyze the basic structure of a C# application and be able to debug, compile, and run a simple application.
CO5	Ability to understand the concepts of Delegates and Events

V SEMESTER

SEMESTER V

PAPER XVIII

L	T	P	C
5	0	0	4
TOTAL HOURS: 65			

BIG DATA ANALYTICS
SUBJECT CODE: P5CA21MT

OBJECTIVES:

- 1.To understand the competitive advantages of big data analytics
- 2.To understand the big data frameworks
- 3.To learn data analysis methods

Unit 1:

Basic nomenclature - Analytics process model - Analytics model requirements - Types of data sources – Sampling - types of data elements - Visual Data Exploration and Exploratory Statistical Analysis - Missing Values - Outlier Detection and Treatment - Standardizing Data – Categorization -weights of evidence coding - Variable selection -Segmentation.

(14 Hrs)

Unit II:

Predictive Analytics: Target Definition - Linear Regression - Logistic Regression – Decision Trees - Neural Networks - Support Vector machines - Ensemble Methods - Multiclass Classification Techniques - Evaluating Predictive Models.

(13 Hrs)

Unit III:

Descriptive Analytics: Association Rules - Sequence Rules - Segmentation. Survival Analysis: Survival Analysis Measurements - Parametric Survival Analysis.

(13

Hrs)

Unit IV:

Social Network Analytics: Social Network Definitions - Social Network Metrics-Social Network Learning -Relational Neighbor Classifier - Probabilistic Relational Neighbor Classifier - Relational logistic Regression - Collective Inference.

(13 Hrs)

Unit V:

Benchmarking - Data Quality - Software – Privacy - Model Design and Documentation - Corporate Governance. Example applications: Credit Risk Modeling - Fraud Detection – Recommender Systems - Web Analytics

(12 Hrs)

COURSE OUTCOMES:

CO1	Understand how to leverage the insights from big data analytics
CO2	Analyze data by utilizing various statistical and data mining approaches
CO3	Perform analytics on real-time streaming data
CO4	Understand the various SQL alternative database models
CO5	To understand the specialized aspects of big data with the help of different big data applications
CO6	To Identify and distinguish big data analytics applications
CO7	Access and Process Data on Distributed File System

Text Book:

1) Baesens, 2014, Analytics in a Big Data World: The Essential Guide to Data Science and Its applications, Wiley India Private Limited

Reference Books :

- 1) Michael Minelli, Michele Chambers, 2013, Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses, Wiley CIO
- 2) Stephan Kudyba, 2014, Big Data, Mining and Analytics: Components of Strategic Decision Making, CRC Press.
- 3) Frank J. Ohlhorst, 2013, Big data Analytics: Turning Big Data into Big Money, Wiley and SAS Business Series.
- 4) Foster Provost, Tom Fawcett, 2013, Data Science for Business, SPD

SEMESTER V

L T P C

PAPER XIX

5 0 0 4

TOTAL HOURS: 65

WAP & XML

SUBJECT CODE: P5CA22MT

OBJECTIVES:

- 1.To examine some of the most important technologies that are being used today by web developers to build a wide variety of web applications.
- 2.To highlight the web frameworks in web
- 3.To build web applications using proven developer tools and message formats.

UNIT I:

The Rise of mobile data: Market convergence Enabling convergence – Key services the Mobile internet: Overview of the wireless application protocol: The origins of WAP – overview Of the WAP architecture – components of the WAP standard – network infrastructure services Supporting WAP clients – WAP architecture design principles – relationship to other standards

(14 Hrs)

UNIT II:

The wireless markup language: overview – the WML documents model – WML Authoring – URL's identity content – Markup basics - WML – basics – basics content – events,

(13Hrs)

Trash and bindings

UNIT III:

Variables — controls – miscellaneous markup – sending Information – application security – other data: The Meta element – document type declarations –Error and browser limitations – content generation – WML version negotiation.

(13 Hrs)

UNIT IV:

Introduction to XML: Role of XML - XML and the Web-XML Language Basics-SOAP- Web Services-Revolutions of XML-Service Oriented Architecture (SOA)

(13 Hrs)

UNIT V:

XMLTechnology: XML–Namespaces-structuring with Schemas and DTD-presentation techniques-transformation-XML Infrastructure

(12

Hrs)

COURSE OUTCOMES:

CO1	Develop XML based web programming
CO2	Point out the differences and similarities between two important meta-languages - XML
CO3	Design a Web application using various technologies such as XML, AJAX, s and SOAP
CO4	Discuss Markup Languages
CO5	Relate to the history of XML, including some background on Markup Languages (SGML, etc.)
CO6	To learn the syntax and semantics of <i>HTML</i>
CO7	Develop architecture and presentation techniques.

TEXT BOOK:

1. SandeepSinghal, Thomas Bridgram, LalithaSuryanarayana, Daniel Mauney, JariAluinen, David Bevis, Jim Chan, Stefan Hild, “The WAP”, Pearson Education 2/E, 2003.

REFERENCE:

1. Frank. P. Coyle, “XML Web services and Data revolution”, Pearson Education 2/E, 2002.

SEMESTER V

L	T	P	C
5	0	0	4

PAPER XX

TOTAL HOURS: 65

VB.NET & ASP.NET PROGRAMMING
SUBJECT CODE:P5CA23MT

Objectives:

1. Understand the foundations of CLR Execution.
2. Learn the Technologies of the .NET framework
3. To examine some of the most important

UNIT-I

Getting Started with Visual Basic.Net IDE – Visual basic language concepts – Control Structures and Loops-Arrays-Working with forms-Working with common tool box controls-Working with other controls of tool boxes. **(14Hrs)**

UNIT-II

Working with menus - Dialog boxes-Sub procedures and functions-Exception handling-Multiple document interface (MDI)-Inbuilt Functions-String Manipulation. **(12 Hrs)**

UNIT-III

Object Oriented Programming-Creating Classes-Objects-Fields- File Handling-Using File Stream Class-File Modes-File Sharing-File Access Enumerations-Opening or Creating Files with File Stream Class-Reading and Writing text using Stream Reader and Stream Writer Classes. **(13Hrs)**

UNIT-IV

Application and Page Frameworks-ASP.NET Server Controls and Client-Side Scripts- ASP.NET 2.0 Web Server Controls- Validation Server Controls-Working with Master Pages-Collections and Lists **(13 Hrs)**

UNIT-V

Data Binding in ASP.NET 2.0-Data Management with ADO.NET-Site Navigation-Debugging and Error Handling Techniques **(13 Hrs)**

COURSE OUTCOMES:

CO1	Design, formulate, and construct applications with VB.NET
CO2	To understand various controls in VB.NET and able to develop programs using controls
CO3	To Handle controls in Forms(message Box, InputBox), Windows MDI formsControls (Textbox, CreatingMultiLine,Word Wrap textboxes)
CO4	Build integrated VB.NET solutions using files and structures with printing capabilities
CO5	To understand various web server controls and validation controls in ASP.Net
CO6	Translate general requirements into data-related solutions using database concepts
CO7	To handle various error handling techniques in ASP.Net

TEXT BOOKS:

1. Jeffrey R. Shapiro, “Visual Basic .NET The Complete Reference”, McGraw–Hill/Osborne, 3/E, 2002.
2. Bill Evjen, Scott Hanselman, Farhan Muhammad, Srinivasa Sivakumar, Devin Rader, “Professional ASP.NET 2.0”, Wiley Publishing Inc, 2/E, 2005.

REFERENCES:

1. Paul Vick, “The Visual Basic .NET Programming Language”, Addison Wesley, 2/E, 2004.
2. Denise Gosnell, Matthew Reynolds, Bill Forgey, “Beginning Visual Basic .NET Database Programming”, Wrox Press Ltd., 2/E, 2001.
3. Alex Homer, Dave Sussman, “ASP.NET 2.0 Illustrated”, Addison Wesley Professional, 4/E, 2006.
4. Mridula Parihar et al, “ASP.NET Bible”, Hungry Minds Inc., 2/E, 2003.

**SEMESTER V
PAPER XX**

L	T	P	C
5	0	0	3

TOTAL HOURS: 65

NETWORK SECURITY

SUBJECT CODE: P5CA24MT

OBJECTIVES:

- 1.To understand security design principles
- 2.To learn secure programming techniques
- 3.To understand the mathematics behind cryptography

UNIT I:

Security attacks - security services - a model for internetwork security -conventional encryption model - steganography - the data encryption standard.
(13 Hrs)

UNIT II:

Principles of public key cryptosystems - the RSA algorithm - key management -Diffie-Hellman key exchange - prime and relatively prime numbers - Fermat's ad Euler's theorems - testing of primality - Euclid's algorithm - the Chinese remainder theorem . **(14 Hrs)**

UNIT III:

Authentication requirements - authentication functions - message authentication codes - hash functions - digital signatures - authentication protocols - digital signature standards.
(13 Hrs)

UNIT IV:

Kerberos - pretty good privacy - S/MIME - IP security overview - IP security architecture - authentication header.
(13 Hrs)

UNIT V:

Intruder - viruses and related threads - recommended reading - firewall design principles - trusted system. **(12 Hrs)**

COURSE OUTCOMES:

CO1	To understand the Concepts of Networking
CO2	Illustrate the approaches, trade-offs in security design principles.
CO3	Apply number theory in public key encryption techniques.
CO4	Design a secure operating system
CO5	Discuss the various platform security models in a mobile environment.
CO6	To master information security governance, and related legal and regulatory issues
CO7	To be exposed to original research in network security

TEXT BOOK:

1. William Stallings, "Cryptography and network security", PHI, 4/E, 2006.

REFERENCES:

1. Singh, Brijendra, "Network Security and Management", PHI, 3/E, 2007.
2. Charles.P.Pleeger, "Security in Computing", PHI, 3/E, 1989.
3. Hans, "Information and Communication Security", Springer Verlag, 2/E, 1998.
4. Simonds, "Network Security", McGraw Hill, 1/E, 1998.
5. Derek Atkins, "Internet Security", Tec media, 2/E, 1998.
6. Kernel Texplan, "Communication Network Management", PHI, 2/E, 1992.
7. Baxer, "Networking Security", McGraw-hill, 2/E, 1996.

SEMESTER V

L	T	P	C
2	0	0	2

TOTAL HOURS: 26

HUMAN RIGHTS

SUBJECT CODE: P5HR21GS

OBJECTIVE :

To create awareness on Human Rights, UN Human Rights declarations and contemporary issues on Human Rights.

UNIT-I INTRODUCTION

Definition of Human Rights-Nature, Content, Legitimacy and Priority-Theories on Human Rights-Historical Development of Human Rights. Fundamental Rights in the Indian Constitution – Directive principles of State policy – Fundamental Duties – National Human Rights Commission. **(6 Hrs)**

UNIT-II INTERNATIONAL HUMAN RIGHTS

Human Rights and the UNO –Universal Declaration of Human Rights-International Covenant on Civil and Political Rights – International covenant on Economic and Cultural Rights and Optional Protocol. International Human Rights in Domestic courts **(5 Hrs)**

UNIT- III CONTEMPORARY ISSUES ON HUMAN RIGHTS

Contemporary issues on Human Rights: Children's Rights-Women's Rights – Dalit's Rights – Bonded labour and Wages-Refugees– Capital punishment. **(5 Hrs)**

UNIT-IV CONSUMER & ENVIRONMENT PROTECTION ACT.

Consumer protection Act 1986- Objects- Definitions- Central Consumer protection Council – Consumer Dispute Redressal Agencies. Environment Protection Act 1986-Objects-Definition- Powers of Central Government –Provisions of Act to the prevention and control of EnvironmentalPollutionAct. **(5Hrs)**

UNIT- V RIGHT TO INFORMATION ACT 2005

Introduction- History behind the Rights- Scope of the Rights- Main characteristics-Right to Information Act 2005- Exempt from Disclosure-Procedure for seeking information- Appellate Authorities- Reporting Procedure. **(5 Hrs)**

COURSE OUTCOMES:

CO1	Discuss the importance of Fundamental Rights and the theories of Human Rights Practices in India.
CO2	Analyse the Universal Declaration of Human Rights and compare the Cultural, Economic, political, civil Rights in International perspective.
CO3	Outline the Contemporary issues of children and women rights in India.
CO4	Explain the consumer dispute redressal agencies and significance of consumer protection council.
CO5	Describe the importance of Right to information Act and the role of Appellate Authority in seeking information
CO6	Understand the historical growth of Human Rights.
CO7	Demonstrate an awareness of international Human rights and contemporary issues.

TEXT BOOK

T.S.Ravi ,”Human Rights”, Margham Publications Chennai 1st edition 2013

REFERENCES BOOKS:

1. J.Jayasankar. “Corporate laws” Margham publication Chennai 1st edition.2013.
2. “International Bill of Human Rights”, Amnesty International Pub.
3. Desai, A R, “Violation of Democratic Rights in India”

L	T	P	C
4	0	0	3

SEMESTER V

TOTAL HOURS: 52

ELECTIVE - III

(To choose either A or B)

(A) INTERNET OF THINGS

SUBJECT CODE: P5CA25MT

OBJECTIVES:

- 1.To prepare the student for better application of internet technology.
- 2.Understand the communication technologies in IoT
- 3,Know the IoT protocols and web of things

Unit – I IoT Introduction

Introduction to Internet of Things: Definition – Characteristics of IOT – Physical Design of IoT – Things in IoT – IoT Protocols – Logical Design of IoT – IoT Functional Blocks – IoT Communication Models – IoT Communication APIs – IoT Enabling Technologies **(10 Hrs)**

Unit – II Domain Specific IoT - 1

Domain Specific IoT – I : Smart Lighting – Smart Appliances – Intrusion Detection – Smoke / Gas Detection – Smart Parking – Smart Roads – Structural Health Monitoring – Surveillance – Emergency Response – Weather Monitoring **(10 Hrs)**

Unit – III Domain Specific IoT II

Domain Specific IoT – II : Air Pollution Monitoring – Noise Pollution Monitoring – Forest Fire Detection – River Flood Detection – Smart Grids- Smart Vending Machines – Route Generation & Scheduling – Fleet Tracking – Shipment Monitoring **(12 Hrs)**

Unit – IV Domain Specific IoT III

Domain Specific IoT – III: Remote Vehicle Diagnostics – Smart Irrigation - Green House Control – Machine Diagnosis & Prognosis – Indoor Air Quality Monitoring – Health & Fitness Monitoring – Wearable Electronics **(10 Hrs)**

Unit – V IoT and M2M

IoT And M2M: M2M – Difference Between Iot And M2M – SDN And NFV For IoT – IoT System Management With NETCONF – YANG : Need For Iot Systems Management – SNMP Network Operator Requirements – NETCONF – YANG-IoT Systems Management With NETCONF – YANG **(10 Hrs)**

COURSE OUTCOMES:

CO1	Understand the communication technologies in IoT
CO2	Design IoT applications in different domain and be able to analyze their performance
CO3	Know the IoT protocols and web of things
CO4	To apply the knowledge and skills acquired during the course to build and test complete, working IoT system.
CO5	To know the various applications and implementation of IoT
CO6	Learn the concept and capabilities of smart thing/object/device identification, and physical principles of sensing
CO7	Apply IoT knowledge to implement small-scale IoT Project

Text Book:

1. Interconnecting Smart Objects with IP: The Next Internet, Jean-Philippe Vasseur, Adam Dunkels, Morgan Kuffmann.

References:

1. Internet of Things, P.Rizwan Ahmed, Margham Publications, Chennai.
2. Designing the Internet of Things , Adrian McEwen (Author), Hakim Cassimally

SEMESTER V

L	T	P	C
4	0	0	3
TOTAL HOURS: 52			

(B) DECISION SUPPORT SYSTEM **SUBJECT CODE: P5CA26MT**

OBJECTIVES:

- 1.To understand the components of DSS and IS
- 2.To know the appropriate model to be used for a problem
3. Recognize the relationship between business information needs.

UNIT I

Decision-Making And Computerized Support-Management Support Systems: An Overview, Decision Making, Systems, Modeling, and Support. (12Hrs)

UNIT II

Decision Support Systems(Dss) –Introduction and Overview-DSS Architecture , Modeling and Analysis-Data warehousing-Access-Mining visualization , Knowledge based Decision Support (10 Hrs)

UNIT III

Collaboration, Communication, And Enterprise Support Systems- internet –intranet and collaborative technologies –Decision support system-Goal of Group Decision Support System-. Types of Group DSS- Negotiation Support System. (12 Hrs)

UNIT IV

Fundamentals Of Expert Systems And Intelligent Systems-Fundamentals of Expert Systems, Artificial intelligence-Knowledge Acquisition and Validation- Knowledge Representation, Inferences techniques, Building Expert Systems: Process and Tools (10Hrs)

UNIT V

Advanced Intelligent System-Neural Computing Application Genetic Algorithms, Fuzzy Logic, Fuzzy set in decision making, Intelligent Agents and Creativity , Implementing and Integrating Management Support Systems , Organizational and Societal Impacts of Management Support Systems. (10 Hrs)

COURSE OUTCOMES:

CO1	Knowledge of designing DSS/IS for specific problems.
CO2	Explain concepts of a decision support system in term of an interactive system providing information, tools and models and its effects on Industry
CO3	Apply techniques of IDSS (e.g. artificial neural networks, machine learning, rule-based systems, etc.) and validate IDSS techniques to solve a complex industrial problem.
CO4	Identify decision factors, models, and analysis of intelligent decision support systems (IDSS) to support a smart production system.
CO5	Appraise the frameworks of IDSS.
CO6	Design a knowledge-based system for a smart production system.
CO7	To design Collaboration, Communication, And Enterprise Support Systems

Text Book :

1. Efraim Turban, Jay E. Aronson, "Decision Support Systems and Intelligent Systems", Prentice Hall, New Delhi 2004

References:

1. George Marakas, "Decision Support Systems in the 21st Century", Prentice Hall, New Delhi, 2003
2. Robert J Thierauf, "User Oriented Decision Support Systems", Prentice Hall, New Delhi

SEMESTER V

L	T	P	C
0	0	3	2

TOTAL HOURS: 39

PRACTICAL IX

VB.NET & ASP.NET PROGRAMMING LAB **SUBJECT CODE:P5CA21MP**

OBJECTIVES:

- 1.To explore several new standards that may play a significant role in the C# programming.
- 2.Formulate and build extensible windows and web applications using the Model View Controller design.

VB.NET PROGRAMS

1. Create a VB.NET Program for Font Application
2. Create a VB.NET Program for Notepad Application
3. Create a simple calculator using form fields. Have two fields for number entry & one field for the result. Allow the user to be able to use plus, minus, multiply and divide.
4. Create a VB.NET Program for Employee Details with necessary fields and Employee basic pay calculation.
5. Create a VB.NET Program for Students Information with necessary fields and students mark calculation.
6. Create a VB.NET Program for Adding data into a text file

ASP.NET PROGRAMS

1. Create a College Website with basic information about the courses, departments, fees structure etc.
2. Create a Web site for an Online Recruitment System.
3. Create a Web site for an Online Examination System.
4. Create a Web site for an Online Mobile phone shop.
5. Create a Web site for an Online Tax information System.
6. Create a Web site for an Online Voting System.

COURSE OUTCOMES:

CO1	Able to create applications using Microsoft Windows Forms.
CO2	Able to create an application that contains use of ADO. NET
CO3	Able to implement file operations in VB.Net
CO4	Able to create Static and dynamic websites using ASP.Net
CO5	Able to implement the concept of Master pages in ASP.Net web applications
CO6	Able to create applications using Microsoft Windows Forms.
CO7	Able to create an application that contains use of ADO. NET

L	T	P	C
0	0	3	3

SEMESTER V

TOTAL HOURS: 39

PRACTICAL X

MINI PROJECT

SUBJECT CODE: P5CA22PV

Students are to take up sample project development activities with the guidelines given below:

Preparing a project - brief proposal including

- a. Problem Identification
- b. Developing a model for solving the problem
- c. A statement of system / process specifications proposed to be developed (Data Flow Diagram)
- d. List of possible solutions including alternatives and constraints
- e. Cost benefit analysis
- f. Time line activities

A report highlighting the design finalization [based on functional requirements & standards (if any)]

A presentation including the following

- g. Implementation phase (Hardware / Software / both)
- h. Testing & Validation of the developed system
- i. Learning in the project

Consolidated report preparation

VI SEMESTER

SEMESTER VI

L	T	P	C
0	0	30	20

TOTAL DAYS: 90 Days

PROJECT WORK WITH VIVA VOCE **SUBJECT CODE: P6CA21PV**

The objective of the project is to enable the students to work in a project of latest topic /research area / industrial applications. During this semester the students are expected to do literature survey, formulate the problem and form a methodology of arriving at the solution of the problem. Also during this semester, the students are expected to complete the project and submit a full-fledged report comprising of the complete system developed along with Implementation and test results.

REGULATIONS OF PROJECT WORK

- a. Students should do their four months Project work in Company / Institutions during Sixth semester.
- b. The Candidate should submit the filled in format as given in **Annexure-I** to the department for approval during the Ist Week of January.
 - c. Periodically the project should be reviewed minimum three times by the advisory committee.
 - d. The Students should prepare five copies of the project work and submit the same on the date fixed by the Department for the evaluation. After evaluation one copy is to be retained in the College Library, one copy is to be submitted to the Exam cell and the student can hold one copy and One Department, One Guide.
 - e. A Sample Content page format of the Project Work is enclosed in **Annexure-II**.
 - f. Format of the **Title page** and **certificate** are enclosed in **Annexure-III**
 - g. The Students should use Presentation during their Project Viva voce Examinations.
 - h. For the project work and viva-voce a candidate should secure 50% of the marks for pass. The candidate should compulsorily attend viva-voce examination to secure pass in that paper.

ANNEXURE I

M.C.A Syllabus
(CBCS)

College Name :

Course :

Student Name :

Register Number :

Title of the Project :

Address of Organization / Institution:Name of the Internal Guide

Qualification

Teaching Experience

Place :

Date :

Name of the HOD

Designation

Place:

Date :

Signature of the HOD
(with seal)

Principal

Signature of Internal Guide

ANNEXURE II

CONTENTS

	Title	Page No.
i.	Title Page	1
ii.	Original Copy of the Approved Proforma of the Project Proposal	2
iii.	Certificate of Authenticated work	3
iv.	Abstract	
v.	Acknowledgement	
vi.	Table of Contents	
vii.	Table of Figures	

CHAPTER 1: INTRODUCTION

- 1.1 Background
- 1.2 Objectives
- 1.3 Purpose, Scope, and Applicability
 - 1.3.1 Purpose
 - 1.3.2 Scope
 - 1.3.3 Applicability
- 1.4 Achievements
- 1.5 Organization of Report

CHAPTER 2: SURVEY OF TECHNOLOGIES

CHAPTER 3: REQUIREMENTS AND ANALYSIS

- 3.1 Problem Definition
- 3.2 Requirements Specification
- 3.3 Planning and Scheduling
- 3.4 Software and Hardware Requirements
- 3.5 Preliminary Product Description
- 3.6 Conceptual Models

CHAPTER 4: SYSTEM DESIGN

- 4.1 Basic Modules
- 4.2 Data Design
 - 4.2.1 Schema Design
 - 4.2.2 Data Integrity and Constraints
- 4.3 Procedural Design
 - 4.3.1 Logic Diagrams
 - 4.3.2 Data Structures
 - 4.3.3 Algorithms Design

- 4.4 User interface design
- 4.5 Security Issues
- 4.6 Test Cases Design

CHAPTER 5: IMPLEMENTATION AND TESTING

- 5.1 Implementation Approaches
- 5.2 Coding Details and Code Efficiency
 - 5.2.1 Code Efficiency
- 5.3 Testing Approach
 - 5.3.1 Unit Testing
 - 5.3.2 Integrated Testing
- 5.4 Modifications and Improvements

CHAPTER 6: RESULTS AND DISCUSSION

- 6.1 Test Reports
- 6.2 User Documentation

CHAPTER 7: CONCLUSIONS

- 7.1 Conclusion
- 7.2 Limitations of the System
- 7.3 Future Scope of the Project

REFERENCES

APPENDIX

ANNEXURE III

M.C.A Syllabus (CBCS)

OM SAKTHI

TITLE OF THE PROJECT WORK

*Main project submitted to the
Adhiparasakthi College of Arts and Science (Autonomous)*

in partial fulfillment of the requirements for the award of degree

MASTER OF COMPUTER APPLICATIONS

Submitted By

STUDENT NAME

(REG. No.)

Under the Guidance of

Guide Name

Designation

Department of Computer Science and Applications



**DEPARTMENT OF COMPUTER SCIENCE AND APPLICATIONS
ADHIPARASAKTHI COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS)
G.B.NAGAR, KALAVAI-632 506**

MONTH – YEAR

OM SAKTHI

**ADHIPARASAKTHI COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS)
G.B. NAGAR, KALAVAI - 632506**



BONAFIDE CERTIFICATE

This is to certify that the project work entitled **“TITLE OF THE PROJECT WORK”** was carried out by **STUDENT NAME (REG. No:)** in partial fulfillment of the award of the Degree of **MASTER OF COMPUTER APPLICATIONS**, during the SIXTH Semester under the guidance of

GUIDE

HEAD OF THE DEPARTMENT

Submitted for the sixth semester examination project work- viva voce held on_____

INTERNAL EXAMINER

EXTERNAL EXAMINER

The maximum mark for each Project is 200 with 50 for Continuous Internal Assessment (CIA) and 150 for External Evaluation.

CIA Project Work		
I	First Review	15 Marks
II	Second Review	15 Marks
III	Report Preparation	20 Marks
Total		50 Marks
Semester Project Work		
1.	Evaluation of Project Work Document	100 Marks
2.	Viva – Voce	50 Marks
Total		150 Marks

For the conduct of University Examinations in practical subjects and Project work the University will appoint two external examiners.

**ADHIPARASAKTHI COLLEGE OF ARTS AND SCIENCE
(AUTONOMOUS)**

**Permanently Affiliated to Thiruvalluvar University, Vellore
Re-accredited by NAAC with B Grade (CGPA-2-83)**

M.C.A -COMPUTER APPLICATIONS

Under CBCS

[Effective from the Academic year 2020-2021]

REGULATIONS

CBCS:

Choice- Based Credit System is flexible system of Learning “Credit” defines the quantum of contents/ syllabus prescribed for a course and determine the number of hours of instruction required. The distinguishing features of CBCS are the following

It permits the students to:

- Learn at their own pace
- Choice electives from a wide range of electives courses offered by the departments of the Colleges
- Undergo additional courses and acquire more than the required number of credits.
- Adopt an inter-disciplinary approach in learning.
- Make best use of the expertise of available faculty

1. Eligibility for Admission:

A Candidates who have passed the under mentioned degree examinations of this university or an examination of other institution by this university as equivalent thereto provided they have undergone the course under 10+2+3 or 11+1+3 or 11+2+2 pattern shall be eligible for admission to the MCA degree Course

(A) B.C.A / B.E.S/B.Sc in Computer Science / Mathematics/ Physics/ Statistics/ Applied Sciences
OR (B) B.Com / Bachelor of Bank Management / B.B.A/ B.L.M/ B.A Corporate Secretary Ship / B.A Economics/ any other Bachelor’s Degree in any discipline with Business Mathematics and Statistics or Mathematics / Statistics in Main / Allied level or (C) B.Sc Chemistry with Mathematics and Physics as allied subjects or (D) B.E/B.Tech/ M.B.A or (e) A Bachelor’s degree in any discipline with mathematics as one of the subjects at the higher secondary level [i.e. in +2 level of the 10+2 pattern]

2. Eligibility for the Award of Degree:

A candidates shall be eligible for the award of the degree only if he/she has undergone the prescribed course of study in the college for a period of not less than three academic years and passed the

examinations of all the foursemesters prescribed earning 90 credits and fulfilled such conditions as have been prescribed therefore.

3. Duration:

The course duration shall be two years consisting of four Semesters

4. Examinations:

The duration of Semester Examination for theory and practical subjects shall be 3 hours. The Maximum mark for each theory is 100 with 25 for continuous Internal Assessment [CIA] and 75 Semester Examinations. The Maximum marks for each practical is 100 with 25 for Internal Assessment and 75 for Semester Examination.

The following assessment procedure will be followed for Internal Marks:
Continuous Internal Assessment [CIA] Test

S. No	Reg. No	Name	Test I Marks For 75	Test II Marks For 75	Marks For 150	Marks Converted to 15/20	Assignments /Seminars[10] Records[05]	Marks For 25/25	Total Rounded to Marks for 25/25

TestI: Three hours duration for 75 marks

Test II: Three hours duration for 75marks

Total marks150		Theory		Practical	
Test marksconvertedto	:	15 marks	/	20 marks	
Assignment/Seminars	:	10 marks	/	-	
Records	:	-	/	05 marks	
Total	:	25 marks	/	25 marks	

In the column Rounded to 25/25, any fraction may be rounded to the next number. For project work the marks assigned shall be

ProjectReport : 150 Marks
InternalAssessment: 50 Marks

For the conduct of Semester Examination in practical subjects, the college will appoint two external examiners. The College will set the questions and distribute to the Colleges. The examiners will conduct the examinations and award the marks on the same day and forward to the University. The Principal / Head of the Department will coordinate to provide the laboratory and other facilities for conducting the examination.

Project work shall be carried out individually in an R&D section of any industry or University or in the Institute in which the candidate is studying. The Project work / Dissertation report shall be submitted through the guides / Supervisors to the Head of the Department and then to the University not later than the 31st May / 31st December. If he/ she fail to submit the Project Work / Dissertation within the stipulated date for particular semester, he/she may be permitted with the approval of the HOD to submit the Project work / Dissertation report during the succeeding semesters, within the maximum period of Five years from the date of admission to the First Semester. Project Work/ Dissertation evaluation and Viva- Voce shall be conducted by two external examiners.

5. Requirements for Proceeding to Subsequent Semester:

(i) Candidates shall register their name for the first semester Examination after the admission in the P.G.Courses.

(ii) Candidates shall be permitted to proceed from the first semester up to the final semester irrespective of their failure in any of the semester examinations subject to the condition that the candidates should register for all the arrear subject of earlier semesters along the current (subsequent) semesters subjects.

(iii) Candidates shall be eligible to go to subsequent semester, only if they earn sufficient attendance as prescribed there for by the academic council from time to time. provided in case of a candidate earning less than 65 % of attendance in any one of the semester due to any extraordinary circumstances such as medical grounds, such candidates who shall produce Medical Certificate issued by the Authorized Medical Attendant (AMA), duly certified by principal of the college, shall be permitted to proceed to the next semester and to complete the course of study. Such candidates shall have to repeat the missed semester by rejoining after completion of final semester of the course, after paying the fee for the break of study as prescribed by the college from time to time.

6. Passing Minimum:

A Candidate shall be declared to have passed the whole Examination, if he/she passes in all the papers and practical wherever prescribed / as per the scheme of examinations by earnings by earning 90 credits.

In fixing the passing minimum marks, the following will be observed:

- a) There shall be no passing Minimum for Internal.
- b) For External Examination, Passing Minimum shall be of 50 % (Fifty percentages) of the maximum marks prescribed for the paper for each paper/Practical/Project and Viva-Voce.
- c) In the aggregate (External + Internal), the passing minimum shall be of 50 % for the paper for each paper/Practical/Project and Viva-Voce.
- d) Grading shall be based on Overall Marks Obtained [Internal+External].

7. Classification of Successful Candidates:

Candidates who secured not less than 60% of aggregate marks [Internal + External] in the whole examination shall be declared to have passed the examination in the first Class. All other successful candidates shall be declared to have passed in Second Class. Candidates who obtain 75% of the marks in the aggregate [Internal + External] shall be deemed to have passed the examination in First Class with Distinction, provided they pass all the examinations [Theory papers, practical, and project and Viva- voce] prescribed for the course in the first appearance.

8. Requirements to take the Semester Examinations:

- a) A Candidate will be permitted to take the Examination for any semester, If
- i) He / she secure not less than 75 % of attendance out of the 90 instructional days during the semester. [In the case married women students the minimum attendance requirements shall be 55% of the total instruction days]
- ii) He/ she earns a progress certificate from the Head of the Institution of having satisfactory completed the course of Study prescribed in the subjects as required by the regulations, and
- iii) His / her conduct has been satisfactory.

Provided that it shall be open to the academic council or any authority delegated with such powers by the academic council to grant exemption to a candidate who has failed to earn 75% of the attendance prescribed for any valid reasons(s) subject to the usual conditions.

- b) A candidate who secured attendance less than 75% but 65% and above shall be permitted to take the examination on the recommendation of the Head of the Institution to condone the lack of attendance as well as on the payment of the prescribed fees to the college.
- c) A candidate who has secured attendance less than 65 % but 55% and above in Any semester, has to compensate the shortage of attendance in the subsequent Semester besides, earning the required percentage of attendance in that semester and Take the examination of both the semester papers together at the end of the latter Semester.
- d) A Candidate who secured less than 55% of attendance in any semester will not be permitted to take the regular examinations. He/ She to re-do the course after the completion of the final Semesters by rejoining the semester in which the attendance is less than 55%.
- e) A Candidate who secured less than 65% of attendance in, the final semester has to compensate his / her attendance shortage in a manner to be decided by the Head of the department concerned after rejoining the course.

9. Grading System:

In addition to the above marking system, grading system is also adopted as detailed below:

[a] The Marks (Sum of IA and UE marks) in each course is assigned with a letter grade on a seven points scale using the following letter grade points and ranges of marks.

SEVEN POINT SCALE [AS per UGC notification 1998]

Marks	Grade Point	Letter Grade	Class
95-100	7.00	H	First Class with Distinction
90-94	6.00	O	First Class with Distinction
75-89	5.50	D	First Class with Distinction
60-74	4.75	A	First Class
55-59	4.00	B	Second Class
50-54	3.5	C	Second Class
Below 50	3.00	F	Fail

From the Second Semester onwards the total performance with in a semester and continuous performance starting from the first semester are indicated respectively by

Grade Point Average [GPA] and Cumulative Grade Point Average[CGPA]

These two are calculated by the Following formulae:

$$\text{GPA} = \frac{\sum_{i=1}^n C_i G_i}{\sum_{i=1}^n C_i}$$

Where C_i is the credit earned for the Course i in any Semester G_i is the Grade point obtained by the student for the course i and „ n “ is the number of courses **passed** in that semester. **CGPA = GPA** of all the courses starting from the first Semester to the Last Semester.

10. Ranking:

Candidates who pass all the examinations prescribed for the course in the first appearance itself alone are eligible for Ranking / Distinction. Provided in the case of candidates who pass all the examinations prescribed for the course with a break in the first appearance due to the reasons as furnished in the Regulation 7 (iii) Supra are only eligible for classification / Distinction. The mark obtained in the improvement examination will not be taken into consideration for ranking.

11. The Medium of Instruction and Examinations:

The medium of instruction and Examinations shall be in English.

12.Submission of Record Notebooks for PracticalExaminations:

Candidates taking the practical examinations should submit bonafide record note books prescribed for the practical examinations. Otherwise the candidates will not be permitted to take the Practical Examinations. However, in genuine cases where the students could not submit the record note book may be permitted to take the practical examination provided the Head of the Departments Concerns from the institutions certifies that the candidate has performed the experiments prescribed for the course. For such Candidate who do not submit Record Note Books, Zero [0] marks awarded for record note books. In case a candidate fails in the practical Examination the marks awarded for the record at the time of first appearance for the practical examination should be made available by the college to the examiners at the subsequent appearance by the candidate.

13. Improvements of the Marks in the Subjects already passed

Candidates who have passed in theory paper/ papers are allowed to appear again for theory paper/papers only once in order to improve his/her marks, by paying the fee prescribed from time to time. Such candidates are allowed to improve within a maximum period of 12 semesters counting from his/her first semester of his/her admission. If candidate improves his marks that his improved marks will be taken into consideration for the award of classification & distinction only. Such improved marks will not be counted for the award of Prizes/ Medals & Ranks. If the candidate does not show improvement in the marks, his previous marks will be taken into consideration. No

Candidate will be allowed to improve marks in the Practical's, Mini Project, and Major Project & Viva voce.

14. Checklist for Inspection:

A. Qualification for

Teaching Faculty: as prescribed by the UGC and the
University Laboratory Staff: as prescribed by the UGC and
the University.

B. Infrastructure Facilities

Building: Number of classroom with specifications: 3 rooms measuring 20' x
25' " If the class strength is above 50 the space shall increase by 10 sq. ft, per
student.

Number of staff rooms: one measuring 20'

x 20' Furniture: One pair of table / chair per
student

PATTERN OF QUESTION PAPER:

PART-A (300Words)

To Answer 5 Questions (eitherorPattern) 5 X 6 Marks = 30

Marks

PART-B(900Words)

To Answer 3 Questions out of 5 questions 3X 15Marks = 45Marks

Total = 75Marks

STRUCTURE OF THE COURSE AND EVALUATION PATTERN: (PRACTICAL)

Semester Practical Exam		
1.	Experiment 1	25
2.	Experiment 1	25
3.	Record	10
4.	Viva – Voce	15
	Total	75 Marks

ADHIPARASAKTHI COLLEGE OF ARTS & SCIENCE (AUTONOMOUS)

G.B.NAGAR, KALAVAI – 632506

AFFILIATED TO THIRUVALLUVAR UNIVERSITY, VELLORE

DEGREE COURSES

M.C.A. Computer Applications

With effect from 2020-2021

The course of study and the scheme of examinations

Year/ Sem	Subject	Paper	Sub. Code	Title of the Paper	Hr./ wee K	Credit	Exa	Max. Marks		
							M Hrs.	IA	Sem Exam	Total
I Year I Sem	Core	Paper I	P1CA31MT	Data Structure and Algorithms	4	4	3	25	75	100
	Core	Paper II	P1CA32MT	Problem Solving using python	4	4	3	25	75	100
	Core	Paper III	P1CA33MT	Java Programming	4	4	3	25	75	100
	Core	Paper IV	P1CA34MT	Computer Organization	4	3	3	25	75	100
	Compulsory Paper		P1HR31GS	Human Rights	2	2	3	25	75	100
	Elective	Paper I	P1CA31ET	Principles of Programming Languages	3	2	3	25	75	100
			P1CA32ET	Software Project Management						
			P1CA33ET	Object Oriented Analysis Design						
	Core Practical	Practical I	P1CA31MP	Data Structure and Algorithms Lab	3	2	3	25	75	100
	Core Practical	Practical II	P1CA32MP	Problem Solving using python Lab	3	2	3	25	75	100
	Core Practical	Practical III	P1CA33MP	Java Programming Lab	3	2	3	25	75	100
					30	25	27	225	675	900
I Year II Sem	Core	Paper V	P2CA31MT	Relational Database Management System	4	4	3	25	75	100
	Core	Paper VI	P2CA32MT	Web Programming (PHP, MySQL)	4	4	3	25	75	100
	Core	Paper VII	P2CA33MT	Linux Operating System	4	4	3	25	75	100
	Core	Paper VIII	P2CA34MT	Accounting Financial Management	3	4	3	25	75	100
	Elective	Paper II	P2CA31ET	Cloud Computing	3	2	3	25	78	100
			P2CA32ET	Mobile Commerce						
			P2CA33ET	Cryptography and Network Security						
	Elective	Paper III	P2CA34ET	Business Statistics	3	2	3	25	75	100
			P2CA35ET	Internet of Things						
			P2CA36ET	Artificial Intelligence						
	Core Practical	Practical IV	P2CA31MP	Relational Database Management System Lab	3	2	3	25	75	100
	Core practical	Practical V	P2CA32MP	Web Programming (PHP, MySQL) Lab	3	2	3	25	75	100
	Core Practical	Practical VI	P2CA33MP	Linux Operating System Lab	3	2	3	25	75	100
					30	26	27	225	675	900
II Year III Sem	Core	Paper IX	P3CA31MT	Big data analytics	4	4	3	25	75	100
	Core	Paper X	P3CA32MT	.Net Programming	4	4	3	25	75	100
	Core	Paper XI	P3CA33MT	Mobile Application Development	4	4	3	25	75	100
	Core	Paper XII	P3CA34MT	Resource Management Techniques	3	4	3	25	75	100
	Elective	Paper IV	P3CA31ET	Compiler Design	3	2	3	25	75	100
			P3CA32ET	Decision support system						
			P3CA33ET	Parallel Processing						

	Elective	Paper V	P3CA34ET	Digital Image Processing	3	2	3	25	75	100
			P3CA35ET	Machine Learning						
			P3CA36ET	Enterprise Resource Planning						
	Core Practical	Practical VII	P3CA31MP	.Net Programming Lab	3	2	3	25	75	100
	Core Practical	Practical VIII	P3CA32MP	Mobile Application Development Lab	3	2	3	25	75	100
	Core Practical	Practical IX	P3CA33MP	Mini project	3	2	3	25	75	100
					30	26	27	225	675	900
II Year / IV Sem			P4CA31PV	Project Work with Viva Voce	30	13	3	50	150	200
				Total	120	90	84	725	2175	2900



Om Sakthi
ADHIPARASAKTHI COLLEGE OF ARTS AND SCIENCE
(Permanently affiliated to Thiruvalluvar University, Accredited by NAAC with B
Grade)



(Autonomous)
G.B. Nagar, Kalavai – 632 506, Vellore District. Ph:04173-242226, 242644

M.C.A

PROGRAMME SPECIFIC OUTCOMES:

PSO1	Produce industry ready graduates in Software Development, Data Science, Information Security, Web Development, Networking and interdisciplinary areas.
PSO2	Ability to pursue careers in consultancy, research and development, teaching and allied areas related to Computer Applications.
PSO3	Inculcate leadership and entrepreneur skills among students who can develop customized solutions from small to large enterprises.
PSO4	Ability to analyze, design, develop and maintain the software application with latest technologies.
PSO5	Utilize skills and knowledge for computing practice with commitment on social, ethical, cyber and legal values
PSO6	Inculcate employability and entrepreneur skills among students who can develop customized solutions for small to large Enterprises
PSO7	Comprehend, explore and build up computer programs in the areas allied to Algorithms, System Software, Multimedia, Web Design and Big Data Analytics for efficient design of computer-based systems of varying complexity

I SEMESTER

L	T	P	C
4	0	0	4

SEMESTER –I

TOTAL HOURS:52

PAPER - I

DATA STRUCTURE AND ALGORITHMS

SUBJECT CODE:P1CA31MT

OBJECTIVES:

- 1.To review the basic data such as list, stack & queue and introduce concurrency on them
- 2.To learn advanced search structures such as Splay tree, Red Black trees, Multi way search tree and Skip lists
- 3.To study advanced heap structures such as Leftist Heaps, Binomial Heaps

UNIT I:(10 HOURS)

Introduction to data structures-overview-types-primitive and non primitive data structures and operations. Arrays-types-array of structures –array of pointers. Stack and queue operations-infix and postfix notations.

UNIT II:

(11HOURS)

Linked list-Concurrent linked lists– coarse-grained synchronization – fine-grained synchronization – lazy synchronization – non-blocking synchronization. Binary Search tree - Splay tree - Red Black trees –, 2-D tree –2-3 Tree-Multi way Search tree – Skip lists.

UNIT III: (10 HOURS)

Min heap - Double ended heap – Leftist Heaps - Binomial Heaps – Fibonacci Heaps – SkewHeaps

Unit IV:

(11HOURS)

Hashing – closed-address and open-addressed hash sets — Lock based closed-address Concurrent hash set, Cuckoo Hashing. Lock-based concurrent skip lists –An Unbounded Heap-Based Concurrent Priority Queue – skip list based unbounded priority queues.

UNIT V:

(10 HOURS)

ALGORITHMS: Introduction to Approximation algorithms: Vertex cover - Travelling Salesman Problem. Introduction to Randomized algorithms – Randomized Searching and Sorting - Online hiring problem. Introduction to Parallel algorithms – Odd-even transposition sort - Matrix multiplication.

COURSE OUTCOMES:

CO1	Implement and apply concurrency in linked lists, stacks and queues
CO2	Perform operations on advanced search trees
CO3	Design and implement various types of advanced heap structures
CO4	Implement advanced concurrent structures such as hash table & priority queue
CO5	Solve applications using advanced algorithm such as Randomized, Approximation and Parallel algorithms.
CO6	Discusses basic ADTs such as stacks, queues, and trees
CO7	Implements basic algorithms for sorting and searching.

TEXT BOOKS:

1. Ashok N Kamthane, "Introduction to Data structures in C", Pearson Education, 1/E, 2010.
2. Samanta D, "Classic data structures", PHI, 2/E, 2009

REFERENCE BOOK:

1. M. Herlihy and N. Shavit, "The Art of Multiprocessor Programming", Morgan Kaufmann, 2012.
2. E. Horowitz, S. Sahni and Dinesh Mehta, "Fundamentals of Data structures in C++", Universities Press, 2006.
3. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", Pearson Education, 2nd Edition, 1997.
4. Thomas H Cormen, Charles E Leiserson, Ronald L Rivest and Clifford Stein, "Introduction to Algorithms", Prentice Hall of India, New Delhi, Second Edition, 2009.
5. V. Aho, J. E. Hopcroft, and J. D. Ullman, "The Design and Analysis of Computer Algorithms", Addison-Wesley, 1974.
6. Robert Sedgewick and Kevin Wayne, "ALGORITHMS", Pearson Education, Fourth Edition, 2011.
7. S. Sridhar, "Design and Analysis of Algorithms", First Edition, Oxford University Press. 2014
8. J. Kleinberg and E. Tardos, "Algorithm Design" Pearson Education Limited, 2006.
9. Michael J. Quinn, "Parallel Computing: Theory & Practice", Tata McGraw Hill Edition, 2003.

SEMESTER –I

L	T	P	C
4	0	0	4

PAPER – II

TOTAL HOURS: 52

PROBLEM SOLVING USING PYTHON **SUBJECT CODE: P1CA32MT**

OBJECTIVES:

- 1.To know the basics of algorithmic problem solving.
- 2.To develop Python programs with conditionals and loops.
- 3.To define Python functions and use function calls.

UNIT I: INTRODUCTION TO PYTHON, CONDITIONALS AND FUNCTIONS 10hrs

Introduction to Python Programming – Python Interpreter and Interactive Mode– Variables and Identifiers – Arithmetic Operators – Values and Types – Statements - Operators – Boolean Values – Operator Precedence – Expression – Conditionals: If-Else Constructs – Loop Structures/Iterative Statements – While Loop – For Loop – Break Statement – Function Call and Returning Values – Parameter Passing – Local and Global Scope – Recursive Functions.

UNIT II: SIMPLE DATA STRUCTURES IN PYTHON 10hrs

Introduction to Data Structures – List – Adding Items to a List – Finding and Updating anItem – Nested Lists – Cloning Lists – Looping Through a List – Sorting a List – List Concatenation – List Slices – List Methods – List Loop – Mutability – Aliasing – Tuples:Creation, Accessing, Updating, Deleting Elements in a Tuple, Tuple Assignment, Tuple asReturn Value, Nested Tuples, Basic Tuple Operations – Sets.

UNIT III: STRINGS, DICTIONARIES, MODULES 10hrs

Strings: Introduction, Indexing, Traversing, Concatenating, Appending, Multiplying,Formatting, Slicing, Comparing, Iterating – Basic Built – In String FunctionsDictionary: Creating, Accessing, Adding Items, Modifying, Deleting, Sorting, Looping, and Nested Dictionaries Built – in Dictionary Function – Finding Key and Value in a Dictionary Modules: Introduction – Module Loading and Execution – Packages – Making Your OwnModule – The Python Standard Libraries

UNIT IV: FILE HANDLING AND EXCEPTION HANDLING 08 hrs

Files: Introduction – File Path – Opening and Closing Files – Reading and Writing Files –File Position – Exception: Errors and Exceptions, Exception Handling, Multiple Exceptions.

UNIT V: INTRODUCTION TO MACHINE LEARNING 12 hrs

Machine Learning – Types of Machine Learning – Supervised Learning – Unsupervised Learning – Basic Concepts in Machine Learning – Machine Learning Process – Weight Space – Testing Machine Learning Algorithms – A Brief Review of Probability Theory – Turning Data into Probabilities – The Bias-Variance Tradeoff.

COURSE OUTCOMES:

CO1	Develop algorithmic solutions to simple computational problems.
CO2	Develop and execute simple Python programs.
CO3	Structure simple Python programs for solving problems.
CO4	Decompose a Python program into functions.
CO5	Represent compound data using Python lists, Tuples, dictionaries.
CO6	Make the own module packages.
CO7	Read and write data from/to files in Python Programs.

TEXT BOOKS:

1. Wesley J Chun, “Core Python Applications Programming”, 3rd Edition, Pearson Education India, 2015. ISBN-13: 978-9332555365
2. Gowrishankar S, Veena A, “Introduction to Python Programming”, 1st Edition, CRC Press/Taylor & Francis, 2018. ISBN-13: 978-0815394372
3. Reema Thareja, “Python Programming using Problem Solving Approach”, Oxford University Press, 2017.
4. Ethem Alpaydin, “Introduction to Machine Learning”, Third Edition, Prentice Hall of India, 2015.

REFERENCES:

1. Allen B. Downey, “Think Python: How to Think Like a Computer Scientist”, Second Edition, Shroff/O’Reilly Publishers, 2016.(<http://greenteapress.com/wp/thinkpython/>)
2. Guido van Rossum, Fred L. Drake Jr., “An Introduction to Python – Revised and Updated for Python 3.2”, Network Theory Ltd., 2011.
3. John V Guttag, “Introduction to Computation and Programming Using Python”, Revised and Expanded Edition, MIT Press , 2013
4. Charles Dierbach, “Introduction to Computer Science using Python”, Wiley India Edition, 2016.
5. Timothy A. Budd, “Exploring Python”, Mc-Graw Hill Education (India) Private Ltd., 2015.
6. Kenneth A. Lambert, “Fundamentals of Python: First Programs”, Cengage Learning, 2012.
7. Christopher Bishop, “Pattern Recognition and Machine Learning”, Springer, 2006.
8. Kevin P. Murphy, “Machine Learning: A Probabilistic Perspective”, MIT Press, 2012.

SEMESTER –I

L	T	P	C
4	0	0	4

PAPER - III

TOTAL HOURS: 52

JAVA PROGRAMMING **SUBJECT CODE: P1CA33MT**

OBJECTIVES:

- 1.To understand the basics of Object Oriented Programming concepts, Character Set, tokens, variables, data types, operators and control structure.
- 2.To understand the fundamental concept of Java like class and object, array, methods, constructors and inheritance.
- 3.To understand the concept of package, Exception Handling and Threading.

UNIT - I: BASIC CONCEPTS

OOP and Java - Objects and Classes, Encapsulation, Inheritance, Polymorphism, Java Language, The Primaries – Character Set, Tokens, Constants, Variables, Operators and Expressions, Library Methods, Strings, I/O Streams, Formatting the Output values, Control Statements – If, Switch, While, Do-While-for.

UNIT - II: ARRAYS AND OO FEATURES

One, Two dimensional Arrays, Methods – General form, invoking, method overloading, recursion, Classes and objects – General form, creation, constructors, constructor overloading, copy constructor, ‘this’ keyword, Static members, finalize method, Inner class and anonymous classes, Inheritance – inheriting, abstract classes and final classes, Interfaces – structure, implementation, interface inheritance.

UNIT - III: PACKAGES, EXCEPTION HANDLING AND THREADING

Packages – Package Hierarchy, Import Statement, Hiding the Classes, Access Control Modifiers, Exception Handling – Default Exception – User Defined Exception Handling, Exception and Error Classes, Throw and Throws. Threading – Life Cycle, Creating and Running, Methods in Thread Class, Priority Thread, Synchronization, Dead Lock, Inter Thread Communication.

UNIT - IV: APPLETS AND AWT

Applets – Life Cycle, Applet Class, Syntax of Applet Tag, Methods in Graphics Class, Events, Listeners, Event Handling Methods, Inheritance of Control Classes, Labels, Button Control, Check Box Control, Radio Button, Choice Control, List Control, Scroll Bars, Layouts and Panel, Windows and Frames, Menus and Dialogs, Mouse Events and Listeners, Adapter Class and Inner Class.

UNIT - V: JDBC

JDBC – Establishing Connection, Creating Tables, Enter Data, Table Updating Obtaining Metadata, Using Transactions.

COURSE OUTCOMES:

CO1	To understand the basics of Object Oriented Programming concepts, Character Set, tokens, variables, data types, operators and control structure.
CO2	To understand the fundamental concept of Java like class and object, array, methods constructors and inheritance.
CO3	To understand the concept of package, Exception Handling and Threading.
CO4	To understand the concepts of Applets and AWT.
CO5	To understand the concepts of JDBC connectivity.
CO6	Design problem solutions using Object Oriented techniques.
CO7	Use the syntax and semantics of java programming language and basic concepts of OOP

TEXT BOOK

1. Muthu C, “Programming in Java”, 2nd Edition, Tata Mcgraw Hill Education Private Limited, 2009.

Unit –I	:	Ch. 1, 2, 3
Unit - II	:	Ch. 4, 5, 6
Unit - III	:	Ch. 7, 12, 13
Unit – IV	:	Ch. 8, 9, 10
Unit – V	:	Ch. 18

REFERENCES

1. Herbert Schildt, “The Complete Reference – Java 2”, 4th Edition, Tata McGraw Hill, 2001.
2. Balaguruswamy, “Programming with JAVA”, 2nd Edition, Tata McGraw Hill, 1999.

SEMESTER –I

L	T	P	C
4	0	0	3

PAPER - IV**TOTAL HOURS: 52****COMPUTER ORGANIZATION**
SUBJECT CODE: P1CA34MT**OBJECTIVES:**

- 1.To understand basic components of system
- 2.To explore the memory organization
- 3.To design digital circuits, by simplifying the Boolean functions.

UNIT I: (11 HOURS)

Digital Logic Gates, Universal Gates, Design Procedure – Half Adder, Full Adder, Half Subtractor, Full Subtractor, Multiplexers/DeMultiplexers, Magnitude Comparator.

UNIT II: (11 HOURS)

STACK organization, Instruction Formats, Addressing modes, CISC and RISC.Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, Vector Processing

UNIT III: (10 HOURS)

Memory Hierarchy, Main Memory, RAM and ROM, Memory Address map, Auxiliary memory-magnetic Disks, Chip memory, Associate Memory, Cache Memory, Address mapping using pages, Page table , Page Replacement.

UNIT-IV: (10 HOURS)

Computer networks:Network hardware devices, Topology, Types of Networks, OSI reference Model, Transmission Media , Wireless Transmission, Frame, Packet, Switching

UNIT V: (10 HOURS)

Internetworking, Routing, Congestion, IP Address, Connection establishment and releasing, TCP segment format, Working of DNS, Client Server Model

COURSE OUTCOMES:

CO1	Make decision about the configuration and network of system.
CO2	Design and analyze digital circuits.
CO3	Simplify complex Boolean functions.
CO4	Build digital systems involving combinational and sequential logic.
CO5	Knowledge on various memory units
CO6	Ability to trace the flow of information from one node to another node in the network.
CO7	Ability to choose functionalities at each layer for different applications

TEXT BOOK:

1. M. Morris Mano, “Digital Logic and Computer Design”, Pearson, 2nd edition, 2010
2. Computer Organization – Carl Hamacher, ZvonksVranesic, SafeaZaky, Vth Edition, McGraw Hill.
3. Andrew Tanenbaum, “Computer Networks”, PHI, 3rd Edition, 2010

REFERENCE BOOKS:

1. Computer Organization and Architecture – William Stallings 6th Edition, PHI .
2. Structured Computer Organization – Andrew S. Tanenbaum, 4th Edition PHI/Pearson
3. William Stalling, “Computer Networks”, PHI, 6th Edition, 2011 .

SEMESTER –I

COMPULSORY PAPER -01

L	T	P	C
2	0	0	2

TOTAL HOURS: 26

HUMAN RIGHTS
SUBJECT CODE: P1HR31GS

OBJECTIVES:

- To create awareness on Human Rights, UN Human Rights declarations and contemporary issues on Human rights.

UNIT I:INTRODUCTION(05 HOURS)

Definition of Human Rights - Nature, Content, Legitimacy and privacy - Theories on Human Rights - Historical Development of Human Rights.

UNIT II: INTERNATIONAL HUMAN RIGHTS (08 HOURS)

International Human Rights - Prescription and Enforcement upto World War II - Human Rights and the U.N.O - Universal Declaration of Human Rights - International Covenant on Civil and Political Rights - International Covenant on Economic, Social and Cultural Rights and Optional Protocol

UNIT III: CONTEMPORARY ISSUES ON HUMAN RIGHTS(04 HOURS)

Human Rights Declarations - U.N. Human Rights Declarations - U.N. Human Rights Commissioner.

UNIT-IV:CONSUMER& ENVIRONMENT PROTECTION ACT(04 HOURS)

Amnesty International - Human Rights and Helsinki process - Regional Developments - European Human Rights system - African Human Rights system - International Human Rights in Domestic courts.

UNIT V:RIGHT TO INFORMATION ACT 2005(05HOURS)

Contemporary Issues on Human Rights: Children's Rights - Women's Rights - Dalit's Rights - Bonded Labour and Wages - Refugees - Capital Punishment. Fundamental Rights in the Indian Constitution - Directive Principles of State Policy - Fundamental Duties – National Human Rights Commission.

COURSE OUTCOMES:

CO1	Discuss the importance of Fundamental Rights and the theories of Human Rights Practices in India.
CO2	Analyse the Universal Declaration of Human Rights and compare the Cultural, Economical, political, civil Rights in International perspective.
CO3	Outline the Contemporary issues of children and women rights in India.
CO4	Explain the consumer dispute redressal agencies and significance of consumer protection council.
CO5	Describe the importance of Right to information Act and the role of Appellate Authority in seeking information
CO6	Understand the historical growth of Human Rights.
CO7	Demonstrate an awareness of international Human rights and contemporary issues.

TEXT BOOK:

1. International Bill of Human Rights, Amnesty International Publication, 1988.
2. Human Rights, Questions and Answers, UNESCO, 1982.
3. Mausice Cranston – What is Human Rights.

SEMESTER –I

ELECTIVE PAPER - I

L	T	P	C
3	0	0	2

TOTAL HOURS: 39

(To choose 1 out of the given 3)

PRINCIPLES OF PROGRAMMING LANGUAGES

SUBJECT CODE: P1CA31ET

OBJECTIVES:

- 1.To introduce the major programming paradigms, and the principles and techniques involved in design and implementation of modern programming languages.
- 2.To introduce frameworks for specifying and reasoning about programming languages

UNIT I

(9 Hrs)

Introduction: Role of Programming Languages: Why Programming Languages, Towards Higher-Level Languages, Programming Paradigms, and Programming Environments Language Description: Syntactic Structure, Language Translation Issues: Programming Language Syntax, Stages in Translation, Formal Translation Models

UNIT II

(12 Hrs)

Data, Data Types, and Basic Statements : Names , Variables , Binding, Type Checking, Scope, Scope Rules , Lifetime and Garbage Collection, Primitive Data Types, Strings, Array Types, Associative Arrays ,Record Types, Union Types, Pointers and References , Arithmetic Expressions , Overloaded Operators, Type Conversions , Relational and Boolean Expressions, Assignment Statements, Mixed Mode Assignments, Control Structures, Selection ,Iterations, Branching, Guarded Statements

UNIT III

(9Hrs)

Subprograms and Implementations : Subprograms, Design Issues, Local Referencing, Parameter Passing, Overloaded Methods, Generic Methods, Design Issues for Functions , Semantics of Call and Return, Implementing Simple Subprograms, Stack and Dynamic Local Variables, Nested Subprograms, Dynamic Scoping.

UNIT IV

(11Hrs)

Object-Oriented, Concurrency, and Event Handling : Grouping of Data and Operations — Constructs for Programming Structures, Abstraction Information Hiding, Program Design with Modules, Defined Types, Object Oriented Programming — Concept of Object, Inheritance, Derived Classes and Information Hiding – Templates, Semaphores, Monitors, Message Passing, Threads, Statement Level Concurrency Exception Handling (Using C++ and Java as Example Language).

UNIT V

(9Hrs)

Functional and Logic Programming Languages : Introduction to Lambda Calculus , Fundamentals of Functional Programming Languages, Programming with Programming with ML, Introduction to Logic and Logic Programming – Programming with Prolog.

COURSE OUTCOMES:

CO1	Knowledge of, and ability to use, language features used in current programming languages.
CO2	An ability to program in different language paradigms and evaluate their relative benefits
CO3	An understanding of the key concepts in the implementation of common programming languages
CO4	Understand the reason for learning a programming language.
CO5	Understand the usage and existence of various programming languages.
CO6	Describe the usage of data types in various languages.
CO7	Understand the concepts like abstract data types, sub programs and will be able to apply in realistic manner.

Text Book

1. “Programming Languages: Design and Implementations” , Terrance W.Pratt, Marvin V. Zelkowitz, T.V.Gopal, Fourth ed., Prentice Hall

Reference Book

1. “Programming Language Design Concept”, David A. Watt, Willey India
2. “Programming languages: Concepts and Constucts”, Ravi Sethi, Second Ed.,Pearson.
3. “Types and programming Languages”, Benjamin C. Pierce. The MIT Press Cambridge, Massachusetts London, England
4. Concepts of Programming Languages, Robert W. Sebesta, 10th Ed.,Pearson

SEMESTER –I

L	T	P	C
3	0	0	2

TOTAL HOURS: 39

ELECTIVE PAPER - I

(To choose 1 out of the given 3)

SOFTWARE PROJECT MANAGEMENT
SUBJECT CODE:P1CA32ET

OBJECTIVES:

- 1.To understand the fundamental principles of Software Project Management
- 2.To understand the project planning process and be familiar with the different methods and techniques used for project management.
- 3.To learn about project reporting, defect analysis and prevention.

UNIT I: (08 HOURS)

Introduction to Software Project Management: Define Project Management, Significance of Software Project Management, Issues in Project Management Practices. Stages in Software Project: Feasibility Study, Planning, Project Execution, Project Life Cycles Models. Stakeholders of a Project: Role of Project Manager, and Other Key Members and Parties (stake holders).

UNIT II: (08 HOURS)

Project Planning: Project Planning Overview: Steps In Project Plan Development, Project Plan Execution Activities, Human Resource Planning, Staff Acquisition and Team Development, Work Breakdown Structure (WBS).

UNIT III: (08 HOURS)

Project Scheduling: Project Scheduling: Time Management, Project Network Diagrams - Critical Path Analysis (CPA), Program Evaluation & Review Techniques (PERT). Project Cost Estimation: Cost Estimation Principles, Types of Estimation Techniques and Metrics - COCOMO, Function Point, Delphi Technique.

UNIT-IV: (08 HOURS)

Project Monitoring and Control: Dimensions Of Project Monitoring & Control, Earned Value Analysis, Earned Value Indicators: Budgeted Cost For Work Scheduled (BCWS), Cost Variance (CV), Schedule Variance (SV), Cost Performance Index (CPI), Schedule Performance Index (SPI).

UNIT V: (07 HOURS)

Project Communication Management: Communication Plan Overview: Components Of Communication Plan, Information Distribution Techniques, Conflict Resolution Techniques, Report Writing Techniques, Effective Presentation And Meeting Techniques.

COURSE OUTCOMES:

CO1	Understand the issues and challenges faced while doing the Software project Management.
CO2	Identify, formulate, review and analyze complex software project management using principles of mathematics.
CO3	Understand why majority of the software projects fails and how that failure probability can be reduced effectively. They will completely understand the complete software project planning process.
CO4	Perform project Scheduling, tracking, risk analysis, quality management and Project Cost estimation using different techniques and will be able to give quality software by making systematic approach.
CO5	Analyze the different approaches of non-technical problems.
CO6	Appreciate the management issues like team structure, group dynamics.
CO7	Determine an appropriate project management approach through an evaluabusiness context and scope of the project.

TEXT BOOK:

1. “Software Project Management” Bob Hughes and Mike Cotterell, Third Edition, Tata McGraw-Hill.
2. Software Project Management in Practice, Pankaj Jalote, Pearson Education, 2002.

REFERENCE BOOKS:

1. “Microsoft Office Project 2003 Bible”, Elaine Marmel, Wiley Publishing Inc.
2. Basics of Software Project Management, NIIT, Prentice-Hall India, 2004.

SEMESTER –I

L	T	P	C
3	0	0	2

TOTAL HOURS: 39

ELECTIVE PAPER - I

(To choose 1 out of the given 3)

OBJECT ORIENTED ANALYSIS AND DESIGN

SUBJECT CODE:P1CA33ET

OBJECTIVES:

- 1.To introduce the techniques of identifying objects, carrying out analysis, design and provide solution to the given scenario
2. Students will get an exposure on activities of identifying objects and Rerelationships.
3. Students can describe the system as analysis model and design model

UNIT I:INTRODUCTION

(8 HOURS)

An overview - Object basics - Object state and properties - Behavior - Methods - Messages – Information hiding - Class hierarchy - Relationships - Associations - Aggregations - Identity - Dynamic binding - Persistence - Metaclasses - Object oriented system development life cycle.

UNIT II: METHODOLOGY AND UML

(8 HOURS)

Introduction - Rumbaugh - Booch, Jacobson methods - Patterns - Frameworks - Unified approach - Unified modeling language - Static and Dynamic models - UML diagrams - class diagram - Usecase diagrams - Dynamic modeling - Model organization - Extensibility.

UNIT III: OBJECT ORIENTED ANALYSIS

(8 HOURS)

Identifying Usecase - Business object analysis - Usecase driven object oriented analysis - Usecase model - Documentation - Classification - Identifying object, relationships, attributes, methods - Super - sub class - A part of relationships Identifying attributes and methods - Object responsibility.

UNIT-IV: OBJECT ORIENTED DESIGN

(8HOURS)

Design process - Axioms - Designing classes - Class visibility - Refining attributes - Methods and protocols - Object storage and object interoperability - Databases - Object relational systems - Designing interface objects - The purpose of a view layer interface.

UNIT V: TESTING & QUALITY

(7HOURS)

Quality assurance - Testing strategies - Object orientation testing - Test cases - Test plan - Debugging principles - Usability - Satisfaction - Usability testing - Satisfaction testing.

COURSE OUTCOMES:

CO1	Able to understand the object oriented concepts and to apply object oriented life cycle model for a project
CO2	Able to design static and dynamic models using UML diagrams.
CO3	Able to perform object oriented analysis to identify the objects from the problem specification.
CO4	Identify, analyse, and model structural and behavioral concepts of the system.
CO5	Analyse, design, document the requirements through use case driven approach.
CO6	Develop; explore the conceptual model into various scenarios and applications.
CO7	Apply the concepts of architectural design for deploying the code for software.

TEXT BOOK:

1. Ali Bahrami, “ Object Oriented System Development ”, McGraw Hill International Edition, 1990.
2. Craig Larman, Applying UML and patterns, 2nd Edition, Pearson, 2002.
3. Grady Booch, James Rumbaugh, Ivar Jacobson, “ The Unified Modeling Language User Guide”, Addison Wesley Long Man, 1999.
4. Bernd Bruegge, Allen H. Dutoit, Object Oriented Software Engineering Using UML, Patterns and Java, Pearson, 2004.

SEMESTER –I
CORE PRACTICAL - I

L T P C
0 0 3 2

TOTAL HOURS: 39

DATA STRUCTURE AND ALGORITHMS LAB

SUBJECT CODE:P1CA31MP

OBJECTIVES:

- 1.To learn the implementation of linear data structures for concurrency
- 2.To learn the implementation of advanced data structures such as search trees and heaps
- 3.To explore the advanced concurrent data structures such as hash table, Priority Queue

PRACTICAL QUESTIONS:

It is recommended that all implementations are carried out in Java. If C or C++ has to be used, then the threads library will be required for concurrency.

1. Implementation and applications of classic linear data structures, namely, linked lists, queues, and stacks.
2. Implementation of various locking and synchronization mechanisms for concurrent linked lists.
3. Implementation of various locking and synchronization mechanisms for concurrent queues and stacks.
4. Implementation of Binary search tree / 2-D tree.
5. Implementation of Splay tree / Red black tree.
6. Implementation of skip lists
7. Implementation of various heap structures: min heap / Double ended heap / Leftist Heaps.
8. Implementation and demonstration of hashing and concurrent hashing
9. Implementation of approximation algorithms / randomized algorithms.
10. Implementation of parallel sorting algorithms

COURSE OUTCOMES:

CO1	Implement and apply concurrency in linked lists, stacks and queues
CO2	Implement advanced search trees such as Red black tree, 2-D tree, splay tree and skiplist.
CO3	Work with advanced concurrent structures such as hash table, PriorityQueue

SEMESTER –I

CORE PRACTICAL– II

L	T	P	C
0	0	3	2

TOTAL HOURS: 39

PROBLEMS SOLVING USING PYTHON LAB SUBJECT CODE:P1CA32MP

OBJECTIVES:

- 1.To understand the problem solving approaches.
- 2.To learn the basic programming constructs in Python.
- 3.To articulate where computing strategies support in providing Python

EXERCISES:

1. Python programming using simple statements and expressions.
2. Scientific problems using Conditionals and Iterative loops.
3. Practical - Implementing real-time/technical applications using Lists, Tuples.
4. Practical - Implementing real-time/technical applications using Sets, Dictionaries.
5. Practical - Implementing programs using Functions.
6. Practical - Implementing programs using Strings.
7. Practical - Implementing programs using written modules and Python Standard Libraries.
8. Practical - Implementing real-time/technical applications using File handling.
9. Practical - Implementing real-time/technical applications using Exception handling.
10. Developing a game activity using **Pygame** like bouncing ball or car race.

COURSE OUTCOMES:

CO1	Develop algorithmic solutions to simple computational problems
CO2	Develop and execute simple Python programs.
CO3	Structure simple Python programs for solving problems.

SEMESTER –I

CORE PRACTICAL– III

L	T	P	C
0	0	3	2

TOTAL HOURS: 39

JAVA PROGRAMMING LAB SUBJECT CODE:P1CA33MP

OBJECTIVES:

- 1.To understand the basic concepts of Java,Class syntax, data types, flow of control, classes, methods, objects, arrays, exception handling, recursion, and graphical user interfaces (GUIs).
- 2.Writing and testing applets for potential inclusion in web pages.
- 3.Understanding how to access enterprise databases from the application programs.

PRACTICAL QUESTIONS:

1. Class and Objects
2. String and String Buffer Class
3. Inheritance and Interface
4. Packages
5. Exception Handling
6. Threads
7. Applet
8. Shapes
9. AWT
10. JDBC

COURSE OUTCOMES:

CO1	The skills to apply OOP in Java programming in problem solving
CO2	To understand the basic concepts of Java, Class syntax, data types, flow of control, classes,methods, objects, arrays, exception handling, recursion, and graphical user interfaces (GUIs).
CO3	Writing and testing applets for potential inclusion in web pages.
CO4	Understanding how to access enterprise databases from the application programs.
CO5	Use of GUI components (Console and GUI based)

II SEMESTER

SEMESTER –II

PAPER - V

L	T	P	C
4	0	0	4

TOTAL HOURS: 52

RELATIONAL DATABASE MANAGEMENT SYSTEM

SUBJECT CODE: P2CA31MT

OBJECTIVES:

- 1.To have a broad understanding of database concepts and dbms software
- 2.To have a high-level understanding of major DBMS components and their function
- 3.To be able to model an application's data requirements using conceptual modeling tools like ER diagrams and design database schemas based on the conceptual model.

UNIT I: (11 Hours)

File System Vs. DBMS - Database System Applications - View of Data-Database language - Database design - ER Model _ Relational Model - Network Data Model - Hierarchical Data Model - Data Storage & Querying - Data Architecture.

UNIT II: (11 Hours)

Relational Model - Structure of Relational Databases - Relational Algebra and Calculus - SQL - Basic Structure - Set Operations - Aggregate Functions - Null Values - Nested Queries - Complex Queries - Views - Modification of the Database - Advanced SQL – Triggers.

UNIT III: (10 Hours)

Functional Dependencies - Features of Relational designs - Decomposition and Normalization using Functional Dependencies and Multivalued Dependencies - Join dependencies- Domain key Normal form.

UNIT-IV: (10 Hours)

Overview of Physical Storage Media - Magnetic disks - RAID - tertiary Storage - File Organization - Organization of records in Files - Indexing and Hashing - Ordered Indices - B+ -Tree Index Files - B-Tree Index Files - multiple Key Access - Static and Dynamic Hashing - Query Processing - Transaction Management - Transactions - Concurrency.

UNIT V: (10 Hours)

Distributed Databases - Homogeneous and Heterogeneous Databases - Distributed Data Storage - Distributed Transactions - Commit Protocols - Concurrency Control - Object Based Databases - Complex Data types - Structured Types and Inheritance in SQL – Object identity and Reference - Types in SQL - XML - structure of XML data - XML Document - Schema - Querying and Transformation - Data Mining and Data Warehousing.

COURSE OUTCOMES:

CO1	Classify modern and futuristic database applications based on size and complexity
CO2	Map ER model to Relational model.
CO3	Write queries using normalization criteria .
CO4	Use of function and procedure in SQL.
CO5	Use of Cursor and Trigger.
CO6	Database storage devices like RAID and structures.
CO7	Types of databases and Structure of XML Data

TEXT BOOK:

1. Abraham Silberschatz, Henry F. Korth and S. Sudarshan- “Database System Concepts”, Fifth Edition, McGraw-Hill, 2006

REFERENCE BOOKS:

1. Raghu Ramakrishnan and Johannes Gehrke, “Database Management Systems”, Tata McGraw- Hill Publishing Company, 2003.
2. Ramez Elmasri and Shamkant B. Navathe, “Fundamental Database Systems”, Third Edition, Pearson Education, 2003.
3. Hector Garcia–Molina, Jeffrey D. Ullman and Jennifer Widom- “Database System
4. Implementation”- Pearson Education- 2000.
5. Narang, “Database Management Systems”, 2nd ed., PHI.

SEMESTER –II

PAPER – VI

L	T	P	C
4	0	0	4

TOTAL HOURS:52

WEB PROGRAMMING (PHP, MySQL)

SUBJECT CODE: P2CA32MT

OBJECTIVES:

- 1.To understand the basic concepts of internet, its history ,html ,css, xhtml and ways to connect to internet.
- 2.To learn basics of client side JavaScript and server side programming constructs
- 3.To understand the basics and advantages of open source software- linux, scripts

UNIT I:

(11Hours)

Fundamentals of Web: Internet, WWW, Web Browsers, and Web Servers, URLs, MIME, HTTP, Security, The Web Programmers Toolbox. XHTML: Origins and evolution of HTML and XHTML, Basic syntax, Standard XHTML document structure, Basic text markup, Images, Hypertext Links, Lists, Tables.

UNIT II:

(11Hours)

Java Script : Introduction -Web page Designing using HTML, Scripting basics- Client side and server side scripting. Java Script-Object, names, literals, operators and expressions- statements and features- events – windows – documents – frames – data types – built-in functions- Browser object model – Verifying forms -HTML5- CSS3 – Web site creation using tools.

UNIT III:

(10 Hours)

History of Linux –LinuxEssentialCommands–FilesystemConcept–StandardFiles–The LinuxSecurityModel–ViEditor–ShellIntroduction–String Processing–Open Source Server Applications – Apache – other servers -Open Source Desktop Applications - How Open Source Software Is Developed.

UNIT-IV:

(10 Hours)

PHP: Introduction - PHP Installation - Basic Syntax of PHP – programming in web environment - Common PHP Script Elements - Using Variables - Constants – Data types - Operators ; Statements - Working With Arrays -Using Functions – OOP - String Manipulation and Regular Expression , File and Directory Handling , Working With Forms .

UNIT V:

(10 Hours)

MySQL: Introduction - Setting up an account - Starting, Terminating and writing your own MySQL Programs - Record Selection Technology - Working with Strings - Date and Time - Sorting Query Results module - Generating Summary - Working with Metadata - Using Sequences – MySQL and Web PHP and SQL database: PHP and LDAP ; PHP Connectivity ; Sending and receiving emails , PHP Database Connectivity: Retrieving data from MySQL - Manipulating data in MySQL using PHP

COURSE OUTCOMES:

CO1	Able to Understand the fundamentals of web.
CO2	Students will have a working knowledge of designing web pages using XHTML tags.
CO3	Able to understand the need of JavaScript in Dynamic web pages.
CO4	Outline the essential features and elements of the HTML5 and CSS3.
CO5	Understand the concepts, structure, types and design of Linux operating System.
CO6	Able to Understand the basic concepts of PHP.
CO7	Outline the principles behind using MySQL as a backend DBMS with PHP.

TEXT BOOK:

1. M.Deitel, P.J.Deitel, A.B.Goldberg, “Internet & World Wide Web How to program”, 3rd Edition, Pearson Education / PHI, 2004.
2. Web Design The complete Reference, Thomas Powell, Tata McGrawHill
3. HTML and XHTML The complete Reference, Thomas Powell, Tata McGrawHill
4. JavaScript 2.0 : The Complete Reference, Second Edition by Thomas Powell and Fritz Schneider
5. The Linux Kernel Book Rem Card, Eric Dumas and Frank Mevel Wiley Publications sons, 2003
6. PHP : The Complete Reference By Steven Holzner, Tata McGrawHill
7. Programming PHP Rasmus Lerdorf and Levin Tatroe O'Reilly Publications, 2002
8. MySQL Bible Steve Suchring John Wiley sons, 2002
9. Learning-PHP-MySQL-JavaScript-and-CSS-2nd-Edition, O'Reilly.

SEMESTER –II

PAPER - VII

L	T	P	C
4	0	0	4

TOTAL HOURS: 52

LINUX OPERATING SYSTEM

SUBJECT CODE: P2CA33MT

OBJECTIVES:

- 1.To understand various operating systems.
- 2.Flavours of Linux, working with Linux OS, shell programming, idea on Kernel, shell, semaphore.
- 3.Knowledge on DNS, DHCP, Mail, File servers.

UNIT I: (11Hours)

Introduction to Operating System – Types of operating system - Linux Operating system, Various Linux Distribution– Features of Linux - Architecture of Linux, Kernel and Shell, File System.

UNIT II: (11Hours)

Linux Commands :ls, rm, rmdir, pwd, more ,less,grep, awt, sort, cat, head, tail, wc, tee, ps, top, tar,unzip, nice, kill, netstat, Disk related commands, checking disk free spaces. Creation of file(vi editor), Reading Files, Searching for files, Copying, Moving, Renaming, Deleting,Linking, and Editing Files.

UNIT III: (10Hours)

Shell: Various types of Shell available in Linux, Comparisons between various Shells,Shell programming in bash, Read command, Conditional and looping statements,Case statements, Parameter passing and arguments, Shell variables, System shellvariables, Shell keywords, Creating Shell programs for performing various tasks.

UNIT-IV: (10Hours)

Linux Process – Process concept, process attributes, process hierarchy, process states, process composition, process control - process creation, waiting for a process, process termination, zombie process, orphan process, system call interface for process management-fork, vfork, exit, wait, waitpid, exec family, system. Signals. Interprocess Communication.

UNIT V: (10Hours)

Introduction to Semaphores, Sockets and multithreading in Linux.Servers of Linux: DNS server (BIND), Mail server, Web server (Apache), File server (Samba),DHCP server.

COURSE OUTCOMES:

CO1	Understanding the basics of linux, set of commands and utilities in Linux .Can do programs on process and communication. Understand various servers.
CO2	Master system resources sharing among the users
CO3	Able to explain the functions, facilities, structure of operating systems and fundamental operating system abstractions.
CO4	Able to analyze the structure of operating system and design the applications to run in parallel either using process or thread models of different OS.
CO5	Able to analyze the performance and apply different algorithms used in major components of operating systems, such as scheduler, memory manager, concurrency control manager and mass-storage manager, I/O manager
CO6	Able to analyze and justify the various device and resource management techniques, managing deadlock situations for time-sharing and distributed systems.
CO7	Be familiar with multithreading

TEXT BOOK:

1. Linux Administration : A Beginner's Guide by Steve Shah , Wale Soyinka, ISBN
2. Beginning Linux Programming, 4th Edition, N.Matthew, R.Stones, Wrox, Wiley India Edition, rp-2008.
3. Linux System Programming, Robert Love, O'Reilly, SPD, rp-2007.
4. System Programming with C and Unix, A.Hoover, Pearson.
5. Unix and Shell programming, B.A.Forouzan and R.F.Gilberg, Cengage Learning.

SEMESTER –II

CORE PAPER - VIII

L	T	P	C
3	0	0	4

TOTAL HOURS: 39

ACCOUNTING FINANCIAL MANAGEMENT SUBJECT CODE: P2CA34MT

OBJECTIVES:

- 1.To give an insight into the basics of Accounting Concepts and Principles to prepare the accounts.
- 2.Students to understand the role of accounting plays in the overall setup of a business.

UNIT I: ACCOUNTING SYSTEM (8Hours)

Accounting: Introduction-Definition -Nature and Objectives of accounting - Basic accounting Concepts and conventions— Groups interested in accounting information – Principles of double entry system– Accounting cycle - Accounting Rules –Journal–Ledger–Trial balance. (Theory and problems).

UNIT II: FINAL ACCOUNTS (8Hours)

Final Accounts: Meaning - Preparation of Trading account, Profit and loss account and balance sheet including adjustments. Difference between Trial balance and Balance sheet.(Problems Only)

UNIT III: FINANCIAL MANAGEMENT(13Hours)

Financial Management-Meaning-Definition-Scope-Objectives-Finance function-Role of financial manager in financial management. Financial planning and control – CVP Analysis – Leverages-Types.(Theory & Problems).

UNIT-IV: COST OF CAPITAL AND CAPITAL STRUCTURE (8Hours)

Cost of capital-meaning-definition-types-importance of cost of capital-Retained earnings-Dividend Policy (Walter and Gordon model only) Capital structure - meaning – Definition - Optimum capital structure – EBIT - EPS Analysis. (Theory & Problems)

UNIT V: CAPITAL BUDGETING(7Hours)

Introduction of capital budgeting – importance of capital budgeting – methods of capital budgeting: Payback period method - ARR method - Discounted cash flows - Net Present values - Internal rate of return method.(Theory and Problems)

COURSE OUTCOMES:

CO1	Understanding the basics of linux, set of commands and utilities in Linux . Can do programs on process and communication. Understand various servers.
CO2	Master system resources sharing among the users
CO3	Able to explain the functions, facilities, structure of operating systems and fundamental operating system abstractions.
CO4	Able to analyze the structure of operating system and design the applications to run in parallel either using process or thread models of different OS.
CO5	Able to analyze the performance and apply different algorithms used in major components of operating systems, such as scheduler, memory manager, concurrency control manager and mass-storage manager, I/O manager
CO6	Able to analyze and justify the various device and resource management techniques, managing deadlock situations for time-sharing and distributed systems.
CO7	Be familiar with multithreading

TEXT BOOK:

1. Dr.A.Murthy.-Financial Management-Margam Publications-(1st Edition, 2016)

REFERENCE BOOKS:

1. Dr.N.Premavathy,Dr.M.Inbalakshmi-Financial Management-Sri Vishnu Publications (2nd Edition 2010)
2. Financial Management-Shassh.k.Guptha&AnujGupta-Kalyaniblication,Newdelhi(1st edition 2013).
3. Financial Management Principles and Practices-S.N.Maheswari-Sulthan Chand Publications (3rd edition 1993).

SEMESTER –II

ELECTIVE PAPER - II

L	T	P	C
3	0	0	2

TOTAL HOURS: 39

(To choose 1 out of the given 3)

CLOUD COMPUTING SUBJECT CODE:P2CA31ET

OBJECTIVES:

- 1.To provide a comprehensive overview on principles of cloud computing, its convergence with high performance computing and distributed computing.
- 2.To create an awareness of application and technology trends that are shaping the future of computing through various case studies.

UNIT I:DISTRIBUTED SYSTEM MODELS AND ENABLING TECHNOLOGIES(8 HOURS)

Scalable Computing over the internet - Technologies for Network-based Systems - System Models for Distributed and Cloud Computing

UNIT II:COMPUTER CLUSTERS FOR SCALABLE PARALLEL COMPUTING(8 HOURS)

Clustering for Massive Parallelism - Computer Clusters and MPP Architectures - Design Principle of Computer Clusters - Implementation Levels of Virtualization - virtualization Structures/Tools and Mechanisms - Virtualization of CPU, Memory, and I/O Devices.

UNIT III:CLOUD PLATFORM ARCHITECTURE (8 HOURS)

Cloud Computing and Service Models - Architectural Design of Compute and Storage Clouds - Public Cloud Platforms: GAE, AWS and Azure - Inter-cloud Resources Management - Cloud Security and Trust Management

UNIT-IV:SOFTWARE ENVIRONMENTS(8HOURS)

Services and Service-Oriented Architecture - Message Oriented Middleware - Features of Cloud and Grid Platforms - Parallel and Distributed Programming Paradigms –Programming Support of Google AppEngine - Programming on Amazon AWS and Microsoft Azure - Open Source Eucalyptus and Nimbus.

UNIT V: UBIQUITOUS CLOUD (7 HOURS)

Case Studies: Cloud Trends in Supporting Ubiquitous Computing - Online Social and Professional Networking

COURSE OUTCOMES:

CO1	Understand how data centers facilitate management, debugging, migration and disaster recovery through virtualization
CO2	Design innovative applications of parallel, distributed and cloud computing systems
CO3	Identify appropriate tools and techniques for the development of high-performance, scalable and reliable systems using evolving technology
CO4	Explain the core issues of cloud computing such as security, privacy and interoperability
CO5	Choose the appropriate technologies, algorithms and approaches for the related issues
CO6	Describe the principles of Parallel and Distributed Computing and evolution of cloud computing from existing technologies
CO7	Implement different types of Virtualization technologies and Service Oriented Architecture systems

TEXT BOOK:

1. Kai Hwang, Geoffrey C. Fox, Jack J Dongarra, “ Distributed and Cloud Computing “, Morgan Kaufmann Publishers, Elsevier, 2012.
2. James E. Smith, Ravi Nair, “ Virtual Machines: Versatile Platforms for Systems and Processes“, Elsevier/Morgan Kaufmann, 2005.

SEMESTER –II

ELECTIVE PAPER - II (To choose 1 out of the given 3)

L	T	P	C
3	0	0	2

TOTAL HOURS: 39

MOBILE COMMERCE SUBJECT CODE: P2CA32ET

OBJECTIVES:

1. To understanding of the concepts, principles and technologies of m-commerce and study its application to the marketing function of organizations.
2. To understand, through the use of real-world case studies, how mobile phones are used in four marketing disciplines: sales promotion, advertising, customer relationship management, and brand engagement.
3. To understand the interrelationships between two media channels – mobile and social – and how brands can engage consumers through these channels.

UNIT - I ELECTRONIC COMMERCE 9

Traditional commerce and E-commerce – Internet and WWW – Role of WWW – Value Chains – Strategic Business And Industry Value Chains – Role of E-commerce. Packet Switched Networks – TCP/IP Protocol Script – Internet Utility Programmes – SGML, HTML And XML – Web Client And Servers – Web Client/Server Architecture – Intranet And Extranets – Web Based Tools For E-commerce – Security.

UNIT - II MOBILE COMMERCE 9

Introduction – Infrastructure of M-Commerce – Types Of Mobile Commerce Services – Technologies Of Wireless Business – Benefits And Limitations, Support, Mobile Marketing & Advertisement, Non- Internet Applications In M-Commerce – Wireless/Wired Commerce Comparisons.

UNIT - III MOBILE COMMERCE: TECHNOLOGY 9

A Framework For The Study Of Mobile Commerce – NTT Docomo's I-Mode – Wireless Devices For Mobile Commerce – Towards A Classification Framework For Mobile Location Based Services – Wireless Personal And Local Area Networks –The Impact Of Technology Advances On Strategy Formulation In Mobile Communications Networks.

UNIT - IV MOBILE COMMERCE: THEORY AND APPLICATIONS 9

The Ecology Of Mobile Commerce – The Wireless Application Protocol – Mobile Business Services – Mobile Portal – Factors Influencing The Adoption of Mobile Gaming Services – Mobile Data Technologies And Small Business Adoption And Diffusion – E-commerce in The Automotive Industry – Location- Based Services: Criteria For Adoption And Solution Deployment – The Role of Mobile Advertising In Building A Brand – M-commerce Business Models

Enterprise Enablement – Email and Messaging – Field Force Automation (Insurance, Real Estate, Maintenance, Healthcare) – Field Sales Support (Content Access, Inventory) – Asset Tracking and Maintenance/Management – Remote IT Support – Customer Retention (B2C Services, Financial, Special Deals) – Warehouse Automation – Security

COURSE OUTCOMES:

CO1	Web Client/Server Architecture – Intranet And Extranets
CO2	Infrastructure of M-Commerce , Types Of Mobile Commerce Services
CO3	Small Business Adoption And Diffusion
CO4	To Define and analyze the principles of E-commerce and basics of M-Commerce.
CO5	Define and analyze the concept of electronic data interchange and its legal, social and technical aspects
CO6	Analyze the security issues over the web, the available solutions and future aspects of e-commerce security.
CO7	Define and analyze the concept of E-banking, electronic payment system

TEXT BOOKS

1. E.Brian Mennecke, J.Troy Strader, “Mobile Commerce: Technology, Theory and Applications”, Idea Group Inc., IIR press, 2003.
2. Ravi Kalakota, B.AndrewWhinston, “Frontiers of Electronic Commerce”, Pearson Education, 2003.

REFERENCES

1. P. J. Louis, “M-Commerce Crash Course”, McGraw- Hill Companies February 2001.
2. Paul May, “Mobile Commerce: Opportunities, Applications, and Technologies of Wireless Business” Cambridge University Press March 2001.

SEMESTER –II

ELECTIVE PAPER - II

L	T	P	C
3	0	0	2

TOTAL HOURS: 39

(To choose 1 out of the given 3)

CRYPTOGRAPHY AND NETWORK SECURITY

SUBJECT CODE:P2CA33ET

OBJECTIVES:

- 1.To understand basics of Cryptography and Network Security
- 2.To be able to secure a message over insecure channel by various means
- 3.To learn about how to maintain the Confidentiality, Integrity and Availability of a data

UNIT I:

(8 HOURS)

Classical Encryption Techniques: Symantec Cipher model - Substitution Techniques -Transposition techniques - Rotor Machines – Steganography - Block Ciphers and the Data Encryption Standards: Block cipher principles - The data encryption standard - The Strength of DES - Differential and linear cryptanalysis - Block cipher design principles

UNIT II:

(8 HOURS)

Public key Encryption and Hash functions: Prime numbers - Fermat's and Euler's Theorems - Public key cryptography and RSA: Principles of Public key cryptosystems - The RSA algorithm - Key Management other public key cryptosystems: Key management - Diffie-Hallman key exchange - Elliptic curve arithmetic - Elliptic curve cryptography.

UNIT III:

(8 HOURS)

Message authentication and Hash Function: Authentication Requirements - Authentication functions - Message authentication codes - Hash functions - Security of hash function and MACs.Hashand MAC Algorithms: Secure Hash algorithm - HMAC.Digital Signature and Authentication protocols: Digital signatures, Authentication protocols, and digital signature standard

UNIT-IV:

(8HOURS)

Authentication Applications: Kerberos and X.509 Authentication Service –Public key infrastructure - Electronic mail security: Pretty good privacy - S/MIME - IP Security: IP Security overview - IP security architecture - Authentication header - Encapsulating security payload - Combining security associations - Key management.

UNIT V:

(7HOURS)

System security: Intruders - Intrusion Detection - Password management.Malicious software: Viruses and related threats - Virus countermeasures.Firewalls: Firewall Design Principles, Trusted systems.

COURSE OUTCOMES:

CO1	Provide security of the data over the network.
CO2	Do research in the emerging areas of cryptography and network security.
CO3	Implement various networking protocols.
CO4	To access the public key cryptosystems
CO5	To view the protocols and hash functions
CO6	To create an IP security architecture
CO7	Protect any network from the threats in the world.

TEXT BOOK:

1. William Stallings “Cryptography and Network Security – Principles and practices”, 4th ed, PHI, 2006

REFERENCE BOOKS:

1. W. Stallings “Network security Essential “ Applications & Standards”, Pearson ed.
2. Kanfren “Network Security : Private Communications in a public world 2/e
3. Eric Maiwald “Network Security : A Peginner’s Guide, second ed.”, Tata Mcgraw Hill.
4. Roberta Bragg “ Mark Rhodes, Ousley & Keith Strassberg Network Security : The Complete Reference “ Tata McGraw Hill.
5. Eric Maiwald “Fundamentals of Network Security” Wiley India.

SEMESTER –II

ELECTIVE PAPER - III

L	T	P	C
3	0	0	2

TOTAL HOURS: 39

(To choose 1 out of the given 3)

BUSINESS STATISTICS

SUBJECT CODE :P2CA34ET

OBJECTIVE:

- 1.To study the basic elements of statistics for representing data diagrammatically
- 2.To represent a statistical data using diagrams graph
- 3.To apply the large and small sample tests for testing significant difference between given data.

Unit -I : THE VARIANCE RATIO TEST (F-test) AND Z-test

13 Hrs

F-test- Assumptions- Applications of F-test- Problems-Z-test- Test the significance of Correlation- Finding the standard error-Simple problems.

Unit –II : ANALYSIS OF VARIANCE (ANOVA)

13 Hrs

Analysis of Variance-Assumptions-One way classification-Two way classification-Problems on these

Unit – III : TIME SERIES

13 Hrs

Time Series - Components Of time series – Measurement of Trend – Semi Average Method – Moving Average method- Method of Least Squares – Measurement of Seasonal Variations – Simple Average Method- Ratio to Moving Average Method

UNIT –IV : LARGE SAMPLE TEST (χ^2 -TEST)

13 Hrs

Chi square distribution-Characteristics and application-Test of goodness of fit-Test of independence attributes-test of homogeneity-problems

UNIT - V : SMALL SAMPLE TEST (t- test)

13 Hrs

Small sample test-t test –Test of significance of the mean of a random sample-Testing difference between mean of two samples(Independent)-Testing difference between means of two samples (dependent samples or matched paired observations)-Testing the significance of an observed correlation coefficient.

COURSE OUTCOMES:

CO1	Finding Multiple regression equations for a given data
CO2	Applying the various distributions for a given data
CO3	Learning about small sample test for testing significant difference between given data
CO4	Analyzing the large sample test for given data
CO5	Knowing about ANOVA technique
CO6	Explaining probability theory and probability distribution in relation to general statistical analysis
CO7	Evaluating partial correlation for a given data

TextBook :

1. J. K. Sharma Business Statistics by (II edition), 2007, Pearsons publications

Reference book :

1. R. S. N. Pillai & Bhagavathi- Statistics. (17th Edition), 2007, S. Chand company Ltd.
2. P. Navaneetham – Business statistics & Mathematics
3. P. R. Vittal - Business statistics & Mathematics, (2nd Edition), 2001, Margham Publications.

SEMESTER –II

ELECTIVE PAPER - III

L	T	P	C
3	0	0	2

TOTAL HOURS:39

(To choose 1 out of the given 3)

INTERNET OF THINGS SUBJECT CODE: P2CA35ET

OBJECTIVES:

- 1.To prepare the student for better application of internet technology.
- 2..Understand the communication technologies in IoT
- 3.Know the IoT protocols and web of things

UNIT I: IoT INTRODUCTION (8 HOURS)

Introduction to Internet of Things: Definition – Characteristics of IOT – Physical Design of IoT – Things in IoT – IoT Protocols – Logical Design of IoT – Functional blocks of an IoT ecosystem – Sensors, Actuators, Smart Objects and Connecting Smart Objects

UNIT II: DOMAIN SPECIFIC IoT II (8 HOURS)

Domain Specific IoT – I : Smart Lighting – Smart Appliances – Intrusion Detection – Smoke / Gas Detection – Smart Parking – Smart Roads – Structural Health Monitoring – Surveillance – Emergency Response – Weather Monitoring

UNIT III: DOMAIN SPECIFIC IoT II(8 HOURS)

Domain Specific IoT – II : Air Pollution Monitoring – Noise Pollution Monitoring – Forest Fire Detection – River Flood Detection – Smart Grids- Smart Vending Machines – Route Generation & Scheduling – Fleet Tracking – Shipment Monitoring

UNIT-IV: DOMAIN SPECIFIC IoT III(8 HOURS)

Domain Specific IoT – III: Remote Vehicle Diagnostics – Smart Irrigation - Green House Control – Machine Diagnosis & Prognosis – Smart and Connected Cities: Layered architecture, Smart Lighting, Smart Parking Architecture and Smart Traffic Control

UNIT V: IoT AND M2M(7 HOURS)

IoT And M2M: M2M – Difference Between Iot And M2M – SDN And NFV For IoT – IoT System Management With NETCONF – YANG : Need For Iot Systems Management – SNMP Network Operator Requirements – NETCONF – YANG-IoT Systems Management With NETCONF – YANG

COURSE OUTCOMES:

CO1	Understand the communication technologies in IoT
CO2	Design IoT applications in different domain and be able to analyze their performance
CO3	Know the IoT protocols and web of things
CO4	To apply the knowledge and skills acquired during the course to build and test a complete,working IoT system.
CO5	To know the various applications and implementation of IoT
CO6	Learn the concept and capabilities of smart thing/object/device identification, and physical principles of sensing
CO7	Apply IoT knowledge to implement small-scale IoT Project

TEXT BOOK:

1. Interconnecting Smart Objects with IP: The Next Internet, Jean-Philippe Vasseur, Adam Dunkels, Morgan Kuffmann.

REFERENCE BOOKS :

1. Internet of Things, P.Rizwan Ahmed, Margham Publications, Chennai.
2. Designing the Internet of Things , Adrian McEwen (Author), Hakim Cassimally

SEMESTER –II

ELECTIVE PAPER - III

L	T	P	C
3	0	0	2

TOTAL HOURS: 39

(To choose 1 out of the given 3)

ARTIFICIAL INTELLIGENCE

SUBJECT CODE: P2CA36ET

OBJECTIVES:

- 1.To know the underlying structure behind intelligence mathematically.
- 2.To know the logical implications in computational intelligence.
- 3.To know the automated learning techniques.

UNIT I:INTELLIGENT AGENTS AND KNOWLEDGE REPRESENTATION(8 HOURS)

Agents and Environments – Good Behaviour: The Concepts of Rationality – The Nature of Agents and Environments – The Structure of Agents – Knowledge Representation – Object Oriented Approach – Semantic Nets – Frames – Semantic Web – Ontology.

UNIT II: SEARCH TECHNIQUES

(8 HOURS)

Problem Solving by Search – Uninformed Search – Searching with Costs – Informed State Space Search – Heuristic Search – Problem Reduction Search – Game Search – Constraint Satisfaction Problems.

UNIT III:REASONING WITH LOWER ORDER LOGICS

(8 HOURS)

Logical Agent – Proposition Logic – Syntax and Semantics – Theorem Proving – Model Checking – Inference in First Order Logic.

UNIT-IV: ARTIFICIAL INTELLIGENCE PLANNING

(8HOURS)

Classical Planning – Partial Order Planning – Graph Plan and SAT Plan – Hierarchical Planning – Planning and Acting in Nondeterministic Domains – Multi Agent Planning.

UNIT V:LEARNING TECHNIQUES

(7HOURS)

Logical Formulation of learning – Knowledge in Learning – Explanation Based Learning – Learning using Relevance Information – Inductive Logic Programming – Statistical Learning – Learning with Complete Data – Learning with Hidden Data – Applications.

COURSE OUTCOMES:

CO1	Understand the search techniques.
CO2	Apply the search techniques to real-time problems.
CO3	Apply the reasoning techniques to real world problems.
CO4	Understand the representation of knowledge.
CO5	Understand the learning techniques.
CO6	To identify the problems using search engine
CO7	Apply AI techniques in developing real world applications.

TEXT BOOK:

1. Stuart Russell, Peter Norvig, “Artificial Intelligence – A Modern Approach”, Second Edition, Pearson Education / Prentice Hall of India, 2004.
2. Elaine Rich and Kevin Knight, “Artificial Intelligence”, Second Edition, Tata McGraw Hill, 2003.

REFERENCE BOOKS :

1. Nils J. Nilsson, “Artificial Intelligence: A new Synthesis”, Harcourt Asia Pvt. Ltd., 2000.
2. George F. Luger, “Artificial Intelligence-Structures And Strategies For Complex Problem Solving”, Pearson Education / PHI, 2002.
3. DheepakKhemani, “A first course in Artificial Intelligence”, McGraw Hill Education, 2013.

SEMESTER –II

PRACTICAL– IV

L	T	P	C
0	0	3	2

TOTAL HOURS: 39

RELATIONAL DATABASE MANAGEMENT SYSTEM LAB

SUBJECT CODE:P2CA31MP

OBJECTIVES:

- 1.The major objective of this lab is to provide a strong formal foundation in database concepts,
- 2.Technology and practice to the participants well-informed database application development

PRACTICAL QUESTIONS:

1. Creating database tables and using data types.
 - Create table, • Modify table, • Drop table
2. Data Manipulation.
 - Adding data with Insert, • Modify data with Update, • Deleting records with Delete
3. Implementing the Constraints.
 - NULL and NOT NULL, • Primary Key and Foreign Key Constraint • Unique, Check and Default Constraint
4. Data Retrieval
 - Simple select clause, • Accessing specific data with Where, Ordered By, Distinct and Group By
5. Aggregate Functions.
 - AVG, • COUNT, • MAX, • MIN, • SUM, • CUBE
6. String functions.
7. Date and Time Functions, Union, intersection and set difference.
8. Nested Queries & JOIN operation.
9. Practical Based on performing different operations on a view.
10. Practical Based on implementing use of triggers, cursors & procedures.

COURSE OUTCOMES:

CO1	Understand, appreciate and effectively explain the underlying concepts of database technologies
CO2	Design and implement a database schema for a given problem-domain
CO3	Normalize a database

SEMESTER –II

PRACTICAL–V

L	T	P	C
0	0	3	2

TOTAL HOURS: 39

WEB PROGRAMMING (PHP, MySQL) LAB **SUBJECT CODE:P2CA32MP**

OBJECTIVES:

- 1.To learn html tags and JavaScript Language programming concepts and their techniques.
- 2.To learn Linux essential commands and scripting language.
- 3.To develop the applications ability using php and mysql.

PRACTICAL QUESTIONS:

1. Write a html program for creation of website with forms , frames, links, tables etc.
2. Design a web site using HTML and DHTML , using basic text formatting images.
3. Write a JavaScript to design a simple calculator to perform the following operations: sum, product, difference and quotient
4. Create a form for employee information. Write JavaScript code to find da, hra,pf,tax,grosspay,deduction and netpay.
5. Write a shell program to check whether the given string is palindrome or not.
6. Write a shell program to find the GCD of the given number.
7. Write a Php program to display various Server Information like Server Name, Server Software, Server protocol, CGI Revision etc.
8. Write a Php program to display a digital clock which displays the current time of the server.
9. Write a Php program to insert name, age and other information entered by the user into a table created using MySQL and to display the current contents of this table.
10. Write a PHP program and HTML program then perform PHP connection with MYSQL.

COURSE OUTCOMES:

CO1	Able to develop the static website using various XHTML tags.
CO2	Able to develop the dynamic website using JavaScript commands.
CO3	Able to construct the shell program in Linux
CO4	Able to display server information using PHP commands
CO5	Able to develop the dynamic website using PHP commands

SEMESTER –II

PRACTICAL–VI

L	T	P	C
0	0	3	2

TOTAL HOURS: 39

LINUX OPERATING SYSTEM LAB **SUBJECT CODE:P2CA33MP**

OBJECTIVES:

- 1.To develop skill on Linux , working with Linux OS, commands and shell programming, Clear idea on process and interprocess communication.
- 2.Knowledge on DNS, DHCP, Mail, File servers

PRACTICAL QUESTIONS:

1. Study of Unix/Linux general purpose utility command listman,who,cat, cd, cp, ps, ls, mv, rm, mkdir, rmdir, echo, more, date, time,kill, history, chmod, chown, finger, pwd, cal, logout, shutdown.
2. Study of vi editor with all commands.
3. Write a shell program to find out reverse string of the given string and check the given string is palindrome or not.
4. Write a shell program to find out factorial of the given number.
5. Write a shell script to find out whether the given number is prime number or not.
6. Write a shell program to simulate 'cat' command.
7. Write a C program that illustrates two processes communicating using sharedmemory.
8. Write C program to create a thread using pthreads library and let it run itsfunction.
9. Write a C program to demonstrate multi threading.
10. Installation and configuration of webserver

COURSE OUTCOMES:

CO1	Understanding the basics of linux, set of commands and utilities in Linux. Can do programs on process and communication shell program. Understand variousservers.
CO2	Understand and implement basic services and functionalities of the operating system using system calls.
CO3	Use modern operating system calls and synchronization libraries in software/ hardware interfaces.

III SEMESTER

SEMESTER III

L	T	P	C
4	0	0	4

PAPER IX

TOTAL HOURS: 52

BIG DATA ANALYTICS
SUBJECT CODE:P3CA31MT

OBJECTIVES:

- 1.To understand the competitive advantages of big data analytics
- 2.To understand the big data frameworks
- 3.To learn data analysis methods

Unit 1:. (11Hrs)

Basic nomenclature - Analytics process model - Analytics model requirements - Types of data sources – Sampling - types of data elements - Visual Data Exploration and Exploratory Statistical Analysis - Missing Values - Outlier Detection and Treatment – Standardizing Data – Categorization -weights of evidence coding –Variable selection - Segmentation

Unit II: . (11 Hrs)

Predictive Analytics: Target Definition - Linear Regression - Logistic Regression – Decision Trees –Neural Networks - Support Vector machines - Ensemble Methods - Multiclass Classification Techniques - Evaluating Predictive Models

Unit III: (10Hrs)

Descriptive Analytics: Association Rules - Sequence Rules - Segmentation. Survival Analysis: Survival Analysis Measurements - Parametric Survival Analysis

Unit IV: . (10Hrs)

Social Network Analytics: Social Network Definitions - Social Network Metrics-Social Network Learning -Relational Neighbor Classifier - Probabilistic Relational Neighbor Classifier - Relational logistic Regression - Collective Inference

Unit V: (10Hrs)

Benchmarking - Data Quality - Software – Privacy - Model Design and Documentation - Corporate Governance. Example applications: Credit Risk Modeling - Fraud Detection – Recommender Systems - Web Analytics.

COURSE OUTCOMES:

CO1	Understand how to leverage the insights from big data analytics
CO2	Analyze data by utilizing various statistical and data mining approaches
CO3	Perform analytics on real-time streaming data
CO4	Understand the various SQL alternative database models
CO5	To Understand the specialized aspects of big data with the help of different big data applications
CO6	To Identify and distinguish big data analytics applications
CO7	Access and Process Data on Distributed File System

Text Book:

1. Baesens, 2014, Analytics in a Big Data World: The Essential Guide to Data Science and Its applications, Wiley India Private Limited

Reference Books :

1. Michael Minelli, Michele Chambers, 2013, Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses, Wiley CIO
2. Stephan Kudyba, 2014, Big Data, Mining and Analytics: Components of Strategic Decision Making, CRC Press.
3. Frank J. Ohlhorst, 2013, Big data Analytics: Turning Big Data into Big Money, Wiley and SAS Business Series.
4. Foster Provost, Tom Fawcett, 2013, Data Science for Business, SPD

SEMESTER III

L	T	P	C
4	0	0	4

PAPER X

TOTAL HOURS:52

. NET PROGRAMMING

SUBJECT CODE:P3CA32MT

OBJECTIVES:

- 1.The student should be made to: Understand the foundations of CLR execution. Learn the
- 2.Know the object oriented aspects of C#.
- 3.Be aware of application development in .NET. Learn windows and web based applications on .NET (VB.NET & ASP.NET).

UNIT I – INTRODUCTION TO C#(11 HRS)

Introducing C#, Understanding .NET, overview of C#, Literals, Variables, Data Types, Operators, checked and unchecked operators, Expressions, Branching, Looping, Arrays, Array Class, Array List, String, String Builder, boxing and unboxing.

UNIT II – OBJECT ORIENTED ASPECTS OF C#.(11HRS)

Class, Objects, Constructors and its types, inheritance, properties, indexers, index overloading, polymorphism, sealed class and methods, interface, abstract class, abstract and interface, operator overloading, delegates, events, errors and exception, Threading

UNIT III – APPLICATION DEVELOPMENT ON .NET .(10 HRS)

Building windows application, Creating our own window forms with events and controls, menu creation, inheriting window forms, SDI and MDI application, Dialog Box(Modal and Modeless), handling exceptions, validating controls, windows application configuration

UNIT IV – WEB BASED APPLICATION DEVELOPMENT ON .NET (10 HRS)

Programming web application with web forms, ASP.NET introduction, working with XML and .NET, Creating Virtual Directory and Web Application, session management techniques, web.config, web services, passing datasets, returning datasets from web services, handling transaction, handling exceptions, returning exceptions from SQL Server.

UNIT V – .NET FRAMEWORK AND ADO.NET (10 HRS)

Assemblies, Versioning, Attributes, reflection, viewing meta data, type discovery, reflection on type, marshalling, Remoting, security in .NET, Accessing data with ADO.NET, DataSet, typed dataset, Data Adapter, updating database using stored procedures, SQL Server with ADO.NET.

COURSE OUTCOMES:

CO1	Able to Understand the .Net framework and its functionalities
CO2	Able to develop a basic programming in C# Console.
CO3	Able to gain knowledge of Object-oriented programming concepts through C#.
CO4	Able to create GUI applications using VB.Net.
CO5	Able to develop a web programming using ASP.Net.
CO6	Able to understand the need of web services in ASP.Net.
CO7	Able to create an application that contains use of ADO. NET

TEXT BOOKS:

1. Herbert Schildt, “The Complete Reference: C# 4.0”, Tata Mc Graw Hill, 2012.
2. Christian Nagel et al. “Professional C# 2012 with .NET 4.5”, Wiley India, 2012.

REFERENCES:

1. Andrew Troelsen , “Pro C# 2010 and the .NET 4 Platform, Fifth edition, A Press, 2010.
2. Ian Griffiths, Matthew Adams, Jesse Liberty, “Programming C# 4.0”, Sixth Edition, O’Reilly, 2010.
3. Paul Vick, “The Visual Basic .NET Programming Language”, Addison Wesley, 2/E,2004.
4. Denise Gosnell, Matthew Reynolds, Bill Forgey, “Beginning Visual Basic .NET Database Programming”, Wrox Press Ltd., 2/E,2001.
5. Alex Homer, Dave Sussman, “ASP.NET 2.0 Illustrated”, Addison Wesley Professional, 4/E,2006.
6. Mridula Parihar etal, “ASP.NET Bible”, Hungry Minds Inc., 2/E,2003.

SEMESTER III

PAPER-XI

L	T	P	C
4	0	0	4
TOTAL HOURS: 52			

MOBILE APPLICATION DEVELOPMENT **SUBJECT CODE:P3CA33MT**

OBJECTIVES

- 1.To know the basis of Android application and development environment
- 2.To able to develop simple and professional Mobile Applications
- 3.To get ready for the job opportunity in mobile application development

UNIT - I: INTRODUCTION TO ANDROID (11 HOURS)

Introduction, History- Android Architecture Application Framework- Android Applications- Application Components - Manifest File- Installing Android and Android SDK - The Java Perspective Using Eclipse - DDMS Perspective - Command-Line Tools

UNIT – II: ACTIVITIES, INTENTS AND FRAGMENTS (11 HOURS)

Working with Activities– Managing the Life cycle of an Activity - Applying Themes and Styles - Displaying a Dialog - Hiding the title of the activity- Using Intents- Intent Objects- Resolution- Filters - Linking the Activities from Intent – Fragment Implementation

UNIT - III: UI USING VIEWS AND VIEW – GROUPS (10 HOURS)

Working with View Groups – Linear,Relative, Scroll, Table, Frame, Tab Layout using the Action Bar – Working with Views– Handling UI Events – Handling User Interaction with Activities and Views – Fragments–Menu Applications.

UNIT - IV: HANDLING PICTURES AND MENUS WITH VIEWS AND STORING THE DATA(10 HOURS)

Working with Image Views –Gallery View,Grid View, Image Switcher View, Analog-Clock and Digital Clock Views – Embedding Web Browser in an Activity, Toast Notification,Status Bar Notification- Dialog Notification - SQLite Database Operations.

UNIT - V: EMAILING, TELEPHONY AND SMS IN ANDROID (10 HOURS)

Email process- Handling Telephony - Displaying Phone Information, Application Receiving and Making Phone Calls – Sending SMS Using SMS Manager and Intent - Receiving SMS Using the Broadcast Receiver Object.

COURSE OUTCOMES:

CO1	Know about the mobile application development environment
CO2	Develop interface and design
CO3	Use the techniques in Mobile Applications
CO4	Develop a simple as well as a professional application
CO5	Be competent with the characterization and architecture of mobile applications.
CO6	Be exposed to technology and business trends impacting mobile applications
CO7	Be ready for the job opportunity in mobile application development

TEXT BOOKS

1. Pradeep Kothari, “Android Application Development (with kitkat support) Black Book”, Kogent Learning Solution Inc., Dreamtech Press India Pvt. Ltd, Wiley Publications.
2. Sayed Y. Hashimi, SatyaKomatineni, Dave MacLean, “Pro Android 2”, 2010 Edition, Wiley publications.

REFERENCES

1. Reto Meier,” Professional Android Application Development”,2009 Edition, Willy Publication.
2. ZigurdMednieks, Laird Dornin, G. Blake Meike,and Masumi Nakamura, “Programming Android”, 2ndEdition, OReilly publications.,2012.
3. Barry Burd, “Android Application Development – All-in-one for Dummies”, 2ndEdition, Wiley India, 2016.
4. Lauren Darcey, Shane Conder, “Sams Teach Yourself Android ApplicationDevelopment in 24 hours”, 2nd edition, Pearson Education, 2013.

SEMESTER III

PAPER XII

L	T	P	C
3	0	0	4

TOTAL HOURS: 39

RESOURCE MANAGEMENT TECHNIQUES

SUBJECT CODE: P3CA34MT

OBJECTIVES:

1. Basic knowledge of matrix, set theory, functions and relations concepts
2. Logical operations and predicate calculus needed for computing skill
3. Design and solve Boolean functions for defined problems.

UNIT- I: . (8 Hrs)

Linear Programming Models : Mathematical Formulation –Graphical Solution of linear Programming models – Simplex Method -Artificial Variable Techniques

UNIT - II: (8Hrs)

Transportation and Assignment Models : - Methods for finding initial Basic feasible solution – Optimum solution-degeneracy- Hungarian Algorithm-Variants of the Assignment Problem.

UNIT- III: (8Hrs)

Integer Programming Models: Formulation- Gomory's IPP Method –Gomory's mixed integer method.

UNIT - IV: (8 Hrs)

Scheduling by PERT and CPM : Network Construction-Critical Path Method – Project Evaluation and Review Technique.

UNIT- V: (7 Hrs)

Queuing Models : Characteristics of Queuing Models – Poisson Queues - (M/M/1) : (FIFO/ ∞ / ∞), (M/M/1) : (FIFO /N/ ∞) models.

COURSE OUTCOMES:

CO1	Solve problems as graphs and simplex tables
CO2	Be able to build and solve transportation and assignment problems
CO3	Construct linear integer programming models and discuss the solution techniques
CO4	Use CPM and PERT techniques, to plan, schedule, and control project activities
CO5	To analyze a network of queues with Poisson external arrivals, exponential service requirements and independent routing.
CO6	The students will have a fundamental knowledge of the operation research concepts
CO7	Acquire skills in analyzing queueing models

TEXT BOOK:

1. Taha H.A, “Operation Research: An Introduction”, Pearson Education, 8/E, 2006.

REFERENCES:

1. S.P. Gupta, “ An Introduction to Operation Research”, Pearson Education, 8/E, 2006
2. R. Sivarethinamohan, “ An Introduction to Operation Research”, TMG, 1/E, 2006
3. P.K. Gupta, Gandhi Swaroop, Manmohan, “Problem in Operation Research”, Sultan and Chands, 4/E, 2004
4. P.R.Vittal and Malini , “An Introduction to Operation Research”, Pearson Education, 8/E, 2006

SEMESTER III

ELECTIVE PAPER IV

(To choose 1 out of the given 3)

L	T	P	C
3	0	0	2

TOTAL HOURS: 39

COMPILER DESIGN SUBJECT CODE: P3CA31ET

OBJECTIVES:

1. Learn the design principles of a Compiler.
2. Learn the various parsing techniques and different levels of translation
3. Learn how to optimize and effectively generate machine codes

UNIT-I: (8Hrs)

Lexical analysis: Regular expression-non deterministic automata Deterministic automata Equivalent to NFAs-minimizing the states of DFA-implementation of lexical Analyzer.

UNIT-II: (8Hrs)

Syntax analysis: Top down parsing concepts-recursive descent parsing -predictive parsers-non recursive predicate parsing - bottom-up parsing - handle pruning - shift reduce parsing- operator parsing – LR parsers-parser generators-YACC

UNIT-III: (8Hrs)

Intermediate code generation: Syntax directed definitions - construction of syntax trees - top down translation -bottom up evaluation of inherited attributed - recursive evaluators-assigning space at compiler construction time - type checking - overloading of functions and operators – polymorphic function.

UNIT -IV: (8Hrs)

Storage organization: Storage organization-storage allocation strategies parameter passing- symbol tables- dynamic storage allocation-intermediate languages-representation of declarations-assignment statement- Boolean expression- back patching -procedure calls.

UNIT-V: (7Hrs)

Code Optimization: Principal Sources of Optimization – Peep-hole optimization – DAG-Optimization of Basic Blocks - Global Data Flow Analysis – Efficient Data Flow Algorithm.

COURSE OUTCOMES:

CO1	Design and implement a prototype compiler.
CO2	Apply for various optimization techniques for dataflow analysis
CO3	Use the different compiler construction tools.
CO4	Understand the major phases of compilation and to understand the knowledge of Lex tool & YAAC tool
CO5	Develop the parsers and experiment the knowledge of different parsers design without automated tools
CO6	Construct the intermediate code representations and generation
CO7	Convert source code for a novel language into machine code for a novel computer

TEXT BOOK:

1. Alfred Aho, RaviSethi, JeffyD.Ullman, “Compilers - Principles, Techniques and Tools”, Pearson, 1/E, 1986.

REFERENCES:

1. Chattopadhyay Santhanu, “Compiler Design”, PHI, 2/E,2006.
2. Holub Allen, “Compilers in C”, PHI, 2/E,1997.

SEMESTER III

ELECTIVE PAPER-IV **(To choose 1 out of the given 3)**

DECISION SUPPORT SYSTEMS **SUBJECT CODE:P3CA32ET**

OBJECTIVES:

- 1.To introduce the decision-making system, models, and support
- 2.To appraise the general nature and range of decision support and group support systems
- 3.To impart about knowledge-based system and advanced intelligent systems

UNIT - I: DECISION-MAKING SYSTEMS (8 HOURS)

Decision-Making: Models, Phases of the Decision-Making Process, How Decisions Are Supported, Personality Types, Gender, Human Cognition, and Decision Styles, The Decision Makers

UNIT – II: DECISION SUPPORT (08 HOURS)

DSS Configurations, Characteristics and Capabilities of DSS, Components, The Data Management Subsystem, The Model Management Subsystem, The User Interface Subsystem, The Knowledge-Based Management Subsystem, DSS Hardware, DSS Classifications.

UNIT - III:GROUP SUPPORT SYSTEM (8 Hours)

Group Decision-Making, Collaboration Support: Computer-Supported Cooperative Work, Group Support Systems, Group Support Systems Technologies, Group systems Meeting room and Online, The GSS Meeting Process, Distance Learning, Creativity, and Idea Generation.

UNIT – IV:KNOWLEDGE-BASED SYSTEMS (8 Hours)

Introduction to Artificial Intelligence, Basic Concepts of Expert Systems, Applications, Structure, How Expert Systems Work, Problem Areas Suitable for Expert Systems, Benefits and Limitations of Expert Systems, Types of Expert Systems, Expert Systems on the Web.

UNIT – V:KNOWLEDGE ACQUISITION (7 Hours)

Introduction, Knowledge Acquisition methods from Multiple Experts, Automated Knowledge Acquisition, Verification and Validation, Representation of Knowledge, Reasoning in Rule-Based Systems, Inferencing with Uncertainty, Expert Systems Development.

COURSE OUTCOMES:

CO1	Recognize the relationship between business information needs & decisionmaking.
CO2	Appraise the general nature and range of decision supportsystems.
CO3	Appraise issues related to the development ofDSS
CO4	Select appropriate modelingtechniques
CO5	Analyze, design, and implement aDSS
CO6	Understanding an knowledgeacquisition.
CO7	Design the collaborating and meeting process.

TEXTBOOK

1. Efraim Turban and Jay E. Aronson, Decision Support System, and Intelligent Systems, Prentice Hall International, 7th Edition 2007.

REFERENCES

1. Janakiraman V. S and Sarukesi K, Decision Support Systems, Prentice Hall of India, 6th Printing 2006.
2. Lofti, Decision Support System and Management, McGraw Hill Inc, International Edition, New Delhi 1996.
3. Marakas, Decision Support System, Prentice Hall International, Paperback Edition, New Delhi, 2003.

SEMESTER III

L	T	P	C
3	0	0	2

TOTAL HOURS :39

ELECTIVE PAPER IV

PARALLEL PROCESSING

SUBJECT CODE :P3CA33ET

OBJECTIVES:

- 1.This is a graduate level course on parallel computing with the objective to familiarize students with the fundamental concepts, techniques and tools of parallel computing.
- 2.Participation in this course will enable you to better use parallel computing in your application area,
- 3.To take advanced courses in more specific areas of parallel computing

Unit 1

(8 hours)

Introduction: Parallel Processing – Shared Memory Multiprocessing– Distributed Shared Memory – Message Passing Parallel Computers.Processes& Shared Memory ProgrammingProcesses - Shared Memory Programming – General Model OfSharedMemory Programming – Forking-Creating Processes – Joining Processes -Process Model Under UNIX.

Unit 2.

(8 hours)

Basic Parallel Programming Techniques:Loop Splitting – Ideal Speedup – Spin-Locks, Contention And Self-Scheduling.Scheduling :Loop Scheduling – Variations On Loop Scheduling – Self-Scheduling – Variations On Self-Scheduling – Indirect Scheduling – BlockScheduling

Unit 3

(8 hours)

Barriers And Race ConditionsThe Barrier Calls – Expression Splitting.Thread-Based ImplementationThread Management – The POSIX Thread Application ProgrammerInterface-Synchronization Primitives in POSIX- Example WithThreads – Attributes Of Threads – Mutual Exclusion With Threads – Thread Implementation.

Unit 4

(8 hours)

Programming Using the Message Passing ParadigmPrinciples of Message-Passing Programming- The Building Blocks: Send and Receive Operations.MPI: The Message Passing Interface.Topologies and Embedding.Overlapping Communication with Computation.Collective Communication and Computation Operations

(7 hours)

Unit 5:

Algorithms For Parallel Machines Models Of Computation – Analysis Of Parallel Algorithms – Prefix Computation – Histogram Computation – Parallel Reduction – Sorting Networks - Matrix Multiplication. **(8hours)**

COURSE OUTCOMES:

CO1	Understand the evolution of High Performance Computing (HPC) with respect to laws and the contemporary notion that involves mobility for data, hardware devices and software agents
CO2	Understand, appreciate and apply parallel and distributed algorithms in problem solving.
CO3	Evaluate the impact of network topology on parallel/distributed algorithm formulations and traffic their performance.
CO4	Gain hand-on experience with the agent-based and Internet-based parallel and distributed programming techniques.
CO5	Master skills to measure the performance of parallel and distributed programs.
CO6	Be proficient at programming multiple parallel machines in more than one special programming language or programming system.
CO7	Be able to descriptively compare the performance of different programs and methods on one machine.

Text Books:

1. Introduction To Parallel Programming - By Steven Brawer.
2. Introduction to Parallel Computing, Ananth Grama, Anshul Gupta, George Karypis, Vipin Kumar, By Pearson Publication.
3. Introduction To Parallel Processing – By M.Sasikumar, Dinesh Shikhare And P.RaviPrakash.

SEMESTER III
ELECTIVE PAPER V

L	P	T	C
3	0	0	2

TOTAL HOURS:39

DIGITAL IMAGE PROCESSING
SUBJECT CODE : P3CA34ET

OBJECTIVES:

- 1.Learn digital image fundamentals.
- 2.Be exposed to simple image processing techniques.
- 3.Be familiar with image compression and segmentation techniques.

UNIT I DIGITAL IMAGE FUNDAMENTALS(8 HRS)

Steps in Digital Image Processing – Components – Elements of Visual Perception – Image Sensing and Acquisition – Image Sampling and Quantization – Relationships between pixels – Color image fundamentals – RGB, HSI models, Two-dimensional mathematical Preliminaries, 2D transforms – DFT, DCT.

UNIT II IMAGE ENHANCEMENT .(8 HRS)

Spatial Domain: Gray level transformations – Histogram processing – Basics of Spatial Filtering– Smoothing and Sharpening Spatial Filtering, Frequency Domain: Introduction to Fourier Transform– Smoothing and Sharpening frequency domain filters – Ideal, Butterworth and Gaussian filters, Homomorphic filtering, Color image enhancement

UNIT III IMAGE RESTORATION .(8 HRS)

Degradation model, Properties, Noise models – Mean Filters – Order Statistics – Adaptive filters – Band reject Filters – Band pass Filters – Notch Filters – Optimum Notch Filtering – Inverse Filtering – Wiener filtering

UNIT IV IMAGE SEGMENTATION(8 HRS)

ge detection, Edge linking via Hough transform – Thresholding – Region based segmentation – Region growing – Region splitting and merging – Morphological processing- erosion and dilation, Segmentation by morphological watersheds – basic concepts – Dam Construction – Watershed segmentation algorithm)

UNIT V IMAGE COMPRESSION AND RECOGNITION.(7 HRS)

Need for data compression, Huffman, Run Length Encoding, Shift codes, Arithmetic coding, JPEG standard, MPEG. Boundary representation, Boundary description, Fourier Descriptor, Regional Descriptors – Topological feature, Texture – Patterns and Pattern classes – Recognition based on matching

COURSE OUTCOMES:

CO1	Know and understand the basics and fundamentals of digital image processing, such as digitization, sampling, quantization, and 2D-transforms.
CO2	Operate on images using the techniques of smoothing, sharpening and enhancement.
CO3	Understand the restoration concepts and filtering techniques
CO4	Learn the basics of segmentation, features extraction, compression and recognition methods for color models.
CO5	Describe various segmentation techniques for image analysis.
CO6	Outline the various feature extraction techniques for image analysis.
CO7	Discuss the concepts of image registration and fusion.

TEXT BOOKS:

1. Rafael C. Gonzalez, Richard E. Woods, Digital Image Processing Pearson, III Edition, 2010
2. Anil K. Jain, Fundamentals of Digital Image Processing Pearson, 2002.
3. Kenneth R. Castleman, Digital Image Processing Pearson, 2006.

REFERENCE BOOKS:

- 1 Rafael C. Gonzalez, Richard E. Woods, Steven Eddins, Digital Image Processing using MATLAB Pearson Education, Inc., 2011.
2. D.E. Dudgeon and R.M. Mersereau, Multidimensional Digital Signal Processing Prentice Hall Professional Technical Reference, 1990.
3. William K. Pratt, Digital Image Processing John Wiley, New York, 2002
- 4.. Milan Sonka et al Image processing, analysis and machine vision Brookes/Cole, Vikas Publishing House, 2nd edition, 1999

**SEMESTER III
ELECTIVE PAPER V**

L	T	P	C
3	0	0	2

TOTAL HOURS: 39

MACHINE LEARNING

SUBJECT CODE: P3CA35ET

OBJECTIVES

1. Machine learning uses interdisciplinary techniques such as statistics, Linear algebra, optimization, and computer science.
2. Understand a wide variety of learning algorithms.
3. Understand how to evaluate models generated from data.

Unit 1

(8 hours)

Introduction: Definition of learning systems. Goals and applications of machine learning. Aspects of developing a learning system: training data, concept representation, function approximation. Inductive Classification: The concept learning task. Concept learning as search through a hypothesis space. Decision Tree Learning Representing concepts as decision trees. Recursive induction of decision trees.

Unit 2

(8Hours)

Experimental Evaluation of Learning Algorithms: Measuring the accuracy of learned hypotheses. Comparing learning algorithms: cross-validation, learning curves, Computational Learning Theory Models of learnability: learning in the limit; probably approximately correct (PAC) learning. Rule Learning: Propositional and First-Order: Translating decision trees into rules. Heuristic rule induction using separate and conquer and information gain.

Unit 3:

(8Hours)

Artificial Neural Networks: Neurons and biological motivation. Linear threshold units. Perceptrons: representational limitation and gradient descent training. Multilayer networks and backpropagation. Hidden layers and constructing intermediate, distributed representations. Overfitting, learning network structure, recurrent networks.

Unit 4

(8 Hours)

Support Vector Machines: Maximum margin linear separators. Quadratic programming solution to finding maximum margin separators. Kernels for learning non-linear functions. Bayesian Learning Probability theory and Bayes rule. Naive Bayes learning algorithm. Parameters smoothing. Instance-Based Learning Constructing explicit generalizations versus comparing to past specific examples. k-Nearest-neighbor algorithm. Case-based learning.

Unit 5

(7 Hours)

TextClassificationBag of words representation. Vector space model and cosine similarity.Relevance feedback and Rocchio algorithm.ClusteringandUnsupervisedLearning: Learning from unclassified data. Clustering.LanguageLearning Classification problems in language: word-sense disambiguation, Veterbi algorithm for determining most-probable state sequences.

COURSE OUTCOMES:

CO1	Understand a wide variety of learningalgorithms.
CO2	Understand how to evaluate models generated fromdata.
CO3	Apply the algorithms to a real-world problem
CO4	optimize the models learned and reporton the expected accuracy
CO5	Expected accuracy achieved by applying themodels.
CO6	To view the multilayer networks and backpropogation.
CO7	To access various types of languages using learning process.

TEXTBOOK:

1. EthemAlpaydin, Introduction to Machine Learning, Second Edition ,
<http://mitpress.mit.edu/catalog/item/default.asp?ttype=2&tid=12012>.

REFERENCE BOOKS:

1. Stephen Marsland, Machine Learning: An Algorithmic Perspective.
<http://www.amazon.com/Machine-Learning-Algorithmic-Perspective-Recognition/dp/1420067184> .
2. Christopher M. Bishop, Pattern Recognition and Machine Learning.
<http://research.microsoft.com/en-us/um/people/cmbishop/prml/>.
3. Tom Mitchell, Machine Learning, <http://www.cs.cmu.edu/~tom/mlbook.html>.

SEMESTER – III
ELECTIVE PAPER V
ENTERPRISE RESOURCE PLANNING
SUBJECT CODE P3CA36ET

L	T	P	C
3	0	0	2

TOTAL HOURS:39

OBJECTIVES:

- 1.To provide a contemporary and forward-looking on the theory and practice of Enterprise Resource Planning Technology.
- 2.To focus on a strong emphasis upon practice of theory in Applications and Practical oriented approach.
- 3.To train the students to develop the basic understanding of how ERP enriches the business organizations in achieving a multidimensional growth.

Unit – 1 **(10 HRS)**

Introduction to ERP Overview, Benefits of ERP, ERP and Related Technologies, Business Process Reengineering, Data Warehousing, Data Mining, On-line Analytical Processing, Supply Chain Management

Unit – 2 **(10 HRS)**

ERP Implementation: Implementation of Life Cycle, Implementation Methodology, Hidden Costs, Organizing Implementation, Vendors, Consultants and Users, Contracts, Project Management and Monitoring

Unit – 3 **(10 HRS)**

Business Modules: Business Modules in an ERP Package, Finance, Manufacturing, Human Resource, Plant Maintenance, Materials Management, Quality Management, Sales and Distribution

Unit – 4 **(10 HRS)**

ERP Market: ERP Market Place, SAP AG, People Soft, Baan Company, JD Edwards World Solutions Company, Oracle Corporation, QAD, System Software Associates.

Unit – 5 **(10 HRS)**

ERP–Present and Future: Turbo Charge the ERP System, EIA, ERP and E–Commerce, ERP and Internet, Future Directions in ERP.

COURSE OUTCOMES:

CO1	Business processes common to most businesses order processing, inventory management, procurement, etc.
CO2	Master data common to most businesses--customer, vendor, inventory, etc.
CO3	Process modeling--creating diagrams to depict the sequence of tasks completed in a business process.
CO4	How a business process often spans different functional areas of the business: accounting,marketing, material management, etc.
CO5	How enterprise systems, such as SAP, integrate business functional areas into one enterprise-wide information system.
CO6	The issues involved in implementing an ERP system.
CO7	Create reengineered business processes for successful ERP implementation

Textbooks

1. Alexis Leon, “ERP Demystified”, Tata McGraw Hill, 1999.
2. Joseph A. Brady, Ellen F. Monk, Bret J. Wangner, “Concepts in Enterprise ResourcePlanning”, Thomson Learning, 2001

Reference

1. Vinod Kumar Garg and N.K .Venkata Krishnan, “Enterprise Resource Planningconcepts and Planning”, Prentice Hall, 1998.
2. Jose Antonio Fernandz, “ The SAP R /3 Hand book”, Tata McGraw Hill

SEMESTER III

L	T	P	C
0	0	3	2

PRACTICAL – VI I**TOTAL HOURS: 39****.NET PROGRAMMING LAB****SUBJECT CODE:P3CA31MP****OBJECTIVES:**

- 1.To explore several new standards that may play a significant role in theC# programming.
2. Formulate and build extensible windows and web applications using the Model View Controller design

C# PROGRAMS

1. Array List
2. Inheritance
3. Interface
4. Delegates and Events
5. Exception Handling

VB.NET PROGRAMS

6. Create a simple calculator using form fields. Have two fields for number entry & one field for the result. Allow the user to be able to use plus, minus, multiply and divide.
7. Create a VB.NET Program for Employee Details with necessary fields and Employee basic pay calculation.
8. Create a VB.NET Program for Students Information with necessary fields and students mark calculation.

ASP.NET PROGRAMS

9. Create a College Website with basic information about the courses, departments, fees structure etc.
10. Create a Web site for an Online Recruitment System.

COURSE OUTCOMES:

CO1	Able to implement Basic programming constraints in C#.
CO2	Able to implement Object Oriented Programming Concepts in C#.
CO3	Able to construct a GUI Applications using VB.Net
CO4	Able to develop a static web page using ASP.Net
CO5	Able to develop a dynamic web page which includes ADO.Net

SEMESTER III

PRACTICAL-VIII

MOBILE APPLICATION DEVELOPMENT LAB

SUBJECT CODE:P3CA32MP

OBJECTIVES

- 1.To learn the basis of Android application and development environment
- 2.To able to develop simple and professional Mobile Applications
- 3.To get ready for the job opportunity in mobile application development

PROGRAMS

1. Displaying Hello World using Android Applications.
2. Applying an themes and styles to a document using Activity,
3. Linking two activities using Intents
4. Hiding the Title bar and Changing the orientation using Fragments
5. Android Calculator
6. Implementing Menu Applications.
7. CRUD Operations Using SQLite DB
8. Building an Application to Send Email
9. Displaying a Phone Information using Telephony
10. SMS Application using SMS Manager and Broadcast Receiver Object.

COURSE OUTCOMES:

CO1	Can understand the interface and design of Android application
CO2	Use the techniques in Mobile Applications
CO3	Develop a simple as well as a professional application.
CO4	Will deploy the application in Google play store.
CO5	Illustrate the android Wi-Fi features and advance android development
CO6	Develop various Android applications related to layouts & rich uses interactive interfaces
CO7	Develop Android applications related to mobile related server-less database like SQLITE

SEMESTER III

L	T	P	C
0	0	3	2

**PRACTICAL IX
MINI PROJECT**

TOTAL HOURS:39

SUBJECT CODE:P3CA33MP

Students are to take up sample project development activities with the guidelines given below:

A. Preparing a project - brief proposal including

B. Problem Identification

C. Developing a model for solving the problem

D. A statement of system / process specifications proposed to be developed (Data Flow Diagram)

E. List of possible solutions including alternatives and constraints

F. Cost benefit analysis

G. Time line activities

A report highlighting the design finalization [based on functional requirements & standards (if any)]

A presentation including the following

H. Implementation phase (Hardware / Software / both)

I. Testing & Validation of the developed system

J. Learning in the project

Consolidated report preparation

IV SEMESTER

SEMESTER IV

L	T	P	C
30	0	0	13

TOTAL DAYS: 90 Days

PROJECT WORK WITH VIVA VOCE

SUBJECT CODE:P4CA31PV

The objective of the project is to enable the students to work in a project of latest topic /research area / industrial applications. During this semester the students are expected to do literature survey, formulate the problem and form a methodology of arriving at the solution of the problem. Also during this semester, the students are expected to complete the project and submit a full-fledged report comprising of the complete system developed along with Implementation and test results.

REGULATIONS OF PROJECT WORK

- a. Students should do their four months Project work in Company / Institutions during Sixth semester.
- b. The Candidate should submit the filled in format as given in **Annexure-I** to the department for approval during the Ist Week of January.
- c. Periodically the project should be reviewed minimum three times by the advisory committee.
- d. The Students should prepare five copies of the project work and submit the same on the date fixed by the Department for the evaluation. After evaluation one copy is to be retained in the College Library, one copy is to be submitted to the Exam cell and the student can hold one copy and One Department, One Guide.
- e. A Sample Content page format of the Project Work is enclosed in **Annexure-II**.
- f. Format of the **Title page** and **certificate** are enclosed in **Annexure-III**
- g. The Students should use Presentation during their Project Viva voce Examinations.
- h. For the project work and viva-voce a candidate should secure 50% of the marks for pass. The candidate should compulsorily attend a viva - voce examination to secure pass in that paper.

ANNEXURE I

M.C.A Syllabus (CBCS)

CollegeName :

Course :

StudentName :

RegisterNumber :

Title oftheProject :

Address of Organization / Institution:Name of the Internal Guide

Qualification

Teaching Experience

Place :

Date :

Name of the HOD

Designation

Place:

Date:

Signature of theHOD
(withseal)

Principal

Signature of Internal Guide

ANNEXURE II**CONTENTS**

	Title	Page No.
i.	TitlePage	1
ii.	Original Copy of the Approved Proforma of theProject Proposal	2
iii.	Certificate ofAuthenticated work	3
iv.	Abstract	
v.	Acknowledgement	
vi.	Table ofContents	
vii.	Table ofFigures	

CHAPTER 1: INTRODUCTION

Background
 Objectives
 Purpose, Scope, and Applicability
 Purpose
 Scope
 Applicability
 Achievements
 Organization ofReport

CHAPTER 2: SURVEY OF TECHNOLOGIES**CHAPTER 3: REQUIREMENTS AND ANALYSIS**

ProblemDefinition
 RequirementsSpecification
 Planning andScheduling
 Software and HardwareRequirements
 Preliminary ProductDescription
 ConceptualModels

CHAPTER 4: SYSTEM DESIGN

- BasicModules
- DataDesign
 - SchemaDesign
 - Data Integrity andConstraints
- ProceduralDesign
 - Logic Diagrams
 - DataStructures
 - AlgorithmsDesign
- User interfacedesign
- SecurityIssues
- Test CasesDesign

CHAPTER 5: IMPLEMENTATION AND TESTING

- ImplementationApproaches
- Coding Details and CodeEfficiency
 - CodeEfficiency
- TestingApproach
 - Unit Testing
 - IntegratedTesting
- Modifications andImprovements

CHAPTER 6: RESULTS AND DISCUSSION

- TestReports
- UserDocumentation

CHAPTER 7: CONCLUSIONS

- Conclusion
- Limitations of theSystem
- Future Scope of theProject

REFERENCES

APPENDIX

ANNEXURE III

M.C.A Syllabus (CBCS)

OM SAKTHI

TITLE OF THE PROJECT WORK

*Main project submitted to the
Adhiparasakthi College of Arts and Science (Autonomous)*

in partial fulfillment of the requirements for the award of degree
MASTER OF COMPUTER APPLICATIONS

Submitted By
STUDENT NAME
(REG.No.)

Under the Guidance of
Guide Name
Designation
Department of Computer Science and Applications



**DEPARTMENT OF COMPUTER SCIENCE AND APPLICATIONS ADHIPARASAKTHI
COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS) G.B.NAGAR, KALAVAI-632 506**

MONTH – YEAR

OM SAKTHI

ADHIPARASAKTHI COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS)

G.B. NAGAR, KALAVAI - 632506



BONAFIDE CERTIFICATE

This is to certify that the project work entitled “**TITLE OF THE PROJECT WORK**” was carried out by **STUDENT NAME (REG. No:)** in partial fulfillment of the award of the Degree of **MASTER OF COMPUTER APPLICATIONS**, during the **SIXTH** Semester under the guidance of

GUIDE

HEAD OF THE DEPARTMENT

Submitted for the sixth semester examination project work- viva voce held on _____

INTERNAL EXAMINER

EXTERNAL EXAMINER

The maximum mark for each Project is 200 with 50 for Continuous Internal Assessment (CIA) and 150 for External Evaluation.

CIA Project Work		
I	First Review	15 Marks
II	Second Review	15 Marks
III	Report Preparation	20 Marks
Total		50 Marks
Semester Project Work		
1.	Evaluation of Project Work Document	100 Marks
2.	Viva – Voce	50 Marks
Total		150 Marks

For the conduct of University Examinations in practical subjects and Project work the University will appoint two external examiners.

(Autonomous)

Permanently Affiliated to Thiruvalluvar University, Vellore

Accredited by NAAC with B⁺⁺ Grade

Bachelor of Commerce

Under CBCS

(Effective from the Academic Year 2018-2019)

REGULATIONS

CBCS:

Choice –Based Credit System is a flexible system of learning. ‘Credit’ defines the quantum of contents / syllabi prescribed for a course and determine the number of hours of instruction required. The distinguished features of CBCS are the following:

It permits the students to:

- ❖ Learn at their own pace
- ❖ Choose electives from a wide range of elective courses offered by the departments of the colleges
- ❖ Undergo additional courses and acquire more than the required number of credits
- ❖ Adopt an inter – disciplinary approach in learning
- ❖ Make best use of the expertise of available faculty.

1. Eligibility for Admission:

Candidates seeking admission to the first year of the Degree of Bachelor of Commerce Course shall be required to have passed the Higher Secondary Examinations (Academic or Vocational Stream) conducted by the Government of Tamilnadu or an Examination accepted.

Provided that candidates for admission into the specific main subject of study shall also process such other qualifying conditions as may be prescribed by the University in the Regulations governing respective courses of study.

The Upper age limit for admission to B.Com Degree will be 21 (twenty one) years as on 1st July of the year of admission. For SC/ST/BC/MBC/DNC candidates and women candidates the age limit is relaxed by 3 years. For other communities, the Principals can relax up to three years based on merit. A relaxation of 5 years is permitted for Physically Handicapped as per G.O. Ms No.239, dated 03.09.1993.

2. Eligibility for the Award of Degree:

A candidate shall be eligible for the award of the Degree only if he/she has undergone the prescribed course of study in the College for a period of not less than three academic year and passed the examinations of all the Six Semesters prescribed earning 140 credits (in Parts I, II, III, IV and V)

3. Duration:

- a. Each academic year shall be divided into two semesters. The first academic year shall comprise the first and second Semesters, the second academic year the third semester and fourth semesters and the third academic year the fifth and Sixth semesters respectively.
- b. The odd semesters shall consist of the period from June to November of each year and the even semesters from December to April of each year.
There shall be not less than 90 working days for each semester.

4. Course of Study:

The main subject of the study for Bachelor Degree Course shall consist of the following

PART-I TAMIL

PART-II ENGLISH

PART-III CORE SUBJECTS

ALLIED SUBJECTS

ELECTIVE WITH THREE COURSES

PART – IV

1. (a) Those who have not studied Tamil up to XII std. and taken a Non- Tamil Language under Part-I shall take Tamil Comprising of two courses (Level will be at 6th Standard)
- (b) Those who have studied Tamil up to XII Std and taken a Non-Tamil Language under part-I shall take Advanced Tamil Comprising of two courses.
- (c) Others who do not come under a / b can choose non-major elective comprising of two courses.

2. SKILL BASED SUBJECTS (ELECTIVE):

Four courses are to be offered. Let the compulsory papers be accommodated in the second / third year of study for UG Courses.

3. ENVIRONMENTAL STUDIES

4. VALUE EDUCATION

5. SOFT SKILL

PART- V: EXTENSION ACTIVITIES

5. Extension Service (Part-V):

A Candidate shall be awarded a maximum of I credit for compulsory Extension Service. All the Students shall have to enroll for NSS / NCC / NSO (Sports and Games) Rotaract / Youth Red Cross or any other service organization in the college and duly certified by the Principal of the college before 31st March of the IV semester. If a student LACKS 40 hours of attendance in the First year, he / she shall have to compensate the same during the subsequent years. Students those who complete minimum attendance of 40 hours in One year will get Half Credit and those who complete the attendance of 80 or more hours in the two years will ONE CREDIT. Literacy and population Education Field Work shall be compulsory components in the above extension service activities.

The following assessment procedure will be followed for Internal Marks:
Continuous Internal Assessment (CIA) Test

[illegible]

Test I : One hour duration for 50 marks (Two Units of the Syllabus)
Test II : Two hours duration for 75 marks (Four Units of the Syllabus)
Test III : Three hours model test for 75 marks (Total Syllabus)

Total marks **200 (Theory)**

Test marks to be converted to : 20 marks

Assignments / Seminars : 5 marks

Total **: 25 marks**

In the column rounded to 25, any fraction may be rounded to the next number.

6. Requirements for proceeding to Subsequent Semesters:

(i). Candidates shall register their name for the First Semester Examination after the admission in the U.G. Courses.

(ii) Candidates shall be permitted to proceed from the First Semester up to the Final Semester irrespective of their failure in any of the Semester examinations subject to the condition that the candidates should register for all the arrear subject of earlier semesters along the current (subsequent) Semester subjects.

(iii). Candidates shall be eligible to go to subsequent semester, only if they earn, sufficient attendance as prescribed there for by the Academic Council from time to time. provided in case of a candidate earning less than 65 % of attendance in any one of the Semester due to any extraordinary circumstances such as medical grounds, such candidates who shall produce Medical Certificate issued by the Authorized medical Attendant (AMA), duly certified by principal of the college, shall be permitted to proceed to the next semester and to complete the course of study. Such Candidates shall have to repeat the missed semester by rejoining after completion of Final Semester of the course, after paying the fee for the break of study as prescribed by the College from time to time

7. Requirement to take the Semester Examinations.

a). A candidate will be permitted to take the Examination for any Semester, if

- i). He / She secures not less than 75% of attendance out of the 90 instructional days during the semester. [In the case of married women students the minimum attendance requirement shall be 55% of the total instructional days].

- ii). He / she earns a progress Certificate from the Head of the Institution of having satisfactorily completed the Course of Study prescribed in the subjects as required by the regulations, and
- iii). His / her conduct has been satisfactory.

Provided that it shall be open to the Academic Council, or any authority delegated with such powers by the Academic Council to grant exemption to a candidate who has failed to earn 75% of the attendance prescribed for any valid reason(s) subject to the usual conditions.

b). A candidate who has secured attendance less than 75% but 65% and above shall be permitted to take the Examination on the recommendation of the Head of the Institution to condone the lack of attendance as well as on the payment of the prescribed fees to the College.

c] A candidate who has secured attendance less than 65% but 55% and above in every semester, as to compensate the shortage of attendance in the subsequent semester besides, earning the required percentage of attendance in that semester and take the examinations of both the semester papers together at the end of the later semester.

d] A candidate who has secured less than 55% of attendance in any semester will not be permitted to take the regular examinations. He/She has to re-do the course after the completion of the final semesters by rejoining the semester in which the attendance is less than 55%.

e] A candidate who has secured less than 65% of attendance in the final semester as to compensate his/her attendance shortage in a manner to be decided by the Head of the Department concerned after rejoining the course.

8. Passing Minimum:

A Candidate shall be declared to have passed the whole Examination, if he/she passes in all the papers and practical wherever prescribed / as per the scheme of examinations by earnings by earning 140 CREDIT in Parts – I, II, III, IV and V. He / She shall also fulfill the extension activities prescribed earning one Credit to qualify for the Degree.

In fixing the passing minimum marks, the following will be observed

- (a). There shall be no Passing Minimum for Internal.
- (b) For External Examination, Passing Minimum shall be of 40 % (Forty percentages) of the maximum marks prescribed for the paper.
- (c) In the aggregate (External + Internal), the passing minimum shall be of 40 % for each paper.
- (d) Grading shall be based on overall marks obtained [Internal + External]

9. Grading System:

Once the marks of the CIA and end-semester examinations for each of the course are available, they will be added. The mark thus obtained will then be graded as per details given below

Marks	Grade Point	Letter Grade	Class
100	7.00	H	First Class with Distinction
90-99	6.00	O	First Class with Distinction
75-89	5.50	D	First Class with Distinction
60-74	4.75	A	First Class
50-59	4.00	B	Second Class
40-49	3.50	C	Third Class
Below 40	3.00	F	Fail

From the second semester onwards, the total performance within a semester and continuous performance starting from the first semester are indicated respectively by **Grade Point Average [GPA]** and **Cumulative Grade Point Average [CGPA]**. These two are calculated by the following formulae

$$\text{GPA} = \frac{\sum_{i=1}^n C_i G_i}{n}$$

Where 'Ci' is the Credit earned for the Course i in any semester; 'Gi' is the Grade point obtained by the student for the course i and 'n' is the number of courses passed in that semester.

CGPA = GPA of all the courses starting from the first semester to the current semester.

Note: The GPA and CGPA shall be calculated separately for the following three parts:

For purposes of declaring a candidate to have qualified for the Degree of Bachelor of Commerce in the First Class / Second Class / Third Class or First Class with Distinction, the marks and the Corresponding CGPA earned by the candidate in part III alone will be the criterion, provided he / She has secured the prescribed passing minimum in LCs and ELs.

Grade in Part IV & V Extension shall be shown separately and it shall not be taken into account for classification

10. Classification of successful candidates:

Part-I TAMIL

Successful candidates passing Examination for the Language and securing the marks (i) 60 percent and above and (ii) 50 percent and above but below 60 percent in the aggregate shall be declared to have passed the examination in the First and Second class, respectively. All other successful candidates shall declare to have passed the examination in the Third Class

PART –II ENGLISH

Successful candidates passing examinations for English and securing the marks (I) 60 percent and above and (ii) 50 percent and above but below 60 percent in the aggregate shall be declared to have passed the examination in the First and Second class respectively. All other successful candidates shall be declared to have passed the examination in Third class

PART – III consisting of CORE SUBJECTS, ALLIED SUBJECTS, ELECTIVES

Successful candidates passing examination for Core courses together and securing the marks (i) 60 percent and above and (ii) 50 percent and above but below 60 percent in the aggregate of the marks prescribed for the Core Courses together shall be declared to have passed the examination in the First and Second Class, respectively. All other successful candidates shall be declared to have passed the examination in the Third Class.

PART – IV (Consisting of sub items 1 (a) (b) and (c), 2, 3, and 4 & 5) as furnished in the Regulation 4 part – IV supra.

PART - V EXTENSION ACTIVITIES

The only credit earned for Part V Extension activities of a Successful Candidate shall not be taken into consideration for Classification / Ranking / Distinction.

11. Ranking:

Candidates who pass all the examinations prescribed for the course in the first appearance itself alone are eligible for Ranking;

Provided in the case of Candidates who pass all the examinations prescribed for the course with a break in the First Appearance due to the reasons as furnished in the Regulations 7.[iii] supra are eligible for Classification / Distinction.,

The marks obtained in improvement examinations will not be taken into consideration for ranking.

12. The Medium of Instruction and Examinations:

The medium of instruction and Examinations for the papers under part I and II shall be in the language concerned. For Part III and Part IV the medium of instruction and examination shall be English

13. Improvement of marks in the subjects already passed.

Candidates who have passed in theory paper / papers are allowed to appear again for theory paper / papers only once in order to improve his/her marks, by paying the fee prescribed from time to time. Such candidates are allowed to improve within a maximum period of 10 semesters counting from his/her first semester of his/her admission. If candidate improves his marks, then his improved mark will be taken into consideration for the award of Classification and Distinction only. Such improved marks will not be counted for the award of Prize / Medals and Rank. If the Candidate does not show improvement in the marks, his previous marks will be taken into consideration.

14. Checklist for Inspection

A. Qualification for

UG - Teaching Faculty : as prescribed by the UGC and the University

B. Infrastructure Facilities

i) Building: Number of classroom with specifications: 3 rooms measuring 20x”25”.

If the class strength is above 50 the space shall be increase by 10 sq.ft, per student.

Number of staff rooms: one measuring 20” x2

ii). Furniture: One pair of table / chair per student.

PATTERN OF QUESTION PAPER

PART- A(50 Words)

To Answer 10 Questions	10 X 2 Marks	= 20 Marks

PART-B (200 Words)

To Answer 5 Questions (either Or Pattern)	5 X 5 Marks	= 25 Marks

PART-C (500 Words)

To Answer 3 Questions out of 5 questions	3X 10Marks	= 30 Marks

Total	= 75 Marks

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The course of study and the Scheme of Examinations.

BACHELOR OF COMMERCE (UNDER CBCS PATTERN

[With effect from 2020-2021]

Year/ Sem	Part	Subject	Sub Code	Paper	Title of the Paper	Ins. Hrs/ Week	Credit	Exam Hrs	Maximum Marks		
									I A	Uni. Exam	Total
I Year/ I Sem	I	Language	U1LT21FL	I	Tamil - I	6	3	3	25	75	100
	II	English	U1LE21SL	I	English - I	6	3	3	25	75	100
	III	Core	U1CM21MT	I	Principles of Accountancy	6	5	3	25	75	100
			U1CM22MT	II	Business Communication	5	4	3	25	75	100
		Allied – I	U1CM21AT	I	Principles of Marketing	5	4	3	25	75	100
	IV		U1ES21GS	I	Environmental Studies	2	2	3	25	75	100
			U1PE03SL	I	Professional English I	2	2	3	25	75	100
TOTAL(I)						30	21		150	450	600
I Year / II Sem	I	Language	U2LT21FL	II	Tamil - II	6	3	3	25	75	100
	II	English	U2LE21SL	II	English - II	6	3	3	25	75	100
	III	Core	U2CM21MT	III	Financial Accounting	6	5	3	25	75	100
			U2CM22MT	IV	Business Organisation	5	4	3	25	75	100
		Allied-II	U2CM21AT	II	Modern Marketing	5	4	3	25	75	100
	IV		U2VE21GS	II	Value Education	2	2	3	-	50	50
			U2PE03SL	I	Professional English I	2	2	3	25	75	100
TOTAL(II)						30	21		125	425	550
GRANT TOTAL (I + II)						60	42		275	875	1150

POs	Programme Name: B.COM	
PO1	The students can get the knowledge, skills and attitudes during the end of the B.com degree course	
PO2	By goodness of the preparation they can turn into a Manager, Accountant , Management Accountant, cost Accountant, Bank Manager, Auditor, Company Secretary, Teacher, Professor, Stock Agents, Government employments and so on	
PO3	Students will prove themselves in different professional exams like C.A. C S, CMA, MPSC, UPSC. As well as other coerces.	
PO4	Students will learn relevant Advanced accounting career skills, applying both quantitative and qualitative knowledge to their future careers in business.	
PO5	Students will gain thorough systematic and subject skills within various disciplines of finance, auditing and taxation, accounting, management, communication, computer.	
PO6	This program could provide Industries, Banking Sectors, Insurance Companies, Financing companies, Transport Agencies, Warehousing etc., well trained professionals to meet the requirements.	
PO7	Students can also get the practical skills to work as accountant, audit assistant, tax consultant, and computer operator. As well as other financial supporting services	

L	T	P	C
6	0	0	5

PRINCIPLES OF ACCOUNTANCY

OBJECTIVE:

1. The objective of this subject is to acquaint students with the accounting concepts, tools and techniques influencing Business Organizations.
2. To enable students to describe how people analyze the corporate financial under different conditions and understand why people describe the financial statements in different manner.
3. To provide the students to analyze specific characteristics of Logistics Management Accounting and their future action for expenses and income

UNIT-I INTRODUCTION TO ACCOUNTING (16 Hrs.)

Need for Concepts and Conventions-Accounting Equation-Opening Entries, Close Entries, Adjustment Entries and Rectification Entries-Bank Reconciliation Statement

UNIT-II DEPRECIATION ACCOUNTING (18 Hrs.)

Depreciation, Reserves and Provisions – Depreciation, Depletion and Amortization – Objectives of providing Depreciation – Causes of Depreciation – Methods of Recording Depreciation – Straight Line Method – Diminishing Balance method– Annuity method – Sinking fund method – Insurance policy method – Machine hour rate method – Depletion method-Revaluation method[Problems only from Straight Line & Diminishing Balance method]

UNIT-III FIRE INSURANCE ACCOUNTING (13 Hrs.)

Insurance Claim – Loss of stock – Average clause (simple problems)

UNIT-IV FINAL ACCOUNTS (14 Hrs.)

Final accounts – Distinction between Capital and Revenue Expenditure-Classification of Assets and Liabilities

UNIT-V ACCOUNTING SYSTEM**(17Hrs.)**

Single Entry system – objectives – Definition – salient features – Limitations of Single entry system-Difference between Single Entry and Double Entry – Ascertainment of profit – Methods – Net worth Method and Conversation Method – Difference between statement of Affairs and Balance sheet.

CO1	Use information to support business processes and practices, such as problem analysis and decision making
CO2	Quantitative skills to help analyze and solve business problems and to take advantage of business opportunities
CO3	Develop an understanding of internal control issues and the effects of the regulatory environment on financial reporting
CO4	Gain knowledge of generally accepted accounting principles (GAAP) and managerial accounting theories to business organizations, state and local
CO5	Employment feasibility governments, and nonprofit organizations
CO6	Knowledge of federal tax laws and procedures to individuals and businesses
CO7	Describe how basic business events affect accounts and financial statements.

TEXT BOOK:

T.S.Reddy & A.Murthy, “Financial Accounting”, Margham Publication, Chennai, Revised Edition, 2017

REFERENCE BOOKS:

1. S.Ganeson & S.R.Kalavathi, “Financial Accounting” Thirumalai Publication., Nagarkoil, 1st Edition, 2005.
2. R.L. Gupta and V.K.Gupta, Financial Accounting, Sultan Chand & Sons, New Delhi, 6th Edition, 2012
3. Jae K.Shim, Joel G Siegel, “Financial Accounting”, Tata McGraw-Hill, New Delhi, 2nd Edition, 2004

SEMESTER – I

L	T	P	C
5	0	0	4

Total Hours: 65

BUSINESS COMMUNICATION

SUBJECT CODE: U1CM22MT

OBJECTIVE:

1. To familiarize students with the mechanics of writing Business Letters.
2. To participate in an online learning environment successfully by developing the implication-based understanding of Paraphrasing, deciphering instructions, interpreting guidelines, discussion boards & Referencing Styles.
3. To impart the correct practices of the strategies of Effective Business writing

UNIT-I BUSINESS COMMUNICATION

Features of Business Communication – Importance of effective Communication in Business – Classification of Communication – Characteristics [7cs] and Guidelines of Effective Business Communication

UNIT-II LETTER STRUCTURE AND LAYOUT

Analysis of Business Letter – Basic Principles in Drafting – Appearance, Structure and Layout – Letter Styles

UNIT-III TYPES OF BUSINESS LETTER

Various types of Business Letter – letters of enquiry – offers, Quotations, Orders, Complaints and settlement, Circular letters, Status Enquiry – Collection Letters.

UNIT-IV PROCEDURE FOR APPLICATION

Letters of Application – Essential Qualities – Letters of Application with CV, Resumes – Application- Answering an Advertisement – Solicited and Unsolicited Letters – Reference Letters.

UNIT-V BUSINESS REPORT

Business Report – Importance – Characteristics – Types – Reports by Individuals and Committees.

CO1	Identify issues involved in communicating at work.
CO2	Describe team development, team roles, methods for dealing with conflict, and methods for reaching group decisions.
CO3	Describe the importance of listening in the workplace, the listening process, and techniques for improving workplace listening.
CO4	Define nonverbal communication and identify how it can be used positively in one's career
CO5	Identify and define issues in communicating across cultures.
CO6	Outline the business-communication process and techniques for effective business communication.
CO7	Identify effective techniques for writing formal and informal reports and programmes

TEXT BOOK:

Kathiresan & Radha,"Business Communication", Prasanna Publication & Distributors, Chennai. Edition.2014

REFERENCE BOOKS:

1. N.S.Raghunathan & B.Santhanam, "Business Communication" Margham Publication, Chennai, 1st Edition, 2018.
2. Ramesh and Pattanchetti,"Business Communication" Sultan Chand & Co.New Delhi, Edition 2014.

L	T	P	C
5	0	0	4

Total Hours: 65

SEMESTER – I

PRINCIPLES OF MARKETING

SUBJECT CODE: U1CM21AT

OBJECTIVE:

1. The objective is to enable students to understand the concept of four Ps marketing mix.
2. To understand the role of marketing within society and within an economic system. –
3. To consider the various decision areas within marketing and the tools and methods used by marketing managers for making decisions.

UNIT- I MARKETING

Definitions of Market - Importance of Market - Classifications of Markets – Marketing – Definition – Features of Marketing - Distinction between Marketing and Selling - Demarketing – Remarketing - Social marketing .

UNIT- II PRODUCT PLANNING & POLICY

Definition of a Product- Types of product and Product Line- Product Policy- Product mix - New Product Development - Stages involved in New Product Development- Product life cycle

UNIT- III PRICING

Price- Definition- Factors Influencing Pricing Decisions- Factors- Pricing Policy of Marketers- Different Kinds of Pricing.

UNIT- IV PHYSICAL DISTRIBUTION

Meaning of Channels of Distribution- Definition-Need for Channels of Distribution- Factors to be considered in Selection of Channels – Types- Importance- Middlemen.

UNIT- V PROMOTION

Promotion- Objectives of Promotion – merits of promotion- criticisms - Sales Promotion- Advertising – Types of Advertising- Advertising media- Publicity- Personal Selling - The A.I.D.A Concept - Public Relations.

CO1	Demonstrate understanding of marketing terminology and concepts
CO2	Identify wants and environmental factors that shape marketing activities for certain target markets
CO3	Demonstrate knowledge of the individual components of a marketing mix.
CO4	Demonstrate knowledge of key business communication strategies within the marketing field.
CO5	Identify the organizational processes involved in the planning, implementation and control of marketing activities
CO6	Demonstrate understanding of research approaches and basic research tools as applied to marketing
CO7	Demonstrate understanding of the role of marketing intermediaries in introducing products to market

TEXT BOOKS:

J.Jayasankar,"Marketing" Margham Publications, Chennai Revised Edition 2017.

REFERENCE BOOKS

1. Rajan Nair," Marketing" Sultan Chand & Sons,New Delhi,2017.
2. Philips Kotler," Principles of Marketing" Prentice hall, 1984.
3. Cundiff,Still and Govani," Fundamentals of Modern Marketing" prentice hall,1985.

SEMESTER – I
ENVIRONMENTAL STUDIES
SUBJECT CODE: U1ES21GS

	T	P	C
2	0	0	2

Total Hours: 26

Objectives:

- 1.To transform India into a major partner and player in the global arena.
2. To take out Indian economy from the vicious circle of poverty.
3. Open the **TO ENVIRONMENTAL SCIENCES: NATURAL RESOURCES**

Environmental Sciences – Significance – Public awareness – Forest resources – Water resources – Mineral resources – Food resources - Environmental impact – fertilizer – Pesticide Problems.

UNIT – II: ECOSYSTEM, BIODIVERSITY AND ITS CONSERVATION

Ecosystem – concept – structure and function – producers, consumers and decomposers – Food chain – Food web – Forest, Grassland, desert and aquatic ecosystem.

Biodiversity – Definition – genetic, species and ecosystem diversity – Values and uses of biodiversity – biodiversity at global, national (India) and local levels – Hotspots, threats to biodiversity – conservation of biodiversity – In-situ & Ex-situ.

UNIT – III: ENVIRONMENTAL POLLUTION AND MANAGEMENT

Environmental Pollution – Causes – Effects and control measures of Air, Water, Marine, soil, solid waste, Thermal, Nuclear pollution and Disaster Management – Floods, Earth quake, Cyclone and Landslides. Role of individuals in prevention of pollution – pollution, Case studies - – Bhopal gas tragedy, Minamata disease, Mercury factory (Kodaikanal), London fog.

UNIT – IV: SOCIAL ISSUES& ENVIRONMENT

Urban issues – Energy – water conservation – Environmental Ethics – Global warming – Resettlement and Rehabilitation issues – Environmental legislations – Environmental protection Act. 1986 – Air, Water, Wildlife and forest conservation Act.

UNIT – V: HUMAN POPULATION & ENVIRONMENT

Population growth and Explosion – Human rights and Value Education – Environmental Health – HIV/AIDS – Role of IT in Environment and Human Health – Women and child welfare – Public awareness – Case studies. Visit to a local area / local polluted site / local simple ecosystem – Report submission

CO1	Understand core concepts and methods from ecological and physical sciences and their application in environmental problem-solving.
CO2	Appreciate key concepts from economic, political, and social analysis as they pertain to the design and evaluation of environmental policies and institutions.
CO3	Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.
CO4	Appreciate that one can apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.
CO5	Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.
CO6	Understand core concepts and methods from ecological and physical sciences and their application in environmental problem-solving.
CO7	Appreciate key concepts from economic, political, and social analysis as they pertain to the design and evaluation of environmental policies and institutions.

Text Books:

1. Kumaraswamy, K. Alagappa Moses, A and M. Vasanthy, (2005), Environmental Studies, Publication Division, Bharathidasan University, Tiruchirappalli. (in Tamil), pp. 1-282.
2. Kumaraswamy, K. (Ed) (2008) GIS for Natural Resources and Disaster Management, Department of Geography, Bharathidasan University, Tiruchirappalli.
3. Rajamannar. Environmental Studies, EVR College Pub, Trichy. 2004.
4. Kalavathy, S. Environmental Studies, Bishop Heber College Pub., Trichy. 2004.

SEMESTER - II

L	T	P	C
6	0	0	5

Total Hours: 78

FINANCIAL ACCOUNTING

SUBJECT CODE: U2CM21MT

OBJECTIVE:

1. The objective of this subject is to acquaint the students with the few accounting standards and make them familiar with the accounting procedures for different types of business.
2. To help the students to develop cognizance of the importance of accounting in organization financial statements
3. To enable students to describe how people analyze the corporate financial under different conditions and understand why people describe the financial statements in different manner.

UNIT- I BRANCH ACCOUNTS

Branch Accounts- Objects of Branch Accounts – Types of Branches- Dependent Branch – Stock and Debtor System- Accounting System- Independent Branch [Foreign branch excluded] – Incorporation of Branch – Figures in the Head office Books [only simple problems]

UNIT- II DEPARTMENTAL ACCOUNTS

Departmental Accounts – Distinction between departments and branches – Allocation of common expenses – expenses which cannot be allocated – Inter Departmental Transfer at cost and at Selling Price [simple problems only]

UNIT- III HIRE PURCHASE SYSTEM

Hire purchase system- Accounting treatment – calculation of interest – Books of Hire Purchaser and Hire Vendor – Default and Repossession- Hire purchase Trading Accounting- Installment System – Distinguish- between Hire purchase and Installment purchase System- Accounting treatment- Books of buyer and seller [simple problems only]

UNIT- IV PARTNERSHIP ACCOUNTS –I

Partnership Accounts – Profit and Loss Appropriation Account – Admission, Retirement and Death of Partners – Adjustments in the Profit Sharing Ratio – Adjustment for Revaluation of Assets and Liabilities – Treatment of Goodwill [simple problems only]

UNIT –V PARTNERSHIP ACCOUNTS -II

Partnership Accounts – Dissolution of Firm – Settlement of accounts – Accounting treatment for unrecorded Assets and Liabilities – Insolvency of a partner – Garner v/s Murray – Fixed and Fluctuating Capital – All Partners Insolvency [simple problems only].

CO1	Understand the concept of Hire Purchase System and apply it to the preparation of accounts
CO2	Develop the ability to prepare Branch and departmental accounts and calculate profit or loss .
CO3	Understand and apply the accounting procedure followed by companies relating to shares and debentures
CO4	Develop the ability to prepare final statements of companies
CO5	Develop the ability to prepare statement of Insurance claim for loss of stock and manage Investment accounts.
CO6	Understand the methods for maintaining branch accounts and its respective accounting treatment, ascertain profit/loss made by Branch and take corrective measures against unprofitable branches
CO7	Understand the business process in partnership firm

TEXT BOOK:

T.S.Reddy & A.Murthy, “Financial Accounting”, Margham Publication, Chennai, 7th Revised Edition, 2017.

REFERENCE BOOK

1. S.Ganeson & S.R.Kalavathi, “Financial Accounting” Thirumalai Publication.,Nagarkoil, 1st Edition, 2005.
2. R.L. Gupta and V.K.Gupta, Financial Accounting, Sultan Chand & Sons, New Delhi, 6th Edition,2012
3. Jae K.Shim, Joel G Siegel, “Financial Accounting”, Tata McGraw-Hill, New Delhi, 2nd Edition,2004

SEMESTER - II

L	T	P	C
5	0	0	4

Total Hours: 65

BUSINESS ORGANISATION

SUBJECT CODE: U2CM22MT

OBJECTIVE:

1. The objective is to familiarize the students with various aspects of Business Organisation.
2. To help the students gain understanding of the functions and responsibilities of managers.
3. To provide them tools and techniques to be used in the performance of the managerial job.

UNIT-I- NATURE AND SCOPE OF BUSINESS

Business: Meaning and Types – Profession – Meaning and importance of Business Organisation.
Social Responsibilities of Business – Business Ethics

UNIT-II- FORMS OF BUSINESS ORGANISATION

Forms of Business Organisation –Sole Trader – Partnership –Joint Hindu Family- Joint Stock Companies –Co-Operative Societies- Public Utilities and Public Enterprises. Public Sector Vs Private Sector

UNIT-III- LOCATION AND SIZE OF FIRM

Location of Industries – Factors influencing location – Size of Industries – Optimum Firm- Advantages of Large Scale Operation –Limitations of Small Scale Operations – Industrial Estates – District Industries Centers (DIC's)

UNIT-IV- STOCK EXCHANGE

Stock Exchange – Functions – Types – Working – Regulations of Stock Exchange in India – Business Combination – Causes – Types – Effects of Combination in India.

UNIT-VTRADE ASSOCIATION

Trade Association – Chamber of Commerce – Functions – Objectives – Working in India.

CO1	Understand the concepts related to Business.
CO2	Describe different types businesses
CO3	Understand different ways of classifying businesses: by size, industry sector and ownership type
CO4	Understand the vocabulary and grammar of a trading floor
CO5	Experience the interactions between traders, sales, clients, brokers
CO6	Describe the methods of issuing shares and role of intermediaries in the primary market
CO7	List the various speculators and describe the speculative activities

TEXT BOOK:

C.D.Balaji, G.Prasad, “Business Organization” Margham Publications, Chennai, 1st Edition 2016 .

REFERENCE BOOKS:

1. R.N.Gupta, “Business Organization”, S Chand Publication, 1st Edition, 2006.
2. Y.K.Bhusan-Business Organization Sultan Chand & Sons., New Delhi, 7th Edition, 2009.
3. R.N.Guptha, “Business Organization & Management” S.Chand & Co. New Delhi, 9th Revised Edition, 2011.

SEMESTER - II

L	T	P	C
5	0	0	5

Total Hours: 65

MODERN MARKETING **SUBJECT CODE: U2CM21AT**

OBJECTIVE

1. The objective is to enable students to understand the concept of marketing and its applications and the recent trends in Marketing.
2. Understand the basic concepts in Marketing, Marketing environment and develop an understanding about communication, Marketing Communication and its usage.
3. Analyse the importance of personal selling and salesmanship, process of effective selling involvement of salesmen in sales organization.

UNIT- I MODERN MARKETING & RESEARCH

Meaning and Definition of Modern Marketing- Features- Meaning of Marketing Research- Definitions- Objectives- Advantages- Types- Stages involved in Marketing Research- Market Research and Marketing Research.

UNIT- II MARKET SEGMENTATION

Definition of Market Segmentation- Advantages- Criteria for Segmentation- Factors Determining Market Segmentation- Basis for Segmentation of Markets.

UNIT- III BUYER BEHAVIOUR

Buyer, Consumer and Customer - Meaning- Buyer Behaviour- Factors involved in Buying Decisions- Caveat Emptor - Rules Protecting the interest of Seller and Buyer- Factors Determining Buyer Behaviour

UNIT- IV MARKETING ENVIRONMENT

Forces influencing the Internal Environment and External Environment- Inputs- Organizational Plan- Forces in the External Environment- stakeholders in marketing activities.

UNIT- V RECENT TRENDS IN MARKETING

E-Marketing – Objectives- Benefits of E-Marketing-Direct Marketing-Channels- Merits-Demerits-Green Marketing- Objectives-Importance-Problems.

CO1	Students will demonstrate strong conceptual knowledge in the functional area of marketing management.
CO2	Students will demonstrate effective understanding of relevant functional areas of marketing management and its application.
CO3	Students will demonstrate analytical skills in identification and resolution of problems pertaining to marketing management
CO4	Analyse the importance of personal selling and salesmanship, process of effective selling and involvement of salesmen in sales organization.
CO5	Development and usage Nature and growing importance of sales promotion, samples and point of purchases, implementing and evaluating the sales promotion programs
CO6	Understand the various types of Advertising, its applications and its usage with effect to marketing scenario
CO7	Understand the importance of e- marketing

TEXT BOOKS:

J.Jayasankar,"Marketing" Margham Publications,Chennai Revised Editions June2017.

REFERENCE BOOKS

1. Philip Kotler and Paul N.Bloom,"Marketing professional services"prentice hall,New jersey.
2. Green paul and Tull,"Marketing Research". Christopher lovelock,"Services marketing

SEMESTER - II

L	T	P	C
2	0	0	2

Total Hours: 26

VALUE EDUCATION **SUBJECT CODE: U2VE21GS**

UNIT I: VALUE EDUCATION-INTRODUCTION

1. Value Education-Definition - relevance to present Day.
2. Concept of Human Values – self Introspection - self esteem.
3. To create awareness on the various values.

UNIT II: FAMILY VALUES

Family values - Components, structure and responsibilities of family – Neutralization of anger - Adjustability - Threats of family life - Status of Women's in family and society - caring for needy and elderly –Time allotment for sharing ideas and concerns.

UNIT III: ETHICAL VALUES

Ethical values - Professional Ethics - Mass Media Ethics - Advertising Ethics - Influence of Ethics on family life - Psychology of children and youth - leadership qualities - personality development.

UNIT IV: SOCIAL VALUES

Social values - faith, Service and Secularism - Social and Secularism - Social Sense and commitment - students and politics-social awareness, consumer awareness, consumer rights and responsibilities – Redressal mechanisms.

UNIT V: INTERNATIONAL AFFAIRS

Effect of international affairs on values of life/issue of Globalization - Modern Warfare - Terrorism, Environmental issues - Mutual respect of different cultures, religions and their beliefs.

CO1	Students will understand the importance of value based living.
CO2	. Students will gain deeper understanding about the purpose of their life
CO3	Students will understand and start applying the essential steps to become good leaders
CO4	Students will emerge as responsible citizens with clear conviction to practice values and ethics in life.
CO5	Students will become value based professionals .
CO6	Students will contribute in building a healthy nation
CO7	To teach and inculcate the importance of value education.

TEXT BOOK:

1. Daniel and Selvamony – Value Education Today, Madras Christian College, Tambaram and Alachi, New Delhi, 1st Edition. (1990).
2. Ignachimuthu. S. Values for Life. Better Yourself Books, Mumbai, 1st Edition. (1991).
3. Lakshminarayanan. K.R. and M. Uma Mageswari. Value Education. Nalnilam Publications, Chennai. 1st Edition. (2009).

REFERENCE BOOKS:

1. T.Anchukandam and J.Kuttainimathathil (ED) Grow Free Live Free, Krisitu Jyoti Publicaitons, Bangalore, 1st Edition. (1995).
2. Mani Jacob. E.D. Resource Book for Value Education, Institute for Value Education, New Delhi. (2002)

SEMESTER - III

L	T	P	C
2	0	0	5

Total Hours: 26

CORPORATE ACCOUNTING

SUBJECT CODE: U3CM21MT

OBJECTIVE

- 1.The objective of this subject is to enable the students to have a comprehensive awareness about the provisions of the Company's Act and Corporate Accounts.
2. Develop a process for redemption of Preference shares
3. Construct the Restructuring of capital structure in the financial statement of Joint stock company Ltd.

UNIT – I ISSUE OF SHARES

Issue of Shares – at Par, Premium and Discount – Pro-Rata Allotment – Forfeiture and Reissue of Shares

UNIT-II ISSUE OF DEBENTURES

Issue of Debentures – Redeemable, Non- Redeemable and Convertible Debentures- Redemption of Preference Shares.

UNIT-III ACQUISITION OF BUSINESS

Commencement of Business – Final Accounts (Managerial Remuneration Excluded)

UNIT-IV AMALGAMATION AND ABSORPTION

Purchase Consideration – Methods – Amalgamation in the Nature of Merger and Purchase – Absorption – ASI4 – Alteration of Share Capital – Reduction of Share Capital (Scheme of Capital Reduction is Excluded)

UNIT-V LIQUIDATION ACCOUNTING

Liquidation Accounting – Order of Payments – Preferential Payments – Liquidators Final – Statement of Account – Remuneration – Statement of Affairs and Deficiency Accounts (Weightage of Marks, Problems - 80%, theory - 20%)

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CO1	Students will learn about the meaning of companies, its types and procedure of formation of company.
CO2	Students will gain the knowledge of accounting for issue of shares, forfeiture and re-issue of shares, issue of bonus shares and classification of reserves.
CO3	Students will learn the concept of Redemption of Preference Shares redemption of preference shares, sources of redemption, accounting procedure of redemption and preparation of balance sheet of the company immediately after redemption
CO4	Understand the meaning and concept of— Amalgamation
CO5	Students will learn the Purpose of amalgamation and the methods— of amalgamation
CO6	Will able to understand accounting procedure of Liquidation
CO7	Get knowledge of Final statement of companies

TEXT BOOK:

T.S. Reddy &A. Murthy,”Corporate Accounting” Margham Publications, Chennai, 6th Edition-2017

REFERENCE BOOKS:

1. S N Maheshwari, S K Maheshwari, “Corporate Accounting”, Vikas Publishing Pvt Ltd, 4th Revised Edition 2004.
2. Gupta R.L. & Radhaswamy M, “Corporate Accounting”, Sultan Chand & Sons, New Delhi, 4th Edition 2008.
3. S. P. Jain and K. L. Narang –“ Corporate Accounting”,Kalyani publishers, New Delhi 7th Edition 2000.

SEMESTER - III

L	T	P	C
5	0	0	4

Total Hours: 65

BUSINESS LAWS

SUBJECT CODE: U3CM22MT

OBJECTIVE:

1. To introduce the students to various Business laws and familiarize them with common issues of relevance.
2. It is essential to study the legal rules that govern and regulate the commercial documents so that the researcher and the student become aware of his command, and thus can avoid problems that may lead to the occurrence of disputes at the level of the daily business dealings.
3. By regulating the relations that govern people of private law and legal rules and take commercial law with respect to the business, and this business has been identified in the Iraqi law on the basis of the Trade Act.

UNIT – I CONCEPTS OF CONTRACT

Formation and Essential Elements of Contract – Types of Contract and Agreements – Rules as to offer, Acceptance and Consideration – Capacity to Contract – Lawful Object and Free Consent.

UNIT-II PERFORMANCE OF CONTRACT

Performance of Contract – Devolution of Joint Rights and Liabilities – Discharge of Contract – Breach of Contract and Remedies – Quasi Contracts.

UNIT-III INDEMNITY AND GUARANTEE

Indemnity and Guarantee – Features and Distinctions – Extent of Surety's Liability – Rights and Discharge of Surety – Bailment and Pledge – Features – Difference – Rights and Duties of Bailor and Bailee – Law Relating to Lien and Finder of Lost Goods – Rights and Duties of Pawnor and Pawnee – Pledge by Non-Owner.

UNIT-IV CONTRACT OF AGENCY

Contract of Agency – Definition and Meaning – Creation – Ratification and Requisites – Rights of Principal and Agent – Relation of Principal with Third Parties – Personal Liability of Agent – Termination of Agency – Irrevocable Agency.

UNIT-V SALE OF GOODS ACT 1930

Sale of Goods Act 1930 – Definition of Sale – Sale Vs Agreement to Sell – Subject Matter – Express and Implied Conditions and Warranties – Caveat Emptor and Exceptions – Performance of Contract – Transfer of Property – Rights of an Unpaid Seller – Sale by Non – Owner – Auction Sale.

CO1	Explain the basic elements of forming an enforceable contract and agreement.
CO2	Classify various negotiable instruments and reason of its dishonor
CO3	Enumerate the types of companies its management and its rules of corporate governance.
CO4	Demonstrate an understanding of the Legal Environment of Business.
CO5	Apply basic legal knowledge to business transactions.
CO6	Communicate effectively using standard business and legal terminology
CO7	Understand the concept on sale of goods Act 1930

TEXT BOOKS:

1. N.D.Kapoor, “Business Laws” Sultan Chand & Sons Publication, New Delhi, 5th edition 2005.
2. J.Jayasankar, “Business Laws”, Margham Publication, Chennai, Revised Edition 2017.

REFERENCE BOOKS:

1. N.D. Kapoor & Dinkar Pagare, Business Laws and Management, Sultan Chand & Sons Publication, New Delhi 3rd Edition – 2010.
2. V Balachandran & S Thothadri, “Business Laws”, Tata McGraw-Hill, New Delhi 2n^d Edition – 2010.
3. R.S.N.Pillai & Bagavathi, “Business Laws” S.Chand & Co., New Delhi, Edition 2014.

SEMESTER - III

L	T	P	C
5	0	0	3

Total Hours: 65

MODERN BANKING SUBJECT CODE: U3CM23MT

OBJECTIVE:

- 1.The objective of this subject is to acquaint students with the banking technology and their recent developments and enhance their knowledge on modern banking concepts and techniques.
2. To carry out financial analysis of banks and insurance companies,
3. To keep up with developments in financial markets,

UNIT – I INTRODUCTION OF VARIOUS BANKING

Brief History of Banking – Unit Banking – Branch Banking – Structure of Indian Financial System – Mixed Banking – Functions and Importance of Commercial Banks – Credit Creation of Commercial Banks.

UNIT-II STATE BANK OF INDIA

State Bank of India – Organisation – Function – Management – Regional Rural Banks (RRBS)

UNIT-III CENTRAL BANKING

Central Banking (Special Reference to India) – Functions – Instruments of Credit Control – Quantitative and Qualitative or Selective Credit Control.

UNIT-IV MONEY MARKET AND CAPITAL MARKET IN INDIA.

Constituents of Well Developed Money Market – Importance of Developed Money Market – Indian Money Market – Capital Market in India.

UNIT-V DEVELOPMENT BANKING IN INDIA

Development Banking – Industrial Finance Corporation of India (IFC) – Industrial Credit and Investment Corporation of India (ICICI) – Industrial Development Bank of India (IDBI) – Recent Trends – Debit card, Credit Card, ATM and e-banking.

CO1	Acquire knowledge on Indian Banking system and Banking Regulation Acts pertaining to it.
CO2	Recognize features and roles of businessmen, entrepreneur, managers, consultant, which will help learners to possess knowledge and other soft skills and to react aptly when confronted with critical decision making
CO3	Ethical and collegial in professional practice.
CO4	Inclination towards lifelong learning and pursuing professional courses such as CA, CS, ICWA and other courses. Develop skills in Banking Regulations Act
CO5	Gain practical exposure in the fields of Banking, Finance and Corporate Sector
CO6	Obtain advanced lessons in Business Communication, Business Economics Paper, Environmental Studies, Entrepreneurial Development, Accountancy & Portfolio and Investment Management.
CO7	Carry out advanced research in the field of Commerce, banking and finance.

TEXT BOOK :

B.Santhanam, “Banking and Financial System”, Margham Publications, Chennai, 4th Edition 2005.

REFERENCE BOOKS

1.Shekhar & Shekhar, “Banking Theory and practice”, Vikas Publishing Pvt Ltd 18th Edition 2008.

2.Sundharam & Varshney,”Banking and Financial System”, Sultan Chand & Sons, New Delhi, 7th Edition 2000.

3.Vasant Desai, “Indian Banking”, Himalaya Publishing House, Mumbai, Second Edition 2007.

SEMESTER – III

L	T	P	C
5	0	0	3

Total Hours: 65

BUSINESS ECONOMICS I **SUBJECT CODE: U3CM24MT**

OBJECTIVES:

1. To introduce the concepts of demand and utility analysis , to explain principles of micro economics relevant to managing an organization; to describe principles of macro economics.
2. Apply the concept of opportunity cost.
3. Employ marginal analysis for decision making.

UNIT – I INTRODUCTION TO BUSINESS ECONOMICS

Introduction to Business Economics - Objectives of Business - Profit maximization - Social responsibility of Business.

UNIT-II DEMAND ANALYSIS

Demand analysis - Demand schedule - Demand curve - Different types of Elasticity of demand - Measurement - Importance of elasticity of demand.

UNIT-III UTILITY ANALYSIS

Utility analysis - Cardinal - Ordinal - The law of diminishing marginal utility - Equi-Marginal utility - Indifference curve - Break-even analysis - Profit theories and concepts.

UNIT-IV DEMAND FORECASTING

Different types of Demand Forecasting.

UNIT-V PRODUCTION - PRODUCTION FUNCTION

Production - Production function - The law of variable proportions - Economies of scale, Law of returns to scale.

CO1	Obtain knowledge of the concept of opportunity cost
CO2	Employ marginal analysis for decision making
CO3	Analyze operations of markets under varying competitive conditions
CO4	Analyze causes and consequences of unemployment, inflation and economic growth
CO5	Identify the basic elements of economics
CO6	Students focus on demand and supply and equilibrium
CO7	Students focus on essential concept of economic principles

TEXT BOOK :

S. Sankaran, “BusinessEconomics”, Margham Publication, Chennai,4th Edition 2018.

REFERENCE BOOKS:

1. V.G Mankar,”Business Economics”, Macmilan India Ltd., 1st Edition 1999.
2. R.K. Lekhi, ,”Business Economics”, Kalyani Publishers, 1st Edition 2004.
3. D.M.Mithani,”International Economics”,Himalaya Publishing House, 4th Revised Edition 2003.

SEMESTER - III

L	T	P	C
5	0	0	3

Total Hours: 65

STATISTICS AND OPERATION RESEARCH I
SUBJECT CODE: U3CM25AT

OBJECTIVES :

- 1.To apply Statistics methods and operation research for Mathematical Problems
2. To gain knowledge on the aspects operation Research
3. To understand the basic concepts on OR

UNIT-I : Data and Diagrams

Statistics – Definitions-Collection of Data- Primary and Secondary Data --Classification and Tabulation-, ,Diagrammatic and graphical representation of statistical data (bar diagram, multiple bar diagram, pidiagram, histogram & horizontal and vertical bar diagram ,frequency polygon,frequency curve,Lorenz curve,Ogive curve.).

UNIT-II : Measure of Central Tendency

Measure of Central Tendency-Mean-Median-Mode-Harmonic Mean and Geometric Mean

UNIT-III : Measure of Dispersion

Measure of Dispersion – Range- Quartile Deviation-Mean Deviation-Standard Deviation –

Co-efficient of variance.. Measures of Skewness-Karlpearson's and Bow ley's Coefficient of Skewness

UNIT-IV : Sequencing and Replacement problem

Sequencing Problem – Processing n jobs through two machines – Processing n jobs through three machines –Replacement Models - Replacement of items whose efficiency deteriorates with time – Simple Problems.

.UNIT-V : Linear Programming problem

Linear Programming-Basic concepts – Formulation of Lpp-Graphical Method -Simplex Method .

COs	Course Name: Statistics and Operation Research - I	
CO1	Learning about the collection and representation of data	
CO2	Finding the Various measures of Central tendency	
CO3	Comparing the various sets of data	
CO4	Calculating the time of replacement of a machine	
CO5	Solving a linear Programming Problem	
CO6	Assigning certain jobs to a given set of machines	
CO7	Knowing about various types of data	

PRESCRIBED BOOK

R.S.N.Pillai & Bhagavathi- Statistics

Books for Reference:

1. J.K.Sharma-Business Statistics- Pearson Education.
2. B.Agarwal - Basic Statistics-Wiley Eastern.
3. Dr.S.P.Gupta-Statistical Methods-Sultan Chant.
4. Hamady&A.Taha-Opearation Research-Macmilan.
5. Dr.S.P.Gupta-Business Statistics &Opearation Research-Sultan Chant.

SEMESTER - III

L	T	P	C
3	0	0	3

Total Hours: 39

DEVELOPMENT OF SMALL BUSINESS **SUBJECT CODE: U3CM26ST**

OBJECTIVE:

- 1.To learn the skill of various business ideas, Forms of organization and MSMEs.
2. The main aims of the course are to familiarize students with various concepts used in understanding processes involved in entrepreneurship and business formation and development.
3. Introduce key debates around entrepreneurship and small businesses and provide evidence which informs those debates.

UNIT – I INTRODUCTION TO MICRO, SMALL AND MEDIUM ENTERPRISES

Meaning of Small Scale Enterprises – Objectives of Micro, Small and Medium Enterprises Act of 2006 (MSME) – Importance of MSMEs – Advantages – Problems – Measures of the Government to Develop Small Industries.

UNIT-II BUSINESS IDEA

Steps for Starting a Small Industry – Search for Business Idea, Sources of Ideas – Project Formulation and Design.

UNIT-III FORMS OF ORGANIZATION

Selection of Type of Organization – Sole Proprietorship, Partnership – Joint Stock Company – Factors Influencing the Choice of Organization.

UNIT-IV PROJECT FINANCE

Sources of Project Finance – Short Term, Medium Term and Long Term Finance – Role of Banks – Institutions Assisting Small Enterprises – District Industries Centres (DICs), Industrial Estates, SIDO, NSIC, SIDCO, SISIs and SIPCOT.

UNIT-V INCENTIVES AND SUBSIDIES

Incentives and Subsidies – Meaning – Need and Problems – Schemes of Incentives for SSI Units – Taxation Benefits to SSIs.

CO1	Understand the concept of MSME
CO2	Create knowledge on self employment
CO3	This course provides the students with an in-depth understanding of key concepts in entrepreneurship and business development.
CO4	It will cover the different types of entrepreneur here – social, serial and lifestyle.
CO5	Finance and small business and development strategies designed to develop business and businesses. Prerequisites
CO6	Identify the key steps required to initiate and develop a business of MSME
CO7	Understand and apply financial and planning process within the development of a business.

TEXT BOOK:

C.D.Balaji, G.Prasad, “Business Organization” Margham Publications, Chennai, 1st Edition 2007.

REFERENCE BOOKS:

1. R.N.Gupta, “Business Organization”, S Chand Publication, 1st Edition, 2006.
2. Y.K.Bhusan-Business Organization Sultan Chand & Sons., New Delhi, 7th Edition, 2009.
3. R.N.Guptha, “Business Organization & Management” S.Chand & Co. New Delhi, 9th Revised Edition,

SEMESTER III

L	T	P	C
2	0	0	2

TOTAL HOURS:26

NON MAJOR ELECTIVE

INTRODUCTION TO INFORMATION TECHNOLOGY

SUBJECT CODE: U3CS01NM

OBJECTIVES:

1. After successfully completing this course, you should find that you have:
2. Learned the concepts of a computer-based information Processing system
3. Developed an understanding of the terminologies unique to the computer science field.
4. Acquired the ability to use selected commercial application packages.

UNIT I:

Introduction: History of Computer - Parts of Computer System - Hardware Devices - Software - Operating System - Examples of Operating systems - Computer Networking - Visual Editor.

UNIT II:

Microsoft Word - Microsoft Excel - Microsoft PowerPoint.

UNIT III:

Introduction to Multimedia - Images - Sound -Video Desktop Publishing Basics - Page layout Programs - Text Generation - Graphics for DTP - Print Production.

UNIT IV:

Introduction to Internet - Working of Internet - Internet Services - Internet Addressing - E-Mail Basics - Web Development Tools - Introduction to HTML

UNIT V:

Information System - Management Information concepts - Planning Issues and the MIS - Organizing Issues and the MIS - Control Issues and the MIS - Decision Support Systems.

CO1	After completing this course student should be able to more effectively use their computers as tools for business, entertainment or study.
CO2	Also it should have more complete and detail understanding of the role computers play in our daily lives.
CO3	Students should also be better able to use the internet and WWW as a research and information sharing resource.
CO4	It covers the different types of Applications in the real time.
CO5	It helps to apply the techniques of internet
CO6	Students obtained knowledge on HTML
CO7	Provide knowledge on MIS

Text Book:

1. Sanjay Saxsena, “A First Course in Computer”, Vikas Publishing House, 2nd Edition, 2000.

Reference Books:

1. Ron Mansfield, “Working in Microsoft Office”, Tata Mcgraw Hill, 3rd Edition, 2009.
2. Linda Tway, Sapphiro Pacific Lajolla, “Multimedia in Action”, Academic Press, 5th Edition, 2008.
3. Neil Randal “Teach yourself the internet in a week”, Prentice Hall of India, 2nd Edition, 1996.

SEMESTER - IV

L	T	P	C
5	0	0	5

Total Hours: 65

ADVANCED CORPORATE ACCOUNTING

SUBJECT CODE: U4CM21MT

OBJECTIVE:

1. The objective is to enable the students to develop awareness about Corporate Accounting in conformity with the Provision of Companies" Act and latest amendments thereto with adoption of Accounting Standards.
2. Construct the financial statements of company within the frame work .
3. Develop a process for redemption of Preference shares

UNIT – I VALUATION OF GOODWILL

Valuation of Goodwill – Need – Factors Effecting the Valuation – Methods – Average Profit, Super Profit, Annuity and Capitalization Methods, Valuation of Shares: Need – Factors Effecting the Valuation – Net Asset, Yield and Fair Value Methods

UNIT-II HOLDING COMPANIES

Accounts of Holding Companies – Minority Interest – Cost of Control – Elimination of Common Transactions – Unrealized Profits – Revaluation of Assets and Liabilities – Bonus Shares – Consolidated Balance Sheet (Inter Company Investment Excluded)

UNIT-III BANK ACCOUNTS

Bank Accounts: Rebate on Bills Discounted, Interest in Doubtful Debts, Preparation of Profit and Loss Account and Balance Sheet with Relevant Schedules (New Method) – Non-performing Assets (NPA)

UNIT-IV INSURANCE COMPANY ACCOUNTS

Insurance Company Accounts: Life Insurance – Revenue Account, Valuation Balance Sheet and Balance Sheet (New Method). General Insurance Fire and Marine Revenue Account, Profit and Loss Appropriation Account and Balance Sheet (New Method)

UNIT-V INFLATION ACCOUNTING

Inflation Accounting (Accounting for Price Level Changes) – Limitations of Historical Accounting – Current Purchasing Power Method – Current Cost Accounting Method – Hybrid Method – Preparation of Income Statement – Profit and Loss Account and Balance Sheet.

(Weightage of Marks, Problems - 80%, Theory - 20%)

CO1	Compute Value of Shares and Goodwill.
CO2	Prepare the final accounts of Joint Stock companies
CO3	Prepare the accounts of companies undergoing amalgamation and external reconstruction
CO4	Implement the Alteration of Share Capital.
CO5	Analyze the Preparation of Final Accounts.
CO6	Know the concepts of Liquidation of companies.
CO7	Remember the Underwriting of Debentures.

TEXT BOOK:

T.S. Reddy & A. Murthy, "Corporate Accounting" Margham Publications, Chennai, 6th Edition-2014

Reference Books:

1. S N Maheshwari, S K Maheshwari, "Corporate Accounting", Vikas Publishing Pvt Ltd, 4th Revised Edition 2004.
2. Gupta R.L. & Radhaswamy M, "Corporate Accounting", Sultan Chand & Sons, New Delhi, 4th Edition.
3. S. P. Jain and K. L. Narang – "Corporate Accounting", Kalyani Publishers, New Delhi 7th Edition – 2000.

SEMESTER - IV

L	T	P	C
5	0	0	4

Total Hours: 65

COMPANY LAW

SUBJECT CODE: U4CM22MT

OBJECTIVE:

1. The objective is to enable the students to get familiarized with the existing Company Law and Secretarial Procedure.
2. Describes the concept of limited partnership and limited partnership will be able to distinguish them from other partnerships
3. Explains the reason for termination of the joint stock company

UNIT – I INTRODUCTION TO COMPANY

Introduction – Meaning and Definition of a Company – Characteristics of a Company – Advantages – Limitations – Types of Companies – Distinction between a Private Company and a Public Company

UNIT-II FORMATION OF A COMPANY

Formation of a Company – Promotion – Functions of a Promoter – Memorandum of Association – Meaning – Contents – Purpose – Articles of Association – Meaning – Contents – Distinction between Memorandum and Articles.

UNIT-III PROSPECTUS

Prospectus – Meaning – Requirements of a Prospectus – Conditions for a Prospectus – Objects of Issuing a Prospectus – Contents – Liability for Mis-Statement – Remedies for Mis-Statement – Statement in Lieu of Prospectus.

UNIT-IV MEMBERS OF A COMPANY

Members of a Company – Meaning and Definition – Who can become a Member? – Rights of the Members – Liabilities of the Members – Termination of Membership

UNIT-V DIRECTORS OF A COMPANY AND WINDING UP

Directors of a Company – Definition – Who is eligible to become a Director? – Number of Directorships – Appointment of Directors – First Directors – Subsequent Directors – Vacation of Office – Removal of Directors – Positions of the Directors – Powers, Duties and Liabilities of Directors – Winding up of a Company – Meaning – Methods of Winding up – Powers and Consequences.

CO1	Know the basic elements of forming an enforceable contract and agreement.
CO2	Classify various negotiable instruments and reason of its dishonor.
CO3	Enumerate the types of companies its management and its rules of corporate governance.
CO4	Demonstrate an understanding of the key characteristics of businesses run as sole traders
CO5	Determine what are the assets and liabilities of a business using numeracy skills
CO6	Enumerate the Ethical principles and commit to corporate ethics, responsibilities and norms of the corporate practices.
CO7	Gain knowledge of company directors

TEXT BOOK:

M.R.Sreenivasan,"Company Law", Margham Publications, Chennai, 2nd Edition 2017.

REFERENCE BOOKS:

- 1.Kathiresan and Radha,"Company law" Prasanna Publishers, Madras, Edition2014.
- 2.N.D.Kapoor, "Company Law" S Chand Publication, Edition 2014.
3. J. Santhi, "CompanyLaw" (as per Company Act 2013) Margham Publication, Chennai 2018.

SEMESTER - IV

L	T	P	C
5	0	0	4

Total Hours: 65

BANKING LAW AND PRACTICE **SUBJECT CODE: U4CM23MT**

OBJECTIVE:

1. The objective is to familiarize the students with the law and practice of Banking.
2. To acquire knowledge about banking laws in India as it is must for management students.
3. To have conceptual clarity about the process of banking, product and stakeholders with reference to particular acts passed in India.

UNIT – I INTRODUCTION TO BANKING

Banker – Customer Relationship – Meaning of Banker and Customer – Customer – Old View – Duration Theory and Modern View – Relationship Between Banker and Customer – General Relationship – Debtor and Creditor – Special Relationship – Bailor and Bailee, Principal and Agent, Trustee and Beneficiary, Banker as Adviser – Rights of a Banker – Right of set of Right of lien – Law of Limitation, Right of Appropriation – Obligations (Duty) – Duty to honor Cheques, Duty to Maintain Secrecy, Duty not to Close the Account of the Customer with Proper Notice – Opening of Bank Account – General Precaution to be taken by a Bank –Special Type of Banker's Customer – Minor, Club, Societies, Partnership, Joint Stock Companies, Joint Account – Closing of a Bank Account.

UNIT-II NEGOTIABLE INSTRUMENTS

Negotiable Instruments – Meaning – Characteristics – Types – Cheque, Promissory Note, Bills of Exchange – Differences between Promissory Note and Bills – Bill and Cheque – Cheque – Meaning – Features of a Cheque – Specimen of a Cheque – Material Alterations.

UNIT-III CROSSING OF CHEQUES

Crossing of Cheques – Meaning – Objects – Types – General, Special and Double Crossing – Its Significance – Parties Eligible to Cross. Endorsement – Meaning – Rules for Endorsement or Essentials of a Valid Endorsement – Kinds – Significance.

UNIT-IV PAYMENT AND COLLECTION OF CHEQUES

Payment of Cheques – Paying Banker – Role of a Paying Banker – Duties of a Paying Banker – Precautions by the Paying Banker – Statutory Protection to the Paying Banker – Refusal of Payment of Cheques. Collection of Cheques – Collecting Banker – Meaning – Capacity of the Collecting Banker – Precautions to be taken by the Collecting Banker – Statutory given to the Collecting Banker – Negligence – Duties and Responsibilities of a Collecting Banker – Procedure for Collectio

UNIT-V SHORT TERM BANKING INSTRUMENTS

Short term Banking Instruments- Meaning – Certificate of Deposits- Commercial Papers – Mortgage, Pledge and Hypothecation of Certificate of Deposits.

CO1	Cultivate the skill of applying concepts and techniques used in Commerce effectively and efficiently in a business environment and Communicate effectively in different contexts.
CO2	Ethical and collegial in professional practice. Integrate knowledge, skill and attitude that will sustain an environment of learning and creativity among the students
CO3	Analyze socio-political-economic environment of business organizations
CO4	Recognize features and roles of businessmen, entrepreneur, managers, consultant, which will help learners to possess knowledge and other soft skills
CO5	Inclination towards lifelong learning and pursuing professional courses like CA , ACS etc
CO6	Carry out advanced research in the field of Commerce, banking and finance.
CO7	React apply when confronted with critical decision making.

TEXT BOOK:

B.Santhanam, “Banking Law and practice ”, Margham Publications, Chennai, 4th Edition 2018.

Reference Books:

1.Shekhar & Shekhar, “Banking Theory and practice”, Vikas Publishing Pvt Ltd, 18th Edition 1998.

2.Sundharam & Vershney,”Banking and Financial System”, Sultan Chand & Sons, New Delhi, 7th Edition 2000.

3. Vasant Desai, “Indian Banking”, Himalaya Publishing House, Mumbai, Second Edition 1987.

L	T	P	C
5	0	0	3

SEMESTER - IV

BUSINESS ECONOMICS II **SUBJECT CODE: U4CM24MT**

OBJECTIVE:

1. The objective is to familiarize the students with the industrial policy and fiscal economics.
2. To understand the functioning of economy at the macro level.
3. To Understand how the economy is regulated through monetary and fiscal policies

UNIT-I COST AND REVENUE ANALYSIS

Cost and Revenue analysis - Different types of cost and their relations to each other - Average cost - Marginal cost etc. - Various types of revenue curves short term and long term - Diagrammatic representation.

UNIT-II MARKET STRUCTURE AND PRICING

Market structure and pricing - Pricing under perfect competition - Pricing under monopoly - Pricing under monopolistic competition.

UNIT-III DISTRIBUTION THEORY

Distribution - Theories of distribution - Theories of profits.

UNIT-IV DISTRIBUTION - THEORIES

Government and Business - Industrial Policy - National Income Computation - Gross Domestic Products - National Income in India - Contribution.

UNIT-V FISCAL ECONOMICS

Fiscal Economics - Revenues and Public expenditure - Canon of Taxation - Fiscal policy of India.

CO1	stand the basic concepts of Economics.
CO2	ify the Demand and Supply functions.
CO3	r the Behaviour of consumer and marginal utility.
CO4	ibe the Producers equilibrium and Break Even Analysis.
CO5	mber the importance of Product pricing
CO6	To react apply when confronted with forecasting techniques
CO7	It focuses mainly upon the theory of the business

TEXT BOOK:

S. Sankaran, "BusinessEconomics", Margham Publication, Chennai, Revised Edition 2008.

REFERENCE BOOKS:

1. V.G Mankar, "Business Economics", Macmilan India Ltd., New Delhi, 1st Edition 1999.
2. R.K.Lekhi, "Business Economics", Kalyani Publishers, Chennai, 1st Edition 2004.
3. D.M.Mithani, "International Economics", Himalaya Publishing House, 4th Revised Edition 2003.

SEMESTER - IV

L	T	P	C
5	0	0	3

Total Hours: 65

STATISTICS AND OPERATION RESEARCH II

SUBJECT CODE: U4CM25AT

OBJECTIVES :

- 1.To apply Statistics methods and operation research for Mathematical Problems
2. To understand the knowledge of Transportation problems.
- 3.To get wider knowledge on various applicability of statistical tool.

Unit – I Correlation and Regression

Correlation - Definitions – Karl Pearson's Coefficient of Correlation - Rank Correlation – Regression Equations.-Properties-Simple problems.

2. To understand the concepts of Time serieses and Index number.
3. To Understand how the statistics tool applied

Unit – II Index Number

Index Number – Definition – Uses – Un weighted Index Number , Simple Aggregate Price Index , simple Average of Price relatives Index – Weighted index – Laspeyre's Paasche , Dorbish Bowly's – Marshall edge worth, Fisher ideal index – time and Factor reversal test – Cost of living index.

Unit – III Time Series

Time Series – Definition and Uses – Components – semi average moving average – method of least square – seasonal variation – simple average method - Interpolation: Definition – Newton (Forward only) – Lagrange's .

Unit – IV Transportation problem

Transportation problem-Definition-balanced Transportation problem-Finding initial solution-North west corner Rule-Least cost method-Vogels approximation method.

Unit – V Assignment problem

Assignment problem- Definition- Hungarian method- finding solution to TP minimization- Unbalanced assignment problem- finding solution to Minimization- Solving cost missing Assignment problem

CO1	Finding the relationship between the two sets of data
CO2	Drawing the trend line for a given data
CO3	Computing the various types of index numbers
CO4	Minimizing the cost for a given transportation problem
CO5	Assigning machines or persons to do a given job
CO6	Knowing about various methods to solve a statistical problem
CO7	Learning about chain based and fixed based index

PRESCRIBED BOOK

R.S.N.Pillai & Bhagavathi - Statistics

Reference Books:

1. J.J. Sharma - Business Statistics – Pearson Education
2. B.Agarwal - Basic statistics – Wiley Eastern.
3. Dr. S.P.Guptha – Statistical methods – Sultan Chand
4. Hamady and A.Trade – Operation Research – Macmillan
5. Dr.S.P.Guptha – Business statistics and operation research
6. P.R.Vittal –An introduction to operation research

SEMESTER - IV

L	T	P	C
3	0	0	3

Total Hours: 39

INDUSTRIAL ORGANISATION **SUBJECT CODE: U4CM26ST**

OBJECTIVE:

1. The objective of this subject is to acquaint students with the Industrial organization.
2. To identify the formation and functions of various forms of business firm
3. To find the layout of the organisation

UNIT-I INDUSTRIAL TO INDUSTRIAL REVOLUTION

Principles of Industrial Revolution – Industrial Growth – Mass Production – Aggregation, Consolidation and Integration – Specialization, its Advantages and Disadvantages – Division of Labour, its Advantages and Disadvantages.

UNIT-II FORMS OF ORGANISATIONS

Industrial Ownership – Sole Proprietorship, Partnership and Joint Stock Companies – Advantages and Disadvantages

UNIT-III PLANT LOCATION – LAYOUT

Plant Location – Layout – Types of Layouts - Plant Design – One Story and Multi-Story Plants – Building Design for Industrial Fire Prevention, Fireproof Buildings – Its Walls, Floors, Doors and Window – The Power Factor, Plant Communication Systems – Employee Facilities

UNIT-IV INVENTORY CONTROL

Purchasing and Inventory Control – Purchasing Policies – Need for Inventory Control.

UNIT-V PRODUCTION CONTROL

Production Control – Need – Essential of Planning, Assembly, Scheduling and Dispatching – Time and Motion Study – Inspection and Quality Control – Reasons and Basis for Inspection - Methods of Inspection – Inspection of Purchase, Inspection during Manufacture.

CO1	Understand how price and non-price competition among firms affect economic welfare.
CO2	Analyze and evaluate models of competitive, oligopolistic, and monopoly markets.
CO3	Analyze and evaluate how firms' structure and conduct affect economic welfare and how these results feed back to effect structure and conduct.
CO4	Remember the importance of Plant layout
CO5	It focuses mainly upon the theory of the firm and the industry
CO6	The knowledge that the student will derive from the course is useful for further study of firms and markets as well as the effects of regulatory and legal systems
CO7	Will focus upon market structure, firm conduct, and economic performance of industries.

TEXT BOOK:

A Murthy, "Industrial Organization" Margham Publications, Chennai, 1st Edition 2011.

Reference Books:

1. C.D Balaji, G.Prasad, "Business Organization", Margham Publications, Chennai, 1st Edition 2007.
2. Kimball & Kimball, "Principles of Industrial organization" Tata McGraw-Hill, Edition 2014.
- 3.L Bethel, Atwater, Smith and Stackman,"Industrial organization and management", Tata McGraw – Hill, Edition 2014.

L	T	P	C
2	0	0	2

SEMESTER IV

NON MAJOR ELECTIVE

TOTAL HOURS: 26

INTERNET AND ITS APPLICATIONS

SUBJECT CODE: U4CS01NM

OBJECTIVES:

1. Understand the importance of the Internet in the real world.
2. Understand the client-server model of the Internet.
3. Understand how to design the web pages.

UNIT I:

Introduction to Computers- Programming Language types- History of Internet- Personal Computers- History of World Wide Web- Micro software .NET Java-Web resources.

UNIT II:

Web Browsers- Internet Explorer- connecting to Internet- Features of Internet explorer6- Searching the Internet- online help and tutorials- File Transmission Protocol (FTP) -Browser settings.

UNIT III:

Attaching a file, Electronic mail -Creating an E-mail ID- Sending and Receiving mails- attaching a file- Instance messaging - other web browsers.

UNIT IV:

Introduction to HTML headers- Linking- Images-special characters and line breaks- unordered lists- simple HTML programs.

UNIT V:

E-marketing -consumer tracking- Electronic advertising- search engine-CRM- credit card payments- Digital cash and e-wallets- micro payments- smart card .

CO1	Describe the general principles of data communication.
CO2	Describe how computer networks are organized with the concept of layered approach.
CO3	Describe how signals are used to transfer data between nodes.
CO4	Implement a simple LAN with hubs, bridges and switches.
CO5	Describe how packets in the Internet are delivered.
CO6	Analyze the contents in a given data link layer packet, based on the layer concept
CO7	Design logical sub-address blocks with a given address block.

Text book:

1. H.M.Deitel, P.J. Deitel and A.B.Goldberg, “Internet and World Wide Web”, PHI, 5th Edition, 2012.

Reference Books:

1. Harley hahn, “The Internet- Complete Reference”, Tata McGraw Hill, 2nd Edition, 2008.
2. Thomas A.Powell, “The Complete Reference HTML”, TMH, 2nd Edition, 2006.
3. Douglas Comer, “The Internet Book”, Pearson Education, 3rd Edition, 2007.

SEMESTER - V

6	0	0	5

Total Hours: 78

**CORE PAPER - XIII
COST ACCOUNTING I**

SUBJECT CODE: U5CM21MT

OBJECTIVE

- 1.To familiarize the students on the use of cost accounting system in different nature of businesses.
- 2.Describe the Fundamental Concepts of Cost Accounting Apply Cost Accounting Methods to
- 3.Identify Profitable Products and Services.

UNIT-I: NATURE AND SCOPE OF COST ACCOUNTING

Cost Accounting : Nature and Scope – Objectives, Advantages and Limitations – Financial Vs. Cost Accounting, Cost System : Types of Costing and Cost Classification – Cost Sheet and Tenders – Cost Unit – Cost Center and Profit Centre.

UNIT-II: MATERIAL PURCHASE AND CONTROL

Purchase Department and its Objectives – Purchase Procedure – Classification and Codification of Materials, Material Control: Levels of Stock and EOQ.

UNIT-III: METHODS OF PRICING OF MATERIAL ISSUES

Cost Price Methods: FIFO, LIFO, Average Price Methods : Simple and Weighted Average Price Methods, National Price Methods : Standards Price, and Market Price Methods

UNIT-IV: LABOUR COST CONTROL

Labour Turnover: Causes, Methods of Measurement and Reduction of Labour Turnover – Idle and Over Time – Remuneration and Incentives: Time and Piece Rate – Taylor's Merricks and Gantt's Task – Premium Bonus System – Halsey, Rowan and Emerson's Plans. Calculation of Earnings of Workers.

UNIT-V: OVERHEADS

Classification of Overhead Costs – Departmentalization of Overheads — Primary and Secondary Distribution.

(Weightage of Marks, problems 80%, theory 20%)

CO1	Students will be able to understand the meaning cost, costing and Cost Accounting, Advantages and Disadvantages of Cost accounting
CO2	Understand attendance and payroll system, Methods of Labour Turnover, remuneration and bonus methods also be able to calculate labour cost.
CO3	understand different types of overheads and its classification into various heads
CO4	Understand cost unit, cost centre and calculation of various costs. They shall also able to prepare a cost sheet to find out cost and net profit/net loss
CO5	Understand the integrated and non-integrated accounting system and to know how to prepare a reconciliation statement
CO6	Students will be able to acquaint with the procedure of storekeeping, documentation of material receipt and issue, how to use a technique for setting stock levels, calculation of Economic Order Quantity
CO7	Understand the Methods of valuation of inventory and importance of ABC analysis for classification of the various materials

TEXT BOOK:

T.S. Reddy & Hari Prasad Reddy, “Cost Accounting”, Margham Publications, Chennai 4th Edition -2017

REFERENCE BOOKS:

1. S.P.Jain and Narang,” Cost Accounting”, Kalyani Publishers, New Delhi 7th Edition – 2012.
2. S.N.Maheswari, “Principles of Cost Accounting”, Sultan Chand & sons, New Delhi, 9th Edition 2010.
3. S.P.Iyengar, “Cost Accounting”, Sultan Chand & Sons, New Delhi. 9th Edition,2012

SEMESTER - V

L	T	P	C
6	0	0	5

Total Hours: 78

**CORE PAPER - XIV
PRACTICAL AUDITING**

SUBJECT CODE: U5CM22MT

OBJECTIVE:

- 1.This subject aims at imparting knowledge about the principles and methods of auditing and their applications.
2. Outline the major practical provisions of the Statements on Auditing Standards (SASs-AUs) and Auditing Standards.
3. Outline the steps involved in the compilation engagement and the review engagement.

UNIT-I : INTRODUCTION TO AUDITING

Meaning and Definition of Auditing – Nature and Scope of Auditing – Accountancy and Auditing, Auditing and Investigation – Objectives of Auditing – Limitations of Audit – Advantages of Audit – Classification of Audit

UNIT-II : AUDIT PROGRAMME & INTERNAL CHECK, CONTROL

Meaning and Definition of Audit Programme – Advantages and Disadvantages – Audit File, Audit Note Book, Audit Working Papers – Purposes and Importance of Working Papers – Internal Check – Meaning, Object of Internal Check – Features of Good Internal Check System – Auditors Duty in Regards to Internal Check System – Internal Check and Internal Audit

UNIT-III : VOUCHING OF BOOKS & RECORDS

Vouching – Meaning of Vouching – Importance – Objects – Vouching of Cash Transactions – Verification of Assets and Liabilities – Meaning of Verification – Objectives – Distinction between Vouching and Verification – Distinction between Valuation and Verification

UNIT-IV : POWERS & DUTIES OF AUDITORS

Company Auditors – Qualification and Disqualification of an Auditor – Appointment and Removal of an Auditor – Powers and Duties of Auditors – Liabilities of an Auditor

UNIT-V : IMPORTANCE OF AUDIT REPORT

Auditor's Report – Importance of Auditor's Report – Contents of Audit Report – Kinds of Reports – Qualified Report.

CO1	Understand the basic concepts and Objectives of Auditing
CO2	Analyze the Vouching, Verification and Valuation of Assets and Liabilities
CO3	Remember the types of Audit and Accounting Standards
CO4	Apply how to report and audit and to understand the rights and Auditors
CO5	Analyze the recent trends in Auditing
CO6	Understand Audit Programme, Audit Evidence, procedure, techniques and Audit working papers.
CO7	Understand how an asset or a liability can be verified by applying certain audit techniques.

TEXT BOOK:

Premavathy, “ Practical Auditing”, Margham Publication, Chennai. 11th Edition- 2016.

REFERENCE BOOKS:

1. B.N. Tandon, “A handbook of practical Auditing”,Sultan Chand & Sons,New Delhi. 3rd Edition, 2010.
2. B.N. Tandon, Sudharsanam, Sundharabahu, –“Practical Auditing”, S Chand New Delhi. 4th Edition 2009.

SEMESTER - V

L	T	P	C
5	0	0	4

Total Hours: 65

CORE PAPER - XV
BUSINESS MANAGEMENT
SUBJECT CODE: U5CM23MT

OBJECTIVES:

1. The objective is to familiarize the students with concepts and principles of Management.
2. To provide them tools and techniques to be used in the performance of the managerial job.
3. To help the students to develop cognizance of the importance of management principles.

UNIT-I : CONCEPT OR INTRODUCTION OF MANAGEMENT

Concept of Management – Meaning and Definitions – Nature and Characteristics of Management – Management Vs Administration – Levels of Management – Importance of Management and Scope of Management - Principles

UNIT-II : PLANNING

Process of Management – Planning – Its Nature, Need Characteristics, Objectives and Importance of Planning – Types of Planning – Principles of Planning – Steps in Planning Process – Planning Premises – Forecasting – Decision Making

UNIT-III : ORGANIZING

Organizing – Principles of Organization – Staffing Functions and Importance of Staffing – Departmentation - Authority and Responsibility – Organization Charts and Manual – Job Analysis and Job Evaluation

UNIT-IV : DIRECTING

Directing : Principles of Delegation – Delegation Vs Decentralisation – Principles and Techniques of Directing – Span of Supervision – Fundamentals of Effective Supervision – Role of Communication

UNIT-V : LEADERSHIP

Leadership – Qualities of a Good Leader – Types of Leadership – Co-ordination and Control – Problems in Co-ordination – Steps Involved in Control Process.

CO1	Understand the Various techniques of Management Principles.
CO2	Prepare the Financial Statement Analysis.
CO3	Analyze the Ratio Analysis.
CO4	Evaluate the Cash flow and Marginal costing
CO5	To know the preparation of Budgets for planning and control purposes
CO6	It is one of the analytical method which helps the students to carry out the study of financial statements in the form of ratio and such study is more expressive.
CO7	Will be able to frame estimate of Working-Capital/ projection of Working Capital

TEXT BOOK:

J.Jayashankar, “Principles of Management” –Margham Publications, Chennai.2nd Edition 2018.

REFERENCE BOOKS:

1. C.B.Gupta – “Business Management” – Sultan Chand & Sons New Delhi,3rd Edition 1999.
2. Dingare Pagre – “Business Management” – Sultan Chand & Sons New Delhi 4th Edition 1999.
3. Koontz, Weihrich and Aryasri “Principles of management” – & Tata McGraw Hill ,New Delhi 2007.
4. L.M.Prasad,” Principles & Practice of Management” – Sultan Chand & Sons 4th Edition .
New Delhi
. 2010

SEMESTER - V

L	T	P	C
5	0	0	4

Total Hours: 65

CORE PAPER - XVI MANAGEMENT ACCOUNTING

SUBJECT CODE: U5CM24MT

OBJECTIVE

- 1.The objective of this subject is to enable the students to understand the analysis and interpretation of financial statements with a view to prepare management reports for decision-making.
2. To. analyzes the relationship between the cost-volume and profit
3. To understand break-even sales price, break-even sales volume, the total contribution margin, the unit contribution margin, margin of safety, security ratio, profit margin concepts

UNIT-I : INTRODUCTION TO MANAGEMENT ACCOUNTING

Management Accounting: Definition, objectives functions – Advantages and limitations – Financial Statement Analysis – Comparative and Common size statements – Trend Analysis

UNIT-II : RATIO ANALYSIS

Ratio Analysis : Definition – Significance and Limitations – Classification – Liquidity, Solvency, Turnover and Profitability ratios – Computation of Ratios from Financial Statements – Preparation of Financial Statement from Ratios

UNIT-III : FUND FLOW STATEMENT & CASH FLOW STATEMENT

Fund Flow and Cash Flow Analysis: Concept of Funds, Sources and Uses of Funds – Fund Flow Statement – Concept of Cash Flow – Cash Flow Statement as Per AS3

UNIT-IV : BUDGETARY CONTROL

Budget and Budgetary Control: Definition – Objectives – Essentials – Uses and Limitations – Preparation of Material Purchase, Production, Sales, Cash and Flexible Budget – Zero Base Budgeting

UNIT-V : CAPITAL BUDGETING

Capital Budgeting : Concepts – Nature – Advantages and Limitations – Ranking Investment Proposals – Pay Back Period, ARR, NPV, IRR and Present Value Index. **(Weightage of Marks, Problems - 80%, theory - 20%)**

CO1	Enhance the abilities of learners to develop the concept of management accounting and its significance in the business.
CO2	It enables to enhance the abilities of learners to Analyses the financial statements.
CO3	Enable the learners to understand, develop and apply the techniques of management accounting in the financial decision making in the business corporates.
CO4	Helps to make the students develop competence with their usage in managerial decision making and control.
CO5	Develop an understanding of the conceptual framework of the Management Accounting.
CO6	Provides the knowledge in the Management Accounting Techniques in business decision making.
CO7	Analyses cost behavior, perform cost-volume-profit analysis and profit planning

TEXT BOOK:

T.S.Reddy & Hari Prasad Reddy – “Management Accounting” – Marham Publications, Chennai , 3rd Edition, 2015.

REFERENCE BOOKS:

1. S.N.Maheswari –“ Management Accounting “– Sultan Chand & Sons, New Delhi 5th Edition, 2012.

2.M.Wilson “Accounting for management” – Scitec Publications (India)Pvt Ltd., Chennai, 2011.

SEMESTER - V

L	T	P	C
5	0	0	4

Total Hours: 65

**ELECTIVE PAPER
INCOME TAX LAW & PRACTICE - I**

SUBJECT CODE: U5CM25ET

OBJECTIVE

- 1.The Objective of this subject is to expose the students to the various provisions of Income Tax Act 1961 relating to computation of Income of individuals.
- 2.Students will be able to compute income from salaries, house property, business/profession, capital gains and income from other sources.
- 3.To provide theoretical knowledge in the field of tax planning.

UNIT-I : INTRODUCTION TO TAXATION

Objectives of Taxation – Direct and Indirect Taxes – Definitions in Income Tax Act 1961 – Person, Assesses Income – Previous Year Vs Assessment Year - Residential Status – Incidence of Tax

UNIT-II : SALARY INCOME

Heads of Income – Salaries, Definition – features – perquisites – Pension – Leave encashment – Provident fund.

UNIT-III : ALLOWANCES & DEDUCTIONS

Allowances'-Profit in Lieu of Salary - Gross Salary - Computation of Salary – Deductions.

UNIT-IV : HOUSE PROPERTY INCOME

Income from House Property – Annual Value – Gross annual value – Net annual value – Self Occupied House – Let out House – Deemed to be let out House – Partly let out & Self Occupied – Deductions.

UNIT-V: BUSINESS OR PROFESSION INCOME

Profits and Gains of Business or Profession – Expressly Allowed and Disallowed Deductions .

(Weightage of Marks, Problems - 50%, theory - 50%)

CO1	Understand the concept and Objectives of Taxation.
CO2	To acquaint the students with certain basic terms of Income Tax.
CO3	To acquaint them with computational provisions under the heads “Salary Income” , “Income from House Property” , “Profits and Gains of Business / Profession” , “Capital Gains” , “Income from other Sources” and head wise computation for these heads of income.
CO4	To acquaint them with certain deductions from total income and basic computation of total income for individual assesses.
CO5	To acquaint them with residential status and scope of total income
CO6	To acquaint them with exemptions under section 10.
CO7	To acquaint the students with application of above provisions to various practical situations.

TEXT BOOK:

A.Murthy –“Income Tax Law & Practice” - Vijay Nichole Publications, Chennai, 3rd Edition, 2014.

REFERENCE BOOKS:

1. Dr. H.C.Mehrotra“ Income Tax Law and Practice “, 2014.
2. Gaur and Narang “Income Tax Law and Practice” Kalyani publications, 5th Edition, 2007.
3. T.S.Reddy and Hariprasad “Income Tax Law and Practice”, Margham publication, Chennai. – 13th Edition 2014.

SEMESTER – V

L	T	P	C
5	0	0	4

Total Hours: 65

ELECTIVE PAPER PERSONNEL MANAGEMENT SUBJECT CODE: U5CM26ET

OBJECTIVE

- 1.The objective is to familiarize the students with concepts and principles of personnel Management.
2. Compare and contrast the techniques of OD at individual level and group level in accordance with attitude formation and change of mindset of consumers.
3. Integrate the productivity with combined effect of Team development, quality circle and Quality of work life balance among the employees of an organization

UNIT-I : SCOPE & NATURE OF PERSONNEL MANAGEMENT

Personnel Management – Definition – Significance – Scope – Functions – Qualities of a Good Personnel Manager

UNIT-II : MANPOWER PLANNING

Manpower Planning – Benefits – Problems and Limitations – Planning Job Requirements – Job Description and Job Evaluation – Skill Analysis

UNIT-III : MANPOWER REQUIREMENT

Manpower Requirement – Sources – Selection – Tests – Employee Orientation and Training – Training Needs and Objectives

UNIT-IV : MOTIVATION & MORALE

Labour Productivity – Motivation – (Theories Excluded) – Financial and Non-Financial Incentives – Morale – Absenteeism – Causes – Employee Turnover

UNIT-V : LEADERSHIP

Personnel Supervision – Leadership – Styles – Leadership Qualities.

CO1	Develop the understanding of the concept of personal management.
CO2	Strategic issues and strategies required to select and man power resources.
CO3	Integrate the Human Resource knowledge to take correct Business decisions.
CO4	Understand the Importance of Training and Development
CO5	Know the various Incentives Schemes
CO6	Identify the Motivational Techniques
CO7	Understand the various types of Performance Appraisal

TEXT BOOK:

P C Thirupathi, “Personnel Management and Industrial Relations”Sultan Chand & Sons , New Delhi 21st Edition, 2015.

REFERENCE BOOKS:

1..S.Davar , “Personnel Management” Himalayas publishing house. New Delhi.10th Edition . 2006.

2.Asathappa K., “Human resource and Personal Management”,Tatta MC Graw Hill Publishing Ltd., New Delhi,

3.Memoria.C.B., Personnel Management Himalaya publishing house New Delhi, 4thEdition1992.

SEMESTER - V

L	T	P	C
3	0	0	2

Total Hours: 39

**SKILL BASED SUBJECT - III
MERCHANT BANKING**

SUBJECT CODE: U5CM27ST

OBJECTIVE:

The objective is to provide students with a conceptual framework of stock markets and Commodity Markets,

2. To know about functionaries in these markets and their mode of trading.
3. To understand the concept of merchant banking.

UNIT-I : MERCHANT BANKING - OVERVIEW

Merchant Banking – Definitions and Functions – Regulatory Framework – Registration of Merchant Bankers – Procedure Capital Adequacy Requirement – Lead Merchant Banker Appointment, Restrictions and Responsibilities

UNIT-II : PUBLIC ISSUE MANAGEMENT

Public Issue Management – Functions and Mechanism – Categories of Issue – Issue Manager – Category and Restrictions Activities Involved in Public issue Management – Marketing of New Issues – Methods – Pricing of Rights and Other Public Issues

UNIT-III : POST ISSUE MANAGEMENT

Post Issue Management – Allotment / Dispatch of Shares / Refunds – Basis of Allotment – Procedure – Listing Requirements of Stock Exchanges – Advantages – Listing Requirements of OTCEI

UNIT-IV : CAPITAL & MONEY MARKET INSTRUMENTS

Capital Market Instruments – Meaning and Types – Commercial Paper – Issue of Commercial Paper – Usance – Enomiation – Ceiling – Mode of Issue – Credit Syndication – For Long Term and Working Capital

UNIT-V : INVESTMENT DECISIONS / PORTPOLIO MANAGEMENT

Port Folio Management – Functions – Registration of Port-folio Managers – Obligation – Investment of Client Funds – Maintenance of Book and Accounts – Reports to be Furnished – Code of Conduct .

CO1	Get an understanding of banking operations
CO2	Know the different financial and other assistance available for industrial units
CO3	Understand the role of small scale industrial units in economic development
CO4	Know about various fee based service provided by the banks
CO5	Apply learning from this program will help to get opportunities to work with investment banking companies
CO6	Orientation about banking and financial concept covered managing investment in primary and secondary markets.
CO7	This program will help to perform valuation of companies and prepare reports

TEXT BOOK:

S.Guruswamy –“Merchant Banking and financial services” – Vijay Nichole, Chennai .4th Edition , 2017.

REFERENCE BOOKS:

- 1.Gupta D. R–“ A Manual of Merchant Banking “–Bharath Law house, New Delhi ,2003.
- 2.H.R. Machiraju – “Merchant Banking “– New Age International, New Delhi 6th Edition 200.
3. L. Natarajan, “ Merchant Banking and Financial Services ‘ 1st edition , Margham Publications, Chennai .2012

SEMESTER – VI

L	T	P	C
6	0	0	5

Total Hours: 78

CORE PAPER - XVII COST ACCOUNTING II

SUBJECT CODE: U6CM21MT

OBJECTIVE

- 1.The objective is to enable the students to understand techniques used to control as well as reduce the cost.
2. Analyze Reports to Make Sound Pricing Decisions.
3. Use Cost Accounting Methods to Optimize the Use of People, Resources, and• Materials

UNIT-I : JOB, BATCH, CONTRACT COSTING

Job, Batch, Contract Costing: Job Costing – definition – Features – Procedure – WIP – Cost Accumulation, Batch Costing – EBQ, Contract Costing – Definition, Features, Work Certified and Uncertified – Incomplete Contact

UNIT-II : PROCESS COSTING

Process Costing: Definition – Features – Job Vs Process Costing – Process Account

UNIT-III: OPERATING COSTING

Operating Costing (Transport Costing): Cost Unit – Cost Classification – Operating Cost sheet – Reconciliation of Cost and Financial Account.

UNIT-IV: MARGINAL COSTING

Marginal Costing: Definition – Advantages and Limitation – Break Even Point – Margin of Safety – P/V Ratio – Key factor – Make or Buy Decision

UNIT-V: STANDARD COSTING

Standard Costing: Definition – Features – Advantages – Limitation – Analysis of Variances – Material, Labour and Overhead

.(Weightage of Marks, Problems - 80%, Theory - 20%)

CO1	Students will be able to acquaint how to record cost information by using double-entry book keeping system. They shall able to prepare the various ledger accounts relating to cost record
CO2	Students will be able to understand cost accounting methods maintained by real estate developers/builders and other businesses working on contract.
CO3	Students will be able to understand the concepts of normal, abnormal loss/gain and its calculation.
CO4	Students will be able to acquaint the technique of marginal costing and its advantages and disadvantage and also application of marginal cost equations to find out profit volume ratio, Breakeven Point and Marginal of Safety of production units
CO5	Students will be able to the basic concepts of Material and Labour Variances.
CO6	Students will be able to know emerging concepts of cost accounting and its importance to developing cost systems.
CO7	Students will be able to know how to apply these emerging cost concepts in cost reduction, planning and management at the initial stage of production

TEXT BOOK:

T.S. Reddy & Hari Prasad Reddy “ Cost Accounting “– Margham Publications, Chennai 4th Edition -2011.

REFERENCE BOOKS:

1. S.P.Jain and Narang “Cost Accounting “– Kalyani Publishers, New Delhi 7th Edition 2000.

SEMESTER – VI

L	T	P	C
6	0	0	5

Total Hours: 78

CORE PAPER - XVIII FINANCIAL MANAGEMENT

SUBJECT CODE: U6CM22MT

OBJECTIVE

- 1.The objective is to enable students to understand the basic concepts of Financial Management and their role of Financial Management in decision-making.
2. Analyze the importance of capital structure in financial decision.
3. Enumerate the significance of capital budgeting and process of capital budgeting.

UNIT-I; INTRODUCTION TO FINANCIAL MANAGEMENT

Financial Management – Meaning- Definition – Objectives – Significance- Risk Return trade off – Financial Management and other functional areas – Role of Finance manager.

UNIT-II:FINANCIAL PLANNING

Financial Planning –Definition – Scope - Features- Objectives – Factors – Capitalization – Causes and Effects of Over Capitalization -Under Capitalization.

UNIT-III: CAPITAL STRUCTURE DECISIONS

Capital Structure Decisions – Meaning – Definitions- Factors-Theories of Capital Structure

UNIT-IV: COST OF CAPITAL & DIVIDEND POLICY

Cost of Capital- Factors –Types of Cost of Capital – Computation of Cost of Capital- Cost of Debt-Cost of Preference Share Capital – Cost of Equity Capital- Cost of Retained Earnings- Weighted Average Share Capital-Dividend Policy- Factors- Types- Objectives-Dividend Theories.

UNIT-V: WORKING CAPITAL

Working Capital – Gross and Net Working Capital – Determinants of Working Capital – Sources of WC – Credit and Collection Policies.

(Weightage of Marks, Problems - 60%, Theory - 40%)

CO1	Describe the dimensions of performance and risk relevant to financial firms
CO2	Describe the impact of financial innovations , advances in technology and changes in regulation
CO3	It is one of the analytical method which helps the students to carry out the study of financial statements in the form of ratio and such study is more expressive.
CO4	Will acquaint with the concept and management of working-capital
CO5	Gain knowledge of different types of capital budgeting and its applicability.
CO6	Be able to take appropriate decision on selection of projects.(either to buy or on rent)
CO7	Helps students to know how to study the financial statements, make comparisons between current year and previous years and draw proper interpretations.

TEXT BOOK:

A. Murthy,” Financial Management” – Margham publications.6th Edition, 2017.

REFERENCE BOOKS:

1. I.M.Panday “Financial Management” – Vikas publishing house Pvt ltd., 10th Edition, 2010.
2. Premavathy, “Financial Management” – Srinivasa publications, 2nd Edition, 2010.
3. M.Y.Khan, P.K. Jain, Financial Management – Tata MC Grew hill Publications New Delhi, 9th Edition, 2009.

SEMESTER - VI

L	T	P	C
5	0	0	5

Total Hours: 65

CORE PAPER - XIX ENTREPRENEURIAL DEVELOPMENT

SUBJECT CODE: U6CM23MT

OBJECTIVE:

- 1.To enable students to understand the basic concepts of entrepreneurship and preparing a business plan to start a small industry.
2. understand the nature of entrepreneurship.
3. understand the function of the entrepreneur in the successful, commercial application of innovations.

UNIT-I: INTRODUCTION TO ENTREPRENEUR

Meaning of Entrepreneur – Entrepreneur and Enterprise – Entrepreneur and Manager – Entrepreneur and Intrapreneur – Qualities (Traits) of a True Entrepreneur – Characteristics of Entrepreneur – Types of Entrepreneurs – Functions of an Entrepreneur – Roles of Entrepreneurs in the Economic Development

UNIT-II: PROJECT IDENTIFICATION

Establishing an Enterprise – Project Identification – Selection of the Project – Project Formulation –Preparation of Project Report

UNIT-III: ROLE OF BANKS IN EDP

Role of Banks in EDP- TRYSEM- self employment- SEEUY-SEPUP-DICS-Industrial Estate- Role of SIDCO- SIPCOT- TCOs- Problems of Small Entrepreneurs- Sickness of Small Scale Units- Causes and Revival.

UNIT-IV: INCENTIVES AND SUBSIDIES

Incentives and Subsidies – Meaning of Incentives and Subsidies – Needs- Incentives for SSI Units in Backward Areas – Taxation Benefits to SSI Units – Subsidies and Incentives in Tamil Nadu.

UNIT-V: WOMEN& RURAL ENTREPRENEURS

Women Entrepreneurs – Concept – Functions and Role – Problems of Women Entrepreneurs – Suggestions for Development of Women Entrepreneurs – Rural Entrepreneurship – Need – Problems – How to Develop Rural Entrepreneurship .

CO1	Understand the basic concept of Entrepreneurship and their work in life.
CO2	Remember the entrepreneurial Development Agencies.
CO3	Evaluate the Project Management.
CO4	Analyze the entrepreneurial Development Programmes.
CO5	Understand the need for Economic development and Entrepreneurial growth.
CO6	Run a small enterprises with small capital for a short period
CO7	Aware of different opportunities and successful growth stories

TEXT BOOK:

Jayashree Suresh - Entrepreneurial Development, Margham publications.Revised Edition 2011
Reprint 2017.

Reference books:

1. C.B. Gupta – “Entrepreneurship development in India” – Sultan Chand, New Delhi 5th Edition 2010
2. SS Khanna, “Entrepreneurial Development “– S.Chand& sons New Delhi 3rd edition 2007.
- 3.,P Sarvanavel –“ Entrepreneurial development” – Ess Pee kay Pub. House , Chennai, 5th Edition. 20012

SEMESTER - VI

L	T	P	C
5	0	0	4

Total Hours: 65

ELECTIVE PAPER – II
INCOME TAX LAW & PRACTICE - II

SUBJECT CODE: U6CM24ET

OBJECTIVE

- 1.The Objective of this subject is to make the students to understand the computation of Taxable Income and Tax Liability of individuals.
- 2.To make the students understand the basic concepts, definitions and terms related to direct taxation.
- 3.Students will be able to identify the technical terms related to direct taxation. ...

UNIT-I: CAPITAL GAIN

Capital Assets – Short term Capital Assets – Long term Capital Assets – transfer-

Capital Gains – Short Term – Long Term – Deductions

UNIT-II: INCOME FROM OTHER SOURCES

Income from Other Sources – General and Specific Incomes- Set Off of Losses and Carry Forward and Set Off of Losses – Clubbing of Incomes

UNIT-III: TOTAL INCOME DEDUCTIONS

Deductions allowed in computing total Income – Section 80C to 80U – Section 80G Calculations.

UNIT-IV: ASSESSMENT OF INDIVIDUALS AND FIRM

Assessment of Individuals and Firm – Book Profit – Remuneration -Computation of Tax Liability

UNIT-V : TAX AUTHORITIES

Income Tax Authorities – Powers and Duties – Procedure for Assessment – Kinds of Returns and Kinds of Assessment

(Weightage of Marks, Problems - 50%, Theory - 50%)

CO1	To acquaint the students with application of above provisions to various practical situations.
CO2	To acquaint the students with various transactions for supply and identify levy of a particular tax
CO3	To acquaint them with certain deductions from total income and basic computation of total income for individual assesses
CO4	To acquaint them with exemptions under section 80c to 80u
CO5	Discuss the deductions applicable to individual firm and companies
CO6	Understand to aware about the income tax authorities and their powers and duties
CO7	Discuss the assessment and penalties rules

TEXT BOOK:

A.Murthy –“Income Tax Law & Practice”- Vijay Nichole Publications, Chennai, 3rd Edition 2014

REFERENCE BOOKS:

1. Dr. H.C.Mehrotra “Income Tax Law and Practice”, 5th edition 2014.
2. Gaur and Narang “Income Tax Law and Practice” Kalyani publications, 5th Edition, 2007.
3. T.S.Reddy and Hariprasad “Income Tax Law and Practice”, Margham publication, Chennai.. 13th Edition 2014.

SEMESTER - VI

L	T	P	C
5	0	0	4

Total Hours: 65

**ELECTIVE PAPER
MARKETING MANAGEMENT**

SUBJECT CODE: U6CM25ET

OBJECTIVE:

1. The objective is to enable the students to acquire skills in Marketing of Insurance Products.
2. Analyze any legal obligations, principles, and rules associated with the organization.
3. Produce advertising messages and place in the chosen media.

UNIT-I : SCOPE OF MARKETING

Marketing – Definition – Importance – Features of Marketing – Marketing Concepts – Marketing Approaches – Marketing Mix – Marketing Management – Functions – Marketing Information System.

UNIT-II : PRODUCT

Product – Features, Classification, Product Concepts, Product Mix, Product Policy, Product Planning – Idea Generation, Screening, Business Analysis, Product Development, Test Marketing and Commercialization – Product Life Cycle.

UNIT-III : PRICING

Pricing – Importance – Objectives – Pricing Policies, Strategies and Techniques – Pricing from the Point of View of Government

UNIT-IV : SALES PROMOTION

Sales Promotion Techniques and Methods – Advertising – Objectives, Benefits, Selection of Media, Advertising Copy and Ethics in Advertising.

Salesmanship – Objectives, Qualities and Types of Salesmen.

UNIT-V : CONSUMER BEHAVIOUR

Consumer Behaviour – Buying Motives – Consumerism – Consumer Rights, CRM – Marketing Segmentation – Targeting – Positioning – E Marketing .

CO1	Understand the concept of Market and Marketing Mix.
CO2	Gain Knowledge of Product Life Cycle
CO3	Evaluate the Business Opportunities
CO4	Identify the factor of Market Segmentation
CO5	Find the Marketing Environment
CO6	Identify the Problems of the marketing and resolve it.
CO7	Knowing the concept of Pricing strategy

TEXT BOOK:

Jayasankar ,” Marketing Management” Margham publications Reprint 2018.

REFERENCE BOOKS:

1. Rajan Nair –“ Marketing”, Sultan Chand & Sons, New Delhi , & 7th Edition. 2007
2. R.K. Malhotra – “Marketing Management”, Himalaya, Anrol Publication, Edition 2003.
3. Philips Kotler – “Marketing Management”, Prentice Hall New Delhi 11th Edition 2004.

SEMESTER – VI

L	T	P	C
5	0	0	4

Total Hours: 65

**ELECTIVE PAPER III
HUMAN RESOURCE MANAGEMENT**

SUBJECT CODE: U6CM26ET

OBJECTIVE

- 1.The objective is to familiarize the students with concepts and principles of Human Resource Management.
2. To Illustrate the managerial practice of transaction analysis as a tool for HRD
3. To Identify the challenges of HR and Application of recent trends ranging from Competency mapping to HR Audit

UNIT-I : INTRODUCTION TO HRM

Nature and scope of HRM – personnel Management and HRM – Functions of HRM – Functions of HR Manager – HRM as a profession – Indian perspective

UNIT-II : RECRUITMENT & SELECTION

Human Resource Planning – Recruitment – Selection – Methods of Selection – Use of Various tests – Interview techniques in selection - Placement

UNIT-III : TRAINING & DEVELOPMENT

Induction – Training methods – Techniques – Identification of training needs – Training and Development

UNIT-IV : THEORIES OF MOTIVATION

Job satisfaction – Motivation (Maslow's and Two Factor Theory only) – Performance Appraisal – Methods – Compensation – Incentives – Monetary and Non-Monetary

UNIT-V : TRANSFER & CAREER DEVELOPMENT

Transfer – Promotion and Termination of Services – Career Development - Monitoring .

CO1	Develop the understanding of the concept of human resource management and to understand its relevance in organizations.
CO2	Develop necessary skill set for application of various HR issues.
CO3	Analyse the strategic issues and strategies required to select and develop manpower resources.
CO4	Integrate the knowledge of HR concepts to take correct business decisions.
CO5	Develop necessary skill set for application of various HR issues.
CO6	Analyse the strategic issues and strategies required to select and develop manpower resources.
CO7	Develop the understanding of the concept of human resource management and to understand its relevance in organizations

TEXT BOOK:

J. Jayasankar – “Human Resource Management”, Margham Publications, Chennai, 2nd Edition, 2017.

REFERENCE BOOKS:

1..S.Davar ,”Personnel Management”– Hivas publications 10th 3 edition. 2006

2.Asathappa K., “Human resource and Personal Management” ,Tatta MC Graw Hill Publishing Ltd., New Delhi, 1987.

3.Memoria.C.B., “Personnel Management” Himalaya publishing house New Delhi, 2nd edition 1992.

SEMESTER - VI

L	T	P	C
5	0	0	4

Total Hours: 65

**ELECTIVE PAPER
SUBJECT CODE:U6CM27ET
BUSINESS ETHICS**

OBJECTIVE

- 1.The objective is to provide basic knowledge of business ethics and values and its relevance in modern context.
2. To understand the Business Ethics and to provide best practices of business ethics
- 3) To learn the values and implement in their careers to become a good managers.

UNIT1:BUSINESS ETHICS

Introduction – Meaning - Scope – Types of Ethics – Characteristics – Factors influencing Business Ethics – Importance of Business Ethics - Arguments for and against business ethics - Corporate Social Responsibility

UNIT 2: PERSONAL ETHICS

Introduction – Meaning – Emotional Honesty – Virtue of humility – Promote happiness – karma yoga– proactive – flexibility and purity of mind.

UNIT 3: ETHICS IN MANAGEMENT

Introduction – Ethics in HRM – Marketing Ethics – Ethical aspects of Financial Management – Technology Ethics and Professional ethics.

UNIT 4: CORPORATE CULTURE IN BUSINESS

Meaning – Functions – Impact of corporate culture – cross cultural issues in ethics

UNIT 5: CORPORATE GOVERNANCE

Meaning, scope, composition of BODs, Cadbury Committee, various committees, reports on Corporate Governance, scope of Corporate Governance, Benefits and Limitations of Corporate Governance .

CO1	Study the Ethical and Moral issues
CO2	Will help the potentials consequences of Business decision
CO3	Discuss of Ethics include Corporate Governments and Social responsibilities
CO4	Business Ethics enhances the law by outlining acceptable behaviours beyond Government.
CO5	Generate demonstrate respect, responsibility, fairness and caring
CO6	Impacts various aspects of management and operations
CO7	Create a code of conduct.

TEXT BOOK

S.Sankaran,” Business Ethics” Margham Publication Chennai 2016.

REFERENCE BOOKS

1. Murthy CSV: Business Ethics and Corporate Governance, HPH
2. Bholananth Dutta, S.K. Podder – Corporation Governance, VBH.
3. Dr. K. Nirmala, Karunakara Readdy : Business Ethics and Corporate Governance, HPH

SEMESTER – VI

L	T	P	C
3	0	0	2

Total Hours: 39

**SKILL BASED SUBJECT - IV
PUBLIC ENTERPRISES IN INDIA**

SUBJECT CODE: U6CM28ST

OBJECTIVE

- 1.To create awareness among the students on the skills required to plan and pursue a career and empower them with employability skills.
2. To maintain a sustained growth in productivity
3. To enhance gainful employment
- .

UNIT-I: EVOLUTION OF THE PUBLIC SECTOR

Evolution of the Public Sector in India – Forms of organization – Growth – Causes for the Expansion of Public Enterprises.

UNIT-II: ROLE OF PUBLIC SECTOR

Role of Public Sector in India – Employment – Capital Formation – Infrastructure Development – Export Promotion.

UNIT-III : PRICING POLICY

Pricing Policy in Public Enterprises – Features – Guidelines – On Pricing Policy.

UNIT-IV : PROBLEMS & REMEDIES OF PUBLIC SECTOR

Problems of the Public Sector – Remedial Measures – New Policy of the Government.

UNIT-V : PUBLIC ENTERPRISES

Public Enterprises under State and Central Government.

CO2	Discuss the balanced concentrate of wealth and economic power
CO1	Helps students to know the public undertakings and services
CO3	Understand the scope for employment opportunities
CO4	Discuss the various types of organization sectors
CO5	Helps students to know about the infrastructure development
CO6	Analyse the strategic issues and strategies required to select and develop manpower resources.
CO7	Understand the need for Economic development

TEXT BOOK:

Dutt & Sundaram - Indian Economy, S Chand & Co., New Delhi 6th Edition 2003,

REFERENCE BOOKS:

1. Ramanadhan VV –The Structure of Public Enterprises in India”, Allied Publications, New Delhi, 3rdEdition, 2007.
- 2.Vishoo Bhagan Public Administration, S. Chand Company Pvt Ltd, New Delhi,

Om Sakthi
ADHIPARASAKTHI COLLEGE OF ARTS & SCIENCE
(Autonomous)
Permanently Affiliated to Thiruvalluvar University, Vellore
Accredited by NAAC with B⁺⁺ Grade
MASTER OF COMMERCE
Under CBCS
(Effective from the Academic Year 2018-2019)
REGULATIONS

CBCS:

Choice –Based Credit System is a flexible system of learning. ‘Credit’ defines the quantum of contents / Syllabi prescribed for a course and determine the number of hours of instruction required. The distinguished features of CBCS are the following:

It permits the students to:

- ❖ Learn at their own pace
- ❖ Choose electives from a wide range of elective courses offered by the departments of the colleges
- ❖ Undergo additional courses and acquire more than the required number of credit
- ❖ Adopt an inter – disciplinary approach in learning
- ❖ Make best use of the expertise of available faculty

1. Eligibility for Admission:

A candidate who has passed the B.Com. B.Com. [Corporate Secretaryship], B.C.S., B.B.A., B.Com., [Bank Management]., B.A [Co-op.], B.A., [Economics], B.A [Corporate Economics] and B.Sc., Mathematics or B.Sc., [Computer Science] or B.C.A. or B.Sc.,[ISM] with any two Core Papers offered at the B.Com level

2. Eligibility for the Award of Degree:

A candidate shall be eligible for the award of the Degree only if he/she has undergone the prescribed course of study in the College for a period of not less than two academic year and passed the examinations of all the Four Semesters prescribed earning 90/91 credits and fulfilled such conditions as have been prescribed therefore.

3. Duration of the Course:

The course duration shall be Two years consisting of Four semesters.

4. Examinations:

There shall be four semester examinations: first semester examination at the middle of the first academic year and the second semester examination at the end of the first academic year. Similarly, the third and fourth semester examination shall be at the middle and the end of the second academic year, respectively.

The following assessment procedure will be followed for Internal Marks:

Continuous Internal Assessment [CIA] Test

S. No	Reg. No	Name	<u>Test I</u> Marks for 50	<u>Test II</u> Marks for 50	<u>Test III</u> Marks for 50	Marks of Best Two Tests 100	Marks converted to 20	<u>Assignment/; Seminars [5]</u>	Marks for 25

Test I : One hour duration for 50 marks (Two Units of the Syllabus)

Test II : Two hours duration for 50 marks (Four Units of the Syllabus)

Test III : Three hours model test for 50 marks (Total Syllabus)

Total marks 100

Theory

Test marks to be converted to

: 20 marks

Assignments / Seminars

: 5 marks

Total

: 25 marks

5. Requirements for proceeding to Subsequent Semesters:

- Candidates shall register their name for the First Semester Examination after the admission in the P.G. Courses
- Candidates shall be permitted to proceed from the First Semester up to Final Semester irrespective of their failure in any of the Semester Examination subject to the condition that the candidates should register for all the arrear subject of earlier semesters along the current [subject] Semester subjects.

- c) Candidates shall be eligible to go to subsequent semester, only if they earn sufficient attendance as prescribed therefore by the Academic council from time to time. Provided in case of a candidate earning less than 65% of attendance in any one of the Semesters due to any extraordinary circumstances such as medical grounds, such candidate who shall produce Medical Certificate issued by the Authorized Medical Attendant [AMA], duly certified by the Principal of the college shall be permitted to proceed to the next semester and to complete the course of study. Such candidates shall have to repeat the missed Semester by rejoining after completion of Final Semester of the course, after paying the fee for the break of study as prescribed by the College from time to time.

6. Passing Minimum:

A candidate shall be declared to have passed the whole examination, if he/she passes in all the papers wherever prescribed/as per the scheme of examinations by earning 90 CREDITS.

In fixing the passing minimum marks the following will be observed.

- a. There shall be no Passing Minimum for Internal
- b. For External Examinations, Passing Minimum shall be of 50% [Fifty Percentage] of the maximum marks prescribed for the paper.
- c. In the aggregate [External + Internal] the passing minimum shall be of 50% for each Paper/ Practical/Project and Viva-voce.
- d. Grading shall be based on overall marks obtained [Internal + External]

7. Classification of Successful Candidates:

Candidates who secured not less than 60% of aggregate marks [Internal + External] in the whole examination shall be declared to have passed the examination in the First Class.

All other successful candidates shall be declared to have passed in Second Class.

Candidates who obtain 75% of the marks in the aggregate [Internal + External] shall be deemed to have passed the examination in the First Class with Distinction, provided they pass all the examination [theory papers, practicals, Project and Viva-Voce] prescribed for the course in the First appearance.

8. Requirement to take the Semester Examinations.

a). A candidate will be permitted to take the college Examination for any Semester, if

- i). He / she secures not less than 75% of attendance out of the 90 instructional days during the semester. [In the case of married women students the minimum attendance requirement shall be 55% of the total instructional days].
- ii). He / she earns a progress Certificate from the Head of the Institution of having satisfactorily completed the Course of Study prescribed in the subjects as required by the regulations, and
- iii). His / her conduct has been satisfactory.

Provided that it shall be open to the Academic Council, or any authority delegated with such powers by the Academic Council to grant exemption to a candidate who has failed to earn 75% of the attendance prescribed for any valid reason(s) subject to the usual conditions.

b). A candidates who has secured attendance less than 75% but 65% and above shall be permitted to take the Examination on the recommendation of the Head of the Institution to condone the lack of attendance as well as on the payment of the prescribed fees to the University.

c). A candidate who has secured attendance less than 65% but 55% and above in any Semester, has to compensate the shortage of attendance in the subsequent Semester besides, earning the required percentage of attendance in that Semester and take the Examinations of both the Semester papers together a the end of the later Semester.

d). A candidates who has secured less than 55% of attendance in any Semester will not be permitted to take the regular Examinations. He / she has to re-do the Course after the completion of the final semesters by rejoining the Semester in which the attendance is less than 55%.

e). A candidate who has secured less than 65% of attendance in the final Semester has to compensate his / her attendance shortage in a manner to be decided by the Head of the Department concerned after rejoining the Course.

9. Grading System:

In addition to the above marking system grading system is also adopted as detailed below.

The marks (sum of IA and UE marks) in each course is assigned with a letter grade on a five points scale using the following letter grade points and a range of marks.

SEVEN POINT SCALE [As per UGC notification 1998]

Marks	Grade Point	Letter Grade	Class
95-100	7.00	H	First Class with Distinction
90-94	6.00	O	First Class with Distinction
75-89	5.50	D	First Class with Distinction
60-74	4.75	A	First Class
55-59	4.00	B	Second Class
50-54	3.50	C	Second Class
Below 50	3.00	F	Fail

From the second semester onwards, the total performance within a semester and continuous performance starting from the first semester are indicated respectively by Grade Point Average [GPA] and Cumulative Grade Point Average [CGPA].

These two are calculated by the following formulae:

$$\text{GPA} = \frac{\sum_{i=1}^N C_i G_i}{\sum_{i=1}^N C_i}$$

Where ‘C_i’ is the Credit earned for the Course i in any semester; ‘G_i’ is the Grade point obtained by the student for the course i and ‘n’ is the number of courses passed in that semester.

CGPA = GPA of all the courses starting from the first semester to the last semester.

10. Ranking:

Candidates who pass all the examinations prescribed for the course in the first appearance itself alone are eligible for Ranking.

Provided in the case of candidates who pass all the examinations prescribed for the course with a break in the First Appearance due to the reasons as furnished in the Regulations 7.[iii] supra are only eligible for Classification / Distinction.

11. The Medium of Instruction and Examinations:

The medium of instruction and Examinations shall be in English.

12. Appearance for Improvement:

Candidates who have passed in theory / papers are allowed to appear again for theory paper/ papers only once in order to improve his / her marks, by paying the fee prescribed from time to time. Such Candidates are allowed to improve within a maximum period of 10 Semester counting from his / her first semester of his / her admission. If candidate improves his marks, then his improved marks will be taken into consideration for the award of classification only. Such improved marks will not be counted for the award of prizes / Medals, Rank and Distinction. If the Candidate does not show improvement in the marks, his previous marks will be taken into consideration.

No candidate will be allowed to improve marks in the Mini Project, Viva-voce.

Question Paper Pattern:

Section A $5 \times 6 = 30$ Marks (Either or Choice)

Section B $3 \times 15 = 45$ Marks (Out of 5 Questions)

Total 75 Marks

MASTER OF COMMERCE (UNDER CBCS PATTERN)

with effect from 2019-21)

Semester	Part	Subject Code	Title of the Paper	C.I.A		E.S.E		TOTAL MARKS	CREDITS
				MAX MARKS	PASSING MIN	MAX MARKS	PASSING MIN		
I	A	P1CM21MT	ADVANCED FINANCIAL MANAGEMENT	25	13	75	38	100	5
I	A	P1CM22MT	ACCOUNTING FOR MANAGERIAL DECISIONS	25	13	75	38	100	4
I	A	P1CM23MT	GLOBAL MARKETING	25	13	75	38	100	4
I	A	P1CM24MT	ADVANCED BUSINESS	25	13	75	38	100	4

			STATISTICS						
I	A	P1CM25ET	INDUSTRIAL AND LABOUR LAWS	25	13	75	38	100	4
TOTAL				125	65	375	190	500	21
II	A	P2CM21MT	PROJECT MANAGEMENT	25	13	75	38	100	4
II	A	P2CM22MT	HUMAN RESOURCE MANAGEMENT	25	13	75	38	100	4
II	A	P2CM23MT	ADVANCED ACCOUNTS	25	13	75	38	100	4
II	A	P2CM24MT	QUANTITATIVE TECHNIQUES FOR BUSINESS DECISIONS	25	13	75	38	100	4
II	A	P2CM25ET	E-COMMERCE	25	13	75	38	100	4
II	A	P2HR21GS	HUMAN RIGHTS	25	13	75	38	100	2
TOTAL				150	78	450	228	600	22

Semester	Part	Subject Code	Title of the Paper	C.I.A		E.S.E		TOTAL MAR KS	CREDITS
				MAX MAR KS	PASSING MIN	MAX MAR KS	PASSING MIN		
III	A	P3CM21MT	INDIRECT TAXATION	25	13	75	38	100	4
III	A	P3CM22MT	ORGANISATIONAL BEHAVIOUR	25	13	75	38	100	4
III	A	P3CM23MT	ADVANCED COST ACCOUNTING	25	13	75	38	100	4
III	A	P3CM24MT	RESEARCH METHODOLOGY	25	13	75	38	100	4
III	A	P3CM25MT	FINANCIAL SERVICES	25	13	75	38	100	4
III	A	P3CM26ET	SERVICES MARKETING	25	13	75	38	100	3
TOTAL				150	78	450	228	600	23
IV	A	P4CM21MT	DIRECT TAXES	25	13	75	38	100	5
IV	A	P4CM22MT	INVESTMENT MANAGEMENT	25	13	75	38	100	5
IV	A	P4CM25ET	SALES AND ADVERTISING MANAGEMENT	25	13	75	38	100	4
IV	A	P2CM21PV	PROJECT /DISSERTATION WITH VIVA VOCE	50	25	150	75	200	10
TOTAL				125	64	375	189	500	24

Pos	Programme Name: M.COM
PO1	Students can independently start up their own Business.
PO2	Students can get thorough knowledge of finance and commerce.
PO3	Capability of the students to make decisions at personal & professional level will increase after completion of this course.
PO4	After completing graduation, students can get skills regarding various aspects like Marketing Manager, Selling Manager, over all Administration abilities of the Company
PO5	The knowledge of different specializations in Accounting, costing, banking and finance with the practical exposure helps the students to stand in organization.
PO6	To notify students with the emerging issues in policies of India's foreign trade.
PO7	Students can understand Income Tax system properly, and can get the knowledge of different tax provisions.

L	T	P	C
6	0	0	5

Total Hours: 78

SEMESTER I

ADVANCED FINANCIAL MANAGEMENTSUBJECT CODE: P1CM21MT

OBJECTIVE :

- 1.This course is to enable the students to analyze the financial statements using various techniques.
- 2.Apply the components of interest rates to determine the costs of financing for the firm. •
- 3.Identify how the changes in interest rates affect the flow of funds from the suppliers to the users, including global factors

UNIT-I INTRODUCTION TO FINANCIAL MANAGEMENT

Financial management-Functions-Goals of financial management-maximizations
Optimization- Risk-Return trade off.

UNIT-II MANAGEMENT OF FUNDS

Management of funds – long term sources- shares and Debentures – convertible securities and term loans- working capital financing – sources and approaches – Bank credit – Basic principles and methods of assessment – other sources of short term finance – operating environment of working capital.

UNIT-III CAPITAL STRUCTURE PLANNING

Capital Structure Planning: Concepts of cost of capital – cost of equity, Debt, retained earnings weighted average cost of capital – capital structure theories – Net income, net operating income MM and traditional theories- Leverage types and significance. Dividend policies and practices- Dividend policy- Factors affecting dividend decisions, dividend theories, Graham, Gordon, Walter and MM theories.

UNIT –IV INVESTMENT DECISION

Management of fixed Assets – Evaluation of capital investment decision: Pay back period- ARR- IRR-NPV-CAPM.

UNIT –VWORKING CAPITAL MANAGEMENT

Working Capital Management: – Working Capital Cycle – Forecasting Of Working Capital Requirements – Factors Influencing Working Capital – Management Of Inventory, Cash And Account Receivables- Payable Management- Credit And Collection Policies.

(Weightage of Marks, Problems - 60%, Theory - 40%)

CO1	Demonstrate the applicability of the concept of Financial Management to understand the managerial Decisions and Corporate Capital Structure
CO2	Apply the Leverage and EBIT EPS Analysis associate with Financial Data in the corporate
CO3	Analise the complexities associated with management of cost of funds in the capital Structure
CO4	Demonstrate how the concepts of financial management and investment, financing and dividend policy decisions could integrate while identification and resolution of problems pertaining to LSCM Sector
CO5	Demonstrate how risk is assessed
CO6	Provide a systematic and rigorous learning and exposure to Banking and Finance related disciplines.
CO7	Maintain an adequate and consistent cash flow system.

TEXT BOOKS;

A.Murthy, “Financial Management”, Margham Publications Chennai Reprint 2017

REFERENCES BOOKS:

1. Prasanna Chandra, ” Financial management” TaTa McGraw Hill publishing company Limited. New Delhi 8th edition 2011
2. M Y Khan & P K Jain, “Financial Management”, Tata McGraw Hill publishing company Limited, New Delhi .6th edition 2002
3. I.M Pandey, “Financial Management”, Vikas publishing house private limited, 4th edition 2009.

SEMESTER - I

L	T	P	C
6	0	0	4

Total Hours: 78

ACCOUNTING FOR MANAGERIAL DECISIONS

SUBJECT CODE: P1CM22MT

OBJECTIVE :

- 1.This course is to understand the various tools and techniques used for analysis and interpretation of financial statements.
- 2.To understand standard variation analysis through managerial techniques.
3. To identify the investment decisions.

UNIT-I ACCOUNTING FOR DECISION MAKING

Accounting for Decision making – Scope and Importance –Decision Accounting Vs. Financial Accounting and Cost Accounting.

UNIT-II INVESTMENT ANALYSIS

Financial and Investment analysis – Analysis and Interpretation – Ratio Analysis – Leverage analysis – Budgeting and budgetary control– Functional Budgets–Master Budget – Flexile budgeting – Zero Base Budgeting.

UNIT-III FINANCIAL STATEMENTS

Understandingfinancial statements –Construction and analysis of profit & loss Account and Balance sheet – Construction and analysis of Fundsflow and Cash flow statements.

UNIT-IV MARGINAL COSTING

Cost Management – Absorption and Marginal Costing – Volume – Profit analysis – Applications and techniques.

UNIT-V FINANCIAL DECISIONS

Financial decisions – Capital structure – Dividend decisions. (Only simple problems)

(Weightage of Marks, Problems - 80%, theory - 20%)

CO1	Enhance the abilities of learners to develop the concept of management accounting and its significance in the business.
CO2	It enables to enhance the abilities of learners to Analyses the financial statements.
CO3	Enable the learners to understand, develop and apply the techniques of management accounting in the financial decision making in the business corporates.
CO4	Helps to make the students develop competence with their usage in managerial decision making and control.
CO5	Develop an understanding of the conceptual framework of the Management Accounting.
CO6	Provides the knowledge in the Management Accounting Techniques in business decision making.
CO7	Analyses cost behavior, perform cost-volume-profit analysis and profit planning

TEXT BOOK;

1. T.S.Reddy & Hari Prasad Reddy, “ Management Accounting”, Margham Publications, Chennai 2017

REFERENCES BOOKS:

- 1 S.N.Maheswari ,”Management Accounting and Financial Control” , Sultan Chand & Sons, New Delhi2013
- 2 Robert Kaplan and Anthony A. Atkinson, AdvancedManagement Accounting

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SEMESTER - I

L	T	P	C
6	0	0	4

Total Hours: 78

GLOBAL MARKETING

SUBJECT CODE: P1CM23MT

OBJECTIVE :

- 1.To understand the practice of marketing at global level.
2. Identify the costs and benefits of marketing channels; discuss the firms and the functions involved in typical channels in North America.
- 3.Identify the roles of advertising, sales promotion, public relations, personal selling and direct marketing in the promotion mix; compare and contrast integrated marketing communications with a non-integrated approach to the promotional mix.

UNIT-I-INTRODUCTION TO GLOBAL MARKETING

Global Marketing – Scope – Importance - Global Vs National marketing – Global Marketing Environment – Social – Cultural – Political – Legal and Regulatory Environments.

UNIT-II-GLOBAL TRADE PROMOTION

International Infrastructure for global trade promotion – GATT / WTO – Export Promotion Councils – Services Institutions – IIFT – NCTI – ECGC – EXIM Bank – Export Promotion council.

UNIT-III-GLOBAL CUSTOMERS

Global Customers – Segmentation, Targeting and Positioning – Global product positioning – Product life cycle in Global Marketing – Global Pricing – Objectives and Strategies.

UNIT-IV-GLOBAL MARKETING CHANNELS

Global Marketing Channels and Physical Distribution – Channel Objectives and Constraints – Channel Strategy – Physical Distribution and Logistics – Global Advertising and Branding – Global promotion.

UNIT-VGLOBAL TRADE PROCEDURE

Global Trade Procedure – Export Documentation – Processing of Export Procedure – Payment terms and conditions – Letter of Credit – Pre-shipment and Post Shipment finance- Forfeiting – Buyers Credit – Global Trade Assistance.

CO1	Have developed an understanding of major issues related to international marketing
CO2	Have developed skills in researching and analyzing trends in global markets and in modern marketing practice
CO3	Be able to assess an organization's ability to enter and compete in international markets.
CO4	Develop skills in researching and analyzing international marketing opportunities
CO5	Develop knowledge and understanding of key issues associated with international marketing: Importance of global and international marketing, Motives to internationalization, Specific international issues affecting the 4Ps
CO6	The influence of macro-environment on market selection
CO7	Financial, ethical, and organizational issues involved in international marketing

TEXT BOOKS;

L.Natarajan,"International Marketing", MarghampublicationsChennai1st edition.2012

REFERENCES BOOKS:

1. Varshney, R.L. and Bhattacharya B: "International Marketing Management", Sultan Chand and Sons, New Delhi. 1st edition 2012
2. Warnen J.Keegan, "Global Marketing Management", Prentice Hall of India.8th edition 2013
3. Cherian and Jacob," Export Marketing", Himalaya Publishing House. NewDelhi 3rd edition 2009

SEMESTER - I

L	T	P	C
6	0	0	4

Total Hours: 78

ADVANCED BUSINESS STATISTICS

SUBJECT CODE: P1CM24MT

OBJECTIVES :

- 1.To study the significant difference between samples using various tests for best results.
2. Students should be familiar with the terminology and special notation of statistical analysis.
3. Students should learn how statistical techniques fit into the general process of science

UNIT – I:PARTIAL,MULTIPLE CORRELATION

Partial Correlation – Partial Correlation Co-efficient – Partial correlation in case of four variables – Multiple Correlation – Multiple regression.

Chapter 10 and chapter 11

UNIT-II:PROBABILITY

Theory of probability – probability rules – Bayes theorem – Probability distribution – Characteristics and application of Binomial, Poisson and normal distribution

Chapter 1

UNIT-III:SMALL SAMPLE TEST, t- TEST AND Z-TEST

Small sample test-t test –Test of significance of the mean of a random sample-Testing difference between mean of two samples(Independent)-Testing difference between means of two samples (dependent samples or matched paired observations)-Testing the significance of an observed correlation coefficient-Properties of t test-z test

Chapter 5

UNIT-IV:CHI SQUARE DISTRIBUTION

Chi square distribution – characteristics and application – test of goodness of fit and test of independence – Test of Homogeneity

Chapter

UNIT-V: ANALYSIS OF VARIANCE

F distribution – testing equality of population variances – Analysis of variance – one way and two way Classification.

Note: The Proportion between theory and problems shall be 20:80

CO1	Analyze statistical data graphically using frequency distributions
CO2	Analyze statistical data using measures of central tendency
CO3	Recognize, describe, and calculate the measures of the spread of data: variance, standard deviation, and range
CO4	Explain the statistical concepts of skewness, Kurtosis & moments
CO5	Discuss basic ideas of linear regression and correlation
CO6	Students will formulate complete and concise
CO7	Students will frame problems using multiple mathematical and statistical representations of relevant structures and relationships

Recommended Text:

Statistical methods by Dr.S.P.Gupta, forty fourth Edition 2014 sulton chand and Sons, New Delhi.

Reference:

1. R.S.N.Pillai & Bhagavathi- Statistics.
2. D. C. Sancheti and V. K. Kapoor, Business Statistics, Sultan Chand and Pub.
3. J. K. Sharma, Business Statistics, Pearson Education.
4. Richard I Levin and David S Rubit, Statistics for Management, Pearson Edition.

SEMESTER - I

L	T	P	C
6	0	0	4

Total Hours: 78

INDUSTRIAL AND LABOUR LAWS SUBJECT CODE: P1CM25ET

OBJECTIVE:

- 1.To have a broad understanding of the legal principles governing the employment relationship at individual and collective level.
- 2.To familiarize the students to the practical problems inherent in the implementation of labour statutes.
3. To understand the concepts of practical labour law.

UNIT-I INTRODUCTION

Introduction to Labour Laws- Principles of Labour Legislation- Labour Legislation in India- Classification of Labour Legislation.

UNIT-II FACTORIES ACT 1948

Introduction- Objectives-Health-Safety-Welfare Measures-Working Hours of Adult-Employment of Women.

UNIT-III PAYMENT OF WAGES ACT

Introduction of Wages Act- Features-Responsibility for Payment of Wages-Deductions-Authorities under the Act-Inspectors-Powers of Inspectors- Minimum Wages Act- Definition-Concept-Types-The Payment of Bonus Act-Concept-Eligibility& Diseligibility,

UNIT-IV ESI ACT 1948

ESI Act 1948- Objectives – Liable for Compensation-Procedure for Claiming—Procedure for Payment-Provident Fund Act-Schemes of PF- Applicable and Not Applicable of PF- Obligations Employer and Employee- Gratuity Act-Meaning- Determination the Amount of Gratuity and appeals-Recovery of Gratuity

UNIT-VTRADE UNION ACT

Trade Union Act-Introduction-Primary Stage of Trade Union – Features-Appointment of Registrar-Rights and Duties of Trade Union- Industrial Dispute Act-Overview- Meaning-Importance-Objectives-Scope-Merits and Demerits.

CO1	Students should able to elaborate the concept of Industrial Relations.
CO2	The students should able to illustrate the role of trade union in the industrial setup.
CO3	Students should able to outline the important causes & impact of industrial disputes.
CO4	Students should able to elaborate Industrial Dispute settlement procedures.
CO5	Student should be able to summarize the important provisions of Wage Legislations, in reference to Payment of Wages Act 1936, Minimum Wages Act 1948 & Payment of Bonus Act 1965
CO6	Student should able to summarize the important provisions of Social Security Legislations, in reference to Employees State Insurance Act 1948, Employees Provident Fund Act 1952, Payment of Gratuity Act 1972.
CO7	Know the development and the judicial setup of Labour Laws.

TEXT BOOK

CMA Parthiban,"Industrial and Labour Law",Margham publications,Edition 2017.

REFERENCES BOOKS:

- 1.C.B.Memoria,"Industrial and Labour relations in India",Kitab mahal 4th Edition 2004.
- 2.Richard,"Labour relation in the public sector" 4th Edition 2008.
3. ND Kapoor, HandBook of Industrial Law.

SEMESTER - I

L	T	P	C
6	0	0	4

Total Hours: 78

INSURANCE AND RISK MANAGEMENT

SUBJECT CODE: P1CM26ET

OBJECTIVE :

1. The objective is to enable the students to understand various aspects of Life & General Insurance.
2. Understand the concept of risk and risk management
3. Identify and categorize the various types of risks

UNIT-I RISK MANAGEMENT

Risk and Risk Management Process – Risk identification – Evaluation – Risk management techniques – Insurance and risk management – Selecting and implementing risk management techniques.

UNIT-II COMMERCIAL RISK

Commercial risk management application – Property – liability – Commercial property insurance – Different policies and contracts – Business liability and risk management insurance – Workers compensation and risk financing.

UNIT-III PERSONAL RISK MANAGEMENT

Personal Risk Management – Applications- Property And Liability – Risk Management For Auto Owners – Lorry Owners – Risk Management For Home Owners.

UNIT-IVRISK MANAGEMENT APPLICATIONS

Risk Management Applications – Loss of Health – Medi-Claim – Retirement Planning And Annuities – Employee Benefits – Financial And Estate Planning.

UNIT-VRISK MANAGEMENT ENVIRONMENT

Risk management Environment – Insurance Industry – Functions And Organization of insurers – Govt regulations of insurance sector – IRDA – Privatization of Insurance business in India – Changes In Insurance Act – Insurance Intermediaries – Insurance Products-Pricing – Claim Valuation – Foreign Insurers In India

CO1	Understand the concept of risk and risk management; Suggest ways to finance risk
CO2	Identify and categorize the various types of risks;
CO3	Design a risk management program;
CO4	Gain knowledge of the various risk control measures available;
CO5	Identifies the insurance mechanism in risk management
CO6	Choose appropriate insurance policies related to life and health insurance;
CO7	Familiarize with fundamental legal principles of insurance;

TEXT BOOK

Anand Gangly,” Insurance Management”, New Age International publications.3rd Edition
2009

REFERENCES BOOKS:

1. Arthur C Williams, “Risk Management and Insurance”, McGraw Hill Co,8th Edition
1997
2. Insurance Act – Latest

SEMESTER - II

L	T	P	C
6	0	0	4

Total Hours: 78

PROJECT MANAGEMENT SUBJECT CODE: P2CM21MT

OBJECTIVE:

The objective of the subject is to make the students understand the concepts of project management to analysis the various project design and planning.

UNIT-I INTRODUCTION OF PROJECTS

Introduction- Characteristics of Projects-Objectives-Essential requirement of Project objectives-limitations of Projects-Importance-Establishment of a Project-Project Environment-Classification of Project- Project constraints-Features of good Project- reasons for Project failure- Project Management-Functions of Project Managers-Role and Responsibilities of the Report Managers.

UNIT-IIPROJECT MANAGEMENT

Definitions- Evolutionof Project Management-Objectives of Project Management- need for Project Management- Project Ideas- sources of Project Ideas- Importance of Project Management- Steps-Components- Salient features – Phases and Tools

UNIT-III PROJECT LIFE STYLE AND DEVELOPMENT

Definitions of Project Life Style- Initiation or Identification Phase-Formulation Phase-Implementation- Completion Phase- Project Development Cycle-Objectives of opportunity studies- Types- Pre-feasibility and feasibility studies

UNIT-IV PROJECT DESIGN & PLANNING

Steps in involved in Project Design- Process of Project Design- Project Plan- Steps in Project Planning – Need for Project Planning- Components of Projects Planning – Elements of Project Planning

UNIT-V PROJECT SCHEDULING & MANAGEMENT

Planning Scheduling and Monitoring- Project Networks- Objectives- Features-Steps in Network Analysis Techniques- CPM- PERT- Factors influencing Choice of Organization Structure – Features- Functional, Matrix, and Modified Organization Structure- Pure Project Organization.

CO1	Develop plans with relevant people to achieve the project's goal.
CO2	Understand project characteristics and various stages of a project.
CO3	Understand the conceptual clarity about project organization and feasibility analyses – Market, Technical, Financial and Economic.
CO4	Analyses the learning and understand techniques for Project planning, scheduling and Execution Control.
CO5	Apply the risk management plan and analyses the role of stakeholders.
CO6	Understand the contract management, Project Procurement, Service level Agreements and productivity.
CO7	Understand the How Subcontract Administration and Control are practiced in the Industry

TEXT BOOK

Dr. C.D BALAJI,” Project Management”, Margham Publications Chennai 1st Edition 2017.

REFERENCES BOOKS:

1. Prasanna Chandra,”Projects – Preparation ,Appraisal, Budgeting and Implementation”, Tata McGraw – Hill publishing company Ltd,New Delhi, 3rd Edition.
2. Dr. Gupta,C.B & Dr. Srinivasan,” N.P Entrepreneurial Development”, Sultan chand & Sons, New Delhi.
3. Varma,M.L,” Foreign Trade Management in India”, Vikas Publishing House, New Delhi,1993.

SEMESTER - II

L	T	P	C
6	0	0	4

Total Hours: 78

HUMAN RESOURCE MANAGEMENT

SUBJECT CODE: P2CM22MT

OBJECTIVE :

1. The objective is to familiarize the students with concepts and principles of Human Resource Management
2. Demonstrate competence in development and problem-solving in the area of HR Management.
3. Provide innovative solutions to problems in the fields of HRM.

UNIT-I INTRODUCTION

Humans And Other Physical Resources – Development Of The Human Potential – Implications Of Behavioral Science Theories To HRM – Link Between Organization Planning And HR Planning.

UNIT-II RECRUITMENT AND SELECTION

Acquisitions And Maintenance Of Personnel – Recruitment And Selection Purposes And Methods Of Recruitment And Selection – Maintenance Of Personnel – Motivation Of Increased Productivity – Q W L.

UNIT-III REWARDS AND INCENTIVES

Rewards And Incentives – Financial And Non-Financial Incentives – Grievance Procedure- Conflict – Process – Stress Vs Challenge – Sources – Resolution.

UNIT-IV PERFORMANCE APPRAISAL

Performance Appraisal – Ranking, Rating Scales, Critical Incident Method– MBO As A Method Of Appraisal – Removing Subjectivity From Evaluation– Criteria For Promotions And Job Enrichment

UNIT-V HUMAN DEVELOPMENT

Human Development – Training – Need And Importance – Methods Of Training – Designing Training Program – Evolution Of Training Program – Executive Development – Organization Change – Change Agents – Resistance To Change – Managing The Resistance.

CO1	It develops the understanding of the concept of human resource management and to understand its relevance in organizations.
CO2	Develops necessary skill set for application of various HR issues.
CO3	Analyses the strategic issues and strategies required to select and develop manpower resources.
CO4	Integrates the knowledge of HR concepts to take correct business decisions.
CO5	Enables the students to understand the HR Management and system at various levels in general and in certain specific industries or organizations
CO6	Helps the students focus on and analyses the issues and strategies required to select and develop manpower resources.
CO7	It develops relevant skills necessary for application in HR related issues.

TEXT BOOK.

Aswathappa, "Human resource and Personnel management", Tata McGraw Hill. New Delhi 6TH edition 2012

REFERENCES BOOKS:

1. S K Chakraborty, "Values and Ethics for Organization", Oxford University Press
2. J. Jayashankar, "Human resource management" Margham publications Chennai 1st edition 2014

SEMESTER - II

L	T	P	C
6	0	0	4

Total Hours: 78

ADVANCED ACCOUNTS

SUBJECT CODE: P2CM23MT

OBJECTIVE :

1. The objective is to enable the students to develop awareness about Corporate Accounting in conformity with the Provision of Companies" Act.
 2. To identify the latest amendments thereto with adoption of Accounting Standards.
- To provide information on the concepts on corporate accounting systems.

UNIT-I-ACCOUNTS OF BANKING COMPANIES

Accounts of Banking Companies – Legal provisions – Capital Adequacy Norms – Rebate on Bills Discounted – Asset Classification and provisioning – Preparation of final accounts

UNIT-II-INSURANCE COMPANY ACCOUNTS

Insurance Company Accounts – Nature of Insurance Business – Distinction between Life and Non life Insurance – Accounts of life insurance Business – Accounts of General Insurance Business – IRDA Regulations Regarding preparation of financial statements.

UNIT-III-HOLDING COMPANY ACCOUNTS

Holding Company Accounts – Consolidated Financial statements– Consolidation of balance sheet and Profit and Loss Accounts.

UNIT-IV-ACCOUNTS OF ELECTRICITY COMPANIES

Accounts of Electricity Companies – preparation of final accounts using statutory forms prescribed by Electricity Rules 1956 – Replacement of an asset. Inflation accounting – Need – Objections – adjustments for General Price Changes – Current purchasing power Accounting (CPP) – CPP method of preparing financial statements.

UNIT-V HUMAN RESOURCE ACCOUNTING

Human Resource Accounting – Need and Development – Importance of Human Resource Accounting–Objections against Human Resource Accounting – Human Resource Accounting in India. Corporate Social Reporting – Concept and Objectives of responsibilities.

CO1	Apply the ‘equity method of accounting’ to appropriate acquisitions.
CO2	Describe and apply the generally-accepted accounting principles relating to business combinations under the ‘parent company theory’ and the ‘entity theory’.
CO3	Analyses information for consolidated financial statements under the purchase method, including adjustment and elimination of inter-company profits, losses, and other inter-company transactions.
CO4	Apply appropriate accounting principles relating to the translation of foreign currency in the preparation of consolidated financial statements of multinational companies.
CO5	Analyses partnership-related transactions and properly account for the formation, operations, termination (admission of new partners or withdrawal of partners), and the liquidation of a partnership.
CO6	Apply proper accounting treatment for legal reorganization and liquidation of a business entity.
CO7	Understand worldwide accounting diversity and the internationalization of accounting standards.

TEXT BOOKS

T.S.Reddy&Murthy,”Corporate Accounting”, Margham Publications Chennai
Revised Edition 2017

REFERENCES BOOKS:

1. M C Shukla and T S Grewal, “Advance accounts”, S.Chand & Co New Delhi.3rd edition 2007
2. AnjanBhattacharya & Subrata Mukarjee, “Advanced Practical Accounts”,S.Chand & Co 6th edition 2006

SEMESTER - II

L	T	P	C
6	0	0	4

Total Hours: 78

QUANTITATIVE TECHNIQUES FOR BUSINESS DECISIONS

SUBJECT CODE: P2CM24MT

OBJECTIVES :

1. To study the transportation assignment models and queuing models for maximum profit and minimum cost and time for commercial purpose.
2. To know the concept of various practical theorem
3. To identify the rules of measures of central tendency and dispersion, probability distributions, the Central Limit Theorem, Sampling

UNIT : I LINEAR PROGRAMMING PROBLEM

Linear programming and network analysis – PERT and CPM – Simplex method Application of Simplex method.

Chapter 4 and chapter 25

UNIT : II INVENTORY MODELS

Inventory models – General concepts and definitions – various cost concepts – The technique of inventory control –EOQ models.

Chapter 19

UNIT : III TRANSPORTATION PROBLEM

Transportation model – definitions – formulation and solution of Transportation models – North West corner – Least Cost Method –Vogel's Approximation Method.Un balanced Transportation- Maximize Transportation problem.

Chapter 10

UNIT : IV ASSIGNMENT PROBLEM

Assignment model – Definitions- Formulation and Solution of Assignment- Hungarian method- maximization case- Travelling salesmen problem

Chapter 11

UNIT : V QUEUING THEORY

Queuing theory – meaning- objectives – Limitations – Elements of queuing system –M/M/1 and M/M/N systems with finite and infinite capacities-Simple problems.

CO1	Solve problems as graphs and simplex tables
CO2	Be able to build and solve transportation and assignment problems
CO3	Construct linear integer programming models and discuss the solution techniques
CO4	Use stastics techniques, to plan, schedule, and control project activities
CO5	To analyze a network of queues with Poisson external arrivals, exponential service requirements and independent routing.
CO6	Solve problems as graphs and simplex tables
CO7	Be able to build and solve transportation and assignment problems

Recommended Text :

Operations Research by Kanti Swarup,P.k. Gupta & Man Mohan, Sixteenth edition,2012 , Sultan Chand & sons ,New Delhi.

REFERENCE BOOKS :

- 1.C.R.Kothari, Quantitative Techniques, Vikas Pubishing house.
- 2.P.R.Gupta and man Mohan, Operation Research, Sultan Chand andsons,NewDelhi.
3. J.K. Sharma, Mathematical Models in operation research, TMHPublishers.
- 4.Business Statistics and operations research, DR.D.Joseph anbarasu, lintec Press, Trichy.

NOTE : The Proportion between theory and practice shall be 20:80

SEMESTER - II

L	T	P	C
4	0	0	4

Total Hours: 54

E - COMMERCE

SUBJECT CODE: P2CM25ET

OBJECTIVES

- 1.To understand the interest and opportunity of e-commerce
- 2.To know how to plan and how to manage e-commerce solutions
- 3.To apply processes of e-commerce and to analyze and understand the human, technological and business environment associated with e-commerce

UNIT-I

Introduction – E-commerce Framework – Anatomy of E-Commerce - Ecommerce Consumer Applications – Organization Applications.

UNIT-II

Components of the I-way, Global Information Distribution Networks – Internet Terminology – Internet Governance – An overview of internet Applications

UNIT-III

Introduction to Encryption Standards – DES – RSA – DSS – Digital Certificates Electronic Data interchange (EDI) – EDI and E- Commerce – EDI application in Business.

UNIT-IV

Electronic payment Systems -Secure Electronic Transactions (SET) Protocol- Intra-Organizational E-Commerce - Types of Digital Documents – Corporate data warehouse – Digital Copyrights and E-Commerce.

UNIT-V

M-Commerce - Introduction – Infrastructure of M-Commerce – Types Of Mobile Commerce Services – Technologies of Wireless Business,Non – Internet Applications/services in M-Commerce – Wireless/Wired Commerce Comparisons -The Role Of Mobile Advertising In Building A Brand – M-Commerce Business Models.

CO1	An introduction to digital computer and their fundamental architectures.
CO2	Able to define the function units of computer architecture
CO3	Functionalities and organization of processor units and their types.
CO4	Understand the basic programming unit and execution of instruction
CO5	Computer arithmetic algorithm in signed magnitude data with hardware implementation and hardware algorithm
CO6	Include the interrupts and direct memory access and clasp the standard
CO7	Computer arithmetic algorithm in signed magnitude data with hardware implementation and hardware algorithm.

TEXT BOOK:

1. R. Kalakota and A. B. Whinston, “Frontiers of Electronic Commerce”, Addison Wesley, 1996.

REFERENCE BOOKS:

1. David Kosuor, “Understanding electronic Commerce”, Addison Wesley, 1986
2. Soka, From EDI to Electronics Commerce, Tata McGraw Hill.
3. Saily Chan, Electronic Commerce Management, John Wiley.
4. Brian E. Mennecke, Troy J. Strader, —Mobile Commerce: Technology, Theory and Applications||, Idea Group Inc., IRM press, 2003.
5. P. J. Louis, M – Commerce Crash Course, McGraw – Hill Companies February 2001.
6. Paul May, Mobile Commerce: Opportunities, Applications, and Technologies of Wireless Business|| Cambridge University Press March 2001.

SEMESTER - II

L	T	P	C
4	0	0	4

Total Hours: 52

INDUSTRIAL RELATIONS

SUBJECT CODE: P2CM26ET

OBJECTIVE :

- 1.To create awareness among the students on the Industrial relations required
- 2.To plan and pursue a career and empower them with employability skills.
3. To understand the relationship of both industrial experts and their stakeholders.

UNIT-I-CONCEPT OF INDUSTRIAL RELATIONS

The changing concept of Industrial Relations; Factors affecting employee stability – Application on psychology to industrial relations – Workers participation in management

UNIT-II-TRADE UNIONS

Trade unions – growth – conditions for the development of trade unionism – Aims and objectives of trade unions – Trade unions in India, problems and future.

UNIT-III-INDUSTRIAL DISPUTES ACT

Industrial disputes Act – Machinery – Functions, powers, scope, strikes, lockouts, lay off, Retrenchment and closure.

UNIT-IV-MANAGEMENT AND PERSONNEL ADMINISTRATION

Management and personnel administration – managing, working and living in a changing world. Managers and their personnel concepts. Organization structure and Management development.

UNIT-V DIAGNOSING ORGANIZATIONAL HEALTH

Diagnosing organizational health situational thinking; A systematic Approach – interviewing – indicators of organizational health – personal research turnover and internal mobility, complaints and grievances, occupational safety and health trends.

CO1	Acquire a solid theoretical, practical and ethical perspective on many aspects of industrial relations
CO2	Critically analyze theories, models, and paradigms in the field
CO3	Understand the key participants, institutions, relationships and processes in employment relations, so that you acquire an enhanced ability to influence industrial relations outcomes in an informed manner
CO4	Develop research, writing and speaking skills necessary for work, life and further postgraduate study
CO5	Strengthen key competencies in group participation, oral and written communication and persuasion, critical thinking, problem-solving, information processing and planning
CO6	Be acquainted with the concepts, principles and issues connected with trade unions, collective bargaining, workers participation, grievance redressal, and employee discipline and dispute resolution
CO7	Understand the various processes and procedures of handling Employee Relations.

TEXT BOOKS

C.B.Memoria,” Industrial and labour relations in India”, Kitab Mahal.4th edition, 2004.

REFERENCES BOOKS:

1. Pigou and Myers, “Personnel Administration; appoint of view and a method”, McGraw Hill , Inc.
2. N.K.Singh, “Dimensions of Personnel Management”, Vani Educational Books, New Delhi.6th edition 2007

SEMESTER - II

L	T	P	C
2	0	0	2

Total Hours: 26

HUMAN RIGHTS

SUBJECT CODE: P2HR21GS

OBJECTIVE :

- 1.To create awareness on Human Rights,
- 2.To identify the UN Human Rights declarations and contemporary issues on Human Rights.
3. To find the laws relates to child , women's etc.,

UNIT-I INTRODUCTION

Definition of Human Rights-Nature, Content, Legitimacy and Priority-Theories on Human Rights-Historical Development of Human Rights. Fundamental Rights in the Indian Constitution – Directive principles of State policy – Fundamental Duties – National Human Rights Commission.

UNIT-II INTERNATIONAL HUMAN RIGHTS

Human Rights and the UNO –Universal Declaration of Human Rights-International Covenant on Civil and Political Rights – International covenant on Economic and Cultural Rights and Optional Protocol. International Human Rights in Domestic courts

UNIT- III CONTEMPORARY ISSUES ON HUMAN RIGHTS

Contemporary issues on Human Rights: Children's Rights-Women's Rights – Dalit's Rights – Bonded labour and Wages–Refugees– Capital punishment.

UNIT-IV CONSUMER & ENVIRONMENT PROTECTION ACT.

Consumer protection Act 1986- Objects- Definitions- Central Consumer protection Council – Consumer Dispute Redressal Agencies. Environment Protection Act 1986-Objects- Definition- Powers of Central Government –Provisions of Act to the prevention and control of Environmental Pollution Act.

UNIT- V RIGHT TO INFORMATION ACT 2005.

Introduction- History behind the Rights- Scope of the Rights- Main characteristics-Right to Information Act 2005- Exempt from Disclosure-Procedure for seeking information- Appellate Authorities- Reporting Procedure.

CO1	Human rights as a branch of public international law, and relevant juridical mechanisms at global as well as regional levels,
CO2	The role of human rights in contemporary issues relating to terrorism, religion, ethnicity, gender and development
CO3	Human rights as an object of study in history, philosophy and the social sciences, as well as a practical reality in national and international politics,
CO4	Different forms of promoting and implementing human rights, domestically as well as on the international level
CO5	Scholarly values such as transparency, impartiality, clarity, reliance and the importance of sound reasoning and empirical inference
CO6	It takes an analytic and critical stance and deal with questions of how human rights affect social and political processes
CO7	It helps to identify, contextualise and use information about the human rights situation in a given country,

TEXT BOOK

T.S.Ravi ,”Human Rights”, Margham Publications Chennai 1st edition 2013

REFERENCES BOOKS:

1. J.Jayasankar. “Corporate laws” Margham publication Chennai 1st edition.2013.
2. “International Bill of Human Rights”, Amnesty International Pub.
3. Desai, A R, “Violation of Democratic Rights in India”

SEMESTER - III

INDIRECT TAXATION

L	T	P	C
6	0	0	4

SUBJECT CODE: P3CM21MT

OBJECTIVE :

- 1.This course is to provide adequate knowledge of various concepts and their applications relating to tax.
2. In direct tax laws with a view to integrating the relevance of these laws with financial planning and management decisions.
- 3.To provide, master and reinforce skills in calculating **tax** savings

UNIT -IINDIAN FEDERAL SYSTEM

Indian federal system- an overview of Federal Finance- Canons of Taxation-Direct and Indirect Taxation-Merits and Demerits-Types of Indirect Taxes.

UNIT –IITYPES OF GST

Types of GST- CGST-SGST-IGST-UGST- Apportionment of GST between Central and State- Input Tax Credit(ITC) under GST.

UNIT III COLLECTION OF GST

Collection of GST- Late fee-Interest for Delay Payment-Compounding Option>Returns under GST- Registration Number-Audit and Assessment-other features of dual GST Model.

UNIT IVGST RATE STRUCTURE

GST-Rate Structure – GST rates in prominent Countries- Zero rating of Exports-GST on Imports-Special Industrial area scheme-Refund and adjustment of GST- Transactions within State under GST and Interstate- State transactions under GST.

UNIT VCUSTOMS DUTIES

Customs duties-Definitions-Goods-Imported Goods- levy of Customs Duty-Exemptions from Customs Duty- Baggage rules-Authorities of Customs Duties-Powers-Imposition of Fines and Penalties.

CO1	It enables to understand various terms related to Goods and Service tax (GST)
CO2	It helps to understand the difference between forward charge and reverse charge mechanism and also to understand the difference between composite and mixed supply.
CO3	It able to determine the time, place and value of supply.
CO4	The contents and format for various documents like tax invoice, bill of supply, debit note, credit note etc., are clarified.
CO5	Students will be able to compute the amount of CGST, SGST and IGST payable after considering the eligible input tax credit.
CO6	Determines whether a person is required to obtain registration under GST law.
CO7	By the end of the course students will be able to describe how the provisions in the corporate tax laws can be used for tax planning.

TEXT BOOKS:

T.S. Reddy, “Indirect Taxes”, Margham Publications, Chennai Revised Edition 2018

REFERENCES BOOKS

1. Dinkar Pagare, “Business Taxation”, Sultan Chand & Sons, New Delhi. 3rd edition, 2011
2. Balachandran V, “Indirect Taxation”, Sultan Chand & Sons, New Delhi. 3rd edition. 2014
3. Govindan M.S, “Indirect Taxes Made Easy”, Sitaraman & Co, Chennai.

SEMESTER - III

L	T	P	C
6	0	0	4

Total Hours: 78

ORGANISATIONAL BEHAVIOUR

SUBJECT CODE:P3CM22MT

OBJECTIVE:

- 1.The objective is to enable the students to understand the Organizational Behaviour, and Organizational Change and dynamic of groups .
2. To **learn** the basic concepts of **Organizational Behaviour** and its applications in contemporary organizations.
3. Understands Employee's Behavior · Enhancing Organizational Efficiency · Resolving Conflicts

UNIT-I ORGANISATIONAL BEHAVIOUR

Organisational Behavior - Fundamental concepts - nature and scope - OB in the new millennium
- Foundations of Individual behavior - Personality, Perception, Learning, Values and Attitudes.

UNIT-II MOTIVATION

Motivation - Early theories - Contemporary theories - Motivation at work - Designing and Motivating for jobs.

UNIT-III GROUP DYNAMICS

Group Dynamics - Group Behaviour, - Inter-group relations - Communication and Group - Decision making.

UNIT-IV LEADERSHIP

Leadership - Trait, behavior and contingency theories- Power and Politics - Conflict -causes, conflict management, Transactional Analysis (TA) - Work Stress.

CO1	Discuss the development of the field of organizational behaviour and explain the micro and macro approaches
CO2	Analyse and compare different models used to explain individual behaviour related to motivation and rewards
CO3	Identify the processes used in developing communication and resolving conflicts
CO4	Group dynamics and demonstrate skills required for working in groups (team building)
CO5	Identify the various leadership styles and the role of leaders in a decision-making process.
CO6	Explain organizational culture and describe its dimensions and to examine various organizational designs
CO7	Discuss the implementation of organizational change.

UNIT-V ORGANISATIONAL STRUCTURE AND DESIGN:

Organisational Structure And Design: Organizational changes and development - Organisational culture and climate -Organizational effectiveness.

TEXT BOOKS

1. Jayakumar, “OrgansationalBehaviour”Margam Publications, Chennai, 1st edition,2013
2. S.S. Khanka, “OrganisationalBehaviour”, S.Chand &Co., New Delhi 6th edition,2010

REFERENCE BOOKS

1. Stephen Robbins,” Organisational Behaviour”, Pearson Education, New Delhi,1st edition , 2001.
2. Fred Luthans, “Organizational Behavior”, McGraw Hill, New Delhi 1st edition 1998
3. CD Balaji, Organisational Behaviour Margham Publications Chennai Edison 2017

SEMESTER - III

L	T	P	C
6	0	0	4

Total Hours: 78

ADVANCED COST ACCOUNTING

SUBJECT CODE:P3CM23MT

OBJECTIVE:

1.The objective of this subject is to familiarize students with the various advanced concepts and element of cost involved in various techniques of costing methods.

2. Compare Cost Accumulation Systems and Choose the Right One .

3. To Evaluate Results Against Budgets with Greater Accuracy

UNIT-I NATURE AND SIGNIFICANCE OF COST ACCOUNTS

Nature and significance of cost accounts - Definition of Costing, Scope, Objectives, Functions and limitations of cost accounting - Installation of costing system - Elements of Cost - Cost centre and profit centre - Preparation of Cost sheet, tender of quotations.

UNIT-II METHODS OF COSTING

Methods of Costing - Process costing, Treatment of equivalent production - Inter process profit - Joint and by product Costing - Preparation of contract account, Cost plus contract and escalation clause.

UNIT-III STANDARD COSTING

Standard Costing and Variance analysis - Material, Labor and Overheads -reporting of variances

UNIT-IVCOST CONTROL

Cost control - Reconciliation Statement - Control over wastages, Scrap, Spoilage and defectives - Constituting cost reduction cell.

UNIT-V ACTIVITY BASED COSTING

Activity based costing - JIT Costing - Cost Audit

(Weightage of Marks, problems 80%, theory 20%)

CO1	Prepare learners to understand the Scope of Cost Accounting in any business activity.
CO2	It helps to learn the Cost Accounting treatment in relation to Material Cost Accounting, employee cost and overheads.
CO3	Develop the learners to establish the interface between Cost Accounting Standards and the various elements of Cost.
CO4	Enable students to learn application of different methods of costing in Manufacturing and Service industries.
CO5	Enhance the abilities of learners to develop the concept of Cost and Management Accounting and its significance in the business
CO6	Enable the learners to understand, develop and apply the techniques of costing in the decision making in the corporate world.
CO7	Equip the students with knowledge and skill to design and implement Cost Control through Costing Techniques.

TEXT BOOK

T.S. Reddy & Hari Prasad Reddy, “Cost Accounting”, Margham Publications, Chennai 4th Edition -2011

REFERENCE BOOKS

1. S.P. Jain and K.L. Narang –“Cost accounting”-Kalyani Publishers-New Delhi. 4th edition 2013
2. B.K. Bhar –“Cost Accounting”-Academic publishers, Calcutta 1st edition 2009
3. . S.P.Iyengar, “Cost Accounting”, Sultan Chand & Sons, New Delhi. 9th Edition,2000.

SEMESTER - III

L	T	P	C
4	0	0	4

Total Hours: 52

RESEARCH METHODOLOGY

SUBJECT CODE:P3CM24MT

OBJECTIVE:

- 1.The objective is to create an awareness of the Process of Research, the tools and techniques of research and generation of reports.
- 2.Students should be able to distinguish between categorical and continuous measures. Students
3. Students should be able to define theory use in quantitative research

UNIT-I-INTRODUCTION

Research - definition, characteristics, nature and scope. Various types of research - Formulation of research problem - Major steps in Research – Hypothesis - Research Design - Uses of social research.

UNIT-II : SAMPLING AND DATA COLLECTION

Sampling: Meaning, definition, need and types. Sampling errors - Merits and demerits of Sampling. Data collection: Sources of data; Primary and Secondary data. Procedure for data collection, Tool of data collection - Questionnaire – Interview - Schedule.

UNIT-III DATA PROCESSING AND ANALYSIS

Processing of data: editing, coding and Tabulation - Problems - use of computer in social research. Analysis of data: Statistical analysis; diagrammatic and graphic representation. Interpretation of results.

UNIT-IV : STATISTICAL APPLICATIONS

Factor Analysis -Bivariate and Multivariate Analysis. (Practical problems.)

UNIT-V : RESEARCH REPORTS

Structure and components - Types of Research Report, Good Research Report. Pictures and Graphs. Introduction to SPSS Package.

CO1	Acquaint the students with the areas of Business Research Activities
CO2	It enhances capabilities of students to conduct the research in the field of business and social sciences
CO3	Enable students, in developing the most appropriate methodology for their research studies.
CO4	It makes them familiar with the art of using different research methods and techniques
CO5	Discuss the methodology and techniques used in research work.
CO6	Basic computer skills necessary for the conduct of research.
CO7	Assess the basic function and working of analytical instruments used in research.

TEXT BOOKS

Kothari.C.R.” Research Methodology” - Methods & Technology, New Age International Publisher, New Delhi 23rd edition 2013

References Books

1. Ravilochanan, Research Methodology” Margham Publication Revised Edition 2017
2. Panneerselvam. R. “Research Methodology”, Prentice Hall of India, New York. , Edition 2004.
3. Green, P.E., et al.,” Research for Marketing Decisions”, Prentice-Hall of India, 5th Edition,

SEMESTER - III
FINANCIAL SERVICES
SUBJECT CODE –P3CM25MT

L	T	P	C
4	0	0	4

Total Hours : 52

Objectives:

1. To make students understand various functions, importance of financial services.
2. To introduce students to the world of financial services.
3. To identify the knowledge of Financial products.

UNIT I: INTRODUCTION TO FINANCIAL SERVICES

Introduction : Overview of Financial Services in India, Nature, importance, Growth , Structure and Types. An overview of financial market - Capital Market, Money Market, Government Securities Market, Foreign Exchange Market - International Financial Markets

UNIT II: LEASING

Leasing : Introduction -Concept and Classification of Leasing, Essential Elements of Leasing- Types of Leasing (finance lease & operating lease)- Procedure of a Lease, Advantages and Limitations of Leasing-Financial evaluation of Leasing.

UNIT III: VENTURE CAPITAL

Venture Capital : Meaning and Definition of Venture Capital, Characteristics of Venture Capital, Forms - Types of Venture Capital Assistances

UNIT IV: FACTORING

Factoring : Introduction, Meaning of Factoring, , Types of Factoring, Functions of Factoring, Advantages & Disadvantages of Factoring.

UNIT V: STOCK EXCHANGES

Organisation and Functions of Stock Exchanges - Regulation and control of Stock Exchanges - NSE, BSE, OTCEI, Regional Exchanges.

CO1	Students get knowledge about financial services in India as Indian Financial System, Financial Markets, Banking and Insurance Sector in India and Recent Trends in Accounting and Finance
CO2	Students are acquainted with current financial practices
CO3	Students are well acquainted with Financial Markets
CO4	Understand the various services offered and various risks faced by banks.
CO5	Understand the dynamic changes of the banking industry and the policy responses because of the recent crisis
CO6	Have a practical understanding of the various distribution channels of insurance products for effective marketing.
CO7	Have a practical understanding of regulations and be able to understand insurance operations both in life as well as general insurance.

TEXT BOOKS

Dr. S. Gurusamy, “Financial Services and Systems ”, Vijay Nicole Imprint, Pvt. Ltd. 2nd edition 2013.

REFERENCE BOOKS

1. M.Y. Khan, “Financial Services”, Tata McGraw Hill, 2nd edition 2001.
2. Machiraji, “Indian Financial System”, Vikas Publishers, 0th edition,1998.
3. Mark Grinblatt, Sheridan Titman, “Financial Markets and Corporate Strategy”, Tata Mc Graw Hill, New Delhi, 4th edition 2003.
- 4.B.S. Bhatia, G.S. Bhatra, “Management of Capital Markets, Financial Services and Institutions”, Deep & Deep Publishers, 0th edition,2000.

L	T	P	C
4	0	0	3

Total Hours : 52

SERVICES MARKETING

SUBJECT CODE:P3CM26ET

OBJECTIVE:

- 1.To understand the meaning of services and the significance of marketing the services
- 2.Analyze the customer service practices and attitudes in the organizational culture. 3.
- 3.Identify and analyse various service sector.

UNIT-I GROWTH OF THE SERVICE SECTOR

Nature and Concept of Service - classification of services - Characteristics of Services and their marketing implications - Essential Elements of marketing mix in Service marketing.

UNIT-II MARKETING STRATEGIES FOR SERVICE FIRMS

Marketing strategies for service firms with special reference to information, communication, consultancy, advertising, professional services, after sales service, recruitment training and tourism.

UNIT-III PRODUCT SUPPORT SERVICES

Product support services - Pricing of services - Problems of Service quality management - Customer Expectations - Innovation in services.

UNIT-IV MARKETING OF FINANCIAL SERVICES

Marketing of Financial Services - Nature - Types - Marketing of Insurance - Mutual Fund - Marketing for non - profit firms - Growth of financial services in India.

UNIT-V CRM

CRM - identifying and Satisfying Customer needs - Relationship marketing - Customer Satisfaction - Managing Service Brands.

CO1	Demonstrate an extended understanding of the similarities and differences in service-based and physical product-based marketing activities;
CO2	Demonstrate a knowledge of the extended marketing mix for services;
CO3	Develop and justify marketing planning and control systems appropriate to service-based activities;
CO4	Specify, analyze and select markets for specific service products;
CO5	Prepare, communicate and justify marketing mixes and information systems for service-based organizations;
CO6	Demonstrate integrative knowledge of marketing issues associated with service productivity, perceived quality, customer satisfaction and loyalty
CO7	Exhibit the capability to work effectively within a team environment.

TEXT BOOKS

L.Natarajan, “Service marketing”, marghampublications, Chennai .1st edition ,2013

REFERENCE BOOKS

1. Philip Kotler and Paul N.Bloom, “Marketing professional Services”, Prentice hall
2. R.Srinivasan“Services Marketing: The Indian Context“Prentice Hall India Learning Private Limited. Fourth edition, 2014

WORKING CAPITAL MANAGEMENT

SUBJECT CODE:P3CM27ET

L	T	P	C
4	0	0	3

Total Hours : 52

OBJECTIVES :

To understand how the capital for used to day today operations.

UNIT-I: WORKING CAPITAL POLICY

Working Capital Policy : Importance of working capital management- Concept of working capital-Risk Return trade off for financing working capital-Sources and uses of working capital-Factors influencing working capital cycle- Issues in working capital policy-Forecasting and management of working capital.

UNIT-II: CASH MANAGEMENT

Cash management :Importance-Factors influencing cash balance- Determining minimum cash balance- Cash budgeting-Cash control- Monitoring collection and disbursement-Cash management models.

UNIT-III: INVENTORY MANAGEMENT

Inventory management :Need for Inventories and importance of its management-Techniques for managing inventory –Different models-Reorder point- Monitoring and control of inventories.

UNIT-IV: RECEIVABLES MANAGEMENT

Receivables Management :Credit Policy-Credit Evaluation-Credit granting decision- Control of Receivables- Collection policy.

UNIT-V : FINANCING CURRENT ASSETS

Financing Current Assets :Trade credit-Short term bank finance-commercial paper-public deposits- regulation of bank credit-Recommendations.

CO1	Evaluate comparative working capital management policies and their impact on the firm's profitability, liquidity, risk and operating flexibility.
CO2	Evaluate the importance of effective working capital management and its role in meeting the firm's strategic objectives and its impact in value creation.
CO3	Investigate funds flow cycles and their impact on working capital management objectives.
CO4	Compare and contrast the relative merits of alternative working capital policies and the likely short-term and long-term impact on the firm.
CO5	Formulate appropriate working capital management policies to achieve corporate objectives.
CO6	Corporate cash management, accounts receivable management, bank relations, and inventory management techniques to maximize the share holders' value.
CO7	Formulate and integrate an extended treatment on international working capital topics.

Text books

Vijay Prakash Joshi: Working capital management, TATA Mc-Graw Hill publishing co Ltd New delhi. 23rd Edition 2009

Reference Books:

1. John J Hampton, Lecillial wagner and S. Shivaraman : Working capital management, John Wiley & Sons, New York, 5th Edition, 1989.
2. V K Bhalia: Working capital management, Anmol Publications, New Delhi, 5th edition 2007

L	T	P	C
4	0	0	3

Total Hours 52

DIRECT TAXES

SUBJECT CODE:P4CM21MT

OBJECTIVE:

1. Objective of this course is to provide adequate knowledge of various concepts and their applications relating to direct tax
- 2.Laws with a view to integrating the relevance of these laws with financial planning.
- 3.To provide, master and reinforce skills in calculating **tax** savings

UNIT-I INTRODUCTION

Basic concepts - Definitions - Assesses - Assessment year - Previous Year - Income - Residential Status - Scope of Total Income - Exempted income - Agricultural income - Capital income and expenditure - Revenue Income and expenditure.

UNIT-II HEADS OF INCOME

Heads of Income - Income from Salaries - Income from House property - Income from Business or Profession - Depreciation.

UNIT-III HEADS OF INCOME

Income under the head capital gains - Income from other sources - Deductions from Gross Total Income.

UNIT-IV TOTAL INCOME

Computation of Total Income - Individual - Firm - Companies - Tax Deducted at Source - Advance Tax - Interest payable - Set off and Carry forward of losses - Rates of Tax.

UNIT-V ASSESSMENT PROCEDURE

Assessment Procedure - Income tax Authorities –Types of Assessment- Returns – PAN

Note: The ratio between theory and problems shall be 40:60.

CO1	Acquire conceptual knowledge of Direct and Indirect Tax.
CO2	Understand the concept of exempted incomes and the provisions of agricultural income.
CO3	Identify and comply with the relevant provisions of the Income Tax Act as it relates to the income tax of individuals.
CO4	Develop the skill of recording difference between Direct and Indirect Tax.
CO5	Compute the income under the head "Income from Salary", "Income from house property", "Income from business or profession".
CO6	Acquire the complete knowledge of basic concepts of income tax.
CO7	Describe the role of Income Tax in Growth of Country.

TEXT BOOKS

H.C.Mehrotra—"Direct taxes" ,Sahitya Bhawan Publications,27th edition, reprint2015

REFERENCE BOOKS

1. Gaur V.P & Narang K.L, "Income Tax Law and Practice", Kalyani Publishers, Chennai 4th edition 2015
2. Vinod Singhania," Direct Taxes", Tax Man Publications, New Delhi. 27th edition,2015
3. Dinkar Pagare, "Income Tax Law and Practice", Sultan Chand & Sons, New Delhi. 20th edition, 2015.

L	T	P	C
4	0	0	3

Total Hours : 52

INVESTMENT MANAGEMENT

SUBJECT CODE: P4CM22MT

OBJECTIVES

:

1. Enables student to Understand the nuances of stock market operations. Understand the techniques involved in deciding upon purchase or sale of securities.
2. To under stand the characteristics of different financial assets.
3. To enable the students to grasp the basic knowledge in. Investments.

UNIT-I PROPERTIES OF FINANCIAL ASSETS

Properties of financial assets - Financial Markets - Investments - Types - Characteristics - Objectives - Types of investors - Investment vs. Gambling, Speculation, Speculation Vs. Gambling.

UNIT-II SECURITY ANALYSIS

Nature and Scope of Security Analysis - Concept of Risk and Return - Measurement of Risk

UNIT-III FUNDAMENTAL ANALYSIS

Fundamental analysis - Economic analysis, Industry Analysis and company Analysis - Technical analysis - Trend indications - Indices and moving average applied in technical analysis.

UNIT-IV VALUATION OF SECURITIES

Valuation of Securities - Equity shares - Preference shares - Debentures - Bonds

UNIT-V EFFICIENT MARKET HYPOTHESIS

Efficient market Hypothesis - Random Walk Theory - Markowitz Theory - Sharpe's optimization solution - Dow Theory - CAPM model - SML, CML.

Note: Only theory question

CO1	Critically discuss client objectives and the investment policy statement
CO2	portfolio theory in practice, covering asset allocation and international investment, portfolio risk management and risk-adjusted performance measurement
CO3	Understand and critically evaluate Value strategies, Momentum strategies and Hedge fund strategies
CO4	Understand and critically interpret output from investment and risk management tools such as Style Research, Thomson One Banker and Data stream.
CO5	Students will understand the characteristics of different financial assets such as money market instruments, bonds, and stocks, and how to buy and sell these assets in financial markets
CO6	Students will understand the benefit of diversification of holding a portfolio of assets, and the importance played by the market portfolio.
CO7	Students will know how to apply different valuation models to evaluate fixed income securities, stocks, and how to use different derivative securities to manage their investment risks.

TEXT BOOKS:

L. Natarajan, "Investment management" Margham publications, Chennai Revised Edition 2018.

REFERENCE BOOKS

1. Ragunatham m & Madhumathi R. Investment analysis and Portfolio management. Pearson Education, New Delhi. 1st,edition, 2001.
2. Bhalla V.K.Investment Management, S.Chand and Company, New Delhi.1st edition ,2001.
3. Fisher & Jordan, Security analysis and portfolio management, Prentice Hall of India, 3rd edition ,2009.

L	T	P	C
4	0	0	3

Total Hours : 52

PROJECT DEVELOPMENT

SUBJECT CODE:P4CM23MT

OBJECTIVE:

1. To learn the concepts of managing projects.
2. To recognize the components of a project charter and how to be appropriately scale .
3. To identify the various techniques of Budgeting and budgetary control.

UNIT-I : PROJECT

Meaning and overview - Project Development Cycle - Capital Expenditure Decisions - Importance and Difficulties.

UNIT-II : PROJECT APPRAISAL

Aspects of Appraisal - Market Appraisal - Technical Appraisal - Financial Appraisal - Economic Appraisal. Project formulation. Feasibility Report.

UNIT-III : PROJECT COST AND MEANS OF FINANCE

Project cost - Social Cost and Social Benefit. Term Loans - Loans from Development banks - Assistance from Indian finance Corporations and international finance Corporations. External commercial borrowing.

UNIT-IV : PROJECT SELECTION

Selection of a suitable project - Programming - scheduling and Controlling Mechanism.

UNIT-V : PROJECT CONTROL

Time and cost control - Budgetary control - corrective and preventive actions. Risk Management functions

CO1	Break work down into tasks and determine handover procedures
CO2	Identify links and dependencies, and schedule to achieve deliverables
CO3	Estimate and cost the human and physical resources required, and make plans to obtain the necessary resources
CO4	Allocate roles with clear lines of responsibility and accountability.
CO5	Students will identify the resources needed for each stage, including involved stakeholders, tools and supplementary materials
CO6	Students will describe the time needed to successfully complete a project, considering factors such as task dependencies and task lengths
CO7	Students will be able to develop a project scope while considering factors such as customer requirements and internal/external goals

TEXT BOOKS

Gupta, C.B. & Dr. Srinivasan, N.P. Entrepreneurial Development, Sultan Chand & sons, New Delhi 2nd edition, 2013

REFERENCES BOOKS

1. Prasanna Chandra, Projects - Preparation, Appraisal, Budgeting and Implementation, Tata McGraw- Hill Publishing Company Limited, New Delhi. 3rd edition,. 2013
2. Gupta, C.B. & Dr. Srinivasan, N.P. Entrepreneurial Development, Sultan Chand & Sons, New Delhi. 4th edition 2008
3. Varma, M.L. Foreign Trade Management in India, Vikas Publishing House, New Delhi. 3rd edition 1993,

L	T	P	C
4	0	0	5

Total Hours : 52

MARKETING RESEARCH

SUBJECT CODE:P4CM24MT

OBJECTIVE

- 1.The objective is to enable students to understand the concept of marketing Research and it applications and the recent trends in Marketing Research.
- 2.Develop!and!maintain!an!advertising!budget.
- 3.Determine!the!goals!of!an!advertising!effort.

UNIT-I INTRODUCTION

Marketing research - Nature, Scope and importance - Research proposal - Steps in marketing research.

UNIT-II RESEARCH DESIGN

Research design - Exploratory research - Descriptive research - survey research.

UNIT-III DATA COLLECTION

Data collection - Secondary data - primary data-types, merits and Limitations -Methods of collection - Processing of collected data - Management Information System.

UNIT-IV ETHICS IN MARKETING RESEARCH

Ethics in marketing research-Treatment of respondents, buyer and Researchers-International code of marketing research practice.

UNIT-V APPLICATION OF MARKETING RESEARCH

Application of marketing research - product research-motivation Research-presentation of research project - Future of Marketing Research in India.

CO1	Understand the process of marketing research and its different processes
CO2	Identify sources of information
CO3	Understand different research methods
CO4	Selection research methods
CO5	Analise and interpret both qualitative and quantitative data
CO6	Conduct and analyze a focus group discussion
CO7	Build a simple questionnaire from a web-based survey administration site.

TEXT BOOKS

Philip Kotler”Marketing Management and Control-Asian perspectives”Prentice Hall of India (The Millennium Edition). 1999

REFERENCE BOOKS

1. Boyd Harper W. and Ralph Westfall-marketing research-text and cases-Richard D. Irwin Inc. Indian Edition. 1st edition 2007
2. .D.D Sharma - Marketing research - Sulthan Chand & Sons, New Delhi. 4th edition 2003
3. Dr. P. Ravilochanan, “Margham Publication “ Revised Edison – 2016.

.

SEMESTER - IV

L	T	P	C
6	0	0	4

Total Hours: 78

SALES AND ADVERTISING MANAGEMENT

SUBJECT CODE:P4CM25ET

OBJECTIVE:

1. To facilitate how the sales and advertising to be practiced in the current scenoria.
2. To Identify the roles of advertising, sales promotion, public relations, personal selling and direct marketing in the promotion mix; compare and contrast integrated marketing communications with a non-integrated approach to the promotional mix.
3. To Illustrate how the international trade system, economic, political-legal and cultural environments in a foreign country affect a company's international marketing decisions.

UNIT-I INTRODUCTION

Sales management - Meaning and Scope - Functions Sales and Planning - Sales policy - Sales organization - Sales Territories - Sales Quota - Selling process-Responsibilities of Sales manager

UNIT-II RECRUITMENT AND SELECTION

Need for sales force - Recruitment and Selection of sales force - Training of salesmen - Qualities of a Good salesman

UNIT-III ADVERTISING

Advertising - Scope and Function - Need for Advertising classification -Advertisement Planning and Organization - Ethical Issues in Advertising

UNIT-IV ADVERTISING MEDIA

Advertising Media - Role of Media - Types of Media - Merits and Demerits - Media Research - Evaluation and Effectiveness of Advertising.

UNIT-V ADVERTISING BUDGET

The Advertising budget - Advertising Agencies - Types of Legal framework of advertising - Self regulation of Advertising.

CO1	Know the basic principles of sales and advertising management
CO2	Demonstrate an understanding of the role of the sales force as a part of the marketing mix;
CO3	Apply in a competent manner sales and advertising management tool such as sales forecasting, sales compensation methods, sales budgeting, sales reports, routings, quotas, sales analysis, and evaluation of performance by means of a team project that creates a sales force plan.
CO4	Understand the role of the function of sales and advertising management in the corporate structure.
CO5	Develop the skills among students to enable them to design the promotion-mix strategies and to make the students aware about the current trends in marketing to enable them to take proactive measures while taking marketing decisions.
CO6	Take effective decisions for launching new products.
CO7	Discuss and make the students understand the complexities involved in various targeting and positioning decisions

TEXT BOOKS

P.Saravanel, & S.Sumathi , “ Advertising and Sales manship”, Margham publication Chennai
Revised Edition 2017

REFERENCE BOOKS

1. Ramasamy: V S” Marketing Management”, Macmillan pub. 3rd edition 2004.
2. Davar: “Salesmanship and Advertising”,Mc Graw hill New Delhi 2nd edition, 2003.
4. Richard R Still and Edward W Gundiff –“Sales management”- Prentice Hall .10th edition 2001.

SEMESTER - IV

L	T	P	C
6	0	0	4

Total Hours: 78

BUSINESS ENVIRONMENT AND POLICY

SUBJECT CODE:P4CM26ET

OBJECTIVES:

- 1.To familiarize the students with International Financial environment, instruments and institutions.
- 2.To analyse the overall business environment and evaluate its various components in business.
3. It helps students to study the aggregates and to provide overall idea about national economic Policies.

UNIT-I BUSINESS ENVIRONMENT

Business Environment: Cultural, social, political, technological, economic and legal environment - scanning - techniques of environmental forecasting - SWOT - Internal environment - their impact on policy formulation.

UNIT-II ECONOMIC REFORMS

Economic reforms in India - Liberalization - privatization and globalization - Competitive Strength of Indian industry - Impact of liberalization policy on different sectors - Foreign Investments policy in India.

UNIT-III MULTI-NATIONAL CORPORATIONS

Multi-national corporations -Their participation in India - Their strategies, competitive strengths policies and performance.

UNIT-IV BUSINESS POLICY AND CORPORATE STRATEGY

Business policy and corporate strategy: Policies; Strategies and Tactics; Policies and procedures - Corporate strategy: alternatives - variations - Strategic choice, implementation.

UNIT-V BUSINESS ETHICS AND SOCIAL RESPONSIBILITIES

Business ethics and social responsibilities - relationship between business and society - Corporate power social accountability - Ethical issues and values in business - Corporate Social policies - issues and challenges - Ecological and environmental issues.

CO1	Familiarize with global business environment
CO2	Make them understand about different trade policy on export and import
CO3	Develop the knowledge about international business
CO4	Create an awareness about various international trade institutions (IMF, IBRD, IFC, IDA)
CO5	Develop knowledge about different marketing strategies
CO6	Enable the students with data processing and modern electronic medium
CO7	Develop the students about application of information system

TEXT BOOKS

Wheelen, Concepts of Strategic Management and Business policy, Pearson Education, New Delhi, 8th Edition,. 2002.

REFERENCE BOOKS

- 1.. William Gluck & L R Jauch,” Business Policy & Strategic Management”,McGraw-Hill ,New Delhi . 4TH Edition,2001.
2. Kazhmi Azhar , “Business Policy”, TMH,New Delhi. 8th edition,2002.
3. Gupta, “Liberalisation - its impact on Indian Economy”, Macmillan, 9th edition,2002

Om Sakthi
ADHIPARASAKTHI COLLEGE OF ARTS & SCIENCE
(Autonomous)
Permanently Affiliated to Thiruvalluvar University, Vellore
Accredited by NAAC with B⁺⁺ Grade

MASTER OF PHILOSOPHY IN COMMERCE

Under CBCS
(Effective from the Academic Year 2018-2021)
REGULATIONS

CBCS:

Choice –Based Credit System is a flexible system of learning. ‘Credit’ defines the quantum of contents / Syllabi prescribed for a course and determine the number of hours of instruction required.

1. Eligibility for Admission:

Admission to the M.Phil (Commerce) Degree Course shall be need as follows:

A student who has passed M.Com. Degree with 50% of marks.

2. The minimum duration for completion of M.Phil in Commerce is Two Semesters
maximum duration is Four semester.

3. The M.Phil Degree is Awarded if a student has,

- Registered, undergone and secured the required minimum number of credits for the core and elective courses including dissertation specified in the corresponding programme within the stipulated time.
- Secured the required attendance:
- No dues to the college, Hostel or Library:
- No disciplinary action pending against him/her.

4. Structure of the Programme

The **M.Phil.** programme consists of:

Core courses which are mandatory for all students

Elective courses which students can choose from amongst the courses offered within the department of the college.

Dissertation[Mandatory]

5. The distribution of credits will be as below:

- i. Core courses – minimum two courses carrying 5 credits each (10 or more credits)
- ii. Elective carrying 5 credits each – No minimum
- iii. Dissertation 21 credits

The total number of credits for core and electives shall be 15, consisting of

- 2 Core courses (10 credits) plus one elective (5credits)

The research topic for the dissertation may be finalized even at the beginning of the M.Phil Programme, so that the collection of relevant literature and research design could be completed in the First semester leaving the entire second semester for the research work. The course registration for dissertation shall be in the First semester and a separate registration form shall be used for Registration.

6. Evaluation of the dissertation

6.1 The dissertation shall be jointly valued by the supervisor and one external examiner.

The external examiner is to be drawn from:

- i. University department or affiliated college within the city or vellore; or
- ii. Any accredited institution of higher education and / or research within tamilnadu

The viva-voce examination on the dissertation shall be jointly conducted by the supervisor

and the external examiner. The distribution of marks shall be as under:

- 20% marks for periodical presentation (to be evaluated and awarded by the supervisor)
- 60%marks for the Dissertation
- 20%marks for Viva-voice

6.2 The last date for submission of dissertation shall be 31st August every year without penalty. Those who do not submit the dissertation in time may be given an extension of a maximum of two months with a penal fee prescribed by the college (i.e. up to 31st October). There shall be no further extension of time beyond this period. Any student failing to submit the dissertation within this period will be permitted to submit the dissertation only in the next academic year along with the subsequent batch of students.

7 Regulations of M.Phil. Programme

The rules and regulations governing course registration, attendance and discipline of student for M.Phil. Programme shall be the same as for the Master's Programme.

8 Evaluation

The process of evaluation, examination, grading, etc for the M.Phil. Programme shall be the same as for Master's Programme except for the dissertation; However, final semester students of the M.Phil. should be allowed to appear for examinations in any arrear papers in the month of September / October each year.

Illustration: M.Phil CUMULATIVE GRADE STATEMENT

Semester and Course	Course Number/ Code	Credits earned	Marks Secured [Max.100]	Grade Point	Letter Grade	Results
First Semester						
Research Methodology (Core)	M1RM21AM	5	70	5.05	A+	PASS
Advanced Financial Management (Core)	M1CM21MT	5	60	4.00	A	PASS
Elective	M1CM22MT	5	75	5.50	O	PASS
Grade Point Average [GPA] / Weighted average Marks [WAM]		15	68.33	4.85		
Second Semester						
Dissertation and Viva-voce	M2CM21DV	21	64	4.49	A	PASS
Grade Point Average [GPA] / Weighted average Marks [WAM]		21	64	4.49		
Cumulative Grade Point Average [CGPA] / Overall Weighted average Marks [WAM]			65.81	4.64	A+	FIRST CLASS

Question paper pattern:

1. **Section A**(5X 6=30 marks) either or type
2. **Section B**(3X 15=45marks) three out of five

(Note: One question from unit for section A and section B.)

ADHIPARASAKTHI COLLEGE OF ARTS & SCIENCE
G.B.NAGAR, KALAVAI-632506 (AUTONOMOUS STATUS)
AFFILIATED TO THIRUVALLUVAR UNIVERSITY, VELLORE
DEGREE COURSES

M.Phil.
(With effect from 2019-2021)

Year/ Semester	Subject	Paper	Subject Code	Title of the Paper	Ins. Hrs/ Week	Credit	Exam Hrs	Marks		
								IA	Sem .	Total
I Year/ I Semester	Core	Paper I			6	5	3	25	75	100
	Core	Paper II			6	5	3	25	75	100
	Elective	Guide Paper		Guide Paper	6	5	3	25	75	100
I Year/ II Semester	-	-		Dissertation with Viva Voce	-	21	-	25	75	100
TOTAL					-	36	-	100	300	400

The course of study and the scheme of examination

POs	Programme Name: M.PHIL
PO1	Students will be able to do their higher education and can make research in the field of finance and commerce.
PO2	To enable them to analyse and evaluate various Research Techniques/ Statistical tools
PO3	To familiarize with ethical issues in educational research, including those issues that arise in using quantitative research.
PO4	To make them employable in reputed higher institutions
PO5	
PO6	To encourage the scholars to do quality research in the area of Commerce.
PO7	Proficiency to communicate research findings at diverse levels

L	T	P	C
5	0	0	5

Total Hours: 65

PART I
CORE COURSE
RESEARCH METHODOLOGY

SUBJECT CODE: M1RM21AM

Objective:

- 1.The objective of research is to discover answers to the questions through the applications of scientific methods which are defined properly.
- 2.The main aim of research is to find out the truth which is hidden and is undiscovered.
- 3.The students should be able to: • understand some basic concepts of research and its methodologies.

UNIT - I SCOPE OF RESEARCH METHODOLOGY

Meaning of research and scope of research methodology – stakeholders of social research – ethical considerations – significance of research in social and business science identification of the problem area – section of the problem – formulation of research question(s) – pilot study – meaning and components of research design – review of literature:purpose.

UNIT- II MEANING AND ROLE OF HYPOTHESIS

Meaning and role of hypothesis - structure of hypothesis :concepts, constructs and variables – The relationship between variables – types of hypothesis – strong and weak hypothesis – sampling theory – sampling methods and techniques – sample error.

UNIT- III DATA COLLECTION

Data collection- sources: primary and secondary – data matrix – unit of data collection and unit of data analysis – methods and tools of data collection: Interview and questionnaires and their types – observation and its types – Audio visual aids in data collection – scaling and testing techniques – reliability and validity of instruments – uses of information technology in data collection.

UNIT- IV DATA ANALYSIS

Data analysis – analysis of quantitative data: Descriptive statistics – inferential statistics – tests of significance – parametric and non-parametric tests-presentation of data – computer software for quantitative data analysis. Analysis of qualitative data : data reduction, data display and conclusion drawing – saturation – conceptual mapping – computer software for qualitative data analysis – interpretation – explanation – theorization.

UNIT- V REPORT WRITING

Report writing – meaning, techniques and precautions of interpretation- significance of report writing – target audience – different steps in writing report – layout of research report – types: technical report, popular report – mechanics of writing a research report.

CO1	Develop the ability to apply the methods while working on a research project work
CO2	Describe the appropriate statistical methods required for a particular research design
CO3	Choose the appropriate research design and develop appropriate research hypothesis for a research project
CO4	Develop a appropriate framework for research studies
CO5	Determine the measures of asymmetry in research
CO6	Identify the various steps in sampling design
CO7	To provide guidelines to write research report.

TEXT BOOK:

C.R.Kothari – Research Methodology; Methods and Techniques, Wiley Eastern Ltd., New Delhi

REFERENCE BOOKS

1. Amarchand .D – Research Methods in Commerce – Emerald Publishers, Chennai.
2. Anderson.J.Berry & Poole.M – Thesis and Assignment Writing - Wiley Eastern Ltd., New Delhi.

L	T	P	C
3	0	0	2

SEMESTER – I
RESEARCH AND PUBLICATION ETHICS
SUBJECT CODE: M1RE21GS

Total Hours: 39

OBJECTIVES:

1. To impart knowledge on research problem and finding scientific articles with Internet.
2. To provide the knowledge about the Software tool to identify predatory publications.
3. This course clarify about the Scientific misconducts, Redundant publications, Ethics, database and research merits

THEORY

- **RPE 01: PHILOSOPHY AND ETHICS (3 hrs.)**
 1. Introduction to philosophy: definition, nature and scope, concept, branches
 2. Ethics: definition, moral philosophy, nature of moral judgements and reactions
- **RPE 02: SCIENTIFIC CONDUCT (5hrs.)**
 1. Ethics with respect to science and research
 2. Intellectual honesty and research integrity
 3. Scientific misconducts: Falsification, Fabrication, and Plagiarism (FFP)
 4. Redundant publications: duplicate and overlapping publications, salami slicing
 5. Selective reporting and misrepresentation of data
- **RPE 03: PUBLICATION ETHICS (7 hrs.)**
 1. Publication ethics: definition, introduction and importance
 2. Best practices / standards setting initiatives and guidelines: COPE, WAME, etc.
 3. Conflicts of interest
 4. Publication misconduct: definition, concept, problems that lead to unethical behavior and vice versa, types
 5. Violation of publication ethics, authorship and contributorship
 6. Identification of publication misconduct, complaints and appeals
 7. Predatory publishers and journals

PRACTICE

- **RPE 04: OPEN ACCESS PUBLISHING(4 hrs.)**

1. Open access publications and initiatives
2. SHERPA/RoMEO online resource to check publisher copyright & self-archiving policies
3. Software tool to identify predatory publications developed by SPPU
4. Journal finder / journal suggestion tools viz. JANE, Elsevier Journal Finder, Springer Journal Suggested, etc.

- **RPE 05: PUBLICATION MISCONDUCT (4hrs.)**

A. Group Discussions (2 hrs.)

1. Subject specific ethical issues, FFP, authorship
2. Conflicts of interest
3. Complaints and appeals: examples and fraud from India and abroad

B. Software tools (2 hrs.)

1. Use of plagiarism software like Turnitin, Urkund and other open source software tools

- **RPE 06: DATABASES AND RESEARCH METRICS (7hrs.)**

A. Databases (4 hrs.)

1. Indexing databases
2. Citation databases: Web of Science, Scopus, etc.

B. Research Metrics (3 hrs.)

1. Impact Factor of journal as per Journal Citation Report, SNIP, SIR, IPP, Cite Score
2. Metrics: h-index, g index, i10 index, altmetrics

Outcomes:

CO1	Overview of research publications, open access, ethics following in research articles
CO2	Methods to identify the Scientific misconducts, Redundant publications Journal finder / journal suggestion tools viz. JANE, Elsevier Journal Finder, Springer
CO3	To impart the knowledge on Use of plagiarism software like Turnitin, Urkund and other open source software tools, calculate the Metrics

PART – I
CORE COURSE - II

L	T	P	C
5	0	0	5

Total Hours:65

ADVANCED FINANCIAL MANAGEMENT

SUBJECT CODE: M1CM21MT

Objective:

- 1.To develop understanding of Leverages, Management of Working Capital
- 2.To help students analyse the Cash flow statements.
3. To develop financial analysis skills

UNIT- I MEANING AND SCOPE FINANCIAL MANAGEMENT

Financial management – meaning, functions and objectives and scope- management of sources of funds – working capital: financing policy, analysis and management.

UNIT- II CAPITAL STRUCTURE AND DIVIDEND DECISIONS

Capital structure and dividend decisions – approaches and theories – payout policy, investment policy, management of investments.

UNIT -III CAPITAL BUDGETING DECISIONS

Capital budgeting decisions – cost of capital – risk analysis in capital budgeting – issues in capital budgeting – constraints, value options, influences, corporate strategies and organizational considerations.

UNIT- IV SECURITY ANALYSIS

Security analysis – risk and return – valuation of instruments – equity, derivatives – options, rights, warrants and convertibles futures – types of analysis: economic, industry, company, technical-efficient market theory.

UNIT- V PORTFOLIO ANALYSIS

Portfolio analysis and selection – capital market theory – managing portfolios and performance measurements – corporate restructuring: mergers and acquisition – corporate ownership, control and governance.

CO1	Describe the dimensions of performance and risk relevant to financial firms
CO2	Apply the Leverage and EBIT EPS Analysis associate with Financial Data in the corporate
CO3	Analise the complexities associated with management of cost of funds in the capital Structure.
CO4	Will acquaint with the concept and management of working-capital
CO5	Demonstrate the applicability of the concept of Financial Management to understand the managerial Decisions and Corporate Capital Structure
CO6	Demonstrate how the concepts of financial management and investment, financing and dividend policy decisions could integrate while identification and resolution of problems pertaining to LSCM Sector
CO7	Demonstrate how risk is assessed

TEXT BOOK:

A.Murthy – Financial Management, Vijay niche publications

REFERENCE BOOKS:

1. Prasanna Chandra – Financial Management, Tata Mc Graw Hill.
2. Dralald . E. Fischer and Ronald.J – Security Analysis and Portfolio Management, Prentice Hall of India.
3. I.M.Pandey – Financial Management – Vikas Publishers.
4. Richard A. Brealey, Stewart.C.Myers, Franklin Allen, Pitabes Mohanty- Principles of Corporate Finance, Tata Mc Graw Hill.
5. Eugene .F. Brigham, Joel.F.Houston- Fundamentals of Financial Management, South & Westorn Cengage Learning India Pvt Ltd.

PART – II
ELECTIVE COURSE - I

L	T	P	C
5	0	0	5

Total Hours:65

HUMAN RESOURCE MANAGEMENT

SUBJECT CODE: M1CM22MT

Objective:

- 1.To develop the understanding of the concept of human resource management and to understand its relevance in organizations.
2. To develop necessary skill set for application of various HR issues.
- 3.To analyse the strategic issues and strategies required to select and develop manpower resources.

UNIT- I HUMAN AND OTHER PHYSICAL RESOURCES

Human and other physical resources – objectives, nature and scope of HRM – objectives of HRM – development of the human potential – the foundation of individual behavior – value, knowledge, skill, personality, perception, motivation, beliefs and attitudes – HR planning.

UNIT - II RECRUITMENT AND SELECTION PROCESS

Acquisition and maintenance of personnel – recruitment and selection process – trainings & development – types of training – user of training – evaluation of training designing effective program.

UNIT - III REWARDS AND INCENTIVES

Rewards and incentives – financial and non financial – executive pay & employee benefit. Grievance procedure – conflict – process – stress Vs challenges – sources of stress – resolution.

UNIT- IV PERFORMANCE APPRAISAL METHODS

Performance appraisal methods – criteria for promotions and job enrichment – leadership – type and effectiveness.

UNIT - V EMPLOYER AND EMPLOYEE RELATIONS

Employer and employee relations – collective bargaining – process – protecting safety and health measures

CO1	It develops the understanding of the concept of human resource management and to understand its relevance in organizations.
CO2	Develop necessary skill set for application of various HR issues.
CO3	Analyses the strategic issues and strategies required to select and develop manpower resources.
CO4	Integrate the knowledge of HR concepts to take correct business decisions
CO5	Enables the students to understand the HR Management and system at various levels in general and in certain specific industries or organizations
CO6	Analyse the strategic issues and strategies required to select and develop manpower resources.
CO7	It develops relevant skills necessary for application in HR related issues.

TEXT BOOK:

J. Jayasankar, , Human Resource Management, Margam Publisher

Reference BOOKS:

1. K.Aswathappa, Human Resource Management Tata McGraw Hill.
2. CB Guptha, Human Resource Management, Sulthan chand Publisher.

PART – II
ELECTIVE COURSE - II
MARKETING AND MARKETING RESEARCH
SUBJECT CODE: M1CM22MT

L	T	P	C
5	0	0	5

Total Hours:65

Objective:

1. To enhance the students understanding of the marketing research.
2. To develop skills required by the researcher and understand different applications of Marketing Research .
3. To explore different approaches of Marketing research

UNIT- I SCOPE OF MARKETING

Introduction – Definition – Scope of Marketing – Modern approach- Market Environment – Marketing Mix –Marketing Segmentation – Consumer Behaviour.

UNIT – II PRODUCT PLANNING AND DEVELOPMENT

Product – Meaning and Classification – Product Planning and Development – Product Life Cycle – Product Mix – Product Line Strategies – Branding, Packaging and Packing, Grading, Standardization, Labelling – Trade Marks.

UNIT – III PRODUCT PRICING

Product Pricing – Pricing Objectives – Pricing Policies, Strategies and Techniques – Pricing.

UNIT- IV DISTRIBUTION CHANNELS

Distribution channels – Sales Promotion – Techniques and methods – Salesmanship and advertising – Publicity and Public Relations – Direct Marketing, personal Selling and Target Marketing.

UNIT – V MARKETING RESEARCH

Marketing Research – Nature and Scope of the Marketing research – Marketing Information System – Research Techniques – Planning and formulating research problem – methods of data collection – preparation of Report.

CO1	Identify and apply new ideas, methods and ways of thinking
CO2	Critically evaluate the key analytical frameworks and tools used in marketing
CO3	Apply key marketing theories, frameworks and tools to solve Marketing problems
CO4	Utilise information of a firm's external and internal marketing environment to identify and prioritise appropriate marketing strategies
CO5	Exercise critical judgement through engagement and reflection with existing marketing literature and new developments in the marketing environment
CO6	Critically evaluate the marketing function and the role it plays in achieving organisational success both in commercial and non-commercial settings
CO7	Evaluate and act upon the ethical and environmental concerns linked to marketing activities

TEXT BOOK:

J. Jayasankar, , Marketing Management, Margam Publisher

REFERENCEBOOKS:

- 1.D.D Sharma, Marketing &Marketing Research, Sultan & Sons Publications, New Delhi.
2. Dr. Ravilochanan, Marketing Research, Margham Publications, Chennai.

ADHIPARASAKTHI COLLEGE OF ARTS & SCIENCE
(Autonomous)

Permanently Affiliated to Thiruvalluvar University, Vellore

Re – accredited by NAAC with ‘B’ Grade (CGPA – 2.83)

B.Sc., MATHEMATICS
Under CBCS

SYLLABUS

(Effective from the Academic Year 2020-2021)

ADHIPARASAKTHI COLLEGE OF ARTS & SCIENCE

(Autonomous)

Permanently Affiliated to Thiruvalluvar University, Vellore

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B.Sc., MATHEMATICS

Under CBCS

(Effective from the Academic Year 2020-2021)

REGULATIONS

CBCS

Choice-Based Credit System is a flexible system of learning. ‘Credit’ defines the quantum of contents / syllabi prescribed for a course, and determines the number of hours of instruction required. The distinguishing features of CBCS are the following:

It permits the students to:

- ❖ Learn at their own pace
- ❖ Choose electives from a wide range of elective courses offered by the departments of the college.
- ❖ Undergo additional courses and acquire more than the required number of credits
- ❖ Adopt an inter – disciplinary approach in learning
- ❖ Make best use of the expertise of available faculty

1. Eligibility for Admission:

Candidates seeking admission to the first year of the Degree of Bachelor of Science Courses, shall be required to have passed the Higher Secondary Examinations [Academic or Vocational Stream] conducted by the Government of Tamil Nadu or an Examination accepted as equivalent thereto by the Syndicate of the Thiruvalluvar University.

The upper age limit for admission to UG Degree courses will be 21 (Twenty one) years as on 1st July of the year of admission. For SC/ST/BC/MBC/DNC candidates and women candidates the age limit is relaxed by 3 years. For other communities the Principals can relax

upto 3 years based on merit. A relaxation of 5 years is permitted for Physically Handicapped as per G.O.Ms. No. 239, dated 03.09.1993.

Provided that candidates for admission into the specific main subject of study shall also possess such other qualifying conditions as may be prescribed by the University in the Regulations governing respective courses of study.

Candidate for the Degree of Bachelor of Science in Mathematics shall be required to have passed the Higher Secondary Examination [10 + 2 year] conducted by the Government of Tamil Nadu, or an Examination accepted as equivalent there to by the Academic Council, subject to conditions as may be prescribed. Candidates should have studied one of the following Subjects at the +2 level.

- 1) Mathematics
- 2) Physics
- 3) Chemistry
- 4) Biology [Zoology + Botany]
- 5) Computer Science

2. Eligibility for the Award of Degree:

A Candidate shall be eligible for the award of the Degree only if he/she has undergone the prescribed course of study in the college for a period of not less than three academic year and passed the examinations of all the Six Semesters prescribed earning 140 credits [in part- I, II, III, IV and V].

3. Duration:

- a. Each academic year shall be divided into two semesters. The first academic year shall comprise the first and second semesters, the second academic year the third semester and fourth semesters and the third academic year the fifth and sixth semesters respectively.
- b. The odd semesters shall consist of the period from June to November of each year and the even semesters form December to April of each year. There shall be not less than 90 working days for each semester.

4. Course of Study:

The main subject of study for Bachelor Degree Courses shall consist of the following:

PART – I	TAMIL / OTHER LANGUAGES
PART – II	ENGLISH
PART – III	CORE SUBJECTS ALLIED SUBJECTS ELECTIVES WITH THREE COURSES

PART – IV

1. [a]. Those who have not studied Tamil up to XII Std and taken a Non-Tamil Language under Part – I shall take Tamil comprising of two courses [level will be at 6th standard].

[b]. Those who have studied Tamil up to XII Std and taken a Non-Tamil Language under Part – I shall take Advanced Tamil comprising of two courses.

[c]. Those who do not come under a/b can choose non-major elective comprising of two courses.

2. SKILL BASED SUBJECTS [ELECTIVE]:

Four courses are to be offered. The papers are to be accommodated in the second / third year of study for UG courses.

3. ENVIRONMENTAL STUDIES

4. VALUE EDUCATION

5. SOFT SKILL

PART – V EXTENSION ACTIVITIES

5. Extension Activities:

A Candidate shall be awarded a maximum of 1 credit for Compulsory Extension Service.

All the students shall have to enroll for NSS / NCC/ NSO [Sports and Games] Rotract / Youth Red Cross or any other service organization in the college and shall have to put in compulsory minimum attendance of 40 hours which shall be duly certified by the principal of the college before 31st Mach in a year. If a student LACKS 40 hours attendance in the First year, he/she shall have to compensate the same during the subsequent years.

Students those who complete minimum of attendance of 40 hours in One year will get Half Credit and those who complete the attendance of 80 or more hours in two years will get ONE CREDIT.

Literacy and population Education Field Work shall be compulsory components in the above Extensions service activities.

The following assessment procedure will be followed for Internal Marks:

Continuous Internal Assessment [CIA] Test

S. No	Reg. No	Name	Test I Marks For 50	Test II Marks For 75	Test III Marks For 75	Marks For 200	Marks Converted to 20/20	Assignments /Seminars [5] Records [5]	Marks For 25/25	Total Rounded to Marks for 25 /25

Test I : One hour duration for 50 marks [Two Units of the Syllabus]

Test II : Two hours duration for 75 marks [Four Units of the Syllabus]

Test III: Three hours model test for 75 marks [Total Syllabus]

Total marks 200

Theory

Practical

Test marks to be converted to	:	20 marks	/	20 marks
Assignments / Seminars	:	5 marks	/	-
Records	:	-	/	5 marks
Total	:	25 marks	/	25 marks

In the column Rounded to 25 / 25, any fraction may be rounded to the next number.

6. Requirements for proceeding to Subsequent Semester:

- i. Candidates shall register their names for the First Semester Examination after admission in the UG Courses.
- ii. Candidates shall be permitted to proceed from the First Semester up to Final Semester irrespective of their failure in any of the Semester Examination subject to the condition that the candidates should register for all the arrear subject of earlier semesters along the current [subsequent] Semester subjects.
- iii. Candidates shall be eligible to go to subsequent semester, only if they earn sufficient attendance as prescribed therefore by the Academic Council from time to time. Provided in case of a candidate earning less than 65% of attendance in any one of the Semesters due to any extraordinary circumstances such as medical grounds, such candidate who shall produce Medical Certificate issued by the Authorised Medical Attendant [AMA], duly certified by the Principal of the college, shall be permitted to proceed to the next semester and to complete the course of study. Such candidates shall have to repeat the missed Semester by rejoining after completion of Final Semester of the course, after paying the fee for the break of study as prescribed by the College from time to time.

7. Requirements to take the Semester Examinations

- a] A candidate will be permitted to take the Examination of any Semester, if
 - i] He/She secures not less than 75% of attendance out of the 90 instructional days during the semester. [In the case of married women students the minimum attendance requirement shall be 55% of total instructional days].
 - ii] He / She earns a Progress Certificate from the Head of the Institution, of having satisfactorily completed the prescribed course of study in the subject as required by these Regulations, and
 - iii] His/ Her conduct has been satisfactory.

Provided that it shall be open to the Academic Council or any authority delegated with such powers by the Academic council to grant exemption to a candidate who has fail to earn 75% of the attendance prescribed for any valid reason[s] subject to the usual conditions.
- b] A candidate who has secured attendance less than 75% but 65% and above shall be permitted to take the Examination on the recommendation of the Head of the Institution to condone the lack of attendance as well as on the payment of the prescribed fees to the College.

8. Passing Minimum:

A Candidate shall be declared to have passed the whole examination, if he/she passes in all the papers and practicals wherever prescribed / as per the scheme of examinations by earning 140 CREDITS in parts – I, II, III, IV and V. He / She shall also fulfill the extension activities prescribed earning one credit to qualify for the Degree.

In fixing the passing minimum marks, the following will be observed:

- [a]. There shall be no Passing Minimum for Internal.
- [b]. For External Examinations, Passing Minimum shall be of 50% [Fifty Percentage] of the minimum marks prescribed for the paper.
- [c]. In the aggregate (External + Internal) the Passing Minimum shall be of 50% for each Paper/Practical/Project and Viva-voce.
- [d]. Grading shall be based on overall marks obtained (Internal + External)

Grading:

Once the marks of the CIA and end-semester examinations for each of the course are available, they will be added. The mark thus obtained will then be graded as per details given below:

Marks	Grade Point	Letter Grade	Class
100	7.00	H	First Class with Distinction
90-99	6.00	O	First Class with Distinction
75-89	5.50	D	First Class with Distinction
60-74	4.75	A	First Class
50-59	4.00	B	Second Class
40-49	3.50	C	Third
Below 40	3.00	F	Fail

From the second semester onwards the total performance within a semester and continuous performance starting from the first semester are indicated respectively by **Grade Point Average [GPA]** and **Cumulative Grade Point Average [CGPA]**. These two are calculated by the following formulae:

$$\text{GPA} = \frac{\sum_{i=1}^n C_i G_i}{\sum_{i=1}^n C_i}$$

Where 'Ci' is the credit earned for the course 'i' in any semester; 'Gi' is the Grade Point obtained by the student for the course 'i' and 'n' is the number of courses passed in that semester.

CGPA=GPA of all the courses starting from the first semester to the current semester.

Note: The GPA and CGPA shall be calculated separately for the following three parts:

For purpose of declaring a candidate to have qualified for the Degree of Bachelor of Arts / Science / Commerce / Management / Literature in the First Class / Second Class / Third Class or First Class with Distinction, the marks and the corresponding CGPA earned by the candidate in part III alone will be the criterion, provided he / she has secured the prescribed passing minimum in LCs and ELCs.

Grade in Parts IV & V shall be shown separately and it shall not be taken into account for classification.

9. Classification of Successful Candidates:

PART – I TAMIL / OTHER LANGUAGES:

Successful candidates passing Examinations for the Language and securing the marks [i] 60 percent and above and [ii] 50 percent and above but below 60 percent in the aggregate shall be declared to have passed the examination in the First and Second Class, respectively. All other successful candidates shall be declared to have passed the examination in the Third Class.

PART – II ENGLISH :

Successful candidates passing Examinations for English and securing the marks [i] 60 percent and above and [ii] 50 percent and above but below 60 percent in the aggregate shall be declared to have passed the examination in the First and Second Class, respectively. All other successful candidates shall be declared to have passed the examination in the Third Class.

PART – III CONSISTING OF CORE SUBJECTS, ALLIED SUBJECTS, ELECTIVES

Successful candidates passing Examinations for Core Courses together and securing the marks [i] 60 percent and above and [ii] 50 percent and above but below 60 percent in the aggregate of the marks prescribed for the Core Courses together shall be declared to have passed the examination in the First and Second Class, respectively. All other successful candidates shall be declared to have passed the examination in the Third Class.

PART – IV: [Consisting of sub items 1 (a), (b) and (c), 2, 3,4 and 5] as furnished in the Regulations 4 part – IV supra.

PART – V EXTENSION ACTIVITIES:

The only credit earned for Part V Extension activities of a Successful Candidate SHALL NOT BE taken into consideration for Classification / Ranking / Distinction.

10. RANKING

Candidates who pass all the examinations prescribed for the course in the First Appearance itself alone are eligible for Ranking;

Provided in the case of Candidates who pass all the examinations prescribed for the course with a break in the First Appearance due to the reasons as furnished in the Regulation 7.[iii] Supra are eligible for Classification / Distinction.

The marks obtained in improvement examination will not be taken into consideration for Ranking.

11. The Medium of Instruction and Examinations

The medium of Instruction and Examinations for the papers under part I and II shall be in language concerned. For parts III & IV, the medium of Instruction and Examinations shall be English.

12. Submission of Record Notebooks for Practical Examinations

Candidates taking the Practical Examinations should submit bonafide Record Notebook prescribed for the Practical Examinations. Otherwise the candidate will not be permitted to take the practical Examinations. However, in genuine case where the students could not submit the record notebook may be permitted to take the Practical Examinations provided the Head of the Department concerned certifies that the candidate has performed the experiments prescribed for the Course. For such of those candidates who do not submit Record Books, zero [0] marks will be awarded for record notebooks.

In case a candidate fails in the Practical Examination the marks awarded for the record at the time of first appearance for the Practical Examination should be made available by the University to the Examiners at the subsequent appearance by the candidate.

13. Improvement of marks in the subjects already passed

Candidates who have passed in theory paper/papers are allowed to appear again for theory paper/papers only once in order to improve his/her marks, by paying the fee prescribed from time to time. Such candidates are allowed to improve within a maximum period of 10 semesters counting from his/her first semester of his/her admission. If candidate improves his/her marks, then his/her improved mark will be taken into consideration for the award of Classification and Distinction only. Such improved marks

will not be counted for the award of Prize/Medals and Rank. If the candidate does not show improvement in the marks, his/her previous marks will be taken into consideration.

No candidate will be allowed to improve marks in the Practical and Field work.

14. Checklist for Inspection

- a. Qualification for
 - i. Teaching Faculty : as Prescribed by the UGC and the University
 - ii. Technical Faculty : as Prescribed by the UGC and the University
 - iii. Laboratory Staff : as Prescribed by the UGC and the University
- b. Infrastructure Facilities
 - i. Building : Number of Classrooms with specifications: 3 rooms measuring 20'X 25'.
If the class strength is above 50, the space shall increase by 10 square feet /student.
Number of Staff rooms: One measuring 20' X 20'
 - ii. Furniture : One pair of table / chair per student
 - iii. Laboratory @ 10 Sq. ft. per student

PATTERN OF QUESTION PAPER

Part – A [50 words]

To Answer 10 questions

10 X 2 marks = 20 marks

Part – B [200 words]

To Answer 5 questions (either / or pattern)

5 X 5 marks = 25 marks

Part – C [500 words]

To Answer 3 questions out of 5 questions

3 X 10 marks = 30 marks

Total = 75 marks

MISSION & GOALS OF MATHEMATICS

We aim to provide a learning environment that excites and informs undergraduate majors and non-majors about Mathematics and the many ways that it is relevant to everyday life. Through our Mathematics department is committed to providing a transformative education through the following elements:

- Develop a positive attitude towards learning Mathematics
- Perform mathematical operations and manipulations with confidence, speed and accuracy.
- Think and reason precisely, logically and critically in any given situation.
- Find employment utilizing their mathematical knowledge.
- To teach effectively mathematical concepts in problem solving.
- Gain knowledge in foundational areas of mathematics.

ADHIPARASAKTHI COLLEGE OF ARTS & SCIENCE (AUTONOMOUS)
G. B. NAGAR, KALAVAI – 632 506
AFFILIATED TO THIRUVALLUVAR UNIVERSITY, VELLORE
DEGREE COURSES

B.Sc., Mathematics
(With effect from 2020 - 2021)

The course of study and the scheme of examination.

Year/ Semester	Part	Subject	Paper	Subject Code	Title of the Paper	Ins. Hrs/ week	Credit	Exam Hrs.	Max. Mark		
									CIA	ESE	Total
I Year I Sem	I	Language	Paper I	U1LT21FL	Tamil I	5	3	3	25	75	100
	II	English	Paper I	U1CE21SL	Communicative English I	5	3	3	25	75	100
	III	Core	Paper I	U1MA21MT	Algebra	5	4	3	25	75	100
	III	Core	Paper II	U1MA22MT	Trigonometry	5	3	3	25	75	100
	III	Core (PE)	Paper I	U1PE01SL	Professional English I	3	2	3	25	75	100
	III	Allied I	Paper I	U1MA22AT	Numerical Methods- I	5	2	3	25	75	100
	IV	Environmental Studies	Paper I	U1ES21GS	Environmental Studies	2	2	3	25	75	100
Total						30	19		175	525	700
I Year II Sem	I	Language	Paper II	U2LT21FL	Tamil II	5	3	3	25	75	100
	II	English	Paper II	U2CE21SL	Communicative English II	5	3	3	25	75	100
	III	Core	Paper III	U2MA21MT	Calculus	5	4	3	25	75	100
	III	Core	Paper IV	U2MA22MT	Analytical Geometry of Three dimensions	5	3	3	25	75	100
	III	PE	Paper I	U2PE01SL	Professional English II	3	2	3	25	75	100
	III	Allied I	Paper II	U2MA22AT	Numerical Methods- II	5	2	3	25	75	100
	IV	Value Education	Paper I	U2VE21GS	Value Education	2	2	2	—	50	50
Total						30	19		150	500	650

Year/ Semester	Part	Subject	Paper	Subject Code	Title of the Paper	Ins. Hrs/ week	Credit	Exam Hrs.	Max. Mark		
									CIA	ESE	Total
II Year III Sem	I	Language	Paper III	U3LT21FL	Tamil III	6	3	3	25	75	100
	II	English	Paper III	U3LE21SL	English III	6	3	3	25	75	100
	III	Core	Paper - V	U3MA21MT	Differential equations	6	5	3	25	75	100
	III	Allied	Paper - I	U3MA22AT	Mathematical statistics-I	7	5	3	25	75	100
	IV	Skill based Subject	paper - I	U3MA23ST	Mathematics for Competitive Examinations	3	3	3	25	75	100
	IV	Non Major Elective	Paper I	U3BA21NM	Management Concepts	2	2	3	25	75	100
Total						30	21	-	150	450	600
II Year IV Sem	I	Language	Paper IV	U4LT21FL	Tamil IV	6	3	3	25	75	100
	II	English	Paper IV	U4LE21SL	English IV	6	3	3	25	75	100
	III	Core	Paper VI	U4MA21MT	Vector Analysis and Fourier Analysis	6	5	3	25	75	100
	III	Allied	Paper - II	U4MA22AT	Mathematical Statistics-II	5	4	3	25	75	100
	IV	Skill based Subject	paper – II	U4MA23ST	Linear Programming	3	2	3	25	75	100
	IV	Non Major Elective	Paper II	U4BA21NM	General Commercial Knowledge	2	2	3	25	75	100
	III	Allied Practical	Practical-I	U4MA21AP	Allied-II Practical Mathematical Statistics	2	2	3	25	75	100
Total						30	21	-	175	525	700

Year/ Semester	Part	Subject	Paper	Subject Code	Title of the Paper	Ins. Hrs/ week	Credits	Exam Hrs.	Max. Mark		
									CIA	SEM	Total
III Year V Sem	III	Core	Paper – VII	U5MA21MT	Abstract Algebra	5	5	3	25	75	100
	III	Core	Paper-VIII	U5MA22MT	Real Analysis - I	5	5	3	25	75	100
	III	Core	Paper – IX	U5MA23MT	Complex Analysis – I	5	5	3	25	75	100
	III	Core	Paper – X	U5MA24MT	Statics	5	5	3	25	75	100
	III	Core	Paper – XI	U5MA25MT	Operation Research	4	4	3	25	75	100
	III	Elective I (Choose 1 out of 2)	Paper - I	U5MA26ET	Graph Theory	3	3	3	25	75	100
			Paper - II	U5MA27ET	Astronomy						
	IV	Skill based Subject	Paper - III	U5MA28ST	Quantitative Techniques	3	3	3	25	75	100
Total						30	30		175	525	700
III Year VI Sem	III	Core	Paper – XII	U6MA21MT	Linear Algebra	5	5	3	25	75	100
	III	Core	Paper- XIII	U6MA22MT	Real Analysis-II	5	5	3	25	75	100
	III	Core	Paper- XIV	U6MA23MT	Complex Analysis-II	4	4	3	25	75	100
	III	Core	Paper- XV	U6MA24MT	Dynamics	4	4	3	25	75	100
	III	Elective II (Choose 1 out of 2)	Paper – III	U6MA25ET	Programming in C	3	3	3	25	75	100
			Paper – IV	U6MA26ET	Matlab Programming						
			Practical- II	U6MA21EP	Programming in C Lab	3	2	3	25	75	100
			Practical – III	U6MA22EP	Matlab						
	III	Elective III (Choose 1 out of 2)	Paper – V	U6MA27ET	Special Functions	3	3	3	25	75	100
			Paper – VI	U6MA28ET	Fuzzy Mathematics						
	IV	Skill based Subject	Paper – IV	U6MA29ST	Fundamentals of Applied Mathematics	3	3	3	25	75	100
	V	Extension Activities	-	U6EA21GS	Extension Activities	0	1	-	50	-	50
Total						30	30	-	250	600	850
Grand Total						180	140	-	1075	3125	4200

ADHIPARASAKTHI COLLEGE OF ARTS & SCIENCE (AUTONOMOUS)
G.B. NAGAR, KALAVAI – 632 506
PERMANENTLY AFFILIATED TO THIRUVALLUVAR UNIVERSITY, VELLORE
DEGREE COURSES

M.Sc., Mathematics

(With effect from 2018 - 2019)

The course of study and the scheme of examination.

Year/ Semester	Subject	Paper	Subject Code	Title of the Paper	Ins. Hrs/week	Credits	Exam Hrs.	Max. Mark		
								CIA	SEM	Total
I Year I Sem	CORE	Paper-I	P1MA21MT	Algebra I	6	5	3	25	75	100
	CORE	Paper-II	P1MA22MT	Mathematical Analysis I	6	5	3	25	75	100
	CORE	Paper-III	P1MA23MT	Ordinary Differential Equations	6	4	3	25	75	100
	CORE	Paper-IV	P1MA24MT	Mechanics	6	4	3	25	75	100
	ELECTIVE-I (to choose 1 out of 3)	Paper-I	P1MA25ET	A. Probability Theory	6	3	3	25	75	100
			P1MA26ET	B. Mathematical Programming						
			P1MA27ET	C. Reliability and Queuing Theory						
Total					30	21	-	125	375	500
I Year II Sem	CORE	Paper-V	P2MA21MT	Algebra II	6	5	3	25	75	100
	CORE	Paper-VI	P2MA22MT	Mathematical Analysis II	6	5	3	25	75	100
	CORE	Paper-VII	P2MA23MT	Partial Differential Equations	5	4	3	25	75	100
	CORE	Paper-VIII	P2MA24MT	Calculus of Variations and Integral Equations	5	4	3	25	75	100
	GENERAL STUDIES	Paper-I	P2HR21GS	Human Rights	2	2	3	25	75	100
	ELECTIVE-II (to choose 1 out of 3)	Paper-II	P2MA25ET	A. * Programming in C++ With Practical	6	3	3	25	75	100
			P2MA26ET	B. Algebraic Number Theory						
P2MA27ET			C. Optimization Techniques							
Total					30	23	-	150	450	600

Year/ Semester	Subject	Paper	Subject Code	Title of the Paper	Ins. Hrs/week	Credits	Exam Hrs.	Max. Mark		
								CIA	SEM	Total
II Year III Sem	CORE	Paper-IX	P3MA21MT	Complex Analysis I	6	5	3	25	75	100
	CORE	Paper-X	P3MA22MT	Topology	6	5	3	25	75	100
	CORE	Paper-XI	P3MA23MT	Differential Geometry	6	5	3	25	75	100
	CORE	Paper-XII	P3MA24MT	Discrete Mathematics	6	5	3	25	75	100
	ELECTIVE-III (to choose 1 out of 3)	Paper-III	P3MA25ET	A. Tensor Analysis and Relativity Theory	6	3	3	25	75	100
			P3MA26ET	B. Analytic Number Theory						
			P3MA27ET	C. Fluid Dynamics						
Total					30	23	-	125	375	500
II Year IV Sem	CORE	Paper-XIII	P4MA21MT	Complex Analysis II	6	5	3	25	75	100
	CORE	Paper-XIV	P4MA22MT	Functional Analysis	6	5	3	25	75	100
	CORE	Paper-XV	P4MA23MT	Mathematical Statistics	6	5	3	25	75	100
	CORE	Paper-XVI	P4MA24MT	Difference Equations	6	5	3	25	75	100
	ELECTIVE-IV (to choose 1 out of 3)	Paper-IV	P4MA25ET	A. Number Theory and Cryptography	6	3	3	25	75	100
			P4MA26ET	B. Fuzzy Mathematics						
			P4MA27ET	C. Stochastic Processes						
Total					30	23	-	125	375	500
Grand Total					120	90	-	525	1575	2100

ADHIPARASAKTHI COLLEGE OF ARTS & SCIENCE (AUTONOMOUS)
G.B. NAGAR, KALAVAI – 632 506
PERMANENTLY AFFILIATED TO THIRUVALLUVAR UNIVERSITY, RANIPET DISTRICT
DEGREE COURSES

M.Phil. Mathematics

(With effect from 2020 - 2021)

The course of study and the scheme of examination.

Year/ Semester	Subject	Paper	Subject Code	Title of the Paper	Ins. Hrs/week	Credits	Exam Hrs.	Max. Mark		
								CIA	SEM	Total
I Year/ I Sem	CORE	Paper-I	M1MA21MT	Algebra and Analysis	6	4	3	25	75	100
	CORE	Paper-II	M1MA22MT	Topology and Differential Equations	6	5	3	25	75	100
	CORE	Paper-III	M1RE21GS	Research and Publication Ethics	6	2	3	25	75	100
	CORE	Guide paper	M1MA23MT	Queueing Theory	6	4	3	25	75	100
			M1MA23MT	Advanced Fluid Dynamics	6	4	3	25	75	100
			M1MA23MT	Stability Theory	6	4	3	25	75	100
			M1MA23MT	Stability Of Time- Delay System	6	4	3	25	75	100
	I Year/ II Sem	-	M2MA21DV	Dissertation with Viva Voce	-	21	-	25	75	100
Total					-	36	-	125	375	500

PSOs	Course Name: B.Sc., Mathematics
PSO1	Enabling students to develop a positive attitude towards mathematics as an interesting and valuable subject of study
PSO2	Ability to analyze a problem, identify and define the computing requirements, which may be appropriate to its solution
PSO3	Think in a critical manner about solving problems
PSO4	Formulate and develop mathematical arguments in a logical manner
PSO5	A student should get a relational understanding of mathematical concepts and concerned structures, and should be able to follow the patterns involved, mathematical reasoning
PSO6	Acquire good knowledge and understanding in advanced areas of mathematics and statistics, chosen by the student from the given courses
PSO7	Ability to pursue advanced studies and research in pure and applied mathematical science

SEMESTER – I
MAJOR PAPER - I
ALGEBRA
SUBJECT CODE – U1MA21MT

L	T	P	C
5	0	0	4

Total Hours : 65

OBJECTIVES :

1. In this course students are exposed to topics like Theory of Equations, Summation of Series, Matrices, Continued Fractions and Elementary Number Theory.
2. The stress is on the development of problem solving skills.

UNIT – I : THEORY OF EQUATIONS

16 hrs

Polynomial Equations – Imaginary and Irrational roots – Symmetric Functions of roots in terms of co-efficients – Sum of r-th power of roots – Reciprocal Equations – Transformation of Equations.

Chapter 6: Section 1 to 12.

UNIT – II : THEORY OF EQUATIONS (Contd.)

10 hrs

Descarts Rule of Signs – Approximate Solutions of Polynomials by Horner's method – Newton Raphson method of Solution of Cubic Polynomial.

Chapter 7.

UNIT – III : SUMMATION OF SERIES

15 hrs

Summation of series using Binomial – Exponential and Logarithmic series (Theorems without proofs)- Approximation using Binomial & Exponential series.

Chapter: 2,3,4.

UNIT – IV : MATRICES

12 hrs

Symmetric – Skew Symmetric – Hermitian – Skew Hermitian – Orthogonal and Unitary Matrices – Rank of Matrix – Consistency and Solutions of linear Systems- Cayley-Hamilton Theorem(without proof) – Eigen Values – Eigen Vectors – Similar Matrices – Diagonalisation of a Matrix.

Chapter: 2

UNIT – V : ELEMENTARY NUMBER THEORY

12 hrs

Prime Number – Composite Number – Decomposition of a Composite Number as a Product of Primes uniquely (without proof) – Divisors of a positive Integers – Congruence Modulo n – Euler Function (without proof) – Highest Power of a Prime Number p contained in n! – Fermat's and Wilson's Theorems.

Chapter: 5.

OUT COMES :

CO1	Evaluation imaginary and irrational roots and Descarts rule of signs
CO2	Finding approximate solutions of polynomials by Horner's method and Newton Raphson method
CO3	Calculate the summation value of series using Binomial, Exponential and Logarithmic series

CO4	Compute eigen values eigen vectors of a square matrix using Cayley-Hamilton theorem
CO5	Decomposition of a composite number as a product of primes
CO6	Solving system of linear equations
CO7	Understanding basic ideas of algebra

PRESCRIBED BOOK

1. T. K. Manicavachagam Pillay, T. Natarajan and K. S. Ganapathy, Algebra, Volume - I & II S. Viswanathan Printers Pvt. Ltd., Chennai. (II Edition) 2011 for Unit I, Unit II ,Unit IV and Unit V.
2. P. R .Vittal Algebra , Analytical Geometry and Trigonometry Margham Publications, Chennai. (III Edition) 2004 for Unit III.

REFERENCE BOOKS:

1. S. Sudha, Algebra and Trigonometry. Emerald Publishes, Chennai. (I Edition) 2008
2. A. Singaravelu, Algebra and Trigonometry , Volume - I & II Meenakshi Agency, Chennai. (II Edition) 2015.

SEMESTER – I
MAJOR PAPER - II
TRIGONOMETRY
SUBJECT CODE – U1MA22MT

L	T	P	C
4	0	0	4

Total Hours : 52

OBJECTIVES :

- 1.This course is a fundamental one for many courses of this degree programme.
- 2.This covers topics on the expansions of trigonometric functions, hyperbolic functions, inverse circular, inverse hyperbolic functions and it aims to develop computational skills.

UNIT – I : EXPANSIONS

10hrs

Expansions of $\cos n\theta$, $\sin n\theta$ – Expansion of $\tan n\theta$ in terms of $\tan\theta$ – Expansion of $\tan(A+B+C+\dots)$ – Formation of Equations.

UNIT – II : POWERS OF SINES AND COSINES

10hrs

Powers of sines and cosines of θ in terms of functions of multiples of θ – Expansions of $\sin \theta$ and $\cos \theta$ in a series of ascending powers of θ – Expansion of Inverse Circular Functions.

UNIT – III : HYPERBOLIC FUNCTIONS

11hrs

Definition of hyperbolic functions – Relation between Hyperbolic Functions – Inverse Hyperbolic Functions.

UNIT – IV : DE - MOIVRE'S PROPERTY

11hrs

Resolution into Factors – De Moivre's Property on the Circle and Cote's Property on the Circle. Logarithm of complex quantities.

UNIT – V : SUMMATION OF TRIGONOMETRIC SERIES

10hrs

Summation of Trigonometric Series: Method of Differences – Gregory Series – Euler Series.

OUT COME:

CO1	Find the Expansions of Trigonometric functions
CO2	Calculate the powers of sines and cosines of θ
CO3	Compute the Hyperbolic functions and summation of Trigonometric series
CO4	Find the Logarithm of complex quantities and resolution into factors
CO5	Find Gregory series and Euler series
CO6	Compute the trigonometric functions of any angle
CO7	Use fundamental trigonometric identities to verify other identities

PRESCRIBED BOOK :

- 1.S.Narayanayan and T. K. Manicavachagom Pillay, Trigonometry.
S. Vishwanathan Printers & Publishers Pvt. Ltd. Chennai.(2012)

REFERENCE BOOKS :

1. P. R. Vital, Trigonometry, Margham Publications, Chennai. (III Edition) 2004

SEMESTER – I
ALLIED - I PAPER – I
NUMERICAL METHODS - I
SUBJECT CODE – U1MA22AT

L	T	P	C
7	0	0	3

Total Hours : 91

OBJECTIVES :

- 1.This course will cover basic methods for finding the Finite differences, Central differences, Inverse Interpolation, Summation of series, Interpolation for equal & unequal intervals.
- 2.Solutions of simultaneous equations, Important principles, Method and Processes to get numerical results, Reliability of numerical results.

UNIT – I : FINITE DIFFERENCES

19hrs

First and higher order differences and Backward differences – Properties of Operators – Differences of a Polynomial –Factorial Polynomials – Operator E, Relation between Δ and E- Interpolation – Newton – Gregory forward & Backward formulae for Interpolation.

UNIT – II : CENTRAL DIFFERENCES

18hrs

Central difference Operators-Central differences formulae: Gauss Forward and Backward formulae- Sterling's formula-Bessel's formula.

UNIT – III : INTERPOLATION FOR UNEQUAL INTERVALS

18hrs

Divided differences-Newton's divided differences formula and Lagrange's-Estimating the Missing terms(With one or more missing values).

UNIT – IV : INVERSE INTERPOLATION

18hrs

Lagrange's method and Reversion of series method(Using Newton's forward formula only).
Summation of series: Sum to n term of the series whose general term is the first difference of a function-summation by parts.

UNIT – V : SOLUTIONS OF SIMULTANEOUS LINEAR EQUATIONS

18hrs

Gauss elimination method-matrix inversion method-Gauss-Jordan method and Gauss-Seidal method (Three unknowns only)

OUTCOMES:

CO1	Finding the value of function using Newton's formulae for interpolation
CO2	Apply various interpolation methods and finite difference concepts
CO3	Computing the value of function using Lagrange's formula for interpolation
CO4	Estimate the sum to n term of the series whose general term is the first difference of a function
CO5	Calculate the unknowns using Gauss elimination method and Gauss-Jordan method
CO6	Apply numerical methods to find our solution of algebraic equations
CO7	Solve the simultaneous linear equations and find the solution using numerical methods

PRESCRIBED BOOK

1. B. D. Gupta, Numerical Analysis, Konark Pub. Ltd., Delhi. (I Edition) 2008

2. A. Singaravelu, Numerical Methods, Meenakshi Agency, Chennai. (I Edition) 2004

REFERENCE BOOKS :

1. S. Arumugham, Numerical Methods, New Gamma Publishing, Palayamkottai. (I Edition) 2003
2. H. C. Saxena, Finite differences and Numerical analysis S. Chand & Co., Delhi. (II Edition) 2010
3. P. Kandasamy, K. Thilagavathy, Calculus of Finite differences & Numerical Analysis, S. Chand & Company Ltd., New Delhi - 55. (I Edition) 2012.

SEMESTER – I

ENVIRONMENTAL STUDIES

SUBJECT CODE: U1ES21GS

Total Hours: 26

OBJECTIVES: Students in Environmental Studies are motivated by concern for welfare of the many human and non-human communities that shape this planet.

- Recognize the interconnectedness of multiple factors in environmental challenges
- Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.

UNIT – I: INTRODUCTION TO ENVIRONMENTAL SCIENCES: NATURAL RESOURCES (4 Hrs)

Environmental Sciences – Significance – Public awareness – Forest resources – Water resources – Mineral resources – Food resources - Environmental impact – fertilizer – Pesticide Problems.

UNIT – II: ECOSYSTEM, BIODIVERSITY AND ITS CONSERVATION (6 Hrs)

Ecosystem – concept – structure and function – producers, consumers and decomposers – Food chain – Food web – Forest, Grassland, desert and aquatic ecosystem.

Biodiversity – Definition – genetic, species and ecosystem diversity – Values and uses of biodiversity – biodiversity at global, national (India) and local levels – Hotspots, threats to biodiversity – conservation of biodiversity – In-situ & Ex-situ.

UNIT – III: ENVIRONMENTAL POLLUTION AND MANAGEMENT (6 Hrs)

Environmental Pollution – Causes – Effects and control measures of Air, Water, Marine, soil, solid waste, Thermal, Nuclear pollution and Disaster Management – Floods, Earth quake,

Cyclone and Landslides. Role of individuals in prevention of pollution – pollution, Case studies -
– Bhopal gas tragedy, Minamata disease, Mercury factory (Kodaikanal), London fog.

UNIT – IV: SOCIAL ISSUES AND ENVIRONMENT

(5 Hrs)

Urban issues – Energy – water conservation – Environmental Ethics – Global warming –
Resettlement and Rehabilitation issues – Environmental legislations – Environmental protection
Act. 1986 – Air, Water, Wildlife and forest conservation Act.

UNIT – V: HUMAN POPULATION AND ENVIRONMENT

(5 Hrs)

Population growth and Explosion – Human rights and Value Education – Environmental Health
– HIV/AIDS – Role of IT in Environment and Human Health – Women and child welfare –
Public awareness – Case studies. Visit to a local area / local polluted site / local simple
ecosystem – Report submission

OUTCOMES:

CO1	Recognize the importance of environment and public awareness required for sustainability.
CO2	Understand the availability of various resources, their availability and conservation.
CO3	Develop knowledge on structure and functions of the ecosystem, productivity and energy flow.
CO4	Comprehend the importance and conservation needs of biodiversity by framing policies.
CO5	Able to link causal effects of human activities and develop mitigation strategies for different pollution.
CO6	Demonstrate an integrative approach to environmental issues
CO7	Demonstrate and ability to integrate the many disciplines and filed that intersect with environmental concerns

Text Books:

1. Kumaraswamy, K. Alagappa Moses, A and M. Vasanthy, (2005), Environmental Studies, Publication Division, Bharathidasan University, Tiruchirappalli.
2. Kumaraswamy, K. (Ed) (2008) GIS for Natural Resources and Disaster Management, Department of Geography, Bharathidasan University, Tiruchirappalli.
3. Rajamannar. Environmental Studies, EVR College Pub, Trichy. 2004.
4. Kalavathy, S. Environmental Studies, Bishop Heber College Pub., Trichy. 2004.

SEMESTER – II
MAJOR PAPER – III
CALCULUS
SUBJECT CODE – U2MA21MT

L	T	P	C
5	0	0	4

Total Hours : 65

OBJECTIVES :

1. This course introduces students to the fundamental principles, concepts and knowledge in the areas of differential and integral calculus.
2. This prepares the students to apply these fundamental concepts and working knowledge to other courses.

UNIT - I : DIFFERENTIAL CALCULUS

14hrs

Differential Calculus: nth derivative – Leibnitz's theorem (without proof) and its application – Jacobians – Total differential – Maxima and Minima functions of 2 & 3 independent variable, Lagranges method (without proof), Problems on this concepts.

UNIT - II : CURVATURE & RADIUS OF CURVATURE

13hrs

Curvature, Radius of Curvature in Cartesian and Polar coordinates, p-r equation, Evolutes.

UNIT - III : ASYMPTOTES

12hrs

Asymptotes: Methods (without proof) of finding asymptotes of rational algebraic curves with special cases.

UNIT - IV : INTEGRAL CALCULUS

13hrs

Bernoulli's Formulae, Reduction formulae for integration of sine, cosine & its combinations with limits 0 to $\frac{\pi}{2}$, Beta and Gamma Functions – Properties (1 to 7 related) and Problems.

UNIT - V : MULTIPLE INTEGRALS

13hrs

Double Integrals – Change of order of Integration – Triple Integrals – Applications to Area and Volume (Only in Cartesian coordinates).

OUT COME:

CO1	Compute Differential, Total differential, Maxima and Minima of functions
CO2	Calculate radius of curvature in Cartesian and Polar coordinates
CO3	Finding Asymptotes, Area and Volume
CO4	Apply the concept of definite integral to solve various kinds of problems
CO5	Deriving Reduction formulae and the relation between Beta and Gamma functions
CO6	Remembering the formulas in differentiation and integration
CO7	Recall the properties of definite integrals

PRESCRIBED BOOK :

1. P. R. Vittal, Calculus, Margham Publication, Chennai. (I Edition) 2013

REFERENCE BOOKS :

1. Shanti Narayan, Differential Calculus, Shyamlal Charitable Trust, New Delhi. (30th Edition) 2005
2. Shanti Narayan, Integral Calculus. S. Chand & Co. New Delhi. (35th Edition) 2005.

SEMESTER – II
MAJOR PAPER - IV

L	T	P	C
4	0	0	4

Total Hours : 52

ANALYTICAL GEOMETRY OF THREE DIMENSIONS
SUBJECT CODE – U2MA22MT

OBJECTIVES :

1. To deepen the knowledge of the students in various concepts of Analytical Solid Geometry.
2. Accurately identify the equations, properties and graphs of the parabola, circle and ellipse.

UNIT I: Plane

10hrs

General equation of a plane – Equation of a plane in the normal form – Angle between planes – Plane through three given points – Equation of a plane through the line of intersection of two planes.

UNIT II: Straight Line

10hrs

Symmetrical form of a straight line – Image of a point with respect to a plane – Image of a line with respect to a plane – Length and equation of the shortest distance between two skew lines - Coplanar lines.

UNIT III: Sphere

12hrs

Equation of the sphere – Length of the tangent – Tangent plane – Section of a sphere by a plane – Orthogonal spheres – Equation of a sphere through a given circle.

UNIT IV: Cone

10hrs

Equation of a cone with a given vertex and a given guiding curve - Equation of a cone with its vertex at the origin - Condition for the general equation of the second degree to represent a cone - Right circular cone – Enveloping cone - Tangency of a plane to a cone.

UNIT V: Cylinder

10hrs

Equation of a cylinder with a given generator and a given guiding curve - Right circular cylinder - Enveloping cylinder – Enveloping cylinder as a limiting form of an enveloping cone.

OUTCOMES :

CO1	Finding equation of a plane in the normal form
CO2	Learn the symmetrical form of a straight line
CO3	Calculate the equation of a sphere through a given circle
CO4	Compute solution of second degree cone
CO5	Find the solutions of cylinder and right circular cylinder
CO6	Identify lines and planes from their equation
CO7	Understanding of the application of three dimensional analytical geometry

Recommended Text

T.K.Manickavachagom Pillay & others. (2004) *Analytical Geometry*(Three Dimensions)
S.Viswanathan Printers & Publishers Pvt. Ltd. Chennai.

Reference Books

1. P.R.Vittal (2003) *Coordinate Geometry*. Margham Publishers, Chennai
2. P.Duraipandian and LaxmiDuriapandian (1975) *Analytical Geometry-3 D*, Emerald Publishers, Chennai.
3. G.B.Thomas and R.L.Finney.(1998) *Calculus and Analytic Geometry*, Addison Wesley

(9thEdn.), Mass. (Indian Print).

SEMESTER – II
ALLIED - I PAPER – II
NUMERICAL METHODS - II
SUBJECT CODE – U2MA22AT

L	T	P	C
7	0	0	3

Total Hours : 91

OBJECTIVES :

- 1.This course will cover basic methods for finding the Finite differences, Central differences, Inverse Interpolation Summation, of series, Interpolation for equal & unequal intervals, Solutions of simultaneous equations, Important principles.
2. Method and Processes to get numerical results, Reliability of numerical results.

UNIT – I : NUMERICAL DIFFERENTIATION

18hrs

Newton's forward and backward differences to compute derivatives- Derivative using divided differences formula- Maxima and Minima using the above formulae.

Chapter-5

UNIT – II : NUMERICAL INTEGRATION

18hrs

General Quadrature formula- Trapezoidal rule- Simpson's one third rule- Simpson's three-eighth rule, Weddle's rule – Euler –Maclaurin Summation Formula

Chapter-6(Sections 6.1 & 6.2)

UNIT – III : DIFFERENCE EQUATIONS

18hrs

Linear differences equations – Linear homogeneous difference equation with constant co-efficeint- Particular integrals for ax , xm , and $axf(x)$.

Chapter-11(Pages 331 – 341)

**UNIT – IV: SOLUTION OF ALGEBRAIC AND
TRANSCENDENTAL EQUATIONS**

18hrs

Bisection method- Iteration method – Regular-falsi method (Falsi Position Method)- Newton-Raphson Method.

Chapter-15(Sections 15.4, 15.5, 15.8 & 15.9)

**UNIT - V: NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL
EQUATIONS (FIRST ORDER ONLY)**

19hrs

Euler's method- Euler's modified method – Picard's method – Taylor's methods – Runge-Kutta method (Fourth order only).

Chapter-16(Sections 16.2 – 16.4,16.6 &16.7)

OUTCOMES:

CO1	Learning numerical differentiation concepts
CO2	Understanding basic of numerical integration
CO3	Finding solution of difference equation using numerical methods
CO4	Solving algebraic and transcendental equations
CO5	Work out numerical solution of ordinary differential equations

CO6	Evaluate an integral using numerical integration by various rules
CO7	Solve the differential equations using numerical methods

RECOMMENDED TEXT:

1. B. D. Gupta, Numerical Analysis, Konark Pub. Ltd., Delhi. (I Edition) 2008

REFERENCE BOOKS :

1. A. Singaravelu, Numerical methods, Meenakshi Publications, (II Edition) 2009

2. H. C. Saxena, Finite differences and Numerical Analysis, S. Chand & Co., New Delhi. (II Edition) 2010

3. P. Kandasamy, K. Thilagavathy, Calculus of finite difference & Numerical Analysis, S. Chand & Company Ltd., New Delhi - 55. (II Edition) 2012

L	T	P	C
2	0	0	2

SEMESTER – II

VALUE EDUCATION

SUBJECT CODE: U2VE21GS

Total Hours: 26

OBJECTIVES:

- To make the students responsible citizens in the personal and social life.
- To develop proper attitude towards self and fellow being of one's own country and people of other countries thereby enriching humanity.

UNIT – I: INTRODUCTION AND OUTLINE OF VALUE EDUCATION (6 Hrs)

Value education – Definition and Scope. Family Values – Responsibility of family, Status of Women in family and society, Caring for needy and elders. Ethical Values – Mass and media Ethics in family. Influence of Ethics in Family. Issue of globalization – Modern warfare, Terrorism, Mutual respect of different cultures and religions.

UNIT – II: PERSONAL SKILLS (5 Hrs)

Self Esteem – Definition, Factors influencing Self Esteem, Qualities of high and low self esteem. Self Concept- Definition, Characteristics of self concept. Role of self concept in Personal growth. Self acceptance – Definition, Benefits and obstacles of self acceptance.

UNIT –III: POSITIVE THINKING, MOTIVATION AND PERSONALITY DEVELOPMENT (5 Hrs)

Positive thinking- Definition, Positive and Negative Attitude, Power of Positive thinking, Positive imaging. Motivation – Definition, Difference between Inspiration and Motivation, Internal and External Motivation. Demotivation, Demotivating factors. Personality Development – Definition, characteristics and elements of personality, Development of Personality.

UNIT – IV: COPING AND DEVELOPING COPING MECHANISM (5 Hrs)

Coping – Definition, Positive and Negative Coping, kinds of coping, Typical responses to coping. Shyness – Definition, types and symptoms of shyness. How to overcome shyness. Depression – Definition, symptoms, causes and impact of Depression, How to overcome Depression. Failure – Definition, coping with failure, Developing Competence.

UNIT – V: LEADERSHIP TEAMWORK AND WORK ENVIRONMENT (5 Hrs)

Leadership – Definition, characteristics of leadership, various kinds of leaders, factors influencing leadership styles. Characteristics of successful leader. Teamwork – Definition, Characteristics of Teamwork, Team learning. Lifeskills required for work environment and ways to build a better work environment.

OUTCOMES:

SEMESTER – II		
COs	Course Name: Value Education	Code:U2VE21GS Credits: 2
CO1	Acquire the basic knowledge on value education.	
CO2	Understand the importance of principles of life and components of values.	
CO3	To learn about philosophy of Life and Individual qualities and family values.	
CO4	Creating and improving awareness of values and their importance and role.	
CO5	To know about ethics and social values.	
CO6	To learn more of Risk and Safety assessment with case studies.	
CO7	To learn more of Responsibilities and Rights as Professional and facing Global Challenges.	

Text books

1. S.Xavier Alphonse. We shall overcome - A textbook on life coping skills. 6th edition. ICRDCE Publication, 2012.
2. Lakshminarayanan K. R and Uma Mageswari. M. Value Education. Nalnilam publication, 2009.

Reference books

1. T.Archukandam and J.Kuttainimathathil (ED) Grow Free Live Free, Krisitu Jyoti Publications, Bangalore (1995).
2. Mani Jacob (ED) Resource Book For Value Education, Institute for value education, New DELHI 2002.
3. DBNI, NCERT, SCERT, Dharma Bharti National Institute of Peace and Value education, Secunderabad, 2002.
4. Daniel and Selvamony – Value Education Today, (Madras Christian College, Tambaram and ALACHI, New Delhi, 1990)
5. S.Ignachimuthu – Values for Life – Better Yourself Books, Mumbai, 1991.
6. M.M.M.Mascaronhas, Centre for Research Education Science and Training for Family. Life Promotion – Family Life Education, Bangalore, 1993.

SEMESTER – III
MAJOR PAPER - V
DIFFERENTIAL EQUATIONS
SUBJECT CODE – U3MA21MT

L	T	P	C
6	0	0	5

Total Hours : 78

OBJECTIVES :

1. This course aims to provide logical skills in the formation of differential equations.
2. To expose to different techniques of finding solutions to these equations and in addition stress is laid on the Application of these equations in geometrical and physical problems.

UNIT - I : ORDINARY LINEAR DIFFERENTIAL EQUATIONS 15hrs

Bernoulli Equation – Exact Differential Equations – Equations of First order and Higher degree: Equations solvable for p, Equation solvable for x and equations Solvable for y – Clairaut's Equation.

UNIT - II : ORDINARY LINEAR DIFFERENTIAL EQUATION (Contd.) 16hrs

Method of variation of Parameters - 2nd order Differential Equations with Constant Coefficients for finding the P. I 's of the form $e^{ax} V$, where V is $\sin(mx)$ or $\cos(mx)$ and X^n - Equations reducible to Linear Equations with Constant Coefficients- Cauchy's homogeneous Linear Equations – Legendre's Linear Equations – Linear Dependence of Solutions - Simultaneous Equations with Constant Coefficients.

UNIT – III : DIFFERENTIAL EQUATIONS OF OTHER TYPES 17hrs

Equations of the form $d^2y/dx^2 = f(x)$ - Equations of the form $d^2y/dx^2 = f(y)$ - Equations which do not contain y - Equations which do not contain x – Total Differential Equations Simultaneous Total Differential Equations – Equations of the form $dx/P = dy/Q = dz/R$ – Method of Grouping.

UNIT – IV : LAPLACE TRANSFORM 15hrs

Laplace Transform – Inverse Laplace Transform – Properties – Application of Laplace Transform to solution of first and second order Linear Differential Equations [with Constant Coefficients] and Simultaneous Linear Differential Equations.

UNIT – V : PARTIAL DIFFERENTIAL EQUATIONS 15hrs

Formation of PDE- Complete integral-Particular integral-Singular integral-Equations solvable by direct Integration-Linear Equations of the first order-Non-linear Equations of the first order Types: $f(p, q) = 0$, $f(X, p, q) = 0$, $f(Y, p, q) = 0$, $f(Z, p, q) = 0$, $f(X, q) = f(Y, p)$,
 $Z = px + qy + f(p, q)$

OUT COME:

CO1	Recalling the concept of first order linear differential equations.
CO2	Understanding the concept of second order higher degree differential equations
CO3	Solve total differential equations by method of grouping
CO4	Analyzing the concepts of Laplace transforms and inverse Laplace transforms to solve differential equations with constant coefficients.
CO5	Solving partial differential equations
CO6	Evaluate the Bernoulli equation, exact differential equations, Clairaut's equation
CO7	Calculate complete integral and particular integral differential equations

PRESCRIBED BOOK

1. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, New Delhi.
(43rd Edition) 2014
2. P. R. Vittal, Differential Equations and Laplace Transform, Margham Publications,
Chennai. (I Edition) 2010

REFERENCE BOOKS

1. Sheply L. Ross, Differential Equations, John Wiley & Sons, Newyork. (III Edition) 2007
2. M. D. Raisinghania, Ordinary and partial Differential Equations, S. Chand & co.,
(II Edition) 2015
3. S. Narayanan & T. K. Manicavachagam Pillai, Calculus,
S. Viswanathan Printers & Publishers Pvt. Ltd., Chennai. (II Edition) 2012
4. P. Kandasamy, K. Thilagavathy, Mathematics for B.Sc., Volume - III,
S. Chand & Co., Ltd., New Delhi - 55. (II Edition) 2014

SEMESTER – III
SKILL BASED SUBJECT - I
MATHEMATICS FOR COMPETITIVE EXAMINATIONS SUBJECT CODE
– U3MA23ST

L	T	P	C
3	0	0	3

Total Hours : 39

OBJECTIVES :

- 1.To introduce concepts of mathematics with emphasis on analytical ability and computational Skill needed in competitive examinations.
2. To test your ability to solve basic mathematical problems logically.

UNIT – I : PROBLEMS ON GENERAL ARITHMETIC

9hrs

Ratio and Proportions - Inverse ratio – Properties (Addendo, Subtrahendo, componendo &dividendo)- ratio of four numbers-increasing and decreasing order of fractions -problems of ages. Section 1.12 and 1.8

UNIT – II : PROBLEMS ON PERCENTAGE

7hrs

Percentages - gain and loss percents-partnership problems. Section 1.10, 1.11 and 1.13

UNIT – III : TIME, DISTANCE AND WORK

7hrs

Time and distance - Time and work Section 1.17 and 1.15

UNIT – IV : COMMERCIAL ARITHMETIC

7hrs

Simple interest-compound interest-Shares and Stocks Section 1.21,1.22 and 1.29

UNIT – V : HISTORY OF MATHEMATICS

8hrs

Ancient arithmetic- The only true Knowledge – The language of the universe – A million dollar mystery – The interconnectedness of all things.

OUTCOME:

CO1	Finding ratio and proportions in various problems
CO2	Compute gain and loss percents problems
CO3	Calculate quickly the time distance
CO4	Work out simple interest and compound interest for various investment
CO5	Knowing the history of mathematics
CO6	Gaining knowledge about aptitude
CO7	Developing the skills to face various competitive examinations

PRESCRIBED BOOK

1. Uta C. Merzbach and Carl B. Boyer, A History of Mathematics, John Wiley & sons, Inc. (Third Edition) 2011.
2. R. S. Aggarwal, Quantitative Aptitude (I - IV Units) S. Chand & Co., New Delhi. (III Edition) 2012

REFERENCE BOOKS

1. Edgar Thorpe, Course in Mental Abilities and Quantitative Aptitude for Competitive Examinations, Tata McGraw Hill Pub., Co., Ltd. New Delhi. (III Edition) 2012
2. RSN Pillai and A. Bagavathi, Statistics, S. Chand & Co., (II Edition) 2010
3. Arun Sharma, Quantitative aptitude for CAT, McGraw Hill Education (India) Private Ltd., (VI Edition) 2014
4. Abhigita Guha, Quantitative Aptitude for Competitive Examinations, Tata McGraw Hill Pub., Co., Ltd. New Delhi. (III Edition) 2014

SEMESTER – III
ALLIED-II PAPER – I
MATHEMATICAL STATISTICS – I
SUBJECT CODE – U3MA22AT

L	T	P	C
7	0	0	5

Total Hours : 91

OBJECTIVES :

1. To apply Statistics methods for Mathematical Problems
2. To develop the basic mathematical theory of statistical inference at an undergraduate level.

UNIT – I : PROBABILITY**19hrs**

Concept of Sample Space-Events-Definition of Probability (Classical, Statistical and Axiomatic)-Addition and Multiplication laws of Probability-Independence of Events-Conditional Probability-Bayes' theorem-Simple Problems.

Chapter-3(Sections 3.6 – 3.9) & Chapter-4(Section 4.2)

UNIT – II : PROBABILITY (Continued...)**18hrs**

Random Variables(Discrete and Continuous)-Distribution Function-Expectation and Moments-Moment Generating Function-Probability Generating Function-Cumulant Generating Function-Simple Problems-Chebychev's inequality-Simple Problems.

Chapter-5(Sections 5.1 – 5.4) , Chapter-6(Sections 6.1&6.3) & Chapter-7(Section 7.1)

UNIT – III : RANK CORRELATION**18hrs**

Characteristic Function-Properties-Uniqueness and Inversion Theorem (Statement only) - Concept of Bivariate Distribution-Correlation-Karl Pearson's Coefficient of correlation-Rank Correlation-Linear Regression

Chapter-10(Sections 10.2 & 10.4-10.7)

UNIT – IV : DISTRIBUTIONS**18hrs**

Standard distribution: (Discrete distributions)- Binomial, Poisson, and Geometric Distributions- Interrelationship among these Distributions.
Chapter-8(Section 8.4&8.5)

UNIT – V : DISTRIBUTIONS (Continued...)

18hrs

Standard distribution: (Continuous Distribution)- Normal, Uniform, Gamma and Beta Distributions.
Chapter-9(Section 9.2&9.6)

OUTCOMES:

CO1	Understand conditional probability concepts
CO2	Finding moment generating function for continuous and discrete
CO3	Calculate correlation coefficients for given data
CO4	Analyzing the various measures of discrete distribution
CO5	Deriving the various measures of continuous distribution
CO6	Recognize the basic concepts in probability
CO7	Understanding the basic concepts in distribution.

PRESCRIBED BOOK

S. C. Gupta & V. K. Kapoor, Fundamentals of Mathematical Statistics, Sultan & sons.
(VIII Edition) 2014

REFERENCE BOOKS

1. Mood. A. M., Graybill. F. A. & Boes. D. G., Introduction to theory of statistics, McGraw Hill. (I Edition) 2007
2. Hoel. P. G., Introduction to mathematical Statistics, Wiley. (I Edition) 2008
3. Wilks. S. S., Elementary Statistical Analysis, Oxford and IBH. (I Edition) 2008

SEMESTER – IV MAJOR PAPER – VI VECTOR ANALYSIS AND FOURIER ANALYSIS SUBJECT CODE : U4MA21MT

L	T	P	C
6	0	0	5

Total Hours : 78

OBJECTIVES :

- 1.This course covers the topics in vector calculus and Fourier Analysis which are essential tools of modern Applied mathematics.
- 2.To develop deep understanding of key concepts followed by problems of Applied nature. The portion on Fourier analysis will lead to post graduate studies and research in Pure as well as applied mathematics..

UNIT – I : DIFFERENTIATION OF VECTOR

15hrs

Differentiation of a vector- Differentiation Formulae-Differentiation of dot and cross products-Partial derivatives of vectors-Differentials of vectors

UNIT – II : GRADIENT, DIVERGENCE AND CURL

16hrs

Vector differential operator Del-Gradient of a Scalar function-Directional Derivative- -Gradient of the sum, functions, the product of functions and a function of Function-operations involving del-Divergence of a vector - Curl of a vector - formulae involving operator Del- solenoidal and irrotational.

UNIT – III : VECTOR INTEGRATION

15hrs

The Line integral-Surface integral and Volume- Gauss Divergence theorem, Green's theorem and Stoke's theorem (only statement , simple problems).

UNIT – IV : FOURIER SERIES

16hrs

Euler's Formulae- Fourier expansion of function with period 2π -Odd and Even Function-Half range series - Parseval's formula- Change of intervals.

UNIT – V : FOURIER TRANSFORM

16hrs

Fourier integral - Complex form of Fourier integral- Fourier Sine and cosine integral-Fourier Transform – Definition, properties, Convolution theorem, Parseval's identity – simple problems.

OUT COME:

CO1	Understand differentiation of a vector
CO2	Learn gradient, divergence and Curl of a vector
CO3	Knowing about vector integration
CO4	Derive Fourier series for given function
CO5	Solve complex form of Fourier integral
CO6	Use concept of the Curl of a Vector in calculus
CO7	Apply concept of vectors to in calculus

PRESCRIBED BOOK

1. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, New Delhi. (43rd Edition) 2014
2. P. R. Vittal, Vector Calculus, Fourier Series and Fourier Transform, Margham Publications, Chennai. (II Edition) 2015

REFERENCE BOOKS

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, Addison Wesley, Mass. (Indian Print) (I Edition) 2009
2. M. K.Venkataraman, Engineering Mathematics Part-B, National Publishing Company, Chennai. (XI Edition) 2014

SEMESTER – IV
SKILL BASED SUBJECT – II
LINEAR PROGRAMMING
SUBJECT CODE : U4MA23ST

L	T	P	C
3	0	0	2

Total Hours : 39

OBJECTIVES :

1. To improve the skills of solving very common problems which we come across in various fields like transportation, games and industries with machines.
2. To maximize or minimize the numerical value. It consists of linear functions which are subjected to the constraints in the form of linear equations or in the form of inequalities

UNIT – I : LINEAR PROGRAMMING PROBLEM

8hrs

Linear programming problem – Mathematical formulation of the problem – Graphical solution method – Simplex method – Duality – Primal and dual relation (simple problems).

Sec 2.1 to Sec 2.7

UNIT – II : TRANSPORTATION PROBLEM

8hrs

Transportation problem – Degeneracy in transportation problem.

Sec 3.1 to Sec 3.10

UNIT – III : ASSIGNMENT PROBLEM

7hrs

The Assignment problem – Travelling salesman problem.

Sec 4.1 to Sec 4.8

UNIT – IV : GAME THEORY

8hrs

Game theory – two persons Zero sum game – the maximin minimax principle - Saddle points – games without saddle points.

Sec 8.4

UNIT – V : SIMULATION

8hrs

Monte-Carlo Techniques-Generalisation of Random numbers-Step in simulation-Uses of simulation-Simulation applied to queueing problems

Sec 13.1 to Sec 3.14

Outcomes:

CO1	Solve linear programming problem using graphical method
CO2	Explains transportation model algorithms
CO3	Optimum solution by assignment problem in warehousing and travelling
CO4	Calculate two persons zero sum game and saddle points
CO5	Understand and uses of simulation and applied to queueing problems
CO6	Recognizes special cases in the solution methods
CO7	Evaluate different situations after the solution of linear programming model

PRESCRIBED BOOK

Gupta P. K and Hira D. S., Problems in operations Research, S.Chand & Co.Delhi.
(III Edition) 2000

REFERENCE BOOKS

1. Kanti Swaroop, Gupta P. K. and Manmohan, Problems in operation Research, Sultan Chand & Sons. (II Edition) 2010
2. J. K. Sharma, operations Research: Theory and Applications Macmillan, Delhi.

(II Edition) 2011

3. V. K. Kapoor Operations Research (Concepts, Problems & Solutions), Sultan Chand & Sons. (I Edition) 2012

4. P. R. Vittal, Operations Research, Margham publications, Chennai. (I Edition) 2012

SEMESTER – IV
ALLIED-II PAPER – II
MATHEMATICAL STATISTICS - II
SUBJECT CODE - U4MA22AT

L	T	P	C
5	0	0	4

Total Hours : 65

OBJECTIVES :

1. To apply Statistics for Mathematical problems
2. To develop the basic mathematical theory of statistical inference at an undergraduate level.

UNIT – I: SAMPLING AND SAMPLING DISTRIBUTION

13hrs

Statistical population Census and Sampling Survey – Parameter and Statistics – Sampling and Sampling Distribution and Standard Error. Sampling distributions – students ‘t’ distribution.

Chapter-14(Sections 14.1-14.3)

UNIT – II: ‘t’, CHI - SQUARE

13hrs

Test of significance – Large sample test for proportion, mean and standard deviation – Exact test based on ‘t’ with respect to population mean , variance and correlation coefficient – Chi- square Tests of independence of attributes – goodness of fit tests.

Chapter-15 & 16

UNIT – III: THEORY OF ESTIMATION

12hrs

Quality – Methods of Estimation – Maximum Likelihood Estimation – Method of Moments.

Chapter-17

UNIT – IV: TEST OF HYPOTHESIS

14hrs

Test of Hypothesis: Null and Alternate Hypothesis – Type I and Type II error – Power of the test – Neymann Pearson Lemma – Likelihood Ratio Test – Concept of Most Powerful test (Statement and Results only) – Simple Problems.

Chapter-18(Sections 18.1-18.6)

UNIT – V: F-TEST & ANALYSIS OF VARIANCE

13hrs

F-test - Analysis of Variance –One way and two way Classification.

Chapter-18

OUTCOMES:

CO1	Compute the sampling distributions of means and variances
CO2	Apply large sample theory of estimators and test

CO3	Be able to construct tests and estimators and derive their properties
CO4	Find method of moments and maximum likelihood estimators
CO5	Determine the power of a test and apply the Neyman-Pearson lemma
CO6	Calculate sampling distributions related to the normal distribution t test and Chi-square
CO7	Understand one and two-sample estimation problems

PRESCRIBED BOOK

S. C. Gupta & V. K. Kapoor, Fundamentals of Mathematical Statistics, Sultan & sons.
(VIII Edition) 2014

REFERENCE BOOKS

1. Mood A. M., Graybill. F. A. & Boes D. G., Introduction to theory of Statistics, McGraw Hill. (III Edition) 2001
2. Hoel P. G., Introduction to Mathematical Statistics, Wiley. (I Edition) 2008
3. S. C. Gupta & V. K. Kapoor, Fundamentals of Applied Statistics, Sultan & Sons. (IV Edition) 2014

**SEMESTER – IV
ALLIED PRACTICAL
MATHEMATICAL STATISTICS
SUBJECT CODE : U4MA21AP**

L	T	P	C
2	0	2	2

Total Hours : 26

OBJECTIVES :

1. To apply Statistics for Mathematical problems.
2. To develop the basic mathematical theory of statistical inference at an undergraduate level.

The following exercises shall be performed as minimum mandatory requirements (for eligibility to take the practical examination) and a RECORD of the code-listing and outputs shall be maintained by each students.

1. Measures of location and Dispersion(absolute and relative) **13hrs**
2. Computation of Correlation Coefficient for raw and Grouped data, Rank Correlation Coefficient.
3. Computation of Regression Equations for Raw and Grouped Data.
4. Curve Fitting by the Method of Least Squares.
 - a) $y = aX + b$
 - b) $y = aX^2 + bX + c$
 - c) $y = ae^{bx}$
 - d) $y = aX^b$
5. Fitting of Binomial, Poisson, Normal distributions and Tests of goodness of fit.
6. Large sample tests with regard to population mean, proportion, standard deviation. **13hrs**
7. Exact tests with Respect to Mean , Variance and Coefficient of Correlation.

8. Test for Independence of Attributes Based on Chi – square Distribution.
9. Confidence interval based on Normal, ‘t’ , and Chi-square and F Distributions.
10. Problems based on ANOVA – One and Two way Classification.

Note :

Use of scientific calculator shall be permitted for practical examination. Statistical and Mathematical tables are to be provided to the students at the examination hall.

➤ Mathematics faculty alone should be appointed as examiners.

OUTCOMES:

CO1	Finding Measures of location and Dispersion
CO2	Be able to analyze the statistical data
CO3	Fitting a data to various curves

PRESCRIBED BOOK

S. C. Gupta & V. K. Kapoor, Fundamentals of Mathematical Statistics, Sultan & sons.
(VIII Edition) 2014.

REFERENCE BOOKS

1. Mood A. M., Graybill. F. A. & Boes D. G., Introduction to theory of Statistics, McGraw Hill. (III Edition) 2001
2. Hogg R. V. & Craig A. T., Introduction to Mathematical Statistics, Macmillan. (III Edition) 2001
3. Hoel P. G., Introduction to Mathematical Statistics, Wiley. (I Edition) 2008
4. Wilks S. S., Elementary Statistical Analysis, Oxford and IBH. (I Edition) 2008
5. M. N. Das and N. C. Giri, Design of Experiments, Wiley Eastern. (II Edition) 2010
6. Snedecor G. W. & Cochran. W. G. Statistical Methods, Oxford and IBH. (VIII Edition) 2014
7. S. C. Gupta & V. K. Kapoor, Fundamentals of Mathematical Statistics, Sultan & Sons. (II Edition) 2014
8. S. C. Gupta & V. K. Kapoor, Fundamentals of Applied Statistics, Sultan & Sons.

SEMESTER – V
MAJOR PAPER - VII
ABSTRACT ALGEBRA
SUBJECT CODE – U5MA21MT

L	T	P	C
5	0	0	5

Total Hours : 65

OBJECTIVES :

1. This course aims to impart emphasis on concepts and technology of the groups and rings as these algebraic structures have applications in Mathematical Physics, Mathematical Chemistry and Computer Science.

2. To understand uses of abstract algebra are increasingly important in certain areas, for example in communication theory, electrical engineering, computer science, and cryptography.

UNIT – I : GROUPS

Definition of a Group – Examples - Some Preliminary Lemmas – Subgroups.

Sections 2.1 - 2.4 of I.N.Herstein

UNIT – II : GROUPS (Contd.)

Counting Principle - Normal Subgroups & Quotient group - Homomorphisms.

Sections 2.5 - 2.7 of I.N.Herstein

UNIT – III : GROUPS (Contd.)

Automorphisms - Cayley's Theorem - Permutation Groups.

Sections 2.8 - 2.10 of I.N.Herstein

UNIT-IV: RINGS

Definition and Examples – Some Special Classes of Rings - Homomorphism of Rings - Ideals and Quotient Rings. Sections 3.1 - 3.4 of I.N.Herstein

UNIT-V: RINGS (Contd.)

Prime Ideal and Maximal Ideal - The field of quotients of an Integral domain - Euclidean rings.

Sections 3.5 - 3.7 of I.N.Herstein

OUTCOMES:

CO1	The students will learn to construct and describe groups
CO2	They will learn basic properties of groups and get familiar with important groups
CO3	Students will be able to compute the expression of permutation groups by using permutation multiplication
CO4	They will be able to learn the basics of rings.
CO5	Knowing concepts of ideal and Euclidean ring
CO6	Learn about structure preserving maps between groups and their consequences.
CO7	Analyze consequences of Lagrange's theorem.

Recommended Text :

I. N. Herstein, Topics in Algebra, Wiley Eastern Ltd., New Delhi. (II Edition) 2013

Chapter – 2 : Sections 2.1 - 2.10 (Omit Applications 1 and 2 of 2.7)

Chapter – 3 : Sections 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7

Reference Books :

1. M. L. Santiago, Modern Algebra, Tata McGraw Hill, New Delhi. (I Edition) 2002

2. J. B. Fraleigh, A First Course in Algebra, Addison Wesley, Mass. (Indian Print) (VII Edition) 2003

3. Lloyd R. Jaisingh and Frank Ayres, Jr. Abstract Algebra, Tata McGraw Hill Edition, New

Delhi.

(II Edition) 2005

4. Surjeet Singh and Qazi Zameeruddin, Modern Algebra,
Vikas Publishing House Pvt. Ltd., New Delhi. (VIII Edition) 2006

5. S. Arumugam, Modern Algebra. Scitech Publications, Chennai. (II Edition) 2013

SEMESTER – V
MAJOR PAPER - VIII
REAL ANALYSIS - I
SUBJECT CODE – U5MA22MT

L	T	P	C
5	0	0	5

OBJECTIVES :

Total Hours : 65

1. To understand various limiting behavior of sequences and series To explore the various limiting processes viz. continuity, uniform continuity, differentiability and integrability.
2. To enhance the mathematical maturity and to work comfortably with concepts.

UNIT – I: FUNCTIONS & SEQUENCES

Functions - real valued functions - equivalence - countability and real numbers - least upper bound - definition of sequence and subsequence - limit of a sequence - convergent sequence
Ch. 1.4 to 1.7, 2.1 to 2.3 of Goldberg.

UNIT – II: SEQUENCES (Contd.)

Divergent sequences - Bounded sequences - Monotone sequence - Operations on convergent sequences - Operations on divergent sequences - Limit superior and Limit inferior - Cauchy sequences Ch. 2.4 to 2.10 of Goldberg.

UNIT – III: SERIES OF REAL NUMBERS

Convergence and Divergence - Series with non negative terms - Alternating series - conditional convergence and Absolute convergence - Test for Absolute convergence.
Ch. 3.1 to 3.4 and 3.6 of Goldberg.

UNIT – IV: SERIES OF REAL NUMBERS (Contd.)

Test for Absolute convergence – The class ℓ^2 - Limit of a function on the real line - Metric spaces - Limits in Metric spaces. Ch. 3.7, 3.10, 4.1 to 4.3 of Goldberg.

UNIT-V: CONTINUOUS FUNCTIONS ON METRIC SPACES

Functions Continuous at a point on the real line - Reformulation - Functions Continuous on a Metric Spaces - Open Sets - Closed Sets. Ch. 5.1 to 5.5 of Goldberg

OUTCOMES:

CO1	Understand many properties of the real line $\mathbb{R}$ and learn to define sequence in terms of functions from $\mathbb{R}$ to a subset of $\mathbb{R}$
CO2	Recognize bounded, convergent, divergent, Cauchy and monotonic sequences and to calculate their limit superior, limit inferior, and the limit of a bounded sequence.

CO3	Concepts of series of real numbers
CO4	Apply the ratio, root, and alternating series and limit comparison tests for convergence and absolute convergence of an infinite series of real numbers.
CO5	Understand Continuous Functions on Metric Spaces
CO6	Learn real number system and properties
CO7	Known sequences and series of the real number system

Recommended Text :

R. Goldberg, Methods of Real Analysis. Oxford & IBH Publishing Co., New Delhi. (II Edition) 2012

Reference Books :

1. Tom M. Apostol, Mathematical Analysis, Addison-Wesley New York. (II Edition) 2002
2. Sanjay Arora and Bansi Lal, Introduction to Real Analysis, Satya Prakashan, New Delhi. (II Edition) 2008
3. Malik S.C. and Savita Arora, Mathematical Analysis, Wiley Eastern Limited, New Delhi. (II Edition) 2010
4. Bartle R.G. and Shebert, Real Analysis, John Wiley and Sons Inc., New York. (III Edition) 2012

SEMESTER – V
MAJOR PAPER - IX
COMPLEX ANALYSIS - I
SUBJECT CODE – U5MA23MT

L	T	P	C
5	0	0	5

Total Hours : 65

OBJECTIVES :

- (1) A modern treatment of concepts and techniques of complex function theory.
- (2) To gain knowledge about the complex number system, the complex function and complex integration.

UNIT – I : COMPLEX NUMBERS AND ELEMENTARY FUNCTIONS

Complex Number system, complex numbers -Algebraic properties-Point at Infinity Stereographic Projection-Function of a complex variable-Mappings-Elementary Functions- The Logarithmic function- Branches of $\log Z$ - Simple problems. Sections 1-10, 21-30. of R.V.Churchill and J.W.Brown

UNIT – II : ANALYTIC FUNCTIONS

Definitions of Limits -Continuity- Derivatives and Differentiation formula-Cauchy-Riemann equations-Cauchy-Riemann equations in polar form-properties of Analytic functions-Necessary and sufficient conditions for Analytic functions - Simple problems. Sections 11-19. of R.V.Churchill and J.W.Brown

UNIT – III : CONFORMAL MAPPINGS

Harmonic functions-Determination of Harmonic conjugate and Analytic functions-conformal mapping-Isogonal mapping-Further properties and examples-transformations of Harmonic functions - Simple problems. Sections 20, 76-80. of R.V.Churchill and J.W.Brown

UNIT – IV: MAPPING BY ELEMENTARY TRANSFORMATIONS

The transformations $w=z+d$, $w=1/z$, $w=z$, $w=z^2$, $w=\sqrt{z}$, $w=e^z$, $w=\sin z$ Bilinear

Transformation and special Bilinear Transformation- Simple problems. Sections 31-36, 38-39 of R.V.Churchill and J.W.Brown

UNIT – V : INTEGRALS

Contours - Line Integrals Cauchy - Goursat's Theorem (with out proof) Cauchy's Integral Formula - Derivatives of Analytic Functions - Simple problems. Sections 43-46, 50-52. of R.V.Churchill and J.W.Brown

OUTCOMES:

CO1	Visualize complex numbers as points of R and stereographic projection of complex plane on the Riemann sphere.
CO2	Understand the significance of differentiability and analyticity of complex functions Riemann equations
CO3	Knowing the Cauchy Goursat theorem and Cauchy integral formula in evaluation.
CO4	Understand the conformal mapping
CO5	Learn the role of line integrals in complex number system
CO6	Understand the complex number system
CO7	Transformation of the complex number system

Recommended Text :

R. V. Churchill and J. W. Brown, Complex Variables and Applications.
McGraw Hill International Book Co., Singapore. (VIII Edition) 2009

Reference Books :

1. P. Duraipandian and Laxmi Duraipandian, Complex Analysis: Emerald Publishers, Chennai. (II Edition) 2003
2. S. Ponnusamy. Foundations of Complex Analysis, Narosa Publishing House, New Delhi. (II Edition) 2012
3. Murray R. Spiegel. Theory and Problems of Complex Variable.
Tata-Mcgraw Hill Edition, New Delhi. (II Edition) 2014

SEMESTER – V
MAJOR PAPER - X
STATICS
SUBJECT CODE – U5MA24MT

L	T	P	C
5	0	0	5

Total Hours : 65

OBJECTIVES :

- 1.This course introduces the students the basic concepts of forces, moments, couple, friction law virtual displacement and work, catenary and the centre of gravity and kinematics.
2. This course stresses the development of skills in formation of suitable mathematical models and problems solving techniques

UNIT- I : THREE FORCES

Forces, Type of forces- Resultant of three forces related to triangle acting at a point - Resultant of several forces acting on a particle - Equilibrium of a particle under three forces - Equilibrium of a particle under several forces - Limiting Equilibrium of a particle on an inclined plane.

UNIT- II : PARALLEL FORCES, COUPLES AND COPLANAR FORCES

Moment of a forces- Parallel forces- Forces along the sides of the triangle - Couples- Resultant of several coplanar forces - Equilibrium of a rigid body under three coplanar forces.

UNIT- III : FRICTION

Friction – laws of friction -cone of friction and angle of friction- Applications involving frictional forces.

UNIT – IV: CENTRE OF MASS

Centre of mass – Centre of mass of a triangular lamina - uniform rods forming a triangle - lamina in the form of a trapezium and solid tetrahedron – Centre of mass using integration - circular arc - circular lamina - elliptic lamina - solid hemisphere - solid right circular cone - hemispherical shell - hollow right circular cone - cardioid lamina - Center of mass of a non-homogeneous solid.

UNIT- V EQUILIBRIUM OF STRING

Equilibrium of a uniform homogeneous string - Equation of the shape of the strings hanging under gravity in Cartesian form - Equation of the shape of the string hanging under gravity in parametric form - Sag - Suspension bridge.

OUTCOMES:

CO1	Develop equilibrium relationships for non-accelerating particles acted on by forces and moments
CO2	Compute moments and couples in vector form
CO3	Learn about the concept of laws of friction
CO4	Finding centre of mass of solid object
CO5	Deriving equilibrium of a uniform homogeneous string
CO6	Determine the equilibrium when two or more forces are acting on a particle
CO7	Understand the difference between mass and weight

Recommended Text :

P. Duraipandian, Laxmi Duraipandian , Muthamizh Jayapragasam, Mechanics, S. Chand and Company Ltd, (I Edition) 2005 Chapter 2,3,4,5,6,9 (Omit 5.2.1, 6.2.4, 6.3)

Reference Books :

1. S. Narayanan, R. Hanumantha Rao, K. Sitaraman, P. Kandaswamy, Statics, S. Chand and Company Ltd, New Delhi. (II Edition) 2008
2. Joseph F. Shelley, Vector Mechanics for Engineers Volume - I: Statics, Tata McGraw Hill Edition, New Delhi. (I Edition) 2008
3. A.V. Dharmapadam, Mechanics. S. Viswanathan Printers & Publishers. Chennai. (II Edition) 2011
4. M. K. Venkataraman, Statics, A. Rajhans Publications. Meerut. (16th Edition) 2013
5. S. L. Loney, An Elementary Treatise on Statics, Cambridge University Press, (IV Edition) 2014

SEMESTER – V
MAJOR PAPER - XI
OPERATION RESEARCH
SUBJECT CODE – U5MA05MT

L	T	P	C
4	0	0	4

Total Hours : 52

OBJECTIVES :

- 1.To develop computational skill and logical thinking in formulating industry oriented problems as a mathematical problem and finding solutions to these problems.
- 2.To learn Solve linear programming problems using appropriate techniques and optimization.

UNIT – I : CRITICAL PATH METHOD

Network-construction of network diagram-Critical path method (CPM) - Three floats

UNIT – II : PROJECT EVALUATION REVIEW TECHNIQUE

Three time estimates-Network scheduling by PERT Method-PERT Computation

UNIT – III : ECONOMIC ORDERING QUANTITY

Inventory models - EOQ model (a) Uniform demand rate infinite production rate with no shortages (b) Uniform demand rate finite production rate with no shortages - Inventory control with Price Breaks.

UNIT – IV : SEQUENCING PROBLEM

Sequencing problem - n jobs through 2 machines, n jobs through 3 machines - two jobs through m machines - n jobs through m machines.

UNIT – V : QUEUING SYSTEM

Queuing Theory - Basic concepts - Steady state analysis of M/M/1 and M/M/N systems with finite and infinite capacities.

OUTCOMES:

CO1	Acquire the knowledge of network diagram and floats
CO2	Understand network scheduling by PERT and CPM
CO3	Study the concepts of economic order quantity problems
CO4	Learn sequencing problems to n jobs 2,3 machines

CO5	Knowing basic concept of queuing system
CO6	Identify and develop operational research models from the verbal description of the real system.
CO7	Use mathematical software to solve the proposed models.

Recommended Text :

Gupta P. K. and Hira D. S., Problems in Operations Research, S. Chand & Co., Delhi. (II Edition) 2010

Reference Books :

1. P. R. Vittal, Operation Research, Margham Publications, Chennai. (II Edition) 2003
2. Arumugam & Issac, Operation research - Volume - I, New Gamma Pub., House. Palayamkottai. (II Edition) 2006
3. Ravindran A., Philips D.T. and Solberg J.J., Operation research, John Wiley & Sons, New York. (I Edition) 2009
4. V. K. Kapoor, Operation Research, Sultan Chand & sons. (II Edition) 2010
5. Taha H. A., Operation Research, Macmillan Publishing Company, New York. (IX Edition) 2010
6. S. J. Venkatesan, Operation Research, J. S. Publishers, Cheyyar - 604 407. (III Edition) 2012
7. Kanti Swaroop, Gupta P.K. and Manmohan, Problems in Operation Research, Sultan Chand & Sons., Delhi. (16 th Edition) 2013

SEMESTER – V
ELECTIVE PAPER - I
GRAPH THEORY
SUBJECT CODE – U5MA26ET

L	T	P	C
3	0	0	3

Total Hours : 39

OBJECTIVES :

- 1.To study and develop the concepts of graphs, subgraphs, trees connectivity, Eulerian.
- 2.Hamiltonian graphs, matching colorings of graphs and planar graphs.

UNIT – I : BASICS OF GRAPH

7hrs

Graphs, subgraphs, Degree of a vertex, Isomorphism of graphs, independent sets and coverings. Chapter-2(Sections 2.0 – 2.6) Omit 2.5

UNIT - II: OPERATIONS ON GRAPHS

8hrs

Intersection graphs; Adjacency and incidence of matrices; Operations on graphs. Chapter-2(Sections 2.7 – 2.9)

UNIT – III : CONNECTED GRAPHS

7hrs

Walks; trails; paths; Connectedness and components; cut point, bridge, block.

Chapter-4(Sections 4.0 – 4.4)

UNIT – IV : EULERIAN AND HAMILTONIAN GRAPHS

8hrs

Connectivity theorems and simple problems. Eulerian graphs and Hamiltonian graphs; simple problems

Chapter-5(Sections 5.0 – 5.2)

UNIT – V : TREES

7hrs

Introduction; Characterization of Trees, theorems and Centre of tree.

Chapter-6(Sections 6.0 – 6.2)

OUTCOMES:.

CO1	Understand the basic concepts of graph
CO2	Know the intersection and union of the graph
CO3	Acquire the knowledge connected graph and trails, paths and walk
CO4	Learn about the Eulerian and Hamiltonian Graph
CO5	Study tree and their properties
CO6	Analyzing the concepts graph and subgraph
CO7	Learn basics of graph and their properties

PRESCRIBED BOOK

S. Arumugam and S. Ramachandran, "Invitation to Graph Theory" SITECH Publications India Pvt. Ltd., 7/3C, Madley Road, T.Nagar, Chennai – 17. (I Edition) 2013

Reference Books :

1. N. Biggs, E. Lloyd, and R. Wilson, Graph Theory, Clarendon Press Oxford, (II Edition) 2010
2. L. Steen editor, Introduction to contemporary mathematics, W. H. Freeman and Company, New York. (III Edition) 2012
3. O. Ore, The four colour problem, academic press, New York. (III Edition) 2014

SEMESTER – V
ELECTIVE PAPER - I
ASTRONOMY
SUBJECT CODE – U5MA27ET

L	T	P	C
3	0	0	3

Total Hours : 39

OBJECTIVES :

1. Acquire knowledge of the Physical universe and its evolution.
2. Define and use fundamental principles and techniques of astronomy and astrophysics.
3. This course aims to provide working knowledge about the universe.

UNIT-I

Celestial Sphere -Diurnal motion -Simple Problems page 39 -83 (Use the results 65,67,83,84) to solve problems. No derivation.)

UNIT-II

Zones of Earth -Terrestrial Latitudes and Longitudes -Rotation of Earth -Dip of the horizon --Simple problems. Page 90-131 (Use the results of 96,99,102 to solve problems. No need for derivation.

UNIT-III

Twilight-simple problems-Astronomical refraction -Simple problems. page 131-157. (use the result of 124,125,126,127 to solve problems. No need to derive the result)

UNIT-IV

Kepler's Laws -simple problems page 172-189. (Use results of 159,160 to solve the problems. No need to derive the results.

UNIT-V

Moon -phases of moon -Eclipses -Introduction -umbra and penumbra -lunar eclipse -solar eclipse -condition for the occurrence of lunar and solar eclipses. Page 334-377.(Use the results of 270,271,272 to solve problem, no need to derive the results)

OUTCOMES:

CO1	Communicate about celestial objects such as parent star, planets, dwarf planets, satellites
CO2	Describe the classification of stars, stellar evolution, interstellar matter, galaxies
CO3	Current understanding and investigation of the basic knowledge about cosmic threats
CO4	Solving problems with scientific reasoning and critical thinking skills
CO5	Understand the impact of astronomical bodies and formations on earth and climate.
CO6	Familiarize and appreciate the field of astronomy and its relation with various allied fields of Science
CO7	Prepare graduates with strong foundation to pursue advanced degree in Astronomy or seek career in science education

RECOMMENDED TEXT

S.Kumaravelu and SusheelaKumaravelu.(2004) Astronomy.SKV Publishers, Nagarkoil

REFERENCE BOOKS

- 1.L.W.Frederick and R.H.Baker (1976) Astronomy(10thEdn) Van Nostrand, New York.
- 2.R.Jastrow and M.H.Thompson (1984) Astronomy : Fundamentals and Frontiers,(4thEdn) John Wiley & Sons, New York.
- 3.H.Karttunen et. al. (2003) Fundamental Astronomy(4thEdn) Springer Verlag, Berlin.
- 4.L.Motz and A.Duveen. (1977) Essentials of Astronomy(2ndEdn) Columbia University Press, New York.

5.G.V.Ramachandran. (1965) A Text Book of Astronomy(5thEdn) Published by Mrs.RukmaniRamachandran, Tiruchirappalli
 6.M.Zeilik (2002) Astronomy: The Evolving Universe(9thEdn) Cambridge University Press, Cambridge.

SEMESTER – V
SKILL BASED SUBJECT
PAPER - III
QUANTITATIVE TECHNIQUES
SUBJECT CODE – U5MA28ST

L	T	P	C
3	0	0	3

Total Hours : 39

OBJECTIVES :

- 1.To formulate design and solve the practical problems in various fields using the quantitative techniques.
2. Be able to apply quantitative methods to solve a variety of business problems.

UNIT – I : STATISTICAL TECHNIQUES: STATISTICAL QUALITY CONTROL

Introduction - basis of control charts - control charts for variables - control charts for attributes - control charts for mean and variance.

UNIT – II : INDEX NUMBERS

Introduction - construction of index number - classification of index number - wholesale index number - cost of living index numbers (Importance to be given only to simple problems)

UNIT – III : TIME SERIES ANALYSIS

Introduction - components of time series - analysis of time series - measurement of trends (Importance to be given only to simple problems).

UNIT – IV : TEST OF SIGNIFICANCE

Definition of t-test and its applications, χ^2 test and its applications.

UNIT – V : Z - TRANSFORM TECHNIQUES

Z-transform - elementary properties - Inverse Z - transforms - solution of difference equations using Z-transforms.

OUTCOMES:

CO1	Learn about basis of control charts
CO2	Understand index number and classification of index number
CO3	Know the time series analysis and measurement of trend

CO4	Study of measurements of seasonal and cyclic variations
CO5	Using to Z transform to solve the difference equation
CO6	Solve the practical problems in various fields using the quantitative techniques.
CO7	To develop Z- transform techniques which will perform the same task for discrete time systems as Laplace Transform, a valuable aid in analysis of continuous time systems.

Recommended Text :

1. S. C. Gupta and V. K. Kapoor, Fundamentals of Applied Statistics, S. Chand & Co., Delhi. (II Edition) 2013
2. Kanti Swaroop, Gupta P. K. and Manmohan, Operations Research, Sultan Chand & Sons. (XIII Edition) 2013
3. A. Singaravelu, Engineering mathematics - III, Meenakshi agency, Chennai. (III Edition) 2014

Reference Books :

1. Arumugam & Issac, Linear programming, New Gamma Pub., House Palayamkottai. (II Edition) 2010
2. P. Kandasamy and others, Probability statistics and queuing theory, Sultan Chand & Sons. (I Edition) 2010
3. V. Sundaresan, K. S. Ganapathy Subramanian and K. Ganesan, Resource management Techniques, Meenakshi Pub., Arapakkam-609111 [Ph.04364-71417-20081] (I Edition) 2011

**SEMESTER – VI
MAJOR PAPER – XII
LINEAR ALGEBRA
SUBJECT CODE – U6MA21MT**

L	T	P	C
5	0	0	5

Total Hours : 65

OBJECTIVES :

- 1.To study the Algebraic structures of Vector Spaces and Linear Transformation.
2. To Understand the concept of matrices , trace and transpose.

UNIT – I : VECTOR SPACES

Definition and examples-Linear dependence and independence ,basis

UNIT – II : VECTOR SPACES (Contd.)

Dual space - Inner Product spaces.

UNIT – III : LINEAR TRANSFORMATION

Algebra of linear transformations –Characteristic equation- Characteristic roots

UNIT – IV : LINEAR TRANSFORMATION (Contd.)

Matrices, Canonical forms; Triangular forms.

UNIT-V: LINEAR TRANSFORMATION (Contd.)

Trace and Transpose, Determinants

OUTCOMES:

CO1	Familiar with vector space, basis and dimension of vector space
CO2	Investigate properties of vector spaces and subspaces
CO3	Learn about polynomial rings over the rational field
CO4	Understand Linear transformation and their representation as matrices
CO5	Known the concepts of matrices , trace and transpose
CO6	Acquire the knowledge of vector spaces
CO7	Learn the basics of vector spaces and linear transformations

Recommended Text :

I. N. Herstein, Topics in Algebra, Wiley Eastern Ltd., New Delhi. (II Edition) 2013

Chapter – 4 : Sections 4.1, 4.2, 4.3, 4.4, Chapter – 6 : Sections 6.1, 6.2, 6.3, 6.4, 6.8, 6.9

Reference Books :

1. M. L. Santiago, Modern Algebra, Tata McGraw Hill, New Delhi. (I Edition) 2002

2. J. B. Fraleigh, A First Course in Algebra, Addison Wesley, Mass. (Indian Print) (VII Edition) 2003

3. Lloyd R. Jaisingh and Frank Ayres, Jr. Abstract Algebra, Tata McGraw Hill Edition, New Delhi. (II Edition) 2005

4. Surjeet Singh and Qazi Zameeruddin, Modern Algebra,
Vikas Publishing House Pvt. Ltd., New Delhi. (VIII Edition) 2006

5. S. Arumugam, Modern Algebra. Scitech Publications, Chennai. (II Edition) 2013

L	T	P	C
5	0	0	5

SEMESTER – VI
MAJOR PAPER - XIII
REAL ANALYSIS - II
SUBJECT CODE – U6MA22MT

Total Hours : 65

OBJECTIVES :

- 1.To understand Integration process of Riemann
- 2.To develop the understanding of point wise and uniform convergence of sequence and series of functions.
3. To enhance the mathematical maturity and to work comfortably with concepts.

UNIT – I: CONNECTEDNESS, COMPLETENESS

Open Sets - Connected Sets - Bounded Sets and Totally Bounded Sets - Complete Metric Spaces. Ch. 6.1 to 6.4 of Goldberg

UNIT – II: COMPACTNESS

Compact Metric Space - Continuous Functions on Compact Metric Spaces - Continuity of Inverse Functions - Uniform Continuity. Ch. 6.5 to 6.8 of Goldberg

UNIT – III: RIEMANN INTEGRATION

Sets of measure zero - Definition Riemann Integral - Properties of Riemann Integral - Derivatives. Ch. 7.1, 7.2, 7.4, 7.5 of Goldberg.

UNIT – IV: RIEMANN INTEGRATION (Contd.)

Rolle's Theorem - The law of mean - Fundamental theorems of calculus - Taylor's theorem Ch. 7.6 to 7.8 and 8.5 of Goldberg.

UNIT – V: SEQUENCES AND SERIES OF FUNCTIONS

Point wise convergence of sequences of functions - Uniform convergence of sequences of functions - consequences of uniform convergence - Convergence and uniform convergence of series of functions. Ch. 9.1 to 9.4 of Goldberg.

OUTCOMES:

CO1	Understand the concept of connectedness and completeness
CO2	Knowing about the compactness of metric spaces
CO3	Learn some of the properties of Riemann integrable functions
CO4	How to apply applications of the fundamental theorems in integration
CO5	Study about sequence and series of real numbers

CO6	Find the derivative of Riemann Integral
CO7	Determine the continuity of Inverse functions

Recommended Text:

R. Goldberg, Methods of Real Analysis. Oxford & IBH Publishing Co., New Delhi. (II Edition) 2012

Reference Books:

1. Tom M. Apostol, Mathematical Analysis, Addison-Wesley New York. (II Edition) 2002
2. Sanjay Arora and Bansilal, Introduction to Real Analysis, Satya Prakashan, New Delhi. (II Edition) 2008
3. Malik S.C. and Savita Arora, Mathematical Analysis, Wiley Eastern Limited, New Delhi. (II Edition) 2010
4. Bartle R.G. and Sherbert, Real Analysis, John Wiley and Sons Inc., New York. (III Edition) 2012

SEMESTER – VI
MAJOR PAPER - XIV
COMPLEX ANALYSIS - II
SUBJECT CODE – U6MA23MT

L	T	P	C
4	0	0	4

Total Hours : 52

OBJECTIVES :

- (1) To gain knowledge about complex Integration and series.
- (2) This course provides methods to solve problems in pure as well as in applied mathematics.

UNIT – I : INTEGRALS

Morera's theorem- Maximum Moduli of functions- The fundamental theorem of Algebra- Liouville's theorem-convergence of sequences and series-uniform convergence. Sections 53-56, 61 of R.V.Churchill and J.W.Brown

UNIT – II : POWER SERIES

Taylor's and Laurent's theorem-Integration and differentiation of power series- problems. Sections 57- 60. Of R.V.Churchill and J.W.Brown

UNIT – III : SINGULARITIES AND RESIDUES

Singularities and classifications-Isolated singularities: Removable singularity -Pole and essential singularity-Residues-Cauchy's Residue theorem-problems. Sections 67-71 of R.V.Churchill and J.W.Brown

UNIT – IV : ANALYTIC CONTINUATION

Conditions under which $f(z) = 0$ – Uniqueness - Singular points: Poles and zeros - Essential singular points - Number of zeros and poles - The Argument principle.
Sections 106-114 of R.V.Churchill and J.W. Brown

UNIT – V : CONTOUR INTEGRATION

Evaluation of Improper Real Integrals-Improper integrals involving Trigonometric functions
Sections 72-75. of R.V.Churchill and J.W.Brow

OUTCOMES:

CO1	Understand Liouville's theorem and the fundamental theorem of the algebra
CO2	Learn the concept of sequences and series of the complex functions
CO3	Solve Residues-Cauchy's Residue theorem
CO4	Understand and learn to use argument principle
CO5	Apply the methods of complex analysis to evaluate definite integrals and infinite series
CO6	Understanding of the basic concepts underlying complex analysis
CO7	Studying about the concept of sequences and series of the complex functions

Recommended Text :

R. V. Churchill and J. W. Brown, Complex Variables and Applications.
McGraw Hill International Book Co., Singapore. (VIII Edition) 2009

Reference Books :

1. P. Duraipandian and Laxmi Duraipandian, Complex Analysis: Emerald Publishers, Chennai. (II Edition) 2003
2. S. Ponnusamy. Foundations of Complex Analysis, Narosa Publishing House, New Delhi. (II Edition) 2012
3. Murray R. Spiegel. Theory and Problems of Complex Variable. Tata-Mcgraw Hill Edition, New Delhi. (II Edition) 2014

SEMESTER – VI
MAJOR PAPER - XV
DYNAMICS
SUBJECT CODE – U6MA24MT

L	T	P	C
4	0	0	4

Total Hours : 52

OBJECTIVES :

1. This course aims to provide models for some real life problems.
2. This covers topics like Simple Harmonic Motion, Projectiles, Central Orbits and Moment of Inertia. Stress is on the mathematical formulation of the physics aspects of the problems and it develops logical deduction and interpretation.

UNIT – I : VELOCITY

Velocity - Relative Velocity - Angular Velocity, Acceleration, Rectilinear motion - Rectilinear motion with constant acceleration - Relative angular velocity - Work, Power, Energy.

UNIT – II : PROJECTILE

Motion of a projectile - Nature of a trajectory - Results pertaining to the motion of a projectile - Range on an inclined plane - Maximum range on the inclined plane. Simple problems.

UNIT – III : IMPACT

Impulsive force - Conservation of linear momentum - Impact of a sphere - Laws of impact - Impact of two smooth spheres - Direct impact of two smooth spheres - Direct impact of a smooth sphere on a plane - oblique impact of two smooth spheres on a plane. Simple problems.

UNIT- IV: CENTRAL FORCE

Central force and Central Orbit - Equation of central orbit - finding law of force and speed for a given orbit Determination of the orbit when law of force is given - Kepler's Laws on planetary motion. Simple problems.

UNIT – V: MOMENT OF INERTIA

Moment of Inertia of simple bodies - Theorem on parallel and perpendicular axes - Moment of inertia of triangular lamina - circular lamina - circular ring - right circular cone – sphere - Simple problems.

OUTCOMES:

CO1	Distinguish between velocity and acceleration, Rectilinear motion and Rectilinear motion with constant acceleration and understand the concept of Relative angular velocity Work, Power, Energy.
CO2	Able to solve simple problem by using concepts of Nature of a trajectory and Results pertaining to the motion of a projectile
CO3	Understand the collision of two smooth sphere and that of a smooth sphere on the smooth plane
CO4	Students known distinguish between Central force and Central Orbit
CO5	Students learn Theorem on parallel and perpendicular axes
CO6	Build up critical thinking and problem solving capacity of various idea about Motion, Projectiles, Central Orbits and Moment of Inertia.
CO7	Asses various concepts of dynamics like Central Orbits and Moment of Inertia

Recommended Text :

P. Duraipandian, Laxmi Duraipandian , Muthamizh Jayapragasam, Mechanics,
S. Chand and Company Ltd, (I Edition) 2005 Chapter 2,3,4,5,6,9 (Omit 5.2.1, 6.2.4, 6.3)

Reference Books :

1. S. Narayanan, R. Hanumantha Rao, K. Sitaraman, P. Kandaswamy, Statics,

- S. Chand and Company Ltd, New Delhi. (II Edition) 2008
2. Joseph F. Shelley, Vector Mechanics for Engineers Volume - I: Statics, Tata McGraw Hill Edition, New Delhi. (I Edition) 2008
 3. A.V. Dharmapadam, Mechanics. S. Viswanathan Printers & Publishers. Chennai. (II Edition) 2011
 4. M. K. Venkataraman, Statics, A. Rajhans Publications. Meerut. (16th Edition) 2013
 5. S. L. Loney, An Elementary Treatise on Statics, Cambridge University Press, (IV Edition) 2014

SEMESTER – VI
ELECTIVE PAPER – III
PROGRAMMING IN C
SUBJECT CODE – U6MA25ET

L	T	P	C
3	0	0	3

Total Hours : 39

OBJECTIVES :

1. To impart adequate knowledge on the need of programming languages and problem-solving techniques.
2. To develop an in-depth understanding of functional and logical concepts of C Programming
3. To provide exposure to problem-solving through C programming.

UNIT - I : C- CONSTANTS & VARIABLES

C- Constants, variables, Data-type, Declaration of variables, assigning values to variables.

UNIT – II : OPERATORS

Arithmetic, Relational, Logical, Assignment, Increment and decrement, Conditional, Arithmetic Expressions, Evaluation of Expressions, Precedence of Arithmetic operators, Formatted input and output.

UNIT – III : OPERATORS AND ARRAYS

Decision making and branching If, simple if, If else, Nesting of if - else, Else – If ladder, Switch statement, the?: operator, Go to statement. Decision making with looping: While, Do, For statement, Jumps in loops. **Arrays:** 1 - dimensional array, 2 - dimensional array, Initializing 2 - dimensional array, Multi - dimensional arrays.

UNIT – IV : USER - DEFINED FUNCTION & STRUCTURES AND UNIONS

User-Defined Function : Need for User-defined function, Multi-function program, the form of C-Function, Return Value and their types. **Structures and Unions :** Structure definition, Structure initialization, Comparison of structure variables, union.

UNIT – V : POINTERS

Understanding Pointers, Accessing the address of a variable, Declaring and initializing of pointers, accessing a variable through its pointer, Pointer expression. Pointers and arrays, Pointers and structures.

OUTCOMES:

CO1	Able to understand and design the solution to a problem using object-oriented Programming concepts.
CO2	Able to use proper class protection mechanism to provide security.
CO3	Able to Understand and Apply the concepts of Classes & Objects, friend function, constructors & destructors in program design.
CO4	Able to Design & implement various forms of inheritance, and calling base class constructors.
CO5	Able to Apply & Analyze function/operator overloading, runtime polymorphism, Generic Programming.
CO6	Able to demonstrate the use of virtual functions to implement polymorphism.

Recommended Text :

E. Balagurusamy, Programming in ANSI C. Tata McGraw Hill, New Delhi. (VI Edition) 2012

Chapters:

2.5 to 2.9, 3.2 to 3.7, 3.10 to 3.12, 4.4 to 4.5

5.2 to 5.9, 6.2 to 6.5, 7.2 to 7.5, 9.2 to 9.5

10.2, 10.4, 10.5, 10.10, 11.2 to 11.6, 11.8, 11.11

Reference Books :

1. H. Schildt, Osborne. Teach Yourself C, McGraw Hill. New York. (II Edition) 2008
2. Mullish Cooper, The Spirit of C- An Introduction to Modern Programming, Jaico Publishing House, Delhi. (II Edition) 2009
3. V. Rajaraman, Computer Programming in C, Prentice Hall, New Delhi. (II Edition) 2010
4. Yashavant kanetkar, let us C, BPB publication. (16th Edition) 2012

SEMESTER – VI
ELECTIVE PAPER - III
PROGRAMMING IN C Lab
SUBJECT CODE – U6MA21EP

L	T	P	C
0	0	3	2

Total Hours : 39

OBJECTIVES :

1. To introduce the field of programming using C language.
2. To learn the fundamental concepts of C Programming

The following exercises shall be performed as minimum mandatory requirements (for eligibility to take the practical examination) and a RECORD of the code-listing and outputs shall be maintained by each students.

1. Assigning the ASCII value.
2. Square of numbers: Using For loop, While loop

3. Square of numbers: Do-While loop, Goto statement.
4. Characters between two given characters.
5. Number of vowels and consonants.
6. Three - dimensional matrix.
7. Prime numbers between two give numbers.
8. Fibonacci series.
9. Factorial numbers
10. Power of a value.
11. Interchange sort.
12. Student record.

Note: Mathematics faculty should be appointed as an Examiner.

OUTCOMES:

CO1	Write the algorithm of a given problem.
CO2	Draw a flow chart of a given problem.
CO3	Write programs to print output on the screen as well as in the files

Recommended Text :

E. Balagurusamy, Programming in ANSI C, Tata McGraw Hill, New Delhi. (VI Edition) 2012

Reference Books :

1. Herbert Schildt, Obsbome Megrawhill, Teach yourself C, (II Edition) 2008
2. Mullish Cooper, The spirit of C, Indian Edition by Jaico Publishers. (II Edition) 2009
3. Schaum Series, Programming in C, (XIII Edition) 2010

SEMESTER – VI
ELECTIVE PAPER – IV
MATLAB PROGRAMMING
SUBJECT CODE – U6MA25ET

L	T	P	C
3	0	0	3

Total Hours : 39

OBJECTIVES :

1. Understand the program functions using the MATLAB development environment
2. To learn to use MATLAB as a simulation tool.

UNIT – I : INTRODUCTION TO MATLAB

The Advantages of MATLAB-Disadvantages of MATLAB- The MATLAB Environment-Using MATLAB

as a Scratch Pad

UNIT – II : MATLAB BASICS

Variables and Arrays – Multidimensional Arrays – Subarrays – Special Values – Displaying Output Data – Data Files- Scalar and Array Operations – Hierarchy of Operations – Built-in MATLAB Functions – Introduction to Plotting.

UNIT –III : BRANCHING STATEMENTS AND PROGRAM DESIGN

Introduction to Top-Down Design Techniques – Use of Pseudo code – The Logical Data Type – Branches –Additional Plotting Features – More on Debugging MATLAB Programs

UNIT – IV : LOOPS

The While Loop – The For Loop – Logical Arrays and Vectorization – The MATLAB Profiler – User defined Functions

UNIT - V: ADDITIONAL DATA TYPES AND PLOT TYPES

Complex Data – String Functions – Multi Dimensional Arrays – Additional Data Types – Additional Two Dimensional Plots – Three Dimensional Plots.

OUTCOMES:

CO1	Learn the basics of MATLAB and advanced techniques for specialized areas
CO2	Able to generate plots and export this for use in reports and presentations
CO3	Able to use Matlab for interactive computations
CO4	Understand logical arrays and vectorization
CO5	Able to program functions using the MATLAB development environment
CO6	Students learned graphic features of MATLAB and they are able to use this feature effectively in the various applications
CO7	Students are able to use MATLAB as a simulation tool

Recommended Text :

1. Stephen J. Chapman, MATLAB Programming for Engineering, BAE Systems, Australia. (IV Edition) 2008

Reference Books :

1. Stormy Attaway, MatLAB, A Practical Introduction to Programming and Problem Solving, BH Publications. (III Edition) 2009
2. David Kuncicky, MatLAB Programming, Prentice Hall, (II Edition) 2010
3. Duane C. Hanselman , Bruce L. Littlefield, Mastering MATLAB, Prentice Hall. (I Edition) 2011

SEMESTER – VI
ELECTIVE PAPER - IV
MATLAB

SUBJECT CODE – U6MA22EP

L	T	P	C
0	0	3	2

Total Hours : 39

OBJECTIVES :

- 1.To learn features of MATLAB as a programming tool.

The following exercises shall be performed as minimum mandatory requirements (for eligibility to take the practical examination) and a RECORD of the code-listing and outputs shall be maintained by each students.

1. Write a Program to Solve for the roots of a quadratic equation.
2. Generation of N Fibonacci Series.
3. Find Geometric Mean, Harmonic Mean and RMS average.
4. Using While Construct loop, Find factorial of a given number
5. Write the MATLAB statements required to calculate and print out the squares of all the even integers between 0 and 50. Create a table consisting of each integer and its square, with appropriate labels over each column.
6. Sum of N elements using Array.
7. MATLAB Program for Matrix Addition.
8. Write a program that allows a user to enter a string containing a day of the week ("Sunday," "Monday," "Tuesday," etc.) and uses a switch construct to convert the day to its corresponding number.
9. Write a program that accepts a series of strings from a user with the input function, sorts the strings into ascending order disregarding case, and prints them out.
10. Write a function that converts a Roman numeral to its decimal equivalent.

OUTCOMES:

CO1	Students learned features of MATLAB as a programming tool
CO2	Solve for the roots of a quadratic equation
CO3	Major outcome is students are able to work as a MATLAB programmer in the industry because of the hands on practical sessions

Recommended Text :

1. Stephen J. Chapman, MATLAB Programming for Engineering, BAE Systems, Australia.
(IV Edition) 2008

Reference Books :

1. Stormy Attaway, MatLAB, A Practical Introduction to Programming and Problem Solving, BH Publications. (III Edition) 2009
2. David Kuncicky, MatLAB Programming, Prentice Hall, (II Edition) 2010
3. Duane C. Hanselman , Bruce L. Littlefield, Mastering MATLAB, Prentice Hall. (I Edition) 2011

SEMESTER – VI
ELECTIVE PAPER - V
SPECIAL FUNCTIONS
SUBJECT CODE – U6MA27ET

L	T	P	C
3	0	0	3

Total Hours : 39

OBJECTIVES :

- 1.To develop computational skill in certain special functions which are frequently occurring in higher mathematics and mathematical physics.
- 2.To Learn Adams and modified Adams method.

UNIT – I : LINEAR OPERATORS

Properties of Linear Operators - Simultaneous Linear Differential Equations -

UNIT – II : NONLINEAR EQUATIONS

Special Solvable Types of Nonlinear Equations. Numerical Solutions Using Taylor Series -

UNIT – III : ADAMS METHOD

Adams and Modified Adams Method - Extrapolation with Differences Properties of Power Series - Examples

UNIT – IV : SINGULAR POINTS

Singular Points of Linear Second Order Differential Equations - Method of Frobenius.

UNIT - V : BESSEL FUNCTIONS AND LEGENDRE FUNCTIONS

Bessel Functions - Properties - Legendre Functions.

OUTCOMES:

CO1	Understand properties of linear operators
CO2	Know numerical solutions using Taylor series
CO3	Learn Adams and modified Adams method
CO4	Analyze singular points of linear second order differential equations
CO5	Get knowledge of Bessel functions and properties
CO6	Develop computational skill in certain special functions which are frequently occurring in higher mathematics and mathematical physics
CO7	Study about the Legendre functions and their properties

Recommended Text :

F. B. Hildebrand, Advanced Calculus for Applications. Prentice Hall. New Jersey. (II Edition) 2010

Reference Books :

1. B. D. Gupta, Mathematical Physics, Vikas Publishing House. (IV Edition) 2009
2. J. N. Sharma and R. K. Gupta, Special Functions, Krishna Prakashan Mandir, Meerut. (II Edition) 2014
3. Satya Prakash, Mathematical Physics, Sultan & Sons, New Delhi. (II Edition) 2014

**SEMESTER – VI
ELECTIVE PAPER - VI
FUZZY MATHEMATICS
SUBJECT CODE – U6MA28ET**

L	T	P	C
3	0	0	3

Total Hours : 39

OBJECTIVES:

1. To know the fundamentals of fuzzy Algebra.
2. To know the basic definitions of fuzzy theory
3. To know the applications of fuzzy Technology.

UNIT – I: FUZZY SETS

Introduction- Fuzzy subsets-Lattices and Boolean Algebras- L fuzzy sets-operations on fuzzy - level sets - properties of fuzzy subsets of a set sections 1.1-1.10 of S. Nanda and N. R. Das

UNIT – II: OPERATIONS ON FUZZY SETS

Algebraic product and sum of two fuzzy subsets-properties satisfied by Addition and product-cartesian product of fuzzy subsets. Sections 1.11-1.13. of S. Nanda and N. R. Das

UNIT – III: LOGIC

Introduction- Algebra of fuzzy relations-logic-connectives. sections 2.1-2.4 of S. Nanda and N. R. Das

UNIT – IV: FUZZY SUBGROUP

Some more connectives-Introduction-fuzzy subgroup - homomorphic image and Pre-image of subgroupoid. Sections 2.5, 3.1-3.3 of S. Nanda and N. R. Das

UNIT – V: FUZZY SUBRING

Fuzzy invariant subgroups-fuzzy subrings. Section 3.4 and 3.5 of S. Nanda and N. R. Das

OUTCOMES:

CO1	Be able to distinguish between the ordinary set and fuzzy set concepts
CO2	Learn about Algebraic product and sum of two fuzzy subsets
CO3	Students able to understand fuzzy logic of Algebra of fuzzy relations and logic connectives
CO4	Learn differences between Group and fuzzy subgroup homomorphism image and Pre image of sub groupoid
CO5	Students known about Fuzzy invariant subgroups and fuzzy sub ring.
CO6	Be able to draw a parallelism between crisp set operations and fuzzy set operations through the use of characteristic and membership functions respectively
CO7	Become aware of the use of fuzzy inference systems in the design of intelligent or humanistic systems.

Recommended Text:

S. Nanda and N. R. Das "Fuzzy Mathematical concepts", Narosa Publishing House, New Delhi. (I Edition) 2012

Reference Books:

1. G. J. Klir and Bo Yuan, Fuzzy sets and fuzzy logic: Theory And Applications Prentice Hall, Upper Saddle River, NJ. (I Edition) 2008
2. G. J. Klir and T. A. Folger, Fuzzy sets, Uncertainty, and Information, Prentice Hall, Englewood Cliffs, NJ, (II Edition) 2009
3. A. Kaufmann and M. M .Gupta, Introduction to Fuzzy Arithmetic Theory and Application, Van Nostrand Reinhold, New York. (III Edition) 2011

SEMESTER – VI
SKILL BASED SUBJECT
PAPER - IV
FUNDAMENTALS OF APPLIED MATHEMATICS
SUBJECT CODE – U6MA29ST

L	T	P	C
3	0	0	3

Total Hours : 39

OBJECTIVES :

1. This course aims to develop mathematical maturity and ability to deal with abstraction.
2. To develop construction and verification of formal logical manipulation.

UNIT – I : RECURRENCE RELATIONS AND GENERATING FUNCTIONS

Recurrence - Polynomials and their Evaluations - Recurrence Relations - Solution of Finite Order Homogeneous [linear] Relations - Solutions of Non-homogeneous Relations.

UNIT – II : MATHEMATICAL LOGIC

TF Statements - Connectives - Atomic and Compound Statements - Well-formed[Statement

Formulae] - Parsing - Truth Table of a Formula - Tautology - Tautological Implications and Equivalence of Formulae.

UNIT – III : MATHEMATICAL LOGIC (Contd.)

Replacement process - Functionally complete sets of connectives and Duality law - Normal Forms - Principal Normal Forms.

UNIT – IV : LATTICES

Lattices [omit example 15 Pg. No.10.6) - Some properties of Lattices - New Lattices (omit remark Pg. No. 10.14) - Modular and Distributive Lattices (omit theorem 10 and 17, Example 4 – Pg. No. 10.23, Example 11 – Pg. No. 10.24)

UNIT – V : BOOLEAN ALGEBRA

Boolean Algebra (omit theorem 25) - Boolean Polynomials - Karnaugh Maps (omit K-map for 5 and 6 variables)

OUTCOMES:

CO1	Acquire the basic skills and conceptual understanding regarding recurrence relations and generating functions
CO2	Students understand to construct of mathematical logic
CO3	Solve and analyze the Normal Forms and Principal Normal Forms
CO4	Ability to interpret the properties of Lattices and new Lattices
CO5	Students known about Boolean algebra
CO6	Communicate mathematical ideas orally and in writing, with precision, clarity and organization, using proper terminology and notation
CO7	Demonstrate mathematical thinking skills, progressing from a procedural and computational understanding of mathematics to logical reasoning, pattern recognition, generalization, and abstraction, and to a formal proof

Recommended Text :

M. K. Venkataraman, N. Sridharan and N. Chandrasekaran, Discrete Mathematics, The National Publishing Company, Chennai. (II Edition) 2003

Reference Books :

1. C. L. Liu, Elements of Discrete Mathematics, McGraw Hill, New York, (III Edition) 2008
2. J. K. Truss. Discrete Mathematics for Computer Scientists, Pearson Education, Asia. (II Edition) 2009
3. R. Johnsonbaugh, Discrete Mathematics, Pearson Education, Asia. (V Edition) 2010
4. M. K. Sen and B. C. Chakraborty, Discrete Mathematics, Books and allied private Ltd., Kolkata. (II Edition) 2012

ADHIPARASAKTHI COLLEGE OF ARTS & SCIENCE
(Autonomous)

Permanently Affiliated to Thiruvalluvar University, Vellore

Re – accredited by NAAC with ‘B’ Grade (CGPA – 2.83)

M.Sc., MATHEMATICS
Under CBCS

SYLLABUS

(Effective from the Academic Year 2018-2019)

ADHIPARASAKTHI COLLEGE OF ARTS & SCIENCE

(Autonomous)

Permanently Affiliated to Thiruvalluvar University, Vellore

Re – accredited by NAAC with ‘B’ Grade (CGPA – 2.83)

M.Sc., MATHEMATICS

Under CBCS

(Effective from the Academic Year 2018-2019)

REGULATIONS

CBCS

Choice-Based Credit System is a flexible system of learning. ‘Credit’ defines the quantum of contents / syllabi prescribed for a course, and determines the number of hours of instruction required. The distinguishing features of CBCS are the following:

It permits the students to:

- ❖ Learn at their own pace
- ❖ Choose electives from a wide range of elective courses offered by the departments of the college.
- ❖ Undergo additional courses and acquire more than the required number of credits
- ❖ Adopt an inter – disciplinary approach in learning
- ❖ Make best use of the expertise of available faculty

6. Eligibility for Admission:

No student shall be eligible for admission to a Master's degree programme in any of the faculties unless he/she has successfully completed a three year undergraduate degree or earned prescribed number of credits for an undergraduate degree through the examinations conducted by a University / autonomous institutions or possesses such qualifications recognized by Thiruvalluvar University as equivalent to an undergraduate degree.

Provided that candidates for admission into the specific main subject of study shall also possess such other qualifying conditions as may be prescribed by the University in the Regulations governing respective courses of study.

Admission to the M.Sc., MATHEMATICS Degree Course shall be made as follows:

Preference

A student who has passed B.Sc. Degree with 55% with MATHEMATICS as Major Subject 5% relaxation shall be given to SC /ST applicants.

7. Eligibility for the Award of Degree:

A Candidate shall be eligible for the award of the Degree only if he/she has undergone the prescribed course of study in the college for a period of not less than two academic year and passed the examinations of all the Four Semesters prescribed earning 90 credits and fulfilled such conditions as have been prescribed therefore.

8. Duration of the course:

The duration of course shall be two years consisting of four semesters.

4. Examination:

There shall be four semester examinations: The first semester examination at the middle of the first academic year and the second semester examination at the end of the first academic year. Similarly the third and fourth semester examinations shall be held at the middle and the end of the second academic year, respectively.

A candidate who does not pass the examination in any subject or subjects in one semester will be permitted to appear in such failed subject or subject along with the papers of following semesters.

The following assessment procedure will be followed for Internal Marks:

Continuous Internal Assessment [CIA] Test

S.	Reg.	Nam	Test I	Test	Test	Marks	Marks	Assignments	Marks	Total

No	No	e	Marks For 50	II Marks For 75	III Marks For 75	For 200	Converted to 20/20	/Seminars [5] Records [5]	For 25/25	Rounded to Marks for 25 /25

Test I : One hour duration for 50 marks [Two Units of the Syllabus]

Test II : Two hours duration for 75 marks [Four Units of the Syllabus]

Test III: Three hours model test for 75 marks [Total Syllabus]

Total marks 200		Theory		Practical	
Test marks to be converted to	:	20 marks	/	20 marks	
Assignments / Seminars	:	5 marks	/	-	
Records	:	-	/	5 marks	
Total	:	25 marks	/	25 marks	

In the column Rounded to 25 / 25, any fraction may be rounded to the next number.

a. Requirements for proceeding to Subsequent Semester

- Candidates shall register their names for the First Semester Examination after admission in the PG Courses.
- Candidates shall be permitted to proceed from the First Semester up to Final Semester irrespective of their failure in any of the Semester Examination subject to the condition that the candidates should register for all the arrear subject of earlier semesters along the current [subject] Semester subjects.
- Candidates shall be eligible to go to subsequent semester, only if they earn sufficient attendance as prescribed therefore by the Academic council from time to time. Provided in case of a candidate earning less than 65% of attendance in any one of the Semesters due to any extraordinary circumstances such as medical grounds, such candidate who shall produce Medical Certificate issued by the Authorised Medical Attendant [AMA], duly certified by the Principal of the college shall be permitted to proceed to the next semester and to complete the course of study. Such candidates shall have to repeat the missed Semester by rejoining after completion of Final Semester of the course, after paying the fee for the break of study as prescribed by the College from time to time.

6. Passing Minimum:

A candidate shall be declared to have passed the whole examination, if he/she passes in all the papers and practical wherever prescribed/as per the scheme of examinations by earning 90 CREDITS.

In fixing the passing minimum marks the following will be observed.

[a]. There shall be no Passing Minimum for Internal.

[b]. For External Examinations, Passing Minimum shall be of 50% [Fifty Percentage] of the minimum marks prescribed for the paper.

[c]. In the aggregate (External + Internal) the Passing Minimum shall be of 50% for each Paper/Practical/Project and Viva-voce.

[d]. Grading shall be based on overall marks obtained (Internal + External).

7. Classification of Successful Candidates:

Candidates who secured not less than 60% of aggregate marks [Internal + External] in the whole examination shall be declared to have passed the examination in the First Class.

All other successful candidates shall be declared to have passed in Second Class. Candidates who obtain 75% of the marks in the aggregate [Internal + External] shall be deemed to have passed the examination in First Class with Distinction, provided they pass all the examinations [theory papers, practical, project and Viva-voce] prescribed for the course in the First appearance.

8. Requirements to take the Semester Examinations

a] A candidate will be permitted to take the Examination of any Semester, if

i] He/She secures not less than 75% of attendance out of the 90 instructional days during the semester. [In the case of married women students the minimum attendance requirement shall be 55% of total instructional days].

ii] He / She earns a Progress Certificate from the Head of the Institution, of having satisfactorily completed the prescribed course of study in the subject as required by these Regulations, and

iii] His/ Her conduct has been satisfactory.

Provided that it shall be open to the Academic council or any authority delegated with such powers by the Academic council to grant exemption to a candidate who has failed to earn 75% of the attendance prescribed for any valid reason[s] subject to the usual conditions.

b] A candidate who has secured attendance less than 75% but 65% and above shall be permitted to take the Examination on the recommendation of the Head of the Department to condone the lack of attendance as well as on the payment of the prescribed fees to the College.

c] A candidate who has secured attendance less than 65% but 55% and above in every semester, as to compensate the shortage of attendance in the subsequent semester besides, earning the

required percentage of attendance in that semester and take the examinations of both the semester papers together at the end of the later semester.

d] A candidate who has secured less than 55% of attendance in any semester will not be permitted to take the regular examinations. He/She has to re-do the course after the completion of the final semesters by rejoining the semester in which the attendance is less than 55%.

e] A candidate who has secured less than 65% of attendance in the final semester as to compensate his/her attendance shortage in a manner to be decided by the Head of the Department concerned after rejoining the course.

9. Grading System:

In addition to the above marking system grading system is also adopted as detailed below.

The marks (sum of IA and UE marks) in each course are assigned with a letter grade on a five points scale using the following letter grade points and a range of marks.

SEVEN POINT SCALE [As per UGC notification 1998]

Marks	Grade Point	Letter Grade	Class
95-100	7.00	H	First Class with Distinction
90-94	6.00	O	First Class with Distinction
75-89	5.50	D	First Class with Distinction
60-74	4.75	A	First Class
54-59	4.00	B	Second Class
50-54	3.50	C	Second Class
Below 50	3.00	F	Fail

From the second semester onwards the total performance within a semester and continuous performance starting from the first semester are indicated respectively by **Grade Point Average [GPA]** and **Cumulative Grade Point Average [CGPA]**. These two are calculated by the following formulae:

$$\text{GPA} = \frac{\sum_{i=1}^n C_i G_i}{\sum_{i=1}^n C_i}$$

Where 'Ci' is the credit earned for the course 'i' in any semester; 'Gi' is the Grade Point obtained by the student for the course 'i' and 'n' is the number of courses passed in that semester.

CGPA=GPA of all the courses starting from the first semester to the last semester.

10. RANKING

Candidate who pass all the examinations prescribed for the course in the First Appearance itself alone are eligible for Ranking.

Provided in the case of Candidates who pass all the examinations prescribed for the course with a break in the First Appearance due to the reasons as furnished in the Regulation 7.[iii] Supra are eligible for Classification / Distinction.

The mark obtained in improvement examination will not be taken into consideration for Ranking.

11. The Medium of Instruction and Examinations

The medium of Instruction and Examinations shall be in English.

15. Submission of Record Notebooks for Practical Examinations

Candidates taking the Practical Examinations should submit bonafide Record Notebook prescribed for the Practical Examinations. Otherwise the candidate will not be permitted to take the practical Examinations. However, in genuine case where the students could not submit the record notebook may be permitted to take the Practical Examinations provided the Head of the Department concerned certifies that the candidate has performed the experiments prescribed for the Course. For such of those candidates who do not submit Record Books, zero [0] marks will be awarded for record notebooks.

In case a candidate fails in the Practical Examination the marks awarded for the record at the time of first appearance for the Practical Examination should be made available by the College to the Examiners at the subsequent appearance by the candidate.

16. Improvement of marks in the subjects already passed

Candidates who have passed in theory paper/papers are allowed to appear again for theory paper/papers only once in order to improve his/her marks, by paying the fee prescribed from time to time. Such candidates are allowed to improve within a maximum period of 10 semesters counting from his/her first semester of his/her admission. If candidate improves his/her marks, then his/her improved mark will be taken into consideration for the award of Classification and Distinction only. Such improved marks will not be counted for the award of Prize/Medals and

Rank. If the candidate does not show improvement in the marks, his/her previous marks will be taken into consideration.

No candidate will be allowed to improve marks in the Practical and Field work.

17. Checklist for Inspection

1. Qualification for
 - iv. Teaching Faculty : as Prescribed by the UGC and the University
 - v. Technical Faculty : as Prescribed by the UGC and the University
 - vi. Laboratory Staff : as Prescribed by the UGC and the University
2. Infrastructure Facilities
 - iv. Building : Number of Classrooms with specifications: 3 rooms measuring 20'X 25'
Number of Staff rooms: One measuring 20' X 20'
 - v. Furniture : One pair of table / chair per student
 - vi. Laboratory @ 10 Sq. ft. per student

PATTERN OF QUESTION PAPER

Section – A (300 words)

To Answer 5 questions (either / or pattern) 5 X 6 marks = 30 marks

Section – B (900 words)

To Answer 3 questions out of 5 questions 3 X 15 marks = 45 marks

Total = 75 marks

ANNEXURE – I

ELIGIBILITY FOR ADMISSION TO M.Sc., MATHEMATICS

Admission to the M.Sc., MATHEMATICS Degree Course shall be made as follows:

Preference

A student who has passed B.Sc. Degree with 50% either with MATHEMATICS as Major Subject 5% relaxation shall be given to SC /ST applicants.

MISSION & GOALS OF MATHEMATICS

We aim to provide a learning environment that excites and informs undergraduate majors and non-majors about MATHEMATICS and the many ways that it is relevant to everyday life.

Through our MATHEMATICS Department is committed to providing a transformative education through the following elements:

- To provide strong mathematical foundation, analytical and computational skills and abstract understanding to young post graduate Mathematics students which enable them to handle any industrial and research problems.
- To promote high quality research in pure and applied Mathematics in the diversified areas thereby creating opportunities for the young researchers to contribute significantly in the frontier areas of Mathematics.
- To enhance the computational facilities to suit the needs of faculty members and research scholars working on research areas such as CFD, Applied Probability & Statistics, Complex Analysis & Fuzzy Logic and Graph Algorithm.
- To create computer software and mathematical modeling to cater to the growing needs of Industries/Research establishments.
- To popularize and project in proper perspective the scope of Mathematics and Computer Science so as to attract young talents to take up teaching and research career in Computer and Mathematical Sciences.

ADHIPARASAKTHI COLLEGE OF ARTS & SCIENCE (AUTONOMOUS)
G.B. NAGAR, KALAVAI – 632 506
PERMANENTLY AFFILIATED TO THIRUVALLUVAR UNIVERSITY, VELLORE
DEGREE COURSES

M.Sc., Mathematics

(With effect from 2018 - 2019)

The course of study and the scheme of examination.

Year/ Semester	Subject	Paper	Subject Code	Title of the Paper	Ins. Hrs/week	Credits	Exam Hrs.	Max. Mark		
								CIA	SEM	Total
I Year I Sem	CORE	Paper-I	P1MA21MT	Algebra I	6	5	3	25	75	100
	CORE	Paper-II	P1MA22MT	Mathematical Analysis I	6	5	3	25	75	100
	CORE	Paper-III	P1MA23MT	Ordinary Differential Equations	6	4	3	25	75	100
	CORE	Paper-IV	P1MA24MT	Mechanics	6	4	3	25	75	100
	ELECTIVE-I (to choose 1 out of 3)	Paper-I	P1MA25ET	A. Probability Theory	6	3	3	25	75	100
			P1MA26ET	B. Mathematical Programming						
			P1MA27ET	C. Reliability and Queuing Theory						
Total					30	21	-	125	375	500
I Year II Sem	CORE	Paper-V	P2MA21MT	Algebra II	6	5	3	25	75	100
	CORE	Paper-VI	P2MA22MT	Mathematical Analysis II	6	5	3	25	75	100
	CORE	Paper-VII	P2MA23MT	Partial Differential Equations	5	4	3	25	75	100
	CORE	Paper-VIII	P2MA24MT	Calculus of Variations and Integral Equations	5	4	3	25	75	100
	GENERAL STUDIES	Paper-I	P2HR21GS	Human Rights	2	2	3	25	75	100
	ELECTIVE-II (to choose 1 out of 3)	Paper-II	P2MA25ET	A. * Programming in C++ With Practical	6	3	3	25	75	100
			P2MA26ET	B. Algebraic Number Theory						
P2MA27ET			C. Optimization Techniques							
Total					30	23	-	150	450	600

* Programming in C++ With Practical's

Theory 60 Marks - Internal 15 + External 45

Practical 40 Marks - Internal 10 + External 30

PSOs	Course Name: M.Sc., Mathematics
PSO1	Inculcate critical thinking to carry out scientific investigation objectively without being biased with preconceived notions
PSO2	Understanding of the fundamental axioms in mathematics and capability of developing ideas based on them
PSO3	Motivate students for research studies in mathematics and related fields
PSO4	Provide advanced knowledge on topics in pure mathematics, empowering the students to pursue higher degrees at reputed academic institutions
PSO5	Prepare students for pursuing research or careers in industry in mathematical sciences and allied fields
PSO6	Getting strong foundation on algebraic topology and representation theory which have strong links and application in theoretical physics, in particular string theory
PSO7	Assist students in preparing for competitive exams TNSPC, SET, NET, GATE, etc.

SEMESTER – I
MAJOR PAPER - I
ALGEBRA - I
SUBJECT CODE – P1MA21MT

L	T	P	C
6	0	0	5

OBJECTIVES :

Total Hours : 78

- 1.To introduce the concepts of class equation, solvability of groups, finite abelian groups
2. To develop working knowledge on linear transformations, real quadratic forms.

UNIT - I : COUNTING PRINCIPLE

15hrs

Another counting principle - class equation for finite groups and its applications - Sylow's theorems (For theorem 2.12.1, Only First proof).

Chapter 2: Sections 2.11 and 2.12 (Lemma 2.12.5 Excluded) of I. N. Herstein

UNIT - II : GROUPS

15hrs

Direct products - Finite abelian groups

Chapter 2: Sections 2.13 and 2.14

UNIT - III : LINEAR TRANSFORMATIONS

15hrs

Linear Transformations: Canonical forms – Triangular form- Nilpotent transformations-

Chapter 6: Sections 6.4 & 6.5 of I. N. Herstein

UNIT – IV : JORDAN FORM

16hrs

Jordan form - rational canonical form.

Chapter 6 : Sections 6.6 and 6.7 of I. N. Herstein

UNIT – V : MATRICES AND TRANSFORMATIONS

17hrs

Trace and transpose - Hermitian, unitary, normal transformations, real quadratic form.

Chapter 6 : Sections 6.8 to 6.11 of I. N. Herstein

OUTCOMES:

CO1	Utilize the class equation and Sylow theorems to solve different related problems
CO2	Demonstrate competence with the basic ideas of algebra including the concepts of direct products, finitely generated abelian groups
CO3	Discuss the basic ideas of linear Algebra including the concepts of linear transformations and Nilpotent transformations
CO4	Analyze jordan form and rational canonical form.
CO5	Discuss the concept of Matrices and transformations
CO6	Determine the class equation for finite groups and its applications.
CO7	Find the trace and transpose in matrices.

PRESCRIBED BOOK

I. N. Herstein. Topics in Algebra, Wiley Eastern Limited, New Delhi. (II Edition) 2013

REFERENCE BOOKS

1. I. S. Luther and I. B. S. Passi, Algebra, Volume - I Groups ; Volume - II Rings, Narosa Publishing House, New Delhi, (II Edition) 2004 .
2. D. S. Malik, J.N. Mordeson and M. K. Sen, Fundamental of Abstract Algebra, McGraw Hill (International Edition), New York. (II Edition) 2007.
3. P. B. Bhattacharya, S. K. Jain, and S. R. Nagpaul, Basic Abstract Algebra, Cambridge University Press, (Indian Edition), (II Edition) 2009.
4. M. Artin, Algebra, Prentice Hall of India, (II Edition) 2010.
5. N. Jacobson & W. H. Freeman, Basic Algebra, Volume - I & II; Published by Hindustan Publishing Company, New Delhi. (II Edition) 2012.

SEMESTER – I
MAJOR PAPER - II
MATHEMATICAL ANALYSIS - I
SUBJECT CODE – P1MA22MT

L	T	P	C
6	0	0	5

Total Hours : 78

OBJECTIVES :

- 1.To work comfortably with functions of bounded variation, Riemann - Stieltjes Integration.
2. To introduce the concepts of convergence of infinite series, infinite product and uniform convergence and its interplay between various limiting operations.

UNIT - I : FUNCTIONS OF BOUNDED VARIATION

15hrs

Introduction - Properties of monotonic functions - Functions of bounded variation - Total variation - Additive property of total variation - Total variation on $[a, x]$ as a function of x - Functions of bounded variation expressed as the difference of two increasing functions - Continuous functions of bounded variation – Infinite series – Alternating series.
Chapter - 6 : Sections 6.1 to 6.8 Chapter 8 : Sections 8.5 & 8.7 of Tom M. Apostol

UNIT - II : THE RIEMANN - STIELTJES INTEGRAL

15hrs

Introduction - Notation - The definition of the Riemann - Stieltjes integral - Linear Properties - Integration by parts- Change of variable in a Riemann - Stieltjes integral - Reduction to a Riemann Integral - Euler's summation formula - Monotonically increasing integrators, Upper and lower integrals - Additive and linearity properties of upper and lower integrals - Riemann's condition. Chapter - 7: Sections 7.1 to 7.13 of Tom M. Apostol

UNIT - III : THE RIEMANN-STIELTJES INTEGRAL

15hrs

Integrators of bounded variation-Sufficient conditions for the existence of Riemann-Stieltjes integrals-Necessary conditions for the existence of Riemann-Stieltjes integrals- Mean value theorems for Riemann - Stieltjes integrals - The integrals as a function of the interval - Second fundamental theorem of integral calculus-Change of variable in a Riemann integral-Second Mean Value Theorem for Riemann integral-Riemann-Stieltjes integrals depending on a parameter-Differentiation under the integral sign – Interchanging the order of integration.
Chapter - 7 : 7.15 to 7.25 of Tom M. Apostol

UNIT - IV : INFINITE SERIES AND INFINITE PRODUCTS**16hrs**

Absolute and conditional convergence - Dirichlet's test and Abel's test - Rearrangement of series - Riemann's theorem on conditionally convergent series. Double sequences - Double series - Rearrangement theorem for double series - A sufficient condition for equality of iterated series - Multiplication of series - Cesaro summability - Infinite products.

Chapter 8 : Sections 8.8, 8.15, 8.17, 8.18, 8.20, 8.21 to 8.26 of Tom M. Apostol

UNIT – V : SEQUENCES OF FUNCTIONS**17hrs**

Pointwise convergence of sequences of functions - Examples of sequences of real - valued functions - Definition of uniform convergence - Uniform convergence and continuity - The Cauchy condition for uniform convergence - Uniform convergence of infinite series of functions - Uniform convergence and Riemann - Stieltjes integration - Uniform convergence and differentiation - Sufficient condition for uniform convergence of a series - Mean convergence. Chapter - 9 Sec 9.1 to 9.6, 9.8, 9.10, 9.11, 9.13 of Tom M. Apostol

OUTCOMES:

CO1	Define and illustrate the concept of functions of bounded variation
CO2	Describe the Riemann - Stieltjes integral
CO3	Analyze necessary conditions for the existence of Riemann, Stieltjes integrals and Mean value theorems for Riemann
CO4	Discuss the concept of infinite series and infinite products
CO5	Understand the basics of Riemann - Stieltjes Integration, infinite product and uniform convergence
CO6	Analyze uniform convergence of infinite series of functions and Riemann - Stieltjes integration
CO7	Find the uniform convergence, uniform convergence of infinite series of functions.

PRESCRIBED BOOK

Tom M. Apostol, Mathematical Analysis, Addison Wesley Publishing Company Inc., New York. (II Edition) 2009

REFERENCE BOOKS

1. Malik. S. C. and Savita Arora, Mathematical Analysis, Wiley Eastern Limited, New Delhi. (II Edition) 2005
2. A. L. Gupta and N. R. Gupta, Principles of Real Analysis, Pearson Education, (Indian print), (IV Edition) 2008
3. Sanjay Arora and Bansilal, Introduction to Real Analysis, Satya Prakashan, New Delhi. (III Edition) 2012

4. Rudin. W, Principles of Mathematical Analysis,
McGraw Hill Company, New York. (III Edition) 2013
5. Bartle. R. G., Real Analysis, John Wiley and Sons Inc., (II Edition) 2014

SEMESTER – I
MAJOR PAPER - III
ORDINARY DIFFERENTIAL EQUATIONS
SUBJECT CODE – P1MA23MT

L	T	P	C
6	0	0	4

OBJECTIVES :

Total Hours : 78

- 1.To develop strong background on finding solutions to linear differential equations with constant and variable coefficients and also with singular points.
- 2.To study existence and uniqueness of the solutions of first order differential equations.

UNIT - I : LINEAR EQUATIONS WITH CONSTANT COEFFICIENTS **15hrs**

Second order homogeneous equations-Initial value problems-Linear dependence and independence - Wronskian and a formula for Wronskian -Non-homogeneous equation of order two. Chapter - 2 : Sections 1 to 6 of E. A. Coddington

UNIT - II : LINEAR EQUATIONS WITH CONSTANT COEFFICIENTS **15hrs**

Homogeneous and non-homogeneous equation of order n - Initial value problems- Annihilator method to solve non-homogeneous equation - Algebra of constant coefficient operators. Chapter - 2 : Sections 7 to 12 (Omit section 9) of E. A. Coddington

UNIT - III : LINEAR EQUATION WITH VARIABLE COEFFICIENTS **16hrs**

Initial value problems - Existence and uniqueness theorems - Solutions to solve a non-homogeneous equation - Wronskian and linear dependence - reduction of the order of a homogeneous equation - homogeneous equation with analytic coefficients -The Legendre equation. Chapter - 3 Sections 1 to 8 (Omit section 6 and 9) of E. A. Coddington

UNIT - IV : LINEAR EQUATION WITH REGULAR SINGULAR POINTS **15hrs**

Euler equation - Second order equations with regular singular points -Exceptional cases - Bessel Function.

Chapter 4 : Sections 1 to 5 and 6 to 8 (Omit section 9) of E. A. Coddington

UNIT - V: EXISTENCE AND UNIQUENESS OF SOLUTIONS TO FIRST ORDER EQUATIONS

17hrs

Equation with variable separated - Exact equation - method of successive approximations - the Lipschitz condition - convergence of the successive approximations and the existence theorem. Chapter 5 : Sections 1 to 6 (Omit Sections 7 to 9) of E. A. Coddington.

OUTCOMES:

CO1	Solve a variety of second order differential equations
CO2	Discuss the concept of homogeneous and non-homogeneous equation of order n
CO3	Understand and be able to use various theoretical ideas of linear independence and the Wronskian

CO4	Give series solutions for second order linear differential equations, both at ordinary points and at regular singular points
CO5	Discuss the Existence and uniqueness of solutions to second order equations
CO6	Evaluate Wronskian, Annihilator method to solve non-homogeneous equation
CO7	Evaluate The Legendre equation, Euler equation, Bessel Function

PRESCRIBED BOOK

E. A. Coddington, An introduction to ordinary differential equations
Prentice-Hall of India Ltd., New Delhi. (III Edition) 2012 .

REFERENCE BOOKS

1. Williams E. Boyce and Richard C. DI Prima, Elementary differential equations and boundary value problems, John Wiley and sons, New York. (IX Edition) 2002.
2. George F. Simmons, Differential equations with applications and historical notes, Tata McGraw Hill, New Delhi. (II Edition) 2005.
3. W. T. Reid, Ordinary Differential Equations, John Wiley and Sons, New York. (99th Edition) 2008.
4. B. Rai, D. P. Choudary and H. I. Freedman, A Course in Ordinary Differential Equations, Narosa Publishing House, New Delhi. (II Edition) 2012.
5. N. N. Lebedev, Special functions and their applications, Prentice Hall of India, New Delhi. (II Edition) 2012.
6. M. D. Raisinghania, Advanced Differential Equations, S. Chand & Company Ltd., New Delhi. (V Edition) 2013

**SEMESTER – I
MAJOR PAPER - IV
MECHANICS
SUBJECT CODE – P1MA24MT**

L	T	P	C
6	0	0	4

Total Hours : 78

OBJECTIVES :

- 1.To study mechanical systems under generalized coordinate systems, virtual work, energy and momentum.
- 2.To study mechanics developed by Newton, Langrange, Hamilton Jacobi and Theory of Relativity due to Einstein.

UNIT - I : MECHANICAL SYSTEMS

15 hrs

The Mechanical system - Generalised coordinates - Constraints - Virtual work - Energy and Momentum Chapter 1 : Sections 1.1 to 1.5 of D. T. Greenwood

UNIT - II : LAGRANGE'S EQUATIONS

16 hrs

Derivation of Lagrange's equations- Examples - Integrals of motion.
Chapter 2 : Sections 2.1 to 2.3 (Omit Section 2.4) of D. T. Greenwood

UNIT - III : HAMILTON'S EQUATIONS

15 hrs

Hamilton's Principle - Hamilton's Equation - Other variational principle.
Chapter 4 : Sections 4.1 to 4.3 (Omit section 4.4) of D. T. Greenwood

UNIT - IV : HAMILTON-JACOBI THEORY

15 hrs

Hamilton Principle function - Hamilton-Jacobi Equation - Separability
Chapter 5 : Sections 5.1 to 5.3 of D. T. Greenwood

UNIT - V : CANONICAL TRANSFORMATION

17 hrs

Differential forms and generating functions - Special Transformations - Lagrange and Poisson brackets.

Chapter 6 : Sections 6.1, 6.2 and 6.3 (omit sections 6.4, 6.5 and 6.6) of D. T. Greenwood

OUT COMES :

CO1	Demonstrate the knowledge of core principles in mechanics
CO2	Deriving Lagrange's equations and discuss the integrals of motion
CO3	Discuss the Hamilton's Principle and Hamilton's Equation
CO4	Deriving Hamilton-Jacobi Equation
CO5	Discuss about the special transformations, Lagrange and Poisson brackets
CO6	Find the equation of motion of a particle using Lagrange equation
CO7	Determine the generating function using Poisson brackets

PRESCRIBED BOOK

D. T. Greenwood, Classical Dynamics, Prentice Hall of India, New Delhi. (I Edition) 2008

REFERENCE BOOKS:

1. H. Goldstein, Classical Mechanics, Narosa Publishing House, New Delhi. (II Edition) 2010
2. N. C. Rane and P. S. C. Joag, Classical Mechanics, Tata McGraw Hill, (II Edition) 2010
3. J. L. Synge and B. A. Griffith, Principles of Mechanics, McGraw Hill Book Co., New York. (III Edition) 2015

**SEMESTER – I
ELECTIVE PAPER - I
A. PROBABILITY THEORY
SUBJECT CODE – P1MA25ET**

L	T	P	C
6	0	0	3

Total Hours : 78

OBJECTIVES :

- 1.To introduce axiomatic approach to probability theory.
- 2.To study some statistical characteristics, discrete and continuous distribution functions and their properties, characteristic function and basic limit theorems of probability.

UNIT - I : RANDOM EVENTS AND RANDOM VARIABLES**15hrs**

Random events - Probability axioms - Combinatorial formulae - conditional probability - Bayes Theorem - Independent events - Random Variables - Distribution Function - Joint Distribution - Marginal Distribution - Conditional Distribution - Independent random variables - Functions of random variables.
Chapter 1: Sections 1.1 to 1.7 Chapter 2 : Sections 2.1 to 2.9 of M. Fisz

UNIT - II : PARAMETERS OF THE DISTRIBUTION**15hrs**

Expectation- Moments - The Chebyshev Inequality - Absolute moments - Order parameters - Moments of random vectors - Regression of the first and second types.
Chapter 3 : Sections 3.1 to 3.8 of M. Fisz

UNIT - III : CHARACTERISTIC FUNCTIONS**16hrs**

Properties of characteristic functions - Characteristic functions and moments - semi-invariants - characteristic function of the sum of the independent random variables - Determination of distribution function by the Characteristic function - Characteristic function of multidimensional random vectors - Probability generating functions.
Chapter 4 : Sections 4.1 to 4.7 of M. Fisz

UNIT - IV : SOME PROBABILITY DISTRIBUTIONS**15hrs**

One point , two point , Binomial - Polya - Hypergeometric - Poisson (discrete) distributions - Uniform - normal gamma - Beta - Cauchy and Laplace (continuous) distributions.
Chapter 5 : Section 5.1 to 5.10 (Omit Section 5.11) of M. Fisz

UNIT - V : LIMIT THEOREMS**17hrs**

Stochastic convergence - Bernoulli law of large numbers - Convergence of sequence of distribution functions - Levy-Cramer Theorems - de Moivre-Laplace Theorem - Poisson, Chebyshev, Khintchine Weak law of large numbers - Lindberg Theorem - Lyapunov Theroem - Borel-Cantelli Lemma - Kolmogorov Inequality and Kolmogorov Strong Law of large numbers. Chapter 6 : Sections 6.1 to 6.5, 6.6 to 6.12
(Omit Sections 6.13 to 6.15) of M. Fisz

CO1	Explain the concept of a random event and Express the probability definitions.
CO2	Calculate the expected value and the moments, random variable and function of a random variable.
CO3	Calculate the moments and formulates the Moment Generating Function.
CO4	Define the discrete distributions and solve the problems about these distributions
CO5	Apply Chebyshev's , Khintchine, Kolmogorov and Borel-Cantelli theorem.
CO6	Apply theorems concerning the distributions of functions of random variables and the moment-generating functions.
CO7	Define the principal concepts about probability

PRESCRIBED BOOK

M. Fisz, Probability Theory and Mathematical Statistics,
John Wiley and Sons, New York. (II Edition) 2010

REFERENCE BOOKS

1. V. K. Rohatgi, An Introduction to Probability Theory and Mathematical Statistics, Wiley Eastern Ltd., New Delhi, (I Edition) 2007
2. R. B. Ash, Real Analysis and Probability, Academic Press, New York, (II Edition) 2009

3. S. I. Resnick, A Probability Path, Birhauser, Berlin. (I Edition) 2010.
4. R. Durrett, Probability: Theory and Examples, Duxbury Press, New York .
(II Edition) 2010
5. K. L. Chung, A course in Probability, Academic Press, New York, (III Edition) 2012
6. B. R. Bhat, Modern Probability Theory, New Age International (P) Ltd,
New Delhi. (III Edition) 2014

SEMESTER – I
ELECTIVE PAPER - I
B. MATHEMATICAL PROGRAMMING
SUBJECT CODE – P1MA26ET

L	T	P	C
6	0	0	3

Total Hours : 78

OBJECTIVES :

- 1.This course introduces advanced topics in Linear and non-linear Programming.
2. To study integer programming problem, Dynamic Programming Under Certainty.

UNIT - I : INTEGER LINEAR PROGRAMMING

15hrs

Types of Integer Linear Programming Problems - Concept of Cutting Plane - Gomory's All Integer Cutting Plane Method - Gomory's mixed Integer Cutting Plane method . DYNAMIC PROGRAMMING: Characteristics of Dynamic Programming Problem - Developing Optimal Decision Policy - Dynamic Programming Under Certainty - DP approach to solve LPP. Chapter-7: 7.1 - 7.5 and Chapter-20: 20.1 - 20.5 of J. K. Sharma

UNIT - II : CLASSICAL OPTIMIZATION METHODS

16hrs

Unconstrained Optimization - Constrained Multi-variable Optimization with Equality Constraints - Constrained Multi-variable Optimization with inequality Constraints. NON-LINEAR PROGRAMMING METHODS: Examples of NLPP - General NLPP - Graphical solution - Quadratic Programming - Wolfe's modified Simplex Methods. Chapter-23: 23.1 - 23.4 and Chapter-24: 24.1 - 24.4.2 of J. K. Sharma

UNIT - III : THEORY OF SIMPLEX METHOD

15hrs

Canonical and Standard form of LP - Slack and Surplus Variables - Reduction of any Feasible solution to a Basic Feasible solution - Alternative Optimal solution - Unbounded solution - Optimality conditions - Some complications and their resolutions - Degeneracy and its resolution Chapter-25: 25.1 - 25.4, 25.6-25.9 of J. K. Sharma

UNIT - IV : REVISED SIMPLEX METHOD

15hrs

Standard forms for Revised simplex Method - Computational procedure for Standard form I - comparison of simplex method and Revised simplex Method. BOUNDED VARIABLES LP PROBLEM: The simplex algorithm Chapter-26: 26.1 - 26.4 Chapter-28: 28.1, 28.2 of J. K. Sharma

UNIT - V : PARAMETRIC LINEAR PROGRAMMING

17hrs

Variation in the coefficients c_j , Variations in the Right hand side, b_i . GOAL PROGRAMMING : Difference between LP and GP approach - Concept of Goal Programming - Goal Programming Model formulation - Graphical Solution Method of Goal Programming - Modified Simplex method of Goal Programming. Chapter-29: 29.1 - 29.3. Chapter-8: 8.1 - 8.4, 8.6 and 8.7. of J. K. Sharma(omit chapter 8.5)

OUTCOME:

CO1	Discuss the types of Integer Linear Programming Problems
CO2	Analyze classical optimization methods
CO3	Discuss about the theory of simplex method
CO4	Learning Revised simplex method
CO5	Recognize the importance and value of Operations Research and parametric linear programming in solving practical problems
CO6	Learning integer programming problem, Dynamic Programming Under Certainty
CO7	Know the basics of the Revised simplex method, Parametric Programming problem

PRESCRIBED BOOK

J. K. Sharma, Operations Research Theory and Applications, Macmillan India Ltd., (III Edition) 2011

REFERENCE BOOKS

1. S. S. Rao, Optimization Theory and Applications, Wiley Eastern Ltd., New Delhi, (IV Edition) 2011
2. Beightler. C. D. Phillips, B. Wilde, Foundations of Optimization, Prentice Hall Pvt. Ltd., New York. (II Edition) 2012
3. Hamdy A. Taha, Operations Research, Prentice - Hall of India Private Limited, New Delhi. (VII Edition) 2013
4. F. S. Hillier & J. Lieberman, Introduction to Operation Research, Tata- McGraw Hill Company, New Delhi. (VII Edition) 20

SEMESTER – I
ELECTIVE PAPER - I
C. RELIABILITY AND QUEUEING THEORY
SUBJECT CODE – P1MA27ET

L	T	P	C
6	0	0	3

Total Hours : 78

OBJECTIVES :

1. To study applications of Mathematics.
2. To understand Markovian queueing models and acquire skills in analyzing queueing models..

UNIT - I : RELIABILITY DEFINITION AND FAILURE DATA ANALYSIS 15hrs

Introduction – Definition of Probability – Failure Data – Mean Failure Rate – Mean Time To Failure (MTTF) – Mean Time Between Failure (MTBF) – Graphical Plots.

Chapter-2: 2.1 - 2.2 Chapter-3: 3.2 - 3.6 of Srinath. L. S.

UNIT - II : FAILURE DATA ANALYSIS**15hrs**

Four important points – MTTF in terms of Failure density – Generalization – Reliability in terms of Hazard rate and failure density – MTTF in integral form. Introduction – Definition of Probability – Failure Data – Mean Failure Rate – Mean Time To Failure – Mean Time Between Failure – Graphical Plots. Chapter-3: 3.7 - 3.11 of Srinath. L. S.

UNIT - III : SYTEM RELIABILITY**16hrs**

Introduction – Series Configuration – Parallel Configuration – Mixed Configuration – Application to specific hazard Models – An r out of n structure – Systems not reducible to mixed configuration. Chapter-6: 6.1 - 6.6 and 6.8 of Srinath. L. S.

UNIT - IV : INTRODUCTION TO QUEUEING PROCESS**17hrs**

Measuring system performance – Some general results Simple data book keeping for queues - Poisson process and the exponential distribution – Markovian Property of the exponential distribution. Chapter-1: 1.4 - 1.8 of Donald Gross

UNIT - V : SIMPLE MARKOVIAN BIRTH-DEATH QUEUEING MODELS **15hrs**

Steady state solution for the M / M / 1 model – Methods of solving steady state difference equations – Queues with parallel channels and truncation (M / M / c / K). of Donald Gross

OUTCOMES:

CO1	Establish quality and reliability requirements for suppliers
CO2	Collect field data and find root causes of failures
CO3	Construct models in discrete and continuous time based on Markov Chains
CO4	Understand Markovian queueing models
CO5	Describe and analyze basic Markov queuing models and situations to which they may be applied and apply Markov models for selected applications.
CO6	Understand basic characteristic features of a queuing system and acquire skills in analyzing queuing models.
CO7	Able to specify a given discrete and Markov chain in terms of a transition diagram.

PRESCRIBED BOOK

1. Donald Gross, Carl M. Harris, Fundamentals of Queueing Theory, Wiley India. (for Units IV and V) (IV Edition) 2012
2. Srinath. L. S., Reliability Engineering, East West Press, New Delhi. (for Units I , II and III) (IV Edition) 2013

REFERENCE BOOKS

1. Karlin. S and H. Taylor, A First Course in Stochastic Processes, Academic Press, New York. (II Edition) 2007
2. Cox. D. R. and H. D. Miller, Theory of Stochastic Processes, Methuen, London. (II Edition) 2009
3. Cramer. H. and M. Leadbetter, Stationary and Related Stochastic Processes Wiley, New York.(III Edition) 2013

SEMESTER – II
MAJOR PAPER - V
ALGEBRA - II
SUBJECT CODE – P2MA21MT

L	T	P	C
6	0	0	5

Total Hours : 78

OBJECTIVES :

1. To study applications of Mathematics.
2. To understand Markovian queueing models and acquire skills in analyzing queueing models.

UNIT - I : EXTENSION FIELDS **15hrs**

Extension fields - Transcendence of e . Chapter 5: Section 5.1 and 5.2 of I. N. Herstein

UNIT - II : ROOTS OF POLYNOMIALS **15hrs**

Roots of Polynomials - More about roots Chapter 5: Sections 5.3 and 5.5 of I. N. Herstein

UNIT - III : GALOIS THEORY **16hrs**

Elements of Galois theory – Solvability by radicals. Chapter 5 : Section 5.6 and 5.7 (Lemma 5.7.1, Lemma 5.7.2, Theorem 5.7.1) of I. N. Herstein

UNIT - IV: FINITE FIELDS **15hrs**

Finite fields - Wedderburn's theorem on finite division rings.
Chapter 7: Sections 7.1 and 7.2 of I. N. Herstein

UNIT - V : DIVISION RINGS **17hrs**

A theorem of Frobenius - Integral Quaternions and the Four - Square theorem. Chapter 7
: Sections 7.3 and 7.4 of I. N. Herstein

OUTCOMES:

CO1	Learn about Extension fields and Transcendence of e
CO2	Finding roots of Polynomials on irrational numbers
CO3	Explain the concept of Elements of Galois theory
CO4	Known about Wedderburn's theorem on finite division rings
CO5	Study about integral Quaternions
CO6	Study field extension, roots of polynomials and finite fields
CO7	Develop computation skills in division rings and solvability in radicals

PRESCRIBED BOOK

I. N. Herstein. Topics in Algebra, Wiley Eastern Limited, New Delhi. (II Edition) 2013

REFERENCE BOOKS

1. I. S. Luther and I. B. S. Passi, Algebra, Volume - I Groups (1996); Volume - II Rings, Narosa Publishing House, New Delhi. (II Edition) 2004
2. D. S. Malik, J. N. Mordeson and M. K. Sen, Fundamental of Abstract Algebra, McGraw Hill, (International Edition) New York. (II Edition) 2007
3. B. Bhattacharya, S. K. Jain, and S. R. Nagpaul, Basic Abstract Algebra, Cambridge University Press, (Indian Edition) (II Edition) 2009
4. N. Jacobson, Basic Algebra, Vol. I & II Hindustan Publishing Company, New Delhi. (II Edition) 2012.
5. M. Artin, Algebra, Prentice Hall of India, (II Edition) 2015

SEMESTER – II
MAJOR PAPER - VI
MATHEMATICAL ANALYSIS - II
SUBJECT CODE – P2MA22MT

L	T	P	C
6	0	0	5

Total Hours : 78

OBJECTIVES :

- 1.To introduce measure on the real line, Lebesgue measurability.
- 2.To learn about integrability, Fourier Series and Integrals, in-depth study in multivariable calculus.

UNIT - I : FOURIER SERIES AND FOURIER INTEGRALS

15hrs

Introduction - Orthogonal system of functions - The theorem on best approximation - The Fourier series of a function relative to an ortho normal system - Properties of Fourier Coefficients - The Riesz-Fischer Theorem - The convergence and representation problems in trigonometric series - The Riemann - Lebesgue Lemma - The Dirichlet Integrals - An integral representation for the partial sums of Fourier series - Riemann's localization theorem - Sufficient conditions for convergence of a Fourier series at a particular point - Cesaro summability of Fourier series- Consequences of Fejes's theorem - The Weierstrass approximation theorem
Chapter 11 : Sections 11.1 to 11.15 of Apostol

UNIT - II : MULTIVARIABLE DIFFERENTIAL CALCULUS

15hrs

Introduction - The Directional derivative - Directional derivative and continuity - The total derivative - The total derivative expressed in terms of partial derivatives - The matrix of linear function - The Jacobian matrix - The chain rule - Matrix form of chain rule - The mean - value theorem for differentiable functions - A sufficient condition for differentiability - A sufficient condition for equality of mixed partial derivatives - Taylor's theorem for functions of R_n to R_1
Chapter 12 : Section 12.1 to 12.14 of Apostol

UNIT - III : IMPLICIT FUNCTIONS AND EXTREMUM PROBLEMS

16hrs

Functions with non-zero Jacobian determinants - The inverse function theorem -The Implicit function theorem - Extrema of real valued functions of severable variables - Extremum problems with side conditions. Chapter 13 : Sections 13.1 to 13.7 of Apostol

UNIT – IV: THE LEBESGUE INTEGRAL

Length of open sets and closed sets - Inner and outer measure : Measurable sets - Properties of measurable sets - Measurable functions - Definition and existence of the Lebesgue integral for bounded function. Chapter 11 : Section 11.1 to 11.5 of R. R. Goldberg]

UNIT - V: LEBESGUE INTEGRAL -BOUNDED MEASURABLE FUNCTIONS 17hrs

Properties of the Lebesgue integral for bounded measurable functions - The Lebesgue integral for unbounded functions - Some fundamental theorems - The metric space $L^2[a, b]$ - The integral on $(-\infty, \infty)$ and int plane. Chapter 11 : Section 11.6 to 11.10 of R. R. Goldberg

OUTCOMES:

CO1	Students will be able to describe Properties of Fourier Coefficients and Riemann's localization theorem
CO2	Demonstrate an Understanding of Directional derivative and continuity the total derivative ,Total derivative expressed in terms of partial derivatives
CO3	Learn about implicit function and Extremum Problems
CO4	Finding Inner and outer measure of Measurable sets
CO5	Students known about Properties of the Lebesgue integral for bounded measurable functions
CO6	Evaluate Fourier series and Fourier integral

RECOMMENDED TEXTS

1. Tom M. Apostol, Mathematical Analysis, Addison-Wesley Publishing Company Inc., New York. (II Edition) 2012 (for Units I, II and III)
2. Richard R. Goldberg, Methods of Real Analysis, Oxford & IBH Publishing, New Delhi. (II edition) 2012 (for Unit IV and V)

REFERENCE BOOKS

1. Munroe. M. E. Measure and Integration. Addison-Wesley, Mass. (II Edition) 2010
2. Burkill. J. C. The Lebesgue Integral, Cambridge University Press. (II Edition) 2011
3. Sanjay Arora and Bansilal, Introduction to Real Analysis, Satya Prakashan, New Delhi, (III Edition) 2012
4. Rudin. W. Principles of Mathematical Analysis, McGraw Hill Company, New York, (III Edition) 2013
5. Roydon. H. L. Real Analysis, Macmillan Pub. Company, New York. (IV Edition) 2014
6. Malik. S. C. and Savita Arora. Mathematical Analysis, Wiley Eastern Limited. New Delhi,

SEMESTER-II
MAJOR PAPER - VII
PARTIAL DIFFERENTIAL EQUATIONS
SUBJECT CODE – P2MA23MT

L	T	P	C
5	0	0	4

Total Hours : 65

OBJECTIVES :

1. The aim of the course is to introduce to the students the various types of partial differential equations and how to solve these equations.
2. To learn about the derivation of Laplace and Poisson equation.
3. To learn about Cauchy Problem order equation and solution of PDE.

UNIT - I : PARTIAL DIFFERENTIAL EQUATIONS OF FIRST ORDER 13hrs

Formation and solution of PDE- Integral surfaces - Cauchy Problem order equation - Orthogonal surfaces - First order non-linear - Characteristics - Compatible system - Charpits method. Chapter 0: 0.1 to 0.11(Omit section 0.2 and 0.3) of K. Sankar Rao

UNIT - II : FUNDAMENTALS 13hrs

Introduction-Classification of Second order PDE-Canonical forms-Adjoint operators-Riemann's method. Introduction – Classification of Second Order PDE - Canonical forms – Adjoint Operators _ Riemann's method. Chapter 1 : 1.1 to 1.5 of K. Sankar Rao

UNIT - III : ELLIPTIC DIFFERENTIAL EQUATIONS 13hrs

Derivation of Laplace and Poisson equation - BVP - Separation of Variables - Dirichlet's Problem and Neumann Problem for a rectangle - Solution of Laplace equation in Cylindrical and spherical coordinates - Examples.

Chapter 2 : 2.1 to 2.13(Omit section 2.3,2.4 and 2.8 to 2.10) of K. Sankar Rao

UNIT - IV : PARABOLIC DIFFERENTIAL EQUATIONS 12hrs

Formation and solution of Diffusion equation - Dirac-Delta function - Separation of variables method - Solution of Diffusion Equation in Cylindrical and spherical coordinates - Examples.

Chapter 3 : 3.1 to 3.9(Omit section 3.8 and 3.9) of K. Sankar Rao

UNIT - V : HYPERBOLIC DIFFERENTIAL EQUATIONS 14hrs

Formation and solution of one-dimensional wave equation - canonical reduction - IVP- d'Alembert's solution - IVP and BVP for two-dimensional wave equation - Periodic solution of one-dimensional wave equation in cylindrical and spherical coordinate systems - Uniqueness of the solution for the wave equation - Duhamel's Principle - Examples.

Chapter 4: 4.1 to 4.12(Omit section 4.5 to 4.7 and 4.10) of K. Sankar Rao

OUT COMES:

CO1	Students learn about Cauchy Problem order equation and solution of PDE
CO2	Classify the fundamental Principles of partial differential equations
CO3	Students will able Derivation of Laplace and Poisson equation
CO4	Solve parabolic equations
CO5	Solve hyperbolic differential equations
CO6	Find solution of PDE, Cauchy Problem, Orthogonal surfaces
CO7	Find Solution of Laplace equation in Cylindrical and spherical coordinates, d'Alembert's solution, Uniqueness of the solution for the wave equation

PRESCRIBED BOOK

K. Sankar Rao, Introduction to Partial Differential Equations, Prentice Hall of India, New Delhi. (III Edition) 2011

REFERENCE BOOKS

1. R. C. McOwen, Partial Differential Equations, Pearson Education, New Delhi, (II Edition) 2005
2. R. Dennermeyer, Introduction to Partial Differential Equations and Boundary Value Problems, McGraw Hill, New York, (I Edition) 2008

3. M. D. Raisinghania, Advanced Differential Equations, S. Chand & Company Ltd., New Delhi, (II Edition) 2010
4. I. N. Sneddon, Elements of Partial Differential Equations, McGraw Hill, New Delhi. (II Edition) 2010

SEMESTER-II
MAJOR PAPER - VIII
CALCULUS OF VARIATIONS AND INTEGRAL EQUATIONS
SUBJECT CODE – P2MA24MT

L	T	P	C
5	0	0	4

Total Hours : 65

OBJECTIVES :

1. The aim of the course is to introduce to the students the concept of calculus of variation and its applications.
2. To introduce various types of integral equations and how to solve these equations.

UNIT-I : VARIATIONAL PROBLEMS WITH MOVING BOUNDARIES 13 hrs

The concept of Variation and its properties – Euler's equation – Variational problems for functional – Functionals dependent on higher order derivatives – Functions of several independent variables – Some applications to problems of mechanics- Movable boundary for a functional dependent on two functions – One sided variations

Chapter 1 : 1.1 to 1.7 Chapter 2 : 2.1 to 2.3 of A. S. Gupta

UNIT – II : INTEGRAL EQUATIONS 14 hrs

Introduction – Definition – Regularity conditions – Special kinds of Kernels – Eigen values and eigen functions – Convolution integral – Reduction to a system of algebraic equations – Examples – Fredholm alternative – Examples – An approximation method.

Chapter 1 : 1.1 to 1.5 Chapter 2 : 2.1 to 2.5 of Ram P. Kanwal

UNIT – III : METHOD OF SUCCESSIVE APPROXIMATIONS AND FREDHOLM THEORY 13 hrs

Method of successive approximations – Iterative scheme – Examples – Volterra integral equations – Examples – Some results about the resolvent kernel – The method of solution of Fredholm equation – Fredholm first theorem – Examples.

Chapter 3 : 3.1 to 3.5 Chapter 4 : 4.1 to 4.3 of Ram P. Kanwal

UNIT – IV : APPLICATIONS TO ORDINARY DIFFERENTIAL EQUATIONS 12 hrs

Initial value problems – Boundary value problems – Examples – Singular integral equations – The Abel integral equations - Examples.

Chapter 5 : 5.1 to 5.3 Chapter 8 : 8.1 to 8.2 of Ram P. Kanwal

UNIT- V : INTEGRAL TRANSFORMATION METHODS 13 hrs

Introduction- Fourier transform – Laplace transform- Applications to Volterra integral Equations with convolution – Type Kernels-Examples- Hilbert Transform-Examples

Chapter 9 : 9.1 to 9.7 of Ram P. Kanwal

OUT COMES:

CO1	Learn the concept of Variation and its properties
CO2	Students will be able to recognize Regularity conditions and Special kinds of Kernels

CO3	Apply different methods to solve Integral Equations integral equations
CO4	Students known difference between Initial value problems and Boundary value problems
CO5	Understanding of the concepts of Hilbert Transform
CO6	Evaluate a functional for it's maximality
CO7	Solve an integral equation and find the resolvent kernel

PRESCRIBED BOOK

1. A. S. Gupta, Calculus of Variations with Applications, PHI, New Delhi. (II Edition) 2005 (for Units I and II)
2. Ram P. Kanwal, Linear Integral Equations, Theory and Techniques, Academic Press, New York. (I Edition) 2013 (for Units III, IV and V)

REFERENCE BOOKS

1. Sudir K. Pundir and Rimple Pundir, Integral Equations and Boundary Value Problems, Pragati Prakasam, Meerut. (II Edition) 2010
2. M. D. Raisinghania, Integral Equations and Boundary Value Problems, S. Chand & Co., New Delhi. (V Edition) 2013

**SEMESTER-II
GENERAL STUDIES
HUMAN RIGHTS
SUBJECT CODE – P2HR21GS**

L	T	P	C
2	0	0	2

Total Hours : 26

UNIT I: DEVELOPMENT OF HUMAN RIGHTS

5hrs

Definition of Human Rights – Nature, Content, Legitimacy and Priority – Theories on Human Rights – Historical Development of Human Rights.

UNIT II: INTERNATIONAL COVENANT OF HUMAN RIGHTS

6hrs

International human Right-prescription and Enforcement upto World War II – Human rights and the U. N. O. – Universal Declaration of Human Rights – International Covenant on Civil and political Rights – International. Covenant on Economic, Social and cultural Rights and Optical protocol.

UNIT III: HUMAN RIGHTS DECLARATIONS

5hrs

Human Rights Declarations – U.N. Human Rights Declarations – U.N. Human Commissioner.

UNIT IV: REGIONAL DEVELOPMENTS OF HUMAN RIGHTS**5hrs**

Amnesty International – Human Rights and Helsinki process – Regional Developments – European Human Rights system – African Human Rights system – International Human Rights in Domestic courts.

UNIT V: ISSUES ON HUMAN RIGHTS**5hrs**

Contemporary Issues on Human Rights: Children's Rights – Women's Rights – Dalit's Rights – Bonded labour and wages – Refugees – Capital punishment. Fundamental Rights in the Indian Constitution – Directive principles of State policy – Fundamental Duties – National Human Rights Commission.

Outcomes

CO1	Discuss the importance of Fundamental Rights and the theories of Human Rights Practices in India.
CO2	Analyse the Universal Declaration of Human Rights and compare the Cultural, Economical, political, civil Rights in International perspective.
CO3	Outline the Contemporary issues of children and women rights in India.
CO4	Explain the consumer dispute redressal agencies and significance of consumer protection council.
CO5	Describe the importance of Right to information Act and the role of Appellate Authority in seeking information.
CO6	Understand the historical growth of Human Rights.
CO7	Demonstrate an awareness of international Human rights and contemporary issues.

PRESCRIBED BOOK:

1. Desai, A.R. Violation of Democratic Rights in India
2. Pandey. Constitutional Law
3. Timm. R.W. Working for Justice and Human Rights

REFERENCE BOOKS:

1. International Bill of Human Rights, Amnesty International publication,(1988)
2. Human Rights, Questions and Answers, UNESCO, (1982)
3. Mausice Cranston. What is Human Rights.
4. Human Rights, A selected Bibliography, USIS.
5. J.C. Johari. Human Rights and New World Order
6. G.S Bajwa. Human Rights in India

**SEMESTER-II
ELECTIVE - II**

**A. PROGRAMMING IN C++ WITH PRACTICAL
SUBJECT CODE – P2MA25ET
(Theory 60 marks + Practical 40 Marks)**

L	T	P	C
6	0	0	3

Total Hours : 78

(Theory: Int.15 + Univ. Exam. 45)

(Practical: Int.10 + Univ. Exam. 30)

OBJECTIVES :

1. To impart adequate knowledge on the need of programming languages and problem-solving techniques.
2. To develop an in-depth understanding of functional and logical concepts of C++ Programming
3. To provide exposure to problem-solving through C++ programming.

UNIT – I : PRINCIPLES OF OOP

15hrs

Principles of OOP – Beginning with C++ - Tokens, Expressions and Control Structures.

Chapters : 1 to 3 of E. Balagurusamy

UNIT – II : FUNCTIONS IN C++

15hrs

Functions in C++ - Classes and Objects. Chapters : 4 and 5 of E. Balagurusamy

UNIT - III : CONSTRUCTORS AND DESTRUCTORS

17hrs

Constructors and destructors - Operator Overloading and Type Conversions.

Chapters : 6 and 7 of E. Balagurusamy

UNIT – IV : INHERITANCE

16hrs

Inheritance : Extending Classes - Pointers, Virtual Functions and Polymorphism.

Chapters : 8 and 9 of E. Balagurusamy

UNIT – V: I/O OPERATIONS

15hrs

Managing Console I/O Operations - Working with Files. Chapters : 10 and 11 of E.

Balagurusamy

OUTCOMES:

CO1	Able to understand and design the solution to a problem using object-oriented Programming concepts.
CO2	Able to use proper class protection mechanism to provide security.
CO3	Able to Understand and Apply the concepts of Classes & Objects, friend function, constructors & destructors in program design.
CO4	Able to Design & implement various forms of inheritance, and calling base class constructors.
CO5	Able to Apply & Analyze function/operator overloading, runtime polymorphism, Generic Programming.
CO6	Able to demonstrate the use of virtual functions to implement polymorphism.

PRESCRIBED BOOK:

E. Balagurusamy, Object Oriented Programming with C++, Tata McGraw Hill, New Delhi. (III Edition) 2013

REFERENCE BOOKS:

D. Ravichandran, Programming with C++, Tata McGraw Hill, New Delhi. (II Edition) 2010

COMPUTER LABORATORY PRACTICE EXERCISES
COMPUTER LANGUAGE EXERCISES FOR PROGRAMMING IN C++

1. Write a class to represent a vector (a series of float values). Include member functions to perform the following tasks: To create the vector, To modify the value of a given element, To multiply by a scalar value, To display the vector in the form (10, 20, 30,...). Write a program to test your class.
2. Create a class FLOAT that contains one float data member. Overload all the four arithmetic operators so that they operate on the objects of FLOAT.
3. Write a program which shows the days from the start of year to date specified. Hold the number of days for each month in an array. Allow the user to enter the month and the day of the year. Then the program should display the total days till the day.
4. Write a program to include all possible binary operator overloading using friend function.
5. Write a program to read an array of integer numbers and sort it in descending order. Use read data, putdata, and arraymax as member functions in a class.
6. Write a program to read two character strings and use the overloaded '+' operator to append the second string to the first.
7. Develop a program Railway Reservation System using Hybrid Inheritance and Virtual Function.
8. Using overloaded constructor in a class write a program to add two complex numbers.
9. Create a class MAT of size(m,n). Define all possible matrix operations for MAT type objects.
10. Write a program that determines whether a given number is a prime number or not and then prints the result using polymorphism.
11. Write a program to illustrate the dynamic initialization of constructors.
12. Write a program to illustrate the use of pointers to objects.
13. Write a program to illustrate how to construct a matrix of size m x n .
14. Write a program to arrange the given data in ascending / descending order using various sorting algorithms
15. Write a program to find the biggest /smallest number in the given data using various search algorithms

SEMESTER-II
ELECTIVE - II
B. ALGEBRAIC NUMBER THEORY
SUBJECT CODE – P2MA26ET

L	T	P	C
6	0	0	3

Total Hours : 78

OBJECTIVES :

1. The course aims to provide a study on modules over rings, finite fields, algebraic extensions, number fields .
2. To learn about cyclotomic fields, Noetherian rings and modules and Dedekind rings.

UNIT-I : ALGEBRAIC BACKGROUND

15hrs

Rings and Fields- Factorization of Polynomials - Field Extensions - Symmetric Polynomials - Modules - Free Abelian Groups. Chapter 1: Sec. 1.1 to 1.6 of I. Steward and D.Tall

UNIT-II : ALGEBRAIC NUMBERS

15hrs

Algebraic numbers - Conjugates and Discriminants - Algebraic Integers - Integral Bases - Norms and Traces - Rings of Integers. Chapters 2: Sec. 2.1 to 2.6 of I. Steward and D.Tall

UNIT-III : QUADRATIC AND CYCLOTOMIC FIELDS

16hrs

Quadratic fields and cyclotomic fields : Factorization into Irreducibles : Trivial factorization - Factorization into irreducibles - Examples of non-unique factorization into irreducibles. Chapter 3: Sec. 3.1 and 3.2 ; Chapter 4: Sec. 4.2 to 4.4 of I. Steward and D.Tall

UNIT-IV : EUCLIDEAN DOMAINS

16hrs

Prime Factorization - Euclidean Domains - Euclidean Quadratic fields - Consequences of unique factorization - The Ramanujan -Nagell Theorem. Chapter 4: Sec. 4.5 to 4.9 of I. Steward and D.Tall

UNIT-V : IDEALS

16hrs

Prime Factorization of Ideals - The norms of an Ideal - Non-unique Factorization in Cyclotomic Fields. Chapter 5 : Sec. 5.2 to 5.4 of I. Steward and D.Tall

OUTCOMES:

CO1	Learn rings and factorization of polynomials
CO2	Understand algebraic numbers and conjugates
CO3	Discuss the quadratic fields and cyclotomic fields
CO4	Analyze Euclidean domains
CO5	Know prime factorization of ideals and the norms of an ideal
CO6	Study on modules over rings and finite fields
CO7	Known the algebraic extensions and Dedekind rings

PRESCRIBED BOOK

I. Steward and D. Tall. Algebraic Number Theory and Fermat's Last Theorem
A. K. Peters Ltd., Natick, Mass. (III Edition) 2013

REFERENCE BOOKS

1. P. Ribenboim, Algebraic Numbers, Wiley, New York. (II Edition) 2007
2. Z. I. Bosevic and I. R. Safarevic, Number Theory, Academic Press, New York (II Edition) 2008
3. J. W. S. Cassels and A. Frohlich, Algebraic Number Theory, Academic Press, New York, (II Edition) 2010
4. A. Weil. Basic Number Theory, Springer, New York, (II Edition), 2012.
5. P. Samuel, Algebraic Theory of Numbers, Houghton Mifflin Company, Boston (III Edition) 2013

**SEMESTER-II
ELECTIVE - II
C. OPTIMIZATION TECHNIQUES
SUBJECT CODE – P2MA27ET**

L	T	P	C
6	0	0	3

Total Hours : 78

OBJECTIVES :

1. This course aims to introduce decision theory, PERT, CPM, deterministic and probabilistic inventory systems.
2. To understand queues, replacement and maintenance problems.

UNIT-I : DECISION THEORY

15 hrs

Steps in Decision theory Approach - Types of Decision-Making Environments - Decision Making Under Uncertainty - Decision Making under Risk - Posterior Probabilities and Bayesian Analysis.

Chapter-11 : 11.1 - 11.6 of J. K. Sharma

UNIT-II : PROJECT MANAGEMENT : PERT AND CPM

15 hrs

Basic Differences between PERT and CPM - Steps in PERT/CPM Techniques - PERT/CPM Network Components and Precedence Relationships - Critical Path Analysis - Probability in PERT Analysis.

Chapter-13 : 13.1 - 13.6 of J. K. Sharma

UNIT-III : DETERMINISTIC INVENTORY CONTROL MODELS

16 hrs

Meaning of Inventory Control - Functional Classification - Advantage of Carrying Inventory - Features of Inventory System - Inventory Model building - Deterministic Inventory Models with no shortage - Deterministic Inventory with Shortages Chapter-14 : 14.1 - 14.6 of J. K. Sharma

UNIT-IV : QUEUEING THEORY

16 hrs

Introduction –The structure of a Queueing System- Performance measures of Queueing system - Probabilistic Distribution in Queueing Systems - Classification of Queueing Models - Solution of Queueing Models - Probability Distribution of Arrivals and Departures.

Chapter-16: 16.1-16.6; Appendix 16.A (PP 774-781) of J. K. Sharma

UNIT-V : REPLACEMENT AND MAINTENANCE MODELS

16 hrs

Failure Mechanism of items - Replacement of Items Deteriorates with Time - Replacement of items that fail completely - other Replacement Problems.

Chapter - 17 : 17.1 - 17.5 of J. K. Sharma

OUTCOMES:

CO1	Analysis of decision making under risk
CO2	Students known difference between PERT and CPM
CO3	Finding solution by using Inventory models
CO4	Students understand classification of queueing models
CO5	Finding solution by using replacement problems
CO6	Compute decision theory and critical path analysis
CO7	Calculate probabilistic distribution in queueing systems

PRESCRIBED BOOK

J. K. Sharma, Operations Research Theory and Applications, Macmillan India Ltd., (V Edition) 2014

REFERENCE BOOKS

1. Hamdy. A. Taha, Operations Research Prentice, Hall of India Private Limited, New Delhi. (IX edition) 2010
2. Beightler. C, D. Phillips, B. Wilde, Foundations of Optimization Prentice Hall Pvt. Ltd., New York. (III Edition) 2010
3. Bazaraa, M. S; J. J. Jarvis, H. D. Sharall, Linear Programming and Network flow, John Wiley and sons, New York. (II Edition) 2011
4. Gross. D and C. M. Harris, Fundamentals of Queueing Theory, Wiley and Sons, New York, (IV Edition) 2013

SEMESTER – III
MAJOR PAPER - IX
COMPLEX ANALYSIS - I
SUBJECT CODE – P3MA21MT

L	T	P	C
6	0	0	5

Total Hours : 78

OBJECTIVES :

- 1.To Study Cauchy integral formula, local properties of analytic functions.
- 2.To learn about general form of Cauchy's theorem and evaluation of definite integral and harmonic functions.

UNIT-I : CAUCHY'S INTEGRAL FORMULA**16 hrs**

The Index of a point with respect to a closed curve - The Integral formula - Higher derivatives. Local Properties of Analytic Functions: Removable Singularities - Taylors's Theorem - Zeros and poles - The local Mapping - The Maximum Principle.

Chapter 4 : Section 2 : 2.1 to 2.3; Chapter 4 : Section 3 : 3.1 to 3.4

UNIT-II : THE GENERAL FORM OF CAUCHY'S THEOREM**16 hrs**

Chains and cycles- Simple Continuity - Homology - The General statement of Cauchy's Theorem - Proof of Cauchy's theorem - Locally exact differentials- Multiply connected regions - Residue theorem - The argument principle.

Chapter 4 : Section 4 : 4.1 to 4.7; Chapter 4 : Section 5: 5.1 and 5.2

UNIT-III : EVALUATION OF DEFINITE INTEGRALS AND HARMONIC FUNCTIONS**15 hrs**

Evaluation of definite integrals - Definition of Harmonic function and basic properties - Mean value property - Poisson formula.

Chapter 4 : Section 5 : 5.3 ; Chapter 4 : Sections 6 : 6.1 to 6.3

UNIT-IV : HARMONIC FUNCTIONS AND POWER SERIES EXPANSIONS**16 hrs**

Schwarz theorem - The reflection principle - Weierstrass theorem - Taylor's Series - Laurent series .

Chapter 4 : Sections 6.4 and 6.5 ; Chapter 5 : Sections 1.1 to 1.3

UNIT-V: PARTIAL FRACTIONS AND ENTIRE FUNCTIONS**15 hrs**

Partial fractions - Infinite products - Canonical products - Gamma Function - Jensen's formula - Hadamard's Theorem

Chapter 5 : Sections 2.1 to 2.4 ; Chapter 5 : Sections 3.1 and 3.2

OUT COMES :

CO1	Evaluate line integrals, curve integrals, singularities and determine the values of integrals using residues.
CO2	Apply and understand about limits and to know how they are used in series and problems
CO3	Describe definite integrals and harmonic functions
CO4	Analyze functions of complex variable in terms of continuity, differentiability and analyticity
CO5	Analyze partial fractions and entire functions
CO6	Evaluation of definite integrals and Cauchy's theorem
CO7	Find the gamma function and removable singularities

PRESCRIBED BOOK

Lars V. Ahlfors, Complex Analysis, McGraw Hill Co., New York, (III Edition) 2014.

REFERENCE BOOKS

1. H.A.Presfly, Introduction to complex Analysis, Clarendon Press,Oxford, (II Edition) 1990.
2. J. B. Conway, Functions of one complex variables Springer - Verlag, International student Edition, Naroser Publishing Co. (II Edition) 2002.
3. E. Hille, Analytic function Thorey (2 vols.), Gonm & Co, (II Edition) 1959.
4. M. Heins, Complex function Theory, Academic Press, New York, (II Edition) 1968.
5. S. G. Venkatachalapathy, Complex Analysis, Margham Publications, (I Edition) 2012.
6. Shishir Gupta, Complex Variables, Tata McGrawhill Education Private Limited, (II Edition) 2013.

SEMESTER – III
MAJOR PAPER - X
TOPOLOGY
SUBJECT CODE – P3MA22MT

L	T	P	C
6	0	0	5

Total Hours : 78

OBJECTIVES :

- 1.To study topological spaces, continuous functions, connectedness, compactness.
2. To learn about countability and separation axioms.
3. To Find the compactness and locally compactness

UNIT-I : TOPOLOGICAL SPACES

15 hrs

Topological spaces - Basis for a topology - The order topology - The product topology on $X \times Y$
- The subspace topology - Closed sets and limit points.
Chapter 2 : Sections 12 to 17

UNIT-II : CONTINUOUS FUNCTIONS

15 hrs

Continuous functions - the product topology - The metric topology.
Chapter 2 : Sections 18 to 21

UNIT-III : CONNECTEDNESS

16 hrs

Connected spaces - connected subspaces of the Real line - Components and local connectedness.
Chapter 3 : Sections 23 to 25

UNIT-IV : COMPACTNESS

16 hrs

Compact spaces - compact subspaces of the Real line - Limit Point Compactness - Local Compactness. Chapter 3 : Sections 26 to 29

UNIT-V: COUNTABILITY AND SEPARATION AXIOM

16 hrs

The Countability Axioms - The separation Axioms - Normal spaces - The Urysohn Lemma - The Urysohn metrization Theorem-The Tietz extension theorem. Chapter 4: Sections 30 to 35

OUTCOMES :

CO1	Define and illustrate the concept of topological spaces
CO2	Describe continuous functions, concept of product topology and quotient topology
CO3	Identify the concepts of distance between two sets, connectedness.
CO4	Analyze compactness and separation axioms
CO5	Apply theorem proofs to do variety of examples and counter examples in Topology
CO6	Determine the connectedness of two spaces
CO7	Find the compactness or locally compactness of a topological space

PRESCRIBED BOOK

James R. Munkres, Topology Pearson Education Pvt. Ltd., Delhi.
(Third Indian Reprint) (II Edition) 2015.

REFERENCE BOOKS

1. J. Dugundji , Topology , Prentice Hall of India, New Delhi, 1975.
2. George F.Simmons, Introduction to Topology and Modern Analysis, McGraw Hill Book Co., Indian Edition (II Edition) 2015.
3. J. L. Kelly, General Topology, Van Nostrand, Reinhold Co., New York (I Edition) 2001.
4. L. Steen and J. Subhash, Counter Examples in Topology, Holt, Rinehart and Winston, New York, (II Edition) 2000.
5. S. Willard, General Topology, Addison - Wesley, Mass., (II Edition) 2002.
6. General Topology, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi. (II Edition) 2014.

SEMESTER – III
MAJOR PAPER - XI
DIFFERENTIAL GEOMETRY
SUBJECT CODE – P3MA23MT

L	T	P	C
6	0	0	5

Total Hours : 78

OBJECTIVES :

- 1.This course introduces space curves and their intrinsic properties of a surface and geodesics.
2. To know about the non-intrinsic properties of surfaces are explored.

UNIT-I : SPACE CURVES

16hrs

Definition of a space curve - Arc length - tangent - normal and binormal - curvature and torsion - contact between curves and surfaces - tangent surface - involutes and evolutes - Intrinsic equations - Fundamental Existence Theorem for space curves - Helics.

Chapter I : Sections 1 to 9

UNIT-II : INTRINSIC PROPERTIES OF A SURFACE

15hrs

Definition of a surface - curves on a surface - Helicoids - Metric - families of curves - Intrinsic properties.

Chapter II: Sections 1,2,4,5,7,9

UNIT-III : GEODESICS

16hrs

Geodesics - Canonical geodesic equations - Normal property of geodesics - Existence Theorems - Geodesic parallels Chapter II: Sections 10 to 14

UNIT-IV : GEODESICS (Contd . . .)

15hrs

Geodesics curvature - Gauss - Bonnet Theorem - Gaussian curvature - surface of constant curvature. Chapter II: Sections 15 to 18

UNIT-V : NON INTRINSIC PROPERTIES OF A SURFACE

16hrs

The second fundamental form - Principal curvature - Lines of curvature - Developable - Developable associated with space curves and with curves on surface - Minimal surfaces - Ruled surfaces. Chapter III: Sections 1 to 8.

OUTCOMES:

CO1	Make clear and concise arguments involving basic notions and constructions of 2-dimensional Riemannian geometry, curves and torsion.
CO2	Identification of important types of curves in surfaces, including principal curves, asymptotic curves and geodesics.
CO3	Identification of important types of curves in surfaces and analyze of Geodesics
CO4	Describe Gaussian curvature: The surfaces with constant positive/Negative Gaussian curvature
CO5	Analyze Gaussian and mean curvatures using variety of methods including patch computations, direct calculation of the shape operator
CO6	Evaluate the Geodesics curvatures
CO7	Find space curves and intrinsic properties of a surface.

PRESCRIBED BOOK

T. J. Willmore, An Introduction to Differential Geometry, Oxford University Press, New Delhi. (Indian Print) (30th Edition) 2014.

REFERENCE BOOKS

1. Struik, D. T. Lectures on Classical Differential Geometry, Addison - Wesley, Mass. (IV Edition) 1950.
2. Kobayashi. S. and Nomizu. K. Foundations of Differential Geometry, Interscience Publishers, (II Edition) 1963.
3. Wilhelm Klingenberg: A course in Differential Geometry, Graduate Texts in Mathematics, Springer-Verlag (I Edition) 1978.
4. J. A. Thorpe, Elementary topics in Differential Geometry, Under - graduate Texts in Mathematics, Springer - Verlag (III Edition) 1979.
5. D. Somasundaram, Differential Geometry, Narosa Publishing, Chennai. (III Edition) 2014.

SEMESTER – III
MAJOR PAPER - XII
DISCRETE MATHEMATICS
SUBJECT CODE – P3MA24MT

L	T	P	C
6	0	0	5

Total Hours : 78

OBJECTIVES :

1. This course aims to explore the topics like lattices and their applications in switching circuits, finite fields, polynomials.
2. To get the knowledge of coding theory

UNIT - I : LATTICES**15hrs**

Properties and examples of Lattices - Distributive lattices - Boolean algebras - Boolean polynomials - Minimal Forms of Boolean Polynomials. Chapters : 1 to 4 and 6.

UNIT - II : APPLICATIONS OF LATTICES**15hrs**

Switching Circuits - Applications of Switching Circuits Chapters : 7 and 8.

UNIT - III : FINITE FIELDS**16hrs**

Finite fields Chapter : 13.

UNIT - IV : POLYNOMIALS**16hrs**Irreducible Polynomials over Finite fields - Factorization of Polynomials over Finite fields.
Chapters : 14 and 15.**UNIT - V: CODING THEORY****15hrs**

Introduction to Coding - Linear Codes. Chapters : 16 and 17.

OUTCOMES:

CO1	Get knowledge of Boolean function and partial order relation.
CO2	Describe applications of Lattices
CO3	Get new concept of finite fields
CO4	Understand polynomials
CO5	Get knowledge of coding theory
CO6	Formulate and interpret statements presented in Boolean logic
CO7	Apply the different properties of injections, surjections, bijections and compositions

PRESCRIBED BOOKRudolf Lidl & Gunter Pilz. Applied Abstract Algebra, Springer Verlag, NewYork.
Second Indian Reprint (II Edition) 2010.**REFERENCE BOOKS**

1. A. Gill, Applied Algebra for Computer Science, Prentice Hall Inc., New Jersey. (I Edition) 2012.
2. J. L. Gersting, Mathematical Structures for Computer Science, Computer Science Press, New York. (I Edition) 2014.
3. S. Wiitala, Discrete Mathematics- A Unified Approach, McGraw Hill Book Co. (I Edition) 2015.
4. John B. Fraleigh, A first course in Abstract algebra, (II Edition) 2011.

SEMESTER – III**ELECTIVE PAPER - III****A. TENSOR ANALYSIS AND RELATIVITY THEORY****SUBJECT CODE – P3MA25ET**

L	T	P	C
6	0	0	3

Total Hours : 78

OBJECTIVES :

1. The course aims to introduce vector algebra and vector calculus and special relativity and relativistic kinematics, dynamics and accelerated systems.
2. To know the basics of tensor analysis and tensor calculus.

UNIT-I : TENSOR ALGEBRA**16hrs**Systems of Different orders - Summation Convention - Kronecker Symbols - Transformation of coordinates in S_n - Invariants - Covariant and Contravariant vectors - Tensors of Second Order - Mixed Tensors - Zero Tensor - Tensor Field - Algebra of Tensors - Equality of Tensors -

Symmetric and Skew –symmetric tensors - Outer multiplication, Contraction and Inner Multiplication - Quotient Law of Tensors - Reciprocal Tensor of Tensor - Relative Tensor - Cross Product of Vectors.

Chapter I : I.1 - I.3, I.7 and I.8 and Chapter II : II.1 - II.19

UNIT-II : TENSOR CALCULUS

15hrs

Riemannian Space - Christoffel Symbols and their properties

Chapter III: III.1 and III.2

UNIT-III : TENSOR CALCULUS (Contd . . .)

15hrs

Covariant Differentiation of Tensors - Riemann - Christoffel Curvature Tensor - Intrinsic Differentiation.

Chapter III: III.3 - III.5

UNIT-IV : SPECIAL THEORY OF RELATIVITY

16hrs

Galilean Transformation - Maxwell's equations - The ether Theory - The Principle of Relativity

Relativistic Kinematics : Lorentz Transformation equations - Events and simultaneity - Example - Einstein Train - Time dilation - Longitudinal Contraction - Invariant Interval. Proper time and Proper distance - World line - Example - twin paradox - addition of velocities - Relativistic Doppler effect.

Chapter 7 : Sections 7.1 and 7.2

UNIT-V : RELATIVISTIC DYNAMICS

16hrs

Momentum - Energy - Momentum - energy four vector - Force - Conservation of Energy - Mass and energy - Example - inelastic collision - Principle of equivalence - Lagrangian and Hamiltonian formulations. **Accelerated Systems** : Rocket with constant acceleration - example - Rocket with constant thrust.

Chapter 7 : Sections 7.3 and 7.4

OUTCOMES:

CO1	Understand concept of tensor variables and difference from scalar or vector Variables
CO2	Derive base vectors, metric tensors and strain tensors in an arbitrary coordinate system
CO3	Investigate the Christoffel symbols which provide a concrete representation of the connection of Riemannian geometry in terms of coordinates on the manifold
CO4	Understand Galilean transformation, principle of relativity and relativistic Kinematics
CO5	Understand principle of equivalence and accelerated systems
CO6	Know the basics of tensor analysis and tensor calculus
CO7	Know the basics of relativistic dynamics and special theory of relativity

PRESCRIBED BOOK**For Units I, II and III**

U.C. De, Absos Ali Shaikh and Joydeep Sengupta, Tensor Calculus, Narosa Publishing House, New Delhi, (II Edition) 2014.

For Units IV and V

D. T. Greenwood, Classical Dynamics, Prentice Hall of India, New Delhi, (I Edition) 1985.

REFERENCE BOOKS

1. J. L. Synge and A. Schild, Tensor Calculus, Toronto, (I Edition) 2010.
2. A. S. Eddington. The Mathematical Theory of Relativity, Cambridge University Press, (II Edition) 2010.
3. P. G. Bergman, An Introduction to Theory of Relativity, New York, (I Edition) 2007.
4. C. E. Weatherburn, Riemannian Geometry and the Tensor Calculus, Cambridge, (I Edition) 2008.

SEMESTER – III
ELECTIVE PAPER - III
B. ANALYTIC NUMBER THEORY
SUBJECT CODE – P3MA26ET

L	T	P	C
6	0	0	3

Total Hours : 78

OBJECTIVES :

1. This course introduces arithmetic function and Dirichlet multiplication, averages of arithmetic function, congruence and quadratic residues.
2. To Study Dirichlet characters and analytic properties of Dirichlet L-functions.

UNIT-I : ARITHMETICAL FUNCTION

Arithmetical function and Dirichlet multiplication. Chapter 2

UNIT-II : AVERAGES OF ARITHMETICAL FUNCTION

Averages of Arithmetical function. Chapter 3

UNIT-III : CONGRUENCE

Congruence - Finite Abelian Groups and their characters
Chapter 5 (5.10 and 5.11 Excluded) ; Chapter 6: 6.1 to 6.4

UNIT-IV: FINITE ABELIAN GROUPS

Finite Abelian Groups and their characters (contd. . .) - Dirichlet's theorem on Primes in Arithmetic Progressions Chapter 6: 6.5 to 6.10; Chapter 7: All sections (7.9 Excluded)

UNIT-V: QUADRATIC RESIDUES

Quadratic residues and quadratic reciprocity law. Chapter 9 (9.10 and 9.11 Excluded)

OUTCOMES:

CO1	Learn many of the fundamental theorems in the analytic theory of numbers
CO2	Understand better the distribution of prime numbers
CO3	Know the basic theory of zeta- and L-functions
CO4	Discuss the prime number theorem and the relation between its error term to the location of zeros of the zeta function
CO5	Study Dirichlet characters and analytic properties of Dirichlet L-functions
CO6	Understand the proof of Dirichlet's Theorem
CO7	Apply the analytic number theory techniques and skills in various applications

PRESCRIBED BOOK

Tom Apostol, Introduction to Analytic Number theory, Narosa Publications, New Delhi. (I Edition) 2011.

REFERENCE BOOKS

1. I. Niven and Zuckermann H.S. : An Introduction to the theory of numbers, Wiley Eastern Ltd. (V Edition) 2011.
2. C.Y. Hsiung : Elementary Theory of Numbers, World Scientific Publishing Co. Pvt. Ltd., (I Edition) 1991.
3. W. W. Adams and L. J. Goldstein, Introduction to Number Theory, Prentice Hall Inc. (I Edition) 2001.
4. David M. Burton, Elementary Number Theory, Tata McGraw Hill Education India Pvt. Ltd., (VII Edition) 2012.

SEMESTER – III
ELECTIVE PAPER - III
C. FLUID DYNAMICS
SUBJECT CODE – P3MA27ET

L	T	P	C
6	0	0	3

Total Hours : 78

OBJECTIVES :

1. This course aims to discuss kinematics of fluids in motion.
2. To understand the equations of motion of a fluid, three dimensional flows, two dimensional flows and viscous flows.
3. To Understand the basic principles of fluid dynamics.

UNIT-I : BASICS OF FLUID

Kinematics of Fluids in motion. Real fluids and Ideal fluids - Velocity of a fluid at a point, Stream lines , path lines , steady and unsteady flows- Velocity potential - The vorticity vector- Local and particle rates of changes - Equations of continuity - Worked examples - Acceleration of a fluid - Conditions at a rigid boundary.

Chapter 2. Sections 2.1 to 2.10.

UNIT-II: EQUATIONS OF MOTION OF A FLUID

Pressure at a point in a fluid at rest. - Pressure at a point in a moving fluid - Conditions at a boundary of two inviscid immiscible fluids- Euler's equation of motion - Discussion of the case of steady motion under conservative body forces.

Chapter 3. Sections 3.1 to 3.7

UNIT-III : THREE DIMENSIONAL FLOW

Some three dimensional flows. Introduction- Sources, sinks and doublets - Images in a rigid infinite plane - Axis symmetric flows - stokes stream function

Chapter 4 Sections 4.1 to 4.5 (4.4 Excluded)

UNIT-IV : TWO DIMENSIONAL FLOWS

Meaning of two dimensional flow - Use of Cylindrical polar coordinate - The stream function - The complex potential for two dimensional, irrotational incompressible flow - Complex velocity potentials for standard two dimensional flows - Some worked examples - Two dimensional Image systems - The Milne Thompson circle Theorem.

Chapter 5. Sections 5.1 to 5.8

UNIT-V : VISCOUS FLOWS

Stress components in a real fluid. - Relations between Cartesian components of stress- Translational motion of fluid elements - The rate of strain quadric and principal stresses - Some further properties of the rate of strain quadric - Stress analysis in fluid motion - Relation between stress and rate of strain - The coefficient of viscosity and Laminar flow - The Navier - Stokes equations of motion of a Viscous fluid.

Chapter 8. Sections 8.1 to 8.9

OUTCOMES:

CO1	Define the properties of fluids and classify the fluids
CO2	Apply conservation laws to fluid flow problems in engineering applications and examine the stability of a floating bodies
CO3	Apply Euler's Equation of motion and Bernoulli's equation for flow measuring devices and hydraulic machines
CO4	Analyze a flow field to determine various quantities of interest such as flow rates and heat fluxes
CO5	Understand the concepts of Navier-Stokes equation
CO6	Demonstrate the ability to communicate the results of this detailed fluid flow
CO7	Understanding of the basic principles of fluid dynamics

PRESCRIBED BOOK

F. Chorlton, Text Book of Fluid Dynamics, CBS Publications. Delhi. (I Edition) 2015.

REFERENCE BOOKS

1. R.W.Fox and A. T.McDonald, Introduction to Fluid Mechanics, Wiley. (I Edition) 2015.
2. E. Krause, Fluid Mechanics with Problems and Solutions, Springer, (I Edition) 2005.

3. B.S.Massey, J.W.Smith and A.J.W.Smith, Mechanics of Fluids, Taylor and Francis, New York, (VIII Edition) 2007.
4. P. Orlandi, Fluid Flow Phenomena, Springer Publisher, Kluwer, New York, (I Edition) 2006.
5. T. Petrilă, Basics of Fluid Mechanics and Introduction to Computational Fluid Dynamics, Springer, Berlin, (I Edition) 2008.

SEMESTER – IV
MAJOR PAPER - XIII
COMPLEX ANALYSIS II
SUBJECT CODE – P4MA21MT

L	T	P	C
6	0	0	5

Total Hours : 78

OBJECTIVES :

- 1.To study Riemann Theta Function and normal families, Riemann mapping theorem, Conformal mapping of polygons.
- 2.To get the knowledge of harmonic functions, elliptic functions and Weierstrass Theory of analytic continuation.

UNIT-I : RIEMANN THETA FUNCTION AND NORMAL FAMILIES **16 hrs**

Product development - Extension of $\zeta(s)$ to the whole plane - The zeros of zeta function - Equicontinuity - Normality and compactness - Arzela's theorem - Families of analytic functions - The Classical Definition

Chapter 5 : Sections 4.1 to 4.4 ; Chapter 5 : Sections 5.1 to 5.5

UNIT-II : RIEMANN MAPPING THEOREM **16 hrs**

Statement and Proof - Boundary Behavior - Use of the Reflection Principle. **Conformal mappings of polygons** : Behavior at an angle - Schwarz-Christoffel formula - Mapping on a rectangle. **Harmonic Functions** : Functions with mean value property - Harnack's principle. Chapter 6 : Sections 1.1 to 1.3; Sections 2.1 to 2.3 Section 3.1 and 3.2

UNIT-III : ELLIPTIC FUNCTION **15 hrs**

Simply periodic functions - Doubly periodic functions

Chapter 7 : Sections 1.1 to 1.3 ; Sections 2.1 to 2.4

UNIT-IV : WEIRSTRASS THEORY **15 hrs**

The Weierstrass - p-function - The functions $\zeta(z)$ and - The differential equation - The modular equation - The Conformal mapping by.

Chapter 8 : Sections 1.1 to 1.7

UNIT-V: ANALYTIC CONTINUATION **16 hrs**

The Weierstrass Theory - Germs and Sheaves - Sections and Riemann surfaces - Analytic continuation along Arcs - Homotopic curves - The Monodromy Theorem - Branch points.

Chapter 7 : Sections 3.1 to 3.5

OUT COMES :

CO1	Understand Riemann zeta function and normal families
CO2	Study the Riemann mapping theorem, conformal mappings of polygons and a closer look at harmonic functions
CO3	Know Elliptic functions, simply periodic functions
CO4	Understand Weirstrass theory, the conformal mapping by $\lambda(\tau)$
CO5	Get the knowledge of analytic continuation and the Monodromy theorem
CO6	Evaluation of product development and Riemann mapping theorem
CO7	Find simply periodic functions and analytic continuation along arcs.

PRESCRIBED BOOK

Lars V. Ahlfors, Complex Analysis, McGraw Hill Co., New York, (III Edition) 2014.

REFERENCE BOOKS

1. H.A.Presfly, Introduction to complex Analysis, Clarendon Press,Oxford, (II Edition) 1990.
2. J. B. Conway, Functions of one complex variables Springer - Verlag, International student Edition, Naroser Publishing Co. (II Edition) 2002.
3. E. Hille, Analytic function Thorey (2 vols.), Gonm & Co, (II Edition) 1959.
4. M. Heins, Complex function Theory, Academic Press, New York, (II Edition) 1968.
5. S. G. Venkatachalapathy, Margham Publications, (I Edition) 2012.
6. Shishir Gupta, Complex Variables, Tata McGrawhill Education Private Limited, (II Edition) 2013.

SEMESTER – IV
MAJOR PAPER - XIV
FUNCTIONAL ANALYSIS
SUBJECT CODE – P4MA22MT

L	T	P	C
6	0	0	5

Total Hours : 78

OBJECTIVES:

- 1.To study the details of Banach and Hilbert Spaces.
- 2.To introduce Banach algebras.

UNIT-I : BANACH SPACES**16 hrs**

Definition - Some examples - Continuous Linear Transformations - The Hahn -Banach Theorem
Chapter 9 : Sections 46 to 48

UNIT-II : BANACH SPACES AND HILBERT SPACES**16 hrs**

Open mapping theorem - conjugate of an operator - Definition and some simple properties -
Orthogonal complements - Orthonormal sets
Chapter 9 : Sections 50 and 51 ; Chapter 10 : Sections 52, 53 and 54

UNIT-III : HILBERT SPACE**16 hrs**

Conjugate space H^* - Adjoint of an operator - Self-adjoint operator - Normal and Unitary Operators - Projections
 Chapter 10 : Sections 56,57,58 and 59

UNIT-IV : PRELIMINARIES ON BANACH ALGEBRAS**15 hrs**

Definition and some examples - Regular and single elements - Topological divisors of zero - spectrum - the formula for the spectral radius - the radical and semi-simplicity.
 Chapter 12 : Sections 64 to 69

UNIT-V: STRUCTURE OF COMMUTATIVE BANACH ALGEBRAS**15 hrs**

Gelfand mapping - Applications of the formula $r(x) = \lim_{n \rightarrow \infty} \sqrt[n]{\|x^n\|}$ - Involutions in Banach Algebras - Gelfand-Neumark Theorem.
 Chapter 13 : Sections 70 to 73

OUT COMES:

CO1	Understand continuous linear transformations
CO2	Learn the open mapping theorem and its applications
CO3	Know the relevance of operator theory
CO4	Gain the basic concepts of Banach algebra
CO5	Understand the basic properties of Gelfand mapping
CO6	Determine orthogonality of the given set of vectors
CO7	Find the element in a Hilbert space is regular

PRESCRIBED BOOK

G. F. Simmons, Introduction to topology and Modern Analysis, McGraw Hill International Book Company, New York, (I Edition) 2004.

REFERENCE BOOKS

1. W. Rudin Functional Analysis, Tata McGraw-Hill Publishing Company, New Delhi. (II Edition) 2013
2. G. Bachman & L. Narici, Functional Analysis Academic Press, New York, (II Edition) 2013.
3. H.C. Goffman and G. Fedrick, First Course in Functional Analysis, Prentice Hall of India, New Delhi. (I Edition) 2003.
4. E. Kreyszig Introductory Functional Analysis with Applications, John Wiley & Sons, New York. (I Edition) 2007.

SEMESTER – IV
MAJOR PAPER - XV
MATHEMATICAL STATISTICS
SUBJECT CODE – P4MA23MT

L	T	P	C
6	0	0	5

OBJECTIVES :

Total Hours : 78

1. This course introduces sampling theory, significance tests, estimation, testing of hypotheses.

2.To understand ANOVA and sequential analysis with rigorous mathematical treatment.

UNIT-I: SAMPLE MOMENTS AND THEIR FUNCTIONS

16 hrs

Notion of a sample and a statistic - Distribution functions of X , S^2 and (X, S^2) - χ^2 distribution - Student t-distribution - Fisher's Z - distribution - Snedecor's F - distribution - Distribution of sample mean from non-normal populations. Chapter 9 : Sections 9.1 to 9.8

UNIT-II: SIGNIFICANCE TEST

16 hrs

Concept of a statistical test - Parametric tests for small samples and large samples - χ^2 test - Kolmogorov Theorem 10.11.1 - Smirnov Theorem 10.11.2 - Tests of Kolmogorov and Smirnov type - The Wald-Wolfowitz and Wilcoxon -Mann-Whitney tests - Independence Tests by contingency tables.

Chapter 10 : Sections 10.11; Chapter 11 : 12.1 to 12.7

UNIT-III: ESTIMATION

15 hrs

Preliminary notion - Consistency estimation - Unbiased estimates - Sufficiency - Efficiency - Asymptotically most efficient estimates - methods of finding estimates - confidence Interval.

Chapter 13 : Sections 13.1 to 13.8

UNIT-IV: ANALYSIS OF VARIANCE

15 hrs

One way classification and two - way classification. **Hypotheses Testing:** Power functions - OC function - Most Powerful test - Uniformly most powerful test - unbiased test.

Chapter 15 : Sections 15.1 and 15.2 Chapter 16 : Sections 16.1 to 16.5

UNIT-V: SEQUENTIAL ANALYSIS

16 hrs

SPRT - Auxiliary Theorem - Wald's fundamental identity - OC function and SPRT - $E(n)$ and Determination of A and B - Testing a hypothesis concerning p on 0-1 distribution and m in Normal distribution. Chapter 17 : Sections 17.1 to 17.9

OUT COMES :

CO1	Demonstrate knowledge of statistical models in common use
CO2	Understand the basic principles underlying statistical inference
CO3	Able to construct exact and approximate confidence intervals
CO4	Demonstrate knowledge of applicable large sample theory of estimators and tests
CO5	Be able to testing a hypothesis concerning p on 0-1 distribution
CO6	Analyze Distribution of sample mean from non-normal populations.
CO7	Get a knowledge of find the One way classification and two - way classification

PRESCRIBED BOOK

M. Fisz, Probability Theory and Mathematical Statistics, John Wiley and sons, New York. (III Edition) 1963.

REFERENCE BOOKS

1. E. J. Dudewicz and S. N. Mishra , Modern Mathematical Statistics, John Wiley and Sons, New York. (I Edition) 2008.
2. V. K. Rohatgi An Introduction to Probability Theory and Mathematical Statistics, Wiley Eastern New Delhi. (II Edition) 2013.
3. G. G. Roussas, A First Course in Mathematical Statistics, Addison Wesley Publishing Company. (II Edition) 2007.
4. B. L. Vander Waerden, Mathematical Statistics, G. Allen & Unwin Ltd., London.

SEMESTER – IV
MAJOR PAPER - XVI
DIFFERENCE EQUATIONS
SUBJECT CODE – P4MA24MT

L	T	P	C
6	0	0	5

Total Hours : 78

OBJECTIVES :

- 1.To introduce the process of discretization, Discrete version of Differential Equations, Discrete oscillation and the asymptotic behaviour of solutions of certain class of difference equations for linear cases only.
- 2.To find the Solution of difference equations using z-transforms.
- 3.To understand the system of difference equations .

UNIT-I : LINEAR DIFFERENCE EQUATIONS OF HIGHER ORDER 16hrs

Difference Calculus - General Theory of Linear Difference Equations - Linear Homogeneous Equations with Constant coefficients - Linear non-homogeneous equations - Method of Undetermined coefficients, the method of variation of constants - Limiting behavior of solutions.

Chapter 2: Sections 2.1 to 2.5

UNIT-II : SYSTEM OF DIFFERENCE EQUATIONS 15hrs

Autonomous System - The Basic Theory - The Jordan form - Linear periodic system.

Chapter 3: Section 3.1 to 3.4

UNIT-III : THE Z-TRANSFORM METHOD 16hrs

Definition, Example and properties of Z-transform - The Inverse Z-transform and solution of Difference Equations: Power series method, partial fraction method, the inverse integral method - Volterra Difference Equation of convolution types - Volterra systems.

Chapter 5: Sections 5.1 to 5.5 (5.4 Excluded)

UNIT-IV : ASYMPTOTIC BEHAVIOUR OF DIFFERENCE EQUATION 16hrs

Tools and Approximations - Poincare's Theorem - Second order difference equations - Asymptotic diagonal systems - Higher order Difference Equations.

Chapter 7 : Sections 7.1 to 7.5

UNIT-V : OSCILLATION THEORY**15hrs**

Three-term difference Equation - Non-linear Difference Equations - Self-Adjoint second order equations.

Chapter 8 : Sections 8.1 to 8.3

OUTCOMES:

CO1	Get a knowledge of linear difference Equations of higher order
CO2	Understand system of difference equations
CO3	Analyze Z-transform
CO4	Understand asymptotic behaviour of difference equation
CO5	Analyze oscillation theory
CO6	Solve and apply linear difference equations of second order
CO7	Apply difference equations to significant and theoretical problems

PRESCRIBED BOOK

Saber N. Elaydi, An Introduction to Difference Equations, Springer Verlag, New York. (III Edition) 2005.

REFERENCE BOOKS

1. R. P. Agarwal, Difference Equations and Inequalities, Marcel Dekker. (II Edition) 2000.
2. S. Goldberg, Introduction to Difference Equations, Dover Publications. (II Edition) 2004.

SEMESTER-IV**ELECTIVE - IV****A. NUMBER THEORY AND CRYPTOGRAPHY****SUBJECT CODE – P4MA25ET**

L	T	P	C
6	0	0	3

Total Hours : 78

OBJECTIVES :

1. This course aims to give elementary ideas from number theory which will have applications in cryptology.
2. To get the knowledge of the concepts of cryptography.

UNIT-I : ELEMENTARY NUMBER THEORY**16hrs**

Time Estimates for doing arithmetic - Divisibility and Euclidean algorithm - Congruences - Applications to factoring. Chapter-I

UNIT-II : FINITE FIELDS AND QUADRATIC RESIDUES**15hrs**

Finite fields - Quadratic residues and Reciprocity Chapter-II

UNIT-III : CRYPTOGRAPHY**15hrs**

Some simple crypto systems - Enciphering matrices Chapter-III

UNIT-IV : PUBLIC KEY CRYPTOGRAPHY**16hrs**The idea of public key cryptography - RSA - Discrete log - Knapsack
Chapter-IV : Sections IV.1 to IV.4**UNIT-V : PRIMALITY AND FACTORING****16hrs**

Pseudo primes - The rho method - Fermat factorization and factor bases - The Continued fraction method - The quadratic sieve method. Chapter-V

OUTCOMES:

CO1	Understand the elementary concepts of number theory
CO2	Learn the basic principles of Finite Fields and quadratic Residues.
CO3	Be able to know the concepts of cryptography
CO4	Know the concepts of public key cryptography and RSA cryptosystem
CO5	Understand the Fermat factorization method and quadratic sieve method
CO6	Recognize to determine elementary number theory
CO7	Apply various applications in cryptography

PRESCRIBED BOOK

Neal Koblitz, A Course in Number Theory and Cryptography, Springer-Verlag, New York, (II Edition) 2012.

REFERENCE BOOKS

1. Niven and Zuckermann, An Introduction to Theory of Numbers, Wiley Eastern Ltd., New Delhi, (V Edition) 2011.
2. David M.Burton, Elementary Number Theory, Wm C.Brown Publishers, Dubuque, Iowa, (VII Edition) 2012.
3. K.Ireland and M.Rosen, A Classical Introduction to Modern Number Theory, Springer Verlag, (II Edition) 2010.

SEMESTER-IV
ELECTIVE - IV
B. FUZZY MATHEMATICS
SUBJECT CODE – P4MA26ET

L	T	P	C
6	0	0	3

Total Hours : 78

OBJECTIVES :

- 1.To introduce the basic notions and study the techniques of Fuzzy Mathematics.
- 2.To learn about the making of truth tables by using fuzzy logic.

UNIT - I : FUZZY SETS

Fuzzy sets – Basic Types – Basic concepts – Characteristics – Significance of the paradigm shift – Additional properties of α – cuts.

Chapter 1 : Sections 1.3 to 1.5 and Chapter 2 : Section 2.1

UNIT - II : FUZZY SETS VERSUS CRISP SETS

Representation of Fuzzy sets – Extension principle of Fuzzy sets – Operation on Fuzzy sets – Types of operation – Fuzzy complements.

Chapter 2 : Sections 2.2 and 2.3 and Chapter 3 : Sections 3.1 and 3.2

UNIT - III : OPERATIONS ON FUZZY SETS

Fuzzy intersection – t-norms – Fuzzy unions – t-conorms – Combinations of operations- Aggregation operations. Chapter 3 : Sections 3.3 to 3.6

UNIT - IV : FUZZY ARITHMETIC

Fuzzy number – Linguistic variables – Arithmetic operation on intervals – Lattice of Fuzzy numbers. Chapter 4 : Sections 4.1 to 4.4

UNIT - V : CONSTRUCTING FUZZY SETS

Methods of construction : An overview – Direct methods with one expert – Direct method with multiple experts – Indirect method with multiple experts and one expert – Construction from sample data. Chapter 10 : Sections 10.1 to 10.7

OUTCOMES:

CO1	Students learn difference of Basic types of fuzzy sets and Concepts of fuzzy sets
CO2	Finding Fuzzy complements , Fuzzy intersections , Fuzzy unions on Fuzzy numbers
CO3	Analyze of Fuzzy equivalence relations and Fuzzy morphisms
CO4	Discuss the concept of Fuzzy sets and possibility theory
CO5	Discuss the concept of Multi valued logics
CO6	Knowing the operations on fuzzy sets
CO7	Making the truth tables by using fuzzy logic

PRESCRIBED BOOK

G. J. Klir and Bo Yuan, Fuzzy Sets and Fuzzy Logic : Theory and Applications, PHI, New Delhi, (I Edition) 2010.

REFERENCE BOOKS

1. H. J. Zimmerman, Fuzzy Set Theory and its Applications, Allied Publishers, (I Edition) 2013.

2. A. Kaufman, Introduction to the theory of Fuzzy Subsets, Academic Press, (I Edition) 2011.
3. V. Novak, Fuzzy Sets and their Applications, Adam Hilger, Bristol, (I Edition) 2012.

**SEMESTER-IV
ELECTIVE - IV
C. STOCHASTIC PROCESSES
SUBJECT CODE – P4MA27ET**

L	T	P	C
6	0	0	3

Total Hours : 78

OBJECTIVES :

1. This course aims to introduce advanced topics in Markov process, Markov chains and Renewal theory.
2. To Learn about Brownian motion of system of particles

UNIT - I : STOCHASTIC PROCESSES

Specification of stochastic processes – stationary processes – Markov Chains : Definitions and Examples – Higher transition probabilities – Generalization of independent Bernoulli trials.
Chapter 2 : 2.1 to 2.4; Chapter 3 : 3.1 to 3.1

UNIT - II : MARKOV CHAINS

Stability of Markov system – Graph theoretic approach – Markov chain with denumerable number of state – Reducible chains – Statistical inference for Markov chains. specification of stochastic processes – stationary processes – Markov Chains : Definitions and Examples – Higher transition probabilities – Generalization of independent Bernoulli trials.
Chapter 3 : 3.6 to 3.10

UNIT - III : MARKOV PROCESS WITH DISCRETE STATE SPACE

Poisson process: Poisson process and related distributions – Generalizations of Poisson process – Birth and death process – Markov process with discrete state space (Continuous time Markov chain). Chapter 4 : 4.1 to 4.5

UNIT - IV : MARKOV PROCESS WITH CONTINUOUS STATE SPACE

Brownian motion – Wiener process – Differential equations for Wiener Process – Kolmogorov equations – First passage time distribution for Wiener process.
Chapter 5 : 5.1 to 5.5

UNIT - V : RENEWAL PROCESS AND THEORY

Renewal process and renewal equation – Stopping time – Wald's equation – Renewal theorem – Delayed and equilibrium renewal process.
Chapter 6 : 6.1 to 6.6

OUTCOMES:

CO1	Explain the Markov processes
CO2	Learning about Brownian motion of system of particles
CO3	Solving Stochastic integration problems
CO4	Discuss the concept of Stochastic differential equations and numerical methods
CO5	Understand the basics concept of stochastic processes
CO6	Knowing about Kirsanov's theorem and its applications
CO7	Finding out the various states of a Markov chain

RESCRIBED BOOK

J. Medhi, Stochastic Processes, New Age International Publishers, (III Edition) 2015.

REFERENCE BOOKS

1. S. Karlin, A first course in Stochastic Processes, Academic Press, (II Edition) 2011.
2. U. N. Bhat, Elements of Applied Stochastic Processes, John Wiley Sons, (III Edition) 2002.
3. E. Cinlar, Introduction to Stochastic Processes, PHI, (I Edition) 2013.
4. S. K. Srinivasan and A. Vijayakumar, Stochastic Processes, Narosa, (I Edition) 2003.

ADHIPARASAKTHI COLLEGE OF ARTS & SCIENCE
(Autonomous)

Permanently Affiliated to Thiruvalluvar University, Vellore

Re – accredited by NAAC with ‘B’ Grade (CGPA – 2.83)

M.Phil., MATHEMATICS
Under CBCS

SYLLABUS

(Effective from the Academic Year 2020 - 2021)

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M. Phil., MATHEMATICS
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REGULATIONS

CBCS

Choice-Based Credit System is a flexible system of learning. ‘Credit’ defines the quantum of contents / syllabi prescribed for a course, and determines the number of hours of instruction required. The distinguishing features of CBCS are the following:

It permits the students to:

- ❖ Learn at their own pace
- ❖ Choose electives from a wide range of elective courses offered by the departments of the college.
- ❖ Undergo additional courses and acquire more than the required number of credits
- ❖ Adopt an inter – disciplinary approach in learning
- ❖ Make best use of the expertise of available faculty

1. Eligibility for Admission

Admission to the M.Phil., MATHEMATICS Degree Course shall be made as follows:

Preference

A student who has passed M.Sc. Degree with 55% with MATHEMATICS as Major Subject.

b. The minimum duration for completion of M.Phil., in a discipline is two semesters and the maximum duration is four semesters.

c. The M.Phil., Degree is awarded if a student has

- Registered, undergone and secured the required minimum number of credits for the core and elective courses including dissertation specified in the corresponding programme within the stipulated time;
- Secured the required attendance;
- No dues to the College, Hostel or Library;
- No disciplinary action pending against him/her

4. Structure of the Programme

The M.Phil., Programme consists of :

Core courses which are mandatory for all students.

Elective courses which students can choose from amongst the courses offered within the department of the college.

Dissertation (Mandatory)

5. The distribution of credits will be as below:

- i. Core Courses – Minimum two courses carrying 5 Credits each (10 or more credits)
- ii. Elective carrying 5 Credits each – No minimum.
- iii. Dissertation 21 Credits.

The total number of credits for core and electives shall be 15, consisting of

- 2 Core courses (10 Credits) plus one elective (5 Credits)

The research topic for the dissertation may be finalized even at the beginning of the M.Phil Programme, so that the collection of relevant literature and research design could be completed in the first semester leaving the entire Second Semester for the research work. The course registration for dissertation shall be in the First semester and a separate registration form shall be used for Registration.

6. Evaluation of the dissertation

6.1. The dissertation shall be jointly valued by the supervisor and one external examiner. The external examiner is to be drawn from:

- i. University department or affiliated college with in the city of Vellore; or
- ii. Any accredited institution of higher education and/or research within Tamilnadu.

The viva-voce examination on the dissertation shall be jointly conducted by the supervisor and the external examiner. The distribution of marks shall be as under

- 20% marks for Periodical presentation (to be evaluated and awarded by the supervisor)
- 60% marks for the Dissertation
- 20% marks for viva-voce

6.2. The last date for submission of Dissertation shall be 31st August every year without penalty. Those who do not submit the dissertation in time may be given an extension of a maximum of two months with a penal fee prescribed by the college (i.e. up to 31st October). There shall be no further extension of time beyond this period.

Any student failing to submit the dissertation within this period will be permitted to submit the dissertation only in the next academic year along with the subsequent batch of students.

7. Regulations of M.Phil Programme

The rules and regulation governing course registration, attendance and discipline of students for M.Phil. Programme shall be the same as for the Master's Programme.

8. Evaluation

The process of evaluation, examination, grading, etc for the M.Phil. programme shall be the same as for Master's programme except for the dissertation; However, Final semester students of the M.Phil. should be allowed to appear for examinations in any arrear papers in the month of September/October each year.

Illustration: M.Phil., CUMULATIVE GRADE STATEMENT

Semester and Course	Course Number/ Code	Credits Earned	Marks Secured (Max. 100)	Grade Point	Letter Grade	Result
First Semester						
Core	Algebra and Analysis / M1MA21MT	4	90	6.00	O	PASS
Core	Topology and Differential Equations/ M1MA22MT	4	85	5.50	D	PASS
CORE	Research and Publication Ethics/ M1RE21GS	2	80	5.50	D	PASS
Elective	M1MA23MT	5	75	5.50	O	PASS
Grade Point Average (GPA) / Weighted Average Marks (WAM)		15	68.33	4.85		
Second Semester						
Dissertation and Viva-voce	M2MA21DV	21	64	4.49	A	PASS
Grade Point Average (GPA) / Weighted Average Marks (WAM)		21	64	4.49		
Cumulative Grade Point Average (CGPA) 36 Overall Weighted Percentage Marks (OWPM)			65.81	4.64	A+	First Class

Question paper pattern:

Section – A (300 words)

To Answer 5 questions (either / or pattern)

5 X 6 marks = 30 marks

Section – B (900 words)

To Answer 3 questions out of 5 questions

3 X 15 marks = 45 marks

Total = 75 marks

RESEARCH GOALS

The Department of MATHEMATICS strives to obtain national and international recognition of its faculty by encouraging them to build strong, externally funded research programs. The Department must continue to support opportunities for developments that will bring benefit to the research activities of the department. To maintain and expand our vigorous participation in research, the Department strives to:

1. Be able to apply problem-solving and logical skills
2. Have a deeper understanding of mathematical theory
3. Have a solid knowledge of elementary statistics
4. Be able to communicate mathematical/logical ideas in writing
5. Be competent in computer programming
6. Be familiar with several subfields of mathematics (e.g, numerical analysis, topology, operations research).
7. Be exposed to undergraduate research or internship opportunities

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M.Phil., MATHEMATICS

Under CBCS

(Effective from the Academic Year 2020 - 2021)

The Course of Study and the Scheme of Examinations

Year/ Semester	Subject	Paper	Subject Code	Title of the Paper	Ins. Hrs/ Week	Credit	Exam Hrs	Marks		
								IA	Sem. Exam	Total
I Year/ I Semester	Core	Paper I	M1MA21MT	Algebra and Analysis	6	4	3	25	75	100
	Core	Paper II	M1MA22MT	Topology and Differential Equations	6	4	3	25	75	100
	Core	Paper-III	M1RE21GS	Research and Publication Ethics	2	2	3	25	75	100
	Elective	Guide Paper	M1MA23MT	Guide Paper	6	5	3	25	75	100
I Year/ II Semester	-	-	M2MA21DV	Dissertation with Viva Voce	-	21	-	25	75	100
TOTAL					-	36	-	125	375	500

PSOs	Course Name: M.Phil., Mathematics
PSO1	Read mathematics independently and solve advanced mathematical problems
PSO2	Demonstrate mastery of subject material, as evidenced by quality of performance in coursework, and on written and oral examinations in mathematics
PSO3	Produce and defend an original contribution to knowledge, as evidenced by the writing and defense of a thesis involving significant original research
PSO4	Communicate mathematical ideas, results, context, and background effectively and professionally in written and oral form
PSO5	Effectively communicating research, through journal publications and conference presentations, to the mathematics community
PSO6	Demonstrate the highest standard of ethics in research
PSO7	Apply knowledge of Mathematics, in all the fields of learning including higher research and its extensions

PART I
CORE COURSE I
ALGEBRA AND ANALYSIS
SUBJECT CODE – M1MA21MT

L	T	P	C
6	0	0	5

Total Hours : 78

OBJECTIVES :

- 1.To know the definitions and understand the key concepts introduced in this modules.
- 2.To be able to investigate the properties of modules.
- 3.The concept of a module as a generalization of a vector space and an abelian group.

UNIT-I: RINGS, IDEALS AND MODULES

17Hrs

Rings and ring homomorphisms - Ideals, Quotient rings - Zero-divisors, Nilpotent elements, Units - Prime ideals and maximal ideals - Nilradical and Jacobson radical - Operations on ideals - Extension and contraction - Exercises - Modules and module homomorphisms - Submodules and quotient modules - Operations on submodules - Direct sum and product - Finitely generated modules - Exact sequences - Tensor product of modules - Restriction and extension of scalars - Exactness properties of the tensor product - Algebras - Tensor product of algebras - Exercises.

UNIT-II: RINGS, MODULES OF FRACTIONS AND PRIMARY DECOMPOSITION

15Hrs

Local properties - Extended and contracted ideals in rings of fractions Exercises - Primary Decomposition - Exercises.

UNIT-III: CHAIN CONDITIONS, NOETHERIAN RINGS AND ARTIN RINGS

15Hrs

Chain conditions - Exercises - Primary decomposition in Noetherian rings - Exercises - Artin Rings - Exercises.

UNIT-IV: ABSTRACT INTEGRATION AND L_P – SPACES

15Hrs

The concept of measurability - simple functions - Elementary properties of measures - Integration of positive functions - Integration of complex functions - The role played by sets of measure zero - Convex functions and inequalities - L_P – spaces

UNIT-V: FOURIER TRANSFORMS AND HOLOMORPHIC FOURIER TRANSFORMS

16 Hrs

Formal properties - The Inversion Theorem - the Plancherel Theorem - The Banach algebra L_1 - Introduction - Two Theorems of Paley and Wiener - Quasi - analytic classes - The Denjoy - Carleman theorem.

OUTCOMES:

CO1	Know the definitions and understand the key concepts introduced in this modules
CO2	Be able to investigate the properties of modules

CO3	Knowledge of basic properties of primary decompositions and Noetherian Rings
CO4	The decomposition of an ideal into primary ideals and Cohen-Seidenberg theorems on prime ideals
CO5	Study the Riemann mapping theorem
CO6	Learn the ideas of transformations
CO7	The concept of a module as a generalization of a vector space and an abelian group

TEXT BOOKS:

1. M.F. Atiyah, I.G. Macdonald, Introduction to Commutative Algebra, Addison - Wesley Publishing Company, 1969.

Unit - I Chapter - 1 (pp 1 - 10), Chapter - 2 (pp 17 - 31)

Unit - II Chapter - 3 (pp 36 - 43), Chapter - 4 (pp 50 - 55)

Unit - III Chapter - 6 (pp 74 - 78), Chapter - 7 (pp 80 - 84)

Chapter - 8 (pp 89 - 91)

2. Walter Rudin, Real and Complex Analysis, 3rd Edition, McGraw Hill International, 1986.

Unit - IV Chapter - 1 (pp 5 - 31), Chapter - 3 (pp 61 - 69),

Unit - V Chapter - 9 (pp 178 - 193), Chapter - 19 (pp 371 - 383)

PART I
CORE COURSE II
TOPOLOGY AND DIFFERENTIAL EQUATIONS
SUBJECT CODE – M1MA22MT

L	T	P	C
6	0	0	5

Total Hours : 78

OBJECTIVES :

1. To provide advanced level topological and function.
2. To impact knowledge about connected compactness and axioms in $\mathbb{R}$.

UNIT-I: FUNDAMENTAL GROUP AND COVERING SPACES

15 Hrs

Homotopy - Fundamental group - Covering spaces.

UNIT-II: SIMPLICIAL COMPLEXES

15Hrs

Geometry of Simplicial Complexes - Bary Centric subdivisions - Simplicial approximation Theorem - Fundamental Group of a simplicial Complex.

UNIT-III: LINEAR SYSTEMS

17 Hrs

Uncoupled Linear System - Diagonalization - Exponential operators - The Fundamental Theorem for linear system - Linear System in $\mathbb{R}^2$ - Complex Eigen Values - Multiple Eigen Values - Non Homogeneous Linear System.

UNIT-IV: NON LINEAR SYSTEMS: LOCAL THEORY**15 Hrs**

Some preliminary concepts & definitions - The Fundamental Existence - Uniqueness Theorem - Dependence on Initial Conditions and Parameters - The Maximum Interval of Existence - The Flow Defined by a Differential Equation.

UNIT-V: NON LINEAR SYSTEMS**16 Hrs**

Linearization - The Stable Manifold Theorem - Dynamical Systems and Global Existence Theorems - Limit Sets and Attractors

OUTCOMES:

CO1	Demonstrate an understanding of the concepts of metric spaces and topological spaces
CO2	Learn fundamental Group of a simplicial complex
CO3	Applying techniques for solving first and second order linear system of ordinary differential equations in homogeneous and non-homogeneous
CO4	Identifying the problems and solutions of nth order differential systems
CO5	Knowing methods of Lyapunov stability and Lyapunov functions
CO6	Learn fundamental group and covering spaces
CO7	Understanding various methods for two point boundary value problems

TEXT BOOKS:

1. **I.M. Singer, J.A. Thorpe**, Lecture Notes on Elementary Topology and Geometry, Springer - Verlag, New York, 1967.

Unit - I Chapter - 3 (pp 49 - 77)

Unit - II Chapter - 4 (pp 78 - 108)

2. **L. Perko**, Differential Equation and Dynamical System, Third Edition, Springer – Verlag, New York, 2006.

Unit - III Chapter - 1 (Sections 1.1 to 1.7 and 1.10) (pp 1 - 39, 60 - 63)

Unit - IV Chapter - 2 (Sections 2.1 to 2.5) (pp 65 - 101)

Unit - V Chapter - 2 (Sections 2.6 and 2.7) (pp 101 - 118)

Chapter - 3 (Sections 3.1 and 3.2) (pp 181 - 199)

PART I
CORE COURSE III
GUIDE PAPER
QUEUEING THEORY
SUBJECT CODE –M1MA23MT

L	T	P	C
6	0	0	5

Total Hours : 78

OBJECTIVES :

1. In this course, students will be able to understand the advanced level concepts of Stochastic models in Queueing theory, which is involved in decision making problems.
2. To gain sufficient knowledge in principles of Queueing theory.

UNIT –I : FUNDAMENTALS OF QUEUEING SYSTEM 15 Hrs

Introduction – Queueing System – Basic concepts of Queue – Transient and steady States – Kendal'S Notation for representing Queueing models – Poisson Distribution Formula . chapter 13 : Sections- 13.1 to 13.5

UNIT – II : (M/M/1) : (∞ /FCFS) Model 17 Hrs

Probability distribution of Queue length – Various measures – Average number of units In the system – Average length of queue – Expected waiting time in the system and queue Queue size – Probability of waiting time in the system and queue – simple problems. chapter 13 : Sections- 13.6

UNIT – III : (M/M/S) : (∞ /FCFS) Model 15 Hrs

System of steady state equation – Probability of Steady state distribution of arrivals(n)- Various measures (all without proof) – Length of queue – Length of System- Waiting time In the system and queue – Average number of idle servers – Problems. chapter 13 : Sections- 13.7

UNIT–IV:(M/M/1):(N/FCFS)Model and (M/M/S):(N/FCFS)Model 15 Hrs

Various measures of (M/M/1):(N/FCFS)Model (all without proof) – Problems in the relevant Model -Various measures of (M/M/S):(N/FCFS)Model (all without proof) – Problems in the relevant model. chapter 13 : Sections- 13.8 & 13.9

UNIT–V: STOCHASTIC PROCESSES AND ITS CLASSIFICATION 16 Hrs

Definition – Classification of Stochastic process – Transition probability and its matrix- Markov chain – Definition- Two types of Markov chain – Absorbing Markov chain –Problems. chapter 13 : Sections- 13.10

CO1	Describe networks of queuing systems
CO2	Understand and apply various theoretical distributions
CO3	Describe and analyze basic Markov queuing models
CO4	Apply Markov models for selected applications
CO5	Describe and explain the theory of Markov Chains

CO6	Solving different cases of stochastic processes along with their properties
CO7	Gain sufficient knowledge in principles of Queueing theory

Text Book : Prof . V. Sundaresan, K.S.Ganapathy Subramanian , K.Ganesan , Resource Management Techniques, Sixth Edition , A.R.Publications, Chennai (2012).

Books for Reference : 1. **Kanti swarup, P.k.Gupta & Manmohan, Operations Research ,** Sixteenth Edition, S.Chand & sons , New Delhi (2013).
2. **J.Medhi ,** Stochastic Processes , Third Edition, New age International Publishers, New Delhi (2015).

L	T	P	C
3	0	0	2

SEMESTER – I

Total Hours: 39

RESEARCH AND PUBLICATION ETHICS

SUBJECT CODE: MIRE21GS

OBJECTIVES:

1. To impart knowledge on research problem and finding scientific articles with Internet.
2. To provide the knowledge about the Software tool to identify predatory publications.
3. This course clarify about the Scientific misconducts, Redundant publications, Ethics, database and research merits

THEORY

- **RPE 01: PHILOSOPHY AND ETHICS (3 hrs.)**
 1. Introduction to philosophy: definition, nature and scope, concept, branches
 2. Ethics: definition, moral philosophy, nature of moral judgements and reactions
- **RPE 02: SCIENTIFIC CONDUCT (5hrs.)**
 1. Ethics with respect to science and research
 2. Intellectual honesty and research integrity
 3. Scientific misconducts: Falsification, Fabrication, and Plagiarism (FFP)
 4. Redundant publications: duplicate and overlapping publications, salami slicing
 5. Selective reporting and misrepresentation of data
- **RPE 03: PUBLICATION ETHICS (7 hrs.)**
 1. Publication ethics: definition, introduction and importance
 2. Best practices / standards setting initiatives and guidelines: COPE, WAME, etc.
 3. Conflicts of interest

4. Publication misconduct: definition, concept, problems that lead to unethical behavior and vice versa, types
5. Violation of publication ethics, authorship and contributorship
6. Identification of publication misconduct, complaints and appeals
7. Predatory publishers and journals

PRACTICE

- **RPE 04: OPEN ACCESS PUBLISHING(4 hrs.)**
 1. Open access publications and initiatives
 2. SHERPA/RoMEO online resource to check publisher copyright & self-archiving policies
 3. Software tool to identify predatory publications developed by SPPU
 4. Journal finder / journal suggestion tools viz. JANE, Elsevier Journal Finder, Springer Journal Suggested, etc.
- **RPE 05: PUBLICATION MISCONDUCT (4hrs.)**
 - A. Group Discussions (2 hrs.)**
 1. Subject specific ethical issues, FFP, authorship
 2. Conflicts of interest
 3. Complaints and appeals: examples and fraud from India and abroad
 - B. Software tools (2 hrs.)**
 1. Use of plagiarism software like Turnitin, Urkund and other open source software tools
- **RPE 06: DATABASES AND RESEARCH METRICS (7hrs.)**
 - A. Databases (4 hrs.)**
 1. Indexing databases
 2. Citation databases: Web of Science, Scopus, etc.
 - B. Research Metrics (3 hrs.)**
 1. Impact Factor of journal as per Journal Citation Report, SNIP, SIR, IPP, Cite Score

2. Metrics: h-index, g index, i10 index, altmetrics

Outcomes:

CO1	Overview of research publications, open access, ethics following in research articles
CO2	Methods to identify the Scientific misconducts, Redundant publications Journal finder / journal suggestion tools viz. JANE, Elsevier Journal Finder, Springer
CO3	To impart the knowledge on Use of plagiarism software like Turnitin, Urkund and other open source software tools, calculate the Metrics

**PART I
CORE COURSE III
GUIDE PAPER
ADVANCED FLUID DYNAMICS
SUBJECT CODE –M1MA23MT**

L	T	P	C
6	0	0	5

Total Hours : 78

OBJECTIVES:

- 1.To enable the students to understand the concept of Fluid motion, heat and mass transfer and its applications
2. To gain the knowledge of the concept of heat and mass transfer.

UNIT-I: BASICS OF FLUID

15hrs

Kinematics of Fluids in motion. Real fluids and Ideal fluids - Velocity of a fluid at a point, Stream lines , path lines , steady and unsteady flows- Velocity potential - The vorticity vector- Local and particle rates of changes - Equations of continuity - Worked examples - Acceleration of a fluid - Conditions at a rigid boundary.

Chapter 2. Sections 2.1 to 2.10 of F. Chorlton .

UNIT-II: EQUATIONS OF MOTION OF A FLUID

15 hrs

Pressure at a point in a fluid at rest. - Pressure at a point in a moving fluid - Conditions at a boundary of two inviscid immiscible fluids- Euler's equation of motion - Discussion of the case of steady motion under conservative body forces.

Chapter 3. Sections 3.1 to 3.7 of F. Chorlton

UNIT-III : VISCOUS FLOWS

16 hrs

Stress components in a real fluid. - Relations between Cartesian components of stress- Translational motion of fluid elements - The rate of strain quadric and principal stresses - Some further properties of the rate of strain quadric - Stress analysis in fluid motion - Relation between stress and rate of strain - The coefficient of viscosity and Laminar flow - The Navier - Stokes equations of motion of a Viscous fluid.

Chapter 8. Sections 8.1 to 8. 9 of F. Chorlton

UNIT IV HEAT AND MASS TRANSFER

16hrs

Concept of Heat conduction -Fundamental law of heat conduction - Steady state heat conduction - Unsteady heat conduction - Numerical solutions of heat conduction equations. Laminar heat transfer on a vertical plate and horizontal tube. Diffusion - flat plate with heat and mass transfer - Integrated boundary layer equations of mass transfer - Similarity relations for mass transfer.

Chapter .1 to 5 of John H. Lienhard IV and John H. Lienhard V

UNIT V LAPLACE TRANSFORM

16 hrs

Laplace Transform – Properties of Laplace Transform -Transform of error function -Transform Bessel's function -Transform of Dirac delta function-Inverse Laplace transform-Transformation of unit step function -Solution of partial differential equation.

Chapter 6. Sections 6.1, 6. 3, 6.5-6.10 of K. Sankar Rao.

OUTCOMES:

CO1	Identify importance of various fluid properties at rest and in transit
CO2	Demonstrate use of advanced mathematical methods to analysis fluid flow
CO3	Analysis and utilize solution strategies for a variety of problems
CO4	Learn Viscous flows and its properties
CO5	Understand the concept of heat and mass transfer
CO6	The students are capable of solving various Heat and mass transfer problems using Laplace transform
CO7	Understand the concept of boundary layer theory and flow

RECOMMENDED TEXT

1. F. Chorlton, Text Book of Fluid Dynamics, CBS Publications. Delhi. (I Edition) 2015
for Units I,II and III
2. John H. Lienhard IV and John H. Lienhard V , A Heat Transfer Textbook , Published by J.H. Lienhard V Cambridge, Massachusetts, U.S.A(II Edition)2000
for Unit IV
3. K. Sankar Rao, Introduction to Partial Differential Equations, Prentice Hall of India, New Delhi. (III Edition) 2011
for Unit V

REFERENCES:

1. Gebhart B., "Heat transfer ", McGraw Hill Publishing Co., New York , Second Edition, 1971.
2. Schlichting H., "Boundary Layer Theory", McGraw Hill Publishing Co., Second Edition, 1979.
3. Cengel Y.A., "Heat Transfer", Mc Graw Hill, Second Edition, 2003
4. R.W.Fox and A. T.McDonald, Introduction to Fluid Mechanics, Wiley. (I Edition) 2015.
5. E. Krause, Fluid Mechanics with Problems and Solutions, Springer, (I Edition) 2005.
6. B.S.Massey, J.W.Smith and A.J.W.Smith, Mechanics of Fluids, Taylor and Francis, New York, (VIII Edition) 2007.

PART I
CORE COURSE III
STABILITY THEORY
SUBJECT CODE –M1MA23MT

L	T	P	C
5	0	0	4

Total Hours : 65

OBJECTIVES :

- 1.To provide a basic understanding of the concepts and techniques involved in Lyapunov's stability theory.
2. To learn about the systems with multiple distributed delays.
3. To gain the facility in designing controllers.

UNIT-I: INTRODUCTION TO TIME DELAY SYSTEMS

13Hrs

Introduction – A sample time delay system – Functional differential equations – Stability of time delay systems
[Chapter 1.1 to 1.4]

UNIT-II: SYSTEMS WITH COMMENSURATE DELAYS

13Hrs

Introduction – Some classical stability tests, 2-D stability tests, Pseudo-delay methods, Direct method–Frequency–Sweeping tests–Constant matrix tests.
[Chapter 2.1 to 2.4]

UNIT-III: SYSTEMS WITH SINGLE DELAY

13Hrs

Introduction –Delay–Independent stability criteria based on the Razumikhin theorem, single delay case, Distributed delay case.
[Chapter 5.1 to 5.2]

UNIT-IV: ROBUST STABILITY ANALYSIS

13Hrs

Introduction – Uncertainty characterization – Polytopic Uncertainty, Subpolytopic Uncertainty, Norm– Bounded Uncertainty and Block – Diagonal Uncertainty – Robust stability criteria based on the Razumikhin Theorem.
[Chapter 6.1 to 6.3]

UNIT-V: SYSTEMS WITH MULTIPLE AND DISTRIBUTED DELAYS

13 Hrs

Introduction –Delay–Independent stability criteria of systems with multiple delays– simple delay – Dependent stability criteria of systems with multiple delays.
[Chapter 7.1 to 7.3]

OUTCOMES:

CO1	Understand when and how linearized models can be useful for studying behaviour around equilibrium points
CO2	Master Lyapunov's stability theory and its modern control theoretic extensions
CO3	Know how to investigate stability for linear systems
CO4	Gain facility in designing controllers
CO5	Compute the complete quadratic functional for general linear systems
CO6	Learn the systems with multiple distributed delays
CO7	Analysis the generalized eigen value problem

TEXT BOOK:

1. Kegin Gu Vladimir L.Kharitonov, Stability of Time delay, Edition – 2003.

CORE COURSE III
GUIDE PAPER
STABILITY OF TIME-DELAY SYSTEM
SUBJECT CODE –M1MA23MT

L	T	P	C
6	0	0	5

Total Hours : 78

OBJECTIVES :

- 1.To provide a basic understanding of the concepts and techniques involved in designing control schemes for dynamic systems.
2. To learn about stability concept and linear systems

UNIT-I STABILITY TO TIME-DELAY SYSTEMS**15hrs**

Introduction - Stability concept - Lyapunov-Krasovskii theorem- Razumikhin theorem- Linear systems.

Chapter 1 Sections 1.4 to 1.5 of Kegin Gu.

UNIT-II TIME DOMAIN APPROACH**15hrs**

Introduction-Delay-independent stability criteria based on Razumikhin Theorem-Simple delay-dependent stability criteria based on Razumikhin Theorem-Delay-independent stability based on Lyapunov-Krasovskii stability theorem-Delay-dependent stability criteria using simple Lyapunov-Krasovskii functional.

Chapter 5 Sections 5.1 to 5.5 of Kegin Gu.

UNIT-III ROBUST STABILITY ANALYSIS**16hrs**

Introduction- Uncertainty characterization- Robust stability based on Razumikhin Theorem- Delay independent stability using Lyapunov-Krasovskii functional- Delay-dependent stability using simple Lyapunov-Krasovskii functional.

Chapter 6 Sections 6.1 to 6.5 of Kegin Gu.

UNIT-IV SYSTEMS WITH MULTIPLE AND DISTRIBUTED DELAYS 16hrs

Introduction- Delay-independent stability of systems with multiple delays- Simple delay-dependent stability of systems with multiple delays- Complete quadratic functional for general linear systems.

Chapter 7 Sections 7.1 to 7.4 of Keqin Gu.

UNIT-V LMI & QUADRATIC INTEGRAL INEQUALITIES 16hrs

Basic LMI problem- Generalized Eigenvalue Problem (GEVP)- Transforming nonlinear matrix inequalities to LMI form- S-procedure.

Chapter B Sections B.1 to B.4 of Keqin Gu.

OUTCOMES:

CO1	Learn stability concept and linear systems
CO2	Understand the delay-dependent stability criteria using simple Lyapunov-Krasovskii functional
CO3	Gain uncertainty characterization and robust stability
CO4	Compute the complete quadratic functional for general linear systems
CO5	Analysis the generalized eigen value problem
CO6	Knowledge of concepts from classical control theory
CO7	Analyze dynamic systems for their stability and performance

PRESCRIBED BOOK

1. Keqin Gu, Vladimir L. Kharitonov and Jie Chen, Stability of Time-Delay Systems, Birkhauser Boston, 2003.

ADHIPARASAKTHI COLLEGE OF ARTS & SCIENCE

(Autonomous)

Permanently Affiliated to Thiruvalluvar University, Vellore

Accredited by NAAC with B Grade

Bachelor of Business Administration

Under CBCS

(Effective from the Academic Year 2018-2019)

REGULATIONS

CBCS:

Choice Based Credit System is a flexible system of learning. 'Credit' defines the quantum of contents / syllabi prescribed for a course and determine the number of hours of instruction required. The distinguished features of CBCS are the following:

It permits the students to:

- ❖ Learn at their own pace.
- ❖ Choose electives from a wide range of elective courses offered by the departments of the colleges.
- ❖ Undergo additional courses and acquire more than the required number of credits.
- ❖ Adopt an inter – disciplinary approach in learning
- ❖ Make best use of the expertise of available faculty.

1. Eligibility for Admission:

Candidates seeking admission to the first year of the Degree of Bachelor of Business Administration Course shall be required to have passed the Higher Secondary Examinations (Academic or Vocational Stream) conducted by the Government of Tamilnadu or an Examination accepted.

Provided that candidates for admission into the specific main subject of study shall also process such other qualifying conditions as may be prescribed by the University in the Regulations governing respective courses of study.

The Upper age limit for admission to BBA Degree will be 21 (twenty one) years as on 1st July of the year of admission. For SC/ST/BC/MBC/DNC candidates and women candidates the age limit is relaxed by 3 years. For other communities, the Principals can relax up to three years based on merit. A relaxation of 5 years is permitted for Physically Handicapped as per G.O. Ms No.239, dated 03.09.1993.

2. Eligibility for the Award of Degree:

A candidate shall be eligible for the award of the Degree only if he/she has undergone the prescribed course of study in the College for a period of not less than three academic year and passed the examinations of all the Six Semesters prescribed earning 140 credits (in Parts I, II, III, IV and V)

3. Duration:

- a. Each academic year shall be divided into two semesters. The first academic year shall comprise the first and second Semesters, the second academic year the third semester and fourth semesters and the third academic year the fifth and Sixth semesters respectively.
- b. The odd semesters shall consist of the period from June to November of each year and the even semesters from December to April of each year.
There shall be not less than 90 working days for each semester.

4. Course of Study:

The main subject of the study for Bachelor Degree Course shall consist of the following

PART-I	TAMIL
PART-II	ENGLISH
PART-III	CORE SUBJECTS
	ALLIED SUBJECTS
	ELECTIVE WITH THREE COURSES

PART – IV

1. (a) Those who have not studied Tamil up to XII std. and taken a Non- Tamil Language under Part-I shall take Tamil Comprising of two courses (Level will be at 6th Standard)
- (b) Those who have studied Tamil up to XII Std and taken a Non-Tamil Language under part-I shall take Advanced Tamil Comprising of two courses.
- (c) Others who do not come under a / b can choose non-major elective comprising of two courses.

2. SKILL BASED SUBJECTS (ELECTIVE):

Four courses are to be offered. Let the compulsory papers be accommodated in the second / third year of study for UG Courses.

3. ENVIRONMENTAL STUDIES

4. VALUE EDUCATION

PART- V: EXTENSION ACTIVITIES

**The following assessment procedure will be followed for Internal Marks:
Continuous Internal Assessment (CIA) Test**

S. No	Reg. No	Name	Test I Marks for 75	Test II Marks for 75	Marks for 150	Marks converted to 15	<u>Assignments (5)</u> <u>/;Seminars(5)</u> <u>[10]</u>	Marks for 25	Total Rounded to Marks for 25

Test I : Three hours duration for 75 marks (Two Units of the Syllabus)

Test II : Three hours duration for 75 marks (Total Syllabus)

Total marks 150 (Theory)

Test marks to be converted to : 15 marks

Assignments / Seminars : 10 marks

Total : 25 marks

In the column rounded to 25, any fraction may be rounded to the next number.

6. Requirements for proceeding to Subsequent Semesters:

(i). Candidates shall register their name for the First Semester Examination after the admission in the U.G. Courses.

(ii) Candidates shall be permitted to proceed from the First Semester up to the Final Semester irrespective of their failure in any of the Semester examinations subject to the condition that the candidates should register for all the arrear subject of earlier semesters along the current (subsequent) Semester subjects.

(iii). Candidates shall be eligible to go to subsequent semester, only if they earn, sufficient attendance as prescribed there for by the Academic Council from time to time. provided in case of a candidate earning less than 65 % of attendance in any one of the Semester due to any extraordinary circumstances such as medical grounds, such candidates who shall produce Medical Certificate issued by the Authorized medical

Attendant (AMA), duly certified by principal of the college, shall be permitted to proceed to the next semester and to complete the course of study. Such Candidates shall have to repeat the missed semester by rejoining after completion of Final Semester of the course, after paying the fee for the break of study as prescribed by the College from time to time.

7. Requirement to take the Semester Examinations.

- a). A candidate will be permitted to take the Examination for any Semester, if
- i). He / She secures not less than 75% of attendance out of the 90 instructional days during the semester. [In the case of married women students the minimum attendance requirement shall be 55% of the total instructional days].
 - ii). He / she earns a progress Certificate from the Head of the Institution of having satisfactorily completed the Course of Study prescribed in the subjects as required by the regulations, and
 - iii). His / her conduct has been satisfactory.

Provided that it shall be open to the Academic Council, or any authority delegated with such powers by the Academic Council to grant exemption to a candidate who has failed to earn 75% of the attendance prescribed for any valid reason(s) subject to the usual conditions.

b). A candidates who has secured attendance less than 75% but 65% and above shall be permitted to take the Examination on the recommendation of the Head of the Institution to condone the lack of attendance as well as on the payment of the prescribed fees to the College.

c] A candidate who has secured attendance less than 65% but 55% and above in every semester, as to compensate the shortage of attendance in the subsequent semester besides, earning the required percentage of attendance in that semester and take the examinations of both the semester papers together at the end of the later semester.

d] A candidate who has secured less than 55% of attendance in any semester will not be permitted to take the regular examinations. He/She has to re-do the course after the completion of the final semesters by rejoining the semester in which the attendance is less than 55%.

e] A candidate who has secured less than 65% of attendance in the final semester as to compensate his/her attendance shortage in a manner to be decided by the Head of the Department concerned after rejoining the course.

8. Passing Minimum:

A Candidate shall be declared to have passed the whole Examination, if he/she passes in all the papers and practical wherever prescribed / as per the scheme of examinations by earnings by earning 140 CREDIT in Parts – I, II, III, IV and V. He / She shall also fulfill the extension activities prescribed earning one Credit to quality for the Degree.

In fixing the passing minimum marks, the following will be observed:

- (a). There shall be no Passing Minimum for Internal.
- (b) For External Examination, Passing Minimum shall be of 40 % (Forty percentages) of the maximum marks prescribed for the paper.
- (c) In the aggregate (External + Internal), the passing minimum shall be of 40 % for each paper.
- (d) Grading shall be based on overall marks obtained [Internal + External]

9. Grading System:

Once the marks of the CIA and end-semester examinations for each of the course are available, they will be added. The mark thus obtained will then be graded as per details given below

Marks	Grade Point	Letter Grade	Class
100	7.00	H	First Class with Distinction
90-99	6.00	O	First Class with Distinction
75-89	5.50	D	First Class with Distinction
60-74	4.75	A	First Class
50-59	4.00	B	Second Class
40-49	3.50	C	Third Class
Below 40	3.00	F	Fail

From the second semester onwards, the total performance within a semester and continuous performance starting from the first semester are indicated respectively by **Grade Point Average [GPA]** and **Cumulative Grade Point Average [CGPA]**. These two are calculated by the following formulae:

$$GPA = \frac{\sum_{i=1}^n C_i G_i}{\sum_{i=1}^n C_i}$$

Where 'C_i' is the Credit earned for the Course i in any semester; 'G_i' is the Grade point obtained by the student for the course i and 'n' is the number of courses passed in that semester.

CGPA = GPA of all the courses starting from the first semester to the current semester.

Note: The GPA and CGPA shall be calculated separately for the following three parts:

For purposes of declaring a candidate to have qualified for the Degree of Bachelor of Business Administration in the First Class / Second Class / Third Class or First Class with Distinction, the marks and the Corresponding CGPA earned by the candidate in part III alone will be the criterion, provided he / She has secured the prescribed passing minimum in LCs and ELs.

Grade in Part IV & V Extension shall be shown separately and it shall not be taken into account for classification

10. Classification of successful candidates:

Part-I TAMIL

Successful candidates passing Examination for the Language and securing the marks (i) 60 percent and above and (ii) 50 percent and above but below 60 percent in the aggregate shall be declared to have passed the examination in the First and Second class, respectively. All other successful candidates shall declare to have passed the examination in the Third Class.

PART –II ENGLISH

Successful candidates passing examinations for English and securing the marks (I) 60 percent and above and (ii) 50 percent and above but below 60 percent in the aggregate shall be declared to have passed the examination in the First and Second class respectively. All other successful candidates shall be declared to have passed the examination in Third class

PART – III consisting of CORE SUBJECTS, ALLIED SUBJECTS, ELECTIVES

Successful candidates passing examination for Core courses together and securing the marks (i) 60 percent and above and (ii) 50 percent and above but below 60 percent in the aggregate of the marks prescribed for the Core Courses together shall be declared to have passed the examination in the First and Second Class, respectively. All other successful candidates shall be declared to have passed the examination in the Third Class.

PART – IV (Consisting of sub items 1 (a) (b) and (c), 2, 3, and 4 & 5) as furnished in the Regulation 4 part – IV supra.

PART - V EXTENSION ACTIVITIES

The only credit earned for Part V Extension activities of a Successful Candidate shall not be taken into consideration for Classification / Ranking / Distinction.

11. Ranking:

Candidates who pass all the examinations prescribed for the course in the first appearance itself alone are eligible for Ranking; Provided in the case of Candidates who pass all the examinations prescribed for the course with a break in the First Appearance due to the reasons as furnished in the Regulations 7.[iii] supra are eligible for Classification / Distinction.,

The marks obtained in improvement examinations will not be taken into consideration for ranking.

12. The Medium of Instruction and Examinations:

The medium of instruction and Examinations for the papers under part I and II shall be in the language concerned. For Part III and Part IV the medium of instruction and examination shall be English

13. Improvement of marks in the subjects already passed.

Candidates who have passed in theory paper / papers are allowed to appear again for theory paper / papers only once in order to improve his/her marks, by paying the fee prescribed from time to time. Such candidates are allowed to improve within a maximum period of 10 semesters counting from his/her first semester of his/her admission. If candidate improves his marks, then his improved mark will be taken into consideration for the award of Classification and Distinction only. Such improved marks will not be counted for the award of Prize / Medals and Rank. If the Candidate does not show improvement in the marks, his previous marks will be taken into consideration.

14. Checklist for Inspection

A. Qualification for

UG - Teaching Faculty : as prescribed by the UGC and the University

B. Infrastructure Facilities

- i) Building: Number of classroom with specifications: 3 rooms measuring 20x”25”.
If the class strength is above 50 the space shall be increase by 10 sq.ft, per student.
Number of staff rooms: one measuring 20” x20
- ii). Furniture: One pair of table / chair per student.

PATTERN OF QUESTION PAPER

PART- A(50 Words)

To Answer 10 Questions	10 X 2 Marks	= 20 Marks

PART-B (200 Words)

To Answer 5 Questions (either Or Pattern)	5 X 5 Marks	= 25 Marks

PART-C (500 Words)

To Answer 3 Questions out of 5 questions	3 X 10Marks	= 30 Marks

Total		= 75 Marks

DEPARTMENT OF BUSINESS ADMINISTRATION
I B.B.A (2018-21)

Semester	Part	Subject Code	Title of the Paper	C.I.A		E.S.E		TOTAL MARKS	CREDITS
				MAX MARKS	PASSING MIN	MAX MARKS	PASSING MIN		
I	I	U1LT21FL	TAMIL - I	25	10	75	30	100	3
I	II	U1LE21SL	ENGLISH - I	25	10	75	30	100	3
I	III	U1BA21MT	PRINCIPLES OF MANAGEMENT	25	10	75	30	100	4
I	III	U1BA22MT	BUSINESS STATISTICS-I	25	10	75	30	100	4
I	III	U1BA21AT	BUSINESS ORGANISATION	25	10	75	30	100	5
I	IV	U1ES21GS	ENVIRONMENTAL STUDIES	25	10	75	30	100	2
TOTAL				150	60	450	180	600	21
II	I	U2LT21FL	TAMIL - II	25	10	75	30	100	3
II	II	U2LE21SL	ENGLISH - II	25	10	75	30	100	3
II	II I	U2BA21MT	BUSINESS COMMUNICATION	25	10	75	30	100	4
II	II I	U2BA22MT	BUSINESS STATISTICS-II	25	10	75	30	100	4
II	II I	U2BA21AT	ORGANISATIONAL BEHAVIOUR	25	10	75	30	100	5
II	I V	U2VE21GS	VALUE EDUCATION	-	-	50	20	50	2
TOTAL				125	50	425	170	550	21

II BBA

Semester	Part	Subject Code	Title of the Paper	C.I.A		E.S.E		TOTAL MARKS	CREDITS
				MAX MARKS	PASSING MIN	MAX MARKS	PASSING MIN		
III	III	U3BA21MT	PRODUCTION MANAGEMENT	25	10	75	30	100	4
III	III	U3BA22MT	FINANCIAL ACCOUNTING	25	10	75	30	100	4
III	III	U3BA23MT	STRATEGIC MANAGEMENT	25	10	75	30	100	4
III	III	U3BA24MT	MANAGERIAL ECONOMICS	25	10	75	30	100	4
III	III	U3BA21AT	OFFICE MANAGEMENT	25	10	75	30	100	5
III	IV	U3BA21ST	CUSTOMER RELATIONSHIP MANAGEMENT	25	10	75	30	100	3
III	IV	U3CS21NM	INTRODUCTION TO INFORMATION TECHNOLOGY	25	10	75	30	100	2
TOTAL				175	70	525	210	700	26
IV	III	U4BA21MT	MATERIALS MANAGEMENT	25	10	75	30	100	5
IV	III	U4BA22MT	MANAGEMENT ACCOUNTING	25	10	75	30	100	4
IV	III	U4BA23MT	BUSINESS ENVIRONMENT	25	10	75	30	100	4
IV	III	U4BA24MT	OPERATION RESEARCH	25	10	75	30	100	4
IV	III	U4BA21AT	FINANCIAL MANAGEMENT	25	10	75	30	100	5
IV	IV	U4BA21ST	TOTAL QUALITY MANAGEMENT	25	10	75	30	100	3
IV	IV	U4CS21NM	INTERNET AND ITS APPLICATIONS	25	10	75	30	100	2
TOTAL				175	70	525	210	700	27

III BBA

Semester	Part	Subject Code	Title of the Paper	C.I.A		E.S.E		TOTAL MARKS	CREDITS
				MAX MARKS	PASSING MIN	MAX MARKS	PASSING MIN		
V	III	U5BA21MT	BUSINESS LAW	25	10	75	30	100	5
V	III	U5BA22MT	MARKETING MANAGEMENT	25	10	75	30	100	5
V	III	U5BA23MT	HUMAN RESOURCE MANAGEMENT	25	10	75	30	100	5
V	IV	U5BA24ET	ELECTIVE-I- INTERNATIONAL BUSINESS	25	10	75	30	100	5
		U5BA25ET	ELECTIVE-II- BANKING AND INSURANCE						
V	IV	U5BA25ST	E-BUSINESS	25	10	75	30	100	3
TOTAL				125	50	375	150	500	23
VI	III	U6BA21MT	INDUSTRIAL RELATIONS	25	10	75	30	100	4
VI	III	U6BA22MT	COMPUTER APPLICATIONS IN BUSINESS	25	10	75	30	100	4
VI	III	U6BA23ET	ELECTIVE-I- RESEARCH METHODOLOGY	25	10	75	30	100	5
		U6BA24ET	ELECTIVE-II- MARKETING RESEARCH						
VI	III	U6BA21PV	PROJECT WORK WITH VIVA VOCE	25	10	75	30	100	5
VI	IV	U6BA25ST	ENTREPRENEURIAL DEVELOPMENT	25	10	75	30	100	3
VI	V	U6BA21EA	EXTENSION ACTIVITIES	50	20	-	-	50	1
TOTAL				175	70	375	150	550	22
GRAND TOTAL				925	370	2675	1070	3600	140

SEMESTER –I**PRINCIPLES OF MANAGEMENT**

L	T	P	C
5	0	0	5

SUBJECT CODE: U1BA21MT**Total Hours: 65****OBJECTIVES:**

- 1.To enable the students to understand the managerial functions of an organization.
- 2.To make the students aware of the management concepts and practices thereby enabling them to understand the basic theories and concepts of management.

UNIT-I INTRODUCTION TO MANAGEMENT**(14 Hrs)**

Management-Definition-Nature- Importance-Levels- Management a Science or an Art- Management as a Profession. Managerial roles and Functions- Contribution of experts to management theory.

UNIT-II PLANNING**(13Hrs)**

Planning: Definition-Nature-Importance-Types-Steps in Planning-Objectives-Policies - Procedures and Methods-Nature and types of Policies-Decision making: Process and its types.

UNIT-III ORGANISING**(13 Hrs)**

Organisation-Meaning-Principles-Types of Organization structure-Span of Control-Departmentalisation-Formal and Informal Organization.

UNIT-IV STAFFING**(13Hrs)**

Authority -Difference between authority, power and responsibility-Delegation-Centralisation and decentralisation-Staffing-Sources of recruitment-Selection process.

UNIT-V COORDINATION**(12 Hrs)**

Co-ordination-Need-Types-Techniques-Controlling:Meaning-importance-Process-Motivation-Motivation Theories.

OUTCOMES:

CO1	Describe about Management and the contributions of Management theories.
CO2	Explain the Pros and cons of Planning and knowing the stages of Planning cycle.
CO3	Understanding the types of organization structure and its Departmentalization.
CO4	Classify the underlying concepts of authority, power and responsibility in organization.
CO5	Discussing the techniques of controlling and motivation theories.
CO6	Explain the importance of control as it relates to other managerial functions.
CO7	Outline the control process and discuss the various methods of control available to the manager.

TEXT BOOKS

1. Dr.J.Jayasankar -Principles of Management - Margam Publications, (2nd edition 2013)
2. C.B.Gupta- Business management-Sultan Chand & sons- New delhi(3rd edition 2007)

REFERENCE BOOKS

- 1 P.C. Tripathi & P.N. reddy- Principles of Management- Tata McGraw-hill (3Rd edition 2004)
2. Harold Koontz and O' Donnel- Management concepts & practices-McMillan India Ltd. (2nd edition2000)
3. L.M.Prasad-Essential of management-Sultan Chand & sons- New elhi,(4th edition 2003)
4. Dinkarpagare-Principles of management-S. Chand & sons New delhi (2nd edition 2000)

SEMESTER – I

ALLIED – I BUSINESS STATISTICS - I SUBJECT CODE – U1BA22MT

L	T	P	C
5	0	0	5

Total Hours :65

OBJECTIVES :

1. To study the basic elements of statistics for representing data diagrammatically.
2. To enable the use of statistical, graphical and algebraic techniques wherever relevant.
3. To apply the large and small sample tests for testing significant difference between given data.
- 4.

UNIT –I :DIAGRAMS AND GRAPHS (13 Hrs)

Statistics – Definition – Scope and Limitation – Presentation of Data - Diagrammatic and Graphical Representation of data-Bar diagram,pie diagram-Histogram,frequency polygon and frequency curve-Ogive curve-Lorenz curve-Problems on these.

UNIT – II :MEASURES OF CENTRAL TENDENCY (13 Hrs)

Measures of central tendency – Mean-Median and Mode –GM and HM -Their limitations.

UNIT – III : MEASURES OF DISPERSION (13 Hrs)

Measures of Dispersions – Range – Mean Deviation- Quartile Deviation – Standard Deviation – Coefficient of Variation - Measures of Skewness – Karl Pearson's and Bowley's methods.

UNIT –IV :LARGE SAMPLE TEST (χ^2 -TEST) (13 Hrs)

Chi square distribution-Characteristics and application-Test of goodness of fit-Test of independence attributes-test of homogeneity-problems.

UNIT - V :SMALL SAMPLE TEST (t- test) (13 Hrs)

Small sample test-t test –Test of significance of the mean of a random sample-Testing difference between mean of two samples(Independent)-Testing difference between means of two samples (dependent samples or matched paired observations)-Testing the significance of an observed correlation coefficient.

OUTCOMES :

CO1	Learning about the collection and representation of data
CO2	Finding the Various measures of Central tendency
CO3	Comparing the various sets of data
CO4	Applying the large sample test for given data
CO5	Learning about testing significant difference for a given data
CO6	Representing a statistical data using diagrams graphs
CO7	Studying the various measures of dispersion

TEXT BOOKS:

1. J. K. Sharma -Business Statistics - Pearsons publications (II edition 2007)
2. P. R. Vittal - Business statistics &Mathematics,(3rd edition2012)

REFERENCE BOOKS:

1. R. S. N. Pillai &Bhagavathi - Statistics. ,(3rd edition2011)
2. P.Navaneetham – Business statistics &Mathematics- Pearsons publications- ,(2nd edition2011)

SEMESTER –I

BUSINESS ORGANIZATION

SUBJECT CODE: U1BA21AT

L	T	P	C
6	0	0	4

Total Hours: 78

OBJECTIVES:

1. To enable the students in terms of understanding the various concepts related to business organizations and administrative aspects.
2. Understand modern business practices and functions of various business organizations.
3. To make students understand the Sole trading, Partnership firm and Joint stock companies.

UNIT-I INTRODUCTION TO BUSINESS

(15 Hrs)

Business: Meaning and types - Profession - Meaning and importance of Business Organization. Social responsibilities of Business-Business Ethics.

UNIT-II FORMS OF BUSINESS ORGANISATION

(17 Hrs)

Forms of Business Organization - Sole Trader- Partnership - Joint Hindu Family - Joint Stock Companies - Co-operative Societies - Public Utilities and Public Enterprises. Public Sectors Vs Private sectors.

UNIT-III STOCK EXCHANGE AND FUNCTIONS

(16 Hrs)

Stock Exchange - Functions –Types- Working - Regulations of Stock Exchange in India- Listing of securities - Business combinations - Causes - Types – Effects of Business combinations in India-Online trading, patents, trademarks and copyright.

UNIT-IV SETTING UP NEW BUSINESS UNITS

(17 Hrs)

Setting up a New Enterprise-Business size and location decisions, various factors to be considered for starting a new unit, Government policies- SEZ (Special Economic Zone)- Advantages of large scale operation-Limitations of small scale operations- Industrial Estates-District Industries Centers (DIC's)

UNIT-V TRADE ASSOCIATIONS

(13 Hrs)

Trade Associations - Chamber of Commerce- Functions-Objectives-Working in India.

OUTCOMES:

CO1	Describe the fundamentals of communication its importance and ways to over come communication barriers.
CO2	Outline the layout, kinds of business letter and its essentials to correspond effectively.
CO3	Explain the method of drafting business letters, reports, minutes of meeting and memos.
CO4	Understand various equipments used for oral communication for effective business

	correspondence.
CO5	Discuss how to draft a job application and succeed in group discussions, interviews.
CO6	Develop practical skills and applications of business communication.
CO7	Understand the do's and don'ts in business correspondence.

TEXT BOOKS

1. C.B. Gupta- Business Organisation& Management-Sulthan Chand-New Delhi,(3rd edition 2007)
2. G.D. Balaji, G. Prasad- business Organisation- Margam Publication Chennai,(1st edition 2015)

REFERENCE BOOKS

1. Prakash Jagadeesh- Business Organisation and management, (2nd edition 2000)
2. M.C. Shukla- Business Organisation& Management- Sultan Chand, New Delhi.(1st edition 2006)
3. Y.K.Bhushan- Business Organisation-Sultan Chand, New Delhi, (3rd edition 2003)

SEMESTER –I
ENVIRONMENTAL STUDIES
SUBJECT CODE: U1ES21GS

L	T	P	C
2	0	0	2

Total Hours:26

OBJECTIVES:

1. Students in Environmental Studies are motivated by concern for welfare of the many human and non-human communities that shape this planet.
2. Recognize the interconnectedness of multiple factors in environmental challenges.
3. Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.

UNIT – I

(4 Hrs)

INTRODUCTION TO ENVIRONMENTAL SCIENCES: NATURAL RESOURCES

Environmental Sciences – Significance – Public awareness – Forest resources – Water resources – Mineral resources – Food resources - Environmental impact – fertilizer – Pesticide Problems.

UNIT – II

(6 Hrs)

ECOSYSTEM, BIODIVERSITY AND ITS CONSERVATION

Ecosystem – concept – structure and function – producers, consumers and decomposers – Food chain – Food web – Forest, Grassland, desert and aquatic ecosystem.

Biodiversity – Definition – genetic, species and ecosystem diversity – Values and uses of biodiversity – biodiversity at global, national (India) and local levels – Hotspots, threats to biodiversity – conservation of biodiversity – In-situ & Ex-situ.

UNIT – III

(6 Hrs)

ENVIRONMENTAL POLLUTION AND MANAGEMENT

Environmental Pollution – Causes – Effects and control measures of Air, Water, Marine, soil, solid waste, Thermal, Nuclear pollution and Disaster Management – Floods, Earth quake, Cyclone and Landslides. Role of individuals in prevention of pollution – pollution, Case studies - – Bhopal gas tragedy, Minamata disease, Mercury factory (Kodaikanal), London fog.

UNIT – IV**(5 Hrs)****SOCIAL ISSUES AND ENVIRONMENT**

Urban issues – Energy – water conservation – Environmental Ethics – Global warming – Resettlement and Rehabilitation issues – Environmental legislations – Environmental protection Act. 1986 – Air, Water, Wildlife and forest conservation Act.

UNIT – V**(5 Hrs)****HUMAN POPULATION AND ENVIRONMENT**

Population growth and Explosion – Human rights and Value Education – Environmental Health – HIV/AIDS – Role of IT in Environment and Human Health – Women and child welfare – Public awareness – Case studies. Visit to a local area / local polluted site / local simple ecosystem – Report submission

OUTCOMES:

CO1	Recognize the importance of environment and public awareness required for sustainability.
CO2	Understand the availability of various resources, their availability and conservation.
CO3	Develop knowledge on structure and functions of the ecosystem, productivity and energy flow.
CO4	Comprehend the importance and conservation needs of biodiversity by framing policies.
CO5	Able to link causal effects of human activities and develop mitigation strategies for different pollution.
CO6	Demonstrate an integrative approach to environmental issues
CO7	Demonstrate and ability to integrate the many disciplines and filed that intersect with environmental concerns

Text Books:

1. Kumaraswamy, K. Alagappa Moses, A and M. Vasanthy, (2005), Environmental Studies, Publication Division, Bharathidasan University, Tiruchirappalli.
2. Kumaraswamy, K. (Ed) (2008) GIS for Natural Resources and Disaster Management, Department of Geography, Bharathidasan University, Tiruchirappalli.
3. Rajamannar. Environmental Studies, EVR College Pub, Trichy. 2004.
Kalavathy, S. Environmental Studies, Bishop Heber College Pub., Trichy. 2004.

SEMESTER –II

BUSINESS COMMUNICATION SUBJECT CODE: U2BA21MT

L	T	P	C
6	0	0	5

Total Hours: 65

OBJECTIVES:

1. To familiarize the students with the fundamentals of communication for professional purposes and to enable them in writing and speaking Proficiency.
2. Students to draft a Resume /Curriculum vitae and succeed in group discussions cum interviews.

UNIT-I COMMUNICATION AND BARRIER

(13 Hrs)

Communication-Meaning-Definition-Process-Functions-Objectives-Importance-Essentials of good communication-Communication barriers-Overcoming communication barriers-Types of communication - Merits and demerits – Directions of communication.

UNIT-II BUSINESS LETTER AND TYPES

(13 Hrs)

Business Letters: Need and functions of business letters- Planning and layout of business letter- Kinds of business letters-Essentials of effective correspondence of banking: Transport and Insurance Letters-Sales letters-Circular letters -Government correspondence.

UNIT-III ENQUIRIES AND REPORT WRITING

(13 Hrs)

Enquiries and replies-Placing and fulfilling orders- Complaints and follow-up - Report writing- Drafting reports – Individual and committees- Agenda and Minutes of Meetings-Memos.

UNIT-IV ORAL COMMUNICATION EQUIPMENTS

(13 Hrs)

Medium of Oral communication: Face to face conversation-Teleconferences-Press conference-Demonstration- Radio Recording-Dictaphone-Meetings-Rumor-Demonstration and Dramatisation-Public address system-Grapevine- Effective Presentation – Video conferencing.

UNIT-V BUSINESS COMMUNICATION APPLICATIONS

(13 Hrs)

Business Communication Applications: Letter of application for a job- Job application: Important aspects- Resume Format: Do's and Don'ts- CV Model- Group Discussion-Interview- Guidelines to prepare for an interview- Types of Interview.

OUTCOMES:

CO1	Describe the fundamentals of communication its importance and ways to overcome communication barriers.
CO2	Outline the layout, kinds of business letter and its essentials to correspond

	effectively.
CO3	Explain the method of drafting business letters, reports, minutes of meeting and memos.
CO4	Understand various equipments used for oral communication for effective business correspondence.
CO5	Discuss how to draft a job application and succeed in group discussions, interviews.
CO6	Develop practical skills and applications of business communication.
CO7	Understand the do's and don'ts in business correspondence.

TEXT BOOKS

1. N.S.Raghunathan&B.Santhanam- Business Communication - Margham Publications, (Third Edition 2009)
2. B.N.Tandon, Manual of Office Management and Correspondence,S.Chand& Co., Ltd., New Delhi, (Second Edition, 2008).

REFERENCE BOOKS

1. Pattanshethy-Essential of Business Communication,(first edition,2004)
2. Rajendrapaul-Business Communication, Sultan Chand & Sons, (2nd edition 1983)

SEMESTER – II
ALLIED – II
BUSINESS STATISTICS - II
SUBJECT CODE – U2BA22MT

L	T	P	C
5	0	0	5

Total Hours :65

OBJECTIVE :

1. To understand the relationship between two variables and to test the significant difference between two sets of data.
2. To develop the students ability to deal with numerical and quantitative issues in business
3. To have a proper understanding of Statistical applications in Management.

Unit -I : THE VARIANCE RATIO TEST (F-test) AND Z-test (13 Hrs)

F-test- Assumptions- Applications of F-test- Problems-Z-test- Test the significance of Correlation-Finding the standard error-Simple problems.

Unit –II :ANALYSIS OF VARIANCE (ANOVA) (13 Hrs)

Analysis of Variance-Assumptions-One way classification-Two way classification-Problems on these.

Unit -III : CORRELATION (14 Hrs)

Correlation - Scatter Diagram - Karl Pearson's Correlation - Concurrent Deviation Method – Rank Correlation - Uses of Correlation in business - Regression - Regression Lines - Regression Coefficients- Properties of Regression Coefficients - Uses of Regression in Business Problems.

Unit – IV : TIME SERIES (13 Hrs)

Time Series - Components Of time series – Measurement of Trend – Semi Average Method – Moving Average method- Method of Least Squares – Measurement of Seasonal Variations – Simple Average Method- Ratio to Moving Average Method.

Unit - V : INDEX NUMBER (12 Hrs)

Index Numbers – Weighted and Un weighted Index Numbers - Cost of Living Index Number- Test on Index Numbers.

OUTCOMES:

CO1	Analyzing about the variance using F- test
CO2	Knowing about ANOVA technique
CO3	Finding the relationship between the two sets of data
CO4	Drawing the trend line for a given data
CO5	Computing the various types of index numbers
CO6	finding out the significant difference between variances of two samples
CO7	Calculating the Seasonal variation for a given data

TEXTBOOKS

1. J. K. Sharma-Business Statistics- Pearsons publications,(II edition),2007
- 2.R.S.N.Pillai &Bhagavathi – Statistics. S.Chand and Company Ltd.,Newdelhi (1st edition1991):.

REFERENCEBOOKS

- 1.P.Navaneetham – Business statistics &Mathematics S.Chand and Company Ltd.,Newdelhi (2nd edition1995):.
- 2.P. R. Vittal - Business statistics &Mathematics- Pearsons publications,(II edition),2000

SEMESTER –II

ORGANISATIONAL BEHAVIOUR

SUBJECT CODE : U2BA21AT

L	T	P	C
6	0	0	4

Total Hours: 78

OBJECTIVES:

1. To enable the students to gain insights into the concepts that go into the making of a successful organization.
2. To enable the students to learn the various concepts related to how employees tend to behave in an organization.
3. To help the students to develop cognizance of the importance of human behavior.

Unit-I INTRODUCTION TO ORGANIZATIONAL BEHAVIOUR (16 Hrs)

Organizational behavior – Meaning – Importance-Organization as a social system-factors influencing organizational behavior-Meaning of individual-Individual Differences- personality-stages of personality development-determinants of personality-learning-perception –factors influencing perception-values-attitudes-attitude formation-role behavior.

Unit-II GROUP DYNAMICS (16 Hrs)

Meaning of group and group dynamics-reasons for the formation of groups-characteristics of groups-Group dynamic theories -types of groups in organization-group cohesiveness-factor influencing group cohesiveness-group decision making process.

Unit-III LEADERSHIP (15 Hrs)

Leadership concept - characteristics - leadership theories–leadership styles-leadership effectiveness.

Unit-IV CHANGE MANAGEMENT (16 Hrs)

Management of change: meaning-importance-resistance to change-causes-dealing with resistance to change- concepts of social change and organizational causes-factors contributing to organizational change-change agents-organizational development-Meaning and process.

Unit-V ORGANISATIONAL CULTURE (15 Hrs)

Organizational culture-concept-distinction between organizational culture and organizational climate-factors influencing organizational culture-morale-concept and types-managing conflict-organizational effectiveness.

OUTCOMES:

CO1	Understand the basic concepts of organization behavior and different stages of personality development.
CO2	Explain about group, its types, behavior, dynamics and group decision making.
CO3	Discuss the qualities, styles, theories and effectiveness of leadership.
CO4	Describe the concepts and importance of organization change and resistance to change.
CO5	List the Insight about organization culture, climate, conflict and organization effectiveness.
CO6	Demonstrate leadership skills at work and help to manage emotions inside the organisation
CO7	Understand factors influencing perception, values, attitudes and attitude formation in an organization.

TEXT BOOKS

1. Dr.J.Jayasankar- Organizational Behaviour- Margham Publications,(1st Edition 2017)

REFERENCE BOOKS

1. Aswathappa.K-Organizational Behaviour-HPH,Bombay by Himalaya Publishing house, (First Edition 2009)
2. S.S. Khanka- Organisational Behaviour- sulthan chand publications (Second Edition 2010)

SEMESTER –II
VALUE EDUCATION

SUBJECT CODE: U2VE21GS

L	T	P	C
2	0	0	2

Total Hours: 26

OBJECTIVES:

1. The aim of the subject is to educate the values of family, society, cultivate the personal skills & to motivate on positive thinking.
2. Understand the benefits and obstacles of self acceptance.
3. Positive thinking and positive imaging.

UNIT – I

(6 Hrs)

INTRODUCTION AND OUTLINE OF VALUE EDUCATION

Value education – Definition and Scope. Family Values – Responsibility of family, Status of Women in family and society, Caring for needy and elders. Ethical Values – Mass and media Ethics in family. Influence of Ethics in Family. Issue of globalization – Modern warfare, Terrorism, Mutual respect of different cultures and religions.

UNIT – II

(5 Hrs)

PERSONAL SKILLS

Self Esteem – Definition, Factors influencing Self Esteem, Qualities of high and low self esteem. Self Concept- Definition, Characteristics of self concept. Role of self concept in Personal growth. Self acceptance – Definition, Benefits and obstacles of self acceptance.

UNIT –III

(5 Hrs)

POSITIVE THINKING, MOTIVATION AND PERSONALITY DEVELOPMENT

Positive thinking- Definition, Positive and Negative Attitude, Power of Positive thinking, Positive imaging. Motivation – Definition, Difference between Inspiration and Motivation, Internal and External Motivation. Demotivation, Demotivating factors. Personality Development – Definition, characteristics and elements of personality, Development of Personality.

UNIT – IV

(5 Hrs)

COPING AND DEVELOPING COPING MECHANISM

Coping – Definition, Positive and Negative Coping, kinds of coping, Typical responses to coping. Shyness – Definition, types and symptoms of shyness. How to overcome shyness. Depression – Definition, symptoms, causes and impact of Depression, How to overcome Depression. Failure – Definition, coping with failure, Developing Competence.

UNIT – V**(5 Hrs)****LEADERSHIP TEAMWORK AND WORK ENVIRONMENT**

Leadership – Definition, characteristics of leadership, various kinds of leaders, factors influencing leadership styles. Characteristics of successful leader. Teamwork – Definition, Characteristics of Teamwork, Team learning. Life skills required for work environment and ways to build a better work environment.

OUTCOMES:

CO1	Understand the influence of ethics in family.
CO2	Characteristics self concept and personal growth.
CO3	Characteristics and elements of personality development.
CO4	Depression, symptoms, causes and impact.
CO5	Characteristics of successful leader and team work.
CO6	Life skill required for better work environments.
CO7	How to overcome depression and failure.

Text books

1. S.Xavier Alphonse. We shall overcome - A textbook on life coping skills. 6th edition. ICRDCE Publication, 2012.
2. Lakshminarayanan K. R and Uma Mageswari. M. Value Education. Nalnilam publication, 2009.

Reference books

1. T.Anchukandam and J.Kuttainimathathil (ED) Grow Free Live Free, Krisitu Jyoti Publications, Bangalore (1995).
2. Mani Jacob (ED) Resource Book For Value Education, Institute for value education, New DELHI 2002.
3. DBNI, NCERT, SCERT, Dharma Bharti National Institute of Peace and Value education, Secunderabad, 2002.
4. Daniel and Selvamony – Value Education Today, (Madras Christian College, Tambaram and ALACHI, New Delhi, 1990)
5. S.Ignachmuthu – Values for Life – Better Yourself Books, Mumbai, 1991.
6. M.M.M.Mascaronhas, Centre for Research Education Science and Training for Family. Life Promotion – Family Life Education, Bangalore, 1993.

SEMESTER - III

L	T	P	C
5	0	0	5

Total Hours: 65

PRODUCTION MANAGEMENT **SUBJECT CODE: U3BA21MT**

OBJECTIVES:

1. To enable the students to understand production concept, process and give emphasis in various production system and work measurement.
2. Students to identify the suitable plant location and the kinds of layout design in the organization.

Unit-I INTRODUCTION TO PRODUCTION (11 Hrs)

Production- Meaning- Definition- Model of production system- Types of production- Productivity-Functions and scope of Production management-Relationship of production with other functional areas.

Unit-II PRODUCTION PLANNING AND CONTROL (12 Hrs)

Production planning and control-Routing-Scheduling-Dispatching-Maintenance management-Types of Maintenance- Break down -preventive-Routine-Maintenance scheduling.

Unit-III PLANT LOCATION (15 Hrs)

Plant location-Introduction-Need for selecting a suitable location-Plant location problem-Types-Advantage of Urban, Suburban, Rural location-factors influencing plant location- plant location model.

Plant layout- Objectives- Principles of plant layout-factors influencing plant layout-types of layout- Process- product- fixed-FMS- cellular manufacturing.

Unit-IV WORK STUDY (15 Hrs)

Work and Method study-Importance of work study-Work study procedures-time study-Human considerations in work study-Introduction to method study-Objectives of method study-Steps involved in method study.

Work measurement-Objectives of work measurement-Techniques of work measurement-Computation of standard time-Allowance-Comparison of various techniques.

Unit-V QUALITY CONTROL (12Hrs)

Quality control-objectives-principles-Introduction to SQC-Control charts-Definition-Types of charts (X, R, C, P charts)-Inspection-Definition-Types of Inspection-Centralized and Decentralized.

OUTCOMES:

CO1	Understanding the methods of production system and its relationship of production with other functional areas.
CO2	Discuss various types of maintenance and production control process.
CO3	Identify the suitable plant location and knowing the pros and cons of urban, sub - urban, and rural.
CO4	Classify the Human consideration in work study, Time study and methods study.
CO5	Describe the various kinds of control charts and its applications of SQC.
CO6	List the kinds of layout applied in the organisation
CO7	Explain the objectives and techniques of work measurement applied in the current scenario.

TEXT BOOKS

1. P.Saravanavel and Sumathi-Production and Materials management-Margam Publications(3rd Edition,2016)
2. Chunawalla,S. A., & Patel, D. R. Production & Operations Management. New Delhi: Himalya Publishing House.(2nd Edition,2005)

REFERENCE BOOKS

1. Bedi, K. *Production & Operations Management*. New Delhi: Oxford University Press..(3nd Edition,2006)
2. Buffa, E. S., & Sarin, R. K. *Modern Production / Operations Management*. New Delhi: WilleyIndia..(4nd Edition,2006)
3. Gupta, C. B. *Operations Management and Control*. New Delhi: Sultan Chand & Sons..(2nd Edition,2005)
4. Khanna, R. B. *Production & Operations Management*. New Delhi: Prentice-Hall India Pvt. Ltd. .(2nd Edition,2008)
5. Paneerselvam-Production and Operations Management-Prentice-Hall of India..(4th Edition,2011)

L	T	P	C
5	0	0	4

Total Hours: 65

**SEMESTER - III
FINANCIAL ACCOUNTING
SUBJECT CODE: U3BA22MT**

OBJECTIVES:

1. To acquire fundamental knowledge in accounting and techniques, company accounts influencing business units.
2. To make students understand the concept of Depreciation Accounting.
3. Students to understand the role of accounting plays in the overall setup of a business.

UNIT -1 ACCOUNTING SYSTEM (14Hrs)

Accounting-Introduction-Definition-Concepts-Conventions-Objectives of accounting – Accounting Rules – Principles of double entry system-Journal-Ledger-Trial balance-subsiary books – Purchase book, sales book, returns book and cash books. (Theory only)

UNIT – II DEPRECIATION (13Hrs)

Depreciation Accounting-Meaning-Causes-Need for depreciation-Types-Straight Line and WDV methods of charging depreciation only. (Simple problems)

UNIT-III FINAL ACCOUNTS (12Hrs)

Final Accounts – Preparation of trading, profit and loss account and balance sheet. (Problems Only)

UNIT – IV SINGLE ENTRY SYSTEM (14Hrs)

Single Entry System: Definition - Salient features - Limitations - Differences between Single Entry System and Double Entry System –Net worth method Only. (Theory and problems)

UNIT– V CREDIT RATING AGENCY (12Hrs)

Shares – Introduction - Meaning-Types-Issue, forfeiture and reissue of shares-Introduction to Credit Rating Agency-CRISIL-ICRA. (Theory and problems)

OUTCOMES:

CO1	Understand the basic concept and conventions of accounting.
CO2	Solve depreciation accounting under straight line method and diminishing balance method.
CO3	Able to prepare final accounts with adjustments.
CO4	Understand the difference between single entry system and double entry system.
CO5	Analyse the credit rating agencies.
CO6	Learn the accounting rules and principles.
CO7	Understand the role of accounting plays in the overall setup of a business.

TEXT BOOKS

1. T.S.Reddy & Murthy – Financial Accounting- Margam Publication.(7nd Edition,2017)
2. Maheswari, S. N. Financial accounting for management. Mumbai: Vikas Publishing House.(4nd Edition,2010)

REFERENCE BOOKS

- 1) Gupta R.L. “Advanced Accountancy”, S.Chand, Delhi,(2nd edition, 2005).
- 2) S.P.Jain and K.L.Narang, ”Financial Accounting” Atlantic Publishers, (4th Edition 2007)

Note: The Proportion between theory and problems shall be 20:80

SEMESTER – III

L	T	P	C
5	0	0	4

Total Hours: 65

STRATEGIC MANAGEMENT SUBJECT CODE:U3BA23MT

OBJECTIVES:

1. To know the students to the various strategic issues such as strategic planning, implementation and evaluation to take decisions.
2. Able to understand the concepts of merger, acquisition, amalgamation and its influence on organization structure and organization change.
3. To expose students to various perspectives and concepts in the field of Strategic Management.

Unit-1 BUSINESS SYSTEM (15Hrs)

Business system-Objectives of the business- Setting up and balancing the objectives mission-Vision-Goals Strategic analysis of functional areas in production-Marketing-Human resources-Finance-corporate capabilities-SWOT/TOWS.

Unit-II CORPORATE STRATEGY (14Hrs)

Corporate strategy-Nature and scope-process of strategic planning-formulation of strategy-Portfolio analysis: BCG matrix-G.E matrix (or) Stop light strategy-Organisational structure-functional-divisional-SBU-Strategic decision making-business level sub Strategies.

Unit-III GENERIC STRATEGIES (11Hrs)

Generic strategic alternatives-Horizontal, Vertical, Diversification-Active and passive alternatives - Mckinsey's 7s models-Five force theory.

UNIT-IV MERGER AND ACQUISITION (12Hrs)

External growth strategy-merger acquisition-amalgamation-joint venture-Problems organizational structure and corporate development-evaluation of organizational structure-management of change.

Unit-V ERP (13Hrs)

Implementation of strategy-Element of strategy-Leadership and organizational climate-Planning and control of implementation. ERP-Features and applications, Packages: Baan, Marshall, SAP-Functional feature and implementation difficulties.

OUTCOMES:

CO1	Describe the nature of business and its objectives, mission, vision, goals in strategy formation.
CO2	Understand the concepts of strategic management and portfolio analysis and its techniques.
CO3	Acquire knowledge about strategic alternatives and techniques for effective business performance.
CO4	Able to understand the concepts of merger, acquisition, amalgamation and its influence on organization structure and organization change.
CO5	Insight about ERP its features, applications, functions and implementation of various ERP's.

CO6	Understand the strategic analysis of different functional areas of a business.
CO7	Describe corporate capabilities and SWOT analysis for decision making.

TEXT BOOKS

1. Cherunilam, F. Business Policy and Strategic Management. New Delhi: Himalaya Publishing House. (2nd Edition,2008)
2. Dr. C.B Mamoria& Satish Mamoria, Business planning and policy (1987) Himalaya publishing house, Mumbai, (3rd Edition,2012)

REFERENCE BOOKS:

1. S.C Bhattacharya- Strategic Management Concepts & Cases-S.Chand. (2nd Edition,2009)
2. Ghosh, P. K. Strategic Planning and Management. New Delhi: Sultan Chand & Sons. (4th Edition,2013)
3. Hunger, J. D. and Wheelen T. L. Strategic Management and Business Policy. New Delhi:Pearson Education.(2nd Edition,2002)
4. Kazmi, A. Strategic Management and Business Policy. New Delhi: Tata McGraw Hill(5th Edition,2008)
5. Prasad, L. M. Business Policy: Strategic Management. New Delhi: Sultan Chand & Sons(2nd Edition,2013)

SEMESTER - III

L	T	P	C
5	0	0	4

Total Hours: 65

MANAGERIAL ECONOMICS

SUBJECT CODE: U3BA24MT

OBJECTIVES:

1. To understand the students in micro economic concepts and techniques in evaluating business decisions taken by firm.
2. Understand the pricing methods and pricing strategies and the various types of market structure.
3. To understand and appreciate the basic Micro and Macroeconomics and their application to the business.

UNIT-I INTRODUCTION TO ECONOMICS

(14Hrs)

Introduction – meaning – Nature and Scope of Managerial Economics –Important Concepts of Economics – Basic Economic problem – Relationship between Micro and Macro Economics – Objectives of the Firm.

UNIT – II DEMAND ANALYSIS

(14Hrs)

Demand analysis– Theory of Consumer behavior – Marginal Utility Analysis indifference curve and analysis.

Meaning of Demand – Law of Demand – Types of Demand – Determinants of Demand – Elasticity of Demand – Demand Forecasting.

UNIT – III PRODUCTION AND COST ANALYSIS

(13Hrs)

Production and Cost Analysis – Law of Returns to scale and Economics of sale – Cost analysis – different cost concepts – Cost – Output relationship – Short run and Long run – Revenue curves of Firms – Supply curve.

UNIT – IV PRICING

(12Hrs)

Pricing Methods and Strategies – Objectives – Factors – General Consideration of Pricing – Methods of Pricing – Role of Government in pricing – Dual pricing – Price Discrimination.

UNIT – V MARKET STRUCTURES

(12Hrs)

Market Structure – Basis of Market Classification – Perfect Competition – Monopoly – Monopolistic Competition – Duopoly –Oligopoly .

OUTCOMES:

CO1	Construct a sound theoretical base off micro-economic concepts.
CO2	Discuss the theories of consumer behavior and demand forecasting.
CO3	Understand the theories of cost and production.
CO4	Evaluate the pricing methods and pricing strategies.
CO5	Analyze the various types of market structure.
CO6	Develop fundamental economic principles, theories under concepts useful to business.
CO7	Apply the economic principles in the field of business management.

TEXT BOOKS

1. Dr.S.Shankaran, Managerial Economics-Margam Publication, (3rd Edition,2012)
2. Varshney, R. L. & Maheswari, K. L. Managerial economics. New Delhi: Sultan Chand & Sons. (4TH Edition,2002).

REFERENCE BOOKS

1. Geetika, Ghosh, P., &Chodhury, P. R. Managerial economics. New Delhi: Tata McGraw Hill. (3rd Edition,2009)
2. Dwivedi, D N. Managerial economics. New Delhi: Vikas Publishing House(2nd Edition,2002)
3. Mehta, P L. Managerial economics. New Delhi: Sultan Chand & Sons(5th Edition,2012)
4. Yogesh Maheshwari-Managerial Economics-Prentice-Hall of India. (2nd Edition,2000)
5. Jinghan ML-Micro Economics, Vrinda Publications(P) Ltd. (3rd Edition,2013)

L	T	P	C
5	0	0	4

Total Hours: 65

SEMESTER – III

OFFICE MANAGEMENT SUBJECT CODE:U3BA21AT

OBJECTIVES:

1. To enable students to understand management of office, methods, environment and procedures.
2. Students to Gain knowledge on different postal services and central, departmental office correspondence.

Unit-I OFFICE MANAGEMENT (11Hrs)

Office management-Meaning-definition-scope-Function and Qualifications of Office Manager-Poor and good Organisation Departments-Flow of Work-Organisation Charts and manual.

Unit-II OFFICE LAYOUT (14Hrs)

Administrative arrangements and physical conditions- Centralisation and Decentralisation of Office services-Office accommodation and Layout-Office furniture-Meaning Of Various terms-Basic pattern of work- Sub-Division-Standardization and Standards-Work Measurement and Control.

Unit-III OFFICE EQUIPMENTS (15Hrs)

Office equipments-Reproduction equipments-Typewriter-Duplicators-Photo Copier-Franking Machine-Communication Equipments-Dictaphone-Intercom-Telephone-Telex-Teleprinters-PABX-PBX-STD-Storage equipments-Filing Cabinets-Time Clocks-Use of Computers in Office Management.Office system-Procedure-Routine and methods-Video conferencing.

Unit-IV OFFICE CORRESPONDENCE (12Hrs)

Mail service and communication-Office Correspondence-Central vs. Departmental Correspondence- Postal services-Postbag and Box Numbers Registered and Insured Posts-VPP and Private courier.

Unit-V SUPERVISOR SKILLS (13Hrs)

Office supervisor-Meaning and Characteristics of supervisor-Status-Place and Role of Supervisor-Effective Supervisor-Qualification-Knowledge and skill of Supervisor.

OUTCOMES:

CO1	Understand the concepts of Office Management, Organisation structure, manual and departmentation.
CO2	Enable to describe fundamentals of office layout, centralization and decentralization of office services.
CO3	Describe various office equipments, furnitures, and their functions.
CO4	Gain knowledge on different postal services and central, departmental office correspondence.

CO5	Discuss the roles, qualities and responsibilities of efficient supervisor
CO6	Able to understand office system and environment
CO7	Acquire knowledge about effective utilization of various office resources.

TEXT BOOKS

1. Pillai R.S.N, Bhagwathi. V-Office Management-Sulthanchand and company,(1st Edition,2003)
2. Dr.C.B.Guptha-Office organization-.Sulthanchand and sons(3rd Edition,2007

REFERENCE BOOKS:

1. Chopra, R. K. & Chopra, A. Office Management. New Delhi: Himalaya Publishing House., (3rd Edition,2013)
2. Arora, S. P. Office Organization and Management. New Delhi: Vikas Publishing House(2nd Edition,2003)
3. .Nair, R.K. & Banerjee, A. K. Office Management. Meerut: Pragati Prakashan. (5th Edition,2012)

SEMESTER - III

L	T	P	C
3	0	0	3

Total Hours: 39

CUSTOMER RELATIONSHIP MANAGEMENT **SUBJECT CODE:U3BA21ST**

OBJECTIVE:

1. To enable the students to understand the importance of satisfying the customer in today's competitive world.
2. Understand the importance of customer satisfaction, customer loyalty and customer relations for a successful business.

Unit-I CRM INTRODUCTION (8 Hrs)

CRM-Introduction-Definition-Need for CRM-Complementary Layers of CRM-Customer Satisfaction-Customer loyalty-Product Marketing-Direct Marketing.

Unit-II PRINCIPLES OF CRM (7 Hrs)

Customer Learning Relationship-Key Stages of CRM-Forces driving CRM-Benefits of CRM-Growth of CRM Market in India-Key principles of CRM.

Unit-III TYPES OF CRM (9 Hrs)

CRM Program-Ground work for effective use of CRM-Information Requirement for an Effective use of CRM-components of CRM-Types of CRM.

Unit-IV CRM PROCESS (7 Hrs)

CRM Process Framework-Governance Process-Performance Evaluation Process.

Unit-V CRM TECHNOLOGIES (8 Hrs)

Use of Technology in CRM- Call Center Process-CRM Technology Tools-Implementation-Requirements Analysis-Selection of CRM Package-Reasons and Failure of CRM.

OUTCOMES:

CO1	Able to Define the needs, importance of a good customer relations and complementary layers of CRM.
CO2	Demonstrate the principles and stages of CRM and its growth in India.
CO3	Analyse how effective CRM leads to business prospect.
CO4	Describe the CRM framework, governance and performance evaluation process.
CO5	Understand the process of call center and various technologies used in CRM.
CO6	Learn how to utilize customer data to build customer relations and achieve organizational goals.
CO7	Understand the importance of customer satisfaction, customer loyalty and customer relations for a successful business.

TEXT BOOKS:

1. Dr.S.Sheela Rani-Customer Relationship Management-Margam Publication (2nd Edition 2011)
2. Customer Relationship Management- K.Balasubramaniyan,GIGO publication, (3rd Edition 2005).

REFERENCE BOOKS

1. E-Business-Roadmap for success, Dr.RaviKalakota,Pearson education asia,(4th Edition,2000).
2. Business-The Dell way, Rebeccasaunders, India book distributors,(2nd Edition,2000).
3. The essentials guide to knowledge management-E-Business and CRM application, Amrittlwana, Person education,(3rd Edition,2001).

L	T	P	C
5	0	0	4

SEMESTER – IV

Total Hours: 65

MATERIALS MANAGEMENT SUBJECT CODE: U4BA21MT

OBJECTIVES:

1. To provide functional knowledge of material management, material procurement, inventory control as well as warehousing for both service as well as manufacturing sector.
2. Students to understand the functions of storekeeping and protection of stores from hazards

UNIT – I INTRODUCTION TO MATERIALS (13 Hrs)

Materials Management – Definition and Function – Importance and objectives of materials Management- service function-IMM.

UNIT – II INVENTORY (15 Hrs)

Inventory-meaning-definition–Inventory control – Function of inventory – Importance – Replenishment stock – Material Demand Forecasting – Material Requirement Planning MRP – Basis –Tools of Inventory Control – ABC – VED –FSN analysis – Inventory control of spares – EOQ and EBQ – Stores planning.

UNIT – III PURCHASING MANAGEMENT (12 Hrs)

Purchase Management – Purchasing – Procedure – Dynamic Purchasing – Principles – Import substitution – Internal Purchase – Import purchase Procedure.

UNIT – IV STORE KEEPING (14 Hrs)

Store Keeping – Objectives – Functions of store keeping – Store responsibilities – Location of store house – Centralized store room – Security Measures – Protection and prevention of stores – Fire and other Hazards – Bincard – Stock Cards-Materials Handling-definition-importance-MHE.

UNIT – V VENDOR RATING (11 Hrs)

Vendor rating – Vendor development – Purchase Department – Responsibility – Buyer – Seller relationship – Value analysis Vs Value Engineering.

OUTCOMES:

CO1	Identifying the scope for integrated materials management function over the supply chain operations.
CO2	Apply the tools of inventory control technique for managing the inventory levels.
CO3	Classify the Purchasing and import purchase procedure.
CO4	Understanding the functions of storekeeping and protection of stores from hazards.
CO5	Discuss the importance of vendor development and Vendor Rating.
CO6	Analysing the materials in storage, handling, packaging, and shipping.
CO7	Integrate the organization materials requirement to develop an overall plan.

TEXT BOOKS

1. Saravanavel P and Sumathi S – Production and Materials Management-Margham Publications,(3rd Edition 2016)
2. Nair, N. K. Purchasing and Material Management. Nodia: Vikas Publishing House.,(3rd Edition,2001)

REFERENCE BOOKS

1. Chary, S.N. Production and Operations Management, TMH Publications,(3rd Edition,2012)
2. Jain, S.P. & Narang. Cost and Management Accounting,(2nd Edition,2002).
3. Sople, V. V. Logistics Management. New Delhi: Pearson Education P. Ltd,(3rd Edition,2004)

SEMESTER - IV

L	T	P	C
5	0	0	5

Total Hours: 65**MANAGEMENT ACCOUNTING****SUBJECT CODE:U4BA22MT****OBJECTIVES:**

1. To acquaint the students to understand the analysis and interpretation of financial statements with a view to prepare management reports for decisions making.
2. To help the students to understand and analyze the financial statements in accounting.
3. Students able to solve ratio analysis problems related to management and cash flow and fund flow statement.

UNIT – 1 INTRODUCTION TO ACCOUNTING**(14 Hrs)**

Meaning, definition and objectives of management accounting – Advantages and limitations of management accounting – differences between management accounting and financial accounting – Financial statements – tools for the analysis of financial statement(only theory)

UNIT – II RATIO ANALYSIS**(12 Hrs)**

Ratio Analysis – meaning, uses and limitations of ratios – types of ratios – liquidity ratios, profitability ratios, activity ratio and solvency ratios.(Problem only)

UNIT – III FUND AND CASH FLOW ANALYSIS**(13 Hrs)**

Fund flow analysis and cash flow analysis. (Theory & Problems)

UNIT– IV BUDGETARY CONTROL**(12 Hrs)**

Budgetary Control – meaning, objectives, advantages & limitations of budgetary control – types of budgets – purchase budget, materials budget, flexible budget & cash budget.(Theory & Problems)

UNIT – V CVP ANALYSIS**(14 Hrs)**

CVP analysis – uses and limitations of marginal costing – assumptions of BE chart – simple problems relating to decision making based on marginal costing – standard costing – meaning, uses and limitations – variance analysis – material and labor variances only. (Simple problems)

OUTCOMES:

CO1	Analyze the various tools of management accounting.
CO2	Able to solve ratio analysis problems related to management.
CO3	Compute the fund flow and cash flow statement.
CO4	Able to prepare purchase, materials, flexible and cash budgets.
CO5	Understand the cost volume profit analysis.
CO6	Calculate material variance and labour variances.
CO7	Analyze the financial statements and interpret the result there of.

TEXT BOOKS

1. Reddy. T.S & Hari Prasad Reddy – Management Accounting- Margaham Publications,(5th Edition 2017).
2. Jain, S. P., & Narang, K. L. Cost & management accounting. New Delhi: Kalyani Publishers,(3rd Edition,2012)

REFERENCE BOOKS

1. Khan& Jain – Management accounting-Tata Mc Graw Hill- (3rd Edition 2000)
2. Maheswari . S. N – Management Accounting- Margaham Publications, ,(4rd Edition,2000)
3. Gupta, S. K. Management accounting. New Delhi: Sultan Chand & Sons. ,(3rd Edition,2012)
4. Khan, M. Y., & Jain, P. K. Management accounting. New Delhi: Tata McGraw Hill,(3rd Edition,2012)

Note: The Proportion between theory and problems shall be 20:80

SEMESTER – IV

L	T	P	C
5	0	0	4

Total Hours: 65**BUSINESS ENVIRONMENT****SUBJECT CODE:U4BA23MT****OBJECTIVES:**

1. To provide the students to have an overview of business environment and opportunities to analyze and approach the need for environment.
2. Students to understand the Political, legal, social, cultural and financial environment.

UNIT – I BUSINESS ENVIRONMENT (12 Hrs)

The concept of Business Environment – types- nature and significance – Brief overview of political – Cultural – Legal – Economic and social environments and their impact on business and strategic decisions.

UNIT – II POLITICAL AND LEGAL ENVIRONMENT (13 Hrs)

Political Environment–Government and Business relationship in India-Legal Environment-Consumer Protection Act 1986.

UNIT – III SOCIAL AND CULTURAL ENVIRONMENT (11 Hrs)

Social Environment – Cultural heritage – Social attitudes – Impact of foreign culture – castes and communities – Joint family systems – Types of Social Organization.

UNIT – IV ECONOMIC ENVIRONMENT (15 Hrs)

Economic Environment – Economic Systems and their impact in Business – Macro Economic Parameters like GDP – Growth rate – Population – Urbanization – Fiscal deficit – Plan investment – Per capita Income and their impact on business decisions.

UNIT – V FINANCIAL ENVIRONMENT (14 Hrs)

Financial Environment – Financial System – Commercial Banks – RBI –IDBI – Non Banking Financial Companies NBFC'S.

OUTCOMES:

CO1	Understand the concepts of business environment and its impact on business and strategic decisions.
CO2	Discuss the elements of political and legal environment and its business relations.
CO3	Learn the elements of social and cultural environment and the way it influences business.
CO4	Demonstrate various economic parameters and their effect on business decisions.
CO5	Equip knowledge about factors of financial environment and various financial and non- banking financial companies.
CO6	Analyse various business environmental factors in making business decisions.
CO7	Describe various economic policies and their impact on business.

TEXT BOOKS

1. Dr.S.Sankaran – Business Environment-Margam publications,(3rd Edition 2016)
2. Dr.N.Premavathy-Business Environment-Sri Vishnu Publications,(3rd Edition 2008)

REFERENCE BOOKS

1. Aswathappa, K. Essentials of business environment. New Delhi: Himalaya Publishing House.,(2ndEdition 2000)
2. Cherunilum, F. Business environment: text and cases. New Delhi: Himalaya Publishing House.,(3rd Edition 2012)
3. Gupta, C. B. Business environment. New Delhi: Sultan Chand & Sons. ,(2nd Edition 2002)

SEMESTER – IV
ALLIED - II
OPERATION RESEARCH
SUBJECT CODE – U4BA24MT

L	T	P	C
5	0	0	5

Total Hours : 65

OBJECTIVE:

1. To impart knowledge in concepts and tools of Operations Research .
2. To understand mathematical models used in Operations Research.
3. To apply these techniques constructively to make effective business decisions.

UNIT – I : LINEAR PROGRAMMING PROBLEM (14 Hrs)

Operation Research – Nature and Significance of OR – Various Models in OR – Applications and Scope of OR – Linear Programming Problem (LPP) – Characteristics of LPP and its formulations – Graphical Method of solving LPP-Simplex Method of solving LPP .

UNIT – II : TRANSPORTATION AND ASSIGNMENT PROBLEM (13 Hrs)

Transportation Problem- Method of finding Initial basic Solution – Assignment Problem – Hungarian Method of finding Solution – Simple Problems on these sections(initial solution only to transportation problem)-Maximization assignment problem.

UNIT – III: GAME THEORY (12 Hrs)

Game Theory – Two person Zero sum Games – Pure and Mixed Strategies – Saddle Point – Dominance Rules – Graphical Solution of Rectangular Games.

UNIT – IV : SEQUENCING AND REPLACEMENT PROBLEMS (13 Hrs)

Sequencing Problem – Processing n jobs through two machines – Processing n jobs through three machines –Replacement Models - Replacement of items whose efficiency deteriorates with time – Simple Problems.

UNIT – V : NETWORK DIAGRAM (PERT AND CPM) (13 Hrs)

Basic difference between PERT and CPM –Construction of Network diagram-Critical Path Analysis-Three times estimates.

OUTCOMES:

CO1	Solve linear programming problem using graphical method
CO2	Minimizing the cost for a given transportation problem
CO3	Finding the Value of a game
CO4	Calculating the time of replacement of a machine
CO5	Drawing a network diagram and finding a critical path

CO6	Solving for maximum profit at corner point graphically for an Industry
CO7	Calculating maximum gain or minimum cost by assigning jobs to suitable persons in order to avoid time and money wastage

TEXT BOOKS

1. KantiSwarup,P.k. Gupta & Man Mohan- Operations Research – Sultan Chand & sons ,New Delhi.(Sixteenth edition,2012)
- 2.R.Panner Selvam- Operation Research- PHI (2nd edition 2000)

REFERENCE BOOKS

1. J.K.Sharma Operation Research-Theory and Applications, Macmillian. (1st edition 2002):
2. P.K.Gupta and Hira D.S Problems in Operation Research, S.Chand and Company Ltd.,Newdelhi (2nd edition1995):.
- 3.Taha.H.A:Operation Research-An Introduction ,PHI(3rd edition 1997)
- 4.Kanti Swarup, Manmohan and Gupta Operations Research,Sultan Chand and sons, Newdelhi. (2nd edition 2002):

SEMESTER - IV

L	T	P	C
5	0	0	4

Total Hours: 65**FINANCIAL MANAGEMENT****SUBJECT CODE:U4BA21AT****OBJECTIVES:**

1. To enable the students to understand the basic concepts of financial management and the role of financial management in decision making.
2. To understand the role of financial manager in financial management.

UNIT – I FINANCIAL MANAGEMENT (14 Hrs)

Financial Management-Meaning-Definition-Scope-Objectives-Finance function-Financial Management and other functional areas-Finance organization-Role of financial manager in financial management. Financial planning and control – Break Even Analysis – Leverages-Types.(Theory & Problems).

UNIT - II WORKING CAPITAL MANAGEMENT (12 Hrs)

Working Capital-Meaning-Definition-Types-Sources of working capital-Current Assets and Current Liabilities Management - Regulation of working capital finance Dhejia Committee - Tandon Committee – Marathe Committee. (Theory Only)

UNIT – III EQUITY AND SHARES (13 Hrs)

Long term capital management-Equity Shares-Preference shares-Debentures-Retained Earnings. (Theory Only)

UNIT- IV COST OF CAPITAL (14 Hrs)

Cost of capital-meaning-definition-types-importance of cost of capital-Retained earnings-Dividend Policy (Walter and Gordon model only) Capital structure - meaning – Definition – Patterns - Optimum capital structure – EBIT - EPS Analysis. (Theory & Problems)

UNIT – V FINANCIAL INFORMATION SYSTEM (12 Hrs)

Financial information system-meaning-features-Advantages-Finance Resource Information System (FRIS)-Benefits-Financial Data System (Theory Only).

OUTCOMES:

CO1	Understand the basic objectives and functional areas of financial management.
CO2	Evaluate the sources of working capital.
CO3	List the various types of shares and debentures.
CO4	Analyse dividend policy using Walter and Gordon model.
CO5	Understand the finance resource information system.
CO6	Able to perform role of financial manager in financial management.
CO7	Understand the cost of capital and investment decisions.

TEXT BOOKS

1. DR.A.Murthy.-Financial Management-Margam Publications-(1st Edition, 2016)
2. Dr.N.Premavathy,Dr.M.Inbalakshmi-Financial Management-Sri Vishnu Publications (2nd Edition 2010)
3. Financial Management-Shassh.k.Guptha&Anuj Gupta-Kalyani Publication,Newdelhi(1st edition 2013).
4. Financial Management Principles and Practices-S.N.Maheswari-Sulthan Chand Publications (3rd edition 1993).

REFERENCE BOOKS

1. Fundamentals of financial management – James C. Van Horne – Prentice Hall of India Pvt Ltd., New Delhi. (2nd Edition 2010)
2. Financial Management – P.V. Kulkarni – Himalaya Publishing House. (3rd Edition 2011)
3. Financial Management – Theory and practice – Prasanna Chandra – Tata McGraw Hill Publishing Co Ltd., New Delhi.. (4th Edition 2011)
4. Financial Management – I.M.Pandey – Vikas Publishing House Private Ltd., (2nd Edition 2000)
5. Financial Management – An analytical and conceptual Approach.S.C. Kuchlal – Chaitanya Publishing House, Allahabad. (2nd Edition 2004)

Note: The Proportion between theory and problems shall be 40:60.

TOTAL QUALITY MANAGEMENT

SEMESTER – IV
SUBJECT CODE:U4BA21ST

L	T	P	C
3	0	0	3

Total Hours:39

OBJECTIVES:

1. To acquaint the student with the basic concepts of total quality concept, tools and Seven Quality control techniques.
2. To give emphasis on quality management and certification system-ISO 2000.

Unit-I INTRODUCTION TO TQM

(8 Hrs)

Total quality management-Meaning-Definition-TQM Frame work-Benefits-Quality customer focus-Vision-Mission and policy statements-Customer Perception of Quality-Dimensions of product and service quality-Cost of quality-Quality Circle.

Unit-II TQM CONTRIBUTION

(7 Hrs)

Overview of contribution of Deming, Juran Crosby, Feigenbaum, Ishikawa and Taguchi – Concepts – Taguchi Quality Loss Function-Japanese 5S principles.

Unit-III STATISTICAL PROCESS CONTROL

(9 Hrs)

Meaning and significance of Statistical Process Control (SPC)-Construction of control charts for variables and attributed-Process capability-meaning, significance and measurement-Six Sigma- Reliability concepts-Definitions-Reliability in series and Parallel.

Unit-IV QUALITY FUNCTION DEPLOYMENT

(6 Hrs)

Quality Functions Deployment (QFD)-House of quality-Failure Mode Effect Analysis (FMEA)-FMEA stages-Q7 tools, Kanban.

Unit-V INTRODUCTION TO ISO

(7 Hrs)

Introduction to ISO: 2000-Quality Management System-Quality Audit-TQM culture-Quality Council-Introduction to Software Quality.

OUTCOMES:

CO1	Understanding the significance of Product and service quality.
CO2	Discuss the contribution of TQM principles of Quality Gurus.
CO3	Explain the Significance of Statistical Process control and its construction of control charts.
CO4	Describe the Process of Quality function deployment and House of Quality.
CO5	List the ISO quality management system followed by Indian corporates.
CO6	Identifying requirements of quality improvement programmes for quality enhancement.
CO7	Analysing how Total Quality Perspective on organizational change relate to organizational theory.

TEXT BOOKS

1. P.S.Saravanel and S.Balakumar- Total Quality Management-Margam Publications, (1st Edition 2010)
2. Subburaj, Total Quality Management, Tata mcgraw hill, (2nd Edition 2006)

REFERENCE BOOKS

1. Ansari.A and Modarress, JIT Purchasing, Free Press, Newyork.(4th edition 2010)
2. Sandeep Malhotra-Quality Management Planning-Deep & Deep.(2nd edition 2006).
3. Shridhara Bhat- Total Quality Management-Himalaya Publishing House,(3rd edition 2006).
4. Poomima.M.Charantimath ,Total Quality Management ,Pearson Education. First Indian Reprint Edition 2004

L	T	P	C
6	0	0	5

**SEMESTER-V
BUSINESS LAW
SUBJECT CODE-U5BA21MT**

Total Hours:78

OBJECTIVES:

1. To enable the students with a solid grounding in business law so that they have an idea as to how the various laws are implemented in the Indian context for the labor force.
2. Students to understand the duties of unpaid sellers and sale of goods act.

UNIT-I INTRODUCTION (16 Hrs)

Contract act-Definition - Elements of valid contract – Essentials of contract and classification- Offer-Essentials of Valid Offer –Agreement.

UNIT-II ESSENTIALS OF VALID ACCEPTANCE (15 Hrs)

Acceptance, Essentials of Valid acceptance-. Consideration-Essentials of Valid Consideration-void contract.

UNIT-III CAPACITY OF CONTRACT (16 Hrs)

Capacity of contract-persons not competent to contract-Minor-persons of unsound mind-persons disqualified by law. Free consent, coercion-undue influence-Fraud-misrepresentation-Mistake.

UNIT-IV PERFORMANCE OF CONTRACT (15 Hrs)

Performance of contract-Actual Performance-Attempted performance- Quasi contract-Features – Types.

UNIT-V CONTRACT OF SALE OF GOODS (16 Hrs)

Sale of goods-Definition – and Classification of goods – Documents of Title of goods and agreement to sell-unpaid seller-Rights of unpaid seller.- Conditions- Definition-Express and Implied – Warranty- Caveat Emptor.

OUTCOMES:

CO1	Discuss the Elements of contract and classification.
CO2	Outline the essentials of valid acceptance.
CO3	Explain the Persons competent to contract and persons disqualified by law.
CO4	Compare and contrast actual and attempted performance.
CO5	List the rights and duties of an unpaid seller.
CO6	Describe the significance of express and implied warranty.
CO7	Demonstrate the significance of contract and sale of goods act in current Indian scenario.

TEXT BOOKS

1. Goswami, V. G. Labour and Industrial Law. Allahabad: Central Law Agency. (2nd edition,2000).
2. Kapoor, N. D. Elements of Merchantile Law. New Delhi: Sultan Chand & Sons (4th edition,2005).

REFERENCE BOOKS

1. Saiyed, I. A. Labour Laws. Mumbai: Himalaya Publication House. (3rd edition,2005)
2. Srivastava, S. C. Industrial Relations and Labour Law. Noida: Vikas Publishing House. (Sixth edition (2012)
3. Taxmann. Labour Law. New Delhi: Taxmann Publications Limited.(2nd edition,2011)

SEMESTER-V
MARKETING MANAGEMENT
SUBJECT CODE-U5BA22MT

L	T	P	C
6	0	0	5

TOTAL HOURS :78

OBJECTIVES:

1. To get students to rethink as business and marketing professionals in the effort of a modern day business organization and to create awareness about the latest trends and developments in marketing.
2. To understand the marketing segmentation and marketing environment.

UNIT – I INTRODUCTION TO MARKETING (17 Hrs)

Fundamentals of Marketing – Role of Marketing– Relationships of Marketing with other functional areas – Concept of marketing mix – Marketing Management of Product - services – Marketing approaches – Selling – Various Environmental factors affecting the marketing functions-Green Marketing.

UNIT – II BUYER BEHAVIOR (17 Hrs)

Buyer Behavior – Consumer Goods and Industrial goods – Buying motives – Buyer Behavior Model – Factors influencing buyer behavior. Market segmentation : Need and basis of Segmentation – Types of segmentation - Marketing Strategy – Targeting – Positioning.

UNIT – III SALES FORECASTING (15 Hrs)

Sales Forecasting – Various methods of sales Forecasting - Product Characteristics – Levels of product – New product development process and product life Cycle – Product line and product mix decisions – Branding – Packaging –Labelling.

UNIT – IV PRICING (15 HRS)

Pricing – Pricing objectives – Pricing policies and procedures -Kinds of Pricing– Factors influencing pricing decisions — Pricing strategies – Physical distribution – importance of various kinds of marketing channels –Salesman motivation.

UNIT – V PROMOTION (14 Hrs)

Promotion – Advertising – Publicity – Public relations – Personal Selling – Direct selling and Sales promotion .

OUTCOMES:

CO1	Describe a clear understanding of various marketing concepts.
CO2	Explain the concept of segmentation and Targeting.
CO3	Outline the Product life cycle strategies and implications of marketing.
CO4	Discuss how price affects the value of the organization product or services.
CO5	Describe how to develop effective message for Marketing communications.
CO6	Understand how demographic ,cultural, and institutional factors shape the marketing environment.
CO7	Compare and contrast the pricing strategies used for fixing price for a product.

TEXT BOOKS

1. Philip Kotler ,Kevin Lane Keller ,Marketing Management, PHI(13th edition 2009).
2. Kumar, A & Meenakshi, N, Marketing Management, Vikas Publishing House, (3rd edition) 2008.

REFERENCE BOOKS

1. K.S Chandrasekar, Marketing Management-Text and cases, Tata Mc Graw Hill (1st edition, 2010)
2. Paul Baines, Chris Fill and Kelly Page, Marketing, Oxford University Press (2nd edition, 2011)
3. Saxena, R. Marketing Management. Tata McGraw-Hill Publication. (3rd Edition. 2003).

SEMESTER-V
HUMAN RESOURCE MANAGEMENT
SUBJECT CODE-U5BA23MT

L	T	P	C
6	0	0	5

TOTAL HOURS:78

OBJECTIVES:

1. To enable students with regard to gaining insights into how human resource management has played a crucial role in the overall scheme of things for an organization.
2. To have an understanding of the basic concepts, functions and processes of human resource management.
3. To understand the employee's performance appraisal and career development.

UNIT –I INTRODUCTION OF HUMAN RESOURCE MANAGEMENT (16 Hrs)

Meaning and Definition of HRM –Nature and scope of HRM – Principles and Functions of HRM - Difference between Personnel Management and HRM — Strategic HRM

UNIT – II HUMAN RESOURCE PLANNING (16 Hrs)

Human Resource Planning – Meaning and Objectives– Recruitment- Types – Selection – Methods of Selection – Types of test – Interview techniques – Placement.

UNIT – III TRAINING METHODS (15 Hrs)

Training methods - Meaning – Importance - Identification of Training needs and Induction – Training and Development.

UNIT – IV PERFORMANCE APPRAISAL (15 Hrs)

Performance Appraisal: Need – Objectives –Methods of Performance Appraisal – BARS and uses.

UNIT – V TRANSFER AND PROMOTION (16 Hrs)

Transfer – Promotion and termination of services – Career development – Mentoring – HRM Audit – Nature – Scope –Approaches and compensation.

OUTCOMES:

CO1	Understand the principles, functions, scope of human resource management.
CO2	List the insight about objectives of HRP, recruitment and its types, stages in selection process.
CO3	Able to understand the needs, importance and methods of training and development.
CO4	Know the objectives, needs and methods of employee's performance appraisal.
CO5	Describe the concepts of transfer, promotion and career development.
CO6	Learn the nature, approaches and significance of HR audit.
CO7	Understand the importance of HR functions in organizational growth.

TEXT BOOKS

1. Rao, V.S.P. Human Resource Management ,Excel Books, New Delhi.(3rd edition 2010)
2. Flippo, E. B. Personnel Management. New Delhi. McGraw –Hill International Series (2nd revised edition 1984)

REFERENCE BOOKS

1. Aswathappa, K. International Human Resource Management/ Text & Cases. Tata McGraw –Hill Publication. New Delhi.(2nd edition 2017).
2. Rao, P. Essentials of Human Resource Management and IR. Himalaya Publishing House. New Delhi. (First Edition edition (2009)

L	T	P	C
3	0	0	3

SEMESTER V

ELECTIVE-I INTERNATIONAL BUSINESS SUBJECT CODE: U5BA24ET

Total Hours: 39

OBJECTIVES:

1. To impart an in-depth knowledge on the application of economic, trade concepts and theories to global business and to develop an understanding of the global trade.
2. Students to understand the foreign exchange market and exchange rate.

UNIT – I INTRODUCTION TO TRADE (8 Hrs)

Nature and scope of International Trade – Importance – Globalisation – Meaning and Stages of Globalisation – Drivers of Globalisation - Distinction between Domestic Trade and International Trade.

UNIT – II THEORIES OF INTERNATIONAL TRADE (8 Hrs)

Theory of International Trade - Classical Theory of International Trade – Comparative cost theory - Modern Theory - Heckscher - Holin theorem - Modern approaches to international trade theory.

UNIT – III TRADE POLICIES (7 Hrs)

Trade Policy - Free Trade - trade restrictions - Tariff, Quota, Dumping, cartels- WTO - Economic integration -Customs Union.

UNIT – IV FOREIGN EXCHANGE (8 Hrs)

Foreign Exchange and Balance of payments - Theories of Exchange rate of determination-Foreign Exchange market - Factors influencing foreign exchange - fixed vs flexible exchange rate, Balance of trade vs Balance of Payments - causes for disequilibrium in Balance of payments- Remedial measures.

UNIT – V TRADE ORGANISATION (8 Hrs)

International Trade Relations - Foreign Aid and Economic Development – Private-Foreign investment - Role of MNC -IMF - International liquidity SDR - World Bank and it's affiliates.

OUTCOMES:

CO1	Understand the scope and importance of international business.
CO2	Analyse the classical and modern theory of international trade.
CO3	Explain the free trade policy, trade restrictions, Tariff and Quotas.
CO4	Understand the functioning of foreign exchange market and exchange rate.
CO5	Discuss the role of MNC, IMF and World Bank.
CO6	Compare domestic trade with international trade.
CO7	Evaluate the difference between balance of payment and balance of trade.

TEXT BOOKS

1. Dr..S.Sankaran-International Business and Environment-Margam Publications, (1st edition (2002)
2. Jeevanandam-International Business-Sultan Chand-(2nd edition 2008)

REFERENCE BOOKS

1. Francis Cheruliam-International Business-Prentice Hall, (4th Revised edition edition 2007)
2. Letiche, John M., International business: Policies and Theoretical Foundations, Academic Press, New York.
3. Mannur, H.G., International business,Vikas Publishing House, New Delhi,

SEMESTER-V
ELECTIVE-II
BANKING AND INSURANCE
SUBJECT CODE : U5BA25ET

L	T	P	C
6	0	0	5

TOTAL HOURS: 78

OBJECTIVES:

1. To enable the students in getting an outlook of how banking & insurance businesses work on day-to-day basis and how things are done in a professional business set up.
2. To know the recent trends in banking and insurance sector.

Unit-I BANKING AND DEPOSIT ACCOUNTS (16 Hrs)

Concept of Banking & e Banking, Businesses permitted for a Banking Company, Services Rendered by Banks, Rights and Obligations of Banker, Types & Features of Deposit Accounts.

Unit-II CUSTOMER ACCOUNTS: (15 Hrs)

Definition of Customer & Various types of Bank Customers- Minor, Joint Account & HUF, Partnership Firm , Clubs, Societies & Charitable Institutions, Joint Stock Companies.

Unit-III CREDIT STYLES & SECURED ADVANCES (16 Hrs)

Styles of Credit -Overdraft, Cash Credit & Term Lending, Secured Advances –Modes of Creating Charge- Lien, Pledge, Hypothecation, Mortgage, Sub Mortgage and Assignment.

Unit-IV INTRODUCTION OF INSURANCE: (16Hrs)

Meaning, Functional and Legal Definitions of insurance, Functions, Role & characteristics of Insurance, Principles of Insurance, Essentials of insurance contract.

Unit-V CLASSIFICATION & ORGANIZATION OF INSURANCE (15 Hrs)

General Insurance: Basic Concepts, Features of Fire Insurance, Marine Insurance & Accidental insurance, Life Insurance: Concept & Salient Features.

OUTCOMES:

CO1	Understand the concept of banking and service rendered by banks.
CO2	List the various types of bank customers.
CO3	Able to identify credit styles and secured advances.
CO4	Explain the role and characteristics of insurance.
CO5	Classify the various insurance policies.
CO6	Apply the knowledge in banking and insurance.

CO7	Adopt the recent changes in banking and insurance sector.

TEXT BOOKS

1. Ganguly, A. Insurance Management. New Delhi: New Age International.(3rd edition 2012)
2. Gopinath, M. N. Banking Principles & Operations. Mumbai: Snow White Publications.(2nd edition 2000)

REFERENCE BOOKS

1. Gulati, N. C. Principles of Insurance Management. New Delhi: Excel Books.(4th edition 2009)
2. Patukale, Kshitij, Banking Finance & Economics. Macmillian Publishers India. (3rd edition 2010)

SEMESTER-V

E-BUSINESS

L	T	P	C
3	0	0	3

SUBJECT CODE-U5BA25ST

TOTAL HOURS: 39

OBJECTIVES:

1. To Understand the interest and opportunity of e-Business.
2. To know how to plan and how to manage e-commerce solutions.
3. To apply processes of e-commerce and to analyze and understand the human,
4. Technological, network and business environment associated with e-commerce.

UNIT-I INTRODUCTION

(7 Hrs)

E-Commerce Framework – Traditional vs E-Business Applications – Architectural Framework – The Internet as Network Infrastructure – Major Categories of E-Commerce – B2C, B2B, C2B and C2C.

UNIT-II NETWORKS

(7 Hrs)

Overview of Communication Network – Communication Processors – Communication Media – Types of Networks – Communication Satellite – Wireless Networks – Wireless Internet Access ISDN – Dial-Up – Broadband.

UNIT-III FIREWALLS AND SECURITIES

(7 Hrs)

OSI Models – Network Security and Firewalls – Protocols – Types – Client Server Network Security – Firewalls and Network Security – Data and Message Security – Digital Signature, Certificates, Envelopes - Encrypted Documents.

UNIT-IV EDI IN BUSINESS

(6 Hrs)

E-Commerce and World Wide Web – E-Payment Systems – Electronic Data Interchange(EDI) – EDI Applications in Business, Intranet Application in Business.

UNIT-V E-PAYMENT SYSTEMS

(6Hrs)

Online Payment – Payments Cards – Electronic Cash – Electronic Wallets – Digital Cards – Types – Stored Value Cards – Internet Technologies – Banking – Net, Mobile.

UNIT-VI WORLD WIDE WEB – PROCESS

(6 Hrs)

Web Hosting Services – Web Servers, Domain Naming Systems (DNS) – Types – POP, IMAP – Accredited Registrars – Country Coded and Top Level Domains – Internet Regulatory Organizations.

OUTCOMES:

CO1	Define and analyze the principles of E-Business and basics of World Wide Web.
CO2	Define and analyze the concept of electronic data interchange and its legal, social and technical aspects.
CO3	Define and analyze the security issues over the web, the available solutions and future aspects of e-commerce security.
CO4	Define and analyze the concept of E-banking, electronic payment system
CO5	Describe the major types of E-commerce.
CO6	n the process that should be followed in building an E-commerce presence.
CO7	Identify the key security threats in the E-commerce environment.

TEXT BOOKS

1. Gray Schneider, Electronic Commerce, Thomson Course Technology, Noida, 7th Annual Edition, 2007.
2. U.S.Pandey, Rahul Srivastava, Saurabh Shukla, E-Commerce and its applications, S.Chand, New Delhi, 1st Edition, 2007.
3. R.Kolkota and A.B.Whinston: Frontiers of Electronic Commerce, New Delhi, Addison Wesley, 1996.

REFERENCE BOOKS

1. P.T.Joseph: Electronic Commerce: A Managerial Perspective, Prentice Hall of India Learning, New Delhi, 3rd Edition, 2008.
2. Efraim Turbon, Jae Lee, David King, H.Michael Chung, Electronic Commerce, A Managerial Perspective, Pearson Education Asia, 2001.

SEMESTER-VI
INDUSTRIAL RELATIONS
SUBJECT CODE:U6BA21MT

L	T	P	C
6	0	0	5

Total Hours: 78

OBJECTIVES:

1. To enable the students with regard to various models of dispute resolution, labour management cooperation, dispute settlement machineries and other Industrial relation issues.
2. Students to know the various collective bargaining techniques and role of government in collective bargaining.

Unit-I Introduction of Industrial Relations (15 Hrs)

Industrial Relations-Role-Importance-Trade Unions-Industrial disputes and their Resolutions.

Unit-II Collective bargaining (16 Hrs)

Participative management-structure-scope-collective bargaining-works committee-joint management councils-Pre-requisite for successful participation-Role of Government in collective bargaining.

Unit-III Industrial unrest (15 Hrs)

Industrial unrest-employee dissatisfaction-grievances- disciplinary action-domestic Enquiry-strikes-lockout-prevention of strikes-lockouts.

Unit-IV Factories act 1948 (16 Hrs)

Factories act 1948-Definition-Factory-Approval - licensing and registration of factories-Inspectors-Appointment and Power of Inspectors – Measures regarding Health – Safety – Welfare.

Unit-V Workmen compensation act 1923 (16 Hrs)

Workmen compensation act 1923-Introduction-Definition-Employees compensation-Employees Liability for Compensation-ILO- Role and Functions of ILO.

OUTCOMES: After completion of the course, student will be able to:

CO1	Describe the concept of industrial relations and industrial dispute with the ways to resolve dispute.
CO2	Explain various collective bargaining techniques and role of government in collective bargaining.
CO3	Understand different factors causing industrial unrest
CO4	Discuss about factories Act 1948 and its impact on industrial relations
CO5	Understand the procedure for appointing inspectors and powers of inspectors
CO6	Understand workmen compensation act 1923
CO7	Describe the role and functions of ILO in maintaining Industrial harmony,

TEXT BOOKS:

1. Sreenivasan M.R.- Industrial Relationship and labor legislations-Margam Publications(3rd edition 2011)
2. Aswathappa K.-Human Resource and Personnel Management-Tata McGraw – Hill Publication. NewDelhi.(2008).

REFERENCE BOOKS

1. Mamoria, C. B., Mamoria, S., &Gankar, S. V. Dynamics of Industrial Relations. New Delhi Himalaya Publishing House. (3rd Edition, 2008)
2. Monnapa, A. Industrial Relations. New Delhi: Tata McGraw Hill.(2000)
3. Sen, R. Industrial Relation in India. New Delhi: Macmillan India. (2nd Edition, 2010)
4. Subba Rao P.-Human Resource Management and Industrial Relations-Himalaya Publishing House,(3rd edition 2007)

SEMESTER-VI
COMPUTER APPLICATION IN BUSINESS
SUBJECT CODE-U6BA22MT

L	T	P	C
6	0	0	4

Total Hours:78

OBJECTIVES:

1. To Understand the role of Information Technology in Business
2. To know how to produce documents in word processing packages.
3. To know how to use technologies with securities to build e-commerce websites.

Unit-I INTRODUCTION

(16 Hrs)

Information Technology Basics-Information Definition-Prerequisites of information-Need for information-Components of Information Technology-Role of Information Technology in Business.

Unit-II WORD PROCESSING

(15 Hrs)

Word processing with MS Word: Starting MS Word-MS Word environment- Working with word documents-Working with text-Working with tables-Checking spelling and grammar-Printing a document.

Unit-III SPREADSHEETS AND MS EXCEL

(16 Hrs)

Spreadsheets and MS Excel: Starting MS Excel-MS Excel Environment- Working with Excel Workbook-Working with worksheet-Formulas and functions-Inserting charts-Printing in Excel.

Unit-IV MAKING PRESENTATION

(16Hrs)

Making Presentation with MS Power point- Starting MS Power Point-MS Power Point Environment-Working with power point- Working with different views-designing presentation-printing in power point.

Unit-V ELECTRONIC COMMERCE

(15Hrs)

Electronic Commerce- Types- Advantages and Disadvantages- Electronic Data Interchange(EDI)- How EDI Benefits-EDI limitations-SMART card- Smart card applications.

OUTCOMES:

CO1	After completing this course student should be able to more effectively use their MS-Word, Excel, and Power point as tools for business, entertainment or study
CO2	It should have more complete and detail understanding of the role computers play in our daily lives
CO3	Students can create variety of documents and presentations for e-learning
CO4	To understand the interest and opportunity of e-commerce
CO5	Describe the major types of E-commerce.

CO6	Explain the process that should be followed in building an E-commerce presence.
CO7	To know how to plan and manage e-commerce solutions

TEXT BOOKS

1. Introduction to Information Technology, ITL ESL, Pearson Education.(2000)
2. Singh, V. Simplified MS-Office 2007. New Delhi: Computech Publications Ltd(2011)

REFERENCE BOOKS

1. Jain, P., & Arora, S. Window based computer courses. Jalandhar: S. Vikas &Co.(3rd edition 2001)
2. Norton, P. Introduction to computers. New Delhi: Tata McGraw Hill.(2nd edition 2007)

**SEMESTER-VI
ELECTIVE-I
RESEARCH METHODOLOGY
SUBJECT CODE :U6BA23ET**

L	T	P	C
6	0	0	4

Total Hours:78

OBJECTIVES:

1. To provide knowledge on research methods, Sampling techniques and the process.
2. To develop skills in the application of research methods for business problem solving.

Unit- I INTRODUCTION TO RESEARCH (16 Hrs)

Research -Meaning and purpose -types of research -Pure and applied, survey, case study experimental, exploratory -Research Design -Steps in selection and formulation of research problem- steps in research -review of literature

Unit - II HYPOTHESIS AND SAMPLING (15 Hrs)

Formulation of Hypothesis- Types, sources -Testing -sampling techniques- sampling error and sample size.

Unit - III DATA COLLECTION (16 Hrs)

Methods of data collection -Primary and secondary data -observation -interview - questionnaire -construction of tools for data collection -testing validity and reliability - pilot study and pre-testing.

Unit - IV DATA HANDLING (16 Hrs)

Processing and analysis of data -editing -coding -transcription- tabulation -outline of statistical analysis -descriptive statistics -elements of processing through computers – packages for analysis.

Unit - V REPORT WRITING (15 Hrs)

Report writing -target audience -types of reports -contents of reports - styles and conventions in reporting -steps in drafting a report.

OUTCOMES:

CO1	Understanding about research methods, techniques and process.
CO2	Analyse the types of sampling techniques.
CO3	Able to collect primary and secondary data.
CO4	Understanding about analysis of data, editing, coding and tabulation etc.
CO5	Formulate systematic business research reports.
CO6	Able to prepare research reports.
CO7	Apply research methods for business problem solving.

TEXT BOOKS

1. Dr.P.Ravilochanan- Reaserch Methodology-Margam Publications (second revised edition 2003)
2. William C Emory, Business Research Methods,(third edition 1985)
3. Donald R Cooper, Business Research Methods McGraw Hill(7th Ed, 2000)

REFERENCE BOOKS

1. Krishnaswami OR, Methodology of Research for Social Science, Himalaya, Mumbai (3rd edition 2016)
2. Anderson J. et.al, Thesis and Assignment writing, Wiley Eastern(4th edition 2011)

**SEMESTER-VI
ELECTIVE-II
MARKETING RESEARCH
SUBJECT CODE :U6BA24EsT**

L	T	P	C
6	0	0	4

TOTAL HOURS: 78

OBJECTIVES:

1. To have understanding of the various research designs and to be aware of different sources of marketing data and the process of gathering such data.
2. Students to understand the New Product development Process and the impact of Product life cycle.

Unit-I INTRODUCTION OF MARKETING RESEARCH (16Hrs)

Introduction-Definition of Marketing Research -Nature and Scope - Marketing Research as aid to Rational Decision Making. Marketing research process.

Unit-II SAMPLING TECHNIQUES (15 Hrs)

Sampling techniques: Random -Stratified - Area - Quota - Observation - Questionnaire - Interview techniques Interviewing skills on the part of investigator.

Unit-III MOTIVATION RESEARCH (16 Hrs)

Motivation research- Nature – Motivation Research Techniques - product research – New Product Development and Product Life Cycle Research.

Unit-IV CONSUMER SURVEY (15 Hrs)

Consumer survey-Survey Methods - sales control research – Sales Forecasting – Sales Potential.

Unit-V MEDIA RESEARCH (16Hrs)

Media research: Types of Media – DAGMAR – Advertising Copy – Appeals -copy testing- pre testing -post testing and Media Evaluation.

OUTCOMES:

CO1	Explain the steps in Marketing Research process.
CO2	Analyze the various kinds of sampling technique used in marketing Research.
CO3	Discuss the New Product development Process and the impact of Product life cycle.
CO4	Apply different kinds of sales forecasting methods to estimate sales.
CO5	Compare and contrast the different kinds of media used in advertisement.
CO6	Apply the marketing theories framework and tools to solve marketing research problems.
CO7	Understanding the ability to demonstrate knowledge of marketing research process applied by collecting and analysing market information.

TEXT BOOKS

1. Malhotra & Dash. Marketing Research, Pearson's Education, New Delhi.
2. (2nd edition, 2011).
3. 2. William G., Zikmund and Babin Barry J. Essence of marketing Research, .(4TH edition, 2000).

REFERENCE BOOKS

1. Beri, G.C. Market Research .New Delhi, India: Tata McGraw Hill (3RD ED 2010)
2. Cooper, Donald, R., & Schindler, Pamela, S. Marketing Research. Concept and Cases. New Delhi, India: Tata McGraw Hill (4th edition 2007).

SEMESTER-VI
ENTREPRENEURIAL DEVELOPMENT
SUBJECT CODE: U6BA25ST

L	T	P	C
9	0	0	3

TOTAL HOURS:39

OBJECTIVE:

1. To enable the students to take key decisions required of the entrepreneur/manager, the driving forces of the small/family business.
2. Students to understand the problems faced by women entrepreneurs.

UNIT I INTRODUCTION OF ENTREPRENEURSHIP (8 Hrs)

Entrepreneur-Meaning – Definition — Characteristics of an entrepreneur – Entrepreneurship – Need – Role and Importance-Difference between Entrepreneur Manager - Difference between Entrepreneur and Intrapreneur – Classification of Entrepreneurs..

UNIT – II ENTREPRENEURIAL GROWTH (8 Hrs)

Entrepreneurial growth – Role played by government and Non – Government agencies – EDP'S, TIIC, SIDBI, IDBI, IFICI, Problems and prospects of Women entrepreneurs – Rural Entrepreneurs.

UNIT – III BUSINESS FEASIBILITY (8 Hrs)

How to enter Into Market? – Business idea generation techniques – Identification of Business Opportunities – Marketing Feasibility – Financial Feasibility – Technical – Legal .

UNIT – IV PROJECT APPRAISAL (7 Hrs)

Project Appraisal – Methods – Techniques – Preparation of Business plan – Content of a Business Plan – Project Report.

UNIT – V PROMOTIONAL STRATEGIES (8Hrs)

How to start an enterprise? –Product —Distribution and Promotional Strategies
Role of Government in promoting new start ups by various schemes - SIPCOT – SEZ – EPZ .

OUTCOMES:

CO1	Understand the role and importance of entrepreneurship.
CO2	Identify the problems faced by women entrepreneurs.
CO3	Able to generate new business ideas.
CO4	Prepare business plan and project report.
CO5	Discuss the role of government in promoting new start-ups.
CO6	Analyse the ethical and legitimacy challenges that force entrepreneurs.
CO7	Identify and understand the driving forces of new entrepreneurs.

TEXT BOOKS

1. Chhabra, T. N. Entrepreneurship Development. New Delhi: Sun India Publications.(2nd edition,2011)
2. Desai, V. Dynamics of Entrepreneurial Development and Management. New Delhi: Himalaya Publishing House, (3rd edition,2014)..

REFERENCE BOOKS

1. Drucker Peter F., Innovation & Entrepreneurship. New Delhi: Elsevier Ltd. .(2nd edition,2000).
2. Holt, David H. Entrepreneurship: New Venture Creation. New Delhi: Prentice Hall of India Pvt.Ltd.(2nd edition,2010).
3. Peters, Hisrich, Entrepreneurship. New Delhi: Tata McGraw-Hill. .(3RD edition,2011).

Other Dept Syllabus (B.C.A,CS AND MATHS)(Non-Major papers)

SEMESTER - III

L	T	P	C
2	0	0	2

Total Hours: 26

MANAGEMENT CONCEPTS

SUBJECT CODE: U3BA21NM

OBJECTIVE:

1. To know the management concepts and practices there by enabling them to understand the basic theories and concepts of management.
2. To help the students gain understanding of the functions and responsibilities of managers.

Unit-I

Management-Definition-Importance-Role and Function of a Manager.

(6 Hrs)

Unit-II

Planning-Nature-Purpose-Steps-Types-Merits and Demerits of Planning-MBO.

(5 Hrs)

Unit-III

Organization- Purpose- Departmentation- Span of control-Delegation-Centralization and Decentralization-Line and staff-Committee.

(5 Hrs)

Unit-IV

Directions-Leadership-Motivation-Communication Process of Communication- Barriers in Communication.

(5 Hrs)

Unit-V

Controlling-Concepts of Control-Methods of Control-Co-Ordination-Need-Principles-Approaches to Achieve effective Co-Ordination.

(5 Hrs)

OUTCOMES:

CO1	Understand the basic concepts, significance of management and role , functions of manager.
CO2	List the insight about planning its steps, types, and its pros and cons.
CO3	Describe organization, departmentation, span of control, centralization decentralization and its purpose.
CO4	Explain leadership styles and communication process and its barriers.
CO5	Concepts of control its process and different control methods.
CO6	Know the needs , principles and approaches of effective employee coordination.
CO7	Understanding the principles of management and its significance in organizational growth.

TEXT BOOKS:

1. J. Jayasankar-Principles of Management-Margam Publications,(2nd Edition 2013)
2. Dinkar Pagare-Principles of Management-Sulthan Chand & Sons, (2nd Edition 2005)

REFERENCE BOOKS

1. Gupta, C. B. Management concept & practices. New Delhi: Sultan Chand & Sons. (3rd Edition 2009)
2. Prasad, L. M. Principles and practice of management. New Delhi: Chand & Sons. (4th Edition 2012)
3. Tripathi, P. C. & Reddy P. N. Principles of management. New Delhi: Tata McGraw Hill(2nd Edition 2006)

L	T	P	C
2	0	0	2

TOTAL HOURS:

SEMESTER - IV

GENERAL COMMERCIAL KNOWLEDGE

SUBJECT CODE: U4BA21NM

OBJECTIVES:

1. To enable the students in terms of understanding the various concepts related to business organizations and office management.
2. Students to understand the office accommodation and office environment.

UNIT-I

Commerce, trade and industry-meaning-scope and importance of commerce-economics basis of commerce.

(6 Hrs)

UNIT-II

Forms of business organization-sole trading-partnership firms-merits and demerits of partnership firm.

(5 Hrs)

UNIT-III

Joint stock companies-features-memorandum and articles of association - shares and debentures-types-co-operatives-features-types and advantages.

(5 Hrs)

UNIT-IV

Office organization –what is an office? Functions of office -office accommodation and environment-office layout-office manual.

(5 Hrs)

UNIT-V

Handling of mail, filing and indexing-inward/out ward of mail-filing and indexing system, essential and classification-methods- horizontal vs. vertical filing-centralized and decentralized-indexing.

(5 Hrs)

OUTCOMES:

CO1	Understand the basic concepts of commerce, trade and industry.
CO2	Identify the various forms of business organization.
CO3	Classify various types of shares and debentures.
CO4	Describe the office functioning and working environment.
CO5	Analyze filing and indexing system in the office management.
CO6	To handle inward and outward mails in the office.
CO7	Understanding the various concepts related to two business organizations and office management.

TEXT BOOKS

1. C.D. Balaji and G. Prasad-Business Organization, Margham Publications,(1st Edition 2015)
2. Pillai R.S.N, Bhagwathi. V-Office Management-Sulthan chand and company, (1st edition 2003)

REFERENCE BOOKS:

1. Dr.C.B.Guptha-Office organization-. Sulthan chand and sons,(3rd edition 2007)
2. Arora, S. P. Office Organization and Management. New Delhi: Vikas Publishing House(2nd Edition,2003)

Adhiparasakthi College of Arts and Science (Autonomous)
G.B. Nagar, Kalavai – 632 506, Ranipet District
(Re-accredited by NAAC with B Grade with CGPA Score of 2.83)

Objectives and Course Outcomes for the Programmes

TAMIL

SEMESTER – I		
COs	Course Name: TAMIL I	Code: U1LT21FL Credits: 3
	OBJECTIVES: தமிழ்ப்பற்று சமூகம் பெண்ணியம் குறித்த விழுமியங்கள் சார்ந்த கவிதைகளும் கருத்து பரிமாற்றத்திறனுக்கு அடிப்படையாக உள்ள இலக்கணப் பகுதியும், பயிற்சிப்பகுதியும் தன் சுய சிந்தனையுடன் படைப்பாக்கச் சிந்தனைத் திறனை வளர்த்தெடுக்கும் வகையில் சிறுகதை பகுதியும், காலவோட்டத்துடன் இணைந்து சிந்திக்கும் ஆற்றலைப் பெறும் வகையில் இலக்கிய வரலாற்றுப் பகுதியும் உரைநடைக் கட்டுரைகளும் தெரிவு செய்யப்பட்டுள்ளன.	
CO1	கவிதையின் பாடுபொருள்களை அறிதல், கவிதை எழுதும் திறன் வளர்த்தல்.	
CO2	இயல் தமிழ் பற்றியும் உரைநடை வளர்ச்சி, உரையாசிரியர்கள் பற்றியும் அறிந்துகொள்ளுதல்.	
CO3	சிறுகதை எழுத்தாளர்களை பற்றியும் சிறுகதையின் வளர்ச்சி திறனை மேம்படுத்துதல்.	
CO4	நாடகத்தமிழ் படித்து நாடகம் எழுதும் திறனை வளர்த்தல்.	
CO5	நாடகங்கள், நாடகக்கலைஞர்களின் கலைதிறனை கண்டு நடிக்கும் திறனை வளர்த்தல், மரபு கவிதை, புதுக்கவிதை, எழுதும் திறனை வளர்த்தல், புதிய கலைச்சொல்லாக்கம் தருதல். எழுத்து இலக்கணம் பற்றி அறிதல்.	
CO6	கவிதை, உரைநடை, சிறுகதை, நாடகம் இவற்றின் வளர்ச்சி பற்றியும் எழுதும் திறனை வளர்த்தல்.	
CO7	இலக்கணம் பற்றியும் மரபுத்தொடர்கள் கலைச்சொல்லாக்கம் பற்றியும் அறிந்துக்கொள்ளுதல்.	
SEMESTER – II		
COs	Course Name: TAMIL II	Code: U2LT21FL Credits: 3
	OBJECTIVES: பக்தி இலக்கியங்களையும் சிற்றிலக்கியங்களையும் அறிந்துக்கொள்ளுதல்	
CO1	திருவருட்பா பாடல்களையும் பராபரக்கண்ணி பாடல்களையும் படித்து அதன் நெறிகளை பின்பற்றுதல்.	
CO2	பிள்ளைத்தமிழ் தூது ஆகிய சிற்றிலக்கியங்களின் வகைகளை அறிதல்.	
CO3	தனிப்பாடல்கள் எழுதும் திறன் வளர்த்தல்.	
CO4	தேவாரம், திருப்பாவை படித்து பக்தி உணர்வை வளர்த்தல்.	
CO5	இலக்கிய வரலாறு பற்றி அறிதல்.	
CO6	சிற்றிலக்கியங்கள் பற்றியும் பக்தி இலக்கியங்கள் பற்றியும் அறிந்துகொள்ளுதல்.	
CO7	கட்டுரை எழுதும் திறன் வளர்த்தல், இலக்கண சொற்களின் வகைகளை அறிதல்.	

SEMESTER – III		
COs	Course Name: TAMIL III	Code: U3LT21FL Credits: 3
	OBJECTIVES: அற இலக்கியங்களையும் காப்பிய இலக்கியங்களையும் இலக்கணப்பகுதிகளையும் அறிந்துக்கொள்ளுதல்	
CO1	அறநூல்கள் கூறும் அறக்கருத்துக்களை விளக்குதல்.	
CO2	ஐம்பெரும் காப்பியங்கள் பற்றியும் சிலம்பு மணிமேகலையின் சிறப்பு பற்றியும் எடுத்துரைத்தல்.	
CO3	கம்பஇராமாயணம் போன்ற இதிகாசங்களைக் கூறி அறிவுத்திறனை மேம்படுத்துதல்.	
CO4	புராணங்களை படித்து திறனை வளர்த்தல்.	
CO5	புதினெண்கீழ்க்கணக்கு நூல்களின் வகைகளை அறிதல்.	
CO6	அற இலக்கியங்கள் பற்றி அறிந்து கொள்ளுதல்.	
CO7	காப்பியங்களின் பண்பினை அறிதல், இலக்கணம் அக இலக்கியம் பற்றி அறிதல்.	
SEMESTER – IV		
COs	Course Name: TAMIL IV	Code: U4LT21FL Credits: 3
	OBJECTIVES: மானுடச் சிறப்பியலை மையப்படுத்தி, அதன் புரிதிறனை மேம்படுத்தும் வகையில் செய்யுட்பகுதிகளும் சங்க இலக்கியங்களும் தொகுக்கப்பட்டுள்ளன.	
CO1	புறநூல்களில் உள்ள செய்திகளை படித்து புரிந்துக்கொள்ளுதல்.	
CO2	குறுந்தொகை, ஐங்குறுநூறு, அகம் படித்து நூலின் பொருளினை அறிதல்.	
CO3	நற்றிணை, கலித்தொகை அகநூலைப்படித்து பயன்பெறுதல்.	
CO4	அகநூல் முல்லைப்பாட்டு படித்து தெரிந்துக்கொள்ளுதல்.	
CO5	எட்டுத்தொகை, பத்துப்பாட்டு நூல் வகைகளை தெரிந்துக்கொள்ளுதல், மொழித்திறன் அறிந்துக்கொள்ளுதல்.	
CO6	சங்க இலக்கியங்கள் பற்றி அறிதல்.	
CO7	யாப்பிலக்கணம், அணியிலக்கணங்களையும் அறிந்துக்கொள்ளுதல்.	

ENGLISH

SEMESTER – I		
COs	Course Name: COMMUNICATIVE ENGLISH – I	Code: U1CE21SL Credits: 3
	OBJECTIVES: 1. Students will interpret texts with attention to ambiguity, complexity, and aesthetic value.	
CO1	To develop skills in functional literacy, including appropriate spelling, punctuation and grammar.	
CO2	To develop skills in reading (understanding, comprehending, interpreting, analyzing) texts for work	
CO3	To develop skills in producing (constructing, creating, writing) texts for work, learning, community and/or everyday personal contexts	
CO4	To improve vocabulary and develop the writing skills.	
CO5	To explain the application of learning theories in the classroom situation.	
CO6	To discuss the concept and theories of intelligence and creativity.	
CO7	To speak and write choosing from a wider range of vocabulary	
SEMESTER – II		
COs	Course Name: COMMUNICATIVE ENGLISH – II	Code: U2CE21SL Credits: 3
	OBJECTIVES: Students will practice a deliberate writing process with emphasis on inquiry, audience, research, and revision.	
CO1	To refer to the dictionary for meaning, usage and grammar.	
CO2	To interact confidently in situations like debates and group discussions and seminars.	
CO3	Exercise dramatic and life skills.	
CO4	Analyze poetic texts using appropriate terms such as diction, tone, imagery, figures of speech, motif, etc.	
CO5	To interpret a poem based on contextual evidence	
CO6	To identify the main ideas, details and speakers’ attitudes and emotions by listening to different types of spoken texts.	
CO7	Speak intelligibly (pronunciation, stress, intonation)	
SEMESTER – III		
COs	Course Name: FOUNDATION ENGLISH – III	Code: U3LE21SL Credits: 3
	OBJECTIVES: 1. Students will evaluate genres of writing and write in appropriate genres and modes for a variety of purposes and audiences.	
CO1	Expose the different genres to acquire knowledge and apply that in the creative writing.	
CO2	Interpret Shakespeare’s works critically in their written form through performance.	

CO3	Analyze various types of novels with reference to thematics and other approaches
CO4	Appreciate the working of various literary devices like irony in fiction.
CO5	Acquire familiarity with a wide variety of forms, styles, structures, and modes in English.
CO6	Identify and understand the significance of these forms in shaping a text's meaning.
CO7	To become proficient in English for global competency.

SEMESTER – IV

COs	Course Name: FOUNDATION ENGLISH – IV	Code: U4LE21SL Credits: 3
	OBJECTIVES: 1. Students will read diverse texts within their historical and cultural contexts. 2. Developing a critical understanding of how literature can both uphold and resist existing structures of power.	
CO1	Identify the distinct literary genres of the tragedies, comedies, and histories present in Shakespeare's work.	
CO2	To enhance their close reading skill.	
CO3	Analyze plays for their structure and meaning, using correct terminology.	
CO4	Learn to use correct articulation of English sounds.	
CO5	Use intonation and stress properly	
CO6	Enhance their ability to understand, appreciate, and discuss works of literature through extensive reading and discussion of short stories, novels and plays.	
CO7	Analyze works of fiction and drama for plot structure, setting, characterization, theme, and narrative point of view.	

PROFESSIONAL ENGLISH FOR LIFE SCIENCES (Biochemistry and Microbiology)

SEMESTER - I

COs	Course Name: PROFESSIONAL ENGLISH I	Code: U1PE01SL Credits: 2
	OBJECTIVES: 1. To develop the language skills of students by offering adequate practice in professional contexts. 2. To enhance the lexical, grammatical and socio-linguistic and communicative competence of first year physical sciences students 3. To focus on developing students' knowledge of domain specific registers and the required language skills.	
CO1	Develop communication skills likes reading, writing, listening thinking and speaking.	
CO2	Able to create strong professional vocabulary for communication.	
CO3	Understand the importance of reading for life	
CO4	Read independently unfamiliar texts with comprehension	
CO5	Understand the importance of writing in academic life	
CO6	Write simple sentences without committing error of spelling or grammar	
CO7	Recognize their own ability to improve their own competence in using the language	

SEMESTER – II		
COs	Course Name: PROFESSIONAL ENGLISH II	Code: U2PE01SL Credits: 2
	OBJECTIVES: 1. Develop their competence in the use of English with particular reference to the workplace situation. 2. Enhance the creativity of the students, which will enable them to think of innovative ways to solve issues in the workplace. 3. Develop their competence and competitiveness and thereby improve their employability skills.	
CO1	Apply to the research and development organization / section in companies and office with winning proposals.	
CO2	Adapt easily in to the work place, context, having become communicatively competent.	
CO3	Attend interviews with boldness and confidence.	
CO4	Adapt easily into the workplace context, having become communicatively competent.	
CO5	Apply to the Research & Development organisations/ sections in companies and offices with winning proposals.	
CO6	Help students with a research bent of mind develop their skills in writing reports and research proposals.	
CO7	Essay on Creativity and Imagination	

PROFESSIONAL ENGLISH FOR PHYSICAL SCIENCES (Computer Science & Mathematics)

SEMESTER – I		
CO	Course Name: PROFESSIONAL ENGLISH I	Code: U1PE02SL Credits: 02
	OBJECTIVES: 1. Understand the total content and underlying meaning in the context. 2. Identify and understand phrase or sentence groups. 3. Comment on the passages read.	
CO1	Students will be enabled to understand the basic objective of the course by being acquainted with specific dimensions of communication skills i.e. Reading, Writing, Listening, Thinking and Speaking.	
CO2	Students would be able to create substantial base by the formation of strong professional vocabulary for its application at different platforms and through numerous modes as Comprehension, reading, writing and speaking etc.	
CO3	Students will apply it at their work place for writing purposes such as Presentation/official drafting/administrative communication and use it for document/project/report/research paper writing.	
CO4	Students will be made to evaluate the correct & error – free writing by being well-versed in rules of English grammar & cultivate relevant technical style of communication & presentation at their work place & also for academic uses.	

CO5	Students will apply it for practical and oral presentation purposes by being honed up in presentation skills and voice-dynamics. They will apply techniques for developing inter-personal communication skills and positive attitude leading to their professional competence.	
CO6	Develop professional work habits, including those necessary for effective collaboration and cooperation with other students, instructors and Service Learning contact representatives.	
CO7	Learning contact representatives.	
	SEMESTER – II	
CO	Course Name: PROFESSIONAL ENGLISH II	Code: U2PE01SL Credits: 2
	OBJECTIVES: 1. Develop their competence in the use of English with particular reference to the workplace situation. 2. Develop their competence and competitiveness and thereby improve their employability skills. 3. Help students with a research bent of mind develop their skills in writing reports and research proposals.	
CO1	Students will improve their reading fluency skills through extensive reading.	
CO2	Students will increase their reading speed and comprehension of academic articles.	
CO3	Students will heighten their awareness of correct usage of English grammar in writing and speaking.	
CO4	Students will improve their speaking ability in English both in terms of fluency and comprehensibility.	
CO5	Able to Attend interviews with boldness and confidence.	
CO6	Adapt easily into the workplace context, having become communicatively competent.	
CO7	Apply to the Research &Development organisations/ sections in companies and offices with winning proposals.	

PROFESSIONAL ENGLISH FOR HUMANITIES (B.Com. and BBA)

SEMESTER – I		
COs	Course Name: PROFESSIONAL ENGLISH – I	Code: U1PE03SL Credits: 2
	OBJECTIVES: To develop the language skills of students by offering adequate practice in professional contexts.	
CO1	To develop skills in functional literacy, including appropriate spelling, punctuation and grammar.	
CO2	To develop skills in reading (understanding, comprehending, interpreting, analyzing) texts for work	
CO3	To develop skills in producing (constructing, creating, writing) texts for work, learning, community and/or everyday personal contexts	
CO4	To improve vocabulary and develop the writing skills.	

CO5	To explain the application of learning theories in the classroom situation.	
CO6	To discuss the concept and theories of intelligence and creativity.	
CO7	To speak and write choosing from a wider range of vocabulary	
SEMESTER – II		
COs	Course Name: PROFESSIONAL ENGLISH – II	Code: U2PE03SL Credits: 2
	OBJECTIVES: To enhance the lexical, grammatical and socio-linguistic and communicative competence of first year physical sciences students	
CO1	To refer to the dictionary for meaning, usage and grammar.	
CO2	To interact confidently in situations like debates and group discussions and seminars.	
CO3	Exercise dramatic and life skills.	
CO4	Analyze texts using appropriate terms such as diction, tone, imagery, figures of speech, motif, etc.	
CO5	To interpret a theme based on contextual evidence	
CO6	To identify the main ideas, details and speakers’ attitudes and emotions by listening to different types of spoken texts.	
CO7	To speak and write choosing from a wider range of vocabulary	

GENERAL PAPERS**FOR ALL UG COURSES**

SEMESTER – I		
COs	Course Name: ENVIRONMENTAL STUDIES	Code: U1ES21GS Credits: 2
	OBJECTIVES: 1. Students in Environmental Studies are motivated by concern for welfare of the many human and non-human communities that shape this planet. 2. Recognize the interconnectedness of multiple factors in environmental challenges. 3. Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.	
CO1	Recognize the importance of environment and public awareness required for sustainability.	
CO2	Understand the availability of various resources, their availability and conservation.	
CO3	Develop knowledge on structure and functions of the ecosystem, productivity and energy flow.	
CO4	Comprehend the importance and conservation needs of biodiversity by framing policies.	
CO5	Able to link causal effects of human activities and develop mitigation strategies for different pollution.	
CO6	Demonstrate an integrative approach to environmental issues	
CO7	Demonstrate and ability to integrate the many disciplines and filed that intersect with environmental concerns	
SEMESTER – II		
COs	Course Name: VALUE EDUCATION	Code: U2VE21GS Credits: 2
	OBJECTIVES: 1.The aim of the subject is to educate the values of family, society, cultivate the personal skills & to motivate on positive thinking. 2. Understand the benefits and obstacles of self acceptance 3.Positive thinking and positive imaging	
CO1	Understand the influence of ethics in family	
CO2	Characteristics self concept and personal growth	
CO3	Characteristics and eliments of personality development	
CO4	Depression, symptoms, causes and impact	
CO5	Characterictics of successible leader and team work	
CO6	Life skill required for better work environments	
CO7	How to overcome depression and failure	
SEMESTER – V		
COs	Course Name: EXTENSION ACTIVITIES	Code: U1ES21GS

		Credits:1
	OBJECTIVES: 1. To arouse social consciousness of the students by providing them opportunities to work with and among the people. 2. To provide with rich and meaningful educational experiences to them in order to make their education complete and meaningful. 3. Develop capacity to meet emergencies and natural disasters	
CO1	To know the locational advantages and disadvantages.	
CO2	To develop the social responsibility among the students.	
CO3	Understand the community in which they work	
CO4	To understand themselves in relation to their community	
CO5	To identify the needs and problems of the community and involve them in problem-solving	
CO6	To develop among themselves a sense of social and civic responsibility	
CO7	To utilize their knowledge in finding practical solutions to individual and community problems	

FOR ALL PG COURSES

SEMESTER – II		
COs	Course Name: HUMAN RIGHTS	Code: P2HR21GS Credits: 2
	OBJECTIVES: 1. To create awareness on Human Rights, UN Human Rights declarations and contemporary issues on Human Rights. 2. Demonstrate a good understanding of the provisions under the Constitution of India dealing with human rights. 3. Demonstrate a good understanding of the practical application of human rights law to specific human rights problems in India	
CO1	Demonstrate a good understanding of the provisions under the Constitution of India dealing with human rights	
CO2	Display a good understating of the nature and scope of special legislations dealing with protection of human rights of marginalized and vulnerable sections	
CO3	Demonstrate a good understanding of the practical application of human rights law to specific human rights problems in india	
CO4	Analyze complex human rights problems and apply relevant provisions of human rights law in india to a hypothetical situation/case study and a theoretical knowledge of the underpinnings of the human rights framework in India, its operation and issues associated with its implementation	
CO5	In depth insight into the constitutional, statutory and institutional aspects of human rights protection in India	

FOR ALL M.PHIL. COURSES

SEMESTER – II		
COs	Course Name: RESEARCH AND PUBLICATION ETHICS	Code: MIRE21GS Credits: 2
	OBJECTIVES: 1. To impart knowledge on research problem and finding scientific articles with Internet. 2. To provide the knowledge about the Software tool to identify predatory publications 3. This course clarify about the Scientific misconducts, Redundant publications, Ethics, database and research merits	
CO1	Overview of research publications, open access, ethics following in research articles	
CO2	Methods to identify the Scientific misconducts, Redundant publications Journal finder / journal suggestion tools viz. JANE, Elsevier Journal Finder, Springer	
CO3	To impart the knowledge on Use of plagiarism software like Turnitin, Urkund and other open source software tools, calculate the Metrics	

B.Sc. BIOCHEMISTRY

SEMESTER – I		
COs	Course Name: CELL BIOLOGY	Code: U1BC21MT Credits: 5
	OBJECTIVES: 1. Understood the relationship between cellular organization and biological function of normal cell, pro and eukaryotic cells. 2. Learnt on the various cell organelles with their functions and actions. 3. Learnt the application of cell biology in research and applications of histopathology.	
CO1	Understanding the relationship between cellular organization and biological function of normal cell, pro and eukaryotic cells	
CO2	Broad knowledge on the cell membrane and transport	
CO3	Knowledge on basic cell organelles and their functions	
CO4	Able to explain the structure and functions of nucleus and Chromosome as well as the Meiotic and mitotic cell divisions	
CO5	Methodology on tissue processing	
CO6	Understanding the various cell organelles with their functions	
CO7	Application of cell biology in research along with applications of histopathology	
SEMESTER – I		
COs	Course Name: CHEMISTRY – I	Code: U1CH21AT Credits: 5
	OBJECTIVES: 1. To provide the basic knowledge on extraction, refining of metals, polarization. 2. Understood the importance of fuels and nuclear chemistry 3. To give a knowledge about biochemistry	
CO1	Basic knowledge on extraction and refining of metals	
CO2	Chemistry of cycloalkanes, polarization and stereo isomerism	
CO3	Understanding chemical kinetics and photochemistry	
CO4	Applications of VSEPR theory, fuels and osmosis	
CO5	Awareness on nuclear chemistry, crude oil and elements of symmetry	
CO6	Basic knowledge on various chemicals for better understanding of biochemistry	
CO7	Applications of biofuels and nuclear chemistry	
SEMESTER – I		
COs	Course Name: BIOCHEMISTRY – I	Code: U1BC21AT Credits: 5

	OBJECTIVES: 1. To give an idea to students on chemistry, structures and classification of carbohydrates, proteins, nucleic acids, vitamins and minerals. 2. Learnt the biological importance of carbohydrates, proteins, nucleic acids, vitamins and minerals 3. To create the knowledge about the deficiency diseases of vitamins and minerals	
CO1	Basic knowledge on classification, chemistry and properties of carbohydrates	
CO2	Understanding the classification and reactions of amino acids and proteins	
CO3	Knowledge on types, classification and functions of lipids	
CO4	Understanding the types, structure and composition of Nucleic acids.	
CO5	Awareness on requirement, biological roles and deficiency diseases of vitamins and minerals.	
CO6	Understanding the significance of the complex biomolecules, polysaccharides, lipids, proteins, nucleic acids, vitamins and minerals.	
CO7	Basic understanding of Biochemistry for the undergraduate students.	
SEMESTER – II		
COs	Course Name: BIOMOLECULES	Code: U2BC21MT Credits: 5
	OBJECTIVES: 1. To provide the knowledge on various biomolecules and its significance. 2. Learnt the structure, chemical composition of nucleic acid, lipids, carbohydrate, protein 3. To provide the idea about the role of the biomolecules	
CO1	Basic knowledge on structure, chemistry and functions of carbohydrates	
CO2	Classification, structure and properties of amino acids	
CO3	Classicization, structure, shape and functions of proteins	
CO4	General knowledge on types, classification and functions of lipids	
CO5	Understanding the structure, composition and functions of Nucleic acids	
CO6	Ability to understand the significance of the complex biomolecules, polysaccharides, lipids, proteins, nucleic acids, vitamins and minerals	
CO7	Basic knowledge on various biomolecules and their significance	
SEMESTER – II		
COs	Course Name: CHEMISTRY – II	Code: U2CH21AT Credits: 5
	OBJECTIVES: 1. To provide the basic knowledge on Co-ordination chemistry. 2. To understand the Heterocyclic Compounds, Electro Chemistry, Paints and Sulpha Drugs. 3. Understanding preservatives, artificial sweetening agents and colloids	
CO1	Understanding of coordination and industrial chemistry	
CO2	Basic knowledge on heterocyclic compounds, environmental and organic chemistry	
CO3	Familiarity with electro chemistry, conductance, pH and buffer	

CO4	Information on components of paint, preservatives, artificial sweetening agents and colloids	
CO5	Knowledge on the uses and mode of action of sulpha drugs and electrochemical corrosion and its prevention	
CO6	Awareness on Coordination chemistry and Heterocyclic Compounds	
CO7	Understanding on electrochemistry, paints and sulpha drugs	
SEMESTER – II		
COs	Course Name: BIOCHEMISTRY – II	Code: U2BC21AT Credits: 5
	OBJECTIVES: 1. To provide a basic knowledge on bioenergetics, biophysics of macromolecules 2. To know the Metabolism of carbohydrates, proteins, lipids and nucleic acids 3. Basic understanding of an enzymes and hormones.	
CO1	Basic knowledge on bioenergetics and biophysics.	
CO2	Understanding the metabolism of carbohydrates and amino acids.	
CO3	Learn the metabolism of lipids and nucleic acids.	
CO4	Basic knowledge on the classification, mechanism and inhibition of enzymes.	
CO5	Awareness on biological functions and disorders of hormones.	
CO6	Understanding the metabolism of complex biomolecules, polysaccharides, lipids, proteins, nucleic acids, vitamins and minerals.	
CO7	Basic understanding of enzymes and hormones.	
SEMESTER – II		
COs	Course Name: VOLUMETRIC AND QUALITATIVE ANALYSIS	Code: U2BC21MP Credits: 5
	OBJECTIVES: 1. Analysis provides a way to identify and evaluate these interventions and to systematically and descriptively analyze alternative or new interventions	
CO1	Proficiency in volumetric analysis of basic chemicals.	
CO2	Understanding the reactions of simple sugar, proteins, and lipids	
CO3	Analysis of biochemicals by qualitative and quantitative methods.	
SEMESTER – II		
COs	Course Name: ALLIED – I PRACTICAL (CHEMISTRY)	Code: U2CH21AP Credits: 2
	OBJECTIVES: 1. To familiar with some single stage preparation of organic compounds. 2. Identification of components in a two component mixture and preparation of their derivatives.	
CO1	Develop practical skills and applications of analytical methods based on titrations.	
CO2	Practical knowledge in systematic analysis of organic compounds containing one functional group and characterization	
CO3	Understanding the qualitative test for adulterants present in foods	
SEMESTER – II		

COs	Course Name: ALLIED – I PRACTICAL (BIOCHEMISTRY)	Code: U2BC21AP Credits: 2
	OBJECTIVES: 1. To understand the various metabolic pathways operating in living cells with special emphasis on carbohydrate, lipid, amino acid, nucleic acid metabolism and the electron transport chain	
CO1	Proficiency in volumetric analysis of basic chemicals.	
CO2	Understanding the reactions of simple sugar, proteins, and lipids	
CO3	Analysis of biochemicals by colorimetric methods by single-step method.	
SEMESTER – III		
COs	Course Name: BIOPHYSICS AND ANALYTICAL BIOCHEMISTRY	Code: U3BC21MT Credits: 4
	OBJECTIVES: 1. To know the significance of biomedical instrumentation in research. 2. To provide the technical knowledge of the instruments 3. To understand the applications of the biochemical and analytical techniques.	
CO1	Proficiency in solution preparation and electrochemical techniques	
CO2	Awareness on the principle, methods and applications of chromatographic techniques	
CO3	Understanding the principle, methods and applications of electrophoresis and centrifugation	
CO4	Acquiring knowledge on colorimeter and UV-VIS-Spectrophotometer	
CO5	Basic information about the isotopes and applications of radioisotopes in biology	
CO6	Understanding the principles, methods and applications of the analytical instruments	
CO7	Awareness on biomedical instrumentation in research	
SEMESTER – III		
COs	Course Name: FUNDAMENTALS OF COMPUTER	Code: U3BC22ST Credits: 2
	OBJECTIVES: 1. To familiarize with the functionality of the various components of a system 2. To know how to produce documents in word processing packages. 3. To develop an in-depth understanding of Internet Technologies.	
CO1	Understand model, components of computer and how it works.	
CO2	Understand the concepts, structure, types and design of operating Systems.	
CO3	Recognize when to use each of the Microsoft Office programs to create professional and academic documents.	
CO4	Students will have a working knowledge of paragraph formatting, macro and mail-merge in MS-Word.	
CO5	Students will have a working knowledge of basic functions and formulas in MS-Excel.	
CO6	Understand model, components of computer networks and how it works.	
CO7	Understand the concepts, structure, types and design of operating Systems.	
SEMESTER – IV		

COs	Course Name: COMPUTER APPLICATIONS	Code: U4BC22ST Credits: 2
	OBJECTIVES: 1. To learn basic computer and keyboarding related vocabulary in English. 2. To learn basic word processing skills with Microsoft Word, such as text input and formatting, editing, cut, copy and paste, spell check, margin and tab controls, keyboard shortcuts, printing. 3. How to include some graphics such as pictures and charts.	
CO1	Understand the concepts, structure, types and design of operating Systems.	
CO2	Able to understand basics of C Programming Language	
CO3	Able to design web pages using html tags.	
CO4	Able to understand the meaning of the term Internet and its functioning.	
CO5	Can have knowledge of the various applications of internet.	
CO6	Understand the Applications of Computers in Various domains	
CO7	Understand model, components of computer networks and how it works.	
SEMESTER – III		
COs	Course Name: DIAGNOSTIC BIOCHEMISTRY – I	Code: U3BC21NM Credits: 2
	OBJECTIVES: 1. The study of diagnostic biochemistry aims to increase understanding of Specimen collection 2. Understanding of disorders of carbohydrate metabolism, liver, renal and gastric functional tests. 3. To provide the Knowledge on applications of diagnostic biochemistry.	
CO1	Basic knowledge on collection and processing of blood, urine and feces.	
CO2	Familiarity with the disorders of carbohydrate metabolism	
CO3	Understanding the structure and functions of liver and liver function tests	
CO4	Basic knowledge on kidney and renal function tests	
CO5	Analysis and interpretation of gastric function tests	
CO6	Knowledge on collection of specimens and disorders of carbohydrate metabolism, liver, renal and gastric function tests.	
CO7	Knowledge on applications of diagnostic biochemistry.	
SEMESTER – IV		
COs	Course Name: MEDICAL LABORATORY TECHNOLOGY	Code: U4BC21MT Credits: 4
	OBJECTIVES: 1. To develop an understanding about good laboratory practice and laboratory instruments. 2. To briefly elucidate on clinical pathology of body fluids. 3. To impart basic knowledge on haemopoiesis and serology.	
CO1	Understanding good laboratory practices and laboratory instruments.	
CO2	Basic knowledge on clinical pathology of body fluids.	
CO3	Acquiring knowledge on haemopoiesis and serology.	

CO4	Understanding the basic concepts of haemostasis and anaemia.	
CO5	Basic knowledge on haematology and blood banking.	
CO6	Familiarity with good laboratory practice, laboratory instruments and clinical pathology of body fluids	
CO7	Understanding of haemopoiesis, serology, haemostasis, anaemia, haematology and blood banking	
SEMESTER – IV		
COs	Course Name: DIAGNOSTIC BIOCHEMISTRY – II	Code: U4BC21NM Credits: 2
	OBJECTIVES: 1. This course would have made the students understand the significance of diagnostic bio chemistry. 2. To understand the basic concepts of haemostasis and anaemia. 3. To provide the Knowledge on applications of diagnostic biochemistry.	
CO1	Knowledge on different types of inborn errors of metabolism	
CO2	Understanding different types of plasma enzymes in diagnosis	
CO3	Awareness on lipid related disorders and its diagnostic methods	
CO4	Basic knowledge on the blood coagulation mechanism and disturbances in blood clotting	
CO5	Understanding classification of hormones and hormone assays	
CO6	Familiarity with the significance of diagnostic biochemistry	
CO7	Knowledge on basic diagnostic analysis of specimens and its importance	
SEMESTER – IV		
COs	Course Name: MEDICAL LABORATORY TECHNOLOGY	Code: U4BC21MP Credits: 5
	OBJECTIVES: 1. To develop sound knowledge on haematology and blood banking. 2. To understand the basic concepts of haemostasis and anaemia.	
CO1	Understanding and application of the hands-on knowledge gained in medical laboratory technology in their future career as well as while establishing clinical laboratories	
CO2	Basic knowledge on collection of samples, role of preservatives, and also various procedures involved in collection of clinical samples like blood, urine,	
CO3	Hands-on experience of clinical and diagnostic laboratory activities.	
SEMESTER – V		
COs	Course Name: BASIC ENZYMOLOGY	Code: U5BC21MT Credits: 5
	OBJECTIVES: 1. Introduce students to various theoretical and practical aspects of enzymology; and 2. Stimulate their interest in learning the structure, function and kinetics of enzyme and their role as catalyst and regulator of cell metabolism. 3. Serve as foundation for more advanced enzymology courses.	

CO1	Understanding the basics regarding the enzymes and their properties	
CO2	Acquiring knowledge on coenzyme and cofactors	
CO3	Understanding the kinetics of enzyme catalyzed reactions	
CO4	Familiarity with enzyme inhibitory and regulatory process	
CO5	Knowledge on applications of enzymes in industries	
CO6	Familiarity with the structure, functions and the mechanisms of action of enzymes.	
CO7	Understanding the applications of enzymes and their future potential.	
SEMESTER – V		
COs	Course Name: INTERMEDIARY METABOLISM	Code: U5BC22MT Credits: 5
	OBJECTIVES: 1. To provide much information related to carbohydrate, fat and protein metabolism that takes place in our body. 2. This course use to know about metabolism and disorders 3. Detailed descriptive about ETC and photosynthesis	
CO1	Knowledge on carbohydrate pathways and metabolism	
CO2	Understanding the Electron Transport Chain and Photosynthesis	
CO3	Understanding the importance of metabolism of lipids	
CO4	Acquiring the knowledge the protein metabolism	
CO5	Basic knowledge on biosynthesis and degradation of nucleic acids	
CO6	Understanding the relationship between carbohydrate, fat and protein metabolism	
CO7	Basic knowledge in metabolism and disorders.	
SEMESTER – V		
COs	Course Name: GENETICS AND MOLECULAR BIOLOGY	Code: U5BC23MT Credits: 5
	OBJECTIVES: 1. To provide the strong knowledge in the mechanism of synthesis of DNA, RNA and proteins, 2. This course use to know the gene regulation, gene mutation and DNA repair in prokaryotes and eukaryotes. 3. It provide knowledge about the DNA repair mechanism in eukaryotes and prokaryotes	
CO1	Basic knowledge about the genes, DNA, Chromosome and Mendalian laws	
CO2	Acquiring knowledge in DNA synthesis in prokaryotes and Eukaryotes	
CO3	Understanding the mechanism of RNA biosynthesis	
CO4	Understanding the uses of genetic code and steps involved in protein synthesis	
CO5	Knowledge on Gene Regulation, Mutation and Repair Mechanism	
CO6	Awareness on synthesis of DNA, RNA and proteins	
CO7	Familiarity in gene regulation, gene mutation and DNA repair in prokaryotes and eukaryotes	
SEMESTER – V		
COs	Course Name: HORMONAL AND NUTRITIONAL BIOCHEMISTRY	Code: U5BC24ET Credits: 5

	OBJECTIVES: 1. The course will give a detailed description of the knowledge hormones and their importance. 2. Understanding of human nutrition, nutritional aspects 3. Detail descriptive of the various classes of food with the nutritional requirements	
CO1	Basic knowledge about classification of hormones as well as the secretion, release and biological functions of hypothalamus and pituitary hormones	
CO2	Understanding the Chemical nature, secretion, function and disorder of thyroid, parathyroid and Pancreatic hormones	
CO3	Knowledge on the adrenal and sex hormones	
CO4	Understanding the composition of food, physiological role and nutritional significance of Carbohydrates, Lipids and Proteins	
CO5	Basic knowledge about the nutritional significance of dietary elements and vitamins	
CO6	Awareness on the hormones and their biological functions	
CO7	Comprehensive knowledge on human nutrition, nutritional aspects of the various classes of food with the nutritional requirements	
SEMESTER – V		
COs	Course Name: BIOCHEMICAL AND ENVIRONMENTAL TOXICOLOGY	Code: U5BC25ET Credits: 5
	OBJECTIVES: 1. introduce students to the subject of toxicology in general and biochemical toxicology in particular 2. Make students aware of the various types of toxicant in the environment, and 3. Teach students how toxicants interact with living systems, especially human	
CO1	Understanding the basics and scope of toxicology	
CO2	Basic knowledge on principles and procedures of testing for acute toxic effects	
CO3	Awareness in Genetic Toxicity Testing and Mutagenesis Assays regarding the toxicity	
CO4	Understanding the food toxicology	
CO5	Basic knowledge on the management of toxicological risk, Regulatory systems and organizations about the air related toxicological effects	
CO6	General awareness of biochemical toxicology	
CO7	Awareness of the various types of toxicant in the environment and how toxicants interact with living systems, especially human.	
SEMESTER – V		
COs	Course Name: BIO STATISTICS	Code: U5BC26ST Credits: 3
	OBJECTIVES: 1. To apply Statistics methods for Mathematical Problems. 2. This course help to calculate the data in different ANOVA methods 3. It clarify the collection of the data and statistical calculation	
CO1	Learning about representation of data by using diagram and graphs	

CO2	Calculating various measures of Central Tendency
CO3	Comparing two series of statistical data
CO4	Testing Large sample and Small sample of data
CO5	Knowing about ANOVA technique for a given data
CO6	Choose and apply appropriate statistical methods for analyzing one or two variables
CO7	Recognize the importance of data collection and its role in determining scope of inference

SEMESTER – VI

COs	Course Name: HUMAN ANATOMY AND PHYSIOLOGY	Code:U6BC21MT Credits:5
	OBJECTIVES: 1. To provide the strong knowledge in the structure and functions of human body 2. To impart basic knowledge about digestive system, excretory system, and some other vital systems in the human body. 3. Familiarity in the structure and functions of organs.	
CO1	Basic knowledge on the basic structure of human body - bone, cartilage, ligaments and tendons	
CO2	Understanding the structure and function human alimentary canal as well as the structure and function of kidney	
CO3	Familiarity in the structure and functions of lungs and heart, mechanism of respiration as well as the pulmonary and systemic circulations	
CO4	General awareness of nervous and muscular system and mechanism of muscle contraction	
CO5	Knowledge in characteristics of skin, nail, and hair along with various methods and radiology techniques used in anatomy	
CO6	Understanding the mechanism of vital organs of the human body	
CO7	Understanding the structure and functions of human body - digestive system, excretory system, and other vital systems in the human body	

SEMESTER – VI

COs	Course Name: CLINICAL BIOCHEMISTRY	Code: U6BC22MT Credits: 5
	OBJECTIVES: 1. To enable the students to learn the disorders of carbohydrate metabolism, lipid metabolism and amino acid metabolism. 2. To impart basic knowledge on organ function tests of liver, pancreas, kidney and stomach. 3. To acquaint the student with the concepts on diagnostic enzymology and tumour markers.	
CO1	Understanding the disorders of carbohydrate metabolism	
CO2	Importance of lipid and amino acid metabolism and disorders related to them.	
CO3	Awareness on various liver function tests and pancreatic function tests	
CO4	Knowledge on the renal function tests and gastric function tests	

CO5	Applications of the enzymes used in diagnostic biochemistry and markers linked to tumour.	
CO6	Comprehensive knowledge on the disorders of carbohydrate metabolism, lipid metabolism and amino acid metabolism.	
CO7	Basic knowledge on organ function tests of liver, pancreas, kidney and stomach.	
SEMESTER – VI		
COs	Course Name: BIOTECHNOLOGY	Code: U6BC23ET Credits: 5
	OBJECTIVES: 1. To provide the basic knowledge on cloning methods 2. It provide the outline of the tissue culture techniques 3. It helps to know about applications of genetic engineering to the students.	
CO1	Information on various tools used in genetic engineering technology	
CO2	Understanding the different methods of gene transfers in rDNA technology	
CO3	Awareness on media composition and growth regulators as well as the types of culture, initiation and differentiation in plant tissue culture	
CO4	Basic knowledge on animal cell culture techniques	
CO5	Awareness on transgenic animals and plants in the application of Biotechnology	
CO6	Understanding on culture media and tissue culture techniques	
CO7	Basic knowledge on cloning methods, tissue culture techniques and applications of genetic engineering	
SEMESTER – VI		
COs	Course Name: PLANT BIOCHEMISTRY AND PLANT MOLECULAR BIOLOGY	Code: U6BC24ET Credits: 5
	OBJECTIVES: 1. The objective is to provide a good working knowledge of the important biological processes in plants 2. To understand developments in plant biochemistry. 3. To provide basic knowledge in molecular mechanisms controlling plant growth, development, function and adaptation	
CO1	Basic knowledge on photosynthesis	
CO2	Information on plant hormones and nitrogen metabolism	
CO3	Awareness on plant disease and secondary metabolites	
CO4	Understanding plant physiology and mechanism of water absorption	
CO5	Familiarity with molecular mechanisms controlling plant growth, development, function and adaptation	
CO6	Comprehensive knowledge on biological processes in plants	
CO7	Understanding the developments in plant biochemistry	
SEMESTER – VI		
COs	Course Name: IMMUNOLOGY	Code: U6BC25ET Credits: 5

	OBJECTIVES: 1. To provide the basic concepts of immunology 2. This follows the course of immune response. 3. Knowledge on the various mechanisms by which microbial pathogens cause disease and the interaction with the host.	
CO1	Basic knowledge on immunology	
CO2	Understanding the antigen, antibody and vaccine	
CO3	Familiarity in reactions of antigen and antibody and importance of Complement	
CO4	Awareness on the transplantation process and immunodeficiency disorders	
CO5	Detailed knowledge on Allergy, Hypersensitivity and autoimmune disorders	
CO6	Understanding the terminology and techniques in microbiology and immunology.	
CO7	Understanding the microbiology and immunology	
SEMESTER – VI		
COs	Course Name: BIONANOTECHNOLOGY	Code: U6BC26ET Credits: 5
	OBJECTIVES: 1. The objective of this course is to provide basic knowledge about nanotechnology. 2. Understanding its application in biological science 3. It clarify the nanomedicine production process	
CO1	Basic knowledge in nano-biomaterials used in Bionanotechnology	
CO2	Knowledge on interaction between biomolecules and nanoparticle surface	
CO3	Development of nanomedicines	
CO4	Understanding the molecular and cellular biology techniques used in nanotechnology	
CO5	Basic knowledge on nanoparticle synthesis	
CO6	Understanding the fundamental principles of nanotechnology and their application to biomedical engineering	
CO7	Knowledge on nanotechnology and its application in biological science	
SEMESTER – VI		
COs	Course Name: PHARMACOLOGY AND PHARMACEUTICAL BIOCHEMISTRY	Code: U6BC27ST Credits: 2
	OBJECTIVES: 1. To impart knowledge on general pharmacology, metabolism and excretion of drugs and the biological mechanism of drug action. 2. To understand the actions and uses of drugs acting on central and autonomous nervous system, cardiovascular system and chemotherapeutic drugs. 3. To create awareness on novel therapeutics such as enzymes, antioxidants, gene therapy, recombinant vaccines and monoclonal antibodies.	
CO1	Knowledge on general pharmacology, drug metabolism and excretion of drugs	
CO2	Understanding the biological mechanism of drug action	
CO3	Awareness on drugs acting on central and autonomous nervous system	
CO4	Familiarity in cardiovascular drugs and chemotherapy mechanism	

CO5	Awareness on novel therapeutics such as enzymes, antioxidants, gene therapy, recombinant vaccines and monoclonal antibodies.	
CO6	Knowledge on general pharmacology, metabolism and excretion of drugs and the biological mechanism of drug action.	
CO7	Understanding the actions and uses of drugs acting on central and autonomous nervous system, cardiovascular system and chemotherapeutic drugs.	
SEMESTER – VI		
COs	Course Name: BLOOD ANALYSIS AND ENZYMOLOGY	Code: U6BC21MP Credits: 5
	OBJECTIVES: 1. The course also aims to outline the applications of enzymes in disease diagnosis 2. It diverse diagnosis therapy as well as role of enzyme in industry.	
CO1	Analysis of biochemical constituents of blood	
CO2	Ability to perform enzyme assays	
CO3	Familiarity in the Separation of DNA by Agarose Gel Electrophoresis and Separation of Proteins by SDS – PAGE	
SEMESTER –VI		
COs	Course Name: FOOD ANALYSIS, MICROBIOLOGY AND SEPARATION TECHNIQUES	Code: U6BC22EP Credits: 4
	OBJECTIVES: 1. To impart basic understanding of microbial techniques by hands on experience on working with microorganisms.	
CO1	Analysisof basic components in food samples	
CO2	Isolation of pure culture, Serial dilution and Staining techniques in microbiology	
CO3	Familiarity in separation of biological compound such as Carbohydrates and Amino acids by Paper Chromatography and separation of Lipids by TLC	

M.Sc. BIOCHEMISTRY

SEMESTER – I		
COs	Course Name: CHEMISTRY OF MACROMOLECULES	Code: P1BC21MT Credits: 4
	OBJECTIVES: 1. To provide the knowledge on various bio-molecules and its significance. 2. To impart basic knowledge about role and function of macromolecules. 3. Comprehensive knowledge about composition of macromolecules	
CO1	Classification of carbohydrates along with their functions.	
CO2	Awareness on the structure, classification and functions of amino acids and proteins.	
CO3	Knowledge of nucleic acids along with their functions.	
CO4	Nomenclature of lipids and their functions.	
CO5	Basic knowledge on structure and biological functions of heterocyclic compounds and porphyrins and vitamins	

CO6	Understanding the significance of the complex bio molecules such as polysaccharides, lipids, proteins, nucleic acids, vitamins and porphyrins.	
CO7	Comprehensive knowledge about vitamins and porphyrins	
SEMESTER – I		
COs	Course Name: CELL BIOLOGY AND GENETICS	Code: P1BC22MT Credits: 4
	OBJECTIVES: 1. The study of cell biology and genetics 2. This course aims to improve the understanding cell, cellular organelles and genetics of living systems. 3. To give basic knowledge on molecular genetics	
CO1	Awareness on cellular organization, division and transport	
CO2	Knowledge intercellular junction and cell death	
CO3	Understanding intracellular vesicular trafficking	
CO4	Knowledge on molecular genetics	
CO5	Analysis of mutation and repair mechanism	
CO6	Understanding the fundamental principles of cell biology	
CO7	Comprehensive knowledge of cell structure functions genetic and mutations	
SEMESTER – I		
COs	Course Name: BIOPHYSICAL AND BIOCHEMICAL TECHNIQUES	Code: P1BC23MT Credits: 4
	OBJECTIVES: 1. The course intends to familiarize students with the basic concepts and analytical techniques and methods in spectroscopy and separation methods. 2. This course helps to become a competent in experimental techniques. 3. It aims to intent the practical skill	
CO1	Basic principles of electrochemical techniques	
CO2	Knowledge on basic principles, operational methods, and biological applications centrifugation techniques and radioactivity.	
CO3	Basic knowledge on electrophoretic techniques and their applications.	
CO4	Basic principles, methods, instrumentation and biological applications of various chromatography techniques.	
CO5	Basic knowledge on spectroscopic techniques, turbidometry, nephelometry and luminometry	
CO6	Ability to have a basic understanding of the theoretical principles involved in Bioinstrumentation.	
CO7	Practical skills and techniques required in biochemical analysis, to become competent in the basic experimental techniques of biochemistry.	
SEMESTER – I		
COs	Course Name: CHEMISTRY AND NANOSCIENCE FOR BIOLOGISTS	Code: P1BC24ET Credits: 4

	OBJECTIVES: 1. To impart basic knowledge on atoms, molecules and chemical bonding and to provide an understanding on the role on metal ions in biological systems. 2. To understand the nomenclature and reaction mechanisms of organic compounds. 3. To create awareness on synthesis, characterization and applications of nanomaterials.	
CO1	Basic knowledge on atoms, molecules and chemical bonding.	
CO2	Understanding on the role on metal ions in biological systems	
CO3	Understanding the nomenclature and reaction mechanisms of organic compounds.	
CO4	Awareness on synthesis, characterization and applications of nanomaterials.	
CO5	Basic knowledge on biomedical applications of nano material	
CO6	Understanding about atoms, molecules and chemical bonding, the role on metal ions in biological systems and the nomenclature and reaction mechanisms of organic compounds.	
CO7	Biosynthesis, characterization and applications of nanomaterials.	
SEMESTER – I		
COs	Course Name: GENETIC ENGINEERING	Code: P1BC25ET Credits: 4
	OBJECTIVES: 1. To provide the strong knowledge on cloning methods, tissue culture techniques 2. Understanding the applications of genetic engineering to the students. 3. To provide brief knowledge about the culture media and tissue culture technique	
CO1	Knowledge on gene cloning, isolation and purification of DNA,	
CO2	Techniques of cloning and expression vector.	
CO3	Awareness on DNA modifying enzymes	
CO4	Understanding the tools of genetic engineering	
CO5	Knowledge on construction of genetic libraries	
CO6	Comprehensive understanding of the components of culture media and various tissue culture techniques	
CO7	Understanding the technique of genetic engineering in plants and animals.	
SEMESTER – II		
COs	Course Name: BIOENERGETICS AND INTERMEDIARY METABOLISM	Code: P2BC21MT Credits: 5
	OBJECTIVES: 1. To provide much information related to carbohydrate, fat and protein metabolism that takes place in our body. 2. This course give an outline in production of ATP. 3. Impart a Knowledge on transamination, deamination and urea cycle.	
CO1	Knowledge on thermodynamics, oxidative phosphorylation and mitochondrial transport system	

CO2	Understanding chemical reactions involved in the carbohydrate metabolism and production of ATP.	
CO3	Process of lipid fatty acid oxidation, phospholipids and cholesterol metabolism	
CO4	Knowledge on transamination, deamination and urea cycle.	
CO5	Metabolism of purine and pyrimidine and understanding the integration of carbohydrate, protein, lipid metabolism.	
CO6	Awareness of interrelationship between carbohydrate, fat and protein metabolism.	
CO7	Knowledge on various disorders related to each metabolism.	
SEMESTER – II		
COs	Course Name: ENZYMOLOGY AND ENZYME TECHNOLOGY	Code: P2BC22MT Credits: 4
	OBJECTIVES: 1. Introduce students to various theoretical and practical aspects of enzymology 2. Stimulate their interest in learning the structure, function and kinetics of enzyme and their role as catalyst and regulator of cell metabolism. 3. Enzyme inhibition and regulation and advancement in industrial and clinical uses of enzymes.	
CO1	Basic knowledge on theoretical and practical aspects of enzymology	
CO2	Understanding kinetics of enzyme	
CO3	Knowledge on structure, functions and the mechanisms of action of co-enzymes.	
CO4	Processes in enzyme inhibition and regulation and instrumental techniques used in enzyme assay.	
CO5	Industrial and clinical application of enzymes	
CO6	Comprehensive knowledge on the structure, functions and the mechanisms of action of enzymes.	
CO7	Exposure to the applications of enzymes	
SEMESTER – II		
COs	Course Name: ADVANCED BIOTECHNOLOGY	Code: P2BC23MT Credits: 4
	OBJECTIVES: 1. To equip the students with innovative thinking by providing the strong information in gene cloning techniques, 2. Tissue culture techniques and large scale production of bioactive molecules 3. Fermentation technology.	
CO1	Knowledge on innovative tools in genetic engineering	
CO2	Understanding cloning strategies, IVF, Gene transfer method	
CO3	Awareness of techniques in recombinant technology PCR, RT-PCR, Blotting and hybridoma technology	
CO4	Wide knowledge on tissue culture technique and its application	
CO5	Industrial biotechnology and gene therapy	
CO6	Broad knowledge on plant and animal tissue culture	

CO7	Understanding bioprocess technology – fermentation methods and production of important compounds by using fermentation technology.	
SEMESTER – II		
COs	Course Name: PLANT BIOCHEMISTRY AND PLANT ECOLOGY	Code: P2BC24ET Credits: 4
	OBJECTIVES: 1. Stimulate their interest in biology at genetic, molecular, physiological, and organismal levels to integrate plant functionalities in a hierarchical manner, from individual cells to the biosphere. 2. Discuss evolution as the foundation of all biological systems . 3. Integrate evolutionary biology to describe patterns of plant diversity and ecological interaction.	
CO1	Knowledge on plant cell structure and transport mechanism	
CO2	Understanding the photosynthesis and nitrogen metabolism in plants	
CO3	Basic knowledge on plant ecology	
CO4	Awareness on plant adaptation ecology, pollination and seed dispersal	
CO5	Knowledge on microbiology and microbial techniques	
CO6	Comprehensive knowledge on plant biochemistry	
CO7	Awareness on plant ecology and plant adaptation.	
SEMESTER – II		
COs	Course Name: BIOINFORMATICS	Code: P2BC25ET Credits: 4
	OBJECTIVES: 1. To provide the knowledge on bioinformatics tools for the management . 2. It helps to provide knowledge an utilization of bioinformatics skills in the research to the students. 3. This course impart idea to drug designing, 3D structural analysis of biomolecules	
CO1	Knowledge on computers, hardware, internet, email and world wide web	
CO2	Awareness of operating systems, MS office, MS word, logic development programming language	
CO3	Exposure to bioinformatics tools, BLAST and FASTA	
CO4	Analysis of secondary structure of RNA, DNA and protein through bioinformatics	
CO5	Understanding the 3D structural analysis of biomolecules, study of substrate-ligand binding and drug designing	
CO6	Comprehensive understanding of bioinformatics tools.	
CO7	Methodologies and research oriented applications of bioinformatics	
SEMESTER – II		
COs	Course Name: ISOLATION AND CHARACTERIZATION STUDIES AND QUANTITATIVE ANALYSIS	Code: P2BC21MP Credits: 5

	OBJECTIVES: 1. The objective of this course is to understand the working principles, instrumentation and applications of the instruments in various disciplines of biological sciences	
CO1	Isolation and characterization of DNA and RNA and glycogen	
CO2	Qualitative and quantitative analysis of minerals	
CO3	Knowledge of the separation of biomolecules/cells/organelles by selecting appropriate techniques.	
SEMESTER – II		
COs	Course Name: ENZYMOLOGY AND PLANT BIOCHEMISTRY	Code: P2BC22MP Credits: 5
	OBJECTIVES: 1. To understand the classification, kinetics, mechanism of action, regulation and applications of enzymes.	
CO1	Ability to perform enzyme assays	
CO2	Understanding molecular biology experiments	
CO3	Phytochemical analysis and antioxidant activities	
SEMESTER – III		
COs	Course Name: HORMONAL CONTROL AND SIGNAL TRANSDUCTION	Code: P3BC21MT Credits: 4
	OBJECTIVES: 1. To provide the basic knowledge on endocrine hormones and their mechanism of action. 2. Awareness on endocrinal activities, mechanism and actions and signal transductions 3. To equip the students to work as a endocrinologist	
CO1	Basic knowledge on endocrine hormones and their mechanism and structure of G-protein	
CO2	Understanding the principles of cell signaling, Signal cascade, inhibitors of signal cascade.	
CO3	Knowledge on hormones of pituitary and pancreatic gland	
CO4	Basic knowledge on thyroid and gonadal hormone	
CO5	Basic knowledge on glucocorticoids, mineralocorticoids and calcium regulating hormones and its disorders.	
CO6	Broad understanding of various endocrine glands and their hormones.	
CO7	Awareness on endocrinal activities, mechanism and actions and signal transductions.	
SEMESTER – III		
COs	Course Name: RESEARCH METHODOLOGY	Code: P3BC22MT Credits: 4

	OBJECTIVES: 1. To provide knowledge on collection and analysis of data using statistical tools. 2. To create awareness on bioinformatics and biological databases. 3. To impart basic knowledge on animal experimentation and intellectual property rights.	
CO1	Knowledge on research problem and finding scientific articles with Internet.	
CO2	Methodology on collection and analysis of data using statistical tools.	
CO3	Awareness on bioinformatics and biological databases	
CO4	Basic knowledge on animal experimentation and intellectual property rights.	
CO5	Knowledge on preparation of research reports.	
CO6	Broad knowledge on research problems, analysis of data using statistical tools, and tools used in bioinformatics	
CO7	Animal experimentation and preparation of research reports.	
SEMESTER – III		
COs	Course Name: ADVANCED MOLECULAR BIOLOGY	Code: P3BC23MT Credits: 4
	OBJECTIVES: 1. To provide the strong knowledge in the mechanism of synthesis of DNA, RNA and proteins. 2. Gene regulation, gene mutation and DNA repair in prokaryotes and eukaryotes. 3. To develop the knowledge about the ethics followed in drug safety, human gene therapy	
CO1	Understanding the DNA replication in prokaryotes and eukaryotes.	
CO2	Knowledge on RNA polymerases, post transcriptional modification, reverse transcription.	
CO3	Awareness on genetic code, protein biosynthesis, gene expressions	
CO4	Understanding the type of mutation, DNA repair mechanism and mutagenesis	
CO5	Knowledge on regulation of gene in prokaryotes, GM food, ethics in drug safety, human gene therapy	
CO6	Comprehensive knowledge on the synthesis of genetic material, RNA and proteins.	
CO7	Overview of gene repair mechanism, gene regulations, epigenetics and bioethics	
SEMESTER – III		
COs	Course Name: PHYTOCHEMISTRY AND PHYTOTHERAPY	Code: P3BC24MT Credits: 3
	OBJECTIVES: 1. To provide the acquire knowledge on medicinal use of plants and plant extracts for therapeutic purposes. 2. To create the Awareness inducing diseases in animal models and use of herbal plants for treating diseases animal models 3. This course helps to predict the secondary compounds present in plants.	
CO1	Knowledge on Indian systems of medicines – Siddha, Ayurveda, Unani, tribal medicine, cultivation, collection and processing of herbal plant.	

CO2	Standardization of herbal drug as per WHO guidelines, plant growth regulator and their function.
CO3	Basic knowledge on classification of crude drug, extraction, screening of phytochemicals using techniques like GCMS, HPTLC, FTIR, UV
CO4	Understanding the biological evaluation of herbal drugs by acute toxicity study & induction of diseases in animal models.
CO5	Knowledge on <i>in-vitro</i> antioxidant assay of plant extract - DPPH, H ₂ O ₂ , OH ⁻ , herbal plant used for treating different disorders.
CO6	Broad knowledge on cultivation of herbs, standardization, classification and screening of herbal drugs.
CO7	Awareness inducing diseases in animal models and use of herbal plants for treating diseases animal models.

SEMESTER – III

COs	Course Name: IMMUNOLOGY AND STEM CELL TECHNOLOGY	Code: P3BC25ET Credits: 4
	OBJECTIVES: 1. To provide the basic concepts of immunology this follows the course of immune response. 2. The various mechanisms by which microbial pathogens cause disease and the interaction with the host. 3. This course helps to gain knowledge on immune system, immunity, transplantation and hypersensitivity.	
CO1	Knowledge on immune system, immunization, vaccine production and structure of immunoglobulin.	
CO2	Understanding the types of immunity, immune suppressive agent and complement system	
CO3	Awareness on transplantation, hypersensitivity and basics of genetic immunology	
CO4	Knowledge on autoimmune disorders, immune deficiency disease, and techniques used to diagnose antigen-antibody reactions, tumor marker.	
CO5	Basic knowledge on stem cell technology.	
CO6	Comprehensive knowledge on immune system, immunity, transplantation and hypersensitivity.	
CO7	Awareness on autoimmune disorders and stem cell technology	

SEMESTER – III

COs	Course Name: PHARMACEUTICAL BIOCHEMISTRY	Code: P3BC26ET Credits: 4
	OBJECTIVES: 1. To impart knowledge on general pharmacology, metabolism and excretion of drugs and the biological mechanism of drug action. 2. To create awareness on novel therapeutics such as enzymes, antioxidants, gene therapy, recombinant vaccines and monoclonal antibodies. 3. To understand the actions and uses of plant based drugs	

CO1	Knowledge on general pharmacology, metabolism and excretion of drugs and the biological mechanism of drug action.	
CO2	Awareness on assay of drug potency, adverse responses to drugs and vaccination against infections	
CO3	Understanding the novel drug delivery system, anti-AIDS drug development and multi-drug resistance	
CO4	Basic knowledge on mechanism of action of drugs used in diseases of respiratory system, antimicrobial drugs, hypolipidemic drugs and oral diabetic drugs.	
CO5	Knowledge on drugs of plant origin, immunosuppressive gene therapy and novel drugs screening strategies	
CO6	Familiarity with general pharmacology, metabolism and excretion of drugs and the biological mechanism of drug action	
CO7	Applications of novel therapeutics and plant based drugs.	
SEMESTER – IV		
COs	Course Name: HUMAN PHYSIOLOGY AND NUTRITION	Code: P4BC21MT Credits: 4
	OBJECTIVES: 1. To provide a comprehensive, balanced introduction to this exciting, evolving and multi-disciplinary field. 2. To Provide Basic knowledge on function of nervous system, muscle contraction, muscle protein 3. This course aim to understand the anatomy and physiology of circulatory and respiratory system	
CO1	Knowledge on the mechanism of digestion and absorption of food, structure of kidney and formation of urine	
CO2	Understanding the anatomical structures of human respiratory system, nervous system, cardiovascular and digestive and excretory system	
CO3	Knowledge on anatomy and physiology of circulatory system and respiratory system	
CO4	Basic knowledge on function of nervous system, muscle contraction, muscle protein	
CO5	Awareness on food and nutrition, calorific value, BMR, water as essential nutrient and electrolytes, vitamins and minerals.	
CO6	Broad knowledge on anatomical structure and functional activities of the internal vital organs	
CO7	Awareness on nutritional disorders, kwashiorkor and marasmus, dietary requirement for infants, children and pregnant and lactating women, and geriatric nutrition	
SEMESTER – IV		
COs	Course Name: ADVANCED CLINICAL BIOCHEMISTRY	Code: P4BC22MT Credits: 4

	OBJECTIVES: 1. To impart knowledge on the disorders of carbohydrate metabolism, nucleic acid metabolism, lipid metabolism and amino acid metabolism. 2. To develop an understanding of organ function tests of liver, pancreas, kidney and stomach. 3. To develop knowledge on the concepts on diagnostic enzymology and hormonal tests.	
CO1	Knowledge on the disorders of carbohydrate metabolism, nucleic acid metabolism, lipid metabolism and amino acid metabolism.	
CO2	Familiarity with disorders of fatty liver, atherosclerosis, obesity, anemia, inborn errors of metabolism and plasma protein abnormalities	
CO3	Basic knowledge on organ function test of liver, pancreas, kidney and GIT	
CO4	Knowledge on the concept of diagnostic enzymology and hormone assays	
CO5	Awareness on the basic concepts of antioxidants, morphological and biochemical characteristics of cancer	
CO6	Comprehensive knowledge on metabolic disorders and organ function tests	
CO7	Awareness of diagnostic enzymology, hormone assays, antioxidants and cancer	
SEMESTER – IV		
COs	Course Name: BIOCHEMICAL ANALYSIS OF BLOOD, ANTIOXIDANT AND IMMUNOLOGICAL STUDIES	Code: P4BC21MP Credits: 5
	OBJECTIVES: 1. To impart knowledge about the biochemical basis of various diseases and disorders 2. To study various diagnostic and therapeutic methodologies available for diseases and disorders.	
CO1	Proficiency in biochemical analysis of blood biomarkers	
CO2	Ability to assay antioxidants	
CO3	Basic knowledge on separating techniques and immunological techniques	
SEMESTER – IV		
COs	Course Name: HAEMATOLOGICAL METHODS, URINE ANALYSIS AND MICROBIAL BIOCHEMISTRY	Code: P4BC22MP Credits: 5
	OBJECTIVES: 1. To impart knowledge on Haematological Methods, 2. Urine Analysis and Microbial Biochemistry	
CO1	Knowledge on collection and storage of blood, and analysis of blood cell components	
CO2	Analysis of abnormal constituents in urine and quantitative analysis constituents in urine sample	
CO3	Knowledge on isolation and identification of bacteria from effluent water and staining techniques.	
SEMESTER – IV		

COs	Course Name: PROJECT / DISSERTATION WITH VIVA-VOCE	Code: P4BC212PV Credits: 8
	OBJECTIVES: 1. To develop an understanding of basic research in science. 2. To impart knowledge on the experimental studies and analysis of results. 3. To understand the basic concepts of research publications.	
CO1	Retrieve, evaluate, and interpret professional literature and use this information to develop theoretical framework, testable hypothesis and ability to use various research methods for research work.	
CO2	Design realistic and feasible research projects and prepare necessary protocol.	
CO3	Develop and communicate educational research, able to communicate with researchers and practitioners through writing and/or presentations.	

M.Phil. BIOCHEMISTRY

SEMESTER – I		
COs	Course Name: RESEARCH METHODOLOGY	Code: M1RM21SM Credits: 5
	OBJECTIVES: 1. To create awareness on bioinformatics and biological databases. 2. To impart basic knowledge on animal experimentation and intellectual property rights. 3. To develop sound knowledge on preparation of research reports.	
CO1	Knowledge on objectives of research in scientific method and finding scientific articles.	
CO2	Basic knowledge on Research problems and designing of research	
CO3	Collection and analysis of data, and documentation using internet	
CO4	Ability to perform statistical analysis of data	
CO5	Basic knowledge on preparation of research report	
CO6	Awareness on animal experimentation and intellectual property rights.	
CO7	Knowledge on bioinformatics and biological databases.	
SEMESTER – I		
COs	Course Name: ANALYTICAL METHODS	Code: M1BC21MT Credits: 5
	OBJECTIVES: 1. The primary objectives of this course is to develop the skills to understand the theory and practice of bio analytical techniques 2. To provide scientific understanding of analytical techniques and detail interpretation of results. 3. To understand the strengths, limitations and creative use of techniques in research and for problem-solving.	
CO1	Awareness on the basic principles of manometry and chromatography	
CO2	Basic knowledge on electrophoretic and centrifugation technique and their	

	applications
CO3	Familiarity with the basic principles, methods, instrumentation and biological applications of blotting and immunological techniques
CO4	Basic knowledge on spectroscopic techniques, principle and application of GC-MS, TOF, MALDI
CO5	Knowledge on the basic principles, operational methods, hazards and biological applications of radioactivity.
CO6	Comprehensive understanding of the theoretical principles involved in Bioinstrumentation and familiarity with working principals, tools and techniques of analytical techniques
CO7	Understanding the strengths, limitations and creative use of techniques in research and for problem-solving.
SEMESTER – I	
COs	Course Name: CLINICAL BIOCHEMISTRY AND PHYTOTHERAPY Code: M1BC22MT Credits: 5
	OBJECTIVES: 1. To impart knowledge on the disorders of carbohydrate metabolism, nucleic acid metabolism, lipid metabolism. 2. To develop an understanding of organ function tests of liver and kidney. 3. To develop knowledge on the concepts on diagnostic enzymology and hormonal tests.
CO1	Knowledge on collection, analysis and interpretation of blood and urine, and introduction to nanoparticles and phytochemicals.
CO2	Familiarity with the disorders of carbohydrate and lipid metabolism
CO3	Knowledge on disorders of protein metabolism and serum enzyme activities in diseases.
CO4	Familiarity with the organ function test.
CO5	Awareness on free radicals and cancer.
CO6	Overview on clinical biochemistry-based research
CO7	Methodology on phytochemical and phytotherapeutic research
SEMESTER – II	
COs	Course Name: PROJECT / DISSERTATION WITH VIVA-VOCE Code: M2BC212PV Credits: 21
	OBJECTIVES: 1. To develop an understanding of basic research in science. 2. To impart knowledge on the experimental studies and analysis of results. 3. To understand the basic concepts of research publications
CO1	Retrieve, evaluate, and interpret professional literature and use this information to develop theoretical framework, testable hypothesis and ability to use various research methods for research work.
CO2	Design realistic and feasible research projects and prepare necessary protocol.
CO3	Prepare and submit manuscripts resulting from their independent research for publication in professional peer-reviewed journals.

B.Sc. MICROBIOLOGY

SEMESTER – I		
COs	Course Name: GENERAL MICROBIOLOGY	Code: U1MB21MT Credits: 3
	OBJECTIVES: 1. The subject aims to understand the scope & history of the microbiology. 2. To understand the basic concept of Microscope, microbial staining techniques & to control the contaminants 3. Principles of physical and chemical methods used in the control of microorganisms and apply this understanding to the prevention and control of infectious diseases.	
CO1	Understand the role and importance of microbiologists in the field of science.	
CO2	Acquire knowledge on classification, observation and control or removal of various microorganisms.	
CO3	Develop a good insight on various contributions given by the eminent scientist who paved a way for the development of microbiology as one of the major disciplines.	
CO4	Understand the basic principle behind the various types of microscopes for exploring the microbial world.	
CO5	Describe the various classification systems and the characteristics of diverse microbial groups.	
CO6	Appreciate various differential and special staining techniques to visualize various Microbes.	
CO7	Comprehend the various methods of sterilization and disinfection to control the contaminating microorganism and also to recognize the antibiotics used to control pathogenic microorganism and their drug resistance.	
SEMESTER – II		
COs	Course Name: MICROBIAL PHYSIOLOGY	Code: U2MB21MT Credits: 4
	OBJECTIVES: 1. The aim of the subject is to gain the knowledge on anatomy, nutrition, cultivation, microbial growth. 2. To understanding the fundamental biology of microorganisms and their interactions between themselves, other organisms and the environment. 3. The major features of growth and metabolism of microorganisms including determination of growth curve environmental influence on the microbial growth and primary and secondary metabolism, and microbial relationships.	
CO1	Understand the basic anatomy and metabolic functions of bacteria.	
CO2	Acquire knowledge on media preparation, isolation, cultivation, growth measurement and preservation.	
CO3	Describe the basic microbial structure and functions.	

CO4	Understand the nutrients required for the growth and development of bacteria.	
CO5	Comprehend the various aseptic techniques for isolation of pure cultures and their preservation.	
CO6	Elucidate the physical and chemical growth requirements of bacteria and get equipped with different methods of growth measurements.	
CO7	Compare aerobic and anaerobic respiration of bacteria.	
SEMESTER – II		
COs	Course Name: GENERAL MICROBIOLOGY AND MICROBIAL PHYSIOLOGY	Code: U2MB22MP Credits: 2
	OBJECTIVES: 1. The aim of the subject is to gain the practical knowledge on sterilization, staining, culture techniques , preservation and identification of Fungi.	
CO1	Acquire practical skills to perform routine laboratory tasks effectively and safely.	
CO2	Demonstrate various staining techniques for the observation of bacteria and fungi.	
CO3	Exemplify various culture media preparation and pure culture techniques for the isolation of microorganism.	
CO4	Analyze the biochemical characteristics for the identification of microorganisms.	
CO5	Evaluate the antimicrobial susceptibility test and assess the drug resistance status of microbes.	
CO6	Able to measure the size of the microorganisms	
CO7	Enable to preserve and maintain microbial culture.	
SEMESTER – II		
COs	Course Name: ALLIED MICROBIOLOGY PRACTICAL II	Code: U2MB21AP Credits: 2
	OBJECTIVES: 1. The student will be able to evaluate methods used to identify infectious agents in the clinical microbiology lab. 2. The student will be able to recall isolation of microorganisms from soil, water, air, etc. 3. Students know the isolation of enzymes from microbes	
CO1	Demonstrate the practical skills in microscopy and their handling techniques and staining procedures	
CO2	Know various Culture media and their applications and also understand various physical and chemical means of sterilization	
CO3	Know General bacteriology and microbial techniques for isolation of pure cultures of bacteria, fungi and algae	
CO4	Master aseptic techniques and be able to perform routine culture handling tasks safely and effectively	
CO5	Comprehend the various methods for identification of unknown microorganisms	

CO6	Know the various Physical and Chemical growth requirements of bacteria and get equipped with various methods of bacterial growth measurement	
SEMESTER – III		
COs	Course Name: IMMUNOLOGY	Code: U3MB21MT Credits: 4
	OBJECTIVES: 1. The aim of the subject is to study the history of Immunology, importance of human immune system, antigen antibody reaction & schedule for vaccine 2. The students will be able to identify the cellular and molecular basis of immune responsiveness 3. The students will be able to describe immunological response and how it is triggered and regulated.	
CO1	Compare and contrast innate and adaptive immunity	
CO2	Describe the organs and cell types present in the immune response	
CO3	Illustrate the structure and functions of antigen and antibodies to regulate the immune response	
CO4	Elucidate the reasons for the immunization and aware of different vaccination	
CO5	Exemplify the adverse effect of immune system including Ag-Ab interaction, allergy and hypersensitivity.	
CO6	Illustrate the various mechanism that regulate the immune response and maintain tolerance	
CO7	Describe the roles of the immune system in both maintaining health and contributing to disease	
SEMESTER – III		
COs	Course Name: BIO-STATISTICS – I	Code: U3MB22AT Credits: 4
	OBJECTIVES: 1. To make the students to understand the bio statistics. 2. To show proficiency in basic statistical skills embedded in their courses. 3. This course help to predict the probabilities.	
CO1	Recognize the importance of data collection and its role in determining scope of inference	
CO2	Calculate and interpret measures of central tendency and variability in statistical data	
CO3	Understand various Measure of Dispersion	
CO4	Recall the characteristics of probability theory	
CO5	Compute and interpret the result of correlation	
CO6	Recognize that data and knowledge of statistics allows you to investigate a wide variety of interesting phenomena	
CO7	Recognize the basic concepts of simple linear correlation	
SEMESTER – III		
COs	Course Name: MEDICAL LABORATORY	Code:U3MB24ST

	TECHNIQUES	Credits: 3
	OBJECTIVES: 1. The aim of the course is to introduce basic concepts of medical laboratory works. The content of this course will help the students to collect the blood, staining and processing of blood sample. 2. Understand and perform basic cytology and haematology procedures 3. Perform grossing, cutting & staining procedures in histopathology	
CO1	Apply knowledge and technical skills associated with medical laboratory technology for delivering quality clinical investigations support	
CO2	Perform routine clinical laboratory procedures within acceptable quality control parameters in hematology, biochemistry, immunohematology and microbiology	
CO3	Recognize the impact of laboratory tests in a global and environmental context	
CO4	Acquire knowledge and understand the formation of blood cells, structure, functions and methods of estimating different parameters	
CO5	Understand the detailed aspects of blood coagulations, disorders of hemostasis, principles and methods of assessment of coagulation.	
CO6	Demonstrate collection, preservation and examination of body fluids to report the abnormalities.	
CO7	Understand the principles of immunohaematology, blood collection, infectious marker determination, compatibility testing and coomb's testing	
SEMESTER – III		
COs	Course Name: PRINCIPLES OF MICROBIOLOGY	Code: U3MB21AT Credits: 4
	OBJECTIVES: 1. The aim of the subject is to understand the scope and history of microbiology, basic concept of microscope, staining techniques and control the contamination 2. To introduce basic principles and application relevance of clinical disease for students who are in preparation for physicians. 3. They study the epidemiology, pathogenesis, processing, clinical diagnosis and prevention including vaccine development of the different microorganisms.	
CO1	Understand the scope, foundation and importance of microbiology	
CO2	Explore the various culture and staining methods involved in identification of bacteria.	
CO3	Knowledge about the nomenclature of bacteria and the instruments uses for viewing the bacteria	
CO4	Compare and contrast various chemotherapy methods involved in the treatment of bacterial diseases	
CO5	Learn about the various methods involved assessing microbial susceptibility	
CO6	Elucidate the microbes and their role.	
CO7	Understand the scope, foundation and importance of microbiology	

SEMESTER – III		
COs	Course Name: DIAGNOSTIC BACTERIOLOGY AND MYCOLOGY-I	Code: U3MB21NM Credits: 2
	OBJECTIVES: 1. To study of the action of bacteria in health and in disease, inside and outside the animal body 2. To explain the function of structures of bacterial cells that are important for causing disease. 3. To provide a basic understanding of the biology, taxonomy and phylogeny of fungi.	
CO1	Understand the common laboratory methods in the diagnosis of bacterial and fungal diseases	
CO2	Able to learn the bacterial systematic, various methods of isolation and techniques to identify from human body fluids.	
CO3	Understand about the medically important fungi	
CO4	Explore the various treatment methods for bacterial and fungal infections.	
CO5	Students well versed in working clinical laboratories.	
SEMESTER – IV		
COs	Course Name: MICROBIAL GENETICS	Code: U4MB21MT Credits: 4
	OBJECTIVES: 1. The aim of the subject is to know the history of microbial genetics, importance of plasmids, DNA replications & their repair mechanisms, mutations, gene transfer & synthesis of proteins. 2. Teach students various techniques used in microbial genetics 3. Understanding of fundamental concepts in microbial genetics.	
CO1	Explain detailed the structure of nucleic acids.	
CO2	Describe in detail the molecular processes such as plasmids and replication of prokaryotic	
CO3	Comprehend the various methods for gene transfer mechanisms.	
CO4	Describe the concepts of transposons mutation and DNA repair mechanism	
CO5	Understand the molecular mechanisms involved in transcription and translation	
CO6	Understand the properties, structure and function of genes in living organisms at the molecular level	
CO7	Know the terms and terminologies related to molecular biology and microbial genetics	
SEMESTER – IV		
COs	Course Name: CORE PRACTICAL II (IMMUNOLOGY)	Code: U4MB21MP Credits: 2
	OBJECTIVES: 1. The aim of the subject is to know the basic practical knowledge about blood grouping, RPR, RA, CRP, WIDAL, VDRL, SRID, ODD, CCI, RIC, DLC, ELISA, TWBC, TRBC	

CO1	Identify the blood grouping and its types	
CO2	Carry out serological diagnostic tests such as RA, ASO, CRP and WIDAL.	
CO3	Detection of various immune cells morphology such as WBC, RBC and platelets using various staining methods like Leishman staininh and giemsa staining.	
CO4	Give the knowledge about the precipitation reaction such as SRID and ODD methods.	
SEMESTER - IV		
COs	Course Name: MICROBIAL TECHNOLOGY - II	Code: U4MB21AT Credits: 4
	OBJECTIVES: 1. The aim of the subject is to know the basic knowledge of different fields in microbiology 2. To know the characteristics and classification of soil, aquatic, air and food related organisms. 3. To know the basic knowledge about Immunology and Molecular Biology	
CO1	Learn the adequate knowledge about the characteristics of soil, Biofertilizer and Biopesticides.	
CO2	Explore the Sewage treatment methods and distribution, source of air borne diseases.	
CO3	Understand the food spoilage and preservation methods and production of milk products.	
CO4	Gain the adequate knowledge about the Ag-Ab reactions.	
CO5	Illustrate the molecular techniques, gene cloning and gene therapy methods.	
SEMESTER – IV		
COs	Course Name: BIO-STATISTICS – II	Code: U4MB22AT Credits: 4
	OBJECTIVES: 1. To make the students to understand the biostatistics. 2. To show proficiency in basic statistical skills embedded in their courses.	
CO1	Define binomial outcomes and use the normal probability distribution including standard normal curve calculations of appropriate areas	
CO2	Compute and interpret the result of regression analysis	
CO3	Identify appropriate tests to perform hypothesis testing and experimental design for biological experiment and interpret the output adequately	
CO4	Explain the characteristics and use of statistical software and packages of biostatistics	
CO5	Compare different population sample using ANOVA	
CO6	Recognize the basic concepts of simple linear regression	
CO7	Recognize and compute the sampling distributions, sampling distributions of means and variances and the t-Test and F-distributions	
SEMESTER – IV		
COs	Course Name: BIO-STATISTICS	Code: U4MB22AP

		Credits: 2
	OBJECTIVES: 1. To make the students to understand the biostatistics.	
CO1	Describe various application area of biostatistics	
CO2	Students will be able to represent and statistically analyze data both graphically and numerically	
CO3	Recognize and compute the sampling distributions, sampling distributions of means and variances and the t-Test and F-distributions	
SEMESTER – IV		
COs	Course Name: DIAGNOSTIC VIROLOGY AND PARASITOLOGY-I	Code: U4MB21NM Credits: 2
	OBJECTIVES: 1. The aim of the subject is to introduce the general properties of Virus, parasite and vectors in causing human diseases. 2. The aim of the subject is to introduce general properties of medically important viruses, fungi and parasite 3. Students know the various diagnostic methods to identify the organisms	
CO1	Gain the adequate knowledge about the general properties of viruses and parasites.	
CO2	Understanding the detection of viral antigens from clinical samples.	
CO3	Learn about various laboratory diagnosis of fungal and protozoan infection.	
CO4	Illustrate the life cycle of parasites in causing human diseases.	
CO5	Explore the treatment methods and the ways of preventing from diseases.	
SEMESTER – IV		
COs	Course Name: COMPUTER APPLICATION IN BIOLOGY	Code: U4MB23ST Credits: 3
	OBJECTIVES: 1. To understand the basic concepts of computer and its history 2. To know about hardware and software of the computer 3. To familiarize the essential concepts in C programming and HTML	
CO1	Familiar with parts of computer	
CO2	Understand the input and output devices	
CO3	Basic ideas of storage devices, computer network and operating system	
CO4	Identify the role of operating system. To understand and designof control unit	
CO5	Defining I/O systems, Device Management policiesand secondary storage Structure and Evaluation of various disk scheduling Algorithm	
CO6	Understand the concept of C and develop looping structure	
CO7	To design presenting of ppt, calculating using Excel and tables,font,alignment using word	
SEMESTER – V		
COs	Course Name: MOLECULAR BIOLOGY AND GENETIC ENGINEERING	Code: U5MB21MT Credits: 6
	OBJECTIVES:	

	1. The aim of the subject is to gain the knowledge on genetic materials, cloning systems, basic techniques of Molecular biology & their applications in various fields. 2. Nucleic acids and proteins and how these molecules interact within the cell to promote proper growth, division, and development. 3. This course will emphasize the molecular mechanisms of DNA replication, repair, protein synthesis, etc.	
CO1	Students gain the knowledge on genetic materials, types of DNA and their functions	
CO2	Understand the students about gene cloning systems and preparation of genomic library and cDNA library	
CO3	Know the applications of Genetic Engineering in Medical and Agricultural field	
CO4	To provide adequate knowledge about hybridization and amplification technology	
CO5	To give detailed explanation of application of genetic engineering in pharmaceuticals	
CO6	The students gain the knowledge on Genetic Engineering	
CO7	Handle and independently work on lab protocols involving molecular techniques	
SEMESTER – V		
COs	Course Name: MEDICAL BACTERIOLOGY	Code: U5MB22MT Credits: 6
	OBJECTIVES: 1. The aim of the subject is to know the human and animal bacterial pathogens, their role in causing diseases and to control them. 2. The student will be able to identify common infectious agents and the diseases that they cause. 3. The student will be able to evaluate methods used to identify infectious agents in the clinical microbiology lab.	
CO1	Aware about the pathogenicity of medically important microorganisms associate with humans	
CO2	Gain adequate knowledge in the laboratory diagnosis of the pathogens, methodologies and safety precautions	
CO3	Better understanding of human bacterial pathogens with its different cultural characteristics and epidemiology	
CO4	Explore the treatment methods and the ways of preventing from human pathogens	
CO5	Competent enough to use medical bacteriology skills to analyze the problems involving microorganisms and to stop the spreading of disease to the environment.	
CO6	Able to learn the bacterial systematic, microscopy, various methods of isolation and techniques to identify the bacteria in human body fluids.	

CO7	Ability to identify the infectious agents	
SEMESTER – V		
COs	Course Name: MEDICAL VIROLOGY	Code: U5MB23MT Credits: 6
	OBJECTIVES: 1. The aim of the subject is to introduce the general properties of viruses their cultivations, human viral diseases and their life cycle inside the host. This course will help the students to understand bacterial viruses and miscellaneous viruses. 2. Explain viral replication strategies; and compare and contrast replication mechanisms used by viruses relevant for human disease. 3. Explain host antiviral immune mechanisms at a cellular and molecular level	
CO1	Apply rules for description of the classification and nomenclature of viruses	
CO2	Understand the structure and life cycle of Bacteriophages	
CO3	Classify the human viral diseases	
CO4	Categorize newly emerged human viral diseases	
CO5	Collect and assemble the miscellaneous viruses	
CO6	Understand the human pathogenic viruses	
CO7	Compare the pathogenic mechanisms of different viral diseases in humans	
SEMESTER – V		
COs	Course Name: MEDICAL MYCOLOGY, PARASITOLOGY AND ENTOMOLOGY	Code: U5MB24ET Credits: 5
	OBJECTIVES: 1. The aim of the subject is to introduce the general properties of fungi, parasite and insect vectors in causing human diseases. 2. Describe basic morphology, life cycle, pathogenesis, lab diagnosis and treatment of parasites and fungi. 3. To provide students with foundation of Parasitology knowledge and perform effectively in Parasitology diagnostic methods.	
CO1	Describe the fungal morphology, reproduction and lab diagnosis	
CO2	Explain the various fungal pathological events during the progression of an infectious disease	
CO3	Discuss morphology, lifecycle, pathology and lab diagnosis of human pathogenic protozoan	
CO4	Discuss morphology, lifecycle, pathology and lab diagnosis of human pathogenic helminthes	
CO5	Apply the epidemiological sciences in studying the underlying mechanisms of spread of disease and controls required to combat the spread of medically importance vectors	
CO6	Discuss the principle involved in the diagnostic test used for detection of fungi	
CO7	Explain the various pathological, lab diagnosis and preventive measures of medically important fungi, parasite and pest.	

SEMESTER – V		
COs	Course Name: HUMAN PHYSIOLOGY	Code: U5MB25ET Credits: 5
	OBJECTIVES: 1. The aim of the subject is to know about the anatomy and physiology of human system 2. Define the main structures composing human body. Tells chemical structure of human body 3. To provide a course of study in mammalian, principally human, systems physiology, building on knowledge of basic physiological principles established in the Physiology of Organisms	
CO1	Have an enhanced knowledge and appreciation of mammalian physiology	
CO2	Understand the functions of important physiological systems including the cardio-respiratory, renal, reproductive and metabolic systems	
CO3	Understand how these separate systems interact to yield integrated physiological responses to challenges such as exercise, fasting and ascent to high altitude, and how they can sometimes fail	
CO4	Be able to perform, analyse and report on experiments and observations in physiology	
CO5	Be able to recognise and identify principal tissue structures	
	SEMESTER – V	
COs	Course Name: MUSHROOM AND VERMICULTURE TECHNIQUES	Code: U5MB26ST Credits: 3
	OBJECTIVES: 1. The aim of the subject is to cultivate the edible mushrooms, to know the mushroom diseases and role of earthworms in soil. 2. To strengthen the promotion of mushroom cultivation by establishing a well-equipped laboratory and offices. 3. To provide the Unit with appropriately trained personnel for the promotion of mushroom production in the country. To increase the production and consumption of mushrooms.	
CO1	Understand the Morphology of common edible mushroom and process involved in mushroom cultivation and differentiate edible and non-edible mushroom	
CO2	Develop skills for cultivating and identifying mushrooms, using them for commercial purposes	
CO3	Acquire knowledge and technical skills associated with mushroom cultivation and bed preparation for different types of mushrooms.	
CO4	Will understand the pathology associated with mushrooms and their pre-harvest & post- harvest management.	
CO5	Acquire basic knowledge on Soil biota, ecological classification of earthworms	
CO6	Understand the preparation method and marketing strategies of vermicompost	
CO7	Can start own enterprise on mushrooms and Vermicompost	

SEMESTER – VI		
COs	Course Name: FOOD AND DAIRY MICROBIOLOGY	Code: U6MB21MT Credits: 6
	OBJECTIVES: 1. The aim of the subject is to know the basic concept of food and dairy microbiology, preservation, contamination of food and production of fermented food products. 2. To understand the key concepts in food and dairy microbiology, to gain knowledge on various methods of microbial analysis of food and dairy products 3. To learn various statistical methods of data analysis.	
CO1	Apply basic principles for preservation of food	
CO2	Exemplify the microbial spoilage of vegetables, fruits, meat and fishes	
CO3	Illustrate various food borne infection that transmit through the contaminated food	
CO4	Recall the contamination, spoilage and preservation of milk	
CO5	Explain stages of various food fermentation processes	
CO6	Compare and contrast contamination and spoilage of different type food	
CO7	Recall the successes of various chemical food preservatives	
SEMESTER – VI		
COs	Course Name: INDUSTRIAL MICROBIOLOGY	Code:U6MB22MT Credits: 6
	OBJECTIVES: 1. The aim of the subject is to know the industrially important microbes & their role in the production of various fermented products. 2. The aim of the course is to give the students broad theoretical and practical skills in industrial microbiology. 3. The students will be able to discuss the role of microorganisms in industry, as well as to carry out experiments to produce microbial metabolites.	
CO1	Ability the principles of physiological understanding in improvement of industrially importance microorganism.	
CO2	Appreciate the different types of fermentation processes and biochemistry of various fermentations	
CO3	Understand the rationale in medium formulation & design for microbial fermentation, sterilization of medium and air	
CO4	Appreciate how microbiology is applied in manufacture of industrial importance fermentation products	
CO5	Discuss the production of industrially importance algae and waste management	
CO6	Get equipped with a theoretical and practical understanding of industrial microbiology	
CO7	Know how to source for microorganisms of industrial importance from the environment	

SEMESTER – VI		
COs	Course Name: PHARMACUETICAL MICROBIOLOGY	Code: U6MB23ET Credits: 5
	OBJECTIVES: 1. The aim of the subject is know the industrially important strains, fermentors, production of drugs, recombinant vaccines & growth hormones. 2. Preservation of pharmaceutical products using antimicrobial agents, evaluation of microbial stability off formulations. 3. Growth of animal cells in culture, general procedure for cell culture, Primary, established and transformed cell cultures.	
CO1	Identify microorganisms of relevance to healthcare and the pharmaceutical industry and their sources.	
CO2	Understand various disinfection and sterilization techniques ,evaluate the sterility testing, microbial assays, pharmacopoeial standards of sterilization process	
CO3	Understand the mechanism of action of non-therapeutic antimicrobial and therapeutic antimicrobial agents.	
CO4	Recognize the biochemical and genetic basis for antibiotic resistance and ways of controlling spread of antibiotic resistance.	
CO5	Evaluate microbial content testing and sterility testing	
CO6	Acquire a knowledge of valuable pharmaceutical products	
CO7	Get equipped with a theoretical and practical understanding of pharmaceutical microbiology	
SEMESTER – VI		
COs	Course Name: TANNERY TECHNOLOGY	Code: U6MB24ET Credits: 5
	OBJECTIVES: 1. Work in the leather, chemical and footwear industries 2. Pursue higher studies 3. Contribute in teaching, research and other developmental activities of Leather technology and its allied fields	
CO1	Bright career in opportunities in technical and designing areas	
CO2	Designers are working with footwear companies as technical designers or stylist designers	
CO3	The ability to perform design of leather products by means of design experiences integrated throughout the professional component of the curriculum.	
CO4	An ability to function on teams, that must integrate contributions from different areas of leather technology towards the solution of multi-disciplinary projects.	
CO5	An ability to identify, formulate, and solve Leather technology problems.	
CO6	An understanding of professional practice issues in leather technology including professional and ethical responsibility.	

CO7	Possess ability to estimate costs, estimate quantities and evaluate materials for leather manufacturing.	
SEMESTER – VI		
COs	Course Name: ENVIRONMENTAL MICROBIOLOGY	Code: U6MB25ET Credits: 5
	OBJECTIVES: 1. The aim of the subject is to know the interaction of microorganisms in environment, biogeochemical cycle and degradation of pollutant by microorganisms. 2. Understand the role of microorganisms as agents of environmental change. 3. Recognize microorganisms as indicators of alteration of an ecosystem.	
CO1	Gain the basic knowledge on microbial community and composition along with environmental parameters.	
CO2	Illustrate the effect of green house gases to the environment and impact of global warming	
CO3	Compare and contrast the various biogeochemical cycles involved in the environment	
CO4	Familiar with the process of degrading xenobiotics compounds present in the environment	
CO5	Perceive the importance of ecosystem and its alteration by human activities.	
CO6	Proficiency in the assessment of air quality and airborne diseases	
CO7	Comprehend the various methods involved in waste water treatment.	
SEMESTER – VI		
COs	Course Name: BIOCHEMICAL METHODOLOGY	Code: U6MB26ET Credits: 5
	OBJECTIVES: 1. Ability to understand fundamental concepts of biology, chemistry and biochemistry 2. Ability to apply basic principles of chemistry to biological systems and molecular biology 3. Ability to relate various interrelated physiological and metabolic events	
CO1	They acquire knowledge in the quantitative and qualitative estimation of biomolecules	
CO2	This skill based course will teach the students the various instrumentations that are used in the analytical laboratories.	
CO3	This course covers both fundamental and applications of the instruments that are routinely used for the characterization of biomolecules	
CO4	At the end of the course, the student has the basic knowledge on the theory, operation and function of analytical instruments.	
CO5	They learn about various analytical techniques that are routinely used for separation of biomolecules and their components	
CO6	The course teaches students the advantages of separation science as applied to	

	biotechnology	
CO7	Through this course the students are exposed to importance of biological macromolecules	
SEMESTER – VI		
COs	Course Name: AGRICULTURE AND BIOFERTILIZER TECHNOLOGY	Code: U6MB27ST Credits: 3
	OBJECTIVES: 1. The aim of the subject is to gain the knowledge about the biofertilizers and biopesticides that are applied in the field of agricultural microbiology. 2. To exploit the microbial diversity in various agro-ecologies for biofertilizer application in diversified systems. To study the impact of soil management practices on microbial functions and soil health. 3. To improve biofertilizer technology to ensure high quality and improved delivery.	
CO1	Understand various biofertilizer organisms and their applications especially the biofertilizers and their production techniques	
CO2	Know the Microorganisms responsible for nitrogen fixers and crop response	
CO3	Describe the importance of phosphate solubilization mechanisms	
CO4	Discuss the isolation, classification and field applications of Mycorrhizae	
CO5	Comprehend the various organisms used to biopesticides	
CO6	The subject is to gain the knowledge about the biofertilizers and biopesticides that are applied in the field of Agricultural microbiology	
CO7	The subject will motivate the student on small scale production of biofertilizers	
SEMESTER – VI		
COs	Course Name: (CORE PRACTICAL III) MEDICAL MICROBIOLOGY	Code: U6MB21MP Credits: 4
	OBJECTIVES: 1. The aim of the subject is to gain the knowledge about the isolation, identification & conformation of microorganisms & collection of clinical specimens from patients.	
CO1	Demonstrate key practical skills in working with microbes for study and use in the laboratory as well as outside, including the use of good microbiological practices	
CO2	Recognize and diagnose common infectious diseases from the clinical presentation and associated microbiology.	
CO3	Describe the epidemiology of infectious agents including how infectious diseases are transmitted	
CO4	Explain interventions employed to prevent infectious diseases including infection control measure and vaccines	
CO5	Perform laboratory investigations for the diagnosis of infectious diseases caused by Bacteria.	

SEMESTER – VI		
COs	Course Name: CORE PRACTICAL IV FOOD, ENVIRONMENTAL & AGRICULTURAL MICROBIOLOGY	Code: U6MB22MP Credits: 5
	OBJECTIVES: 1. The aim of the subject is to gain the practical knowledge about identification of water, milk & air quality, enumeration of bacteria & fungi from air & soil, Isolation of bacteria and fungi from spoiled food and molting leaves.	
CO1	Detection of water quality by using MPN techniques	
CO2	Enumeration of microorganisms from air, milk and soil	
CO3	Isolation of microorganisms from leaves, soil & biofertilizer organisms	

M.Sc., MICROBIOLOGY

SEMESTER – I		
COs	Course Name: GENERAL MICROBIOLOGY	Code: P1AM21MT Credits: 5
	OBJECTIVES: 1. The subject aims to understand the scope, history of microbiology, basic concept of microscope, microbial nutrition, anatomy and physiology of prokaryotes and Eukaryotes. 2. Students know the bacterial anatomy and physiology and also algae and Archaea 3. Understand about the microbial nutrients and microbiology related instruments.	
CO1	Understand the basic concepts of general microbiology.	
CO2	Understand various methods and analytical approaches to identify and differentiate microbes and its requirements.	
CO3	Develop knowledge on evolution of microorganisms and its discovery.	
CO4	Understand the basic mechanism and applications of microscope and analytical instruments for performing various laboratory works.	
CO5	Elucidate the physical and chemical growth requirements of bacteria and get equipped with different methods of growth measurements.	
CO6	Understand the structural similarities and differences among prokaryotes and eukaryotes.	
CO7	Explain the distribution, reproduction and life cycle pattern of algae and archaeal adaptations.	
SEMESTER – I		
COs	Course Name: FOOD AND ENVIRONMENTAL MICROBIOLOGY	Code: P1AM22MT Credits: 5
	OBJECTIVES: 1. The aim of the subject is to know the basic concept in preservation of food,	

	production of fermented food and food borne infection, presence of microorganism in air and water and to treat the waste water effluent 2. Explain the interactions between microorganisms and the food environment and factors influencing their growth and survival. 3. This paper acquaints students with various industrial and food products, their production etc.	
CO1	Gain the adequate knowledge about the different types of food microbial spoilage and food preservation methods involved.	
CO2	Aware about the food borne bacterial and nonbacterial agents involved and fermentation process on food products.	
CO3	Impart the knowledge on airborne disease transmission, assessment and prevention methods.	
CO4	Understand the knowledge on aquatic habitats, microbial communities and their roles in environments.	
CO5	Students will gain knowledge of significance on waste water treatment process.	
CO6	Through the lights to the impart adequate knowledge on food spoilage and environmental related problems.	
CO7	Illustrate about the food preservation and fermented food products.	
SEMESTER – I		
COs	Course Name: IMMUNOTECHNOLOGY	Code: P1AM23MT Credits: 5
	OBJECTIVES: 1. The aim of the subject is to study the history of Immunology, importance of human immune system, antigen antibody reaction & schedule for vaccine. 2. The students will be able to identify the cellular and molecular basis of immune responsiveness. 3. The students will be able to describe the roles of the immune system in both maintaining health and contributing to disease	
CO1	Manifest an understanding of key concepts in immunology.	
CO2	Understand the overall organization of the immune system includes organs and cells.	
CO3	To give the salient features of antigen and antibody & its functions	
CO4	Learn about the antigen antibody reaction & its uses in diagnostics and various studies	
CO5	To give the knowledge about the overall immune response and immune deficiency diseases.	
CO6	Explain about the vaccination and their preparation and its functions	
CO7	The students to understand the immune prophylaxis and Immune therapy.	
SEMESTER – I		
COs	Course Name: SOIL AND ARGICULTURAL MICROBIOLOGY	Code: P1AM24ET Credits: 3

	OBJECTIVES: 1. The aim of the subject to study the properties of soil, mechanism of nitrogen fixation, biofertilizers and to deal with plant pathogens. 2. It also deals with the microbiology of soil fertility, such as microbial degradation of organic matter and soil nutrient transformations. 3. To gain knowledge on several beneficial and harmful microorganisms.	
CO1	Gain the insights of various properties of soil, soil micro-flora and microbial interactions	
CO2	Understand the techniques involved in the production of organic manure.	
CO3	Aware of various biogeochemical cycles involved in the plant nutrient cycling	
CO4	Gain the business knowledge in the production of biofertilizers and biopesticides	
CO5	Impart the knowledge of biological nitrogen fixation that will create awareness and the importance of organic farming.	
CO6	Acquire the treatment and control methods of various plant related diseases	
CO7	Through the lights to the importance of soil microorganisms in improving soil quality, composting processing and society oriented products production.	
SEMESTER – I		
COs	Course Name: BIOPROCESS TECHNOLOGY	Code: P1AM25ET Credits: 3
	OBJECTIVES: 1. To acquaint students with technical and biological aspect of microbial utilisation for production of metabolites 2. Has thorough knowledge of the underlying principles of main bioprocess unit operations like fermentation, downstream processing 3. Has thorough knowledge about genetic engineering for recombinant protein expression and production from various cell systems	
CO1	Student will be able to designing of bioreactors and control necessary for maximising production.	
CO2	Able to appraise bioprocessing and bioproducts manufacturing and valorization using entrepreneurship principles.	
CO3	Understands how lab scale methods transform into large scale, and how main unit operations in downstream processing function	
CO4	Graduates acquire professional leadership roles in bioprocess engineering and related fields leading to successful career	
CO5	Graduates establish commitment and contributes toward sustainable and bio-based economy development for better society	
CO6	Graduates engage in lifelong learning in conducting practical engineer tasks	
CO7	Able to conduct practice-based tasks related to bioprocessing in a responsible, safe, voluntary, self-motivated and ethical manner	
SEMESTER – I		
COs	Course Name: (CORE PRACTICAL I) GENERAL, FOOD, ENVIRONMENTAL MICROBIOLOGY AND	Code: P1AM21MP Credits: 4

	IMMUNOTECHNOLOGY	
	OBJECTIVES: 1. The aim of the subject is to know the practical knowledge about Micrometry, all staining methods, growth curve, Enumeration of bacteria, fungi from soil,water, quality of milk & Isolation of biofertilizer organisms.	
CO1	Understand the principle of cleaning and sterilization of glassware, media and other solutions.	
CO2	Able to measure the size of the microorganisms	
CO3	Exemplify various culture media preparation and pure culture techniques for the isolation of microorganism.	
CO4	Enumerate CFU count by spread and pour plate method.	
CO5	Demonstrate various staining techniques for the observation of bacteria and fungi.	
CO6	Demonstrate motility of a bacteria	
CO7	Calculate generation time and measure specific growth rate of bacteria.	
SEMESTER – II		
COs	Course Name: MEDICAL BACTERIOLOGY AND VIROLOGY	Code: P2AM21MT Credits: 5
	OBJECTIVES: 1. The aim of the subject is to know the human and animal bacterial and viral pathogens, their role in causing diseases and to control them. 2. It covers all biology of bacteria, viruses and other pathogens related with infectious diseases in humans. 3. It will also provide opportunities for a student to develop diagnostic skills in microbiology, including the practical application and interpretation of laboratory tests for the diagnosis of infectious diseases.	
CO1	Identify common infectious agents and the diseases that they cause.	
CO2	Explain general and specific mechanisms by which an infectious agent causes disease.	
CO3	Understand the basic microbial structure and function and study the comparative characteristics of Medically important microbes and also understand the Microbial virulence and virulence factors	
CO4	Understand the collection, transport and preliminary processing of specimens and Clinical, microbiological, immunological and molecular diagnosis of microbial diseases.	
CO5	Acquired knowledge on Characteristics, classification, pathogenesis, diagnosis, treatment, prevention and control of disease caused by medically important bacteria	
CO6	Explain viruses including their classification, morphology, and laboratory diagnosis and disease prevention measures	
CO7	Explain the use of vaccines and delivery systems to control viral infections. And also discuss the modern antivirals developed to control virus diseases	
SEMESTER – II		
COs	Course Name: MEDICAL MYCOLOGY AND	Code: P2AM22MT

	PARASITOLOGY	Credits: 5
	OBJECTIVES: 1. The aim of the subject is to know the human fungal and parasitic pathogens, their role in causing diereses and to control them. 2. Basic morphology, life cycle, pathogenesis, lab diagnosis and treatment of parasites and fungi. 3. Perform appropriate laboratory techniques used in the processing of specimens and identification of parasites and fungi.	
CO1	Comprehend the fungal morphology, classification and lab diagnosis from the clinical specimens	
CO2	Explain the various fungal diseases include morphology, pathogenesis and lab diagnosis	
CO3	Gain the knowledge on medically important parasites such as protozoan	
CO4	Discuss morphology, lifecycle, pathology and lab diagnosis of human pathogenic helminthes	
CO5	Provide chance to increase knowledge and diagnostic skills, including the use and construal of laboratory tests in the diagnosis of parasitic diseases	
CO6	Understand the consequence of pathogenic human fungal diseases.	
CO7	Afford the theoretical basis for appreciative pathogenic human parasites.	
SEMESTER – II		
COs	Course Name: MICROBIAL PHYSIOLOGY AND GENETICS	Code: P2AM23MT Credits: 4
	OBJECTIVES: 1. The student gain the knowledge on medically important microorganism and the diagnosis them in the laboratory. 2. This course deals with characteristics, properties and biological significance of the biomolecules of life. 3. In depth knowledge of the energetic and regulation of different metabolic processes in microorganisms.	
CO1	Understand the basics of physiology and genetic makeup of microbial cells.	
CO2	Understand the molecular concept of structure and functions of DNA, replication and its transfer mechanism in living microorganisms.	
CO3	Recall the nutritional requirements and its uptake by the bacteria cell. Exemplify various culture media preparation and pure culture techniques for the isolation of microorganism and its preservation.	
CO4	Determine the generation time of bacteria and also assess the cell number, mass and drug resistance status of microbes.	
CO5	Explain the carbohydrate metabolism and different classes of enzymes.	
CO6	Describe the structure and functions of DNA and also explain the genetic material of a living cell.	
CO7	Discuss the molecular mechanism underlying gene transfer, mutation, detection of mutations and DNA repair mechanism.	
SEMESTER – II		

COs	Course Name: HEMATOLOGY AND CLINICAL TECHNIQUES	Code: P2AM24ET Credits: 3
	OBJECTIVES: 1. The aim of the course is to introduce the basic concept of medical laboratory works that help the students in processing of blood sample & staining them 2. Hematology is that branch of medicine concerned with the clinical and laboratory investigation, diagnosis and medical management of diseases of the blood and blood forming tissues. 3. Hematologists research, diagnose, and treat various blood disorders, including anemia, blood clots, bleeding disorders, and blood cancers.	
CO1	Differentiate various hematological procedures and the use of basic equipment essential to working in a Clinical Hematology Laboratory	
CO2	Distinguish normal and abnormal hematological laboratory findings to predict the diagnosis of hematological disorders and diseases	
CO3	Identify Collection of Blood and interpret anticoagulant.	
CO4	Assume responsibility in the collection and handling of blood specimens	
CO5	Correlate the importance of hematological tests in the diagnosis and prognosis of diseases	
CO6	Describe the mechanisms of hemostasis and thrombosis and correlate it with the interpretation of coagulation tests and the role of coagulants and anticoagulants in the treatment of various diseases.	
CO7	Discuss the basis of blood grouping and blood transfusion and discuss complications of blood transfusion.	
SEMESTER – II		
COs	Course Name: BIOINFORMATICS AND BIOINSTRUMENTATION	Code: P2AM25ET Credits: 3
	OBJECTIVES: 1. The course is aimed at introducing the students to the field of Bioinformatics and enable them understand the concepts of statistics in biology 2. Be familiar with widely used bioinformatics databases 3. Know basic concepts of probability and statistics	
CO1	Be able to describe statistical methods and probability distributions relevant for molecular biology data	
CO2	Know the applications and limitations of different bioinformatics and statistical methods.	
CO3	Be able to perform and interpret bioinformatics and statistical analyses with real molecular biology data	
CO4	Know the theory behind fundamental bioinformatics analysis methods	
CO5	This course will prepare the students for various applications of bioinformatics in life science research	
CO6	An understanding of physics in biosensor, electrode	
CO7	An understanding of biomedical instrumentation principles in aspects of device design and applications	

SEMESTER – II		
COs	Course Name: MEDICAL MICROBIOLOGY, HAEMATOLOGY AND MICROBIAL PHYSIOLOGY (CORE PRACTICAL II)	Code: P2AM21MP Credits: 4
	OBJECTIVES: 1. The aim of the practical subject is to know the bacteriological methods, isolation and identification of the pathogen, mycological methods, examination of parasites, haematological techniques and biochemical analysis	
CO1	Examine bacterial, fungal and parasitical clinical specimens.	
CO2	Perform basic hematological laboratory testing, assess laboratory data and report findings according to laboratory protocol.	
CO3	Interpretation of common laboratory investigations in various hematological diseases.	
SEMESTER – III		
COs	Course Name: CELL BIOLOGY AND MOLECULAR BIOLOGY	Code: P3AM21MT Credits: 5
	OBJECTIVES: 1. The aim of the subject is to know the anatomy & physiology of prokaryotes & eukaryotes, importance of plasmid & synthesis of proteins. 2. Students examine the basic properties of cells and cell organelles, in addition to the properties of differentiated cell systems and tissues. 3. The course aims to equip students with a basic knowledge of the structural and functional properties of cells.	
CO1	Students will understand the structures and purposes of basic components of prokaryotic and eukaryotic cells and understand the cytological techniques of tissues	
CO2	Explain the components of cell and their functions	
CO3	Explain the communications of cells with other cells and to the environment	
CO4	Compare and contrast the events of cell cycle and its regulation	
CO5	To impart detailed understand of key events of molecular biology comprising of mechanism of DNA Replication, Transcription and translation in prokaryotes and Eukaryotes	
CO6	Illustrate that fundamental structural units define the function of all living things	
CO7	Cell biology gives them a strong foundation on the basic unit of life	
SEMESTER – III		
COs	Course Name: MICROBIAL GENE TECHNOLOGY AND BIOINFORMATICS	Code: P3AM22MT Credits: 5
	OBJECTIVES: 1. The aim of the subject is to gain the knowledge on genetic material, cloning system, basic techniques of molecular biology and their applications in various fields and also gain the knowledge about basics of bioinformatics 2. To understand and apply the principles and techniques of Molecular Biology	

	3. To make the students to understand the concept of gene and bioinformatics.	
CO1	Explain various stages for extraction of chromosomal DNA and plasmid DNA	
CO2	Compare and contrast the restriction endonucleases and other DNA manipulative enzymes	
CO3	Recall the cloning strategies of various vectors	
CO4	Elucidate for sequence analysis of DNA and aware the DNA fingerprinting	
CO5	Apply basic techniques for study of Bioinformatics	
CO6	Recall the study of genomics and proteomics	
CO7	Design a model for blotting techniques	
SEMESTER – III		
COs	Course Name: INDUSTRIAL BIOTECHNOLOGY AND ITS APPLICATIONS	Code: P3AM23MT Credits: 4
	OBJECTIVES: 1. The aim of the subject is to know the industrially important microbes & their role in the production of various fermented products 2. The course aims to provide fundamental insights to exploit enzymes and microbes for the manufacturing of products which have a huge industrial significance. 3. The purpose of this course is to teach students about the ability to apply biotechnology to industrial processes in transforming the manufacturing industry.	
CO1	Discuss the role of microorganisms in industry, as well as to carry out experiments to produce microbial metabolites.	
CO2	Recognize deeper understanding of the industrial Biotechnology and its applications.	
CO3	Give an account of design and operations of various bioreactors and downstream processes; Identify the different types of fermentors	
CO4	Explain the various fermentation strategies and the growth kinetics of industrial microorganisms	
CO5	Discuss the methods for the production of certain products (metabolites) using different microorganisms	
CO6	Select the best conditions and optimization protocol needed for various microbial products	
CO7	Understand and to be able to demonstrate knowledge on the biotechnological potential of micro and macroalgae, with an emphasis on human nutrition, aquaculture, the phycocolloid industry and as environmental tools.	
SEMESTER – III		
COs	Course Name: RESEARCH METHODOLOGY	Code: P3AM24MT Credits: 4
	Objectives 1. The aim of the subject is to gain the knowledge on objective of research, review of literature and to apply biostatistics for writing the thesis.	

	2. Understanding the nature of problem to be studied and identifying the related area of knowledge. 3. Reviewing literature to understand how others have approached or dealt with the problem. Collecting data in an organized and controlled manner so as to arrive at valid decisions.	
CO1	Discuss about the objectives of research and review of literature	
CO2	Gain knowledge in experimental design and thesis writing	
CO3	Biostatistics uses the application of statistical methods to conduct research in the areas of microbiology	
CO4	Create awareness on the Biosafety. Bioethics and patenting of Biodiversity processes	
CO5	Understanding about the intellectual properties rights in India	
CO6	Explore about the traditional knowledge prevailing in India	
CO7	Propose the required numerical skills necessary to carry out research	
SEMESTER – III		
COs	Course Name: HERBAL TECHNOLOGY	Code:P3AM25ET Credits: 3
	OBJECTIVES: 1. The aim of the subject is to gain the knowledge on the medicinally important herbal extract preparation and to treat the diseases. 2. Understand raw material as source of herbal drugs from cultivation to herbal drug product. 3. Know the herbal cosmetics, natural sweeteners, nutraceuticals.	
CO1	Explain methods for selection and processing of herbal drugs as raw materials for herbal drug preparation	
CO2	Acquire basic knowledge on herbal medicine preparation	
CO3	Identification of herbals and Methods of preparation and also explain future prospects of herbal drug based industry	
CO4	Apply the Method of extraction and phytochemical identification and application of herbal drugs	
CO5	Analyze botanical sources, morphology, histology, powder characteristics, important constituents, identification tests and therapeutic uses of some medicinal plants	
CO6	Acquire knowledge and understand Herbal medicines for human ailments	
CO7	understand the cultivation methods of herbal and aromatic plants and also they would know about herbal processing , packing and seae and marketing	
SEMESTER – III		
COs	Course Name: CLINICAL MICROBIOLOGY	Code: P3AM26ET Credits: 3
	OBJECTIVES:	

	1. The aim of the subject is to know the human bacterial pathogens and their role in causing human diseases. 2. Classify human pathogenic bacteria, fungi, parasite and Viruses 3. To know the fungal diseases of human being	
CO1	Elucidate the common disease producing bacteria, fungi, parasite and viruses.	
CO2	Understand the various kinds of fungal diseases of human beings	
CO3	Isolation and identification viral diseases and causative agents	
CO4	To know the students various life cycle of parasitic diseases and its preventive measures	
CO5	Diagnosis, prevention and control of various microbial diseases	
CO6	Collection of data and maintenance of Laboratory records	
CO7	Common laboratory procedure for diagnosis of microbial diseases	
SEMESTER – III		
COs	Course Name: (CORE PRACTICALS III) CELL BIOLOGY, MICROBIAL GENE TECHNOLOGY AND INDUSTRIAL BIOTECHNOLOGY	Code: P3AM21MP Credits: 4
	OBJECTIVES: 1. The aim of the subject is to gain the knowledge on cell and molecular biology, microbial gene technology, industrial biotechnology.	
CO1	Conduct experiments related to industrial microbiology and produce microbial metabolites and solve the difficulties related to the microbial production of certain metabolites	
CO2	Gain working knowledge of isolation and identification of DNA	
CO3	Critically analyze and interpret quantification of DNA and RNA by different methods	
CO4	Identify and demonstrate separation of protein by different chromatographic techniques.	
SEMESTER –IV		
COs	Course Name: BIOLOGICAL TECHNIQUES	Code: P4AM21MT Credits: 4
	OBJECTIVES: 1. The aim of the subject is to handle the basic instruments and techniques in the field of applied microbiology. 2. Expose the students to the basic principles of photometry, colorimetry, chromatography, conductometry, centrifugation and electrophoretic techniques. 3. Acquire basic knowledge of designing biological experiments. afford the students with the techniques of detecting contaminants in stored products.	
CO1	Gain working knowledge of different kinds of microscopy	
CO2	Understand the principle and working mechanisms of spectrophotometer, centrifuge and biosensors	

CO3	Identify the amino acids from different sources by using chromatography	
CO4	Identify antigen, antibodies and proteins from clinical samples by using electrophoresis	
CO5	Demonstrate different kinds of molecular techniques like PCR, Blotting	
CO6	Subject handle the basic instruments and techniques in the field of applied microbiology	
CO7	The students are well versed handling the instruments in various fields of microbiology	
SEMESTER – IV		
COs	Course Name: NANOBIO TECHNOLOGY AND BIOREMEDIATION	Code: P4AM22ET Credits: 3
	OBJECTIVES: 1. The aim of the subject is to synthesis of nanoparticles, degradation of pollutants by using microbes and plants. 2. The main objective of this subject was to analyze the principles of bioremediation assisted by nanomaterials and nanoparticles. 3. The use of nanoparticles and nanotechnology to enhance the microbial activity to remove pollutants.	
CO1	Understand the concept of Nanoparticles formation and its functions.	
CO2	Better knowledge in the measurement of nanoparticles	
CO3	Explore the applications of nanoparticles in various fields	
CO4	Classify pollutants in air, water and soil	
CO5	Design a model for rhizofiltration	
CO6	Exemplify the beneficial role of Genetically engineered microbes in bioremediation	
CO7	Illustrate various method used in bioaugmentation	
SEMESTER – IV		
COs	Course Name: GENETIC ENGINEERING	Code: P4AM23ET Credits: 3
	OBJECTIVES: 1.The aim of the subject is handling various types of Electrophoresis 2. Elucidate restriction endonucleases and its applications 3. Describe PCR and its methods and applications	
CO1	Elucidate various types of blotting techniques	
CO2	Illustrate enzyme and their role in rDNA technology	
CO3	Explain DNA sequence analysis and its types	
CO4	List out vectors and their usage in genetic engineering	
CO5	Applications of rDNA technology in various field	
CO6	Describe about genomic libraries and its use in gene cloning techniques	
CO7	Explain artificial chromosome and its types	
SEMESTER –IV		
COs	Course Name: (CORE PRACTICAL IV) BIOLOGICAL TECHNIQUES	Code: P4AM21MP Credits: 3
	OBJECTIVES:	

	1. The aim of the subject is to gain the knowledge on chromatography, PCR, Gel documentation system, plasmid DNA, ELISA, TLC & Western blotting.	
CO1	Analyze the microorganisms in different microscopic techniques	
CO2	Gain knowledge in the field of chromatography	
CO3	Explore the techniques involved in isolating genetic materials from bacteria	
CO4	Understanding the methodology for separating protein	
CO5	Easy in doing molecular weight analysis of DNA and Proteins.	
SEMESTER- IV		
COs	Course Name: PROJECT WORK WITH VIVA VOCE	Code: P4AM21PV Credits: 10
	OBJECTIVES: 1. Objectives are a specific result you're trying to achieve within a time frame and with available resources. 2. To develop research skills involved execution of microbiological proposal. 3. To prepare document and report on experimental protocols, results, and conclusions	
CO1	Get ability to apply the process of science by formulating hypotheses and design experiments based on the scientific method	
CO2	Analyze and interpret results from a variety of microbiological methods	
CO3	Use quantitative reasoning by using mathematical calculations and graphing skills to solve problems in microbiology.	
CO4	Communicate and collaborate with other disciplines by effectively communicating the fundamental concepts of microbiology in written and oral format.	
CO5	Identify credible scientific sources to interpret and evaluate the evidences	
CO6	Understand the relationship between science and society by recognizing and discussing logical, scientific and ethical issues in microbiology	
CO7	Use pure culture and selective techniques to isolate microorganisms. Identify microorganisms (media-based, molecular and serological).	

M.Phil. MICROBIOLOGY

SEMESTER – I		
COs	Course Name: ADVANCED MICROBIOLOGY	Code : MIMB21MT Credits: 5
	OBJECTIVES: - The aim of the subject is to gain the knowledge about pure culture techniques, Microscopy, Soil microbiology, Industrial microbiology and Bioremediation. - The characteristics of soil environment. Microbial and fauna of soil, microbial activities in soil, nitrogen cycle, carbon cycle etc. - The use of nanoparticles and nanotechnology to enhance the microbial activity to remove pollutants.	
CO1	Describe the various methods for isolating microbes and methods for maintenance	

	and preservation of pure cultures	
CO2	Compare and contrast light and electron microscopes	
CO3	Elucidate the microbes and their role in agriculture	
CO4	Recall the success of various industrial fermentation process	
CO5	Illustrate various approaches in bioremediation of soil, air and water	
CO6	Design a model of fermentor	
CO7	Exemplify the microbes and their role in food and Pharmaceutical industries	
SEMESTER – I		
COs	Course Name: GUIDE PAPER	Code : MIMB22MT Credits: 4
	OBJECTIVES: 1. The aim of the subject is to know the industrially important strains, fermentors, production of various fermented products. 2. Illustrate creative use of modern tools and techniques for manipulation and analysis of genomic sequences. 3. The aim of the subject is to gain the knowledge on degradation of pollutants by using microorganisms and plants	
CO1	Discuss the recovery and purification of industrial importance of products	
CO2	Describe the importance of recombinant DNA technology in various field	
CO3	Elucidate the diversified bacterial community involved in the field of bioremediation	
CO4	Demonstrate the beneficial effect of soil microbes in Agriculture	
CO5	Illustrate the basic techniques for mushroom cultivation	
CO6	Molecular Biology gives you in-depth knowledge of biological processes through the investigation of the underlying molecular mechanisms.	
CO7	Compare and contrast various process of composting methodologies	
SEMESTER- II		
COs	Course Name: PROJECT WORK WITH VIVA VOCE	Code: M2MB21DV Credits: 21
	OBJECTIVES: 1. Information that improves decisions such as a report 2. Getting more output for a unit of input. 3. Getting more output for an hour of work	
CO1	Practice safe microbiology, using appropriate protective, biosafety and emergency procedures.	
CO2	Document and report on experimental protocols, results and conclusions	
CO3	Apply the principles of statistics for designing microbiological experiment, statistical analysis, and interpretation of results	
CO4	Get acquainted with basic approach of research methodology	
CO5	Demonstrate various instruments and techniques	
CO6	Abide by safe microbiology, using appropriate protective, biosafety, and emergency procedures	
CO7	Create document and report on experimental protocols, results, and conclusions	

B.Sc. COMPUTER SCIENCE

SEMESTER – I		
COs	Course Name: DIGITAL LOGIC AND DESIGN	Code: U1CS21MT Credits: 5
	OBJECTIVES: 1. Learn how to design digital circuits, by simplifying the Boolean functions. 2. Learn to design combinational and sequential circuits. 3. To study about asynchronous sequential logic.	
CO1	Apply the Boolean minimization techniques for combinational circuits such as adder, subtractor, encoder etc.	
CO2	Explain the applications of digital electronics	
CO3	Solve asynchronous sequential circuits for simple application	
CO4	Apply the concept of sequential circuits for counters, shift registers etc.	
CO5	Discuss the universality of NAND gates. Construct NOT, OR, AND, NOR, EXOR and EX-NOR gates using NAND gates and show the output.	
CO6	Discuss the universality of NOR gates. Construct NOT, OR, AND, NOR, EXOR and EX-NOR gates using NOR gates and show the output	
CO7	Explain K-map for three and four variables, identification of pairs, quads and octets and solving sum-of-products equations	
SEMESTER – I		
COs	Course Name: MULTIMEDIA LAB	Code: U1CS21MP Credits: 2
	OBJECTIVES: 1. The vast possibilities of traditional tools, and develop an understanding of Sophisticated layering techniques 2. The vast possibilities of traditional tools, and develop an understanding of Sophisticated layering techniques	
CO1	Apply various tools to create and edit images.	
CO2	Apply layers, filter effects and blending modes, share and save your images in various formats.	
CO3	Learn various retouching and repairing techniques to correct images.	
CO4	Demonstrate the techniques to use text reflection effect.	
CO5	Demonstrate how to insert image inside the text.	
CO6	Design and develop creative applications using GIMP.	
CO7	To Understand the concept of multimedia software	
SEMESTER – II		
COs	Course Name: PROGRAMMING IN C	Code: U2CS21MT Credits: 5
	OBJECTIVES: 1. To learn programming using a structured programming language. 2. To provide C programming exposure. 3. To introduce foundational concepts of computer programming to students	

	of different Branches of Engineering and Technology.	
CO1	Write C program for simple applications	
CO2	Formulate algorithm for simple problems	
CO3	Analyze different data types and arrays	
CO4	Perform simple search and sort	
CO5	Use programming language to solve problems	
CO6	Able to implement the algorithms and draw flowcharts for solving Mathematical and Engineering problems	
CO7	To be able to develop C programs on linux platform.	
SEMESTER – II		
COs	Course Name: PROGRAMMING IN C LAB	Code: U2CS21MP Credits: 2
	OBJECTIVES: 1. To understand the basic programming constructs and articulate how they are used to develop a program with a desired runtime execution flow. 2. To articulate where computer programs fit in the provision computer-based solutions to real world problems.	
CO1	Read, understand and trace the execution of programs written in C language.	
CO2	Write and compile programs using C programs.	
CO3	Write program with the concept of Structured Programming	
CO4	Identify suitable data structure for solving a problem	
CO5	Demonstrate the use of conditional statement.	
CO6	Write the C code for a given algorithm	
CO7	Implement Programs with pointers and arrays, perform pointer arithmetic, and use the pre-processor.	
SEMESTER – III		
COs	Course Name: OBJECT ORIENTED PROGRAMMING USING C++	Code: U3CS21MT Credits: 5
	OBJECTIVES: 1. To learn advanced features of the C++ programming language as a continuation of the previous course. 2. To learn the characteristics of an object oriented programming language: Data abstraction and information hiding, inheritance and dynamic binding. 3. To learn the basic principles of object oriented design and software engineering in terms of software reuse and managing complexity.	
CO1	Articulate the principles of object-oriented problem solving and programming.	
CO2	Outline the essential features and elements of the C++ programming language.	
CO3	To learn the syntax and semantics of the C++ programming language.	
CO4	To learn programming fundamentals, including statement and control flow and recursion.	
CO5	Applying the concepts of class, method, constructor, instance, data abstraction, function abstraction, inheritance, overriding, overloading, and polymorphism	
CO6	To learn how containment and inheritance promote code reuse in C++.	

CO7	To learn how to implement files and command line arguments in C++		
SEMESTER – III			
COs	Course Name: OBJECT ORIENTED PROGRAMMING USING C++ LAB	Code: U3CS21MP Credits: 2	
	OBJECTIVES: 1. To learn programming constructs of C++. 2. To implement the linear and non-linear data structure using STL		
CO1	Implement Basic programming constraints in C++.		
CO2	Implement Object Oriented Programming Concepts in C++.		
CO3	Develop applications using stream I/O and file I/O.		
CO4	To Demonstrate practical experience in developing object-oriented solutions.		
CO5	To Analyze a problem description and design and build object-oriented software using good coding practices and techniques.		
CO6	Implement Basic programming constraints in C++.		
CO7	Implement Object Oriented Programming Concepts in C++.		
SEMESTER – III			
COs	Course Name: DATA STRUCTURES AND COMPUTER ALGORITHMS LAB	Code: U3CS22MP Credits: 2	
	OBJECTIVES: 1. To implement the linear and non-linear data structure using STL 2. To Understand different operations of search trees		
CO1	Apply generic programming technique to implement any data structure		
CO2	Apply appropriate search trees for an application		
CO3	Use graphs in problem solving		
SEMESTER – III			
COs	Course Name: DATA STRUCTURES AND COMPUTER ALGORITHMS	Code: U3CS23ST Credits: 3	
	OBJECTIVES: 1. To learn generic data structures using templates 2. To increase the student’s intuitive understanding of search trees 3. To learn advanced tree data structures		
CO1	Implement data structure using C++		
CO2	Suggest appropriate tree/graph data structure for any given data set		
CO3	Apply hashing concepts for a given problem		
CO4	Modify or suggest new data structure for an application		
CO5	Appropriate choose the sorting algorithm		
CO6	Appropriate choose the sorting algorithm		
CO7	Applying Backtracking Technique		
SEMESTER – III			
COs	Course Name: INTRODUCTION TO INFORMATION TECHNOLOGY	Code: U3CS21NM Credits: 2	
	OBJECTIVES: 1. Learned the concepts of a computer-based information Processing system		

	2. Developed an understanding of the terminologies unique 3. Acquired the ability to use selected commercial application packages.	
CO1	Understand model, components of computer and how it works.	
CO2	Understand the concepts, structure, types and design of operating Systems.	
CO3	Recognize when to use each of the Microsoft Office programs to create professional and academic documents.	
CO4	Students will have a working knowledge of paragraph formatting, macro and mail-merge in MS-Word.	
CO5	Students will have a working knowledge of basic functions and formulas in MS-Excel.	
CO6	Create presentation by adding slides, applying animations, set times to slides, linking to another file.	
CO7	Understand the concept of Internet technologies and how it works.	
SEMESTER – IV		
COs	Course Name: JAVA PROGRAMMING	Code: U4CS21MP Credits: 5
	OBJECTIVES: 1. To learn the OOP specific programming languages such as C++ & Java. 2. To write programs to solve problems using the OOP language constructs rather than structural programming. 3. To understand and know the importance of OOP in real world problem	
CO1	Design problem solutions using Object Oriented techniques.	
CO2	Apply the concepts of data abstraction, encapsulation, polymorphism, overloading, and inheritance for problem solutions.	
CO3	Use the OOP concepts of C++ and Java appropriately in problem solving.	
CO4	Use the syntax and semantics of java programming language and basic concepts of OOP	
CO5	Develop reusable programs using the concepts of inheritance, polymorphism, interfaces and packages.	
CO6	Apply the concepts of Multithreading and Exception handling to develop efficient and error free codes	
CO7	Design event driven GUI and web related applications which mimic the real word scenarios.	
SEMESTER – IV		
COs	Course Name: JAVA PROGRAMMING LAB	Code: U4CS21MP Credits: 3
	OBJECTIVES: 1. Writing and testing applets for potential inclusion in web pages. 2. Understanding how to access enterprise data bases from the application programs	
CO1	To use the basics of Java programming, multi-threaded programs.	
CO2	To implement the Exception handling concepts.	
CO3	The skills to apply OOP in Java programming in problem solving	

CO4	Implement Object oriented features using Java	
CO5	Apply the concept of polymorphism and inheritance	
CO6	Implement exception handling	
CO7	Develop network and window application using awt and swings.	
SEMESTER – IV		
COs	Course Name: MICROPROCESSORS AND MICROCONTROLLERS	Code: U4CS23ST Credits: 3
	OBJECTIVES: 1. It gives a practical training of interfacing the peripheral devices with the 8085 microprocessor. 2. The course objective is to introduce the basic Concepts of microprocessor. 3. To develop in students the assembly language programming skills. 4. It gives real time applications of Microprocessor as well as microcontroller.	
CO1	Understanding the concept of 8085 Instruction set and Classification	
CO2	To write programs to find out the smallest / largest number stored in memory, a program related to conversion from Binary to BCD and Hexadecimal to decimal using the 8085 assembly language.	
CO3	Ability to understand the Hardware and Interfacing 8255	
CO4	Solve basic arithmetic operations using the 8085 assembly language.	
CO5	Demonstrate the concept of Programmable Interface Devices	
CO6	Demonstrate the concept of 8051 Microcontroller	
CO7	To provide a theoretical & a practical introduction to microcomputer and microprocessors, assembly language programming techniques, design of hardware interfacing circuit.	
SEMESTER – IV		
COs	Course Name: INTERNET AND ITS APPLICATIONS	Code: U4CS21NM Credits: 2
	OBJECTIVES: 1. Understand the importance of the Internet in the real world. 2. Understand the client-server model of the Internet. 3. Understand the e-mail provider and search engine.	
CO1	Able to understand the meaning of the term Internet and its functioning.	
CO2	Can have knowledge of the various applications of internet.	
CO3	Able to understand the usage of web browsers and its applications.	
CO4	Able to understand the working principles of search engines.	
CO5	Able to understand the concept of Email and its functionalities.	
CO6	Able to design web pages using html tags.	
CO7	Able to understand the need of E-marketing and various digital payments.	
SEMESTER – V		
COs	Course Name: RELATIONAL DATABASE MANAGEMENT SYSTEM	Code: U5CS21MT Credits: 5
	OBJECTIVES: 1. To learn the fundamentals and issues in database systems	

	2. To appreciate the design of databases using relational models 3. To learn data definition and query languages	
CO1	Classify modern and futuristic database applications based on size and complexity	
CO2	Map ER model to Relational model	
CO3	Write queries using normalization criteria	
CO4	Compare and contrast various indexing strategies in different database systems	
CO5	Appraise how advanced databases differ from traditional databases	
CO6	Use of function and procedure in SQL	
CO7	Use of Cursor and Trigger	
SEMESTER – V		
COs	Course Name: OPEN SOURCE PROGRAMMING	Code: U5CS22MT Credits: 5
	OBJECTIVES: 1. This course provides an overview of the historical and modern context and operation of free and open source software (FOSS) communities & associated software projects. 2. The practical objective of the course is to teach students how they can begin to participate in a FOSS project in order to contribute to and improve aspects of the software that they feel are wrong. 3. Students will learn some important FOSS tools and techniques for contributing to projects and how to set up their own FOSS projects	
CO1	Ability to learn Linux Operating system and its environment.	
CO2	Ability to gather information about Free and Open Source Software projects from software releases and from sites on the internet.	
CO3	Ability to build and modify the mysql commands(insert,delete,update,alter,etc)	
CO4	Ability to contribute perl software to and interact with Free and Open Source Software development projects	
CO5	Learn the Python language, its structure, syntax concepts, libraries and application.	
CO6	Learn how to write computer programming using Python language	
CO7	Understand the installation of various packages in open source operating systems	
SEMESTER – V		
COs	Course Name: RDBMS LAB	Code: U5CS21MP Credits: 4
	OBJECTIVES: 1. To give a good formal foundation on the relational model of data. 2. To present SQL and procedural interfaces to SQL comprehensively.	
CO1	Understand, appreciate and effectively explain the underlying concepts of database technologies	
CO2	Design and implement a database schema for a given problem-domain	
CO3	Normalize a database	
CO4	Populate and query a database using SQL DML/DDDL commands	
CO5	Declare and enforce integrity constraints on a database using a state-of-the-art RDBMS	

SEMESTER – V		
COs	Course Name: OPEN SOURCE PROGRAMMING LAB	Code: U5CS22MP Credits: 4
	OBJECTIVES: 1. Open source laboratory introduces the students to develop technical solutions for problems using the open source software is readily available at free of cost. 2. The objective of this course is to enhance the knowledge of students to address the IT requirements both from the operating system and application requirement perspective.	
CO1	Select and install the various open source software as per the requirement.	
CO2	Construct the development environment as per the requirement.	
CO3	Identify the associated plug-in is as per the requirement.	
CO4	Learn the languages like PHP, Perl, Python to develop an application as per requirement.	
CO5	Implement various applications using build systems	
CO6	Understand and implement the mini projects using open source softwares.	
CO7	Understand the kernel configuration and virtual environment	
SEMESTER – V		
COs	Course Name: DATA AND COMMUNICATION NETWORKS	Code: U5CS23ET Credits: 4
	OBJECTIVES: 1. To understand the division of network functionality into layers. 2. To appreciate the top down and bottom up view of computer network architecture 3. To know the functionality of each layer in computer networks	
CO1	Ability to trace the flow of information from one node to another node in the network	
CO2	To understand network communication using the layered concept, Open System Interconnect (OSI) and the Internet Model.	
CO3	Ability to choose functionalities at each layer for different applications.	
CO4	Evaluate the protocols in network layer from QoS perspective	
CO5	To understand the concept of flow control, error control and LAN protocols; to explain the design of, and algorithms used in, the physical, data link layers.	
CO6	To know the functions performed by a Network Management System and to analyze connection establishment and congestion control with respect to TCP Protocol.	
CO7	Understand the principles and operations behind various application layer protocols like HTTP, SMTP, FTP.	
SEMESTER – V		
COs	Course Name: COMPUTER GRAPHICS	Code: U5CS24ET Credits: 4
	OBJECTIVES: 1. To provide students with a foundation in graphics applications programming. 2. To introduce students with fundamental concepts and theory of computer	

	graphics 3. To learn the concepts of operating systems.
CO1	To understand the concept of graphical transformation
CO2	Extract scene with different clipping methods and its transformation to graphics display device.
CO3	Use of geometric transformations on graphics objects and their application in composite form.
CO4	Learn the principles and commonly used paradigms and techniques of computer graphics
CO5	Develop a facility with the relevant mathematics of computer graphics
CO6	Understand the basics of computer graphics, different graphics systems and applications of computer graphics.
CO7	Render projected objects to naturalize the scene in 2D view and use of illumination models for this.
SEMESTER – V	
COs	Course Name: OPERATING SYSTEM Code: U5CS25ST Credits: 3
	OBJECTIVES: 1. To learn about the various issues in OS. 2. To familiarize with the important mechanisms in operating systems. 3. To appreciate the emerging trends in operating systems
CO1	Articulate the main concepts, key ideas, strengths and limitations of operating systems
CO2	Explain the core issues of operating systems
CO3	Know the usage and strengths of various algorithms of operating systems
CO4	Understand the basics of operating systems like kernel, shell, types and views of operating systems
CO5	Describe the various CPU scheduling algorithms and remove deadlocks.
CO6	Explain various memory management techniques and concept of thrashing
CO7	Recognize file system interface, protection and security mechanisms.
SEMESTER – VI	
COs	Course Name: VISUAL PROGRAMMING Code: U6CS21MT Credits: 5
	OBJECTIVES: 1. Implement the event driven programming using Visual Basic 6.0 forms and controls. 2. Create menu to make the application more interactive Use existing.Common Dialog Controls like File Dialog box, Color Dialog box, etc. 3. Create Data centric applications by connecting to the databases.
CO1	Design, create, build, and debug Visual Basic applications.
CO2	Explore Visual Basic's Integrated Development Environment (IDE).
CO3	Implement syntax rules in Visual Basic programs.
CO4	Explain variables and data types used in program development.

CO5	Apply arithmetic operations for displaying numeric output.	
CO6	Write and apply decision structures for determining different operations.	
CO7	Write and apply loop structures to perform repetitive tasks.	
SEMESTER – VI		
COs	Course Name: WEB TECHNOLOGY	Code: U6CS22MT Credits: 5
	OBJECTIVES: 1. To write syntactically correct HTTP messages 2. To describe the semantics of common HTTP methods and header fields 3. Describe the actions, including those related to the cache, performed by a browser in the process of visiting a Web address.	
CO1	Students are able to develop a dynamic webpage by the use of java script and DHTML.	
CO2	Students will be able to write a well formed / valid XML document.	
CO3	Students will be able to connect a java program to a DBMS and perform insert, update and delete operations on DBMS table.	
CO4	Students will be able to write a server side java application called Servlet to catch form data sent from client, process it and store it on database.	
CO5	Students will be able to write a server side java application called JSP to catch form data sent from client and store it on database.	
CO6	To study the framework and building blocks of .net integrated development environment.	
CO7	To design and develop web based enterprise systems for the enterprises using technologies like jsp, servlet and asp.net	
SEMESTER – VI		
COs	Course Name: VISUAL PROGRAMMING LAB	Code: U6CS21MP Credits: 4
	OBJECTIVES: 1. Visual Basic provides an environment called the IDE (Integrated Development environment) provides a platform for visual programming. 2. With the user diversion towards graphical user interfaces, computer programming languages are also changing	
CO1	Can able to create Visual basic applications using forms, controls, and events	
CO2	Develop windows applications using Visual Basic language.	
CO3	Create applications with database connectivity.	
SEMESTER – VI		
COs	Course Name: WEB TECHNOLOGY LAB	Code: U6CS22MP Credits: 4
	OBJECTIVES: 1. To build web applications using proven developer tools and message formats. 2. Web applications using technologies such as Java, JavaScript, AJAX, Ruby on Rails, Django, XML, RSS, XSLT, and JSON.	
CO1	Apply the Object Oriented features of Java for programming on the internet	

	Implement socket programming and Client side scripting in Java
CO2	Implement socket programming and Client side scripting in Java
CO3	Design a Web application using various technologies such as Java, XML, AJAX, Servlets, PHP, JSP, Django and Jena.
CO4	Create applications using web services such as WSDL and SOAP
CO5	Develop application using Dreamweaver/Flex/Silver Light etc
CO6	Design and implement dynamic websites with good aesthetic sense of designing and latest technical know-how's.
CO7	Have a Good grounding of Web Application Terminologies, Internet Tools, E – Commerce and other web services.
SEMESTER – VI	
COs	Course Name: SOFTWARE PROJECT MANAGEMENT
	Code: U6CS22ET Credits: 4
	OBJECTIVES: 1. To understand the roles of the project manager 2. To understand the threats and opportunities in project management 3. To gain Expertise in size, effort and cost estimation techniques
CO1	Comprehend the roles of the project manager.
CO2	Identify the threats and opportunities in project management.
CO3	Gain knowledge about size, effort and cost estimation techniques.
CO4	Apply the techniques available to keep the project's aims and objectives, under control.
CO5	Analyze the different approaches of non-technical problems.
CO6	Appreciate the management issues like team structure, group dynamics.
CO7	Determine an appropriate project management approach through an evaluation of the business context and scope of the project.
SEMESTER – VI	
COs	Course Name: ARTIFICIAL INTELLIGENCE
	Code: U6CS23ET Credits: 4
	OBJECTIVES: 1. To study the concepts of Artificial Intelligence 2. Solving problems using Artificial Intelligence 3. Introduce the concepts of Expert Systems and machine learning
CO1	Solve basic AI based problems
CO2	Define the concept of logic reference
CO3	Apply planning to make complex decisions
CO4	Learning and knowledge algorithms
CO5	Communication and language processing
CO6	Artificial Intelligence Concepts and Algorithms
CO7	Expert system Models
SEMESTER – VI	
COs	Course Name: DATA MINING AND WAREHOUSING
	Code: U6CS24ET Credits: 4

	OBJECTIVES: 1. To make the students to understand data mining principles and techniques 2. To discover the knowledge imbibed in the high dimensional system. 3. To study algorithms for finding the hidden interesting patterns in data.	
CO1	Technical knowhow of the Data Mining principles and techniques for real time applications.	
CO2	To write programs for classification and clustering	
CO3	To evaluate various mining techniques on complex data objects	
CO4	To develop applications using Big Data Mining Tools.	
CO5	Understand the functionality of the various data mining and data warehousing component	
CO6	Appreciate the strengths and limitations of various data mining and data warehousing models	
CO7	To understand the various Data preprocessing Methods	
SEMESTER – VI		
COs	Course Name: MULTIMEDIA SYSTEMS	Code: U6CS25ET Credits: 4
	OBJECTIVES: 1. To learn and understand technical aspect of Multimedia Systems 2. To understand the standards available for different audio, video and text applications. 3. To Design and develop various Multimedia Systems applicable in real time.	
CO1	To acquire the fundamental principles of multimedia, including digitization and data compression for non-textual information	
CO2	To understand issues in representing, processing, and transmitting multimedia data	
CO3	To understand core multimedia technologies and standards	
CO4	To gain hands-on experience in image, sound and video editing and in some aspects of multimedia authoring (incorporating images, sound, video, and animation)	
CO5	To design, capture, store and integrate sound, images and video to deliver multimodal information.	
CO6	To perform various multimedia platforms	
CO7	To prepare the project for planning estimates	
SEMESTER – VI		
COs	Course Name: CLOUD COMPUTING	Code: U6CS26ST Credits: 3
	OBJECTIVES: 1. To understand the concept of cloud and utility computing. 2. To understand the various issues in cloud computing. 3. To familiarize themselves with the state of the art in cloud	
CO1	Articulate the main concepts, key technologies, strengths and limitations of cloud computing	
CO2	Identify the architecture, infrastructure and delivery models of cloud computing	
CO3	Explain the core issues of cloud computing such as security, privacy and	

	interoperability
CO4	Choose the appropriate technologies, algorithms and approaches for the related issues
CO5	Describe the principles of Parallel and Distributed Computing and evolution of cloud computing from existing technologies
CO6	Implement different types of Virtualization technologies and Service Oriented Architecture systems
CO7	Analyse the issues in Resource provisioning and Security governance in clouds

B.C.A.

SEMESTER – I		
COs	Course Name: DIGITAL LOGIC AND DESIGN	Code: U1CA21MT Credits: 5
	OBJECTIVES: 1. Learn how to design digital circuits, by simplifying the Boolean functions. 2. Learn to design combinational and sequential circuits. 3. To study about asynchronous sequential logic.	
CO1	Apply the Boolean minimization techniques for combinational circuits such as adder, subtractor, encoder etc.	
CO2	Explain the applications of digital electronics	
CO3	Solve asynchronous sequential circuits for simple application	
CO4	Apply the concept of sequential circuits for counters, shift registers etc.	
CO5	Discuss the universality of NAND gates. Construct NOT, OR, AND, NOR, EXOR and EX-NOR gates using NAND gates and show the output.	
CO6	Discuss the universality of NOR gates. Construct NOT, OR, AND, NOR, EXOR and EX-NOR gates using NOR gates and show the output	
CO7	Explain K-map for three and four variables, identification of pairs, quads and octets and solving sum-of-products equations	
SEMESTER – I		
COs	Course Name: MULTIMEDIA LAB	Code: U1CA21MP Credits: 2
	OBJECTIVES: 1. The vast possibilities of traditional tools, and develop an understanding of Sophisticated layering techniques 2. The vast possibilities of traditional tools, and develop an understanding of Sophisticated layering techniques	
CO1	Apply various tools to create and edit images.	
CO2	Apply layers, filter effects and blending modes, share and save your images in various formats.	
CO3	Learn various retouching and repairing techniques to correct images.	
CO4	Demonstrate the techniques to use text reflection effect.	
CO5	Demonstrate how to insert image in the text.	

CO6	Design and develop creative applications using GIMP.	
CO7	To Understand the concept of multimedia software	
SEMESTER – II		
COs	Course Name: PROGRAMMING IN C	Code: U2CA21MT Credits: 5
	OBJECTIVES: 1. To learn programming using a structured programming language. 2. To provide C programming exposure. 3. To introduce foundational concepts of computer programming to students of different Branches of Engineering and Technology.	
CO1	Write C program for simple applications	
CO2	Formulate algorithm for simple problems	
CO3	Analyze different data types and arrays	
CO4	Perform simple search and sort	
CO5	Use programming language to solve problems	
CO6	Able to implement the algorithms and draw flowcharts for solving Mathematical and Engineering problems	
CO7	To be able to develop C programs on linux platform.	
SEMESTER – II		
COs	Course Name: PROGRAMMING IN C LAB	Code: U2CA21MP Credits: 2
	OBJECTIVES: 1. To understand the basic programming constructs and articulate how they are used to develop a program with a desired runtime execution flow. 2. To articulate where computer programs fit in the provision computer-based solutions to real world problems.	
CO1	Read, understand and trace the execution of programs written in C language.	
CO2	Write and compile programs using C programs.	
CO3	Write program with the concept of Structured Programming	
CO4	Identify suitable data structure for solving a problem	
CO5	Demonstrate the use of conditional statement.	
CO6	Write the C code for a given algorithm	
CO7	Implement Programs with pointers and arrays, perform pointer arithmetic, and use the pre-processor.	
SEMESTER – III		
COs	Course Name: OBJECT ORIENTED PROGRAMMING USING C++	Code: U3CA21MT Credits:4
	OBJECTIVES: 1. To learn advanced features of the C++ programming language as a continuation of the previous course. 2. To learn the characteristics of an object oriented programming language: Data abstraction and information hiding, inheritance and dynamic binding. 3. To learn the basic principles of object oriented design and software	

	engineering in terms of software reuse and managing complexity.	
CO1	Articulate the principles of object-oriented problem solving and programming.	
CO2	Outline the essential features and elements of the C++ programming language.	
CO3	To learn the syntax and semantics of the C++ programming language.	
CO4	To learn programming fundamentals, including statement and control flow and recursion.	
CO5	Applying the concepts of class, method, constructor, instance, data abstraction, function abstraction, inheritance, overriding, overloading, and polymorphism	
CO6	To learn how containment and inheritance promote code reuse in C++.	
CO7	To learn how to implement files and command line arguments in C++	
SEMESTER – III		
COs	Course Name: DATA STRUCTURES AND COMPUTER ALGORITHMS	Code: U3CA22MT Credits: 4
	OBJECTIVES: 1. To learn programming constructs of C++. 2. To implement the linear and non-linear data structure using STL 3. Implement data structure techniques	
CO1	Implement data structure using C++	
CO2	Suggest appropriate tree/graph data structure for any given data set	
CO3	Apply hashing concepts for a given problem	
CO4	Modify or suggest new data structure for an application	
CO5	Appropriate choose the sorting algorithm	
CO6	Appropriate choose the sorting algorithm	
CO7	Applying Backtracking Technique	
SEMESTER – III		
COs	Course Name: COMPUTER ARCHITECTURE	Code: U3CA23MT Credits: 4
	OBJECTIVES: 1. To distinguish between the various ISA 2. To trace the execution sequence of an instruction through the processor 3. To compare different approaches used for implementing a functional unit	
CO1	Identify the functional units of a computer system and their operation	
CO2	Point out the various metrics of performance	
CO3	Critically analyze the different types of ISA styles	
CO4	Explain the data path and control path implementation of a processor	
CO5	Discuss the implementations of various functional units	
CO6	Point out the characteristics of the memory and I/O systems and discuss their design	
CO7	To view all system devices diagrams with CPU	
SEMESTER – III		
COs	Course Name: OBJECT ORIENTED PROGRAMMING USING C++ LAB	Code: U3CA21MP Credits: 2
	OBJECTIVES:	

	1. To learn programming constructs of C++. 2. To implement the linear and non-linear data structure using STL	
CO1	Implement Basic programming constraints in C++.	
CO2	Implement Object Oriented Programming Concepts in C++.	
CO3	Develop applications using stream I/O and file I/O.	
CO4	To Demonstrate practical experience in developing object-oriented solutions.	
CO5	To Analyze a problem description and design and build object-oriented software using good coding practices and techniques.	
SEMESTER – III		
COs	Course Name: DATA STRUCTURES AND COMPUTER ALGORITHMS LAB	Code: U3CA22MP Credits: 2
	OBJECTIVES: 1. To learn programming constructs of DS 2. To implement the linear and non-linear data structure using STL	
CO1	Apply generic programming technique to implement any data structure	
CO2	Apply appropriate search trees for an application	
CO3	Use graphs in problem solving	
SEMESTER – III		
COs	Course Name: ENTERPRISE RESOURCE PLANNING	Code: U3CA24ST Credits: 3
	OBJECTIVES: 1. This course covers concepts in enterprise resource planning (ERP). 2. The main focus of this course is to show how ERP systems 3. To integrate business processes across functional areas and support business Analysis	
CO1	Business processes common to most businesses order processing, inventory management, procurement, etc.	
CO2	Master data common to most businesses--customer, vendor, inventory, etc.	
CO3	Process modeling-creating diagrams to depict the sequence of tasks completed in a business process.	
CO4	How a business process often spans different functional areas of the business: accounting, marketing, material management, etc.	
CO5	How enterprise systems, such as SAP, integrate business functional areas into one enterprise-wide information system.	
CO6	The issues involved in implementing an ERP system.	
CO7	Create reengineered business processes for successful ERP implementation	
SEMESTER – IV		
COs	Course Name: COMPUTER NETWORKS	Code: U4CA21MT Credits: 4
	OBJECTIVES: 1. To understand the division of network functionality into layers. 2. To familiarize the functions and protocols of each layer of the TCP/IP protocol suite.	

	3. To understand the flow of information from one node to another node in the network.	
CO1	Ability to trace the flow of information from one node to another node in the network.	
CO2	Identify the purpose and use of Network Hardware Devices	
CO3	Finding the Shortest Route to routing packets	
CO4	Develop own protocol	
CO5	Ability to choose functionalities at each layer for different applications	
CO6	Evaluate the protocols in network layer from QoS perspective	
CO7	Purpose and need of Client and Server and its uses	
SEMESTER – IV		
COs	Course Name: OPERATING SYSTEM	Code: U4CA22MT Credits: 4
	OBJECTIVES: 1. To learn the concepts of operating systems. 2. To learn about the various issues in operating systems. 3. To familiarize with the important mechanisms in operating systems	
CO1	Articulate the main concepts, key ideas, strengths and limitations of operating systems	
CO2	Explain the core issues of operating systems	
CO3	Know the usage and strengths of various algorithms of operating systems	
CO4	Understand the basics of operating systems like kernel, shell, types and views of operating systems	
CO5	Describe the various CPU scheduling algorithms and remove deadlocks.	
CO6	Explain various memory management techniques and concept of thrashing	
CO7	Recognize file system interface, protection and security mechanisms.	
SEMESTER – IV		
COs	Course Name: VISUAL PROGRAMMING	Code: U4CA23MT Credits: 4
	OBJECTIVES: 1. Implement the event driven programming using Visual Basic 6.0 forms and controls 2. Use programming fundamental features like variables, control structures, procedures, etc. 3. Create menu to make the application more interactive.	
CO1	Design, create, build, and debug Visual Basic applications.	
CO2	Explore Visual Basic’s Integrated Development Environment (IDE).	
CO3	Implement syntax rules in Visual Basic programs.	
CO4	Explain variables and data types used in program development.	
CO5	Apply arithmetic operations for displaying numeric output.	
CO6	Write and apply decision structures for determining different operations.	
CO7	Write and apply loop structures to perform repetitive tasks.	
SEMESTER – IV		

COs	Course Name: VISUAL PROGRAMMING LAB	Code: U4CA21MP Credits: 2
	OBJECTIVES: 1. Visual Basic provides an environment called the IDE (Integrated Development Environment) that provides a platform for visual programming. 2. With the user diversion towards graphical user interfaces, computer programming languages are also changing..	
CO1	Can able to create Visual basic applications using forms, controls, and events	
CO2	Develop windows applications using Visual Basic language.	
CO3	Create applications with database connectivity.	
SEMESTER – IV		
COs	Course Name: E-COMMERCE	Code: U4CA24ST Credits: 3
	OBJECTIVES: 1. To understand the interest and opportunity of e-commerce 2. To know how to plan and how to manage e-commerce solutions 3. To know how to use technologies to build e-commerce websites.	
CO1	Define and analyze the principles of E-commerce and basics of World Wide Web.	
CO2	Define and analyze the concept of electronic data interchange and its legal, social and technical aspects.	
CO3	Define and analyze the security issues over the web, the available solutions and future aspects of e-commerce security.	
CO4	Define and analyze the concept of E-banking, electronic payment system	
CO5	Describe the major types of E-commerce.	
CO6	Explain the process that should be followed in building an E-commerce presence.	
CO7	Identify the key security threats in the E-commerce environment.	
SEMESTER – V		
COs	Course Name: RELATIONAL DATABASE MANAGEMENT SYSTEM	Code: U5CA21MT Credits: 5
	OBJECTIVES: 1. To learn the fundamentals and issues in database systems 2. To appreciate the design of databases using relational models 3. To learn data definition and query languages	
CO1	Classify modern and futuristic database applications based on size and complexity	
CO2	Map ER model to Relational model	
CO3	Write queries using normalization criteria	
CO4	Compare and contrast various indexing strategies in different database systems	
CO5	Appraise how advanced databases differ from traditional databases	
CO6	Use of function and procedure in SQL	
CO7	Use of Cursor and Trigger	
SEMESTER – V		
COs	Course Name: OPEN SOURCE PROGRAMMING	Code: U5CA22MT Credits: 5

	OBJECTIVES: 1. This course provides an overview of the historical and modern context and operation of free and open source software (FOSS) communities & associated software projects. 2. The practical objective of the course is to teach students how they can begin to participate in a FOSS project in order to contribute to & improve aspects of the software that they feel are wrong. 3. Students will learn some important FOSS tools and techniques for contributing to projects and how to set up their own FOSS projects	
CO1	Ability to learn Linux Operating system and its environment.	
CO2	Ability to gather information about Free and Open Source Software projects from software releases and from sites on the internet.	
CO3	Ability to build and modify the mysql commands (insert, delete, update, alter, etc)	
CO4	Ability to contribute perl software to and interact with Free and Open Source Software development projects	
CO5	Learn the Python language, its structure, syntax concepts, libraries and application.	
CO6	Learn how to write computer programming using Python language	
CO7	Understand the installation of various packages in open source operating systems	
SEMESTER – V		
COs	Course Name: RDBMS LAB	Code: U5CA21MP Credits: 4
	OBJECTIVES: 1. To give a good formal foundation on the relational model of data. 2. To present SQL and procedural interfaces to SQL comprehensively	
CO1	Understand, appreciate and effectively explain the underlying concepts of database technologies	
CO2	Design and implement a database schema for a given problem-domain	
CO3	Normalize a database	
CO4	Populate and query a database using SQL DML/DDDL commands	
CO5	Declare and enforce integrity constraints on a database using a state-of-the-art RDBMS	
SEMESTER – V		
COs	Course Name: OPEN SOURCE PROGRAMMING LAB	Code: U5CA22MP Credits: 4
	OBJECTIVES: 1. Open source laboratory introduces the students to develop technical solutions for problems using the open source software is readily available at free of cost. 2. The objective of this course is to enhance the knowledge of students to address the IT requirements both from the operating system and application requirement perspective.	
CO1	Select and install the various open source software as per the requirement.	
CO2	Construct the development environment as per the requirement.	

CO3	Identify the associated plug-in is as per the requirement.
CO4	Learn the languages like PHP, Perl, Python to develop an application as per requirement.
CO5	Implement various applications using build systems
CO6	Understand and implement the mini projects using open source softwares.
CO7	Understand the kernel configuration and virtual environment
SEMESTER – V	
COs	Course Name: DATA MINING AND WAREHOUSING Code: U5CA23ET Credits: 5
	OBJECTIVES: 1. To understand the division of network functionality into layers. 2. To appreciate the top down and bottom up view of computer network architecture 3. To know the functionality of each layer in computer networks
CO1	Technical knowhow of the Data Mining principles and techniques for real time applications.
CO2	To write programs for classification and clustering
CO3	To evaluate various mining techniques on complex data objects
CO4	To develop applications using Big Data Mining Tools.
CO5	Understand the functionality of the various data mining and data warehousing component
CO6	Appreciate the strengths and limitations of various data mining and data warehousing models
CO7	To understand the various Data preprocessing Methods
SEMESTER – V	
COs	Course Name: MICROPROCESSORS AND MICROCONTROLLERS Code: U5CA24ET Credits: 5
	OBJECTIVES: 1. It gives a practical training of interfacing the peripheral devices with the 8085 microprocessor. 2. The course objective is to introduce the basic Concepts of microprocessor, to develop in students the assembly language programming skills. 3. It gives real time applications of microprocessor as well as microcontroller
CO1	Understanding the concept of 8085 Instruction set and Classification
CO2	To write programs to find out the smallest / largest number stored in memory, a program related to conversion from Binary to BCD and Hexadecimal to decimal using the 8085 assembly language.
CO3	Ability to understand the Hardware and Interfacing 8255
CO4	Solve basic arithmetic operations using the 8085 assembly language.
CO5	Demonstrate the concept of Programmable Interface Devices
CO6	Demonstrate the concept of 8051 Microcontroller
CO7	To provide a theoretical & a practical introduction to microcomputer and

	microprocessors, assembly language programming techniques, design of hardware interfacing circuit.	
SEMESTER – V		
COs	Course Name: MOBILE COMPUTING	Code: U5CA25ST Credits: 3
	OBJECTIVES: 1. Study the details of lower layers of mobile architectures 2. To learn to develop applications for various mobile OS 3. Study the details for Android	
CO1	To explain the features of smart mobiles and other smart devices	
CO2	To develop applications for Android and iOS	
CO3	To explain protocols related to routing in mobile networks	
CO4	Able to think and develop new mobile application.	
CO5	Able to debate on any new technical issue related to this new paradigm and come up with a solution(s).	
CO6	Able to develop new ad hoc network applications and/or algorithms/protocols.	
CO7	Able to explain & develop any existing or new protocol related to mobile environment	
SEMESTER – VI		
COs	Course Name: JAVA PROGRAMMING	Code: U6CA21MT Credits: 5
	OBJECTIVES: 1. To learn the OOP specific programming languages such as C++ & Java. 2. To write programs to solve problems using the OOP language constructs rather than structural programming. 3. To understand and know the importance of OOP in real world problems	
CO1	Design problem solutions using Object Oriented techniques.	
CO2	Apply the concepts of data abstraction, encapsulation, polymorphism, overloading, and inheritance for problem solutions.	
CO3	Use the OOP concepts of C++ and Java appropriately in problem solving.	
CO4	Use the syntax and semantics of java programming language and basic concepts of OOP	
CO5	Develop reusable programs using the concepts of inheritance, polymorphism, interfaces and packages.	
CO6	Apply the concepts of Multithreading and Exception handling to develop efficient and error free codes	
CO7	Design event driven GUI and web related applications which mimic the real word scenarios.	
SEMESTER – VI		
COs	Course Name: WEB TECHNOLOGY	Code: U6CA22MT Credits: 5
	OBJECTIVES: 1. To write syntactically correct HTTP messages	

	2. To describe the semantics of common HTTP methods and header fields 3. Describe the actions, including those related to the cache, performed by a browser in the process of visiting a Web address	
CO1	Students are able to develop a dynamic webpage by the use of java script and DHTML	
CO2	Students will be able to write a well formed / valid XML document.	
CO3	Students will be able to connect a java program to a DBMS and perform insert, update and delete operations on DBMS table.	
CO4	Students will be able to write a server side java application called Servlet to catch form data sent from client, process it and store it on database.	
CO5	Students will be able to write a server side java application called JSP to catch form data sent from client and store it on database.	
CO6	To study the framework and building blocks of .net integrated development environment.	
CO7	To design and develop web based enterprise systems for the enterprises using technologies like jsp, servlet and asp.net	
SEMESTER – VI		
COs	Course Name: JAVA LAB	Code: U6CA21MP Credits: 4
	OBJECTIVES: 1. Writing and testing applets for potential inclusion in web pages. 2. Understanding how to access enterprise data bases from the application programs	
CO1	To use the basics of Java programming, multi-threaded programs.	
CO2	To implement the Exception handling concepts.	
CO3	The skills to apply OOP in Java programming in problem solving	
CO4	Implement Object oriented features using Java	
CO5	Apply the concept of polymorphism and inheritance	
CO6	Implement exception handling	
CO7	Develop network and window application using awt and swings.	
SEMESTER – VI		
COs	Course Name: WEB TECHNOLOGY LAB	Code: U6CA22MP Credits: 4
	OBJECTIVES: 1. To build web applications using proven developer tools & message formats. 2. Web applications using technologies such as Java, JavaScript, AJAX, Ruby on Rails, Django, XML, RSS, XSLT, and JSON.	
CO1	Apply the Object Oriented features of Java for programming on the internet	
CO2	Implement socket programming and Client side scripting in Java	
CO3	Design a Web application using various technologies such as Java, XML, AJAX, Servlets, PHP, JSP, Django and Jena.	
CO4	Create applications using web services such as WSDL and SOAP	
CO5	Develop application using Dreamweaver/Flex/Silver Light etc	

CO6	Design and implement dynamic websites with good aesthetic sense of designing and latest technical know-how's.		
CO7	Have a Good grounding of Web Application Terminologies, Internet Tools, E – Commerce and other web services.		
SEMESTER – VI			
COs	Course Name: COMPUTER GRAPHICS		Code: U6CA23ET Credits: 4
	OBJECTIVES: 1. To provide students with a foundation in graphics applications programming. 2. To introduce students with fundamental concepts and theory of computer graphics 3. To learn the concepts of operating systems		
CO1	To understand the concepts of graphical transformation		
CO2	Extract scene with different clipping methods and its transformation to graphics display device.		
CO3	Use of geometric transformations on graphics objects and their application in composite form.		
CO4	Learn the principles and commonly used paradigms and techniques of CG		
CO5	Develop a facility with the relevant mathematics of computer graphics		
CO6	Understand the basics of computer graphics, different graphics systems and applications of computer graphics.		
CO7	Render projected objects to naturalize the scene in 2D view and use of illumination models for this.		
SEMESTER – VI			
COs	Course Name: ARTIFICIAL INTELLIGENCE		Code: U6CA24ET Credits: 4
	OBJECTIVES: 1. To study the concepts of Artificial Intelligence 2. Solving problems using Artificial Intelligence 3. Introduce the concepts of Expert Systems and machine learning		
CO1	Solve basic AI based problems		
CO2	Define the concept of logic reference		
CO3	Apply planning to make complex decisions		
CO4	Learning and knowledge algorithms		
CO5	Communication and language processing		
CO6	Artificial Intelligence Concepts and Algorithms		
CO7	Expert system Models		
SEMESTER – VI			
COs	Course Name: SOFTWARE PROJECT MANAGEMENT		Code: U6CA25ET Credits: 4
	OBJECTIVES: 1. To understand the roles of the project manager 2. To understand the threats and opportunities in project management		

	3. To gain Expertise in size, effort and cost estimation techniques	
CO1	Comprehend the roles of the project manager.	
CO2	Identify the threats and opportunities in project management.	
CO3	Gain knowledge about size, effort and cost estimation techniques.	
CO4	Apply the techniques available to keep the projects aims and objectives, under control.	
CO5	Analyze the different approaches of non-technical problems.	
CO6	Appreciate the management issues like team structure, group dynamics.	
CO7	Determine an appropriate project management approach through an evaluation of the business context and scope of the project.	
SEMESTER – VI		
COs	Course Name: MANAGEMENT INFORMATION SYSTEMS	Code: U6CA26ET Credits: 4
	OBJECTIVES: 1. Developed a product or process by applying knowledge of programming, web, database, human computer interaction, networking and security tools 2. Participated effectively as a member of a development team and undertaken leadership roles when appropriate 3. Taken graduate courses or continuing education classes to improve skills and abilities	
CO1	An ability to apply knowledge of computing and mathematics appropriate to the programs.	
CO2	Student outcomes and to the discipline	
CO3	An ability to analyze a problem, and identify and define the computing requirements	
CO4	An ability to design, implement, and evaluate a computer-based system, process, component	
CO5	An ability to function effectively on teams to accomplish a common goal	
CO6	An understanding of professional, ethical, legal, security and social issues and responsibilities	
CO7	An ability to communicate effectively with a range of audiences	
SEMESTER – VI		
COs	Course Name: CLOUD COMPUTING	Code: U6CA27ST Credits: 3
	OBJECTIVES: 1. To understand the concept of cloud and utility computing. 2. To understand the various issues in cloud computing. 3. To familiarize themselves with the state of the art in cloud	
CO1	Articulate the main concepts, key technologies, strengths and limitations of cloud computing	
CO2	Identify the architecture, infrastructure and delivery models of cloud computing	
CO3	Explain the core issues of cloud computing such as security, privacy and interoperability	

CO4	Choose the appropriate technologies, algorithms and approaches for the related issues
CO5	Describe the principles of Parallel and Distributed Computing and evolution of cloud computing from existing technologies
CO6	Implement different types of Virtualization technologies and Service Oriented Architecture systems
CO7	Analyse the issues in Resource provisioning and Security governance in clouds

M.C.A.

SEMESTER – I		
COs	Course Name: DATA STRUCTURE AND ALGORITHMS	Code: P1CA31MT Credits: 4
	OBJECTIVES: 1. To review the basic data structures such as list, stack & queue and introduce concurrency on them 2. To learn advanced search structures such as Splay tree, Red Black trees, Multi way search tree and Skip lists 3. To study advanced heap structures such as Leftist Heaps, Binomial Heaps and Fibonacci Heaps	
CO1	Implement and apply concurrency in linked lists, stacks and queues	
CO2	Perform operations on advanced search trees	
CO3	Design and implement various types of advanced heaps structures	
CO4	Implement advanced concurrent structures such as hash table & priority queue	
CO5	Solve applications using advanced algorithm such as Randomized, Approximation and Parallel algorithms.	
CO6	Discusses basic ADTs such as stacks, queues, and trees	
CO7	Implements basic algorithms for sorting and searching.	
SEMESTER – I		
COs	Course Name: PROBLEM SOLVING USING PYTHON	Code: P1CA32MT Credits: 4
	OBJECTIVES: 1. To know the basics of algorithmic problem solving. 2. To develop Python programs with conditionals and loops. 3. To define Python functions and use function calls.	
CO1	Develop algorithmic solutions to simple computational problems.	
CO2	Develop and execute simple Python programs.	
CO3	Structure simple Python programs for solving problems.	
CO4	Decompose a Python program into functions.	
CO5	Represent compound data using Python lists, Tuples, dictionaries.	
CO6	Make the own module packages.	
CO7	Read and write data from/to files in Python Programs.	
SEMESTER – I		

COs	Course Name: JAVA PROGRAMMING	Code: P1CA33MT Credits: 4
	OBJECTIVES: 1. To understand the basics of Object oriented Programming Concepts Character Set variables, data types, operators and controls structure. 2. To understand the fundamental concept of Java like class and Object array, methods, constructors and Inheritance 3. To understand the concept of package, Exception Handling and Threading.	
CO1	To understand the basics of Object Oriented Programming concepts, Character Set, tokens, variables, data types, operators and control structure.	
CO2	To understand the fundamental concept of Java like class and object, array, methods, constructors and inheritance.	
CO3	To understand the concept of package, Exception Handling and Threading.	
CO4	To understand the concepts of Applets and AWT.	
CO5	To understand the concepts of JDBC connectivity.	
CO6	Design problem solutions using Object Oriented techniques.	
CO7	Use the syntax and semantics of java programming language and basic concepts of OOP	
SEMESTER – I		
COs	Course Name: COMPUTER ORGANIZATION	Code: P1CA34MT Credits: 3
	OBJECTIVES: 1. To understand basic components of system 2. To understand network functionality into layers. 3. To design digital circuits, by simplifying the Boolean functions.	
CO1	Make decision about the configuration and network of system.	
CO2	Design and analyze digital circuits.	
CO3	Simplify complex Boolean functions.	
CO4	Build digital systems involving combinational and sequential logic.	
CO5	Knowledge on various memory units	
CO6	Ability to trace the flow of information from one node to another node in the network.	
CO7	Ability to choose functionalities at each layer for different applications	
SEMESTER – I		
COs	Course Name: PRINCIPLES OF PROGRAMMING LANGUAGES	Code: P1CA31ET Credits: 2
	OBJECTIVES: 1. To introduce the major programming paradigms, and the principles and techniques involved in design and implementation of modern programming languages. 2. To introduce frameworks for specifying and reasoning about programming languages 3. Knowledge of, and ability to use, language features used in current	

	programming languages.		
CO1	Knowledge of, and ability to use, language features used in current programming languages.		
CO2	An ability to program in different language paradigms and evaluate their relative benefits		
CO3	An understanding of the key concepts in the implementation of common features of programming languages		
CO4	Understand the reason for learning a programming language.		
CO5	Understand the usage and existence of various programming languages.		
CO6	Describe the usage of data types in various languages.		
CO7	Understand the concepts like abstract data types, sub programs and will be able to apply in realistic manner.		
SEMESTER – I			
COs	Course Name: SOFTWARE PROJECT MANAGEMENT	Code: P1CA32ET Credits: 2	
	OBJECTIVES: 1. To understand the fundamental principles of Software Project Management 2. To understand the project planning process and be familiar with the different methods and techniques used for project management. 3. To learn about project reporting, defect analysis and prevention		
CO1	Understand the issues and challenges faced while doing the Software project Management.		
CO2	Identify, formulate, review and analyze complex software project management using principles of mathematics.		
CO3	Understand why majority of the software projects fails and how that failure probability can be reduced effectively. They will completely understand the complete software project planning process.		
CO4	Perform project Scheduling, tracking, risk analysis, quality management and Project Cost estimation using different techniques and will be able to give quality software by making systematic approach.		
CO5	Analyze the different approaches of non-technical problems.		
CO6	Appreciate the management issues like team structure, group dynamics.		
CO7	Determine an appropriate project management approach through an evaluation of the business context and scope of the project.		
SEMESTER – I			
COs	Course Name: OBJECT ORIENTED ANALYSIS DESIGN	Code: P1CA33ET Credits: 2	
	OBJECTIVES: 1. To introduce the techniques of identifying objects, carrying out analysis, design and provide solution to the given scenario 2. .Students will get an exposure on activities of identifying objects and it relationships. 3. Students can describe the system as analysis model and design model		

CO1	Able to understand the object oriented concepts and to apply object oriented life cycle model for a project		
CO2	Able to design static and dynamic models using UML diagrams.		
CO3	Able to perform object oriented analysis to identify the objects from the problem specification.		
CO4	Identify, analyse, and model structural and behavioral concepts of the system.		
CO5	Analyse, design, document the requirements through use case driven approach.		
CO6	Develop; explore the conceptual model into various scenarios and applications.		
CO7	Apply the concepts of architectural design for deploying the code for software.		
SEMESTER – I			
COs	Course Name: DATA STRUCTURE AND ALGORITHMS LAB	Code: P1CA31MP Credits: 2	
	OBJECTIVES: 1. To learn the implementation of linear data structures for concurrency 2. To learn the implementation of advanced data structures such as search trees and heaps		
CO1	Implement and apply concurrency in linked lists, stacks and queues		
CO2	Implement advanced search trees such as Red black tree, 2-D tree, splay tree and skip list.		
CO3	Work with advanced concurrent structures such as hash table, Priority Queue		
SEMESTER – I			
COs	Course Name: PROBLEM SOLVING USING PYTHON LAB	Code: P1CA32MP Credits: 2	
	OBJECTIVES: 1. To understand the problem solving approaches. 2. To learn the basic programming constructs in Python.		
CO1	Develop algorithmic solutions to simple computational problems		
CO2	Develop and execute simple Python programs.		
CO3	Structure simple Python programs for solving problems.		
SEMESTER – I			
COs	Course Name: JAVA PROGRAMMING LAB	Code: P1CA33MP Credits: 2	
	OBJECTIVES: 1. To understand the basic concepts of Java, Class syntax, data types, flow of control, classes, methods, objects, arrays, exception handling, recursion, and graphical user interfaces (GUIs). 2. Writing and testing applets for potential inclusion in web pages		
CO1	The skills to apply OOP in Java programming in problem solving		
CO2	To understand the basic concepts of Java, Class syntax, data types, flow of control, classes, methods, objects, arrays, exception handling, recursion, and graphical user interfaces (GUIs).		
CO3	Writing and testing applets for potential inclusion in web pages.		
CO4	Understanding how to access enterprise databases from the application programs.		

CO5	Use of GUI components (Console and GUI based)	
SEMESTER – II		
COs	Course Name: RELATIONAL DATABASE MANAGEMENT SYSTEM	Code: P2CA31MT Credits: 4
	OBJECTIVES: 1. To have a broad understanding of database concepts and DBMS software 2. To have a high-level understanding of major DBMS components and their function 3. To be able to model an application’s data requirements using conceptual modeling tools like ER diagrams and design database schemas based on the conceptual model	
CO1	Classify modern and futuristic database applications based on size and complexity	
CO2	Map ER model to Relational model.	
CO3	Write queries using normalization criteria .	
CO4	Use of function and procedure in SQL.	
CO5	Use of Cursor and Trigger.	
CO6	Database storage devices like RAID and structures.	
CO7	Types of databases and Structure of XML Data	
SEMESTER – II		
COs	Course Name: WEB PROGRAMMING (PHP, MySQL)	Code: P2CA32MT Credits: 4
	OBJECTIVES: 1. To understand the basic concepts of internet, its history ,html ,css, xhtml and ways to connect to internet. 2. To learn basics of client side JavaScript and server side programming constructs 3. To understand the basics and advantages of open source software- linux, scripts	
CO1	Able to Understand the fundamentals of web.	
CO2	Students will have a working knowledge of designing web pages using XHTML tags.	
CO3	Able to understand the need of JavaScript in Dynamic web pages.	
CO4	Outline the essential features and elements of the HTML5 and CSS3.	
CO5	Understand the concepts, structure, types and design of Linux operating System.	
CO6	Able to Understand the basic concepts of PHP.	
CO7	Outline the principles behind using MySQL as a backend DBMS with PHP.	
SEMESTER – II		
COs	Course Name: LINUX OPERATING SYSTEM	Code: P2CA33MT Credits: 4
	OBJECTIVES: 1. To understand various operating systems. 2. Flavours of Linux, working with Linux OS, shell programming, idea on Kernel, shell, semaphore. Knowledge on DNS, DHCP, Mail, File servers.	

	3. Understanding the basics of linux, set of commands and utilities in Linux. Can do programs on process and communication	
CO1	Understanding the basics of linux, set of commands and utilities in Linux. Can do programs on process and communication. Understand various servers.	
CO2	Master system resources sharing among the users	
CO3	Able to explain the functions, facilities, structure of operating systems and fundamental operating system abstractions.	
CO4	Able to analyze the structure of operating system and design the applications to run in parallel either using process or thread models of different OS.	
CO5	Able to analyze the performance and apply different algorithms used in major components of operating systems, such as scheduler, memory manager, concurrency control manager and mass-storage manager, I/O manager	
CO6	Able to analyze and justify the various device and resource management techniques, managing deadlock situations for time-sharing and distributed systems.	
CO7	Be familiar with multithreading	
SEMESTER – II		
COs	Course Name: ACCOUNTING FINANCIAL MANAGEMENT	Code: P2CA34MT Credits: 4
	OBJECTIVES: 1. To give an insight into the basics of Accounting Concepts and Principles to prepare the accounts. 2. Students to understand the role of accounting plays in the overall setup of a business. 3. Able to understand the capital structure and investment decisions.	
CO1	Understand the basic principles concept and conventions of accounting.	
CO2	Analyze the cost volume profit analysis.	
CO3	Able to prepare different type of budgets like sales budget, purchase budget, flexible budget, material budget, cash budget etc.	
CO4	Discuss the functions of financial management.	
CO5	Understand the cost of control and investment decisions.	
CO6	Describe the factors affecting capital structure and working capital	
CO7	Able to prepare final account with adjustments.	
SEMESTER – II		
COs	Course Name: CLOUD COMPUTING	Code: P2CA31ET Credits: 2
	OBJECTIVES: 1. To provide comprehensive overview on principles of cloud computing, its convergence with high performance computing and distributed computing. 2. To create an awareness of application and technology trends that are shaping the future of computing through various case studies 3. Understand how data centers facilitate management, debugging, migration and disaster recovery through virtualization	

CO1	Understand how data centers facilitate management, debugging, migration and disaster recovery through virtualization
CO2	Design innovative applications of parallel, distributed and cloud computing systems
CO3	Identify appropriate tools and techniques for the development of high-performance, scalable and reliable systems using evolving technology
CO4	Explain the core issues of cloud computing such as security, privacy and interoperability
CO5	Choose the appropriate technologies, algorithms and approaches for the related issues
CO6	Describe the principles of Parallel and Distributed Computing and evolution of cloud computing from existing technologies
CO7	Implement different types of Virtualization technologies and Service Oriented Architecture systems

SEMESTER – II

COs	Course Name: MOBILE COMMERCE	Code: P2CA32ET Credits: 2

OBJECTIVES:

1. To understanding of the concepts, principles and technologies of m-commerce and study its application to the marketing functions of organizations.
2. To understand, through the use of real-world case studies, how mobile phones are used in four marketing disciplines: sales promotion, advertising, customer relationship management, and brand engagement.
3. To Define and analyze the principles of E-commerce and basics of M-Commerce

CO1	Web Client/Server Architecture – Intranet And Extranets
CO2	Infrastructure of M–Commerce , Types Of Mobile Commerce Services
CO3	Small Business Adoption And Diffusion
CO4	To Define and analyze the principles of E-commerce and basics of M-Commerce.
CO5	Define and analyze the concept of electronic data interchange and its legal, social and technical aspects
CO6	Analyze the security issues over the web, the available solutions and future aspects of e-commerce security.
CO7	Define and analyze the concept of E-banking, electronic payment system

SEMESTER – II

COs	Course Name: CRYPTOGRAPHY AND NETWORK SECURITY	Code: P2CA33ET Credits: 2

OBJECTIVES:

1. To understand basics of Cryptography and Network Security
2. To be able to secure a message over insecure channel by various means
3. To learn about how to maintain the Confidentiality, Integrity and Availability

	of a data	
CO1	Provide security of the data over the network.	
CO2	Do research in the emerging areas of cryptography and network security.	
CO3	Implement various networking protocols.	
CO4	To access the public key cryptosystems	
CO5	To view the protocols and hash functions	
CO6	To create an IP security architecture	
CO7	Protect any network from the threats in the world.	
SEMESTER – II		
COs	Course Name: BUSINESS STATISTICS	Code: P2CA34ET Credits: 2
	OBJECTIVES: 1. To study the basic elements of statistics for representing data diagrammatically 2. To represent a statistical data using diagrams graphs 3. To apply the large and small sample tests for testing significant difference between given data.	
CO1	Finding Multiple regression equations for a given data	
CO2	Applying the various distributions for a given data	
CO3	Learning about small sample test for testing significant difference between given data	
CO4	Analyzing the large sample test for given data	
CO5	Knowing about ANOVA technique	
CO6	Explaining probability theory and probability distribution in relation to general statistical analysis	
CO7	Evaluating partial correlation for a given data	
SEMESTER – II		
COs	Course Name: INTERNET OF THINGS	Code: P2CA35ET Credits: 2
	OBJECTIVES: 1. To prepare the student for better application of internet technology. 2. Understand the communication technologies in IoT 3. Know the IoT protocols and web of things	
CO1	Understand the communication technologies in IoT	
CO2	Design IoT applications in different domain and be able to analyze their performance	
CO3	Know the IoT protocols and web of things	
CO4	To apply the knowledge and skills acquired during the course to build and test a complete, working IoT system.	
CO5	To know the various applications and implementation of IoT	
CO6	Learn the concept and capabilities of smart thing/object/device identification, and	

	physical principles of sensing	
CO7	Apply IoT knowledge to implement small-scale IoT Project	
SEMESTER – II		
COs	Course Name: ARTIFICIAL INTELLIGENCE	Code: P2CA36ET Credits: 2
	OBJECTIVES: 1. To know the underlying structure behind intelligence mathematically. 2. To know the logical implications in computational intelligence. 3. To know the automated learning techniques	
CO1	Understand the search techniques.	
CO2	Apply the search techniques to real-time problems.	
CO3	Apply the reasoning techniques to real world problems.	
CO4	Understand the representation of knowledge.	
CO5	Understand the learning techniques.	
CO6	To identify the problems using search engine	
CO7	Apply AI techniques in developing real world applications.	
SEMESTER – II		
COs	Course Name: RELATIONAL DATABASE MANAGEMENT SYSTEM LAB	Code: P2CA31MP Credits: 2
	OBJECTIVES: 1. .The major objective of this lab is to provide a strong formal foundation database concepts, and practice to database application development 2. Understand, appreciate and effectively explain the underlying concepts of database technologies	
CO1	Understand, appreciate and effectively explain the underlying concepts of database technologies	
CO2	Design and implement a database schema for a given problem-domain	
CO3	Normalize a database	
SEMESTER – II		
COs	Course Name: WEB PROGRAMMING (PHP, MySQL) LAB	Code: P2CA32MP Credits: 2
	OBJECTIVES: 1. To learn html tags and JavaScript Language programming concepts and their techniques. 2. .To learn Linux essential commands and scripting language.	
CO1	Able to develop the static website using various XHTML tags.	
CO2	Able to develop the dynamic website using JavaScript commands.	
CO3	Able to construct the shell program in Linux	
CO4	Able to display server information using PHP commands	
CO5	Able to develop the dynamic website using PHP commands	
SEMESTER – II		
COs	Course Name: LINUX OPERATING SYSTEM LAB	Code: P2CA33MP Credits: 2

	OBJECTIVES: 1. To develop skill on Linux , working with Linux OS, commands and shell programming, Clear idea on process and interposes communication. 2. Knowledge on DNS, DHCP, Mail, File servers 3. Understanding the basics of Linux, set of commands and utilities in Linux.	
CO1	Understanding the basics of linux, set of commands and utilities in Linux. Can do programs on process and communication shell program. Understand various servers.	
CO2	Understand and implement basic services and functionalities of the operating system using system calls.	
CO3	Use modern operating system calls and synchronization libraries in software/hardware interfaces.	
SEMESTER – III		
COs	Course Name: BIG DATA ANALYTICS	Code: P3CA31MT Credits: 4
	OBJECTIVES: 1. To understand the competitive advantages of big data analytics 2. To understand the big data frameworks 3. To learn data analysis methods	
CO1	Understand how to leverage the insights from big data analytics	
CO2	Analyze data by utilizing various statistical and data mining approaches	
CO3	Perform analytics on real-time streaming data	
CO4	Understand the various SQL alternative database models	
CO5	To understand the specialized aspects of big data with the help of different big data applications	
CO6	To Identify and distinguish big data analytics applications	
CO7	Access and Process Data on Distributed File System	
SEMESTER – III		
COs	Course Name: .NET PROGRAMMING	Code: P3CA32MT Credits: 4
	OBJECTIVES: 1. Understand the foundations of CLR Execution. 2. Learn the Technologies of the .NET framework 3. To examine some of the most important	
CO1	Able to Understand the .Net framework and its functionalities	
CO2	Able to develop a basic programming in C# Console.	
CO3	Able to gain knowledge of Object-oriented programming concepts through C#.	
CO4	Able to create GUI applications using VB.Net.	
CO5	Able to develop a web programming using ASP.Net.	
CO6	Able to understand the need of web services in ASP.Net.	
CO7	Able to create an application that contains use of ADO. NET	
SEMESTER – III		
COs	Course Name: MOBILE APPLICATION	Code: P3CA33MT

	DEVELOPMENT	Credits: 4
	OBJECTIVES: 1. To know the basis of Android application 2. To able to develop simple and professional Mobile Applications 3. Use the techniques in Mobile Applications	
CO1	Know about the mobile application development environment	
CO2	Develop interface and design	
CO3	Use the techniques in Mobile Applications	
CO4	Develop a simple as well as a professional application	
CO5	Be competent with the characterization and architecture of mobile applications.	
CO6	Be exposed to technology and business trends impacting mobile applications	
CO7	Be ready for the job opportunity in mobile application development	
SEMESTER – III		
COs	Course Name: RESOURCE MANAGEMENT TECHNIQUES	Code:P3CA34MT Credits: 4
	OBJECTIVES: 1. Basic knowledge of matrix, set theory, functions and relations concepts needed for designing and solving problems 2. Logical operations and predicate calculus needed for computing skill 3. Design and solve Boolean functions for defined problems.	
CO1	Solve problems as graphs and simplex tables	
CO2	Be able to build and solve transportation and assignment problems	
CO3	Construct linear integer programming models and discuss the solution techniques	
CO4	Use CPM and PERT techniques, to plan, schedule, and control project activities	
CO5	To analyze a network of queues with Poisson external arrivals, exponential service requirements and independent routing.	
CO6	The students will have a fundamental knowledge of the operation research concepts	
CO7	Acquire skills in analyzing queueing models	
SEMESTER – III		
COs	Course Name: COMPILER DESIGN	Code: P3CA31ET Credits: 2
	OBJECTIVES: 1. Learn the various parsing techniques 2. Learn the levels of translation 3. Design and implement a prototype compiler	
CO1	Design and implement a prototype compiler.	
CO2	Apply for various optimization techniques for dataflow analysis	
CO3	Use the different compiler construction tools.	
CO4	Understand the major phases of compilation and to understand the knowledge of Lex tool & YAAC tool	
CO5	Develop the parsers and experiment the knowledge of different parsers design without automated tools	
CO6	Construct the intermediate code representations and generation	

CO7	Convert source code for a novel language into machine code for a novel computer	
SEMESTER – III		
COs	Course Name: DECISION SUPPORT SYSTEM	Code: P3CA32ET Credits: 2
	OBJECTIVES: 1. To introduce the decision-making system, models and support 2. To impart about knowledge-based system and advanced intelligent systems 3. Recognize the relationship between business information needs and decision making.	
CO1	Recognize the relationship between business information needs & decision making.	
CO2	Appraise the general nature and range of decision support systems.	
CO3	Appraise issues related to the development of DSS	
CO4	Select appropriate modeling techniques	
CO5	Analyze, design, and implement a DSS	
CO6	Understanding an knowledge acquisition.	
CO7	Design the collaborating and meeting process.	
SEMESTER – III		
COs	Course Name: PARALLEL PROCESSING	Code: P3CA33ET Credits: 2
	OBJECTIVES: 1. This is a graduate level course on parallel computing with the objective to familiarize students with the fundamental concepts, techniques and tools of parallel computing. 2. Participation in this course will enable you to better use parallel computing in your application area, and will prepare you to take advanced courses in more specific areas of parallel computing 3. Understand, appreciate and apply parallel and distributed algorithms in problem solving	
CO1	Understand the evolution of High Performance Computing (HPC) with respect to laws and the contemporary notion that involves mobility for data, hardware devices and software agents	
CO2	Understand, appreciate and apply parallel and distributed algorithms in problem Solving.	
CO3	Evaluate the impact of network topology on parallel/distributed algorithm formulations and traffic their performance.	
CO4	Gain hand-on experience with the agent-based and Internet-based parallel and distributed programming techniques.	
CO5	Master skills to measure the performance of parallel and distributed programs.	
CO6	Be proficient at programming multiple parallel machines in more than one special programming language or programming system.	
CO7	Be able to descriptively compare the performance of different programs and methods on one machine.	
SEMESTER – III		

COs	Course Name: DIGITAL IMAGE PROCESSING	Code: P3CA34ET Credits: 2
	OBJECTIVES: 1. Learn digital image fundamentals. 2. Be exposed to simple image processing techniques 3. Be familiar with image compression and segmentation techniques	
CO1	Know and understand the basics and fundamentals of digital image processing, such as digitization, sampling, quantization, and 2D-transforms.	
CO2	Operate on images using the techniques of smoothing, sharpening and enhancement.	
CO3	Understand the restoration concepts and filtering techniques	
CO4	Learn the basics of segmentation, features extraction, compression and recognition methods for color models.	
CO5	Describe various segmentation techniques for image analysis.	
CO6	Outline the various feature extraction techniques for image analysis.	
CO7	Discuss the concepts of image registration and fusion.	
SEMESTER – III		
COs	Course Name: MACHINE LEARNING	Code: P3CA35ET Credits: 2
	OBJECTIVES: 1. Machine learning uses interdisciplinary techniques such as statistics, Linear algebra, optimization, and computer science. 2. Understand a wide variety of learning algorithms. 3. Understand how to evaluate models generated from data.	
CO1	Understand a wide variety of learning algorithms.	
CO2	Understand how to evaluate models generated from data.	
CO3	Apply the algorithms to a real-world problem	
CO4	Optimize the models learned and report on the expected accuracy	
CO5	Expected accuracy achieved by applying the models.	
CO6	To view the multilayer networks and backpropagation.	
CO7	To access various types of languages using learning process.	
SEMESTER – III		
COs	Course Name: ENTERPRISE RESOURCE PLANNING	Code: P3CA36ET Credits: 2
	OBJECTIVES: 1. To provide a contemporary and forward-looking on the theory and practice of Enterprise Resource Planning Technology. 2. To focus on a strong emphasis upon practice of theory in Applications and Practical oriented approach. 3. To train the students to develop the basic understanding of how ERP enriches the business organizations in achieving a multidimensional growth.	
CO1	Business processes common to most businesses order processing, inventory management, procurement, etc.	
CO2	Master data common to most businesses--customer, vendor, inventory, etc.	

CO3	Process modeling--creating diagrams to depict the sequence of tasks completed in a business process.	
CO4	How a business process often spans different functional areas of the business: accounting, marketing, material management, etc.	
CO5	How enterprise systems, such as SAP, integrate business functional areas into one enterprise-wide information system.	
CO6	The issues involved in implementing an ERP system.	
CO7	Create reengineered business processes for successful ERP implementation	
SEMESTER – III		
COs	Course Name: .NET PROGRAMMING LAB	Code: P3CA31MP Credits: 2
	OBJECTIVES: 1. To explore several new standards that may play a significant role in the C# programming. 2. Formulate and build extensible windows and web applications using the Model View Controller design pattern.	
CO1	Able to implement Basic programming constraints in C#.	
CO2	Able to implement Object Oriented Programming Concepts in C#.	
CO3	Able to construct a GUI Applications using VB.Net	
CO4	Able to develop a static web page using ASP.Net	
CO5	Able to develop a dynamic web page which includes ADO.Net	
SEMESTER – III		
COs	Course Name: MOBILE APPLICATION DEVELOPMENT LAB	Code: P3CA32MP Credits: 2
	OBJECTIVES: 1. To learn the basis of Android application and development environment 2. To able to develop simple and professional Mobile Applications 3. To get ready for the job opportunity in mobile application development	
CO1	Can understand the interface and design of Android application	
CO2	Use the techniques in Mobile Applications	
CO3	Develop a simple as well as a professional application.	
CO4	Will deploy the application in Google play store.	
CO5	Illustrate the android Wi-Fi features and advance android development	
CO6	Develop various Android applications related to layouts & rich uses interactive interfaces	
CO7	Develop Android applications related to mobile related server-less database like SQLITE	
SEMESTER – III		
COs	Course Name: MINI PROJECT	Code: P3CA33MP Credits: 2
	OBJECTIVES: 1. The objective of the project is to enable the students to work in a project of latest topic /research area / industrial applications	

	2. An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution 3. Comprising of the complete system developed along with Implementation and results.	
CO1	To create an Industrial environment and culture within the institution.	
CO2	To set up production lab utilizing the infrastructure of the institution.	
CO3	To standardize laboratories to industrial standard, thereby giving exposure to industrial	
CO4	To provide students hands on experience on, troubleshooting, maintenance, fabrication innovation etc	
CO5	To promote the concept of entrepreneurship	
CO6	To provide students hands on experience on, troubleshooting, maintenance, fabrication,	
CO7	To inculcate innovative thinking and thereby preparing students for main project.	
SEMESTER – IV		
COs	Course Name: PROJECT WORK WITH VIVA VOCE	Code: P3CA31PV Credits: 13
	OBJECTIVES: 1. The objective of the project is to enable the students to work in a project of latest topic / research area / industrial applications. 2. An ability to design, implement, and evaluate a computer-based system, process, components, or program to meet desired needs. 3. Formulate the problem and form a methodology of arriving at the solution of the problem.	
CO1	Plan, analyze, design a software project and demonstrate the ability to communicate effectively in speech and writing.	
CO2	Learn about different software development process models and how to choose an appropriate one for a project	
CO3	Understand of techniques applicable to their own area of professional practice.	
CO4	Demonstrate self-direction and originality in tackling and solving problems	
CO5	Demonstrate self-direction and originality in tackling and solving problems, and act autonomously in planning and implementing tasks at a professional or equivalent level.	
CO6	Learn about different software development process models and how to choose an appropriate one for a project	
CO7	To provide students hands on experience on, troubleshooting, maintenance, fabrication,	

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SEMESTER – I		
COs	Course Name: ARTIFICIAL NEURAL NETWORKS	Code: M1CS21MT Credits: 5

	OBJECTIVES: 1. To understand the various concepts of Neural Networks. 2. To understand the different ways of AI Learning methods and models 3. To learn to represent knowledge based approaches	
CO1	Understand the mathematical foundations of neural network models	
CO2	Model Neuron & Neural Network, and to analyze ANN learning, & its applications	
CO3	Perform Pattern Recognition, Linear classification.	
CO4	Develop different single layer/multiple layer Perception learning algorithms	
CO5	Identify the deep learning algorithms which are more appropriate for various types of learning tasks in various domains.	
CO6	Grasping the use of neural nets for pattern recognition problems	
CO7	Design and implement neural network systems to solve real world problems	
SEMESTER – I		
COs	Course Name: GUIDE PAPER	Code: M1CS22MT Credits: 5
	OBJECTIVES: 1. Able to understand the various concepts in particular subject area 2. The guide paper subject area supports to implements the research development. 3. The subject area of guide paper is used to formulate the problem and form a methodology in research work.	
CO1	To impart knowledge on research problems and findings for particular subject area	
CO2	Ability to understand the concepts for Information experimentation and intellectual property in specific subject area.	
CO3	To develop knowledge in preparation of research based on particular area.	
CO4	Able to understand the various concepts in specific subject	
CO5	To create awareness on Research activities and related work.	
CO6	To impart knowledge on concepts related to subject area in research.	
CO7	To develop a sound knowledge in preparation of research	
SEMESTER – II		
COs	Course Name: DISSERTATION WITH VIVA VOCE	Code: M2CS21DV Credits: 21
	OBJECTIVES: 1. The aim is to understand the concepts to undertake a substantial in-depth study of a specific topic in Computer Science. 2. To carried out a sustained programme of in-depth study on a specific topic 3. Discussion the complex real-world problems and devise efficient computer-based solutions	
CO1	Detailed Study about knowledge of one area of computer science at, or approaching, the frontiers of research	
CO2	Thesis skills to be developed in the analysis, design and implementation of complex systems in support of a research	
CO3	Design and analysis skill develops the technical problem solving by Research	

	literature analysis and critique.
CO4	The critical thinking and technical develops of an original solution
CO5	Implementation design helps to Interpret and evaluate results in computer science.
CO6	To evaluate the application of different methods in these subject areas and will contribute to the development of, new theories and new methods in the subject area
CO7	The development of the thesis will helps to understand from the preparation of peer-reviewed publication.

B.Com.

SEMESTER – I		
COs	Course Name: PRINCIPLES OF ACCOUNTANCY	Code:U1CM21MT Credits: 5
	OBJECTIVES: 1. To familiarize students with the mechanics of writing Business Letters 2. To participate in an online learning environment successfully by developing the implication-based understanding of Paraphrasing, deciphering instructions, interpreting guidelines, discussion boards & Referencing Styles. 3. To impart the correct practices of the strategies of Effective Business writing	
CO1	Use information to support business processes and practices, such as problem analysis and decision making	
CO2	Quantitative skills to help analyze and solve business problems and to take advantage of business opportunities	
CO3	Develop an understanding of internal control issues and the effects of the regulatory environment on financial reporting	
CO4	Gain knowledge of generally accepted accounting principles (GAAP) and managerial accounting theories to business organizations, state and local	
CO5	Employment feasibility governments, and nonprofit organizations	
CO6	Knowledge of federal tax laws and procedures to individuals and businesses	
CO7	Describe how basic business events affect accounts and financial statements.	
SEMESTER – I		
COs	Course Name: BUSINESS COMMUNICATION	Code: U1CM22MT Credits: 4
	OBJECTIVES: 1. To familiarize students with the mechanics of writing Business Letters. 2. To participate in an online learning environment successfully by developing the implication-based understanding of Paraphrasing, deciphering instructions, interpreting guidelines, discussion boards & Referencing Styles. 3. To impart the correct practices of the strategies of Effective Business writing	
CO1	Identify issues involved in communicating at work.	
CO2	Describe team development, team roles, methods for dealing with conflict, and methods for reaching group decisions.	
CO3	Describe the importance of listening in the workplace, the listening process, and techniques for improving workplace listening.	
CO4	Define nonverbal communication and identify how it can be used positively in one's career	
CO5	Identify and define issues in communicating across cultures.	
CO6	Outline the business-communication process and techniques for effective business communication.	
CO7	Identify effective techniques for writing formal and informal reports	
SEMESTER – I		

COs	Course Name: PRINCIPLES OF MARKETING	Code: U1CM21AT Credits: 4
	OBJECTIVES: 1. The objective is to enable students to understand the concept of four Ps marketing mix. 2. To understand the role of marketing within society and within an economic system. 3. To consider the various decision areas within marketing and the tools and methods used by marketing managers for making decisions.	
CO1	Demonstrate understanding of marketing terminology and concepts	
CO2	Identify wants and environmental factors that shape marketing activities for certain target markets	
CO3	Demonstrate knowledge of the individual components of a marketing mix.	
CO4	Demonstrate knowledge of key business communication strategies within the marketing field.	
CO5	Identify the organizational processes involved in the planning, implementation and control of marketing activities	
CO6	Demonstrate understanding of research approaches and basic research toolsas applied to marketing	
CO7	Demonstrate understanding of the role of marketing intermediaries in introducing products to market	
SEMESTER – II		
COs	Course Name: FINANCIAL ACCOUNTING	Code: U2CM21MT Credits: 5
	OBJECTIVES: 1. The objective of this subject is to acquaint the students with the few accounting standards and make them familiar with the accounting procedures for different types of business. 2. To help the students to develop cognizance of the importance of accounting in organization financial statements 3. To enable students to describe how people analyze the corporate financial under different conditions and understand why people describe the financial statements in different manner.	
CO1	Understand the concept of Hire Purchase System and apply it to the preparation of accounts	
CO2	Develop the ability to prepare Branch and departmental accounts and calculate profit or loss.	
CO3	Understand and apply the accounting procedure followed by companies relating to shares and debentures	
CO4	Develop the ability to prepare final statements of companies	
CO5	Develop the ability to prepare statement of Insurance claim for loss of stock and manage Investment accounts.	
CO6	Understand the methods for maintaining branch accounts and its respective	

	accounting treatment, ascertain profit/loss made by Branch and take corrective measures against unprofitable branches	
CO7	Understand the business process in partnership firm	
SEMESTER – II		
COs	Course Name: BUSINESS ORGANISATION	Code: U2CM22MT Credits: 4
	OBJECTIVE: 1. The objective is to familiarize the students with various aspects of Business Organisation. 2. To help the students gain understanding of the functions and responsibilities of managers. 3. To provide them tools and techniques to be used in the performance of the managerial job.	
CO1	Understand the concepts related to Business.	
CO2	Describe different types businesses	
CO3	Understand different ways of classifying businesses: by size, industry sector and ownership type	
CO4	Understand the vocabulary and grammar of a trading floor	
CO5	Experience the interactions between traders, sales, clients, brokers	
CO6	Describe the methods of issuing shares and role of intermediaries in the primary market	
CO7	List the various speculators and describe the speculative activities	
SEMESTER – II		
COs	Course Name: MODERN MARKETING	Code: U2CM21AT Credits: 4
	OBJECTIVES: 1. The objective is to enable students to understand the concept of marketing and its applications and the recent trends in Marketing. 2. Understand the basic concepts in Marketing, Marketing environment and develop an understanding about communication, Marketing Communication and its usage. 3. Analyse the importance of personal selling and salesmanship, process of effective selling involvement of salesmen in sales organization.	
CO1	Students will demonstrate strong conceptual knowledge in the functional area of marketing management.	
CO2	Students will demonstrate effective understanding of relevant functional areas of marketing management and its application.	
CO3	Students will demonstrate analytical skills in identification and resolution of problems pertaining to marketing management	
CO4	Analyse the importance of personal selling and salesmanship, process of effective selling and involvement of salesmen in sales organization.	
CO5	Development and usage Nature and growing importance of sales promotion, samples and point of purchases, implementing and evaluating the sales promotion	

	programs	
CO6	Understand the various types of Advertising, its applications and its usage with effect to marketing scenario	
CO7	Understand the importance of e- marketing	
SEMESTER – III		
COs	Course Name: CORPORATE ACCOUNTING	Code: U3CM21MT Credits: 5
	OBJECTIVES: 1. The objective of this subject is to enable the students to have a comprehensive awareness about the provisions of the Company’s Act and Corporate Accounts. 2. Develop a process for redemption of Preference shares 3. Construct the Restructuring of capital structure in the financial statement of Joint stock company Ltd.	
CO1	Students will learn about the meaning of companies, its types and procedure of formation of company.	
CO2	Students will gain the knowledge of accounting for issue of shares, forfeiture and re-issue of shares, issue of bonus shares and classification of reserves.	
CO3	Students will learn the concept of Redemption of Preference Shares redemption of preference shares, sources of redemption, accounting procedure of redemption and preparation of balance sheet of the company immediately after redemption	
CO4	Understand the meaning and concept of – Amalgamation	
CO5	Students will learn the Purpose of amalgamation and the methods of amalgamation	
CO6	Will able to understand accounting procedure of Liquidation	
CO7	Get knowledge of Final statement of companies	
SEMESTER – III		
COs	Course Name: BUSINESS LAWS	Code: U3CM22MT Credits: 4
	OBJECTIVES: 1. To introduce the students to various Business laws and familiarize them with common issues of relevance. 2. It is essential to study the legal rules that govern and regulate the commercial documents so that the researcher and the student become aware of his command, and thus can avoid problems that may lead to the occurrence of disputes at the level of the daily business dealings. 3. By regulating the relations that govern people of private law and legal rules and take commercial law with respect to the business, and this business has been identified in the Iraqi law on the basis of the Trade Act.	
CO1	Explain the basic elements of forming an enforceable contract and agreement.	
CO2	Classify various negotiable instruments and reason of its dishonor	
CO3	Enumerate the types of companies its management and its rules of corporate governance.	
CO4	Demonstrate an understanding of the Legal Environment of Business.	

CO5	Apply basic legal knowledge to business transactions.	
CO6	Communicate effectively using standard business and legal terminology	
CO7	Understand the concept on sale of goods Act 1930	
SEMESTER – III		
COs	Course Name: MODERN BANKING	Code: U3CM23MT Credits: 4
	OBJECTIVES: 1. The objective of this subject is to acquaint students with the banking technology and their recent developments and enhance their knowledge on modern banking concepts and techniques. 2. To carry out financial analysis of banks and insurance companies, 3. To keep up with developments in financial markets,	
CO1	Acquire knowledge on Indian Banking system and Banking Regulation Acts pertaining to it.	
CO2	Recognize features and roles of businessmen, entrepreneur, managers, consultant, which will help learners to possess knowledge and other soft skills and to react aptly when confronted with critical decision making	
CO3	Ethical and collegial in professional practice.	
CO4	Inclination towards lifelong learning and pursuing professional courses such as CA, CS, ICWA and other courses. Develop skills in Banking Regulations Act	
CO5	Gain practical exposure in the fields of Banking, Finance and Corporate Sector	
CO6	Obtain advanced lessons in Business Communication, Business Economics Paper, Environmental Studies, Entrepreneurial Development, Accountancy & Portfolio and Investment Management.	
CO7	Carry out advanced research in the field of Commerce, banking and finance.	
SEMESTER – III		
COs	Course Name: BUSINESS ECONOMICS I	Code: U3CM24MT Credits: 3
	OBJECTIVES: 1. To introduce the concepts of demand and utility analysis, to explain principles of micro economics relevant to managing an organization; to describe principles of macro economics. 2. Apply the concept of opportunity cost. 3. Employ marginal analysis for decision makings.	
CO1	Obtain knowledge of the concept of opportunity cost	
CO2	Employ marginal analysis for decision making	
CO3	Analyze operations of markets under varying competitive conditions	
CO4	Analyze causes and consequences of unemployment, inflation and economic growth	
CO5	Identify the basic elements of economics	
CO6	Students focus on demand and supply and equilibrium	
CO7	Students focus on essential concept of economic principles	
	SEMESTER – III	

COs	Course Name: STATISTICS AND OPERATION RESEARCH – I	Code: U3CM25AT Credits: 4
	OBJECTIVES: 1. To understand the basic concepts of statistics 2. To know the various techniques of statistics relates to commerce 3. To identify the application knowledge of Operation Research	
CO1	Learning about the collection and representation of data	
CO2	Finding the Various measures of Central tendency	
CO3	Comparing the various sets of data	
CO4	Calculating the time of replacement of a machine	
CO5	Solving a linear Programming Problem	
CO6	Assigning certain jobs to a given set of machines	
CO7	Knowing about various types of data	
SEMESTER – III		
COs	Course Name: DEVELOPMENT OF SMALL BUSINESS	Code: U3CM26ST Credits: 3
	OBJECTIVES: 1. The objective is to familiarize the students with various aspects of Business Organisation. 2. To help the students gain understanding of the functions and responsibilities of managers. 3. To provide them tools and techniques to be used in the performance of the managerial job.	
CO1	Understand the concepts related to Business.	
CO2	Describe different types businesses	
CO3	Understand different ways of classifying businesses: by size, industry sector and ownership type	
CO4	Understand the vocabulary and grammar of a trading floor	
CO5	Experience the interactions between traders, sales, clients, brokers	
CO6	Describe the methods of issuing shares and role of intermediaries in the primary market	
CO7	List the various speculators and describe the speculative activities	
CO7	Understand and apply financial and planning process within the development of a business.	
SEMESTER – IV		
COs	Course Name: ADVANCED CORPORATE ACCOUNTING	Code: U4CM21MT Credits: 5
	OBJECTIVES: 1. The objective is to enable the students to develop awareness about Corporate Accounting in conformity with the Provision of Companies Act and latest amendments thereto with adoption of Accounting Standards. 2. Construct the financial statements of company within the frame work. 3. Develop a process for redemption of Preference shares	

CO1	Compute Value of Shares and Goodwill.	
CO2	Prepare the final accounts of Joint Stock companies	
CO3	Prepare the accounts of companies undergoing amalgamation and external reconstruction	
CO4	Implement the Alteration of Share Capital.	
CO5	Analyze the Preparation of Final Accounts.	
CO6	Know the concepts of Liquidation of companies.	
CO7	Remember the Underwriting of Debentures.	
SEMESTER – IV		
COs	Course Name: COMPANY LAW	Code: U4CM22MT Credits: 4
	OBJECTIVES: 1. The objective is to enable the students to get familiarized with the existing Company Law and Secretarial Procedure. 2. Describes the concept of limited partnership and limited partnership will be able to distinguish them from other partnerships 3. Explains the reason for termination of the joint stock company	
CO1	Know the basic elements of forming an enforceable contract and agreement.	
CO2	Classify various negotiable instruments and reason of its dishonor.	
CO3	Enumerate the types of companies its management and its rules of corporate governance.	
CO4	Demonstrate an understanding of the key characteristics of businesses run as sole traders	
CO5	Determine what are the assets and liabilities of a business using numeracy skills	
CO6	Enumerate the Ethical principles and commit to corporate ethics, responsibilities and norms of the corporate practices.	
CO7	Gain knowledge of company directors	
SEMESTER – IV		
COs	Course Name: BANKING LAW AND PRACTICE	Code: U4CM23MT Credits: 4
	OBJECTIVES: 1. The objective is to familiarize the students with the law and practice of Banking. 2. To acquire knowledge about banking laws in India as it is must for management students. 3. To have conceptual clarity about the process of banking, product and stakeholders with reference to particular acts passed in India.	
CO1	Cultivate the skill of applying concepts and techniques used in Commerce effectively and efficiently in a business environment and Communicate effectively in different contexts.	
CO2	Ethical and collegial in professional practice. Integrate knowledge, skill and attitude that will sustain an environment of learning and creativity among the students	

CO3	Analyze socio-political-economic environment of business organizations	
CO4	Recognize features and roles of businessmen, entrepreneur, managers, consultant, which will help learners to possess knowledge and other soft skills	
CO5	Inclination towards lifelong learning and pursuing professional courses like CA, ACS etc	
CO6	Carry out advanced research in the field of Commerce, banking and finance.	
CO7	React apply when confronted with critical decision making.	
SEMESTER – IV		
COs	Course Name: BUSINESS ECONOMICS II	Code: U4CM24MT Credits: 3
	OBJECTIVES: 1. The objective is to familiarize the students with the industrial policy and fiscal economics. 2. To understand the functioning of economy at the macro level. 3. To Understand how the economy is regulated through monetary and fiscal policies	
CO1	Understand the basic concepts of Economics.	
CO2	Identify the Demand and Supply functions.	
CO3	Apply the behaviour of consumer and marginal utility.	
CO4	Describe the Producers equilibrium and Break Even Analysis.	
CO5	Remember the importance of Product pricing	
CO6	To react apply when confronted with forecasting techniques	
CO7	It focuses mainly upon the theory of the business	
SEMESTER – IV		
COs	Course Name: STATISTICS AND OPERATION RESEARCH – II	Code: U4CM25AT Credits: 4
	OBJECTIVES: 1. The objective is to familiarize the students on the advance information on statistics. 2. To understand the application various techniques in commerce and industry. 3. To find the procedure on operation research	
CO1	Finding the relationship between the two sets of data	
CO2	Drawing the trend line for a given data	
CO3	Computing the various types of index numbers	
CO4	Minimizing the cost for a given transportation problem	
CO5	Assigning machines or persons to do a given job	
CO6	Knowing about various methods to solve a statistical problem	
CO7	Learning about chain based and fixed based index	
SEMESTER – IV		
COs	Course Name: INDUSTRIAL ORGANISATION	Code: U4CM26ST Credits: 3

	OBJECTIVES: 1. The objective of this subject is to acquaint students with the Industrial organization. 2. To identify the formation and functions of various forms of business firm 3. To find the layout of the organisation	
CO1	Understand how price and non-price competition among firms affect economic welfare.	
CO2	Analyze and evaluate models of competitive, oligopolistic, and monopoly markets.	
CO3	Analyze and evaluate how firms' structure and conduct affect economic welfare and how these results feed back to effect structure and conduct.	
CO4	Remember the importance of Plant layout	
CO5	It focuses mainly upon the theory of the firm and the industry	
CO6	The knowledge that the student will derive from the course is useful for further study of firms and markets as well as the effects of regulatory and legal systems	
CO7	Will focus upon market structure, firm conduct, and economic performance of industries.	
SEMESTER – V		
COs	Course Name: COST ACCOUNTING I	Code: U5CM21MT Credits: 5
	OBJECTIVES: 1. To familiarize the students on the use of cost accounting system in different nature of businesses. 2. Describe the Fundamental Concepts of Cost Accounting and its to apply Cost Accounting Methods to 3. Identify Profitable Products and Services.	
CO1	Students will be able to understand the meaning cost, costing and Cost Accounting, Advantages and Disadvantages of Cost accounting	
CO2	Understand attendance and payroll system, Methods of Labour Turnover, remuneration and bonus methods also be able to calculate labour cost.	
CO3	Understand different types of overheads and its classification into various heads	
CO4	Understand cost unit, cost centre and calculation of various costs. They shall also able to prepare a cost sheet to find out cost and net profit/net loss	
CO5	Understand the integrated and non-integrated accounting system and to know how to prepare a reconciliation statement	
CO6	Students will be able to acquaint with the procedure of storekeeping, documentation of material receipt and issue, how to use a technique for setting stock levels, calculation of Economic Order Quantity	
CO7	Understand the Methods of valuation of inventory and importance of ABC analysis for classification of the various materials	
SEMESTER – V		
COs	Course Name: PRACTICAL AUDITING	Code: U5CM22MT Credits: 5

	OBJECTIVES: 1. This subject aims at imparting knowledge about the principles and methods of auditing and their applications. 2. Outline the major practical provisions of the Statements on Auditing Standards (SASs-AUs) and Auditing Standards. 3. Outline the steps involved in the compilation engagement and the review engagement	
CO1	Understand the basic concepts and Objectives of Auditing	
CO2	Analyze the Vouching, Verification and Valuation of Assets and Liabilities	
CO3	Remember the types of Audit and Accounting Standards	
CO4	Apply how to report and audit and to understand the rights and Auditors	
CO5	Analyze the recent trends in Auditing	
CO6	Understand Audit Programme, Audit Evidence, procedure, techniques and Audit working papers.	
CO7	Understand how an asset or a liability can be verified by applying certain audit techniques.	
SEMESTER – V		
COs	Course Name: BUSINESS MANAGEMENT	Code: U5CM23MT Credits: 4
	OBJECTIVES: 1. The objective is to familiarize the students with concepts and principles of Management. 2. To provide them tools and techniques to be used in the performance of the managerial job. 3. To help the students to develop cognizance of the importance of management principles.	
CO1	Acquire knowledge on principles of management	
CO2	Understand the corporate strategic planning techniques	
CO3	Acquire the knowledge on organization structure	
CO4	Familiarize with the different types of leadership	
CO5	Acquaint students with various the techniques of controlling and co-ordination management techniques like Quality Circle, TQM, BPR and Six Sigma	
CO6	Use quantitative measurement to solve business problems	
CO7	Conduct research to identify new business trends and customer needs	
SEMESTER – V		
COs	Course Name: MANAGEMENT ACCOUNTING	Code:U5CM24MT Credits:04
	OBJECTIVES: 1. The objective of this subject is to enable the students to understand the analysis and interpretation of financial statements with a view to prepare management reports for decision-making.	

	2. To analyzes the relationship between the cost-volume and profit 3. To understand break-even sales price, break-even sales volume, the total contribution margin, the unit contribution margin, margin of safety, security ratio, profit margin concepts	
CO1	Understand the Various techniques of Management Principles.	
CO2	Prepare the Financial Statement Analysis.	
CO3	Analyze the Ratio Analysis.	
CO4	Evaluate the Cash flow and Marginal costing	
CO5	To know the preparation of Budgets for planning and control purposes	
CO6	It is one of the analytical method which helps the students to carry out the study of financial statements in the form of ratio and such study is more expressive.	
CO7	Will be able to frame estimate of Working-Capital/ projection of Working Capital	
SEMESTER – V		
COs	Course Name: INCOME TAX LAW AND PRACTICE I	Code: U5CM25ET Credits: 4
	OBJECTIVES: 1. The Objective of this subject is to expose the students to the various provisions of Income Tax Act1961 relating to computation of Income of individuals. 2. Students will be able to compute income from salaries, house property, business/profession, capital gains and income from other sources. 3. To provide theoretical knowledge in the field of tax planning. ·	
CO1	Understand the concept and Objectives of Taxation.	
CO2	To acquaint the students with certain basic terms of Income Tax.	
CO3	To acquaint them with computational provisions under the heads “Salary Income”, “Income from House Property”, “Profits and Gains of Business / Profession”, “Capital Gains”, “Income from other Sources” and head wise computation for these heads of income.	
CO4	To acquaint them with certain deductions from total income and basic computation of total income for individual assesses.	
CO5	To acquaint them with residential status and scope of total income	
CO6	To acquaint them with exemptions under section 10.	
CO7	To acquaint the students with application of above provisions to various practical situations.	
SEMESTER – V		
COs	Course Name: PERSONNEL MANAGEMENT	Code: U5CM26ET Credits: 4
	OBJECTIVES: 1. The objective is to familiarize the students with concepts and principles of personnel Management. 2. Compare and contrast the techniques of OD at individual level and group level in accordance with attitude formation and change of mindset of	

	consumers. 3. Integrate the productivity with combined effect of Team development, quality circle and Quality of work life balance among the employees of an organization	
CO1	Develop the understanding of the concept of personal management.	
CO2	Strategic issues and strategies required to select and man power resources.	
CO3	Integrate the Human Resource knowledge to take correct Business decisions.	
CO4	Understand the Importance of Training and Development	
CO5	Know the various Incentives Schemes	
CO6	Identify the Motivational Techniques	
CO7	Understand the various types of Performance Appraisal	
SEMESTER – V		
COs	Course Name: MERCHANT BANKING	Code: U5CM27ST Credits: 2
	OBJECTIVES: 1. The objective is to provide students with a conceptual framework of stock markets and Commodity Markets, 2. To know about functionaries in these markets and their mode of trading. 3. To understand the concept of merchant banking.	
CO1	Get an understanding of banking operations	
CO2	Know the different financial and other assistance available for industrial units	
CO3	Understand the role of small scale industrial units in economic development	
CO4	Know about various fee based service provided by the banks	
CO5	Apply learning from this program will help to get opportunities to work with investment banking companies	
CO6	Orientation about banking and financial concept covered managing investment in primary and secondary markets.	
CO7	This program will help to perform valuation of companies and prepare reports	
SEMESTER – VI		
COs	Course Name: COST ACCOUNTING -II	Code: U6CM21MT Credits: 5
	OBJECTIVES: 1. To understand the basic concept of costing system 2. To know about functional activities of costing techniques in business. 3. To understand the concept of costing procedure	
CO1	Students will be able to acquaint how to record cost information by using double-entry book keeping system. They shall able to prepare the various ledger accounts relating to cost record	
CO2	Students will be able to understand cost accounting methods maintained by real estate developers/builders and other businesses working on contract.	
CO3	Students will be able to understand the concepts of normal, abnormal loss/gain and its calculation.	

CO4	Students will be able to acquaint the technique of marginal costing and its advantages and disadvantage and also application of marginal cost equations to find out profit volume ratio, Breakeven Point and Marginal of Safety of production units	
CO5	Students will be able to the basic concepts of Material and Labour Variances.	
CO6	Students will be able to know emerging concepts of cost accounting and its importance to developing cost systems.	
CO7	Students will be able to know how to apply these emerging cost concepts in cost reduction, planning and management at the initial stage of production	
SEMESTER – VI		
COs	Course Name: FINANCIAL MANAGEMENT	Code: U6CM22MT Credits: 5
	OBJECTIVES: 1. The objective is to enable students to understand the basic concepts of Financial Management and their role of Financial Management in decision-making. 2. Analyze the importance of capital structure in financial decision. 3. Enumerate the significance of capital budgeting and process of capital budgeting.	
CO1	Describe the dimensions of performance and risk relevant to financial firms	
CO2	Describe the impact of financial innovations , advances in technology and changes in regulation	
CO3	It is one of the analytical method which helps the students to carry out the study of financial statements in the form of ratio and such study is more expressive.	
CO4	Will acquaint with the concept and management of working-capital	
CO5	Gain knowledge of different types of capital budgeting and its applicability.	
CO6	Be able to take appropriate decision on selection of projects.(either to buy or on rent)	
CO7	Helps students to know how to study the financial statements, make comparisons between current year and previous years and draw proper interpretations.	
SEMESTER – VI		
COs	Course Name: ENTREPRENEURIAL DEVELOPMENT	Code: U6CM23MT Credits: 5
	OBJECTIVES: 1. To enable students to understand the basic concepts of entrepreneurship and preparing a business plan to start a small industry. 2. Understand the nature of entrepreneurship. 3. understand the function of the entrepreneur in the successful, commercial application of innovations.	
CO1	Understand the basic concept of Entrepreneurship and their work in life.	
CO2	Remember the entrepreneurial Development Agencies.	
CO3	Evaluate the Project Management.	
CO4	Analyze the entrepreneurial Development Programmes.	

CO5	Understand the need for Economic development and Entrepreneurial growth.	
CO6	Run a small enterprises with small capital for a short period	
CO7	Aware of different opportunities and successful growth stories	
SEMESTER – VI		
COs	Course Name: INCOME TAX LAW AND PRACTICE II	Code: U6CM24ET Credits: 4
	OBJECTIVES: 1. The Objective of this subject is to make the students to understand the computation of Taxable Income and Tax Liability of individuals. 2. To make the students understand the basic concepts, definitions and terms related to direct taxation. 3. Students will be able to identify the technical terms related to direct taxation.	
CO1	To acquaint the students with application of above provisions to various practical situations.	
CO2	To acquaint the students with various transactions for supply and identify levy of a particular tax	
CO3	To acquaint them with certain deductions from total income and basic computation of total income for individual assesses	
CO4	To acquaint them with exemptions under section 80c to 80u	
CO5	Discuss the deductions applicable to individual firm and companies	
CO6	Understand to aware about the income tax authorities and their powers and duties	
CO7	Discuss the assessment and penalties rules	
SEMESTER – VI		
COs	Course Name: MARKETING MANAGEMENT	Code: U6CM25ET Credits: 4
	OBJECTIVES: 1. The objective is to enable the students to acquire skills in Marketing of Insurance Products. 2. Analyze any legal obligations, principles, and rules associated with the organization. 3. Produce advertising messages and place in the chosen media.	
CO1	Understand the concept of Market and Marketing Mix.	
CO2	Gain Knowledge of Product Life Cycle	
CO3	Evaluate the Business Opportunities	
CO4	Identify the factorof Market Segmentation	
CO5	Find the Marketing Environment	
CO6	Identify the Problems of the marketing and resolve it.	
CO7	Knowing the concept of Pricing strategy	
SEMESTER – VI		
COs	Course Name: HUMAN RESOURCE MANAGEMENT	Code: U6CM26ET Credits: 4

	OBJECTIVES: 1. The objective is to familiarize the students with concepts and principles of Human Resource Management. 2. To Illustrate the managerial practice of transaction analysis as a tool for HRD 3. To Identify the challenges of HR and Application of recent trends ranging from Competency mapping to HR Audit	
CO1	Develop the understanding of the concept of human resource management and to understand its relevance in organizations.	
CO2	Develop necessary skill set for application of various HR issues.	
CO3	Analyse the strategic issues and strategies required to select and develop manpower resources.	
CO4	Integrate the knowledge of HR concepts to take correct business decisions.	
CO5	Develop necessary skill set for application of various HR issues.	
CO6	Analyse the strategic issues and strategies required to select and develop manpower resources.	
CO7	Develop the understanding of the concept of human resource management and to understand its relevance in organizations	
SEMESTER – VI		
COs	Course Name: BUSINESS ETHICS	Code: U6CM27ET Credits: 4
	OBJECTIVES: 1. The objective is to provide basic knowledge of business ethics and values and its relevance in modern context. 2. To understand the Business Ethics and to provide best practices of business ethics 3. To learn the values and implement in their careers to become a good managers.	
CO1	Study the Ethical and Moral issues	
CO2	Will help the potentials consequences of Business decision	
CO3	Discuss of Ethics include Corporate Governments and Social responsibilities	
CO4	Business Ethics enhances the law by outlining acceptable behaviours beyond Government.	
CO5	Generate demonstrate respect, responsibility, fairness and caring	
CO6	Impacts various aspects of management and operations	
CO7	Create a code of conduct.	
SEMESTER – VI		
COs	Course Name: PUBLIC ENTERPRISES IN INDIA	Code: U6CM28ST Credits: 2
	OBJECTIVES: 1. To create awareness among the students on the skills required to plan and pursue a career and empower them with employability skills. 2. To maintain a sustained growth in productivity.	

	3. To enhance gainful employment.
CO1	Helps students to know the public undertakings and services
CO2	Discuss the balanced concentrate of wealth and economic power
CO3	Understand the scope for employment opportunities
CO4	Discuss the various types of organization sectors
CO5	Helps students to know about the infrastructure development
CO6	Analyse the strategic issues and strategies required to select and develop manpower resources.
CO7	Understand the need for Economic development.

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SEMESTER – I		
COs	Course Name: ADVANCED FINANCIAL MANAGEMENT	Code: P1CM21MT Credits: 5
	OBJECTIVES: 1. This course is to enable the students to analyze the financial statements using various techniques. 2. Apply the components of interest rates to determine the costs of financing for the firm. 3. Identify how the changes in interest rates affect the flow of funds from the suppliers to the users, including global factors	
CO1	Demonstrate the applicability of the concept of Financial Management to understand the managerial Decisions and Corporate Capital Structure	
CO2	Apply the Leverage and EBIT EPS Analysis associate with Financial Data in the corporate	
CO3	Analise the complexities associated with management of cost of funds in the capital Structure	
CO4	Demonstrate how the concepts of financial management and investment, financing and dividend policy decisions could integrate while identification and resolution of problems pertaining to LSCM Sector	
CO5	Demonstrate how risk is assessed	
CO6	Provide a systematic and rigorous learning and exposure to Banking and Finance related disciplines.	
CO7	Maintain an adequate and consistent cash flow system.	
SEMESTER – I		
COs	Course Name: ACCOUNTING FOR MANAGERIAL DECISIONS	Code: P1CM22MT Credits: 04
	OBJECTIVES: 1. This course is to understand the various tools and techniques used for analysis and interpretation of financial statements. 2. To understand standard variation analysis through managerial techniques.	

	3. To identify the investment decisions.	
CO1	Enhance the abilities of learners to develop the concept of management accounting and its significance in the business.	
CO2	It enables to enhance the abilities of learners to Analyses the financial statements.	
CO3	Enable the learners to understand, develop and apply the techniques of management accounting in the financial decision making in the business corporates.	
CO4	Helps to make the students develop competence with their usage in managerial decision making and control.	
CO5	Develop an understanding of the conceptual framework of the Management Accounting.	
CO6	Provides the knowledge in the Management Accounting Techniques in business decision making.	
CO7	Analyses cost behavior, perform cost-volume-profit analysis and profit planning	
SEMESTER – I		
COs	Course Name: GLOBAL MARKETING	Code: P1CM23MT Credits: 4
	OBJECTIVES: 1. To understand the practice of marketing at global level. 2. Identify the costs and benefits of marketing channels; discuss the firms and the functions involved in typical channels in North America. 3. Identify the roles of advertising, sales promotion, public relations, personal selling and direct marketing in the promotion mix; compare and contrast integrated marketing communications with a non-integrated approach to the promotional mix	
CO1	Have developed an understanding of major issues related to international marketing	
CO2	Have developed skills in researching and analyzing trends in global markets and in modern marketing practice	
CO3	Be able to assess an organization’s ability to enter and compete in international markets.	
CO4	Develop skills in researching and analyzing international marketing opportunities	
CO5	Develop knowledge and understanding of key issues associated with international marketing: Importance of global and international marketing, Motives to internationalization, Specific international issues affecting the 4Ps	
CO6	The influence of macro-environment on market selection	
CO7	Financial, ethical, and organizational issues involved in international marketing	
SEMESTER I		
COs	Course Name: ADVANCED BUSINESS STATISTICS	Code: P1CM24MT Credits: 5
	OBJECTIVES: 1. To identify the concept of statistics in Business 2. To know the basic rules and regulations of applications of statistics 3. To apply the formula for the concept of	
CO1	Finding Multiple regression equations for a given data	

CO2	Applying the various distributions for a given data	
CO3	Learning about small sample test for testing significant difference between given data	
CO4	Analyzing the large sample test for given data	
CO5	Knowing about ANOVA technique	
CO6	Explaining probability theory and probability distribution in relation to general statistical analysis	
CO7	Evaluating partial correlation for a given data	
CO1	Finding Multiple regression equations for a given data	
SEMESTER-I		
COs	Course Name: INDUSTRIAL AND LABOUR LAW	Code: P1CM25ET Credits: 4
	OBJECTIVES: 1. To have a broad understanding of the legal principles governing the employment relationship at individual and collective level. 2. To familiarize the students to the practical problems inherent in the implementation of labour statutes. 3. To understand the concepts of practical labour law.	
CO1	Students should able to elaborate the concept of Industrial Relations.	
CO2	The students should able to illustrate the role of trade union in the industrial setup.	
CO3	Students should able to outline the important causes & impact of industrial disputes.	
CO4	Students should able to elaborate Industrial Dispute settlement procedures.	
CO5	Student should be able to summarize the important provisions of Wage Legislations, in reference to Payment of Wages Act 1936, Minimum Wages Act 1948 & Payment of Bonus Act 1965	
CO6	Student should able to summarize the important provisions of Social Security Legislations, in reference to Employees State Insurance Act 1948, Employees Provident Fund Act 1952, Payment of Gratuity Act 1972.	
CO7	Know the development and the judicial setup of Labour Laws.	
SEMESTER – I		
COs	Course Name: INSURANCE AND RISK MANAGEMENT	Code: P1CM26ET Credits: 4
	OBJECTIVES: 1. The objective is to enable the students to understand various aspects of Life & General Insurance. 2. Understand the concept of risk and risk management 3. Identify and categorize the various types of risk	
CO1	Understand the concept of risk and risk management; Suggest ways to finance risk	
CO2	Identify and categorize the various types of risks;	
CO3	Design a risk management program;	
CO4	Gain knowledge of the various risk control measures available;	
CO5	Identifies the insurance mechanism in risk management	
CO6	Choose appropriate insurance policies related to life and health insurance;	

CO7	Familiarize with fundamental legal principles of insurance;	
SEMESTER – II		
COs	Course Name: PROJECT MANAGEMENT	Code: P2CM21MT Credits: 4
	OBJECTIVES: 1. The objective of the subject to make the students understand . 2. The concept to find the technique of management. 3. To analysis the various project design and planning	
CO1	Develop plans with relevant people to achieve the project's goal.	
CO2	Understand project characteristics and various stages of a project.	
CO3	Understand the conceptual clarity about project organization and feasibility analyses – Market, Technical, Financial and Economic.	
CO4	Analyses the learning and understand techniques for Project planning, scheduling and Execution Control.	
CO5	Apply the risk management plan and analyses the role of stakeholders.	
CO6	Understand the contract management, Project Procurement, Service level Agreements and productivity.	
CO7	Understand the How Subcontract Administration and Control are practiced in the Industry	
SEMESTER – II		
COs	Course Name: HUMAN RESOURCE MANAGEMENT	Code: P2CM22MT Credits: 4
	OBJECTIVES: 1. The objective is to familiarize the students with concepts and principles of Human Resource Management 2. Demonstrate competence in development and problem-solving in the area of HR Management. 3. Provide innovative solutions to problems in the fields of HRM.	
CO1	It develops the understanding of the concept of human resource management and to understand its relevance in organizations.	
CO2	Develops necessary skill set for application of various HR issues.	
CO3	Analyses the strategic issues and strategies required to select and develop manpower resources.	
CO4	Integrates the knowledge of HR concepts to take correct business decisions.	
CO5	Enables the students to understand the HR Management and system at various levels in general and in certain specific industries or organizations	
CO6	Helps the students focus on and analyses the issues and strategies required to select and develop manpower resources.	
CO7	It develops relevant skills necessary for application in HR related issues.	
SEMESTER – II		
COs	Course Name: ADVANCED ACCOUNTS	Code: P2CM23MT Credits: 4

	OBJECTIVES: 1. The objective is to enable the students to level of awareness about Corporate Accounting inconformity with the Provision of Companies" Act. 2. To identify the latest amendments thereto with adoption of Accounting Standards. 3. To provide information on the concepts on corporate accounting systems.	
CO1	Apply the 'equity method of accounting' to appropriate acquisitions.	
CO2	Describe and apply the generally-accepted accounting principles relating to business combinations under the 'parent company theory' and the 'entity theory.	
CO3	Analyses information for consolidated financial statements under the purchase method, including adjustment and elimination of inter-company profits, losses, and other inter-company transactions.	
CO4	Apply appropriate accounting principles relating to the translation of foreign currency in the preparation of consolidated financial statements of multinational companies.	
CO5	Analyses partnership-related transactions and properly account for the formation, operations, termination (admission of new partners or withdrawal of partners), and the liquidation of a partnership.	
CO6	Apply proper accounting treatment for legal reorganization and liquidation of a business entity.	
CO7	Understand worldwide accounting diversity and the internationalization of accounting standards.	
SEMESTER II		
Cos	Course Name: QUANTITATIVE TECHNIQUES FOR BUSINESS DECISIONS	Code: P2CM24MT Credits: 5
	OBJECTIVES: 1. The objective is to enable the students to identify the various techniques of business decisions 2. To identify the various methods of techniques of statistics 3. To provide information on the concepts on quantitative techniques	
CO1	Solving a linear programming problem	
CO2	Discussing about various Inventory models	
CO3	Learning about maximization transportation problem	
CO4	Calculating the route for a given travelling salesman problem	
CO5	Finding the various measures related to queues	
CO6	Sorting out the longest duration of a project in order to avoid wastage for cost and time	
CO7	Computing the length of a queue and the waiting time of a person to stand in queue for his service	
CO1	Solving a linear programming problem	
SEMESTER – II		
COs	Course Name: E-COMMERCE	Code: P2CM25ET Credits: 4

	OBJECTIVES: 1. Understand the importance of the Internet in the real world. 2. Understand the client-server model of the Internet. 3. Understand the e-mail provider and search engine.	
CO1	Able to understand the meaning of the term Internet and its functioning.	
CO2	Can have a knowledge of the various applications of internet.	
CO3	Able to understand the usage of web browsers and its applications.	
CO4	Able to understand the working principles of search engines.	
CO5	Able to understand the concept of Email and its functionalities.	
CO6	Able to design web pages using html tags.	
CO7	Able to understand the need of E-marketing and various digital payments.	
SEMESTER – II		
COs	Course Name: INDUSTRIAL RELATIONS	Code: P2CM26ET Credits: 4
	OBJECTIVES: 1. To create awareness among the students on the Industrial relations required 2. To plan and pursue a career and empower them with employability skills. 3. To understand the relationship of both industrial experts and their stakeholders.	
CO1	Acquire a solid theoretical, practical and ethical perspective on many aspects of industrial relations	
CO2	Critically analyze theories, models, and paradigms in the field	
CO3	Understand the key participants, institutions, relationships and processes in employment relations, so that you acquire an enhanced ability to influence industrial relations outcomes in an informed manner	
CO4	Develop research, writing and speaking skills necessary for work, life and further postgraduate study	
CO5	Strengthen key competencies in group participation, oral and written communication and persuasion, critical thinking, problem-solving, information processing and planning	
CO6	Be acquainted with the concepts, principles and issues connected with trade unions, collective bargaining, workers participation, grievance redressal, and employee discipline and dispute resolution	
CO7	Understand the various processes and procedures of handling Employee Relations.	
SEMESTER – III		
COs	Course Name: INDIRECT TAXATION	Code: P3CM21MT Credits: 4
	OBJECTIVES: 1. This course is to provide adequate knowledge of various concepts and their applications relating to tax. 2. In direct tax laws with a view to integrating the relevance of these laws with financial planning and management decisions. 3. To provide, master and reinforce skills in calculating tax savings	
CO1	It enables to understand various terms related to Goods and Service tax (GST)	

CO2	It helps to understand the difference between forward charge and reverse charge mechanism and also to understand the difference between composite and mixed supply.
CO3	It able to determine the time, place and value of supply.
CO4	The contents and format for various documents like tax invoice, bill of supply, debit note, credit note etc., are clarified.
CO5	Students will be able to compute the amount of CGST, SGST and IGST payable after considering the eligible input tax credit.
CO6	Determines whether a person is required to obtain registration under GST law.
CO7	By the end of the course students will be able to describe how the provisions in the corporate tax laws can be used for tax planning.

SEMESTER – III

COs	Course Name: ORGANIZATIONAL BEHAVIOR	Code: P3CM22MT Credits: 4
	OBJECTIVES: 1. The objective is to enable the students to understand the Organizational Behaviour, and Organizational Change and dynamic of groups. 2. To <i>learn</i> the basic concepts of <i>Organizational Behaviour</i> and its applications in contemporary organizations. 3. Understands Employee's Behavior Enhancing Organizational Efficiency · Resolving Conflicts	
CO1	Discuss the development of the field of organizational behaviour and explain the micro and macro approaches	
CO2	Analyse and compare different models used to explain individual behaviour related to motivation and rewards	
CO3	Identify the processes used in developing communication and resolving conflicts	
CO4	Group dynamics and demonstrate skills required for working in groups (team building)	
CO5	Identify the various leadership styles and the role of leaders in a decision-making process.	
CO6	Explain organizational culture and describe its dimensions and to examine various organizational designs	
CO7	Discuss the implementation of organizational change.	

SEMESTER – III

COs	Course Name: ADVANCED COST ACCOUNTING	Code: P3CM23MT Credits: 4
	OBJECTIVES: 1. The objective of this subject is to familiarize students with the various advanced concepts and element of cost involved in various techniques of costing methods. 2. Compare Cost Accumulation Systems and Choose the Right One . 3. To Evaluate Results Against Budgets with Greater Accuracy	
CO1	Prepare learners to understand the Scope of Cost Accounting in any business	

	activity.
CO2	It helps to learn the Cost Accounting treatment in relation to Material Cost Accounting, employee cost and overheads.
CO3	Develop the learners to establish the interface between Cost Accounting Standards and the various elements of Cost.
CO4	Enable students to learn application of different methods of costing in Manufacturing and Service industries.
CO5	Enhance the abilities of learners to develop the concept of Cost and Management Accounting and its significance in the business
CO6	Enable the learners to understand, develop and apply the techniques of costing in the decision making in the corporate world.
CO7	Equip the students with knowledge and skill to design and implement Cost Control through Costing Techniques.

SEMESTER – III

COs	Course Name: RESEARCH METHODOLOGY	Code: P3CM24MT Credits: 4
	OBJECTIVES: 1. The objective is to create an awareness of the Process of Research, the tools and techniques of research and generation of reports. 2. Students should be able to distinguish between categorical and continuous measures. Students 3. Students should be able to define theory use in quantitative research	
CO1	Acquaint the students with the areas of Business Research Activities	
CO2	It enhances capabilities of students to conduct the research in the field of business and social sciences	
CO3	Enable students, in developing the most appropriate methodology for their research studies.	
CO4	It makes them familiar with the art of using different research methods and techniques	
CO5	Discuss the methodology and techniques used in research work.	
CO6	The basic computer skills necessary for the conduct of research.	
CO7	Assess the basic function and working of analytical instruments used in research.	

SEMESTER – III

COs	Course Name: FINANCIAL SERVICES	Code: P3CM25MT Credits: 4
	OBJECTIVES: 1. To make students understand various functions, importance of financial services. 2. To introduce students to the world of financial services. 3. To identify the knowledge of Financial products	
CO1	Students get knowledge about financial services in India as Indian Financial System, Financial Markets, Banking and Insurance Sector in India and Recent Trends in Accounting and Finance	

CO2	Students are acquainted with current financial practices	
CO3	Students are well acquainted with Financial Markets	
CO4	Understand the various services offered and various risks faced by banks.	
CO5	Understand the dynamic changes of the banking industry and the policy responses because of the recent crisis	
CO6	Have a practical understanding of the various distribution channels of insurance products for effective marketing.	
CO7	Have a practical understanding of regulations and be able to understand insurance operations both in life as well as general insurance.	
SEMESTER – III		
COs	Course Name: SERVICES MARKETING	Code: P3CM26ET Credits: 3
	OBJECTIVES: 1. To understand the meaning of services and the significance of marketing the services 2. Analyze the customer service practices and attitudes in the organizational culture. 3. Identify and analyse various service sector.	
CO1	Demonstrate an extended understanding of the similarities and differences in service-based and physical product-based marketing activities;	
CO2	Demonstrate a knowledge of the extended marketing mix for services;	
CO3	Develop and justify marketing planning and control systems appropriate to service-based activities;	
CO4	Specify, analyze and select markets for specific service products;	
CO5	Prepare, communicate and justify marketing mixes and information systems for service-based organizations;	
CO6	Demonstrate integrative knowledge of marketing issues associated with service productivity, perceived quality, customer satisfaction and loyalty	
CO7	Exhibit the capability to work effectively within a team environment.	
SEMESTER – III		
COs	Course Name: WORKING CAPITAL MANAGEMENT	Code: P3CM27ET Credits: 3
	OBJECTIVES: 1. To understand how the capital for used to day to day operations. 2. To provide knowledge to formulate and integrate an extended treatment on international working capital topics	
CO1	Evaluate comparative working capital management policies and their impact on the firm’s profitability, liquidity, risk and operating flexibility.	
CO2	Evaluate the importance of effective working capital management and its role in meeting the firm’s strategic objectives and its impact in value creation.	
CO3	Investigate funds flow cycles and their impact on working capital management objectives.	
CO4	Compare and contrast the relative merits of alternative working capital policies and	

	the likely short-term and long-term impact on the firm.	
CO5	Formulate appropriate working capital management policies to achieve corporate objectives.	
CO6	Corporate cash management, accounts receivable management, bank relations, and inventory management techniques to maximize the share holders' value.	
CO7	Formulate and integrate an extended treatment on international working capital topics.	
SEMESTER – IV		
COs	Course Name: DIRECT TAXES	Code: P4CM21MT Credits: 5
	OBJECTIVES: 1. Objective of this course is to provide adequate knowledge of various concepts and their applications relating to direct tax 2. Laws with a view to integrating the relevance of these laws with financial planning. 3. To provide, master and reinforce skills in calculating <i>tax</i> savings	
CO1	Acquire conceptual knowledge of Direct and Indirect Tax.	
CO2	Understand the concept of exempted incomes and the provisions of agricultural income.	
CO3	Identify and comply with the relevant provisions of the Income Tax Act as it relates to the income tax of individuals.	
CO4	Develop the skill of recording difference between Direct and Indirect Tax.	
CO5	Compute the income under the head” Income from Salary”, “Income from house property”, “Income from business or profession”.	
CO6	Acquire the complete knowledge of basic concepts of income tax.	
CO7	Describe the role of Income Tax in Growth of Country.	
SEMESTER – IV		
COs	Course Name: INVESTMENT MANAGEMENT	Code: P4CM22MT Credits: 5
	OBJECTIVES: 1. Enables student to understand the nuances of stock market operations. Understand the techniques involved in deciding upon purchase or sale of securities. 2. To understand the characteristics of different financial assets. 3. To enable the students to grasp the basic knowledge in Investments.	
CO1	Critically discuss client objectives and the investment policy statement	
CO2	portfolio theory in practice, covering asset allocation and international investment, portfolio risk management and risk-adjusted performance measurement	
CO3	Understand and critically evaluate Value strategies, Momentum strategies and Hedge fund strategies	
CO4	Understand and critically interpret output from investment and risk management tools such as Style Research, Thomson One Banker and Data stream.	

CO5	Students will understand the characteristics of different financial assets such as money market instruments, bonds, and stocks, and how to buy and sell these assets in financial markets	
CO6	Students will understand the benefit of diversification of holding a portfolio of assets, and the importance played by the market portfolio.	
CO7	Students will know how to apply different valuation models to evaluate fixed income securities, stocks, and how to use different derivative securities to manage their investment risks.	
COs	Course Name: PROJECT DEVELOPMENT	Code: P4CM23MT Credits: 5
	OBJECTIVES: 1. This course helps to Estimate and cost the human and physical resources required, and make plans to obtain the necessary resources 2. To provide the ability to project develop 3. To impart the knowledge to identify the customer requirements and internal and external goals	
CO1	Break work down into tasks and determine handover procedures	
CO2	Identify links and dependencies, and schedule to achieve deliverables	
CO3	Estimate and cost the human and physical resources required, and make plans to obtain the necessary resources	
CO4	Allocate roles with clear lines of responsibility and accountability.	
CO5	Students will identify the resources needed for each stage, including involved stakeholders, tools and supplementary materials	
CO6	Students will describe the time needed to successfully complete a project, considering factors such as task dependencies and task lengths	
CO7	Students will be able to develop a project scope while considering factors such as customer requirements and internal/external goals	
SEMESTER – IV		
COs	Course Name: MARKETING RESEARCH	Code: P4CM24MT Credits: 5
	OBJECTIVES: 1. The objective is to enable students to understand the concept of marketing research and it applications and the recent trends in Marketing Research. 2. Develop and maintain an advertising budget. 3. Determine the goals of an advertising effort.	
CO1	Understand the process of marketing research and its different processes	
CO2	Identify sources of information	
CO3	Understand different research methods	
CO4	Selection research methods	
CO5	Analyse and interpret both qualitative and quantitative data	
CO6	Conduct and analyze a focus group discussion	
CO7	Build a simple questionnaire from a web-based survey administration site.	
SEMESTER – IV		

COs	Course Name: SALES AND ADVERTISING MANAGEMENT	Code: P4CM25ET Credits:4
	OBJECTIVES: 1. To facilitate how the sales and advertising to be practiced in the current scenario. 2. To identify the roles of advertising, sales promotion, public relations, personal selling and direct marketing in the promotion mix; compare and contrast integrated marketing communications with a non-integrated approach to the promotional mix. 3. To Illustrate how the international trade system, economic, political-legal and cultural environments in a foreign country affect a company's international marketing decisions.	
CO1	Know the basic principles of sales and advertising management	
CO2	Demonstrate an understanding of the role of the sales force as a part of the marketing mix	
CO3	Apply in a competent manner sales and advertising management tool such as sales forecasting, sales compensation methods, sales budgeting, sales reports, routings, quotas, sales analysis, and evaluation of performance by means of a team project that creates a sales force plan.	
CO4	Understand the role of the function of sales and advertising management in the corporate structure.	
CO5	Develop the skills among students to enable them to design the promotion-mix strategies and to make the students aware about the current trends in marketing to enable them to take proactive measures while taking marketing decisions.	
CO6	Take effective decisions for launching new products.	
CO7	Discuss and make the students understand the complexities involved in various targeting and positioning decisions	
SEMESTER – IV		
COs	Course Name: BUSINESS ENVIRONMENT AND POLICY	Code: P4CM26ET Credits: 4
	OBJECTIVES: 1. To familiarize the students with International Financial environment, instruments and institutions. 2. To analyse the overall business environment and evaluate its various components in business. 3. It helps students to study the aggregates and to provide overall idea about national economic policies	
CO1	Familiarize with global business environment	
CO2	Make them understand about different trade policy on export and import	
CO3	Develop the knowledge about international business	
CO4	Create an awareness about various international trade institutions (IMF, IBRD, IFC, IDA)	
CO5	Develop knowledge about different marketing strategies	

CO6	Enable the students with data processing and modern electronic medium	
CO7	Develop the students about application of information system	
SEMESTER – IV		
COs	Course Name: PROJECT / DISSERTATION WITH VIVA-VOCE	Code: P4CM21PV Credits: 8
	OBJECTIVES: 1. Ability to independently conduct and lead research within both academic and potentially applied context 2. Thesis and preparation of the dissertation still has a major impact in teaching the student how to organise the relevant information. 3. Ability to identify new problems arising from recent developments in and related to the chosen research	
CO1	Knowledge of the most advanced research in the candidate’s specialisation area related to marketing, finance and Human resource.	
CO2	Understanding of academic theory and the preparation of high-quality research pertinent to the field of study	
CO3	Ability to select appropriate research methods and techniques suitable for the candidate’s research field	
CO4	In-depth understanding the current state of the art in the individual research area, and the ability to appropriately employ methods	
CO5	Research results in the development of new knowledge, theories and presentation of research in the individual research area	
CO6	The preparation of the dissertation forms a significant part of the development of these learning outcomes	
CO7	Thesis and preparation of the dissertation still has a major impact in teaching the student how to organise the relevant information	

M.PHIL. COMMERCE

SEMESTER – I		
COs	Course Name: ADVANCED FINANCIAL MANAGEMENT	Code: M1CM21MT Credits: 5
	OBJECTIVES: 1. The objective of research is to discover answers to the questions through the applications of scientific methods which are defined properly. 2. The main aim of research is to find out the truth which is hidden and is undiscovered. 3. The students should be able to understand some basic concepts of research and its methodologies	
CO1	Understand the concept of financial management to take managerial Decisions and Corporate Capital Structure	
CO2	Apply the Leverage and EBIT EPS Analysis associate with Financial Data in the corporate	

CO3	Analyse the complexities associated with management of cost of funds in the capital Structure	
CO4	Demonstrate how the concepts of financial management and investment, financing and dividend policy decisions could integrate while identification and resolution of problems	
CO5	Demonstrate how risk is assessed	
CO6	To provide a systematic and rigorous learning and exposure to Banking and Finance related disciplines.	
CO7	It is one of the analytical method which helps the students to carry out the study of financial statements in the form of ratio and such study is more expressive.	
SEMESTER – I		
COs	Course Name: RESEARCH METHODOLOGY	Code: M1RM21AM Credits: 5
	OBJECTIVES: 1. To develop understanding of Leverages, Management of Working Capital 2. To help students analyse the Cash flow statements. 3. To develop financial analysis skills	
CO1	Obtain the knowledge of basic research in Commerce and management	
CO2	It enhances capabilities of students to conduct the research in the field of business and social sciences	
CO3	Enable students, in developing the most appropriate methodology for their research studies.	
CO4	It makes them familiar with the art of using different research methods and techniques	
CO5	Knowledge on effective report writing	
CO6	Apply the basic computer skills necessary for the conduct of research.	
CO7	Assess the basic function and working of analytical instruments like SPSS used in research.	
SEMESTER – I		
COs	Course Name: HUMAN RESOURCE MANAGEMENT	Code: M1CM22MT Credits: 5
	OBJECTIVES: 1. To develop the understanding of the concept of human resource management and to understand its relevance in organizations. 2. To develop necessary skill set for application of various HR issues. 3. To analyse the strategic issues and strategies required to select and develop manpower resources.	
CO1	Helps the students focus on and analyses the issues and strategies required to select and develop manpower resources.	
CO2	Integrates the knowledge of HR concepts to take correct business decisions.	
CO3	Get knowledge on application of human resource to be various sectors	
CO4	Develop necessary skill set for application of various HR issues.	
CO5	Identify the Problems of the marketing and resolve it.	

CO6	It able to determine the time, place and value of supply.	
CO7	Be able to assess an organization’s ability to enter and compete in markets.	
	SEMESTER – I	
COs	Course Name: MARKETING MANAGEMENT	Code: M1CM23MT Credits: 5
	OBJECTIVES: 1. The objective is to enable students to understand the concept of four Ps marketing mix. 2. To understand the role of marketing within society and within an economic system. 3. To consider the various decision areas within marketing and the tools and methods used by marketing managers for making decisions.	
CO1	Demonstrate understanding of marketing terminology and concepts	
CO2	Identify wants and environmental factors that shape marketing activities for certain target markets	
CO3	Demonstrate knowledge of the individual components of a marketing mix.	
CO4	Demonstrate knowledge of key business communication strategies within the marketing field	
CO5	Identify the organizational processes involved in the planning, implementation and control of marketing activities	
CO6	Demonstrate understanding of research approaches and basic research toolsas applied to marketing	
CO7	Demonstrate understanding of the role of marketing intermediaries in introducing products to market	
	SEMESTER – II	
COs	Course Name: DISSERTATION AND VIVA-VOCE	Code: M2CM21DV Credits: 21
	OBJECTIVES: 1. This paper aims at exposing the students to the various aspects of commerce and management 2. Identify how the project could have been more effective; 3. Identify whether there have been unintended outcomes and what these	
CO1	To discuss, analyse and present practical situation for find the result of problems	
CO2	Evaluation helps to prove the value of the programme/project, and records the contribution you have made to your field;.	
CO3	Your evaluation can be used for reporting back to funders, and for telling others about the value of the work you have completed	
CO4	The evaluation can help inform the development of future programmes/projects	
CO5	Evaluation helps to prove the value of the programme/project, and records reality.	
CO6	Ensure that the lessons learned are fed back into the decision-making process for future policies, programmes or projects.	
CO7	Indicators will measure whether the programme/project is achieving the desired changes/benefits identified in its aims.	

B.Sc. Mathematics

SEMESTER – I		
COs	Course Name: ALGEBRA	Code: U1MA21MT Credits: 4
	OBJECTIVES: 1. In this course students are exposed to topics like Theory of Equations, Summation of Series, Matrices, Continued Fractions and Elementary Number Theory. 2. The stress is on the development of problem solving skills.	
CO1	Evaluation imaginary and irrational roots and Descarts rule of signs	
CO2	Finding approximate solutions of polynomials by Horner’s method and Newton Raphson method	
CO3	Calculate the summation value of series using Binomial, Exponential and Logarithmic series	
CO4	Compute eigen values eigen vectors of a square matrix using Cayley-Hamilton theorem	
CO5	Decomposition of a composite number as a product of primes	
CO6	Solving system of linear equations	
CO7	Understanding basic ideas of algebra	
SEMESTER – I		
COs	Course Name: TRIGONOMETRY	Code: U1MA22MT Credits: 4
	OBJECTIVES: 1. This course is a fundamental one for many courses of this degree programme. 2. This covers topics on the expansions of trigonometric functions, hyperbolic functions, inverse circular, inverse hyperbolic functions and it aims to develop computational skills.	
CO1	Find the Expansions of Trigonometric functions	
CO2	Calculate the powers of sines and cosines of θ	
CO3	Compute the Hyperbolic functions and summation of Trigonometric series	
CO4	Find the Logarithm of complex quantities and resolution into factors	
CO5	Find Gregory series and Euler series	
CO6	Compute the trigonometric functions of any angle	
CO7	Use fundamental trigonometric identities to verify other identities	
SEMESTER – I		
COs	Course Name: NUMERICAL METHODS - I	Code: U1MA22AT Credits: 3
	OBJECTIVES: 1. This course will cover basic methods for finding the Finite differences, Central differences, Inverse Interpolation, Summation of series, Interpolation for equal & unequal intervals.	

	2. Solutions of simultaneous equations, Important principles, Method and Processes to get numerical results, Reliability of numerical results.	
CO1	Finding the value of function using Newton's formulae for interpolation	
CO2	Apply various interpolation methods and finite difference concepts	
CO3	Computing the value of function using Lagrange's formula for interpolation	
CO4	Estimate the sum to n term of the series whose general term is the first difference of a function	
CO5	Calculate the unknowns using Gauss elimination method and Gauss-Jordan method	
CO6	Apply numerical methods to find our solution of algebraic equations	
CO7	Solve the simultaneous linear equations and find the solution using numerical methods	
SEMESTER – II		
COs	Course Name: CALCULUS	Code: U2MA21MT Credits: 4
	OBJECTIVES: 1. This course introduces students to the fundamental principles, concepts and knowledge in the areas of differential and integral calculus. 2. This prepares the students to apply these fundamental concepts and working knowledge to other courses.	
CO1	Compute Differential, Total differential, Maxima and Minima of functions	
CO2	Calculate radius of curvature in Cartesian and Polar coordinates	
CO3	Finding Asymptotes, Area and Volume	
CO4	Apply the concept of definite integral to solve various kinds of problems	
CO5	Deriving Reduction formulae and the relation between Beta and Gamma functions	
CO6	Remembering the formulas in differentiation and integration	
CO7	Recall the properties of definite integrals	
SEMESTER – I		
COs	Course Name: MATHEMATICS-I	Code: U1MA21AT Credits: 4
	OBJECTIVES: 1. To study about the connectives between two proportions. 2. To verify the validity of an argument. 3. To find the shortest distance between two skew lines	
CO1	Define proposition and argument, explain propositional connectives	
CO2	Understand the idea of differentiation from first principles	
CO3	Perform common matrix operations such as addition, scalar multiplication, multiplication, and transposition and transposition	
CO4	Apply numerical methods to obtain approximate solutions to mathematical problems	
CO5	Finding the integer solutions of an equation or of a system of equations	
CO6	Understand the foundations of mathematics	
CO7	Use mathematical ideas to model real-world problems	
SEMESTER – II		
COs	Course Name: ANALYTICAL GEOMETRY OF	Code: U2MA22MT

	THREE DIMENSIONS	Credits: 4
	OBJECTIVES: 1. To deepen the knowledge of the students in various concepts of Analytical Solid Geometry. 2. Accurately identify the equations, properties and graphs of the parabola, circle and ellipse.	
CO1	Finding equation of a plane in the normal form	
CO2	Learn the symmetrical form of a straight line	
CO3	Calculate the equation of a sphere through a given circle	
CO4	Compute solution of second degree cone	
CO5	Find the solutions of cylinder and right circular cylinder	
CO6	Identify lines and planes from their equation	
CO7	Understanding of the application of three dimensional analytical geometry	
SEMESTER – II		
COs	Course Name: NUMERICAL METHODS – II	Code: U2MA22AT Credits: 3
	OBJECTIVES: 1. This course will cover basic methods for finding the Finite differences, Central differences, Inverse Interpolation Summation, of series, Interpolation for equal & unequal intervals, Solutions of simultaneous equations, important principles. 2. Method and Processes to get numerical results, Reliability of numerical results.	
CO1	Learning numerical differentiation concepts	
CO2	Understanding basic of numerical integration	
CO3	Finding solution of difference equation using numerical methods	
CO4	Solving algebraic and transcendental equations	
CO5	Work out numerical solution of ordinary differential equations	
CO6	Evaluate an integral using numerical integration by various rules	
CO7	Solve the differential equations using numerical methods	
SEMESTER – II		
COs	Course Name: MATHEMATICS-II	Code: U2MA21AT Credits: 4
	OBJECTIVES: 1. To Test the consistency of a system of equation using matrix 2. To solve an algebraic equation & find the solution using numerical methods 3. To Evaluate an integral using numerical integration by various rules	
CO1	Express a system of simultaneous linear equations in matrix form.	
CO2	Compute indefinite and definite integrals using by the method of substitution and evaluates double integrals.	
CO3	Apply numerical methods for differential equation	
CO4	Learn numerical differentiation and integration	
CO5	Know how to find the roots of transcendental equations	

CO6	Learn how to interpolate the given set of values	
CO7	Evaluate an integral using numerical integration by various rules	
SEMESTER – III		
COs	Course Name: DIFFERENTIAL EQUATIONS	Code: U3MA21MT Credits: 5
	OBJECTIVES: 1. This course aims to provide logical skills in the formation of differential equations. 2. To expose to different techniques of finding solutions to these equations and in addition stress is laid on the Application of these equations in geometrical and physical problems.	
CO1	Recalling the concept of first order linear differential equations.	
CO2	Understanding the concept of second order higher degree differential equations	
CO3	Solve total differential equations by method of grouping	
CO4	Analyzing the concepts of Laplace transforms and inverse Laplace transforms to solve differential equations with constant coefficients.	
CO5	Solving partial differential equations	
CO6	Evaluate the Bernoulli equation, exact differential equations, Clairaut's equation	
CO7	Calculate complete integral and particular integral differential equations	
SEMESTER – III		
COs	Course Name: MATHEMATICAL STATISTICS – I	Code: U3MA22AT Credits: 5
	OBJECTIVES: 1. To apply Statistics methods for Mathematical Problems 2. To develop the basic mathematical theory of statistical inference at an undergraduate level.	
CO1	Understand conditional probability concepts	
CO2	Finding moment generating function for continuous and discrete	
CO3	Calculate correlation coefficients for given data	
CO4	Analyzing the various measures of discrete distribution	
CO5	Deriving the various measures of continuous distribution	
CO6	Recognize the basic concepts in probability	
CO7	Understanding the basic concepts in distribution.	
SEMESTER – III		
COs	Course Name: STATISTICAL METHODS AND THEIR APPLICATIONS – I	Code: U3CS22AT Credits: 3
	OBJECTIVES: 1. To understand and computing statistical aspects 2. To represent a statistical data using Diagrams & Graphs. 3. To find Arithmetic Mean, Median, Mode, Co-efficient of variation, Correlation, Regression	
CO1	Analyze statistical data graphically using frequency distributions	
CO2	Analyze statistical data using measures of central tendency	

CO3	Recognize, describe, and calculate the measures of the spread of data: variance, standard deviation, and range		
CO4	Explain the statistical concepts of skewness, Kurtosis & moments		
CO5	Discuss basic ideas of linear regression and correlation		
CO6	Students will formulate complete and concise		
CO7	Students will frame problems using multiple mathematical and statistical representations of relevant structures and relationships		
SEMESTER – III			
COs	Course Name: MATHEMATICS FOR COMPETITIVE EXAMINATIONS		Code: U3MA23ST Credits: 3
	OBJECTIVES: 1. To introduce concepts of mathematics with emphasis on analytical ability and computational Skill needed in competitive examinations. 2. To test your ability to solve basic mathematical problems logically.		
CO1	Finding ratio and proportions in various problems		
CO2	Compute gain and loss percents problems		
CO3	Calculate quickly the time distance		
CO4	Work out simple interest and compound interest for various investment		
CO5	Knowing the history of mathematics		
CO6	Gaining knowledge about aptitude		
CO7	Developing the skills to face various competitive examinations		
SEMESTER – IV			
COs	Course Name: VECTOR ANALYSIS AND FOURIER ANALYSIS		Code: U4MA21MT Credits: 5
	OBJECTIVES: 1. This course covers the topics in vector calculus and Fourier Analysis which are essential tools of modern Applied mathematics. 2. To develop deep understanding of key concepts followed by problems of Applied nature. The portion on Fourier analysis will lead to post graduate studies and research in Pure as well as applied mathematics.		
CO1	Understand differentiation of a vector		
CO2	Learn gradient, divergence and Curl of a vector		
CO3	Knowing about vector integration		
CO4	Derive Fourier series for given function		
CO5	Solve complex form of Fourier integral		
CO6	Use concept of the Curl of a Vector in calculus		
CO7	Apply concept of vectors to in calculus		
SEMESTER – IV			
COs	Course Name: MATHEMATICAL STATISTICS – II		Code: U4MA22AT Credits: 4
	OBJECTIVES: 1. To apply Statistics for Mathematical problems		

	2. To develop the basic mathematical theory of statistical inference at an undergraduate level.	
CO1	Compute the sampling distributions of means and variances	
CO2	Apply large sample theory of estimators and test	
CO3	Be able to construct tests and estimators and derive their properties	
CO4	Find method of moments and maximum likelihood estimators	
CO5	Determine the power of a test and apply the Neyman-Pearson lemma	
CO6	Calculate sampling distributions related to the normal distribution t test and Chi-square	
CO7	Understand one and two-sample estimation problems	
SEMESTER – IV		
COs	Course Name: LINEAR PROGRAMMING	Code: U4MA23ST Credits: 2
	OBJECTIVES: 1. To improve the skills of solving very common problems which we come across in various fields like transportation, games and industries with machines. 2. To maximize or minimize the numerical value. It consists of linear functions which are subjected to the constraints in the form of linear equations or in the form of inequalities	
CO1	Solve linear programming problem using graphical method	
CO2	Explains transportation model algorithms	
CO3	Find optimum solution by assignment problem in warehousing and travelling	
CO4	Calculate two persons zero sum game and saddle points	
CO5	Understand and uses of simulation and applied to queueing problems	
CO6	Recognizes special cases in the solution methods	
CO7	Evaluate different situations after the solution of linear programming model	
SEMESTER – IV		
COs	Course Name: MATHEMATICAL STATISTICS	Code: U4MA21AP Credits: 2
	OBJECTIVES: 1. To apply Statistics for Mathematical problems. 2. To develop the basic mathematical theory of statistical inference at an undergraduate level.	
CO1	Finding Measures of location and Dispersion	
CO2	Be able to analyze the statistical data	
CO3	Fitting a data to various curves	
SEMESTER – IV		
COs	Course Name: STATISTICAL METHODS AND THEIR APPLICATIONS – II	Code: U4CS22AT Credits: 3
	OBJECTIVES: 1. To apply statistical techniques in real life situations	

	2. To Fit a Curve for given data, find Probabilities, Distributions 3. To Test the data by using Sample test & Analysis of variance.	
CO1	Create and interpret a line of best fit	
CO2	Understand and use the terminology of probability and calculate probabilities	
CO3	Recognize the binomial probability distribution and apply it appropriately	
CO4	Conduct and interpret chi-square goodness-of-fit hypothesis tests	
CO5	Discuss two uses for the F distribution	
CO6	Finding Probabilities and Distributions	
CO7	Test the data by using Sample test & Analysis of variance	
SEMESTER – IV		
COs	Course Name: STATISTICAL METHODS AND THEIR APPLICATIONS I & II	Code: U4CS22AP Credits: 2
	OBJECTIVES: 1. To Fit a Curve for giving data, find Probabilities, Distributions 2. To Test the data by using Sample test & Analysis of variance	
CO1	Evaluation measures of central tendency and dispersion	
CO2	The students with various basic concepts on sampling distributions and large sample tests based on normal distribution.	
CO3	Understand the basic terms used in design of experiments	
SEMESTER – V		
COs	Course Name: ABSTRACT ALGEBRA	Code: U5MA21MT Credits: 5
	OBJECTIVES: 1. This course aims to impart emphasis on concepts and technology of the groups and rings as these algebraic structures have applications in Mathematical Physics, Mathematical Chemistry and Computer Science. 2. To understand uses of abstract algebra are increasingly important in certain areas, for example in communication theory, electrical engineering, computer science, and cryptography.	
CO1	The students will learn to construct and describe groups	
CO2	They will learn basic properties of groups and get familiar with important groups	
CO3	Students will be able to compute the expression of permutation groups by using permutation multiplication	
CO4	They will be able to learn the basics of rings.	
CO5	Knowing concepts of ideal and Euclidean ring	
CO6	Learn about structure preserving maps between groups and their consequences.	
CO7	Analyze consequences of Lagrange's theorem.	
SEMESTER – V		
COs	Course Name: REAL ANALYSIS – I	Code: U5MA22MT Credits: 5
	OBJECTIVES: 1. To understand various limiting behavior of sequences and series To explore the various limiting processes viz. continuity, uniform continuity,	

	differentiability and integrability. 2. To enhance the mathematical maturity and to work comfortably with concepts.	
CO1	Understand many properties of the real line $\mathbb{R}$ and learn to define sequence in terms of functions from $\mathbb{R}$ to a subset of $\mathbb{R}$	
CO2	Recognize bounded, convergent, divergent, Cauchy and monotonic sequences and to calculate their limit superior, limit inferior, and the limit of a bounded sequence.	
CO3	Concepts of series of real numbers	
CO4	Apply the ratio, root, and alternating series and limit comparison tests for convergence and absolute convergence of an infinite series of real numbers.	
CO5	Understand Continuous Functions on Metric Spaces	
CO6	Learn real number system and properties	
CO7	Known sequences and series of the real number system	
SEMESTER – V		
COs	Course Name: COMPLEX ANALYSIS - I	Code: U5MA23MT Credits: 5
	OBJECTIVES: 1. A modern treatment of concepts and techniques of complex function theory. 2. To gain knowledge about the complex number system, the complex function and complex integration.	
CO1	Visualize complex numbers as points of $\mathbb{R}$ and stereographic projection of complex plane on the Riemann sphere.	
CO2	Understand the significance of differentiability and analyticity of complex functions Riemann equations	
CO3	Knowing the Cauchy Goursat theorem and Cauchy integral formula in evaluation.	
CO4	Understand the conformal mapping	
CO5	Learn the role of line integrals in complex number system	
CO6	Understand the complex number system	
CO7	Transformation of the complex number system	
SEMESTER – V		
COs	Course Name: STATICS	Code: U5MA24MT Credits: 5
	OBJECTIVES: 1. This course introduces the students the basic concepts of forces, moments, couple, friction law virtual displacement and work, catenary and the centre of gravity and kinematics. 2. This course stresses the development of skills in formation of suitable mathematical models and problems solving techniques.	
CO1	Develop equilibrium relationships for non-accelerating particles acted on by forces and moments	
CO2	Compute moments and couples in vector form	
CO3	Learn about the concept of laws of friction	
CO4	Finding centre of mass of solid object	

CO5	Deriving equilibrium of a uniform homogeneous string	
CO6	Determine the equilibrium when two or more forces are acting on a particle	
CO7	Understand the difference between mass and weight	
SEMESTER – V		
COs	Course Name: OPERATION RESEARCH	Code: U5MA25MT Credits: 4
	OBJECTIVES: 1. To develop computational skill and logical thinking in formulating industry oriented problems as a mathematical problem and finding solutions to these problems. 2. To learn Solve linear programming problems using appropriate techniques and optimization.	
CO1	Acquire the knowledge of network diagram and floats	
CO2	Understand network scheduling by PERT and CPM	
CO3	Study the concepts of economic order quantity problems	
CO4	Learn sequencing problems to n jobs 2,3 machines	
CO5	Knowing basic concept of queuing system	
CO6	Identify and develop operational research models from the verbal description of the real system.	
CO7	Use mathematical software to solve the proposed models.	
SEMESTER – V		
COs	Course Name: GRAPH THEORY	Code: U5MA26ET Credits: 3
	OBJECTIVES: 1. To study and develop the concepts of graphs, subgraphs, trees connectivity, Eulerian. 2. Hamiltonian graphs, matching colorings of graphs and planar graphs.	
CO1	Understand the basic concepts of graph	
CO2	Know the intersection and union of the graph	
CO3	Acquire the knowledge connected graph and trails, paths and walk	
CO4	Learn about the Eulerian and Hamiltonian Graph	
CO5	Study tree and their properties	
CO6	Analyzing the concepts graph and subgraph	
CO7	Learn basics of graph and their properties	
SEMESTER – V		
COs	Course Name: ASTRONOMY	Code: U5MA27ET Credits: 3
	OBJECTIVES: 1. Acquire knowledge of the Physical universe and its evolution. 2. Define and use fundamental principles and techniques of astronomy and astrophysics. 3. This course aims to provide working knowledge about the universe	
CO1	Communicate about celestial objects such as parent star, planets, dwarf planets,	

	satellites	
CO2	Describe the classification of stars, stellar evolution, interstellar matter, galaxies	
CO3	Current understanding and investigation of the basic knowledge about cosmic threats	
CO4	Solving problems with scientific reasoning and critical thinking skills	
CO5	Understand the impact of astronomical bodies and formations on earth and climate.	
CO6	Familiarize and appreciate the field of astronomy and its relation with various allied fields of Science	
CO7	Prepare graduates with strong foundation to pursue advanced degree in Astronomy or seek career in science education	
SEMESTER – V		
COs	Course Name: QUANTITATIVE TECHNIQUES	Code: U5MA28ST Credits: 3
	OBJECTIVES: 1. To formulate design and solve the practical problems in various fields using the quantitative techniques. 2. Be able to apply quantitative methods to solve a variety of business problems.	
CO1	Learn about basis of control charts	
CO2	Understand index number and classification of index number	
CO3	Know the time series analysis and measurement of trend	
CO4	Study of measurements of seasonal and cyclic variations	
CO5	Using to Z transform to solve the difference equation	
CO6	Solve the practical problems in various fields using the quantitative techniques.	
CO7	To develop Z- transform techniques which will perform the same task for discrete time systems as Laplace Transform, a valuable aid in analysis of continuous time systems.	
SEMESTER – VI		
COs	Course Name: LINEAR ALGEBRA	Code: U6MA21MT Credits: 5
	OBJECTIVES: 1. To study the Algebraic structures of Vector Spaces and Linear Transformation. 2. To Understand the concept of matrices , trace and transpose.	
CO1	Familiar with vector space, basis and dimension of vector space	
CO2	Investigate properties of vector spaces and subspaces	
CO3	Learn about polynomial rings over the rational field	
CO4	Understand Linear transformation and their representation as matrices	
CO5	Known the concepts of matrices , trace and transpose	
CO6	Acquire the knowledge of vector spaces	
CO7	Learn the basics of vector spaces and linear transformations	
SEMESTER – VI		
COs	Course Name: REAL ANALYSIS -II	Code: U6MA22MT

		Credits: 5
	OBJECTIVES: 1. To understand Integration process of Riemann 2. To develop the understanding of point wise and uniform convergence of sequence and series of functions. 3. To enhance the mathematical maturity and to work comfortably with concepts.	
CO1	Understand the concept of connectedness and completeness	
CO2	Knowing about the compactness of metric spaces	
CO3	Learn some of the properties of Riemann integrable functions	
CO4	How to apply applications of the fundamental theorems in integration	
CO5	Study about sequence and series of real numbers	
CO6	Find the derivative of Riemann Integral	
CO7	Determine the continuity of Inverse functions	
SEMESTER – VI		
COs	Course Name: COMPLEX ANALYSIS – II	Code: U6MA23MT Credits: 4
	OBJECTIVES: 1. To gain knowledge about complex Integration and series. 2. This course provides methods to solve problems in pure as well as in applied mathematics.	
CO1	Understand Liouville's theorem and the fundamental theorem of the algebra	
CO2	Learn the concept of sequences and series of the complex functions	
CO3	Solve Residues-Cauchy's Residue theorem	
CO4	Understand and learn to use argument principle	
CO5	Apply the methods of complex analysis to evaluate definite integrals and infinite series	
CO6	Understanding of the basic concepts underlying complex analysis	
CO7	Studying about the concept of sequences and series of the complex functions	
SEMESTER – VI		
COs	Course Name: DYNAMICS	Code: U6MA24MT Credits: 4
	OBJECTIVES: 1. This course aims to provide models for some real life problems. 2. This covers topics like Simple Harmonic Motion, Projectiles, Central Orbits and Moment of Inertia. Stress is on the mathematical formulation of the physics aspects of the problems and it develops logical deduction and interpretation.	
CO1	Distinguish between velocity and acceleration, Rectilinear motion and Rectilinear motion with constant acceleration and understand the concept of Relative angular velocity Work, Power, Energy.	
CO2	Able to solve simple problem by using concepts of Nature of a trajectory and Results pertaining to the motion of a projectile	
CO3	Understand the collision of two smooth sphere and that of a smooth sphere on the	

	smooth plane	
CO4	Students known distinguish between Central force and Central Orbit	
CO5	Students learn Theorem on parallel and perpendicular axes	
CO6	Build up critical thinking and problem solving capacity of various idea about Motion, Projectiles, Central Orbits and Moment of Inertia.	
CO7	Asses various concepts of dynamics like Central Orbits and Moment of Inertia	
SEMESTER –VI		
COs	Course Name: PROGRAMMING IN C	Code: U6MA25ET Credits: 3
	OBJECTIVES: 1. To impart adequate knowledge on the need of programming languages and problem-solving techniques. 2. To develop an in-depth understanding of functional and logical concepts of C Programming 3. To provide exposure to problem-solving through C programming.	
CO1	Understanding a functional hierarchical code organization	
CO2	Ability to define and manage data structures based on problem subject domain.	
CO3	Ability to define and manage data structures based on problem subject domain.	
CO4	Ability to work with arrays of complex objects.	
CO5	Understanding a concept of object thinking within the framework of functional model.	
CO6	Understanding a concept of functional hierarchical code organization.	
CO7	Understanding a defensive programming concept. Ability to handle possible errors during program execution.	
SEMESTER – VI		
COs	Course Name: MATLAB PROGRAMMING	Code: U6MA26ET Credits: 3
	OBJECTIVES: 1. Understand the program functions using the MATLAB development environment 2. To learn to use MATLAB as a simulation tool.	
CO1	Learn the basics of MATLAB and advanced techniques for specialized areas	
CO2	Able to generate plots and export this for use in reports and presentations	
CO3	Able to use Matlab for interactive computations	
CO4	Understand logical arrays and vectorization	
CO5	Able to program functions using the MATLAB development environment	
CO6	Students learned graphic features of MATLAB and they are able to use this feature effectively in the various applications	
CO7	Students are able to use MATLAB as a simulation tool	
SEMESTER – VI		
COs	Course Name: PROGRAMMING IN C LAB	Code: U6MA21EP Credits: 2
	OBJECTIVES:	

	1. To introduce the field of programming using C language. 2. To learn the fundamental concepts of C Programming	
CO1	Write the algorithm of a given problem.	
CO2	Draw a flow chart of a given problem.	
CO3	Write programs to print output on the screen as well as in the files	
SEMESTER – VI		
COs	Course Name: MATLAB	Code: U6MA22EP Credits: 2
	OBJECTIVES: 1. To learn features of MATLAB as a programming tool.	
CO1	Students learned features of MATLAB as a programming tool	
CO2	Solve for the roots of a quadratic equation	
CO3	Major outcome is students are able to work as a MATLAB programmer in the industry because of the hands on practical sessions	
SEMESTER – VI		
COs	Course Name: SPECIAL FUNCTIONS	Code: U6MA27ET Credits: 3
	OBJECTIVES: 1. To develop computational skill in certain special functions which are frequently occurring in higher mathematics and mathematical physics. 2. To Learn Adams and modified Adams method.	
CO1	Understand properties of linear operators	
CO2	Know numerical solutions using Taylor series	
CO3	Learn Adams and modified Adams method	
CO4	Analyze singular points of linear second order differential equations	
CO5	Get knowledge of Bessel functions and properties	
CO6	Develop computational skill in certain special functions which are frequently occurring in higher mathematics and mathematical physics	
CO7	Study about the Legendre functions and their properties	
SEMESTER – VI		
COs	Course Name: FUZZY MATHEMATICS	Code: U6MA28ET Credits: 3
	OBJECTIVES: 1. To know the fundamentals of fuzzy Algebra. 2. To know the basic definitions of fuzzy theory 3. To know the applications of fuzzy Technology	
CO1	Be able to distinguish between the ordinary set and fuzzy set concepts	
CO2	Learn about Algebraic product and sum of two fuzzy subsets	
CO3	Students able to understand fuzzy logic of Algebra of fuzzy relations and logic connectives	
CO4	Learn differences between Group and fuzzy subgroup homomorphism image and Pre image of sub groupoid	
CO5	Students known about Fuzzy invariant subgroups and fuzzy sub ring.	

CO6	Be able to draw a parallelism between crisp set operations and fuzzy set operations through the use of characteristic and membership functions respectively	
CO7	Become aware of the use of fuzzy inference systems in the design of intelligent or humanistic systems.	
SEMESTER – VI		
COs	Course Name: FUNDAMENTALS OF APPLIED MATHEMATICS	Code: U6MA29ST Credits: 3
	OBJECTIVES: 1. This course aims to develop mathematical maturity and ability to deal with abstraction. 2. To develop construction and verification of formal logical manipulation.	
CO1	Acquire the basic skills and conceptual understanding regarding recurrence relations and generating functions	
CO2	Students understand to construct of mathematical logic	
CO3	Solve and analyze the Normal Forms and Principal Normal Forms	
CO4	Ability to interpret the properties of Lattices and new Lattices	
CO5	Students known about Boolean algebra	
CO6	Communicate mathematical ideas orally and in writing, with precision, clarity and organization, using proper terminology and notation	
CO7	Demonstrate mathematical thinking skills, progressing from a procedural and computational understanding of mathematics to logical reasoning, pattern recognition, generalization, and abstraction, and to a formal proof	

M.Sc. Mathematics

SEMESTER – I		
COs	Course Name: ALGEBRA I	Code: P1MA21MT Credits: 5
	OBJECTIVES: 1. To introduce the concepts of class equation, solvability of groups, finite abelian groups 2. To develop working knowledge on linear transformations, real quadratic forms.	
CO1	Utilize the class equation and Sylow theorems to solve different related problems	
CO2	Demonstrate competence with the basic ideas of algebra including the concepts of direct products, finitely generated abelian groups	
CO3	Discuss the basic ideas of linear Algebra including the concepts of linear transformations and Nilpotent transformations	
CO4	Analyze jordan form and rational canonical form.	
CO5	Discuss the concept of Matrices and transformations	
CO6	Determine the class equation for finite groups and its applications.	
CO7	Find the trace and transpose in matrices.	
SEMESTER – I		
COs	Course Name: MATHEMATICAL ANALYSIS I	Code: P1MA22MT Credits: 5
	OBJECTIVES:	

	1. To work comfortably with functions of bounded variation, Riemann - Stieltjes Integration. 2. To introduce the concepts of convergence of infinite series, infinite product and uniform convergence and its interplay between various limiting operations.	
CO1	Define and illustrate the concept of functions of bounded variation	
CO2	Describe the Riemann - Stieltjes integral	
CO3	Analyze necessary conditions for the existence of Riemann, Stieltjes integrals and Mean value theorems for Riemann	
CO4	Discuss the concept of infinite series and infinite products	
CO5	Understand the basics of Riemann - Stieltjes Integration, infinite product and uniform convergence	
CO6	Analyze uniform convergence of infinite series of functions and Riemann - Stieltjes integration	
CO7	Find the uniform convergence, uniform convergence of infinite series of functions.	
SEMESTER – I		
COs	Course Name: ORDINARY DIFFERENTIAL EQUATIONS	Code: P1MA23MT Credits: 4
	OBJECTIVES: 1. To develop strong background on finding solutions to linear differential equations with constant and variable coefficients and also with singular points. 2. To study existence and uniqueness of the solutions of first order differential equations.	
CO1	Solve a variety of second order differential equations	
CO2	Discuss the concept of homogeneous and non-homogeneous equation of order n	
CO3	Understand and be able to use various theoretical ideas of linear independence and the Wronskian	
CO4	Give series solutions for second order linear differential equations, both at ordinary points and at regular singular points	
CO5	Discuss the Existence and uniqueness of solutions to second order equations	
CO6	Evaluate Wronskian, Annihilator method to solve non-homogeneous equation	
CO7	Evaluate The Legendre equation, Euler equation, Bessel Function	
SEMESTER – I		
COs	Course Name: MECHANICS	Code: P1MA24MT Credits: 4
	OBJECTIVES: 1. To study mechanical systems under generalized coordinate systems, virtual work, energy and momentum. 2. To study mechanics developed by Newton, Langrange, Hamilton Jacobi and Theory of Relativity due to Einstein.	
CO1	Demonstrate the knowledge of core principles in mechanics	
CO2	Deriving Lagrange's equations and discuss the integrals of motion	
CO3	Discuss the Hamilton's Principle and Hamilton's Equation	
CO4	Deriving Hamilton-Jacobi Equation	

CO5	Discuss about the special transformations, Lagrange and Poisson brackets	
CO6	Find the equation of motion of a particle using Lagrange equation	
CO7	Determine the generating function using Poisson brackets	
SEMESTER – I		
COs	Course Name: PROBABILITY THEORY	Code: P1MA25ET Credits: 3
	OBJECTIVES: 1. To introduce axiomatic approach to probability theory. 2. To study some statistical characteristics, discrete and continuous distribution functions and their properties, characteristic function and basic limit theorems of probability.	
CO1	Explain the concept of a random event and Express the probability definitions.	
CO2	Calculate the expected value and the moments, random variable and function of a random variable.	
CO3	Calculate the moments and formulates the Moment Generating Function.	
CO4	Define the discrete distributions and solve the problems about these distributions	
CO5	Apply Chebyshev's, Khintchine, Kolmogorov and Borel-Cantelli theorem.	
CO6	Apply theorems concerning the distributions of functions of random variables and the moment-generating functions.	
CO7	Define the principal concepts about probability	
SEMESTER – I		
COs	Course Name: MATHEMATICAL PROGRAMMING	Code: P1MA26ET Credits: 3
	OBJECTIVES: 1. This course introduces advanced topics in Linear and non-linear Programming. 2. To study integer programming problem, Dynamic Programming Under certainty.	
CO1	Discuss the types of Integer Linear Programming Problems	
CO2	Analyze classical optimization methods	
CO3	Discuss about the theory of simplex method	
CO4	Learning Revised simplex method	
CO5	Recognize the importance and value of Operations Research and parametric linear programming in solving practical problems	
CO6	Learning integer programming problem, Dynamic Programming Under Certainty	
CO7	Know the basics of the Revised simplex method, Parametric Programming problem	
SEMESTER – I		
COs	Course Name: RELIABILITY AND QUEUING THEORY	Code: P1MA27ET Credits: 3
	OBJECTIVES: 1. To study applications of Mathematics. 2. To understand Markovian queueing models and acquire skills in analyzing queueing models.	
CO1	Establish quality and reliability requirements for suppliers	

CO2	Collect field data and find root causes of failures	
CO3	Construct models in discrete and continuous time based on Markov Chains	
CO4	Understand Markovian queueing models	
CO5	Describe and analyze basic Markov queueing models and situations to which they may be applied and apply Markov models for selected applications.	
CO6	Understand basic characteristic features of a queueing system and acquire skills in analyzing queueing models.	
CO7	Able to specify a given discrete and Markov chain in terms of a transition diagram.	
SEMESTER – II		
COs	Course Name: ALGEBRA II	Code: P2MA21MT Credits: 5
	OBJECTIVES: 1. To study field extension, roots of polynomials, Galois Theory, finite fields, division rings, solvability by radicals. 2. To develop computational skill in abstract algebra.	
CO1	Learn about Extension fields and Transcendence of e	
CO2	Finding roots of Polynomials on irrational numbers	
CO3	Explain the concept of Elements of Galois theory	
CO4	Known about wedderburn’s theorem on finite division rings	
CO5	Study about integral Quaternions	
CO6	Study field extension, roots of polynomials and finite fields	
CO7	Develop computation skills in division rings and solvability in radicals	
SEMESTER – II		
COs	Course Name: MATHEMATICAL ANALYSIS II	Code: P2MA22MT Credits: 5
	OBJECTIVES: 1. To introduce measure on the real line, Lebesgue measurability. 2. To learn about integrability, Fourier Series and Integrals, in-depth study in multivariable calculus.	
CO1	Students will be able to describe Properties of Fourier Coefficients and Riemann's localization theorem	
CO2	Demonstrate an Understanding of Directional derivative and continuity the total derivative ,Total derivative expressed in terms of partial derivatives	
CO3	Learn about implicit function and Extremum Problems	
CO4	Finding Inner and outer measure of Measurable sets	
CO5	Students known about Properties of the Lebesgue integral for bounded measurable functions	
CO6	Evaluate Fourier series and Fourier integral	
CO7	Determine Lebesgue integral	
SEMESTER – II		
COs	Course Name: PARTIAL DIFFERENTIAL EQUATIONS	Code: P2MA23MT Credits: 4
	OBJECTIVES:	

	1. The aim of the course is to introduce to the students the various types of partial differential equations and how to solve these equations. 2. To learn about the derivation of Laplace and Poisson equation. 3. To learn about Cauchy Problem order equation and solution of PDE.	
CO1	Students learn about Cauchy Problem order equation and solution of PDE	
CO2	Classify the fundamental Principles of partial differential equations	
CO3	Students will able Derivation of Laplace and Poisson equation	
CO4	Solve parabolic equations	
CO5	Solve hyperbolic differential equations	
CO6	Find solution of PDE, Cauchy Problem, Orthogonal surfaces	
CO7	Find Solution of Laplace equation in Cylindrical and spherical coordinates, d'Alembert's solution, Uniqueness of the solution for the wave equation	
SEMESTER – II		
COs	Course Name: CALCULUS OF VARIATIONS AND INTEGRAL EQUATIONS	Code: P2MA24MT Credits: 4
	OBJECTIVES: 1. The aim of the course is to introduce to the students the concept of calculus of variation and its applications. 2. To introduce various types of integral equations and how to solve these equations.	
CO1	Learn the concept of Variation and its properties	
CO2	Students will be able to recognize Regularity conditions and Special kinds of kernels	
CO3	Apply different methods to solve Integral Equations integral equations	
CO4	Students known difference between Initial value problems and Boundary value problems	
CO5	Understanding of the concepts of Hilbert Transform	
CO6	Evaluate a functional for it's maximality	
CO7	Solve an integral equation and find the resolvent kernel	
SEMESTER – II		
COs	Course Name: PROGRAMMING IN C++ WITH PRACTICAL	Code: P2MA25ET Credits: 3
	OBJECTIVES: 1. To impart adequate knowledge on the need of programming languages and problem-solving techniques. 2. To develop an in-depth understanding of functional and logical concepts of C++ Programming 3. To provide exposure to problem-solving through C++ programming.	
CO1	Able to understand and design the solution to a problem using object-oriented Programming concepts.	
CO2	Able to Understand and Apply the concepts of Classes & Objects, friend function, constructors & destructors in program design.	
CO3	To construct programs in object-oriented paradigm.	
CO4	To Implement data structure using C++.	

CO5	To implement File handling in object-oriented environment.	
CO6	To implement generic data structures using templates.	
CO7	To implement virtual functions and file handling in C++	
SEMESTER – II		
COs	Course Name: ALGEBRAIC NUMBER THEORY	Code: P2MA26ET Credits: 3
	OBJECTIVES: 1. 1.The course aims to provide a study on modules over rings, finite fields, algebraic extensions, number fields . 2. 2. To learn about cyclotomic fields, Noetherian rings and modules and Dedekind rings.	
CO1	Learn rings and factorization of polynomials	
CO2	Understand algebraic numbers and conjugates	
CO3	Discuss the quadratic fields and cyclotomatic fields	
CO4	Analyze Euclidean domains	
CO5	Know prime factorization of ideals and he norms of an ideal	
CO6	Study on modules over rings and finite fields	
CO7	Known the algebraic extensions and Dedekind rings	
SEMESTER – II		
COs	Course Name: OPTIMIZATION TECHNIQUES	Code: P2MA27ET Credits: 3
	OBJECTIVES: 1. 1.This course aims to introduce decision theory, PERT, CPM, deterministic and probabilistic inventory systems. 2. 2.To understand queues, replacement and maintenance problems.	
CO1	Analysis of decision making under risk	
CO2	Students known difference between PERT and CPM	
CO3	Finding solution by using Inventory models	
CO4	Students understand classification of queueing models	
CO5	Finding solution by using replacement problems	
CO6	Compute decision theory and critical path analysis	
CO7	Calculate probabilistic distribution in queueing systems	
SEMESTER – III		
COs	Course Name: COMPLEX ANALYSIS I	Code: P3MA21MT Credits: 5
	OBJECTIVES: 1. To study Cauchy integral formula, local properties of analytic functions. 2. To learn about general form of Cauchy’s theorem and evaluation of definite integral and harmonic functions.	
CO1	Evaluate line integrals, curve integrals, singularities and determine the values of integrals using residues.	
CO2	Apply and understand about limits and to know how they are used in series and problems	

CO3	Describe definite integrals and harmonic functions	
CO4	Analyze functions of complex variable in terms of continuity, differentiability and analyticity	
CO5	Analyze partial fractions and entire functions	
CO6	Evaluation of definite integrals and Cauchy's theorem	
CO7	Find the gamma function and removable singularities	
SEMESTER – III		
COs	Course Name: TOPOLOGY	Code: P3MA22MT Credits: 5
	OBJECTIVES: 1. To study topological spaces, continuous functions, connectedness, compactness. 2. To learn about countability and separation axioms. 3. To Find the compactness and locally compactness	
CO1	Define and illustrate the concept of topological spaces	
CO2	Describe continuous functions, concept of product topology and quotient topology	
CO3	Identify the concepts of distance between two sets, connectedness.	
CO4	Analyze compactness and separation axioms	
CO5	Apply theorem proofs to do variety of examples and counter examples in Topology	
CO6	Determine the connectedness of two spaces	
CO7	Find the compactness or locally compactness of a topological space	
SEMESTER – III		
COs	Course Name: DIFFERENTIAL GEOMETRY	Code: P3MA23MT Credits: 5
	OBJECTIVES: 1. This course introduces space curves and their intrinsic properties of a surface and geodesics. 2. To know about the non-intrinsic properties of surfaces are explored.	
CO1	Make clear and concise arguments involving basic notions and constructions of 2-dimensional Riemannian geometry, curves and torsion.	
CO2	Identification of important types of curves in surfaces, including principal curves, asymptotic curves and geodesics.	
CO3	Identification of important types of curves in surfaces and analyze of Geodesics	
CO4	Describe Gaussian curvature: The surfaces with constant positive/Negative Gaussian curvature	
CO5	Analyze Gaussian and mean curvatures using variety of methods including patch computations, direct calculation of the shape operator	
CO6	Evaluate the Geodesics curvatures	
CO7	Find space curves and intrinsic properties of a surface.	
SEMESTER – III		
COs	Course Name: DISCRETE MATHEMATICS	Code: P3MA24MT Credits: 5
	OBJECTIVES:	

	1. This course aims to explore the topics like lattices and their applications in switching circuits, finite fields, polynomials. 2. To get the knowledge of coding theory	
CO1	Get knowledge of Boolean function and partial order relation.	
CO2	Describe applications of Lattices	
CO3	Get new concept of finite fields	
CO4	Understand polynomials	
CO5	Get knowledge of coding theory	
CO6	Formulate and interpret statements presented in Boolean logic	
CO7	Apply the different properties of injections, surjections, bijections and compositions.	
SEMESTER – III		
COs	Course Name: TENSOR ANALYSIS AND RELATIVITY THEORY	Code: P3MA25ET Credits: 3
	OBJECTIVES: 1. The course aims to introduce vector algebra and vector calculus and special relativity and relativistic kinematics, dynamics and accelerated systems. 2. To know the basics of tensor analysis and tensor calculus.	
CO1	Understand concept of tensor variables and difference from scalar or vector Variables	
CO2	Derive base vectors, metric tensors and strain tensors in an arbitrary coordinate system	
CO3	Investigate the Christoffel symbols which provide a concrete representation of the connection of Riemannian geometry in terms of coordinates on the manifold	
CO4	Understand Galilean transformation, principle of relativity and relativistic Kinematics	
CO5	Understand principle of equivalence and accelerated systems	
CO6	Know the basics of tensor analysis and tensor calculus	
CO7	Know the basics of relativistic dynamics and special theory of relativity.	
SEMESTER – III		
COs	Course Name: ANALYTIC NUMBER THEORY	Code: P3MA26ET Credits: 3
	OBJECTIVES: 1. This course introduces arithmetic function and Dirichlet multiplication, averages of arithmetic function, congruence and quadratic residues. 2. To Study Dirichlet characters and analytic properties of Dirichlet L-functions.	
CO1	Learn many of the fundamental theorems in the analytic theory of numbers	
CO2	Understand better the distribution of prime numbers	
CO3	Know the basic theory of zeta- and L-functions	
CO4	Discuss the prime number theorem and the relation between its error term to the location of zeros of the zeta function	
CO5	Study Dirichlet characters and analytic properties of Dirichlet L-functions	
CO6	Understand the proof of Dirichlet's Theorem	
CO7	Apply the analytic number theory techniques and skills in various applications	

SEMESTER – III		
COs	Course Name: FLUID DYNAMICS	Code: P3MA27ET Credits: 3
	OBJECTIVES: 1. This course aims to discuss kinematics of fluids in motion. 2. To understand the equations of motion of a fluid, three dimensional flows, two dimensional flows and viscous flows. 3. To Understand the basic principles of fluid dynamics.	
CO1	Define the properties of fluids and classify the fluids	
CO2	Apply conservation laws to fluid flow problems in engineering applications and examine the stability of a floating bodies	
CO3	Apply Euler’s Equation of motion and Bernoulli’s equation for flow measuring devices and hydraulic machines	
CO4	Analyze a flow field to determine various quantities of interest such as flow rates and heat fluxes	
CO5	Understand the concepts of Navier-Stokes equation	
CO6	Demonstrate the ability to communicate the results of this detailed fluid flow	
CO7	Understanding of the basic principles of fluid dynamics	
SEMESTER – IV		
COs	Course Name: COMPLEX ANALYSIS II	Code: P4MA21MT Credits: 5
	OBJECTIVES: 1. To study Riemann Theta Function and normal families, Riemann mapping theorem, Conformal mapping of polygons. 2. To get the knowledge of harmonic functions, elliptic functions and Weierstrass Theory of analytic continuation.	
CO1	Understand Riemann zeta function and normal families	
CO2	Study the Riemann mapping theorem, conformal mappings of polygons and a closer look at harmonic functions	
CO3	Know Elliptic functions, simply periodic functions	
CO4	Understand Weierstrass theory, the conformal mapping by $\lambda(\tau)$	
CO5	Get the knowledge of analytic continuation and the Monodromy theorem	
CO6	Evaluation of product development and Riemann mapping theorem	
CO7	Find simply periodic functions and analytic continuation along arcs.	
SEMESTER – IV		
COs	Course Name: FUNCTIONAL ANALYSIS	Code: P4MA22MT Credits: 5
	OBJECTIVES: 1. To study the details of Banach and Hilbert Spaces. 2. To introduce Banach algebras.	
CO1	Understand continuous linear transformations	
CO2	Learn the open mapping theorem and its applications	
CO3	Know the relevance of operator theory	

CO4	Gain the basic concepts of Banach algebra	
CO5	Understand the basic properties of Gelfand mapping	
CO6	Determine orthogonality of the given set of vectors	
CO7	Find the element in a Hilbert space is regular	
SEMESTER – IV		
COs	Course Name: MATHEMATICAL STATISTICS	Code: P4MA23MT Credits: 5
	OBJECTIVES: 1. This course introduces sampling theory, significance tests, estimation, testing of hypotheses. 2. To understand ANOVA and sequential analysis with rigorous mathematical treatment.	
CO1	Demonstrate knowledge of statistical models in common use	
CO2	Understand the basic principles underlying statistical inference	
CO3	Able to construct exact and approximate confidence intervals	
CO4	Demonstrate knowledge of applicable large sample theory of estimators and tests	
CO5	Be able to testing a hypothesis concerning p on 0-1 distribution	
CO6	Analyze Distribution of sample mean from non-normal populations.	
CO7	Get a knowledge of find the One way classification and two - way classification	
SEMESTER – IV		
COs	Course Name: DIFFERENCE EQUATIONS	Code: P4MA24MT Credits: 5
	OBJECTIVES: 1. To introduce the process of discretization, Discrete version of Differential Equations, Discrete oscillation and the asymptotic behaviour of solutions of certain class of difference equations for linear cases only. 2. To find the Solution of difference equations using z-transforms. 3. To understand the system of difference equations .	
CO1	Get a knowledge of linear difference Equations of higher order	
CO2	Understand system of difference equations	
CO3	Analyze Z-transform	
CO4	Understand asymptotic behavior of difference equation	
CO5	Analyze oscillation theory	
CO6	Solve and apply linear difference equations of second order	
CO7	Apply difference equations to significant and theoretical problems	
SEMESTER – IV		
COs	Course Name: NUMBER THEORY AND CRYPTOGRAPHY	Code: P4MA25ET Credits: 3
	OBJECTIVES: 1. This course aims to give elementary ideas from number theory which will have applications in cryptology. 2. To get the knowledge of the concepts of cryptography.	

CO1	Understand the elementary concepts of number theory	
CO2	Learn the basic principles of Finite Fields and quadratic Residues.	
CO3	Be able to know the concepts of cryptography	
CO4	Know the concepts of public key cryptography and RSA cryptosystem	
CO5	Understand the Fermat factorization method and quadratic sieve method	
CO6	Recognize to determine elementary number theory	
CO7	Apply various applications in cryptography	
SEMESTER – IV		
COs	Course Name: FUZZY MATHEMATICS	Code: P4MA26ET Credits: 3
	OBJECTIVES: 1. To introduce the basic notions and study the techniques of Fuzzy Mathematics. 2. To learn about the making of truth tables by using fuzzy logic.	
CO1	Students learn difference of Basic types of fuzzy sets and Concepts of fuzzy sets	
CO2	Finding Fuzzy complements , Fuzzy intersections , Fuzzy unions on Fuzzy numbers	
CO3	Analyze of Fuzzy equivalence relations and Fuzzy morphisms	
CO4	Discuss the concept of Fuzzy sets and possibility theory	
CO5	Discuss the concept of Multi valued logics	
CO6	Knowing the operations on fuzzy sets	
CO7	Making the truth tables by using fuzzy logic	
SEMESTER – IV		
COs	Course Name: STOCHASTIC PROCESSES	Code: P4MA27ET Credits: 3
	OBJECTIVES: 1. This course aims to introduce advanced topics in Markov process, Markov chains and Renewal theory. 2. To Learn about Brownian motion of system of particles	
CO1	Explain the Markov processes	
CO2	Learning about Brownian motion of system of particles	
CO3	Solving Stochastic integration problems	
CO4	Discuss the concept of Stochastic differential equations and numerical methods	
CO5	Understand the basics concept of stochastic processes	
CO6	Knowing about Kirsanov's theorem and its applications	
CO7	Finding out the various states of a Markov chain	

M.Phil. MATHEMATICS

SEMESTER – I		
COs	Course Name: ALGEBRA AND ANALYSIS	Code: M1MA21MT Credits: 4
	OBJECTIVES: 1. To know the definitions and understand the key concepts introduced in this	

	modules. 2. To be able to investigate the properties of modules. 3. The concept of a module as a generalization of a vector space and an Abelian group.	
CO1	Know the definitions and understand the key concepts introduced in this modules	
CO2	Be able to investigate the properties of modules	
CO3	Knowledge of basic properties of primary decompositions and Noetherian Rings	
CO4	The decomposition of an ideal into primary ideals and Cohen-Seidenberg theorems on prime ideals	
CO5	Study the Riemann mapping theorem	
CO6	Learn the ideas of transformations	
CO7	The concept of a module as a generalization of a vector space and an abelian group	
SEMESTER – I		
COs	Course Name: TOPOLOGY AND DIFFERENTIAL EQUATIONS	Code: M1MA22MT Credits: 5
	OBJECTIVES: 1. To provide advanced level topological and function. 2. To impact knowledge about connected compactness and axioms in R.	
CO1	Demonstrate an understanding of the concepts of metric spaces and topological spaces	
CO2	Learn fundamental Group of a simplicial complex	
CO3	Applying techniques for solving first and second order linear system of ordinary differential equations in homogeneous and non-homogeneous	
CO4	Identifying the problems and solutions of nth order differential systems	
CO5	Knowing methods of Lyapunov stability and Lyapunov functions	
CO6	Learn fundamental group and covering spaces	
CO7	Understanding various methods for two point boundary value problems	
SEMESTER – I		
COs	Course Name: GUIDE PAPER	Code: M1MA23MT Credits: 4
	OBJECTIVES: 1. To enable students understand the purpose and importance of research in Mathematics. 2. To plan and carry out research work by conducting review, collecting materials, and find the results by applying different critical theories.	
CO1	Get familiarized with basic concepts of research.	
CO2	Identify and state the research topic.	
CO3	Design and conduct research study accordance with the identified research need	
CO4	Develop skill to search online and offline sources to carryout research.	
CO5	Assess ways to collect, compile and conduct a data analysis.	
CO6	Appropriately document the data collected.	
CO7	Apply academic skills to present the research study findings in a formal academic oral presentations and a written research paper.	

SEMESTER – II		
COs	Course Name: DISSERTATION WITH VIVA VOCE	Code: M2MA21DV Credits: 21
	OBJECTIVES: 1. To develop an understanding of basic research in mathematics. 2. Keep on discovering new avenues in the chosen field and exploring areas that remain conducive for research and development. 3. To understand the basic concepts of research publications.	
CO1	Students will able to read mathematics independently and solve advanced mathematical problems	
CO2	Communicate mathematical ideas, results, context, and background effectively and professionally in written and oral form.	
CO3	Produce and defend an original contribution to knowledge, as evidenced by the writing and defence of a thesis involving significant original research.	

B.B.A.

SEMESTER – I		
COs	Course Name: PRINCIPLES OF MANAGEMENT	Code: U1BA21MT Credits: 4
	OBJECTIVES: 1. To enable the students to understand the managerial functions of an organization. 2. To make the students aware of the management concepts and practices thereby enabling them to understand the basic theories and concepts of management.	
CO1	Describe about Management and the contributions of Management theories.	
CO2	Explain the Pros and cons of Planning and knowing the stages of Planning cycle.	
CO3	Understanding the types of organization structure and its Departmentalization.	
CO4	Classify the underlying concepts of authority, power and responsibility in organization.	
CO5	Discussing the techniques of controlling and motivation theories.	
CO6	Explain the importance of control as it relates to other managerial functions.	
CO7	Outline the control process and discuss the various methods of control available to the manager.	
SEMESTER – I		
COs	Course Name: BUSINESS STATISTICS - I	Code: U1BA22MT Credits: 5
	OBJECTIVES: 1. To study the basic elements of statistics for representing data diagrammatically. 2. To enable the use of statistical, graphical and algebraic techniques wherever relevant 3. To apply the large and small sample tests for testing significant difference between given data.	
CO1	Learning about the collection and representation of data	
CO2	Finding the Various measures of Central tendency	
CO3	Comparing the various sets of data	
CO4	Applying the large sample test for given data	
CO5	Learning about testing significant difference for a given data	
CO6	Representing a statistical data using diagrams graphs	
CO7	Studying the various measures of dispersion	
SEMESTER – I		
COs	Course Name: BUSINESS ORGANISATION	Code: U1BA21AT Credits: 5
	OBJECTIVES: 1. To enable the students in terms of understanding the various concepts related to business organizations and administrative aspects.	

	2. Understand modern business practices and functions of various business organizations. 3. To make students understand the Sole trading, Partnership firm and Joint stock companies.	
CO1	Understand the basic concept of business and social responsibility of business.	
CO2	Analyze the various forms of business organization.	
CO3	Able to explain the functions of stock exchange.	
CO4	Evaluate the factors to be considered for setting up new business units.	
CO5	Discuss the functions of chamber of commerce and trade .	
CO6	Understand modern business practices and functions of various business organizations.	
CO7	Compare and contrast private vs public sector.	
SEMESTER – II		
COs	Course Name: BUSINESS COMMUNICATION	Code: U2BA21MT Credits: 4
	OBJECTIVES: 1. To familiarize the students with the fundamentals of communication for professional purposes and to enable them in writing and speaking Proficiency. 2. Students to draft a Resume /Curriculum vitae and succeed in group discussions cum interviews.	
CO1	Describe the fundamentals of communication its importance and ways to overcome communication barriers.	
CO2	Outline the layout, kinds of business letter and its essentials to correspond effectively.	
CO3	Explain the method of drafting business letters, reports, minutes of meeting and memos.	
CO4	Understand various equipments used for oral communication for effective business correspondence.	
CO5	Discuss how to draft a job application and succeed in group discussions, interviews.	
CO6	Develop practical skills and applications of business communication.	
CO7	Understand the do's and don'ts in business correspondence.	
SEMESTER – II		
COs	Course Name: BUSINESS STATISTICS - II	Code: U2BA22MT Credits: 5
	OBJECTIVES: 1. To understand the relationship between two variables and to test the significant difference between two sets of data. 2. To develop the students ability to deal with numerical and quantitative issues in business 3. To have a proper understanding of Statistical applications in Management.	
CO1	Analyzing about the variance using F- test	

CO2	Knowing about ANOVA technique	
CO3	Finding the relationship between the two sets of data	
CO4	Drawing the trend line for a given data	
CO5	Computing the various types of index numbers	
CO6	finding out the significant difference between variances of two samples	
CO7	Calculating the Seasonal variation for a given data	
SEMESTER – II		
COs	Course Name: ORGANISATIONAL BEHAVIOUR	Code: U2BA21AT Credits: 5
	OBJECTIVES: 1. To enable the students to gain insights into the concepts that go into the making of a successful organization. 2. To enable the students to learn the various concepts related to how employees tend to behave in an organization. 3. To help the students to develop cognizance of the importance of human behavior.	
CO1	Understand the basic concepts of organization behavior and different stages of personality development.	
CO2	Explain about group, its types, behavior, dynamics and group decision making.	
CO3	Discuss the qualities, styles, theories and effectiveness of leadership.	
CO4	Describe the concepts and importance of organization change and resistance to change.	
CO5	List the Insight about organization culture, climate, conflict and organization effectiveness.	
CO6	Demonstrate leadership skills at work and help to manage emotions inside the organisation	
CO7	Understand factors influencing perception, values, attitudes and attitude formation in an organization.	
SEMESTER – III		
COs	Course Name: PRODUCTION MANAGEMENT	Code: U3BA21MT Credits: 4
	OBJECTIVES: 1. To enable the students to understand production concept, process and give emphasis in various production system and work measurement. 2. Students to identify the suitable plant location and the kinds of layout design in the organization.	
CO1	Understanding the methods of production system and its relationship of production with other functional areas.	
CO2	Discuss various types of maintenance and production control process.	
CO3	Identify the suitable plant location and knowing the pros and cons of urban, sub - urban, and rural.	
CO4	Classify the Human consideration in work study, Time study and methods study.	
CO5	Describe the various kinds of control charts and its applications of SQC.	

CO6	List the kinds of layout applied in the organisation	
CO7	Explain the objectives and techniques of work measurement applied in the current scenario.	
SEMESTER – III		
COs	Course Name: FINANCIAL ACCOUNTING	Code: U3BA22MT Credits: 4
	OBJECTIVES: 1. To acquire fundamental knowledge in accounting and techniques, company accounts influencing business units. 2. To make students understand the concept of Depreciation Accounting. 3. Students to understand the role of accounting plays in the overall setup of a business.	
CO1	Understand the basic concept and conventions of accounting.	
CO2	Solve depreciation accounting under straight line method and diminishing balance method.	
CO3	Able to prepare final accounts with adjustments.	
CO4	Understand the difference between single entry system and double entry system.	
CO5	Analyse the credit rating agencies.	
CO6	Learn the accounting rules and principles.	
CO7	Understand the role of accounting plays in the overall setup of a business.	
SEMESTER – III		
COs	Course Name: STRATEGIC MANAGEMENT	Code: U3BA23MT Credits: 4
	OBJECTIVES: 1. To know the students to the various strategic issues such as strategic planning, implementation and evaluation to take decisions. 2. Able to understand the concepts of merger, acquisition, amalgamation and its influence on organization structure and organization change. 3. To expose students to various perspectives and concepts in the field of Strategic Management.	
CO1	Describe the nature of business and its objectives, mission, vision, goals in strategy formation.	
CO2	Understand the concepts of strategic management and portfolio analysis and its techniques.	
CO3	Acquire knowledge about strategic alternatives and techniques for effective business performance.	
CO4	Able to understand the concepts of merger, acquisition, amalgamation and its influence on organization structure and organization change.	
CO5	Insight about ERP its features, applications, functions and implementation of various ERPs.	
CO6	Understand the strategic analysis of different functional areas of a business.	
CO7	Describe corporate capabilities and SWOT analysis for decision making.	
SEMESTER – III		

COs	Course Name: MANAGERIAL ECONOMICS	Code: U3BA24MT Credits: 4
	OBJECTIVES: 1. To understand the students in micro economic concepts and techniques in evaluating business decisions taken by firm. 2. Understand the pricing methods and pricing strategies and the various types of market structure. 3. To understand and appreciate the basic Micro and Macroeconomics and their application to the business.	
CO1	Construct a sound theoretical base off micro-economic concepts.	
CO2	Discuss the theories of consumer behavior and demand forecasting.	
CO3	Understand the theories of cost and production.	
CO4	Evaluate the pricing methods and pricing strategies.	
CO5	Analyse the various types of market structure.	
CO6	Develop fundamental economic principles, theories under concepts useful to business.	
CO7	Apply the economic principles in the field of business management.	
SEMESTER – III		
COs	Course Name: OFFICE MANAGEMENT	Code: U3BA21AT Credits: 5
	OBJECTIVES: 1. To enable students to understand management of office, methods, environment and procedures. 2. Students to Gain knowledge on different postal services and central, departmental office correspondence.	
CO1	Understand the concepts of Office Management, Organisation structure, manual and departmentation.	
CO2	Enable to describe fundamentals of office layout, centralization and decentralization of office services.	
CO3	Describe various office equipments, furniture's, and their functions.	
CO4	Gain knowledge on different postal services and central, departmental office correspondence.	
CO5	Discuss the roles, qualities and responsibilities of efficient supervisor	
CO6	Able to understand office system and environment	
CO7	Acquire knowledge about effective utilization of various office resources.	
SEMESTER –III		
COs	Course Name: CUSTOMER RELATIONSHIP MANAGEMENT	Code: U3BA21ST Credits: 3
	OBJECTIVES: 1. To enable the students to understand the importance of satisfying the customer in today's competitive world. 2. Understand the importance of customer satisfaction, customer loyalty and customer relations for a successful business.	

CO1	Able to Define the needs, importance of a good customer relations and complementary layers of CRM.	
CO2	Demonstrate the principles and stages of CRM and its growth in India.	
CO3	Analyse how effective CRM leads to business prospect.	
CO4	Describe the CRM framework, governance and performance evaluation process.	
CO5	Understand the process of call center and various technologies used in CRM.	
CO6	Learn how to utilize customer data to build customer relations and achieve organizational goals.	
CO7	Understand the importance of customer satisfaction, customer loyalty and customer relations for a successful business.	
SEMESTER – III		
COs	Course Name: FINANCIAL ACCOUNTING I	Code: U3BA25AT Credits: 3
	OBJECTIVES: 1. To give an insight into the basics of Accounting Concepts and Principles to prepare accounts. 2. Students to understand the role of accounting plays in the overall setup of a business.	
CO1	Understand the basic concepts and conventions of accounting.	
CO2	Able to prepare final accounts with adjustments.	
CO3	Solve depreciation accounting under straight line method and diminishing balance method.	
CO4	Identify the basic problems in average due date.	
CO5	Differentiate single entry system and double entry system.	
CO6	Understand the role of accounting plays in the overall setup of a business	
CO7	Learn the accounting rules and principles.	
SEMESTER – IV		
COs	Course Name: MATERIALS MANAGEMENT	Code: U4BA21MT Credits: 5
	OBJECTIVES: 1. To provide functional knowledge of material management, material procurement, inventory control as well as warehousing for both service as well as manufacturing sector. 2. Students to understand the functions of storekeeping and protection of stores from hazards	
CO1	Identifying the scope for integrated materials management function over the supply chain operations.	
CO2	Apply the tools of inventory control technique for managing the inventory levels.	
CO3	Classify the Purchasing and import purchase procedure.	
CO4	Understanding the functions of storekeeping and protection of stores from hazards.	
CO5	Discuss the importance of vendor development and Vendor Rating.	
CO6	Analysing the materials in storage, handling, packaging, and shipping.	
CO7	Integrate the organization materials requirement to develop an overall plan.	

SEMESTER – IV		
COs	Course Name: MANAGEMENT ACCOUNTING	Code: U4BA22MT Credits: 4
	OBJECTIVES: 1. To acquaint the students to understand the analysis and interpretation of financial statements with a view to prepare management reports for decisions making. 2. To help the students to understand and analyze the financial statements in accounting. 3. Students able to solve ratio analysis problems related to management and cash flow and fund flow statement.	
CO1	Analyse the various tools of management accounting.	
CO2	Able to solve ratio analysis problems related to management.	
CO3	Compute the fund flow and cash flow statement.	
CO4	Able to prepare purchase, materials, flexible and cash budgets.	
CO5	Understand the cost volume profit analysis.	
CO6	Calculate material variance and labour variances.	
CO7	Analyse the financial statements and interpret the result there of.	
SEMESTER – IV		
COs	Course Name: BUSINESS ENVIRONMENT	Code: U4BA23MT Credits: 4
	OBJECTIVES: 1. To provide the students to have an overview of business environment and opportunities to analyze and approach the need for environment. 2. Students to understand the Political, legal, social, cultural and financial environment.	
CO1	Understand the concepts of business environment and its impact on business and strategic decisions.	
CO2	Discuss the elements of political and legal environment and its business relations.	
CO3	Learn the elements of social and cultural environment and the way it influences business.	
CO4	Demonstrate various economic parameters and their effect on business decisions.	
CO5	Equip knowledge about factors of financial environment and various financial and non- banking financial companies.	
CO6	Analyse various business environmental factors in making business decisions.	
CO7	Describe various economic policies and their impact on business.	
SEMESTER – IV		
COs	Course Name: OPERATION RESEARCH	Code: U4BA24MT Credits: 5
	OBJECTIVES: 1. To impart knowledge in concepts and tools of Operations Research . 2. To understand mathematical models used in Operations Research. 3. To apply these techniques constructively to make effective business	

	decisions.	
CO1	Solve linear programming problem using graphical method	
CO2	Minimizing the cost for a given transportation problem	
CO3	Finding the Value of a game	
CO4	Calculating the time of replacement of a machine	
CO5	Drawing a network diagram and finding a critical path	
CO6	Solving for maximum profit at corner point graphically for an Industry	
CO7	Calculating maximum gain or minimum cost by assigning jobs to suitable persons in order to avoid time and money wastage	
SEMESTER – IV		
COs	Course Name: FINANCIAL MANAGEMENT	Code: U4BA21AT Credits: 5
	OBJECTIVES: 1. To enable the students to understand the basic concepts of financial management and the role of financial management in decision making. 2. To understand the role of financial manager in financial management.	
CO1	Understand the basic objectives and functional areas of financial management.	
CO2	Evaluate the sources of working capital.	
CO3	List the various types of shares and debentures.	
CO4	Analyse dividend policy using Walter and Gordon model.	
CO5	Understand the finance resource information system.	
CO6	Able to perform role of financial manager in financial management.	
CO7	Understand the cost of capital and investment decisions.	
SEMESTER – IV		
COs	Course Name: TOTAL QUALITY MANAGEMENT	Code: U4BA21ST Credits: 3
	OBJECTIVES: 1. To acquaint the student with the basic concepts of total quality concept, tools and Seven Quality control techniques. 2. To give emphasis on quality management and certification system-ISO 2000.	
CO1	Understanding the significance of Product and service quality.	
CO2	Discuss the contribution of TQM principles of Quality Gurus.	
CO3	Explain the Significance of Statistical Process control and its construction of control charts.	
CO4	Describe the Process of Quality function deployment and House of Quality.	
CO5	List the ISO quality management system followed by Indian corporate.	
CO6	Identifying requirements of quality improvement programmes for quality enhancement.	
CO7	Analysing how Total Quality Perspective on organizational change relate to organizational theory.	
SEMESTER – IV		
COs	Course Name: FINANCIAL ACCOUNTING II	Code: U4BA25AT

		Credits: 3
	OBJECTIVES: 1. To understand the students branch accounts, departmental accounts, partnership accounts. 2. Students to understand the mechanized accounting system and role of computers in accounting system.	
CO1	Understand the different types of branch accounts.	
CO2	Learn the techniques of preparing departmental accounting.	
CO3	Evaluate the difference between hire purchase system and installment purchase system.	
CO4	Discuss the role of accounting plays in partnership firms.	
CO5	Analyze the mechanized system of accounting.	
CO6	Describe the role of computers in accounting system.	
CO7	Learn the techniques of preparing partnership accounts.	
SEMESTER – V		
COs	Course Name: BUSINESS LAW	Code: U5BA21MT Credits: 5
	OBJECTIVES: 1. To enable the students with a solid grounding in business law so that they have an idea as to how the various laws are implemented in the Indian context for the labor force. 2. Students to understand the duties of unpaid sellers and sale of goods act	
CO1	Discuss the Elements of contract and classification.	
CO2	Outline the essentials of valid acceptance.	
CO3	Explain the Persons competent to contract and persons disqualified by law.	
CO4	Compare and contrast actual and attempted performance.	
CO5	List the rights and duties of an unpaid seller.	
CO6	Describe the significance of express and implied warranty.	
CO7	Demonstrate the significance of contract and sale of goods act in current Indian scenario.	
SEMESTER – V		
COs	Course Name: MARKETING MANAGEMENT	Code: U5BA22MT Credits: 5
	OBJECTIVES: 1. To get students to rethink as business and marketing professionals in the effort of a modern day business organization and to create awareness about the latest trends and developments in marketing. 2. To understand the marketing segmentation and marketing environment	
CO1	Describe a clear understanding of various marketing concepts.	
CO2	Explain the concept of segmentation and Targeting.	
CO3	Outline the Product life cycle strategies and implications of marketing.	
CO4	Discuss how price affects the value of the organization product or services.	
CO5	Describe how to develop effective message for Marketing communications.	

CO6	Understand how demographic, cultural, and institutional factors shape the marketing environment.	
CO7	Compare and contrast the pricing strategies used for fixing price for a product.	
SEMESTER – V		
COs	Course Name: HUMAN RESOURE MANAGEMENT	Code: U5BA23MT Credits: 5
	OBJECTIVES: 1. To enable students with regard to gaining insights into how human resource management has played a crucial role in the overall scheme of things for an organization. 2. To have an understanding of the basic concepts, functions and processes of human resource management. 3. To understand the employee’s performance appraisal and career development.	
CO1	Understand the principles, functions, scope of human resource management.	
CO2	List the insight about objectives of HRP, recruitment and its types, stages in selection process.	
CO3	Able to understand the needs, importance and methods of training and development.	
CO4	Know the objectives, needs and methods of employee’s performance appraisal.	
CO5	Describe the concepts of transfer, promotion and career development.	
CO6	Learn the nature, approaches and significance of HR audit.	
CO7	Understand the importance of HR functions in organizational growth.	
SEMESTER – V		
COs	Course Name: INTERNATIONAL BUSINESS (ELECTIVE-I)	Code: U5BA24ET Credits: 5
	OBJECTIVES: 1. To impart an in-depth knowledge on the application of economic, trade concepts and theories to global business and to develop an understanding of the global trade. 2. Students to understand the foreign exchange market and exchange rate	
CO1	Understand the scope and importance of international business.	
CO2	Analyse the classical and modern theory of international trade.	
CO3	Explain the free trade policy, trade restrictions, Tariff and Quotas.	
CO4	Understand the functioning of foreign exchange market and exchange rate.	
CO5	Discuss the role of MNC, IMF and World Bank.	
CO6	Compare domestic trade with international trade.	
CO7	Evaluate the difference between balance of payment and balance of trade.	
SEMESTER – V		
COs	Course Name: BANKING AND INSURANCE (ELECTIVE-II)	Code: U5BA25ET Credits: 5
	OBJECTIVES: 1. To enable the students in getting an outlook of how banking & insurance	

	businesses work on day-to-day basis and how things are done in a professional business set up.	
	2. To know the recent trends in banking and insurance sector.	
CO1	Understand the concept of banking and service rendered by banks.	
CO2	List the various types of bank customers.	
CO3	Able to identify credit styles and secured advances.	
CO4	Explain the role and characteristics of insurance.	
CO5	Classify the various insurance policies.	
CO6	Apply the knowledge in banking and insurance.	
CO7	Adopt the recent changes in banking and insurance sector.	
SEMESTER- V		
COs	Course Name: E-BUSINESS	Code: U5BA25ST Credits: 3
	OBJECTIVES: 1. To understand the interest and opportunity of e-Business. 2. To know how to plan and how to manage e-commerce solutions. 3. To apply processes of e-commerce and to analyze and understand the human, Technological, network and business environment associated with e-commerce.	
CO1	Define and analyze the principles of E-Business and basics of World Wide Web.	
CO2	Define and analyze the concept of electronic data interchange and its legal, social and technical aspects.	
CO3	Define and analyze the security issues over the web, the available solutions and future aspects of e-commerce security.	
CO4	Define and analyze the concept of E-banking, electronic payment system	
CO5	Describe the major types of E-commerce.	
CO6	Explain the process that should be followed in building an E-commerce presence.	
CO7	Identify the key security threats in the E-commerce environment.	
SEMESTER – VI		
COs	Course Name: INDUSTRIAL RELATIONS	Code: U6BA21MT Credits: 4
	OBJECTIVES: 1. To enable the students with regard to various models of dispute resolution, labour management cooperation, dispute settlement machineries and other Industrial relation issues. 2. Students to know the various collective bargaining techniques and role of government in collective bargaining.	
CO1	Describe the concept of industrial relations and industrial dispute with the ways to resolve dispute.	
CO2	Explain various collective bargaining techniques and role of government in collective bargaining.	
CO3	Understand different factors causing industrial unrest	
CO4	Discuss about factories Act 1948 and its impact on industrial relations	

CO5	Understand the procedure for appointing inspectors and powers of inspectors	
CO6	Understand workmen compensation act 1923	
CO7	Describe the role and functions of ILO in maintaining Industrial harmony,	
SEMESTER – VI		
COs	Course Name: COMPUTER APPLICATIONS IN BUSINESS	Code: U6BA22MT Credits: 4
	OBJECTIVES: 1. To Understand the role of Information Technology in Business 2. To know how to produce documents in word processing packages. 3. To know how to use technologies with securities to build e-commerce websites.	
CO1	After completing this course student should be able to more effectively use their MS-Word, Excel, and Power point as tools for business, entertainment or study	
CO2	It should have more complete and detail understanding of the role computers play in our daily lives	
CO3	Students can create variety of documents and presentations for e-learning	
CO4	To understand the interest and opportunity of e-commerce	
CO5	Describe the major types of E-commerce.	
CO6	Explain the process that should be followed in building an E-commerce presence.	
CO7	To know how to plan and manage e-commerce solutions	
SEMESTER – VI		
COs	Course Name: RESEARCH METHODOLOGY (ELECTIVE-I)	Code: U6BA23ET Credits: 5
	OBJECTIVES: 1. To provide knowledge on research methods, Sampling techniques and the process. 2. To develop skills in the application of research methods for business problem solving.	
CO1	Understanding about research methods, techniques and process.	
CO2	Analyse the types of sampling techniques.	
CO3	Able to collect primary and secondary data.	
CO4	Understanding about analysis of data, editing, coding and tabulation etc.	
CO5	Formulate systematic business research reports.	
CO6	Able to prepare research reports.	
CO7	Apply research methods for business problem solving.	
SEMESTER –VI		
COs	Course Name : MARKETING RESEARCH (ELECTIVE-II)	Code: U6BA24ET Credits: 5
	OBJECTIVES: 1. To have understanding of the various research designs and to be aware of different sources of marketing data and the process of gathering such data. 2. Students to understand the New Product development Process and the impact of Product life cycle.	

CO1	Explain the steps in Marketing Research process.
CO2	Analyze the various kinds of sampling technique used in marketing Research.
CO3	Discuss the New Product development Process and the impact of Product life cycle.
CO4	Apply different kinds of sales forecasting methods to estimate sales.
CO5	Compare and contrast the different kinds of media used in advertisement.
CO6	Apply the marketing theories framework and tools to solve marketing research problems.
CO7	Understanding the ability to demonstrate knowledge of marketing research process applied by collecting and analysing market information.
SEMESTER – VI	
COs	Course Name: PROJECT WORK WITH VIVA VOCE Code: U6BA21PV Credits: 5
	OBJECTIVES: 1. To understanding the concept the projects, applying the various concepts learned in the previous chapters. 2. Able to preparing a report based on the project undergone.
CO1	Applying the concepts of various functional areas in management Practices.
CO2	Demonstrate the leadership, communication and analytical skills in real life situations in business areas.
CO3	Enable students to critically evaluate the live problems in the companies and to give optimal suggestions for their future course of action for the MSME.
SEMESTER – VI	
COs	Course Name: ENTREPRENEURIAL DEVELOPMENT Code: U6BA25ST Credits: 3
	OBJECTIVES: 1. To enable the students to take key decisions required of the entrepreneur/manager, the driving forces of the small/family business. 2. Students to understand the problems faced by women entrepreneurs.
CO1	Understand the role and importance of entrepreneurship.
CO2	Identify the problems faced by women entrepreneurs.
CO3	Able to generate new business ideas.
CO4	Prepare business plan and project report.
CO5	Discuss the role of government in promoting new start-ups.
CO6	Analyse the ethical and legitimacy challenges that force entrepreneurs.
CO7	Identify and understand the driving forces of new entrepreneurs.