

**RAJEEV GANDHI GOVT. PG COLLEGE
AMBIKAPUR CHHATTISGARH
DEPARTMENT OF COMPUTER SCIENCE**



***MASTER OF SCIENCE
IN
COMPUTER SCIENCE***

SYLLABUS

CBCS STRUCTURE FOR M.Sc. (CS)

2023 - 2024

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RAJEEV GANDHI GOVT. PG COLLEGE AMBIKAPUR (C.G.)

Department of Computer Science

Members of Board of Studies






S.No	Name	Role	Signature
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RAJEEV GANDHI GOVT. PG COLLEGE AMBIKAPUR (C.G.)

Department of Computer Science

VISION

The vision of the Computer Science Department is to generate competent professionals with the ability to solve problems, individually and in teams at local and national levels. Excel in the emerging areas of computer science by imparting knowledge, scholarly activity, creative endeavors and public service.

MISSION

- To provide strong fundamental and technical skills for computer science through effective teaching learning methodologies.
- To uplift innovative research in Computer Science for sustainable development of the Country's IT industry, Society and Government needs.
- To transform lives of the students by nurturing ethical values, creativity and commitment to lifelong learning.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)	
PEO1	Students will create and collaborate in emergent computing technologies leading to innovative solutions for industry and academia.
PEO2	Develop strong skills in systematic planning, developing algorithms and providing solutions for computer based systems which helps in employability.
PEO3	To impart the need for consistent learning, importance of research & development for the welfare of the society and to the nation at large.
PEO4	Students will focus on team spirit, leadership, communication, ethics and social values, which will lead to apply knowledge of societal impacts of computing technologies.

PROGRAM OUTCOMES (POs)	
On successful completion of the M.Sc. Computer Science program:	
PO1	Discipline knowledge: Acquiring knowledge on basics of Computer Science and ability to apply to design principles in the development of solutions for problems of varying complexity.
PO2	Problem Solving: Improved reasoning with strong mathematical ability to Identify, formulate and analyze problems related to computer science and exhibiting a sound knowledge on data structures and algorithms.
PO3	Design and Development of Solutions: Ability to design and development of algorithmic solutions to real world problems and acquiring a minimum knowledge on statistics and optimization problems. Establishing excellent skills in applying various design strategies for solving complex problems
PO4	Programming a Computer: Exhibiting strong skills required to program a computer for various issues and problems of day-to-day applications with through knowledge on programming languages of various levels.
PO5	Application Systems Knowledge: Possessing a sound knowledge on computer application software and ability to design and develop app for applicative problems.
PO6	Modern Tool Usage: Identify, select and use a modern scientific and IT tool or technique for modeling, prediction, data analysis and solving problems in the area of Computer Science and making them mobile based application software.
PO7	Industry Familiar: Student will be able to become industry familiar.
PO8	Project Management: Practicing of existing projects and becoming independent to launch own project by identifying a gap in solutions.
PO9	Ethics on Profession, Environment and Society: Exhibiting professional ethics to maintain the integrality in a working environment and also have concern on societal impacts due to computer-based solutions for problems.
PO10	Motivation to take up Higher Studies: Inspiration to continue educations towards advanced studies on Computer Science.

GRADUATE ATTRIBUTES (GA) IN COMPUTER SCIENCE	
GA1	Ability to identify a problem, analyzes using design thinking techniques, and evolves innovative approaches for solving it.
GA2	Ability to apply mathematical concepts and techniques in problem solving.
GA3	Ability to function effectively in multicultural teams to accomplish a common goal.
GA4	Ability to self-learn and engage in life-long learning and upgrade technical skills.
GA5	An understanding of professional and ethical responsibility.
GA6	Ability to undertake small research tasks and projects.
GA7	Exposure to emerging technologies such as DSA, Programming language, Cloud Technology etc.
GA8	Understanding of computing systems at computer architecture, operating systems, and distributed computing levels, and how they affect the performance of software applications.
GA9	Ability to design and apply appropriate algorithms and data structures for evolving efficient computing based solutions for new problems.
GA10	Understanding of theoretical foundations, fundamental principles, and limits of computing

PROGRAM SPECIFIC OUTCOMES (PSOs)	
After successful completion of M.Sc. Computer Science program, the students will be able to:	
PSO1	Apply fundamental knowledge of theoretical computer science and critically analyze problems to provide computer based solutions for various applications.
PSO2	Design cost effective hardware/software systems using the knowledge of hardware and/or software architecture, programming and development.
PSO3	To Demonstrate skills to use modern tools, software and equipment for problem solving in new and emerging disciplines.
PSO4	Apply domain knowledge and expertise for enhancing research capability to transform innovative ideas into reality.

PROGRAM LEARNING OUTCOMES (PLOs) for M.Sc. in COMPUTER SCIENCE	
PLO-1	Problem Analysis and solutions: Think critically, identify, analyze problems/situations and further attempt to design/develop solutions that meet the specified goals.
PLO-2	Use of Technology: Apply appropriate IT tools efficiently in their daily life-professional and personal.
PLO-3	Environment and Sustainability: Be aware of environmental issues and commit towards sustainable development at local/national and global context.
PLO-4	Ethics: Recognize and understand professional ethics/human values and be responsible.
PLO-5	Individual and Team work: Function effectively at various levels, capacities and situations.
PLO-6	Communication: Communicate proficiently (oral and written) as a responsible member of society.
PLO-7	Research Aptitude: Understand general research methods and be able to analyze, interpret and derive rational conclusions.
PLO-8	Life Skills: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of domain specific change.

PROGRAM STRUCTURE AND SCHEME:

The M.Sc. program is a two-year course divided into four semesters. A student has to complete the required credits for the completion of course and the award of degree. In I/II/III/IV semester there shall be five theory courses each of 70 marks (Min. Pass Marks 25) and 30 marks (Min. Pass Marks 12) for internal assessment test. In internal assessment, there will be 10 marks for written test, 10 marks for assignment and 10 marks for a seminar in each paper.

Thus there shall be T/I=100 marks for each paper, minimum passing/ qualifying marks shall be 36% in each Theory/Internal assessment. Candidate will be required to pass separately in each theory and internal assessment.

		<i>Semester</i>	<i>Semester</i>
Part – I	First Year	Semester I	Semester II
Part – II	Second Year	Semester III	Semester IV

SCHEME OF FIRST SEMESTER M.Sc. COMPUTER SCIENCE PROGRAM

Paper	Course Code	Course Type	Course (Paper/Subjects)	Credits	Contact Hours Per Week			EoSE Duration (Hrs.)		Marks	
					L	T	P	Thy	P	SEE	IA
I	MSCS 101	CCC	DATA STRUCTURE AND ALGORITHM IMPLEMENTATION	6	4	3	00	3	0	70	30
II	MSCS 102	CCC	HTML AND WEB DESIGN	6	4	3	0	3	0	70	30
III	MSCS 103	CCC	PROGRAMMING IN C : CORE AND ADVANCED	6	4	3	00	3	0	70	30
IV		OSC	SOCIAL OUTREACH & INTERNSHIP/ ENTERPRENEURSHIP	6	4	3	0	3	0	100	
VI	MSCS 111	CCC	Lab Course A	3	0 0	0 0	3	0	3	100	
VII	MSCS 112	CCC	Lab Course B	3	0 0	0 0	3	0	3	100	
V	MSCS E101	ECC/CB	FUNDAMENTAL OF INFORMATION TECHNOLOGY	6	4	3	00	3	0 0	70	30
	MSCS E102	ECC/CB	NUMERICAL ANALYSIS IN COMPUTER APPLICATION								
	MSCS E103	ECC/CB	DATABASE DESIGN TECHNIQUES								
TOTAL				36						700	

SCHEME OF SECOND SEMESTER M.Sc. COMPUTER SCIENCE PROGRAM

Paper	Course Code	Course Type	Course (Paper/Subjects)	Credit	Contact Hours Per Week			EoSE Duration (Hrs.)		Marks	
					L	T	P	Thy	P	SEE	IA
I	MSCS 201	CCC	OPERATING SYSTEM CONCEPTS	6	4	3	00	3	0	70	30
II	MSCS 202	CCC	OBJECT ORIENTED PROGRAMMING CONCEPTS IN C++	6	4	3	0	3	0	70	30
III	MSCS 203	CCC	WEB TECHNOLOGY : BASED ON ASP.NET	6	4	3	00	3	0	70	30
IV	MSCS 221	OSC	RESEARCH METHODOLOGY & COMPUTER APPLICATION : BASICS	6	4	3	0	3	0	100	
VI	MSCS 211	CCC	LAB COURSE A	3	0 0	0 0	3	0	3	100	
VII	MSCS 212	CCC	LAB COURSE B	3	0 0	0 0	3	0	3	100	
V	MSCS E201	ECC/CB	COMPUTER SYSTEM ORGANIZATION AND ARCHITECTURE	6	4	3	00	3	0 0	70	30
	MSCS E202	ECC/CB	DISCRETE MATHEMATICS								
	MSCS E203	ECC/CB	COMPUTER GRAPHICS								
TOTAL				36						700	

SCHEME OF THIRD SEMESTER M.Sc. COMPUTER SCIENCE PROGRAM

Paper	Course Code	Course Type	Course (Paper/Subjects)	Credit	Contact Hours Per Week			EoSE Duration (Hrs.)		Marks	
					L	T	P	Thy	P	SEE	IA
I	MSCS 301	CCC	ADVANCED JAVA PROGRAMMING	6	4	3	00	3	0	70	30
II	MSCS 302	CCC	DATA COMMUNICATION & COMPUTER NETWORKS	6	4	3	0	3	0	70	30
III	MSCS 303	CCC	RDBMS	6	4	3	00	3	0	70	30
IV	LLM 304	OSC	INTELLECTUAL PROPERTY RIGHTS	6	4	3	0	3	0	100	
VI	MSCS 311	CCC	LAB COURSE A	3	0 0	0 0	3	0	3	100	
VII	MSCS 312	CCC	LAB COURSE B	3	0 0	0 0	3	0	3	100	
V	MSCS E301	ECC/CB	THEORY OF COMPUTATION & AUTOMATA	6	4	3	00	3	0 0	70	30
	MSCS E302	ECC/CB	ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEM								
	MSCS E303	ECC/CB	DATAWAREHOUSE AND VARIOUS TECHNIQUES								
TOTAL				36						700	

SCHEME OF FOURTH SEMESTER M.Sc. COMPUTER SCIENCE PROGRAM

Paper	Course Code	Course Type	Course (Paper/Subjects)	Credit	Contact Hours Per Week			EoSE Duration (Hrs.)		Marks	
					L	T	P	Thy	P	SEE	IA
I	MSCS 401	CCC	NETWORK SECURITY	6	4	3	00	3	0	70	30
II	MSCS 402	CCC	MOBILE COMPUTING AND APPLICATION DEVELOPMENT	6	4	3	0	3	0	70	30
III	MSCS 403	CCC	SYSTEM DESIGN AND SOFTWARE ENGINEERING	6	4	3	00	3	0	70	30
IV	MSCS 404	OSC/PRJ	DISSERTATION	6	4	3	0	3	0	100	
VI	MSCS 411	CCC	LAB COURSE A	3	0 0	0 0	3	0	3	100	
VII	MSCS 412	CCC	LAB COURSE B	3	0 0	0 0	3	0	3	100	
V	MSCS E401	ECC/CB	CYBER CRIME AND SECURITY FUNDAMENTALS	6	4	3	00	3	0 0	70	30
	MSCS E402	ECC/CB	OPERATION RESEARCH								
	MSCS E403	ECC/CB	DATA MINING AND ALGORITHMS								
TOTAL				36						700	

M.Sc. Semester-I

Paper-I: Data Structure and Algorithm Implementation

COURSE OBJECTIVE:

Data Structure Provides the Basics of Programming and Logic Implementation. It helps to design and develop Programs. It is also helpful to solve real world problems in a logistic manner.

COURSE OUTCOMES:

Students, after completion of this course will be able to:

CO1: Acquire knowledge of data structure and its tools and techniques

CO2: Gain knowledge and evaluate the graph theory, searching data items and traversal technique in various data structure.

CO3: Analyze the basic operation of various data structures.

CO4: Understand the working of tree, queue, stack, link list, array and structure.

CO5: Design and analyze minimum traversal cost between tree, link list and queue

CO-PO MAPPING

CO	PO									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	✓			✓			✓			✓
CO2		✓			✓		✓		✓	
CO3	✓		✓					✓		✓
CO4	✓	✓			✓	✓	✓			✓
CO5	✓	✓		✓		✓			✓	✓

M.Sc. in COMPUTER SCIENCE (FIRST SEMESTER)	
COURSE CODE: MSCS 101	
COURSE TYPE: CCC	
COURSE TITLE: DATA STRUCTURE AND ALGORITHM IMPLEMENTATION	
CREDIT: 06	HOURS: 90
MARKS: 100 (SEE: 70 & CCA: 30)	
UNIT-1 15Hrs	Basics Terminologies: Introduction to basic data Structures: Arrays, List, Trees Stack, Queue; Elementary data organization, Data structure operations.
UNIT-2 20Hrs	Array: Terminology , types of Array, Memory organization, operation on Array, Pointer Array; Records and their structures. List: Linear list, traversing a linked list, insertion & deletion, Singly Linked list- Operation on it; Doubly linked list- Operation on it; Circular linked list.
UNIT-3 20 Hrs	Stacks & Queues: Stacks; Array representation of stack; Linked representation of stack; Various polish notations -Prefix, Postfix, infix; Evaluation of a postfix & Prefix expression; Conversion from one another; Application of stack; Queues; Linked representation of queues; Dqueues; Circular queue; Priority queue.
UNIT-4 20 Hrs	Trees : Binary trees; Representation of binary tree in memory; traversing binary tree; Traversing using stack, Binary search trees; Searching and inserting in binary search trees; Deleting in a binary search tree; AVL search trees; Insertion and deletion in binary search trees; B trees: searching, insertion, deletion, Heap Graphs : Terminology & representation; Warshall algorithm; Shortest path; Minimum spanning tree; Kruskal & Dijkstara algorithm; Operation on graph; Traversing a graph.
UNIT- 5 15 Hrs	Searching and Sorting: Searching algorithm: linear search, binary search; sorting algorithms: Bubble sort, Insertion sort, Selection sort, Quick Sort, Merge sort and Heap sort.
SUGGESTED READINGS	Books: 1. Data Structure By Lipshutz, McGraw Hill. 2. Data Structure By Standish, Addison-Wesley. 3. Data Structures using C By A. M. Tennenbaum, Y. Langsam and M. J. Augenstein, PHI, 1991

M.Sc. Semester-I

Paper-II: HTML and Web Design

COURSE OBJECTIVE:

The main objective is to provide basics of Web Page Designing. It also gives knowledge about various webbased Languages available for Web Designing.

COURSE OUTCOMES:

Students, after completion of this course will be able to:

CO1: Acquire knowledge of Website development and its features.

CO2: Gain knowledge of the HTML and related tags.

CO3: Analyze the basic operation of web pages.

CO4: Understand the web related CSS, protocols, and other web servers.

CO5: Design Websites and its hosting process.

CO-PO MAPPING

CO	PO									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	✓				✓				✓	✓
CO2	✓					✓	✓			
CO3	✓	✓					✓			
CO4	✓	✓			✓	✓	✓			✓
CO5	✓	✓	✓		✓			✓	✓	✓

M.Sc. in COMPUTER SCIENCE (FIRST SEMESTER)	
COURSE CODE: MSCS 102	COURSE TYPE: CCC
COURSE TITLE: HTML AND WEB DESIGN	
CREDIT: 06	HOURS: 90
MARKS: 100 (SEE: 70 & CCA: 30)	
UNIT-1 15Hrs	<p>Concept of Internet: Fundamental and History of Web, Web Development Overview, Domain Name System (DNS), Internet service provider (ISP), IP Address, Web Related Protocol, Web Browser and Web Server. Concept of static web pages and dynamic web pages</p>
UNIT-2 20Hrs	<p>Html and its Tags: What is HTML (Markup Language?) Basic Structure of HTML, Basic HTML Tags, Image Tag, HTML Tag for Hyperlink, Various List Tags, Table Creation Tags, Frame Creation Tags, Form Creation Tags.</p>
UNIT-3 20 Hrs	<p>Cascading Style Sheet: What is CSS? Role of CSS in Web Designing. Different Types of CSS. Rule of CSS. CSS Box Model. CSS Selectors, Class Selector. ID Selector. Child Selector. Type Selector, CSS Properties, Different Font Properties. Background Properties. Border Properties. Positioning Properties. Display Properties. List Properties. Inside & Outside Spacing Properties.</p>
UNIT-4 20 Hrs	<p>HTML Editor (MS Expression Web): Getting Started with Expression Web, Creating a Web Site, Adding Text and Links, Structuring and Styling Text, Working with Images, Enhancing a Design with CSS, Designing Site Navigation, Testing and Publishing Your Web Site, Working with Tables, Creating Forms, Working with Behaviors, Using Code Tools, Advanced Typography Using CSS, Creating a Layout with CSS.</p>
UNIT- 5 15 Hrs	<p>Web Publishing and Hosting: Concept of Domain Name and Web Server. Different types of Web Server, Domain Name Registration, Web Space allocation, Uploading /Downloading the website- FTP, cute FTP., Web Site Promotion, Search Engines Optimization.</p>
SUGGESTED READINGS	<p>Books:</p> <ol style="list-style-type: none"> 1. Web Technology: A Developers Perspective, N. P. Gopalan ,J. Akilandeswani, PHI Publication. 2. Java Script: Developers Resource by Kamran Husain and Jason Levitt PTR-PHI publication. 3. World Wide Web design with HTML by Xavier Tata Mc Graw Hill Publication. 4. Web Technology: A Developments Perspective, N.P. Gopalan, J. Akilandeswari, PHI Publication. 5. XML By Example, Sean Mc Grath Pentice Hall Publication.

M.Sc. Semester-I

Paper-III: Programming in C: Core and Advanced

COURSE OBJECTIVE:

Gain an understanding of the basic structure of C programming languages like data types, control structures. To understand basic principles of structured programming using C.

COURSE OUTCOMES:

Students, after completion of this course will be able to:

CO1: Acquire knowledge of programming logic its basic tools.

CO2: Gain knowledge of the C programming Language.

CO3: Analyze the basic operation of data structure.

CO4: Understand the various data types and structures, functions, looping and decision statements.

CO5: Design develops and run programs.

CO-PO MAPPING

CO	PO									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	✓				✓				✓	
CO2	✓				✓				✓	✓
CO3	✓	✓	✓	✓	✓		✓	✓		
CO4	✓	✓	✓	✓		✓				✓
CO5	✓	✓				✓	✓			✓

M.Sc. in COMPUTER SCIENCE (FIRST SEMESTER)	
COURSE CODE: MSCS 103	
COURSE TYPE: CCC	
COURSE TITLE: PROGRAMMING IN C: CORE AND ADVANCED	
CREDIT: 06	HOURS: 90
MARKS: 100 (SEE: 70 & CCA: 30)	
UNIT-1 15Hrs	<p>Fundamentals of C Programming: Overview of C: History of 'C', Basic Structure of 'C' program. C Tokens: Keywords, Data types, Constants, Literals and Variables, Operators and Expressions: Arithmetic, Relational, Logical, Assignment, Increment & Decrement, conditional, Bitwise, Special operators. Expressions, Operator precedence and associativity, Type conversion in expression, Console I/O formatting, Unformatted I/O functions: getch(), getchar, getche(), getc(), putc(), putchar().</p> <p>Control Constructs: Decision making and Branching: If, If-else, Nested if..else, Else if ladder, Switch, Conditional operators, goto and label statement, Decision making and Looping: While, For, do..while, Nested loops, Jumps in loop with break and continue.</p>
UNIT-2 20Hrs	<p>Arrays, Strings and Functions: Array:-Array declaration, One, Two and Multi Dimensional numeric and character arrays.</p> <p>String:-String declaration, initialization, string manipulation with/without using library function.</p> <p>Functions:-Definition, function components: Function arguments, return value, function call statement, function prototype. Type of function arrangement: return and argument, no return and no argument, return and no argument, no return and argument. Scope and lifetime of variable. Call by value and call by reference. Function using arrays, function with command line argument. User defined function: maths and character functions, Recursive function.</p>
UNIT-3 20 Hrs	<p>Structure, Union & Enum- Structure: Basics, declaring structure and structure variable, typedef statement, array of structure, array within structure, Nested structure; passing structure to function, function returning structure. Union: Basics, declaring union and union variable, Enum: declaring enum and enum variable.</p>
UNIT-4 20 Hrs	<p>Dynamic Data Structures in 'C' - Pointers: Definition of pointers, pointer declaration, using & and *operators. Void pointer, pointer to pointer, Pointer in math expression, pointer arithmetic, pointer comparison, dynamic memory allocation functions – malloc, calloc, realloc and free, pointers vs. Arrays, Arrays of pointer, pointer to array, pointers to functions, function returning pointer, passing function as argument to function, pointer to structure, dynamic array of structure through pointer to structure.</p>
UNIT-5 15 Hrs	<p>File Handling and Miscellaneous Features: File handling: file pointer, file accessing functions: fopen, fclose, fputc, fgetc, fprintf, fscanf, fread, fwrite, beof, fflush, rewind, fseek, ferror. File handling through command line argument. Introduction to C preprocessor #include, #define, conditional compilation directives: #if, #else, #elif.</p>
SUGGESTED READINGS	<p>Books:</p> <ol style="list-style-type: none"> 1. Programming in C “Yashwant Kanetkar”, BPB Publications, Tenth Edition. 2. Programming with C “Venugopal”, TMH Outline Series, Third Edition. 3. The C Programming Language “Kemigham and Ritche [Prentice Hall]” 4. Programming in C Language, “Dr Amit Saxena“ Ananya Publication 6. Programming in C Language “Bala Gurusamy“ Fourth Edition

M.Sc. Semester-I

Paper-V: Fundamental of Information Technology

COURSE OBJECTIVE:

The main objective is to provide the fundamentals of Computer show that they get the Knowledge about Software, Hardware, Communication Technology and Internet.

COURSE OUTCOMES:

Students, after completion of this course will be able to:

CO1: Acquire knowledge of programming logic its basic tools. Acquire knowledge of Computer hardware and software.

CO2: Gain knowledge of the basic architecture of computer system and its devices.

CO3: Analyze the basic operation of CPU, Memory, and other devices.

CO4: Understand the various operating systems, generations, types and classification of computersystems.

CO5: Understand and analyze the basic terminology of network, Internet, IT Trends.

CO-PO MAPPING

CO	PO									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	✓									
CO2	✓				✓		✓		✓	✓
CO3	✓								✓	
CO4	✓	✓		✓			✓		✓	✓
CO5	✓	✓	✓		✓		✓			✓

M.Sc. in COMPUTER SCIENCE (FIRST SEMESTER)	
COURSE CODE: MSCS E101	
COURSE TYPE: ECC/CB	
COURSE TITLE: FUNDAMENTAL OF INFORMATION TECHNOLOGY	
CREDIT: 06	HOURS: 90
MARKS: 100 (SEE: 70 & CCA: 30)	
UNIT-1 15Hrs	Introduction –Basics concept of IT, concept of data and information, History of computer, Generations and classification of Computers, organization of computers, Input and Output devices, storage devices, Data processing and file organization.
UNIT-2 20Hrs	Software and Computer language –Software and its need, Types of Software: System software, application software, utility software, Firm ware. Operating system: Types, Job and objective. Language translator .Introduction and evolution of Programming Languages, Types of Programming Languages, Generations of Programming Languages, Programming Paradigms: procedural oriented and object oriented programming
UNIT-3 20 Hrs	Communication and network technology: Communication process, Communication and system elements, Analog and digital signal, mode of communication, communication media: Wired and Wireless. Computer Network: Types, criteria, advantages and disadvantages, Topology, LAN and other network related protocols, OSI reference model and TCP/IP model.
UNIT-4 20 Hrs	Internet –Technical foundation of Internet, history of Internet, Internet Service Provider (ASP), ARPANET, Services Available on Internet; Internet Applications: E-mail, WWW and file transfer. Internet addressing ,Client server computing, Domain name system (DNS), Internet Security –Fire walls, Encryptions etc.
UNIT- 5 15 Hrs	Application of IT and Latest IT Trends: IT in business, Industry, home, education entertainment, science and engineering and medicine. E-commerce, M-Commerce. Latest IT Trends :Artificial Intelligence, Data Mining, Overview of Geographic InformationSystem(GIS),Cloud computing ,Information communication Technology (ICT)
SUGGESTED READINGS	Books: 1. Fundamental of Computer 5th Edition By V.Rajaraman, PHI Publication. 2. Introduction to Information Technology by V.Rajaraman , PHI Publication. 3. Information technology today By S.Jaiswal 4. Fundamental of IT :Leon and Leon ,Leon Tec World 7. Introduction to Information Technology by Aksoy and De Nardis, Cengage Learning.

M.Sc. Semester-I

Paper-V: Numerical Analysis in Computer Application

COURSE OBJECTIVE:

The main objective to know about algebraic Equations, Simultaneous algebraic equations, Interpolations, Differentiation and Integration and Differential equations.

COURSE OUTCOMES:

Students, after completion of this course will be able to:

CO1: Demonstrate competence with understanding the theoretical and practical aspects of the use of numerical methods.

CO2: Establish the limitations, advantages and disadvantages of different numerical methods.

CO3: Identify and interpret the fundamental concepts of polynomial and roots of equations, Finite differences, Eigen values and Eigen vectors and corresponding algorithms.

CO4: Develop skills in analyzing the methods of interpolating a given data, properties of interpolation with unequal intervals and derive conclusions, approximate a function using an appropriate numerical method.

CO5: Analyze the physical problems to establish mathematical model and use appropriate method to solve and optimize the solution.

CO-PO MAPPING

CO	PO									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	✓									
CO2	✓				✓		✓		✓	✓
CO3	✓								✓	
CO4	✓	✓		✓			✓		✓	✓
CO5	✓	✓	✓		✓		✓			✓

M.Sc. in COMPUTER SCIENCE (FIRST SEMESTER)	
COURSE CODE: MSCS E102	
COURSE TYPE: ECC/CB	
COURSE TITLE: NUMERICAL ANALYSIS IN COMPUTER APPLICATION	
CREDIT: 06	HOURS: 90
MARKS: 100 (SEE: 70 & CCA: 30)	
UNIT-1 15Hrs	Algebraic Equation: Computer Arithmetic – Floating point Numbers- Operations Normalization and their consequences. Iterative Methods – Roots of a Single transcendental equations and roots of Polynomials using Bisection Method, False position Method, Newton Raphson Method.
UNIT-2 20Hrs	Simultaneous Algebraic Equation :Gauss Elimination Method, Gauss-Jordan Matrix Inversion & Eigen Value: Gauss Jordan Method, Factorization Method and Eigen Vectors.
UNIT-3 20 Hrs	Interpolations: Polynomials interpolation, Newton Method. Lagrange’s Interpolation Formulaand difference tables. Least Square Approximations- Linear regression only.
UNIT-4 20 Hrs	Differentiation and Integration- Formula for Numerical Differentiation and Numerical integration by Trapezoidal Rule and Simpson’s rule only.
UNIT- 5 15 Hrs	Numerical Solution of Differential Equation: - Euler’s Method, Taylor series Method, Runge-Kutta Method.
SUGGESTED READINGS	Books: 1. Numerical Methods By V. Rajaraman, 3rd Edition, Prentice-Hall India Pvt. Ltd. 2. Numerical Methods By S.S. Shastri, 4th edition, 2005, PHI publications. 3. Numerical Methods in Engineering and Science, 36th Edition, Khanna Publishers, Delhi. 8. Computer Based Numerical and Statistical techniques, P.K.Mittal and Mukesh B.,GalgotiaPublication.

M.Sc. Semester-I

Paper-V: Database Design Techniques

COURSE OBJECTIVE:

The main objectives to introduce Database System, relational database model, querying and transaction management.

COURSE OUTCOMES:

Students, after completion of this course will be able to:

CO1: Acquire knowledge of DBMS and its basic concepts.

CO2: Gain knowledge of the PL/SQL and its scripting technique.

CO3: Analyze the basic operation of DBMS objects.

CO4: Understand the DDL, DML and Other Language.

CO5: Analyze, develop and run programs.

CO-PO MAPPING

CO	PO									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	✓			✓		✓				
CO2	✓		✓		✓					✓
CO3	✓	✓	✓		✓		✓	✓	✓	
CO4	✓	✓					✓			✓
CO5	✓	✓	✓	✓		✓			✓	✓

M.Sc. in COMPUTER SCIENCE (FIRST SEMESTER)	
COURSE CODE: MSCS E103	
COURSE TYPE: ECC/CB	
COURSE TITLE: DATABASE DESIGN TECHNIQUES	
CREDIT: 06	HOURS: 90
MARKS: 100 (SEE: 70 & CCA: 30)	
UNIT-1 15Hrs	INTRODUCTION TO DATABASE SYSTEM Introduction, Purpose and Applications of Database Systems, View Of Data, Characteristics of Database Approach, Architecture DBMS, Advantages and Disadvantages Of DBMS, Database Users and Administrator, Database Design using ER Model , Data Model Classification.
UNIT-2 20Hrs	RELATIONAL DATABASE CONCEPT Structure of Relational Database, Database Schema, Key, Relational Operations Formal Relational Query Languages. Relational Algebra: Basic Operations selection and projection, Set Theoretic Operations, Join Operations.
UNIT-3 20 Hrs	RELATIONAL DATABASE DESIGN Relational Database design: Functional dependencies, Universal Relation, Anomalies in A Database, Normalization Normal forms based on primary keys (1 NF, 2 NF, 3 NF, BCNF, 4 NF, 5NF) Loss less joins and dependency preserving decomposition.
UNIT-4 20 Hrs	DATABASE STORAGE AND QUERYING Basic Concepts Of Indexing and Hashing Query Processing, Measures Of Query Cost, Query Processing for Select, Sort Join Operations. Basics of Query Optimization, Transformation of Relational Expression Estimating Statistics of Expression, Choice of Evaluation Plan. Query Resource Utilization, Query Execution Statistics, Query Execution Plan, Sample Index Access, Fill Factor, Multiple Index Access, Methods for Joining Tables (Nested Loop, Merge Join, Hybrid Join, Multiple Join) Structure of a Query Optimizer.
UNIT-5 15 Hrs	TRANSACTION MANAGEMENT AND CONCURRENCY CONTROL Transaction Processing & Concurrency Control: Concept and definition of transaction, ACID properties, serializability, Prioritization, states of transaction, Types of failure, levels of transaction consistency, deadlocks, long duration transactions, transaction performance, Concurrency Control, locking techniques, techniques based on time-stamp ordering, multiple granularity. Crash Recovery: failure classification, recovery concepts, database backup, recovery concepts based on deferred update and on immediate update. Shadow paging; check points, on-line backup during database updates, crash recovery techniques.
SUGGESTED READINGS	Books: 1. Silverschatz Korth And Sudarshan-Database System Concepts, 6 ed. Tata Mc-Graw Hill. 2. Raghu Rama Krishnan-Database Management Systems, 2 ed. Tata Mc-Graw Hill 3. Rajesh Narang – Database Management System, 2 Ed. Phi 4. R. Elmasri Et. Al “Fundamentals Of Database Systems”. 3 Edition – Addison Wesley, (Indian Reprint), New Delhi. C.J.Date, Data Base Systems, Vol I & II

M.Sc. in COMPUTER SCIENCE (FIRST SEMESTER)		
COURSE CODE: MSCS 111		COURSE TYPE : CCC
COURSE TITLE: LAB COURSE A		
CREDIT : 03	HOURS: 45	PRACTICAL MARKS: 100
LABORATORY WORK MSCS 111	<p>Data Structure:</p> <ol style="list-style-type: none"> 1. Design a program in C for addition of five numbers using single dimension array. 2. Design a program in C for multiplication of two 3X3 Matrix. 3. Design a program in C for Stack basic operations. 4. Design a program in C for Queue basic operations. 5. Design a program in C for Linear Search. 6. Design a program in C for Binary Search. 7. Design a program in C for Bubble sorting. 8. Design a program in C for Insertion Sort. 9. Design a program in C for Merge Sort. 10. Design a program in C for Quick Sort. <p>HTML and Web Design:</p> <ol style="list-style-type: none"> 1. Design a Html code for creating a simple link and Hyperlink. 2. Design a Html code for creating an Ordered List. 3. Design a Html code for creating an Unordered List. 4. Design a Html code for creating a Table showing employee details. 5. Design a Html code for creating a Frame. 6. Design a Html code for inserting an Image. 7. Design a Html code for creating a Marque in the web Page. 8. Design a Html code for creating frames in column and row wise showing details of your department. 9. Design a Html code for creating a form having five textboxes and labels. 10. Design a website for your Department. 	

M.Sc. in COMPUTER SCIENCE (FIRST SEMESTER)		
COURSE CODE: MSCS 112		COURSE TYPE : CCC
COURSE TITLE: LAB COURSE B		
CREDIT : 03	HOURS: 45	PRACTICAL MARKS: 100
LABORATORY WORK MSCS 112	<p>Programming in C:</p> <ol style="list-style-type: none"> 1. Design a program in C for addition of five numbers using float data type. 2. Design a program in C for swapping of two numbers using multiplication and division operator. 3. Design a program in C for addition using two 3X2 matrices. 4. Design a program in C using Structure for employee details. 5. Design a program in C for various logical operators. 6. Design a program in C for printing Table of inputted number. 7. Design a program in C for finding the factorial of any number using call by reference method. 8. Design a program in C for multiplication of two 3X3 Matrix. 9. Design a program in C for addition of two numbers using call by value method. 10. Design a program in C for storing 5 books information using Structure. 11. Design a program in C for union for addition of two float numbers. 12. Design a program in C for pointer. 13. Design a program in C for pointer within Structure. 14. Design a program in C for various loops. 15. Design a program in C for various conditional statements. 16. Design a program in C for #if statement. 17. Design a program in C for generating multiplication table of entered number. 	

M.Sc. Semester-II

Paper-I: Operating System Concepts

COURSE OBJECTIVE:

The main objective is to give the basic concepts regarding operating systems. How it works, its types and various process synchronization and communication, memory management, file and secondary storage management.

COURSE OUTCOMES:

Students, after completion of this course will be able to:

CO1: Acquire knowledge of various types and function of operating systems.

CO2: Gain knowledge of the basic architecture of operating system and various tools.

CO3: Analyze the basic operation of operating system.

CO4: Understand the various techniques of memory management, process management and controlling input output operations.

CO5: Analyze the performance of different scheduling algorithms along with the policies for concurrency and deadlock management.

CO-PO MAPPING

CO	PO									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	✓		✓		✓			✓	✓	✓
CO2	✓		✓	✓	✓		✓			✓
CO3	✓	✓	✓	✓	✓		✓		✓	✓
CO4	✓	✓					✓		✓	✓
CO5	✓			✓				✓		

M.Sc. in COMPUTER SCIENCE (SECOND SEMESTER)	
COURSE CODE: MSCS 201	
COURSE TYPE: CCC	
COURSE TITLE: OPERATING SYSTEM CONCEPTS	
CREDIT: 06	HOURS: 90
MARKS: 100 (SEE: 70 & CCA: 30)	
UNIT-1 15Hrs	Introduction: OS As An Extended Machine, OS As A Resource Manager, Design Goals, Types and Functions of Operating System. Operating system Services, Mainframe OS, Server OS, Multiprocessor OS, Personal Computer OS, Real Time OS, Embedded OS, Smart Card OS, Processor, Buses, Processes, Deadlocks, Memory Management, I/O, Files, Security, The Shell, System Calls, OS Structure.
UNIT-2 20Hrs	Process Management: Process states & Process Control block, Schedulers, CPU Scheduling algorithm, Process Creation, Process Termination, Process Hierarchies, Process State Implementation Of Processes, Thread Model, Thread Usage. Interprocess Communication, Communication in Client Server Systems, Multithreaded Programming, Scheduling Criteria, Algorithm Service, Synchronization, The Critical Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Classical Problems of Synchronization, Monitors, Synchronization Examples, Atomic Transaction, Deadlock Characterization, Methods of handling Deadlocks, Recovery from Deadlock.
UNIT-3 20 Hrs	Memory Management (Contiguous and non contiguous) : Address Binding, Dynamic Loading and Linking Concepts, Logical and Physical Addresses, Contiguous Allocation, Fragmentation, Paging, Segmentation, Virtual Memory, Demand Paging, Page fault, Page replacement algorithms, Global Vs Local Allocation, Thrashing.
UNIT-4 20 Hrs	File and Secondary Storage Management: File Attributes, File Types, File Access Methods, Directory Structure, File System Organization and Mounting, Allocation Methods, Free Space management; Disk Structure, Logical and Physical View, Disk Scheduling, Formatting, Swap Space Management. Protection & Security., DOS, UNIX/ LINUX and WINDOWS as an example of Operating systems.
UNIT- 5 15 Hrs	Protection and Security: Goals and Principles of Protection, Domain of Protection, Access Matrix, Implementation of Access Matrix, Access Control, Security Problem, Program Threats, Cryptography as a Security Tool, User Authentication.
SUGGESTED READINGS	Books: <ol style="list-style-type: none"> 1. Operating System Concepts By Silberschatz and Galvin, Addison Wesley. 2. Operating Systems: Internals and Design Principles 5/ed By William Stalling, PHI. 3. Modern operating Systems By Tanen baum, PHI. 4. Operating System Concepts By Peterson and Silberschatz, Addison Wesley. 5. Operating System Principles By P. B. Hansen, PHI.

M.Sc. Semester-II

Paper-II: Object Oriented Programming Concepts in C++

COURSE OBJECTIVE:

The main objective knows the basic principles of OOPS. Basic data types familiarize about class and objects, polymorphism and Inheritance, file handling and Exception handling.

COURSE OUTCOMES:

Students, after completion of this course will be able to:

CO1: Acquire knowledge of OOPS.

CO2: Gain knowledge of the basic terminology of OOPS.

CO3: Analyze the basic operation of inheritance, polymorphism, classes and objects.

CO4: Understand the various techniques and development environment of OOPS.

CO5: Design a OOPS based program or software.

CO-PO MAPPING

CO	PO									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	✓				✓				✓	
CO2	✓				✓				✓	✓
CO3	✓	✓	✓	✓	✓		✓	✓		
CO4	✓	✓	✓	✓		✓				✓
CO5	✓	✓				✓	✓			✓

M.Sc. in COMPUTER SCIENCE (SECOND SEMESTER)	
COURSE CODE: MSCS 202	COURSE TYPE: CCC
COURSE TITLE: OBJECT ORIENTED PROGRAMMING CONCEPTS IN C++	
CREDIT: 06	HOURS: 90
MARKS: 100 (SEE: 70 & CCA: 30)	
UNIT-1 15Hrs	<p>Principles of OOP</p> <p>Procedure oriented Vs Object oriented, OOP paradigm, Features of OOP, History of C++, Basic Data types, Tokens, Keywords, Constant, Variables, Operators, I/O statements, Structure of C++ program, Creating, Compiling and Linking the program, Arrays, Pointers, Object modeling technique (OMT).</p>
UNIT-2 20Hrs	<p>Function, Object and Class</p> <p>Defining Class, Abstract class, Function prototype, Function with parameter, Passing object as a parameter, Constructor function, Types of constructor, Destructor, Friend function, Friend class, Dynamic allocation operator new and delete.</p>
UNIT-3 20 Hrs	<p>Polymorphism and Inheritance</p> <p>Types of polymorphism, Constructor overloading, Operator overloading, Template function Template class, Types of inheritance, Private, protected and public derivation of class, Resolving ambiguity Pointer to object, This pointer, Virtual class, virtual function.</p>
UNIT- 4 20 Hrs	<p>Input - output and File handling</p> <p>I/O classes, File and stream classes, Opening and closing file, Detecting end of file, String I/O, Char I/O, Object I/O, I/O with multiple object, File pointer, Disk I/O.</p>
UNIT- 5 15 Hrs	<p>Exception handling, Name spaces and Standard Template library (STL)</p> <p>Exceptions Basics, Standard Exceptions, Need of Exception handling, Exception handling mechanism, try, catch and throws keywords, defining namespace, benefit of namespace, Component of STL.</p>
SUGGESTED READINGS	<p>Books:</p> <ol style="list-style-type: none"> 1. Object oriented programming with C++ by E. Balagurusamy IInd edition Tata Mc-Graw Hill. 2. Object Oriented Programming By McGregor and Sykes S A, 1992 Van Nostrand. 3. The C++ Programming Language By Strustrp B, Addison Wasley. 4. Object Oriented Programming in C++ By Lafore R, Galgotia Publications. 5. Introduction to Object Oriented Programming By Witt KV, Galgotia Publications. <p>Object Oriented Programming By Blaschek G, Springer Verlag.</p>

M.Sc. Semester-II

Paper-III: Web Technology: Based on ASP.NET

COURSE OBJECTIVE:

The main objective is to develop a website by using ASP.Net. To know the basics of Database connectivity using ASP.Net.

COURSE OUTCOMES:

Students, after completion of this course will be able to:

CO1: Acquire knowledge of various types of cloud computing systems and .net frameworks.

CO2: Gain knowledge of the development of dynamic website.

CO3: Analyze the basic operation of asp.net pages and its tools.

CO4: Understand the various development techniques, hosting sites and web sites.

CO5: Design a complete web enables sites.

CO-PO MAPPING

CO	PO									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	✓				✓				✓	
CO2	✓				✓				✓	✓
CO3	✓	✓	✓	✓	✓		✓	✓		
CO4	✓	✓	✓	✓		✓				✓
CO5	✓	✓				✓	✓			✓

M.Sc. in COMPUTER SCIENCE (SECOND SEMESTER)	
COURSE CODE: MSCS 203	
COURSE TYPE: CCC	
COURSE TITLE: WEB TECHNOLOGY: BASED ON ASP.NET	
CREDIT: 06	HOURS: 90
MARKS: 100 (SEE: 70 & CCA: 30)	
UNIT-1 15Hrs	Overview of the ASP.NET: Introduction of different Web Technology, What is Asp.Net, How Asp.Net Works, Use of visual studio, Different Languages used in Asp.Net. Framework, Common Language Runtime (CLR),.NET Framework Class Library. Installing Internet Information Server, Installation of Asp.Net, virtual directory, Application Setting in IIS.
UNIT-2 20Hrs	Coding Standards Overview of coding standards follows during programming, Displaying information-Label Controls, Literal Controls, Bulleted List, and Accepting User Input. Textbox controls- Radio Button and Radio Button List Controls. Check Box and Check Box List Controls, Button controls, Link Button Control, Image Button Control ,Using Hyperlink Control, Drop Down List, List Box, Displaying Images, Image Control, Image Map Control, Using Panel Control, Using Hyperlink Control, Asp.Net Validation Controls-Required Field Validator Control, Regular Expression Validator Control, Compare Field Validator Control, Range Validator Control, Validation Summary Control, Custom Validator Control.
UNIT-3 20 Hrs	Master Pages and Advanced Control Creating master pages, Creating default contents, Nesting master pages, Registering master pages in web configuration, Accepting File Uploads, Saving files to file system, Calendar Control, Displaying advertisements, Displaying Different Page view, Displaying a Tabbed Page View, Wizard Control.
UNIT - 4 20 Hrs	SQL Server Basic Microsoft SQL Server 2008, Overview of SQL Server 2008, Installation of SQL Server 2008, Features of SQL Server Express, SQL Server 2008 Express management tools, Database Architecture, Data Manipulation Language (DML), Data Definition Language (DDL), Manipulation of Data (SQL Command), Stored Procedure, Function.
UNIT - 5 15 Hrs	Overview of Data Access Creating database connections, Connecting to MSSQL Server and MS Access, Data Set& Data Table Features, Using inline SQL Statements, Using Stored Procedures, Executing select commands, Sql Transaction, Grid View Control fundamentals, Displaying Data, Using Data Keys, Sorting Data, Paging through Data, Using the Details View control, Displaying data with the Details View control, Using Fields with the Details View control, Displaying Empty data with the Details View control, Displaying data with the Repeater Control, Displaying Data with the Data List Control, Deploying application on Web Server.
SUGGESTED READINGS	Books: 1. The complete Reference By Thomos A. Powell ,TMH publication 2. Web Technology :A Developers Perspective ,N.P. Gopalan ,J. Akilandeswani, PHI Publication. 3. Java Script :The definite Guide By Flangam , O'Reilly 4. Java Script :Developers Resource by Kamran Husain and Jason Levitt PTR-PHI publication. 5. "Mastering VB Script" BPB Publication. 6. World Wide Web design with HTML by Xavier Tata McGraw Hill Publication . 7. XML By Example, Sean Mc Grath Pentice Hall Publication. Web Technology : A Developments Perspective , N.P. Gopalan, J. Akilandeswari, PHI Publication.

M.Sc. Semester-II

Paper-IV: Research Methodology & Computer Application: Basics

COURSE OBJECTIVE:

Understand the concept and place of research in concerned subject.

COURSE OUTCOMES:

Students, after completion of this course will be able to:

CO1: Gets acquainted with various resources for research.

CO2: Becomes familiar with various tools of research. .

CO3: Gets conversant with sampling techniques, methods of research and techniques of analysis of data.

CO4: Achieves skills in various research writings.

CO5: Gets acquainted with computer Fundamentals and Office Software Package.

CO-PO MAPPING

CO	PO									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	✓				✓				✓	✓
CO2	✓					✓	✓			
CO3	✓	✓					✓			
CO4	✓	✓			✓	✓	✓			✓
CO5	✓	✓	✓		✓			✓	✓	✓

M.Sc. in COMPUTER SCIENCE (SECOND SEMESTER)		
COURSE CODE: MSCS 221		COURSE TYPE: OSC
COURSE TITLE: RESEARCH METHODOLOGY & COMPUTER APPLICATION: BASICS		
CREDIT: 06	HOURS: 90	MARKS: 100 (SEE: 70 & CCA: 30)
UNIT-1 15Hrs	<p>CONCEPT OF RESEARCH : Meaning and characteristics of research , Steps in research process , Types of research - i) Basic, applied and action research ii) Quantitative and qualitative research , Areas of research in concern discipline</p> <p>SELECTION OF PROBLEM FOR RESEARCH : Sources of the selection of the problem, Criteria of the selection of the problem, Drafting a research proposal, Meaning and types of variables, Meaning and types of hypotheses.</p>	
UNIT-2 15 Hrs	<p>TOOLS OF RESEARCH : Meaning and general information about construction procedure of (i) Questionnaire, (ii) Interview, (iii) Psychological test, (iv) observation (v) Rating scale (vi) Attitude scale and (vii) check list , Advantages and disadvantages of above tools</p> <p>SAMPLING : Meaning of population and sample , Importance and characteristics of sample , Sampling techniques - i) Probability sampling : random sampling, stratified random sampling, systematic sampling, cluster sampling ii) Non-probability sampling: incidental sampling, Purposive sampling, quota sampling.</p>	
UNIT-3 15 Hrs	<p>METHODS OF RESEARCH Meaning and conducting procedure of following methods of research: Historical method Survey method, Case study, Causal comparative method, Developmental methods, and Experimental methods.</p>	
UNIT- 4 15 Hrs	<p>TREATMENT OF DATA : Level of measurements of data , Steps in treatment of data: editing, coding, classification, tabulation, analysis and interpretation of results</p> <p>WRITING RESEARCH REPORT : Sections of report :Preliminary section , Content section: various chapters , Supplementary section: appendices, references, abstract , Format and style</p>	
UNIT- 5 15 Hrs	<p>Computer Fundamentals Computer System: Features, Basic Applications of Computer, Generations of computers. Parts of Computer System : Block Diagram of Computer System ; Central Processing Unit (CPU) ; Concepts and types of Hardware and Software, Input Devices - Mouse, Keyboard, Scanner, Bar Code Reader, track ball ; Output Devices - Monitor, Printer, Plotter, Speaker ; Computer Memory - primary and secondary memory, magnetic and optical storage devices. Operating Systems - MS Windows : Basics of Windows OS ; Components of Windows - icons, taskbar, activating windows, using desktop, title bar, running applications, exploring computer, managing files and folders, copying and moving files and folders ; Control panel : display properties, adding and removing software and hardware, setting date and time, screensaver and appearance; Windows Accessories : Calculator, Notepad, WordPad, Paintbrush, Command</p>	

	Prompt, Windows Explorer.
UNIT-6 15 Hrs	<p>Office Software Package</p> <p>Word Processing - MS Word :Creating, Saving, Opening, Editing, Formatting, Page Setup and printing Documents ; Using tables, pictures, and charts in Documents ; Using Mail Merge sending a document to a group of people and creating form, letters and label.</p> <p>Spreadsheet - MS Excel: Opening a Blank or New Workbook, entering data/Function/ Formula into worksheet cell, Saving, Editing, Formatting, Page Setup and printing Workbooks.</p> <p>Presentation Software - MS Power Point : Creating and enhancing a presentation, modifying a presentation, working with visual elements, adding Animations & Transitions and delivering a presentation</p>
SUGGESTED READINGS	<p>Books:</p> <ol style="list-style-type: none"> 1. Agrawal, Y. P. (1988). Better sampling : Concepts, Techniques and Evaluation.New Delhi :sterling Publishers Private Ltd.Best, J. W. (1993). 2. Research in Education (6th ed.)New Delhi : Prentice-Hall of India Pvt. Ltd. Broota, K. D. (1992) Experimental design in Behavioral Research (2nd ed.) New Delhi : Wiley Eastern Limited. 3. Dasgupta, A. K. (1968). Methodology of Economic Research.Bombay: Asia Publishing House.Edwards, A. L. (1957). Techniques of Attitude Scale construction. New York: Appleton-Contury 4. Gall, M. D., Gall, J. P. and Borg, W. R. (2007). Educational Research : An introduction (8th ed.) Coston : Allyn and Bacon. 5. Garrett, H. E. & Woodworth, R. S. (1969). Statistics in Psychology and Education.Bombay :Vakils, Fecffer& Simons Pvt. Ltd. 6. Goode, W. J. &Hatt, Paul K. (1952). Methods in Social Research.New York : McGraw-Hill. Gopal, M. H. (1964). An Introduction to research Procedure in Social Sciences. Bombay :Asia Publishing House. 7. Hillway, T. (1964) Introduction to Research (2nd ed.) Noston : Houghton Mifflin. Hyman, H. H., et al. (1975). Interviewing in Social Research. Chicago : University of Chicago Press. 8. Kerlinger, F. N. (1983) Foundation of Behavioural Research. (2nd Indian Reprint) New York : Holt, Rinehart and Winston. 9. Kothari, C. R. (2007) Research Methodology: Methods & Techniques(3rd ed.) New Delhi :WishwaPrakashan.Fundamentals Of Computers, Dr. P. Mohan, Himalaya Publishing House. 10. Microsoft First Look Office 2010, K. Murray, Microsoft Press. 11. Fundamental Of Research Methodology And Statistics, Y.K. Singh, New Age International (P) Limited, Publishers. 12. Practical Research Methods, Dr Catherine Dawson, The Essence Of Research Methodology, Jan Jonker&BartjanPennink, Springer.

M.Sc. Semester-II

Paper-V: Computer System Organization and Architecture

COURSE OBJECTIVE:

The main objective is to know about the organization of a computer. To gain knowledge about micro operations, pipeline and vector processing, memory organization.

COURSE OUTCOMES:

Students, after completion of this course will be able to:

CO1: Acquire knowledge of basic computer organization and architecture. .

CO2: Gain Knowledge about pipeline and memory hierarchy. .

CO3: Analyze & learning with Parallel Computer Models & Program parallelism.

CO4: Understand the importance of Synchronous parallel processing.

CO5: Understand the implementation of System Interconnection.

CO-PO MAPPING

CO	PO									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	✓				✓				✓	✓
CO2	✓					✓	✓			
CO3	✓	✓					✓			
CO4	✓	✓			✓	✓	✓			✓
CO5	✓	✓	✓		✓			✓	✓	✓

M.Sc. in COMPUTER SCIENCE (SECOND SEMESTER)	
COURSE CODE: MSCS E201	
COURSE TYPE: ECC/CB	
COURSE TITLE: COMPUTER SYSTEM ORGANIZATION AND ARCHITECTURE	
CREDIT: 06	HOURS: 90
MARKS: 100 (SEE: 70 & CCA: 30)	
UNIT-1 15Hrs	Micro operation and Computer Organization : Arithmetic micro operation, Logic micro operation, Shift micro operation, Arithmetic logic shift unit, Instruction codes, Computer registers, Computer instructions, Instruction cycle, I/O and interrupt, Design of basic computer and Accumulator logic.
UNIT-2 20Hrs	Programming Basic Computer and C.P.U Organization: Machine language, Assembly language, Assembler, Compiler, Programming arithmetic and logic operation, I/O programming, General register organization of C.P.U, Stack organization, Instruction format, Addressing modes.
UNIT-3 20 Hrs	Pipeline and Vector Processing: Parallel processing, Pipelining, Arithmetic pipelining, Instruction pipeline, RISC pipeline, Vector processing, Memory interleaving, Array processor, Multiprocessor.
UNIT- 4 20 Hrs	Input-output Organization: Peripheral devices, I/O interfaces, Modes of data transfer, Asynchronous data transfer, DMA, Priority interrupt I/O processor.
UNIT- 5 15 Hrs	Memory Organization: Memory hierarchy, Auxiliary memory, Microcomputer memory, Associative memory, Virtual memory, Cache memory, Memory management hardware.
SUGGESTED READINGS	<p>Books:</p> <ol style="list-style-type: none"> 1. M. Morris Manno, "Computer system Architecture", 3rd Edition, PHI 2. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, 5th Edition "Computer Organization", McGraw- Hill, 2002. 3. William Stallings, "Computer Organization and Architecture – Designing for Performance", 6th Edition, Pearson Education, 2003. 4. David A. Patterson and John L. Hennessy, "Computer Organization and Design: The hardware /software interface", 2nd Edition, Morgan Kaufmann, 2002. 5. John P. Hayes, "Computer Architecture and Organization", 3rd Edition, McGraw Hill, 1998. 6. B. Ram "Computer Fundamentals and Organization" 4th Edition .

M.Sc. Semester-II

Paper-V: Discrete Mathematics

COURSE OBJECTIVE:

The main objective is to know about Mathematical Logic, Set theory, Boolean algebra, Groups and Graphs

COURSE OUTCOMES:

Students, after completion of this course will be able to:

CO1: Acquire knowledge of basic mathematics.

CO2: Gain knowledge statements, connectives, quantifiers.

CO3: Analyze & learning with proposition and Boolean algebra.

CO4: Understand the importance of Boolean functions & its environment. .

CO5: Design & Analyze the basic Graph theories & trees.

CO-PO MAPPING

CO	PO									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	✓				✓				✓	✓
CO2	✓					✓	✓			
CO3	✓	✓					✓			
CO4	✓	✓			✓	✓	✓			✓
CO5	✓	✓	✓		✓			✓	✓	✓

M.Sc. in COMPUTER SCIENCE (SECOND SEMESTER)	
COURSE CODE: MSCS E202	
COURSE TYPE: ECC/CB	
COURSE TITLE: DISCRETE MATHEMATICS	
CREDIT: 06	HOURS: 90
MARKS: 100 (SEE: 70 & CCA: 30)	
UNIT-1 15Hrs	<p>Mathematical Logic : Notations, Algebra of Propositions & Propositional functions, logical connectives, Truth values & Truth table Tautologies & Contradictions, Normal Forms, Predicate Calculus, Quantifiers.</p> <p>Set Theory: Sets, Subsets, Power sets, Complement, Union and Intersection, De-Morgan's law Cardinality, relations: Cartesian Products, relational Matrices, properties of relations equivalence relation functions: Injection, Surjection, Bijection, Composition, of Functions, Permutations, Cardinality, the characteristic functions recursive definitions, finite induction.</p>
UNIT-2 20Hrs	<p>Boolean Algebra: Truth values and truth tables, the algebra of propositional functions, Boolean algebra of truth values, Axiomatic definitions of Boolean algebra as algebraic structures with two operations, Switching Circuits.</p>
UNIT-3 20 Hrs	<p>Groups: Groups, axioms, permutation groups, subgroups, co-sets, normal subgroups.</p>
UNIT- 4 20 Hrs	<p>Graphs : Simple Graph, directed graph, Degree of a Vertex, Types of Graphs, Sub Graphs and Isomorphic Graphs, Operations of Graphs, Path, Cycles and Connectivity, Euler and Hamilton Graph, Shortest Path Problems, BFS ,DFS, Dijkstra's Algorithm, Representation of Graphs, Planar Graphs, Applications of Graph Theory.</p>
UNIT- 5 15 Hrs	<p>Matrices: Addition, subtraction, multiplication, transposes, Adjoint, Inverse.</p>
SUGGESTED READINGS	<p>Books:</p> <ol style="list-style-type: none"> 1. A text book of Discrete Mathematics By Swapan Kumar Sarkar (S. Chand & company Ltd.). 2. Discrete Mathematical structure with Applications to computer science By J.P Trembly & R.P.Manohar. 3. Discrete Mathematics By K.A Ross and C.R.B writht. 4. Discrete Mathematics Structures By Bernard Kohman & Robert 5. C. Bushy. for computer science Discrete Mathematics By Seymour Lipschutz Mare Lipson. Tata McGraw-Hill Edition.

M.Sc. Semester-II

Paper-V: Computer Graphics

COURSE OBJECTIVE:

The main objective is to know about Computer graphics and Multimedia which helps students to know about Graphics primitives and Transformations.

COURSE OUTCOMES:

Students, after completion of this course will be able to:

CO1: Acquire knowledge of basic computer graphics and multimedia tools. .

CO2: Gain Knowledge about Graphics software and algorithms.

CO3: Analyze & learning with 2-D & 3-D transformation with its basic terminology.

CO4: Understand the importance of multimedia software.

CO5: Understand the implementation of various algorithms.

CO-PO MAPPING

CO	PO									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	✓				✓				✓	✓
CO2	✓					✓	✓			
CO3	✓	✓					✓			
CO4	✓	✓			✓	✓	✓			✓
CO5	✓	✓	✓		✓			✓	✓	✓

M.Sc. in COMPUTER SCIENCE (SECOND SEMESTER)	
COURSE CODE: MSCS E203	
COURSE TYPE: ECC/CB	
COURSE TITLE: COMPUTER GRAPHICS	
CREDIT: 06	HOURS: 90
MARKS: 100 (SEE: 70 & CCA: 30)	
UNIT-1 15Hrs	Introduction: Introduction to computer Graphics, Pixel, frame, buffer, application of computer graphics, Raster Graphics fundamentals. Display Devices- Random Scan, Raster Scan Monitors, Color CRT Monitor, DVST and Plasma Panel.
UNIT-2 20Hrs	Graphics Primitives: Algorithms for line Generation, circle generation, Polygon generation and polygon filling algorithm, Anti aliasing. 2D Transformation: Translation, Scaling, Rotation, Reflection, homogeneous Coordinates.
UNIT-3 20 Hrs	3-D Transformation: Translation, Scaling, Rotation, windowing & clipping windows, view port, line clipping, polygon clipping, windows & view port transformation. Display file, Segment table, Segment creation, deletion, rename.
UNIT- 4 20 Hrs	Multimedia: Text – Font, Faces, animating Text, Hyper Text. Sound: MIDI, Digital audiobasics, auto file formats, audio editing, MCI-multimedia control interface. Image - Bitmap, Vector drawing, color palate, concept of 3D Modeling, Image fileformats (BMP,JPG). Animation: Principle of animation, cell animation, kinematics, morphing.
UNIT- 5 15 Hrs	Video – Broadcast video standards (NTSC, PAL), Integrating computer and television, video capture board, video, colour, shooting and editing video, recording formats 9S-VHS, video hardware resolution, video compression (JPEG, MPEG). Hard copy devices: Printers & plotters, Input devices: mouse, Trackball, Light pen, Scanner, Digital Camera.
SUGGESTED READINGS	Books: 1. William M. Newman and Robert F. Sproull, „“ Principles of Interactive Computer Graphics „“,Tata McGraw- Hill Edition. 2. Steven Harrington „“ Computer Graphics „“, 2nd Edition, Tata McGraw-Hill Edition. 3. Foley, van Dam, Feiner and Hughes, „“Computer Graphics (Principles and Practice)“ ,IndianEdition, Addison Wesley Publication. 4. D Hearn and P M Baker, ““Computer Graphics „“, Printice Hall of India (Indian Edition). 5. D F Rogers ,““Mathematical Elements for Computer Graphics „“, 2nd Edition, Tata McGraw-Hill

M.Sc. in COMPUTER SCIENCE (SECOND SEMESTER)		
COURSE CODE: MSCS 211		COURSE TYPE : CCC
COURSE TITLE: LAB COURSE A		
CREDIT : 03	HOURS: 45	PRACTICAL MARKS: 100
LABORATORY WORK MSCS 211	<p>Operating System:</p> <ol style="list-style-type: none"> 1. Practice any five Unix commands. 2. Practice any five Linux commands. 3. Practice any five internal Dos commands. 4. Practice any five External Dos commands. 5. Practice DESKTOP and Icons in Windows O.S. 6. Practice pop-up Menu and shortcuts in Windows O.S. 7. Practice any three socket commands of Unix O.S. 8. Practice for simple Networking using any Network O.S. <p>Programming in C++:</p> <ol style="list-style-type: none"> 1. Design a program to create a class and object. 2. Design a program for various relational operators. 3. Design a program for scope resolution operator. 4. Design a program for private and public member functions. 5. Design a program for passing object as parameter. 6. Design a program constructor and Destructor. 7. Design a program for operator overloading. 8. Design a program function overloading. 9. Design a program for various types of inheritance. 10. Design a program for template. 11. Design a program for virtual class and function. 11. Design a program for file handling and Exception handling five textboxes and labels. 12. Design a website for your Department. 	

M.Sc. in COMPUTER SCIENCE (SECOND SEMESTER)		
COURSE CODE: MSCS 212		COURSE TYPE : CCC
COURSE TITLE: LAB COURSE B		
CREDIT : 03	HOURS: 45	PRACTICAL MARKS: 100
LABORATORY WORK MSCS 212	<p>Web Technology based on VB.Net & ASP.NET:</p> <ol style="list-style-type: none"> 1. Design a program for various controls of tool box in window application. 2. Design a program for addition of five numbers in single dimension. 3. Design a program for various types of arrays. 4. Design a program for various relational operators. 5. Design a program for developing a Website in ASP.Net. 6. Design a program for functions. 7. Design a program for subroutine. 8. Design a program for login form and database connectivity using ASP.Net. 9. Design a program to develop any website. 10. Design a program for report generation. 11. Design a program for searching any field from database using ASP.Net. 12. Design a program to develop any Online software using ASP.Net. 	

M.Sc. Semester-III

Paper-I: Advanced Java Programming

COURSE OBJECTIVE:

The main objective is to know about java platform. To be familiar about oops, packages and methods, inheritance, exception handling, input- output and networking applet and swing.

COURSE OUTCOMES:

Students, after completion of this course will be able to:

CO1: Use an integrated development environment to write, compile, run and test simple object-oriented Java programs.

CO2: Identify classes, objects, members of a class and relationships among them needed for a specific problem.

CO3: Write Java application programs using OOP principles and proper program structuring.

CO4: Demonstrate the concepts of polymorphism and inheritance.

CO5: Write java programs to implement error handling techniques using exception handling.

CO-PO MAPPING

CO	PO									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	✓				✓				✓	
CO2	✓				✓				✓	✓
CO3	✓	✓	✓	✓	✓		✓	✓		
CO4	✓	✓	✓	✓		✓				✓
CO5	✓	✓				✓	✓			✓

M.Sc. in COMPUTER SCIENCE (THIRD SEMESTER)	
COURSE CODE: MSCS 301	COURSE TYPE: CCC
COURSE TITLE: ADVANCED JAVA PROGRAMMING	
CREDIT: 06	HOURS: 90
MARKS: 100 (SEE: 70 & CCA: 30)	
UNIT-1 15Hrs	Overview of JAVA : The genesis of java, An overview of java, java virtual machine (JVM) ,Java development kit (JDK) ,Java Vs C++, Data types, Literals, Variables, and Arrays, Operators, Control statements, Introducing Class, closer look at Methods and class ,Nested and inner class ,Writing simple JAVA program.
UNIT-2 20Hrs	Inheritance, Packages and interface- Types of inheritance ,Access specifier ,using super, method overriding ,Abstract class ,constructor in multilevel inheritance ,using final with inheritance ,Dynamic method dispatch ,Defining package, CLASSPATH, Access protection, Importing package ,Defining and implementing interface ,Extending interface, Nested interface.
UNIT-3 20 Hrs	Exception handling and Multithreading: Using try and catch ,multiple catch classes, Nested try statements , throw ,throws and finally ,Built in exception ,Uncaught exception , Creating own exception class , Java Thread Model: Main thread ,Creating own Thread ,Life cycle of thread, Thread priorities ,Synchronization and messaging, Interthread communication ,Suspending, Resuming and stopping thread.
UNIT- 4 20 Hrs	Input Output and Networking: I/O classes: Byte stream and character stream, Predefined stream, reading console input, writing consoleoutput,PrintWriter class ,Reading and writing files. Networking : classes and interface ,Socket and overview, TCP/IP client socket and server socket ,Inet address ,URL Connection.Eclipse IDE, Netbeans IDE , Myeclipse IDE, Apache Tomcat Web Server, JBoss Server , Stateless Session Beans, Stateful Session Beans, Packaging ,Writing Clients ,Spring,Struct framework.
UNIT- 5 15 Hrs	Applet, AWT, Swing, Event handling and Advance JAVA– Applet life cycle, Creating an applet, Using image and sound in applet, passing parameter. Exploring AWT and introduction to Swing. Event handling – The delegation-event model, Event classes, Source of event, Event listener interfaces, handling mouse and keyboard event ,Adapter class. Advance JAVA: JDBC API. Servlet – Overview of servelet, Life cycle of servlet, JAVA servlet architecture, Generic servlet and http servlet ,The servlet interface, Request anresponse.
SUGGESTED READINGS	Books: 1.Java: The complete reference By Naughton P and schildt H. ,Osborne Mcgraw-Hill, Berkeley, USA, 1997. 2. Simply JAVA :An Introduction to JAVA programming By James R. Levenick ,Firewall Mediapublication New, Delhi 3. Java Programming By E. Balguruswami 4. Core JAVA for beginners By RashmiKantaDas ,Vikas Publication.

M.Sc. Semester-III

Paper-II: Data Communication & Computer Networks

COURSE OBJECTIVE:

Familiarize the students with the basic taxonomy and terminology of the computer networking area.

COURSE OUTCOMES:

Students, after completion of this course will be able to:

CO1: Understand the concepts of Data Communication.

CO2: Study the functions of OSI Layers.

CO3: Familiarize with the Transmission Media, Flow control, Error detection & correction.

CO4: Understand fundamental concepts in Routing, Addressing & working of Transport Protocols.

CO5: Describe, analyze and compare different data link, network, and transport and application layer protocols.

CO-PO MAPPING

CO	PO									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	✓		✓		✓			✓	✓	✓
CO2	✓		✓	✓	✓		✓			✓
CO3	✓	✓	✓	✓	✓		✓		✓	✓
CO4	✓	✓					✓		✓	✓
CO5	✓			✓				✓		

M.Sc. in COMPUTER SCIENCE (THIRD SEMESTER)	
COURSE CODE: MSCS 302	COURSE TYPE: CCC
COURSE TITLE: DATA COMMUNICATION & COMPUTER NETWORKS	
CREDIT: 06	HOURS: 90
MARKS: 100 (SEE: 70 & CCA: 30)	
UNIT-1 15Hrs	<p>Introduction and Physical Layer :Introduction: Goal and application Network Hardware and Software ,Protocol Hierarchies, Design Issue of the layers, Interfaces and services, Connection oriented and connectionless services, Service Primitives, Reference Models – The OSI Reference model, The TCP/IP Model ,Types of computer Network :LAN,MAN,WAN, Topologies, Transmission mode .</p> <p>Physical Layer :Data and signal, Analog and digital Communication, Transmission Media, Concept of data transmission, Switching Techniques ,Communication Satellites – Geosynchronous Satellite – VSAT, Low Orbit Satellites, ISDN and ATM.</p>
UNIT-2 20Hrs	<p>Data Link Layer: Data Link Layer design issues Data link control: Framing, Flow control. Error Detection and Correction. DLC protocol :Stop and Wait Protocol, Sliding window protocol, A Simplex protocol for noisy channel, Medium access sub layer: Channel allocation :static anddynamic ,Multiple access protocol FDDI, Data Link Layer in the Internet : SLIP,PPP. Wired and Wireless LAN protocol.</p>
UNIT -3 20Hrs	<p>Network Layer: The Network Layer Design Issue, IP addressing, Address mapping, Error reporting, Multicasting, Delivery, Forwarding and Routing. The Network Layer in the Internet: The IP Protocol. Subnets, Internet control protocols, internet multicasting.</p>
UNIT- 4 20 Hrs	<p>Transport Layer :The Transport layer services, The concept of client and server in terms of socket addressing Quality of service, Transport service primitives and buffering, Multiplexing, Crash Recovery. The Internet Transport Protocols (TCP/IP) – The TCP Service Model, The TCP protocol, The TCP segment header, TCP connection management, TCP transmission policy, TCP congestion control, TCP timer management, UDP.</p>
UNIT- 5 15 Hrs	<p>Presentation and Application Layer : Network Security, Traditional Cryptography, Private key cryptography and public key cryptography, Authentication protocols, DNS ,SNMP,E-mail, application layer protocols .</p>
SUGGESTED READINGS	<p>Books:</p> <ol style="list-style-type: none"> 1. Data Communications and Networking By Forouzan, Tata McGraw Hill Company. 2. Computer Networks By A.S. Tanenbaum 3. Computer Network By S.S.Shinde , New Age International Publisher. 4. Data and computer Communication by Shashibanzal ,Firewall media . 5.Internetworking with TCP/IP :Principles, protocols, and Architecture Vol 1 5th Edition ,PHIpublication 6. Data Communications and Computer Network by Prakash C Gupta, PHI Publication.

M.Sc. Semester-III

Paper-III: RDBMS

COURSE OBJECTIVE:

The main objective is to know about Relational Database Management System. To know about relational model, SQL, various databases and data organization.

COURSE OUTCOMES:

Students, after completion of this course will be able to:

CO1: Acquire knowledge of basic Database design.

CO2: Gain Knowledge about Relational Model.

CO3: Analyze & learning with Database design concept.

CO4: Understand the importance of Normal forms.

CO5: Understand the implementation of Transaction Processing techniques.

CO-PO MAPPING

CO	PO									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	✓			✓		✓				
CO2	✓		✓		✓					✓
CO3	✓	✓	✓		✓		✓	✓	✓	
CO4	✓	✓					✓			✓
CO5	✓	✓	✓	✓		✓			✓	✓

M.Sc. in COMPUTER SCIENCE (THIRD SEMESTER)	
COURSE CODE: MSCS 303	COURSE TYPE: CCC
COURSE TITLE: RDBMS	
CREDIT: 06	HOURS: 90
MARKS: 100 (SEE: 70 & CCA: 30)	
UNIT-1 15Hrs	Overview of Database Management :Data, Information and knowledge, Increasing use of data as a corporate resource, data processing verses data management, file oriented approach verses database oriented approach to data management; data independence, database administration roles, DBMS architecture, different kinds of DBMS users, importance of data dictionary, contents of data dictionary, types of database languages. Data models: network, hierarchical, relational. Introduction to distributed databases. Introduction to MS-Access, Various queries related to MS-Access Database, Form design in MS-Access, Reports in MS-Access.
UNIT-2 20Hrs	Relational Model: Entity - Relationship model as a tool for conceptual design-entities attributes and relationships. ER diagrams; Concept of keys: candidate key, primary key, alternate key, foreign key; Strong and weak entities, Case studies of ER modeling Generalization; specialization and aggregation. Converting an ER model into relational Schema. Extended ER features.
UNIT-3 20Hrs	Relational Database Design: Normalization concept in logical model; Pitfalls in database design, update anomalies: Functional dependencies, Join dependencies, Normal forms (1NF, 2NF, 3NF). Boyce Codd Normal form, Decomposition, Multi-Valued Dependencies, 4NF, 5NF. Issues in physical design; Concepts of indexes, File organization for relational tables, De-normalization.
UNIT- 4 20 Hrs	Structured Query Language :Relational Algebra: select, project, cross product different types of joins (inner join, outer joins, self join); set operations, Tuple relational calculus, Domain relational calculus, Simple and complex queries using relational algebra, stand alone and embedded query languages, Introduction to SQL constructs (SELECT...FROM, WHERE... GROUP BY... HAVING... ORDERBY....), INSERT, DELETE, UPDATE, VIEW definition and use, Temporary tables, Nested queries, and correlated nested queries, Integrity constraints: Not null, unique, check, primary key, foreign key, references, Triggers. Embedded SQL and Application Programming Interfaces.
UNIT-5 15Hrs	Data Constraints and Functions Pseudo columns – ROWID, ROWNUM, USER, UID, SYSDATE, Null values, TAB table, DUAL table, Operators – arithmetic, relational, logical, range searching, pattern matching and set, Data constraints – Introduction, advantages and disadvantages, Type of data constraints – NOT NULL, UNIQUE, PRIMARY KEY, FOREIGN KEY and CHECK, Modifying constraints, working with data dictionary and use of USER_CONSTRAINTS, Functions – introduction, merits and demerits, types of functions- Scalar : Numeric functions (ABS, FLOOR, MOD, POWER, ROUND, SIGN, SQRT and TRUNC), Character functions (CHR, ASCII, CONCAT, INITCAP, LOWER, SUBSTR,TRIM, UPPER),Date functions (ADD_MONTHS, LAST_DAY, NEXT_DAY, MONTHS_BETWEEN), Conversion functions (TO_NUMBER, TO_CHAR and TO_DATE), Aggregate fun : AVG, COUNT, MAX, MIN. SUM, Miscellaneous functions – NVL, DECODE, COALESCE

**SUGGESTED
READINGS****Books:**

1. Database system concept By H. Korth and A. Silberschatz, TMH.
2. Data Base Management System By Alexies & Mathews ,Vikas publication.
3. Data Base Management System By C. J. Date , Narosha Pub.
4. Data Base Management System By James Matin .
5. Principles of Database System By Ullman.

M.Sc. Semester-III

Paper-IV: Intellectual Property Rights

COURSE OBJECTIVE:

To recognize the importance of IP and to educate the pupils on basic concepts of Intellectual Property Rights.

COURSE OUTCOMES:

Students, after completion of this course will be able to:

CO1: Distinguish and explain various forms of IPRs.

CO2: Identify criteria's to fit one's own intellectual work in particular form of IPRs.

CO3: Apply statutory provisions to protect particular form of IPRs.

CO4: Analyze ethical and professional issues which arise in the intellectual property law context.

CO5: Understand current and emerging issues relating to the intellectual property protection.

CO-PO MAPPING

CO	PO									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	✓			✓		✓				
CO2	✓		✓		✓					✓
CO3	✓	✓	✓		✓		✓	✓	✓	
CO4	✓	✓					✓			✓
CO5	✓	✓	✓	✓		✓			✓	✓

M.Sc. in COMPUTER SCIENCE (THIRD SEMESTER)	
COURSE CODE: LLM 304	COURSE TYPE: OSC
COURSE TITLE: INTELLECTUAL PROPERTY RIGHTS	
CREDIT: 06	HOURS: 90
MARKS: 100 (SEE: 70 & CCA: 30)	
UNIT-1 15Hrs	INTRODUCTION, NATURE, BASIC CONCEPTS AND INTERNATIONAL CONVENTIONS: Nature and meaning of Intellectual Property, Justification for protection of Intellectual Property Rights, Types of Intellectual Property, Leading International instrument concerning protection of Intellectual Property: The Berne Convention (1886), Rome convention (1961) Trade Related intellectual property agreement 1995 (TRIPS).
UNIT-2 20Hrs	LAW OF COPYRIGHT: Definition, Subject matter of copyright, Ownership of Copyright, Term of Copyright, Rights of Owner, Assignments and Licenses, Infringement of Copyright, Remedies against infringement of copyright.
UNIT-3 20Hrs	LAW OF PATENTS: Meaning, Criteria for obtaining patents- <i>Novelty, Utility, Non-obviousness</i> , Non-patentable inventions, Procedure for Registration, Term of patent, Rights of Patentee, Compulsory licensing and Government use of patent, Infringement of patent, Remedies in case of Infringement.
UNIT - 4 20 Hrs	LAW OF TRADE MARKS: Meaning of mark & Trademark, Categories of Trademark- Conventional and Non-conventional Marks, Concept of distinctiveness, Doctrine of honest concurrent use, Procedure of registration of trademarks and Term of Protection, Absolute and relative grounds for refusal of registration, Assignment and Licensing, Infringement and Passing off.
UNIT - 5 15 Hrs	GEOGRAPHICAL INDICATION (GI) AND DESIGN: 1. Geographical Indication- Meaning of GI, Difference between GI and Trademark & Concept of Authorized user 2. Designs- Meaning of Design Protection, Concept of original design, Term of Protection.
SUGGESTED READINGS	Books: 1. V.K Ahuja, <i>Law Relating to Intellectual Property Rights</i> , Lexis Nexis, Haryana, India. 2. G.B.Reddy, <i>Intellectual Property Rights and Law</i> , Gogia Law Agency, Hyderabad. 3. S.R.Myneni, <i>Intellectual Property Law</i> , Eastern Law House, Calcutta 4. P Narayanan <i>Intellectual Property Rights and Law (1999)</i> , Eastern Law House, Calcutta, India 5. VikasVashistha, <i>Law and Practice of Intellectual Property</i> , (1999) Bharat Law House, New Delhi. 6. Comish W.R <i>Intellectual Property, 3rded, (1996)</i> , Sweet and Maxwell 7. P.S. Sangal and Kishor Singh, <i>Indian Patent System and Paris Convention</i> ,

M.Sc. Semester-III

Paper-V: Theory of Computation & Automata

COURSE OBJECTIVE:

The main objective is to know Automata, formal languages, regular sets and grammars, context free languages, push down automata and Turing machine.

COURSE OUTCOMES:

Students, after completion of this course will be able to:

CO1: Acquire basic knowledge of Theory of computation.

CO2: Gain Knowledge about Automata theory and its applications.

CO3: Analyze & learning with Regular expression.

CO4: Understand the importance of Context-free grammars.

CO5: Understand the working of Turing machine and computers.

CO-PO MAPPING

CO	PO									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	✓				✓				✓	✓
CO2	✓					✓	✓			
CO3	✓	✓					✓			
CO4	✓	✓			✓	✓	✓			✓
CO5	✓	✓	✓		✓			✓	✓	✓

M.Sc. in COMPUTER SCIENCE (THIRD SEMESTER)	
COURSE CODE: MSCS E301	
COURSE TYPE: ECC/CB	
COURSE TITLE: THEORY OF COMPUTATION & AUTOMATA	
CREDIT: 06	HOURS: 90
MARKS: 100 (SEE: 70 & CCA: 30)	
UNIT-1 15Hrs	Theory of Automata: Definition of an automaton, Transition system, Acceptability of a string by FA, Nondeterministic finite state machine, Designing of DFA and NFA ,Equivalence of DFA and NFA, Conversion of NFA to DFA, Mealy and Moore models, Minimization of finite automata.
UNIT-2 20Hrs	Formal Languages, Regular Sets and Regular Grammars: Definition, Languages and their relation, Chomsky classification of language, Regular expression, Pumping Lemma for regular sets, Application of Pumping lemma, Closure property of regular sets, Regular sets and regular grammar.
UNIT-3 20 Hrs	Context-free Language: Context free language and derivation trees, Ambiguity in context free languages, Simplification of context free languages: (left recursion, Unit production elimination, Eliminating null values) Normal forms of context free languages.
UNIT-4 20 Hrs	Pushdown Automation: Definition, Acceptance by PDA, Designing PDA, Push downautomation and Context free languages, Parsing and Pushdown automata.
UNIT-5 15 Hrs	Turing Machine: Turing Machines model, Representation of TM, Languages acceptability by TM, Design of TM, Introduction: Universal Turing Machines and Halting problem, Introduction: Linear bounded automata and languages.
SUGGESTED READINGS	<p>Books:</p> <ol style="list-style-type: none"> 1. K L P Mishra “Theory of Computation”,3rd Edition PHI Publication. 2. J.E. Hopcroft, R. Motwani and J.D Ullman, “Introduction to Automata Theory, Languages andComputations”, Second Edition, Pearson Education, 2003 3. G.P SaradhiVarma and B. Thirupathi Rao , “ Theory and Computation Formal Languages andAutomata Theory”,2005, SCITECH publication. 4. H.R.Lewis and C.H.Papadimitriou, “Elements of The theory of Computation”, Second Edition,Pearson Education/PHI, 2003. 5. J.Martin, “Introduction to Languages and the Theory of Computation”, Third Edition, TMH,2003.

M.Sc. Semester-III

Paper-V: Artificial Intelligence and Expert System

COURSE OBJECTIVE:

To make students understand how Artificial Intelligence is useful to them in practical interface.

COURSE OUTCOMES:

Students, after completion of this course will be able to:

CO1: Acquire overview of basic Artificial Intelligence.

CO2: Gain Knowledge about problem solving and search strategies.

CO3: Analyze & learning with structured knowledge & its basic terminology.

CO4: Understand the importance of knowledge representation and Expert System.

CO5: Understand the implementation of Planning and Neural Network.

CO-PO MAPPING

CO	PO									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	✓						✓		✓	
CO2	✓	✓			✓	✓			✓	✓
CO3	✓		✓		✓	✓				✓
CO4	✓		✓	✓	✓	✓	✓	✓		✓
CO5	✓	✓	✓	✓		✓	✓	✓	✓	✓

M.Sc. in COMPUTER SCIENCE (THIRD SEMESTER)	
COURSE CODE: MSCS E302	
COURSE TYPE: ECC/CB	
COURSE TITLE: ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEM	
CREDIT: 06	HOURS: 90
MARKS: 100 (SEE: 70 & CCA: 30)	
UNIT-1 15Hrs	Introduction: Definitions and approaches, Foundation of A.I. History, Area and Applications of A.I. Preliminary Concept of Intelligent Agents. AI problems, AI Techniques, Tic-tac-toe, Question Answering. AI programming language: Prolog- objects, relationships, facts, rules and variables, Prolog: Syntax and data structures, representing objects & relationships by using “trees “and “lists”, use of cut, I/O of characters and structures.
UNIT-2 20Hrs	Problem Solving: A water jug problem, production system, Control strategies, Heuristic Search, Design of search programs AI Search techniques :- Depth-first, Breadth-first search, Generate- and-test, Hill climbing, Best-first search, Constraint satisfaction, Mean-ends-analysis, A* Algorithm, AO* algorithm.
UNIT-3 20 Hrs	Knowledge Representation and Reasoning: Knowledge Representation:- Representations and mappings, Knowledge Representations, Issues in Knowledge Representation, Predicate Logic:- Representing Instance and Isa Relationships, Computable Functions and predicates, Resolution, Natural Deduction, Logic programming, Forward versus Backward Reasoning, Distributed Reasoning Systems, Matching, Control knowledge.
UNIT- 4 20 Hrs	Pattern Recognition: Meaning of pattern, Pattern Recognition, Classification, Supervised & Unsupervised Learning of classification, K-NN, K-MEANS. Understanding, Understanding as Constraint satisfaction, Natural Language Processing, Syntactic Processing, Unification grammars, Semantic Analysis, Parallel and Distributed AI, Psychological Modeling.
UNIT- 5 15 Hrs	Expert Systems: Definition and characteristics of Expert System, representing and using domain knowledge, Expert system shells Knowledge Engineering, knowledge acquisition, expert system life cycle & expert system tools, MYCIN & DENDRAL examples of expert system.
SUGGESTED READINGS	Books: <ol style="list-style-type: none"> 1. Artificial Intelligence By E. Rich and K. Knight, Tata McGraw Hill. 2. Artificial Intelligence: A New Synthesis By Nilsson, Morgan Kaufmann. 3. Pattern Classification 2nd Edition By R.O. Duda, Hart, Stork (2001), John wiley, New York. 4. Pattern Recognition: Technique and Applications By Shinghal (2006) ,Oxford University Press, New Delhi.

M.Sc. Semester-III

Paper-V: Datawarehouse and Data Mining

COURSE OBJECTIVE:

The main objective is to give knowledge about Data Warehouse. How data processing concepts are helpful to us and what is its role in any database.

COURSE OUTCOMES:

Students, after completion of this course will be able to:

CO1: Acquire basic knowledge of Data mining and Data warehousing.

CO2: Gain Knowledge about Data design and representation.

CO3: Analyze & learning with Information access and delivery.

CO4: Understand the importance of Algorithms and clustering.

CO5: Understand the implementation of web mining and visualization.

CO-PO MAPPING

CO	PO									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	✓						✓		✓	
CO2	✓	✓			✓	✓			✓	✓
CO3	✓		✓		✓	✓				✓
CO4	✓		✓	✓	✓	✓	✓	✓		✓
CO5	✓	✓	✓	✓		✓	✓	✓	✓	✓

M.Sc. in COMPUTER SCIENCE (THIRD SEMESTER)	
COURSE CODE: MSCS E303	
COURSE TYPE: ECC/CB	
COURSE TITLE: DATAWAREHOUSE AND DATA MINING	
CREDIT: 06	HOURS: 90
MARKS: 100 (SEE: 70 & CCA: 30)	
UNIT-1 15Hrs	Warehouse: What is it, Who Need It, and Why?, Things to Consider, Managing the Data Warehouse, Data Warehouse Design Methodology, Data Marts and Start Schema Design, Fundamentals of ETL Architecture, Partitioning Data, Indexing Data.
UNIT-2 20Hrs	Data mining: Introduction, Data mining on what kind of data , Data mining functionalities classification of Data mining systems, Major issues in Data mining Mining Association rules in large databases - Association rule mining, Mining single-Dimensional Boolean association rules from Transactional databases, Mining multi-Dimensional Association rules from relational Databases and Data Warehouses.
UNIT-3 20 Hrs	Classification and Prediction: Introduction classification by decision tree induction, Bayesian Classification. Other classification methods, classification by back propagation, Prediction, classifier accuracy.
UNIT- 4 20 Hrs	Cluster analysis: Introduction types of data in cluster analysis a categorization of major clustering methods portioning methods, hierarchical methods, Density based methods,: DBSCAN, Grid-based method : STRING , Model based clustering method: Statistical Approach, outlier analysis.
UNIT- 5 15 Hrs	Overview of Database Management : Data, Information and knowledge, Increasing use of data as a corporate resource, data processing verses data management, file oriented approach verses database oriented approach to data management; data independence, database administration roles, DBMS architecture, different kinds of DBMS users, importance of data dictionary, contents of data dictionary, types of database languages. Data models: network, hierarchical, relational. Introduction to distributed databases.
SUGGESTED READINGS	Books: <ol style="list-style-type: none"> 1. Database system concept By H. Korth and A. Silberschatz, TMH. 2. Data Base Management System By Alexies & Mathews ,Vikas publication. 3. Data Base Management System By C. J. Date ,Narosha Pub. 4. Data Mining: Concepts and Techniques, Jiawei Han, Micheline 5. Kamber, MorganKaufmann, Harcourt India 2001. 6. Data Mining Methods for Knowledge Discovery , Cios, Pedrycz, Swiniars ki,Kluwer AcademicPublishers, London – 1998.

M.Sc. in COMPUTER SCIENCE (THIRD SEMESTER)		
COURSE CODE: MSCS 311		COURSE TYPE : CCC
COURSE TITLE: LAB COURSE A		
CREDIT : 03	HOURS: 45	PRACTICAL MARKS: 100
LABORATORY WORK MSCS 311	<p>Data Communication & Computer Network:</p> <ol style="list-style-type: none"> 1. Practice about IP Address. 2. Sharing of Printers. 3. Develop local area network using Windows and Linux Operating System. 4. Practice about Internet and its applications. 5. Practice about installation of various Networks based Operating System. 6. Practice about Client Server architecture. 7. Practice the installation of bus topology of LAN. 8. Familiar about various networking devices. 9. Sharing of file and folders. 10. Communication between two servers. <p>RDBMS:</p> <ol style="list-style-type: none"> 1. Design a table and database in Oracle/MySQL. 2. Practice about various forms in Oracle /MySQL. 3. Practice about various graphs in Oracle/ MySQL e. 4. Database connectivity of MS-Access with Oracle/ MySQL. 5. Practice about various queries regarding DDL, DML and DCL. 6. Practice about various data types and clauses of Oracle. 7. Practice about various constraints of Oracle. 8. Practice for inserting and fetching various records from any database. 9. Database Connectivity of Oracle with any Language. 10. Develop any complete software with oracle and any front end language. 	

M.Sc. in COMPUTER SCIENCE (THIRD SEMESTER)		
COURSE CODE: MSCS 312		COURSE TYPE : CCC
COURSE TITLE: LAB COURSE B		
CREDIT : 03	HOURS: 45	PRACTICAL MARKS: 100
LABORATORY WORK MSCS 312	<p>Advanced JAVA Programming:</p> <ol style="list-style-type: none"> 1. Design a program to develop a simple java program. 2. Design a program for various conditional and relational operators. 3. Design a program for class and interface. 4. Design a program for various types of inheritances. 5. Design a program to create a user defined package. 6. Design a program for exception handling. 7. Design a program to create a thread and related problems. 8. Design a program for various streams. 9. Design a program with Apache Tomcat Web Server and JBoss Web Server. 10. Design a program to create an applet. 11. Design a program for database connectivity. 12. Design a program for swing and related concepts. 13. Design a program with Netbeans IDE. 14. Design a program with Eclipse IDE. 15. Design a program with spring. 	

M.Sc. Semester-IV

Paper-I: Network Security

COURSE OBJECTIVE:

The main objective is to know about Cryptography, Security, Symmetric Cipher, Public Key Cryptography, Hash Function, Web Security and System Security.

COURSE OUTCOMES:

Students, after completion of this course will be able to:

CO1: Acquire basic knowledge of network security.

CO2: Gain knowledge about Conventional and Encryption Principles.

CO3: Understanding Key exchanges.

CO4: Describe the various Digital signatures logic.

CO5: Apply different encryption and decryption techniques.

CO-PO MAPPING

CO	PO									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	✓						✓		✓	
CO2	✓	✓			✓	✓			✓	✓
CO3	✓		✓		✓	✓				✓
CO4	✓		✓	✓	✓	✓	✓	✓		✓
CO5	✓	✓	✓	✓		✓	✓	✓	✓	✓

M.Sc. in COMPUTER SCIENCE (FOURTH SEMESTER)	
COURSE CODE: MSCS 401	
COURSE TYPE: CCC	
COURSE TITLE: NETWORK SECURITY	
CREDIT: 06	HOURS: 90
MARKS: 100 (SEE: 70 & CCA: 30)	
UNIT-1 15Hrs	<p>Foundations of Cryptography and security</p> <p>Security trends, The OSI Security architecture Security attack, services and mechanism Ciphers and secret messages, Mathematical tools for cryptography: substitution techniques, modular arithmetic, Euclid's algorithm, finite fields, polynomial arithmetic.</p>
UNIT-2 20Hrs	<p>Symmetric Cipher</p> <p>Symmetric cipher model, Design Principles of Block Ciphers, Theory of Block Cipher Design, Feistel cipher network structure, Data Encryption Standard (DES), Strength of DES Triple DES, Modes of operation. Advance encryption Standard (AES)- Evaluation criteria of AES, AES cipher, key distribution.</p>
UNIT-3 20Hrs	<p>Public Key cryptography and Hash function</p> <p>Prime numbers and testing for primarily, factoring large numbers, Principles of public key cryptosystem, RSA algorithm. Key management: Diffie-Helman Key exchange, elliptic curve arithmetic, elliptic curve cryptography, Hash and Message authentication Code (MAC), Hash and MAC algorithms, Digital signature and Authentication protocol.</p>
UNIT- 4 20 Hrs	<p>IP and Web security protocols:</p> <p>Authentication application: Kerberos, Public key infrastructure .E-mail: Pretty Good Privacy (PGP), S/MIME. IP security, Web Security: Secure Socket layer (SSL) and Transport layer security, Secure Electronic Transaction (SET).</p>
UNIT- 5 15 Hrs	<p>System Security: Basics of System security ,Types of System Security, Firewall, Intrusion Detection system (IDS), Malicious Software , Spywares ,Hacking Concepts, Spoofing ,Phishing, Mail Bombing, Virus and its types, Concept of infected files and its remedies .</p>
SUGGESTED READINGS	<p>Books:</p> <ol style="list-style-type: none"> 1. Cryptography and Network Security By William Stallings, 4th Edition Pearson Publication 2. Applied cryptography - protocols and algorithm By Bruce Schneier, Springer Verlag 2003 3. Cryptography and Network Security By Atul Kahate , TMH Publication. 4. Cryptography and Network Security By Behrouz A. Forouzan, First Edition, TMH Publication. 5. Network Security: Private Communication in Public World By Charlie Kaufman, Radia Perlman and Mike Speciner , PHI Publication.

M.Sc. Semester-IV

Paper-II: Mobile Computing and Application Development

COURSE OBJECTIVE:

The use of mobile communication and android based applications are increasing day by day. It is therefore necessary for students to know that how mobile communication works and how to build mobile apps for android operating system. This course covers the necessary concepts which are required to understand mobile communication and to develop Android Applications.

COURSE OUTCOMES:

Students, after completion of this course will be able to:

CO1: Explain the basic concepts of wireless network and wireless generations.

CO2: Demonstrate the different wireless technologies such as CDMA, GSM, GPRS ,etc.

CO3: Describe and judge the emerging wireless technologies standards such as WLAN, WMAN.

CO4: Explain the design considerations for deploying the wireless network infrastructure.

CO5: Differentiate and support the security measures standards.

CO-PO MAPPING

CO	PO									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	✓						✓		✓	
CO2	✓	✓			✓	✓			✓	✓
CO3	✓		✓		✓	✓				✓
CO4	✓		✓	✓	✓	✓	✓	✓		✓
CO5	✓	✓	✓	✓		✓	✓	✓	✓	✓

M.Sc. in COMPUTER SCIENCE (FOURTH SEMESTER)	
COURSE CODE: MSCS 402	COURSE TYPE: CCC
COURSE TITLE: MOBILE COMPUTING AND APPLICATION DEVELOPMENT	
CREDIT: 06	HOURS: 90
MARKS: 100 (SEE: 70 & CCA: 30)	
UNIT-1 15Hrs	Introduction to Mobile Computing: Concept of Mobile Communication, Different generations of wireless technology ,Basics of cell, cluster and frequency reuse concept ,Noise and its effects on mobile, Understanding GSM and CDMA, Basics of GSM architecture and services like voice call, SMS, MMS, LBS, VAS ,Different modes used for Mobile Communication, Architecture of Mobile Computing(3 tier),Design considerations for mobile computing, Characteristics of Mobile Communication ,Application of Mobile Communication, Security Concern Related to Mobile Computing, Middleware and Gateway required for mobile Computing, Making Existing Application Mobile Enable, Mobile IP, Basic Mobile Computing Protocol ,Mobile Communication via Satellite • Low orbit satellite • Medium orbit satellite • Geo stationary satellite Phones.
UNIT-2 20Hrs	Introduction to Android: Overview of Android, What does Android run On – Android Internals, Android for mobile apps development, and Environment setup for Android apps Development, Framework - Android- SDK, Eclipse, Emulators – What is an Emulator / Android AVD. Android Emulation – Creation and set up, First Android Application.
UNIT-3 20Hrs	Android Activities and GUI Design Concepts: Design criteria for Android Application : Hardware Design Consideration, Design Demands For Android application, Intent, Activity, Activity Lifecycle and Manifest, Creating Application and new Activities, Simple UI -Layouts and Layout properties : Introduction to Android UI Design, Introducing Layouts , XML Introduction to GUI objects viz.: Push Button , Text / Labels , Edit Text, Toggle Button , Padding etc.
UNIT- 4 20 Hrs	Advanced UI Programming: Event driven Programming in Android (Text Edit, Button clicked etc.), Activity Lifecycle of Android, Exception Handling, Application Development using UI Programming.

UNIT- 5 15 Hrs	Toast, Menu, Dialog, List and Adapters: Menu :Basics, Custom v/s System Menus, Create and Use Handset menu Button (Hardware) , Dialog : Creating and Altering Dialogs , Toast : List & Adapters, Demo Application Development and Launching , Basic operation of SQLite Database, Android Application Priorities.
SUGGESTED READINGS	Books: <ol style="list-style-type: none"> 1. Building Android Apps , In Easy Steps, McGraw-Hill Education. 2. Professional Android 2 Application Development , Reto Meier , Wiley India Pvt. Ltd . 3. Beginning Android , Mark L Murphy , Wiley India Pvt. Ltd . 4. . Pro Android , Sayed Y Hashimi and Satya Komatineni , Wiley India Pvt. Ltd .

M.Sc. Semester-IV

Paper-III: System Design and Software Engineering

COURSE OBJECTIVE:

The main objective is to face the problems of Software Development. How information's are collected from sites, locations, industries etc and how remedies were developed and implemented.

COURSE OUTCOMES:

Students, after completion of this course will be able to:

CO1: Able to understand the principles and tools of systems analysis and design.

CO2: Able to understand the SDLC of system development in different context.

CO3: Understand and apply various software metrics on software quality products.

CO4: Perform software testing on various applications.

CO5: Able to understand the professional and ethical responsibilities system implementation and software documentation.

CO-PO MAPPING

CO	PO									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	✓		✓	✓			✓		✓	✓
CO2	✓		✓		✓		✓			✓
CO3	✓	✓	✓	✓	✓		✓	✓		
CO4	✓				✓	✓			✓	✓
CO5	✓	✓		✓		✓	✓	✓		✓

M.Sc. in COMPUTER SCIENCE (FOURTH SEMESTER)	
COURSE CODE: MSCS 403	
COURSE TYPE: CCC	
COURSE TITLE: SYSTEM DESIGN AND SOFTWARE ENGINEERING	
CREDIT: 06	HOURS: 90
MARKS: 100 (SEE: 70 & CCA: 30)	
UNIT-1 15Hrs	System Concept: System, Characteristics and Elements of System, Types of System, System Development Life Cycle: Various phases, Fact Finding process and techniques, Feasibility Study: Technical, Operational and Economic feasibilities, Cost & Benefit Analysis.
UNIT-2 20Hrs	Tools of Structured Analysis: Data Dictionary, Form, Gantt Charts, System Model, Pseudo Codes, System Flow Chart, DFD, Decision Tree, Decision Tables, Input and Output Form Design Methodologies.
UNIT-3 20Hrs	Software Engineering Fundamentals: Definition of software product, software development paradigms; software engineering and end user development approaches. Software Analysis: , Software requirements specification (SRS) standards, Specification tools, flow based, data based and object orientated analysis design documentation standards.
UNIT- 4 20 Hrs	Systems Design: Idealised and constrained design, process oriented design (Gane and Sarson and Yourdon notations); data oriented design, Object oriented design (Booch approach), Cohesion and coupling; Role of case tools, Re-engineering legacy systems, Coding standards.
UNIT- 5 15 Hrs	Software Quality And Testing : Software quality assurance, types of software testing (white box, black box, unit, integration, validation, system etc), debugging and reliability analysis, program complexity analysis, software quality and metrics; software maturity model and extensions. Software cost and Time estimation, introduction to the Rayleigh curve, algorithmic cost model (COCOMO). Software Project Management: Planning software projects, work background structures, integrating software, software design and project planning, software project teams, project monitoring and controls.
SUGGESTED READINGS	Books: 1. Software Engineering: A Practitioner's Approach , pressman Roger, Tata McGraw Hill. 2. An Integrated approach to Software Engineering ,Jalote Pankaj, Narosa: New delhi. 1991. 3. I Sommerville, " Software Engineering V edition: ", Addison Wesley, 1996. 4. Software Engineering Demystified By Deepti Bhanot, Galgotia Publications. 5. System Analysis and Design By V K JAM, Dream Tech Press. 6. Modern System Analysis & Design By A Hoffer, F George, S Valaciahlow .

M.Sc. Semester-IV

Paper-IV: Dissertation

COURSE OBJECTIVE:

On taking the course, the students will be able to Implement the solution for the chosen problem using the concepts and the techniques learnt in the curriculum, Identify, formulate and implement computing solutions, Design and conduct experiments, analyze and interpret data, Record the result, demonstrate skills to use modern tools, software and equipments to analyze the chosen problem.

COURSE OUTCOMES:

Students, after completion of this course will be able to:

CO1: Discover potential research areas in the field of IT.

CO2: Conduct a survey of several available literatures in the preferred field of study.

CO3: Compare and contrast the several existing solutions for research challenge.

CO4: Formulate and propose a plan for creating a solution for the research plan identified.

CO5: To report and present the findings of the study conducted in the preferred domain.

CO-PO MAPPING

CO	PO									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	✓						✓		✓	
CO2	✓	✓			✓	✓			✓	✓
CO3	✓		✓		✓	✓				✓
CO4	✓		✓	✓	✓	✓	✓	✓		✓
CO5	✓	✓	✓	✓		✓	✓	✓	✓	✓

M.Sc. in COMPUTER SCIENCE (FOURTH SEMESTER)		
COURSE CODE: MSCS 404		COURSE TYPE: OSC/PRJ
COURSE TITLE: DISSERTATION		
CREDIT: 06	HOURS: 135	MARKS: 100
Guide Lines for Development of Major Project	All the students of M.Sc. (CS) final semester are required to submit a project report based on the work done by him/her during the project period.	
	<p>All students must submit a Synopsis/Summary/Abstract separately with the project report. It should be such that the Internal Guide must be aware about the software which the student wants to submit and comprise of about 10-15 pages. The content should be as brief as is sufficient enough to explain the objective and implementation of the project that the candidate is going to take up.</p> <p>The write up must adhere to the guidelines and should be in touch with the internal guide and the progress must be constantly updated to the Internal guide.</p>	
	<p>Project Evaluation Guidelines.</p> <p>The project is evaluated on the basis of following heads :</p> <p>Presentation - 25% of total marks.</p> <p>Viva - 20% of total marks.</p> <p>Thesis/Project report- 30% of total marks.</p> <p>Software Coding</p> <p>i) Documentation - 10% of total marks.</p> <p>ii) Software Execution- 15 % of total marks.</p>	
Format of major Report	<p>The following suggested guidelines must be followed in preparing the Final project Report: Good quality white executive bond paper A4 size should be used for typing and duplication. Care should be taken to avoid smudging while duplicating the copies.</p> <p>Page Specification :(Written paper and source code) Left margin - 3.0 cms Right margin- 2.0 cms Top margin 2.54 cms Bottom margin 2.54 cms Page numbers - All text pages as well as Program source code listing should be numbered at the bottom center of the pages. Normal Body Text: Font Size: 12, Times New Roman, Double Spacing, Justified. 6 point above and below para spacing Paragraph Heading Font Size: 14, Times New Roman, Underlined, Left Aligned. 12 point above & below spacing. Chapter Heading Font Size: 20, Times New Roman, Centre Aligned, 30 point above and below spacing. Coding Font size: 10, Courier New, Normal Submission of Project Report to</p>	

	<p>the University: The student will submit his/her project report in the prescribed format. The Project Report should include :</p> <ol style="list-style-type: none"> 1) One copy of the summary/abstract. 2) One hard Copy of the Project Report. 3) Soft copy of project on CD/DVD in a thick envelope pasted inside of the back cover of the project report. 4) The Project Report may be about 60-90 pages (including coding)
	<p>FORMAT OF THE STUDENT PROJECT REPORT ON COMPLETION OF THE PROJECT</p> <ol style="list-style-type: none"> 1. Cover Page as per format 2. Declaration 3. Certificate of the project guide 4. Certificate of the Company/Organization 5. Certificate by Internal and External Examiner 6. Forwarding Certificate by HOD/Principal 7. Acknowledgement 8. Main Report <ol style="list-style-type: none"> a) Objective & Scope of the Project b) Theoretical Background c) Definition of Problem d) System Analysis & Design vis-a-vis User Requirements e) System Planning f) Methodology adopted, System Implementation & Details of Hardware & Software used g) System Maintenance & Evaluation h) Feasibility Study i) Database Design details k) Module Description i) Detailed Life Cycle of the Project <ol style="list-style-type: none"> a) ERD b) DFD j) Coding k) Methodology used for testing

- l) Test Report
- m) Input and Output Screen Snapshots
- m) Future Aspects
- n) Limitations
- o) Bibliography
- p) References

M.Sc. Semester-IV

Paper-V: Cyber Crime and Security Fundamental

COURSE OBJECTIVE:

Identify the key concepts, roles and domains of Cyber Security. Identify the key components of securing networks, systems and applications and data.

COURSE OUTCOMES:

Students, after completion of this course will be able to:

CO1: Develop a deeper understanding for various types of cyber attacks, cyber crimes, vulnerabilities and remedies thereto.

CO2: Analyze and evaluate existing legal framework and laws on cyber security.

CO3: Analyze and evaluate the importance of personal data its privacy and security.

CO4: Able to take measures for self-cyber-protection as well as societal cyber-protection.

CO5: Get insights into risk-based assessment, requirement of security controls and need for cyber security audit and compliance.

CO-PO MAPPING

CO	PO									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	✓				✓	✓		✓		✓
CO2	✓	✓					✓		✓	✓
CO3	✓	✓	✓				✓		✓	✓
CO4	✓	✓	✓	✓			✓		✓	✓
CO5		✓		✓				✓	✓	

M.Sc. in COMPUTER SCIENCE (FOURTH SEMESTER)	
COURSE CODE: MSCS E401	
COURSE TYPE: ECC/CB	
COURSE TITLE: CYBER CRIME AND SECURITY FUNDAMENTAL	
CREDIT: 06	HOURS: 90
MARKS: 100 (SEE: 70 & CCA: 30)	
UNIT-1 15Hrs	Cyber Crime and Classification, Reasons for Commission of Cyber Crimes and Kinds, Cyber Stalking, Forgery and Counterfeiting, Computer Vandalism, Computer Hacking, Creating and distributing viruses over internet.
UNIT-2 20Hrs	Spamming, Cross Site Scripting, Online Auction Fraud, Cyber Squatting, Logic Bomb, Web Jacking, Internet Time Thefts and Denial of Service Attack, Data Diddling and EmailSpoofing.
UNIT-3 20Hrs	Computer Vandalism, Computer Hacking, Creating and distributing viruses over internet, Logic Bomb, Cyber Security Technique & Attacks.
UNIT- 4 20 Hrs	Cyber Security and Importance, Physical Security and Threats Cyber Terrorism, Phishing, User tracking and Physical Protection of Data, Software Piracy and Crime related to IPRs.
UNIT- 5 15 Hrs	Case Study Prepare Any One : Recent Cyber Crime Cases and its preventions with complete details/Analysis of Cyber Crime Cases/Study of any five recent virus and its effects/Recent Cyber Security Techniques and its implementation Note: Prepare Report Maximum 30 Page with suitable formats.
SUGGESTED READINGS	<p>Books:</p> <ol style="list-style-type: none"> 1. The Psychology of Information Security by Leron Zinatullin 2. Penetration Testing: A Hands-On Introduction to Hacking by Georgia Weidman 3. Hacking: The Art of Exploitation by Jon Erickson 4. Cyber Security for Beginners by Raef Meeuwisse 5. Hacking: A Beginners' Guide to Computer Hacking, Basic Security, And PenetrationTesting by John Slavio 6. Social Engineering: The Science of Human Hacking by Christopher Hadnagy 7. Cyber Security For Dummies by Joseph Steinberg. 8. Alice and Bob Learn Application Security by Tanya Janca.

M.Sc. in COMPUTER SCIENCE (FOURTH SEMESTER)		
COURSE CODE: MSCS 411		COURSE TYPE : CCC
COURSE TITLE: LAB COURSE A		
CREDIT : 03	HOURS: 45	PRACTICAL MARKS: 100
LABORATORY WORK MSCS 411	<p>Network Security:</p> <ol style="list-style-type: none"> 1. Practical based on private key based algorithms. 2. Practical based on public key based algorithms. 3. Practical based on cryptography. 4. Practical based on Web Security. 5. Practical based on Networking. 6. Practical based on Email. 7. Practical based on Spoofing. 8. Practical based on Phishing. 9. Practical based on Virus. 10. Practical based on IP Address. <p>System Analysis and Software Engineering:</p> <ol style="list-style-type: none"> 1. Software Analysis and design of various software models. 2. Practice for Data dictionary and DFD various S/W. 3. Form Designing & coding of various S/W. 4. Testing for various coding based on their requirements. 5. Practice for Debugging and S/W Testing. 6. Practice for database connectivity with any Front End Language and BackendDatabase. 7. Web design practice in Web based Programming Language. 8. Website development n Web based Programming Language. 9. Various S/W models developed according to need of users. 10. Develop any complete software with Front End Language and Backend Database. 	

M.Sc. in COMPUTER SCIENCE (FOURTH SEMESTER)		
COURSE CODE: MSCS 412		COURSE TYPE : CCC
COURSE TITLE: LAB COURSE B		
CREDIT : 03	HOURS: 45	PRACTICAL MARKS: 100
LABORATORY WORK MSCS 412	<p>Mobile Computing and Application Development:</p> <ol style="list-style-type: none"> 1. Installation and setup of java development kit (JDK), setup android SDK, setup eclipse IDE, setup android development tools (ADT) plug-in, create android virtual device. 2. Create “Hello World” application. That will display “Hello World” in the middle of the screen using Text View Widget in the red color. 3. Create application for demonstration of android activity life cycle. 4. Create sample application with login module. (Check username and password) On successful login, Change Text View “Login Successful”. And on failing login, alert user using Toast “Login fail”. 5. Create an application for demonstration of Relative and Table Layout in android. 6. Create an application that will pass two number using Text View to the next screen, and on the next screen display sum of that number. 7. Create an application that will get the Text Entered in Edit Text and display that Text using toast (Message). 8. Create an UI such that, one screen have list of all the types of cars. On selecting of any car name, next screen should show Car details like: name, launched date, company name. 9. Create an application that will demonstrate Dialog Box Control In Android. 10. Create Registration page to demonstration of Basic widgets available in android. 	