Sant Gadge Baba Amravati University, Amravati

Department of Computer Science and Engg.

Programme Outcomes, Programme Specific Outcomes and Course Outcomes

PO, PSO, CO's of PGDCS,MSC (Computer Science), MCA, ME (CSIT)

Programme code	Programme Name	Department
	P.G.Diploma in Computer Science	Computer Science

Programme outcome (POs):

The P.G. Diploma in Computer Science Program of department of Computer Science at SantGadge Baba Amravati University , started in 1986, aims to educate student with problem solving using computer science and technologies. It aims to provide technology-oriented students with the ability to develop software solutionsand technology.

This program develops human resource for IT industries as well as equipped students to start their own business as a software developer, database administrator, programmer, system analyst.

Programme Specific Outcomes (PSOs):

PSO1: Students will be able to understand the evolution and generations of computer, instruction set (RISK and CISC), memory and its organization and types of memory.

PSO2: Students will be able to demonstrate and apply their knowledge of C++, VB.Net and Database programming to develop effectivesoftware solutions needed for the government organizations, industrial, societal and environmental application areas.

PSO3: Students will be able to learn principles of management which includes organization, planning, product design, development, maintenance, marketing and project management.

PSO4: Students will be able to demonstrate adequate skills in oral and written communication for technical English language, actively participate in group discussions and interviews and exhibit the evidence of vocabulary building.

PSO5: Students will be able to analyse system by sampling and investigating hard data. Also students will be able to identifying, forecasting/ comparing cost and or benefits for system under study.

PSO6: Students will be able to understand data communication concepts and its applications. Network architecture, transmission of data, OSI models, layers and protocols study equipped students with know-how on troubleshooting in computer hardware and network related issues.

Course Outcomes (COs):

S.No.	Name of the course	Course Code	Course Outcome
1	Computer Organization and Architecture	PGDCS / MCA19101	• Understanding of digital system, its organization and architecture. • Apply knowledge of digital electronics logic gate to combinational and sequentialcircuits. • Knowledge of the basics of computer hardware and how software interacts withcomputer hardware. • Apply concepts of assembly language in solving problems. • Illustrate the concept of processing I/O organization and examine different ways ofcommunicating with I/O devices and standard I/O interfaces.
2	Object Oriented Programming with C++	PGDCS / MCA19102	• Understanding of Object oriented programming and advanced C++ concepts. • Use C++ Concepts for solving real life problems.

			• Develop problem solving skills using object oriented techniques.
3	Mathematical Foundation	PGDCS / MCA19103	• Understanding of floating point representation and arithmatic. • Ability of solving equations using interactive methods, matrices and linear system ofequations. • Understanding of different curve fitting by approximation of functinos. • Ability of solving numerical differentation and integration using iterative methods.
4	Elective – I (i) System Analysis Design	PGDCS /MCA19104	• Understand different phases of Systems Development life cycle. • Understand how projects are initiated and selected, define a businessproblem and determine the feasibility of a proposed project. • Apply information gathering methods effectively to elicit human informationrequirement. • Understand prototyping and develop logical DFD's that illustrate theproposed system. • Create data dictionary and choose an appropriate decision analysis method foranalyzing structured decision and creating process specification. • Design input-output for user interface and database for storing data.
5	Elective – I (ii) Management Information System	PGDCS / MCA19104	• Understand the leadership role of Management Information Systems inachieving business competitive advantage through informed decision making. • Analyze and synthesize business information and systems to facilitateevaluation of strategic alternatives.

			• Effectively communicate strategic alternatives to facilitate decision making. • Evaluate the role of information systems in today's competitive businessenvironment. • Assess the relationship between the digital firm, electronic commerce,electronic business and internet technology.
6	Elective – I (iii) Accounting and Financial Management	PGDCS / MCA19104	• Understanding of importance of Book-keeping. • Knowledge of different methods and practices of book-keeping. • Knowledge of types of accounting. • Understanding of financial management. • Knowledge of different methods and practices in financial management.
7	Lab 1 – Based on C++	PGDCS / MCA19106	• Skill of application of OOP concept for solving problems.
8	Lab 2 – Based on Mathematical Foundation	PGDCS / MCA19107	• Skill of solving mathematical problems using numerical and statistical methods.
9	Lab. 3 – Based on Web Technology	PGDCS / MCA19108	• Gain conceptual as well as practical knowledge of web-developmentLanguages and web-designing tools. • Develop skills of basic web-development. • Able to use web design tools and to design and develop web-pagesprofessionally.
10	Data Structures	PGDCS / MCA19109	• Knowledge of basic data structures and algorithms. • Understand concepts of searching and sorting techniques • Understand concepts of stacks, queues, lists, trees and graphs. • Able to write algorithms for solving problems with the help of fundamental datastructures

11	Operating System	PGDCS / MCA19110	• Analyze & Classify different types of operating system • Understand the working of Operating system • Understand the Memory Management policies. • Concepts of input/output, storage and file management • Understand various protection and security mechanisms
12	Database Management System	PGDCS / MCA19111	• Understand concepts of database system architecture. • Able to understand relational model and perform SQL operations. • Understand the importance of normal forms and learn query optimization. • Learns the impotance of transaction processing and concurreny control. • Learn the concept of data warehousing and data mining.
13	Elective – II (i) E-Commerce	PGDCS / MCA19112	• Gain a comprehensive understanding of the E-Commerce landscape, currentandemergingbusiness models, and the technology and infrastructureunderpinnings of the business. • Leverage the E-Commerce platforms to enhance current business orincubate new businesses. • Gain an understanding on how innovative use of the E-Commerce canhelp developing competitive advantage. • Develop an understanding on how internet can help business grow. • Gain an understanding on the importance of security, privacy, and ethicalissues as they relate to E-Commerce.
14	Elective – II (ii) Operation Research	PGDCS / MCA19112	• Model a real-world problem as a mathematical programming model. • Understand the theoretical workings of the simple method for linear

			• programming and perform iterations of it by hand. • Understand the relationship between a linear program and its dual, includingstrong duality. • Solve specialized linear programming problems like: Transportation andAssignment Problems. • Solve network models like the shortest path, minimum spanning tree andmaximum flow problems.
15	Elective – II (iii) Software Project Management	PGDCS / MCA19112	• Able to recognize evolving role of software project management. • Understand and estimatecost for software project. • Identify&analyze aspect in s/w to manage time, process & recourses effectively withquality concept. • Estimate software productivity using metrics and indicator & identify importantissues for planning a project. • Judge different testing techniques used to test software. • Evaluate the role of user and software teams.
16	Lab 4 – Based on Data Structures	PGDCS / MCA19114	• Skill of application of different data structures for solving problems.
17	Lab 5 – Based on DBMS	PGDCS / MCA19115	• Skill of effective use of database management system.
18	Lab 6- Based on Linux and Windows	PGDCS / MCA19116	• Able to understand the Basics of Windows & Linux working • Ability to learn the creation of Windows with various components • Able to perform the shell scripting programs . • Able to create file handling utilities by using Linux shell environment.

Programme code	Programme Name	Department
	M.Sc. Computer Science	Computer Science

Programme outcome (POs):

The Master in Computer Science Program of department of Computer Science at SantGadge Baba Amravati University , started in 1992, aims to educate student to identify and analyze complex scientific, societal, industrial problems and reaching effective software solutions using principles of mathematics, appropriate software tools, programming languages.It aims to provide technology-oriented students with the ability to design solutions for complex problems and design system components or processes that meet the specified needs with appropriate consideration for the societal, and environmental considerations.

This program develops human resource for government organizations, IT industries as well as equipped students to start their own business as a software developer, database administrator, programmer, system analyst, data scientist, web application developer, system programmer, software testing, expert system designer.

Programme Specific Outcomes (PSOs):

PSO1: Students will be able to adapt the skills to implement effective solutions for need based problems by applying knowledge gained through different programming languages, tools and software covered in the syllabus of program.

PSO2: Student will be able to learn working and type of operating systems, distributed operating systems, its process, memory and file management which enables them to take appropriate optimized decisions for applying necessary algorithms.

PSO3: Students will be able to handle network related problems by studying data communication network, network security courses. Students learn to troubleshoot fault detection in combinational switching circuits, learn and utilize the concepts of mobile communications.

PSO4: Students will be able to learn and apply the concepts of software engineering which is essentially important while working on big modules and or projects.

PSO5: Students will be able to apply and implement the working of compilers which also tends them towards system programming.By using various components students will be able to implement a efficient scalable software solution in the form of web or windows application.

PSO6: Students are prepared for research oriented concepts of data mining and data warehousing. Student will learn the necessity and importance of data preprocessing, data integration, data discretization. Students learn the concepts of OLAP technology, data mining methods, various classification and prediction methods, accuracy and error measures, various methods of cluster analysis, graph mining and mining sequence patterns.

PSO7: Studentswill be able to understand and implement the mathematical modeling of graphical objects required to be drawn/used in differnent kind of graphical applications. Students learn Remote method invocation for cross-platform data access applications, application related to artificial intelligence using Prolog language, digital image processing techniques.

PSO8: Student will be able to understand finite automata, non-deterministic finite automata, regular set and regular expression, applications of finite automata, regular and context-free grammar, Turing machine, its design and modification, decidability and undecidability of problems.

PSO9: Students will be able to apply software testing knowledge and engineering methods, distinguish characterstics of structural testing methods, design and conduct a software test process for a software testing project, understand and identify various software testing problems and solve these problems by designing and selecting software test models, criteria, strategies, and methods.

Course Outcomes (COs):

S.No.	Name of the course	Course Code	Course Outcome

1	Digital System and Microprocessor	1MCS1	• Learn representation of numbers in digital systems, Karnaugh map, TTL, ECL, MOS, CMOS logic families. • Understand working of multiplexers, demultiplexers, digital comparators, code convertor, decoder. • Design arithmetic circuits, Filp-flops such as RS,JK, JK-MS, D and T flip-flops, counters. • Understand the working of microcomputer, microprocessor. • Able to write codesfor 8086 microprocessor with interrupt processing and memory management.
2	.Net Technologies and C#	1MCS2	• Learn the C# language of the .net technology of Microsoft corporation. • Able to understand object-oriented principles, inheritance along with its types, polymorphism, operator overloading, delegates, exception handling, multithreading. • Learn file manipulation and and data access with ADO.Net. • Able to implement a efficient scalable software solution in the form of web or windows application.
3	Operating System	1MCS3	• Able to learn working and type of operating systems, its process management, process synchronization, deadlocks, memory management. • Able to analyse and write algorithms for disk, process and memory management. • Understand concepts of file system, directory structures, distributed file system and embedded operating system.
4	Computer Networks	1MCS4	• Learn data transmission models, modulation, multiplexing. • Understand applications of layers such as application layer, transport layer, network layer, data link layer.

			• Understand the importance of network security and management by analyzing different threats, principles of cryptography, digital signature, internet network management framework.
5	Lab I – Based on 1MCS1 and 1MCS3	1MCS5	• Skill to implement assembly language programs. • Skill to implement operating system related algorithms as programs.
6	Lab II – Based on 1MCS2	1MCS6	• Skill of writing C# application using OOP concept.
7	Java Programming	2MCS1	• Learn Java programming language which can be utilized to develop windows and internet based software solutions. • Able to understand and apply the knowledge of object-oriented principles, applets, graphical user-interface for scientific and business oriented applications.
8	Data Structures	2MCS2	• Understand the classification of data structures and Knowledge of basic and dynamic data structures.. • Compare and contrast various data structures and design techniques in the area of Performance and Memory Representation. • Ability to evaluate algorithms and data structures in terms of time and complexity of basic operations. • Ability to analyze algorithms for stack, queue and linked list, trees, and graphs and compare their Performance and tradeoffs. • Incorporate data structures into the applications such as binary search trees, AVL tree and B trees. • Ability to implement Data Structure Traversal such as Array, Stack, Queue, Linked List, Tree and Graph.

			• Apply and implement learned algorithm design techniques and data structures to solve problems. • Understand the various searching and sorting techniques
9	Software Engineering	2MCS3	• Able to apply the concepts of software engineering which is essentially important while working on big modules and or projects. • Understand the concept of system and able to analyseitsfeasibility study. • Understand software process framework , requirement modeling approaches, software design, software quality. • Able to apply software metrics and software testing.
10	Discrete Mathematical Structures	2MCS4(1)	• Prepare to develop mathematical logic essentially required in complex programming. • Able to learn and apply set theory, algebraic structures, lattices and Boolean algebra, graph theory. • Able to troubleshoot fault detection in combinational switching circuits. • Understand and able to apply learns to analyse algorithms for generating a fault matrix.
11	Compiler Construction	2MCS4(2)	• Understand the major phases of compilation and to Understand the knowledge of Lex tool &YAAC tool. • Develop the parsers and experiment the knowledge of different parsers design without automated tools. • Construct the intermediate code representations and generation. • Convert source code for a novel language into machine code for a novel computer. • Apply for various optimization techniques for dataflow analysis.

12	Lab III – Based on 2MCS1	2MCS5	• Skill of writing core Java application using OOP concept. • Skill of writing applet for internet applications. • Skill of writing GUI based windows applications.
13	Lab IV – Based on 2MCS2 and 2MCS3	2MCS6	• Skill of applying and implementing linear and non-linear data structures in programs. • Skill of writing effective sorting and searching methods depending upon factors like type and volume of data. • Knowledge of software engineering methods and practice their appropriate applications. • Understands software testing approaches such as white box testing, black box testing. • Skill to take case studies with respect to components learned in software engineering.
14	Data Mining and Data Warehousing	3MCS1	• Develop research oriented applications of data mining and data warehousing. • Understand the necessity and importance of data preprocessing, data integration, data discretization. • Learn the concepts of OLAP technology, data mining methods, various classification and prediction methods. • Able to apply accuracy and error measures, methods of cluster analysis, graph mining and mining sequence patterns in biological data.
15	Computer Graphics	3MCS2	• Apply mathematical geometry and logic to develop Computer programs for elementary graphics operations and to develop scientific and strategic approach to solve complex problems in the domain of Computer Graphics.

			• Demonstrate an understanding of contemporary graphics hardware. • Ability to draw graphics using line & polygon and ability to perform operations on computer graphics. • Understand and demonstrate geometrical transformations, Segment, Windowing and Clipping, Interaction. • Understand and demonstrate 2D & 3D image processing techniques. • Understand and demonstrate Hidden Surfaces & Lines; Light, Colour& Shading; Curves and Fractals
16	Client-Server Computing	3MCS3	• Learn to implement network related programs with concepts of servers and sockets. • Understand JDBC concepts, prepared and callable statements and able to implement database connectivity applications. • Understand and learn effective implementation of Servlet and JSP technologies which is essential component implementing scalable and sturdy enterprise level applications. • Implement Remote method invocation applications for cross-platform data transaction. • Apply client-side scripting language JavaScript which can be utilized to optimize server load. • Learn advanced Java and able to develop enterprise level web applications.
17	Distributed Operating System	3MCS4(1)	• Understand distributed operating system concepts, design issues. • Learn communication, synchronization, processes and processors in distributed systems. • Understand distributed file systems, distributed shared memory concepts.

			• Analyse two distributed operating systems AMOEBA and MACH with reference to modules learned earlier as case study.
18	Theory of Computation	3MCS4(2)	• Use concepts of formal languages of finite automata techniques. • Design Finite Automata's for different regular expressions and languages. • Construct context free grammar for various languages. • Solve various problems of applying normal form techniques, push down automata andTuring Machines.
19	Lab V – Based on 3MCS1 and 3MCS2	3MCS5	• Understand stages in building a Data Warehouse • Understand the need and importance of pre-processing techniques • The data mining process and important issues around data cleaning, and integration. • The principle algorithms and techniques used in data mining, such as clustering, association mining, classification and prediction. • Draw primitive graphical shapes and perform transformation techniques programmatically. • Understand Text and Graphics mode, initialization of graphics mode, graphics drivers, switching between text and graphics mode programmatically. • Understand the basic principles of implementing computer graphics primitives programmatically. • Understand Graphics Primitives: Pixel, Line, Circle, Ellipse, Polygons, Line styles, Bar graphs, Pie Charts, filling a polygon with different methods, windowing programmatically. • Understand Colour, Colour Palette, Aspect ratio, Text: fonts, alignment, size, orientation and justification programmatically.

			• Understand and demonstrate geometrical transformations, Segment, Windowing and Clipping, Interaction, 2D & 3D image processing techniques; Hidden Surfaces & Lines; Light, Colour& Shading; Curves and Fractals programmatically.
20	Lab VI – Based on 3MCS3	3MCS6	• Skill to implement network based applications. • Skill to implement database connectivity application using client-server architecture. • Skill to write enterprise-level applications using Servlet and JSP. • Skill to develop RMI application for cross-platform data transaction. • Skill to develop component-based programming using beans. • Skill to implement client-side JavaScript modules for server optimization.
21	Artificial Intelligence and Expert Systems	4MCS1	• Learn the language for programming in logic (ProLog) which is based on 'inferring with heuristic learning', utilized for implementing artificial intelligence applications and design of expert systems of particular domain knowledge-base. • Understand wide range of techniques to represent knowledge in machines and develop perspective towards variety of methodologies to solve a problem which otherwise would not be possible by procedural languages. • Understand and able to implement game playing algorithms with minimax search procedure, predicate logic. • Understand the process of natural language understanding, applications of artificial neural networks, learning by machines.
22	Design and Analysis of Algorithms	4MCS2	• Learn to compute the time and space complexity of a given algorithm and analyse the efficiency of algorithms.

			• Learns the utilization of different prototypes of problem solving to solve a given problem. • Understand and analyse greedy algorithms, dynamic programming, concepts of tractable and intractable problems. • Understand the class of P, NP and NP-complete problems.
23	Network Security	4MCS3	• Develop basic skills of secure Network Architecture and explain the theory behind security • Study the basic idea behind cryptography and design the algorithm to make a secure communication. • Identify common Network vulnerabilities and attacks. • Learn too find the defense mechanism against network attack • Design the cryptographic protection mechanism. • Knowledge about the authentication and various techniques used for the authentication.
24	Mobile Communication	4MCS4(1)	• Understand the concepts of mobile communication, signal propogation, modulation, medium access control. • Learn concepts of telecommunication systems,satellite systems, broadcast systems. • Understand wireless LAN, mobile network layer, adhoc networks, mobile transport layer. • Understand and analyse various supports for mobility such as file systems, www, WAP, i-mode, SyncML.
25	Digital Image Processing	4MCS4(2)	• Able to learn and implement methodologies and approaches of image enhancement in the spatial domain, frequency domain. • Understand the concept and techniques of image restoration, color image processing, morphological image processing. • Apply approaches towards image segmentation.

			• Learn and able to implement in depth processing of digital image.
26	Software Testing	4MCS4(3)	• Distinguish characterstics of structural testing methods. • Design and conduct a software test process for a software testing project. • Understand and identify various software testing problems and able to solve these problems by designing and selecting software test models, criteria, strategies, and methods. • Able to apply software testing knowledge and engineering methods.
27	Lab VII – Based on 4MCS1 and 4MCS2	4MCS5	• Skill to write applications to prevent and/or enforce backtracking using Prolog. • Skill to write applications using lists with recursion. • Skills to write applications of AI in Prolog. • Skill to implement an expert system using Prolog. • Skill to compute the time and space complexity of a given program and analyse the efficiency of program. • Understands the utilization of different prototypes of problem solving to solve a given problem. • Skill to implement and analyse greedy algorithms, dynamic programming, tractable and intractable problems. • Understand the class of P, NP and NP-complete problems.
28	Project	4MCS6	• Learn to apply the knowledge gained through various courses in solving a real life problem. • Practice different phases of software/system development life cycle. • To introduce the student to a professional environment and/or style typical of a global IT industry,

			• To prepare for structured team work and project management. • Able to prepare effective, real-life, technical documentation. • To provide an opportunity to practice time, resource and person management.

Programme code	**Programme Name**	**Department**
	Master in Computer Application	Computer Science

Programme outcome (POs):

The Master in Computer Application Program of department of Computer Science at SantGadge Baba Amravati University , started in 1995, aims to educate student to identify and analyze complex scientific, societal, industrial problems and reaching effective software solutions using principles of mathematics, appropriate modern IT tools, programming languages. Students of this programme will not only be able to function effectively both as a team leader and team member on multi disciplinary projects to demonstrate computing and management skills but also be able to communicate effectively and present technical information in oral and written reports. This programme develops perspective in context with ethics, social, cultural and cyber regulations.

It aims to provide technology-oriented students with the ability to design solutions for complex problems and design system components or processes that meet the specified needs with appropriate consideration for the societal, and environmental considerations.This program develops human resource for government organizations, IT industries as well as equipped students to start their own business as a software developer,

database administrator, programmer, system analyst, data scientist, web application developer, system programmer, software testing, expert system designer.

Programme Specific Outcomes (PSOs):

PSO1: Students will be able to adapt the skills to implement effective solutions for need based problems by applying knowledge gained through different programming languages, tools and software covered in the syllabus of program.

PSO2: Student will be able to learn working and type of operating systems, distributed operating systems, its process, memory and file management which enables them to take appropriate optimized decisions for applying necessary algorithms.

PSO3: Students will be able to handle network related problems by studying data communication network, network security courses. Students learn to troubleshoot fault detection in combinational switching circuits, learn and utilize the concepts of mobile communications.

PSO4: Students will be able to learn and apply the concepts of software engineering which is essentially important while working on big modules and or projects.

PSO5: Students will be able to apply and implement the working of compilers which also tends them towards system programming.By using various components students will be able to implement a efficient scalable software solution in the form of web or windows application.

PSO6: Students are prepared for research oriented concepts of data mining and data warehousing. Student will learn the necessity and importance of data preprocessing, data integration, data discretization. Students learn the concepts of OLAP technology, data mining methods, various classification and prediction methods, accuracy and error measures, various methods of cluster analysis, graph mining and mining sequence patterns.

PSO7: Studentswill be able to understand and implement the mathematical modeling of graphical objects required to be drawn/used in differnent kind of graphical applications. Students learn Remote method invocation for cross-platform data access applications, application related to artificial intelligence using Prolog language, digital image processing techniques.

PSO8: Student will be able to understand finite automata, non-deterministic finite automata, regular set and regular expression, applications of finite automata, regular and context-free grammar, Turing machine, its design and modification, decidability and undecidability of problems.

PSO9: Students will be able to apply software testing knowledge and engineering methods, distinguish characterstics of structural testing methods, design and conduct a software test process for a software testing project, understand and identify various software testing problems and solve these problems by designing and selecting software test models, criteria, strategies, and methods.

PSO10: Students of this programme will be able to function effectively both as a team leader and team member on multi disciplinary projects to demonstrate computing and management skills.

PSO11: Students will be able to communicate effectively and present technical information in oral and written reports.

PSO12: Students will be able to develop perspective with respect to ethics, social, cultural and cyber regulations.

S.No.	Name of the course	Course Code	Course Outcome
1	Computer Organization and Architecture	MCA19101/PGDCS19101	• Understanding of digital system, its organization and architecture. • Apply knowledge of digital electronics logic gate to combinational and sequential circuits. • Knowledge of the basics of computer hardware and how software interacts with computer hardware. • Apply concepts of assembly language in solving problems. • Illustrate the concept of processing I/O organization and examine different ways of communicating with I/O devices and standard I/O interfaces.
2	Object Oriented Programming with C++	MCA19102/PGDCS19102	• Students will be familiar with the main features of the C++ language.

			• Students will be able to apply the computer programming techniques to solve practical problems. • Students will be able to understand the difference between object oriented programming and procedural oriented language and data types in C++. • Students will be able to understand the concepts and implementation of constructors and destructors. • Students will be able to develop program using C++ features such as composition of objects, Operator overloading, inheritance, Polymorphism etc. • Students are able to learn C++ data types, memory allocation/deallocations, functions and pointers. • Students will be able to develop software applications using object oriented programming language in C++. • Be able to debug and test C++ programs. • Students are able to apply object oriented programming concepts to software problems in C++
3	Mathematical Foundation	MCA19103/PGDCS19103	• Understanding of floating point representation and arithmatic. • Ability of solving equations using interactive methods, matrices and linear system of equations. • Understanding of different curve fitting by approximation of functinos. • Ability of solving numerical differentation and integration using iterative methods.
4	Elective – I (i) System Analysis Design	MCA19104/PGDCS19104	• Understand different phases of Systems Development life cycle.

			• Understand how projects are initiated and selected, define a business problem and determine the feasibility of a proposed project. • Apply information gathering methods effectively to elicit human information requirement. • Understand prototyping and develop logical DFD's that illustrate the proposed system. • Create data dictionary and choose an appropriate decision analysis method for analyzing structured decision and creating process specification. • Design input-output for user interface and database for storing data.
5	Elective – I (ii) Management Information System	MCA19104/PGDCS19104	• Understand the leadership role of Management Information Systems in achieving business competitive advantage through informed decision making. • Analyze and synthesize business information and systems to facilitate evaluation of strategic alternatives. • Effectively communicate strategic alternatives to facilitate decision making. • Evaluate the role of information systems in today's competitive business environment. • Assess the relationship between the digital firm, electronic commerce, electronic business and internet technology.
6	Elective – I (iii) Accounting and Financial Management	MCA19104/PGDCS19104	• Understanding of importance of Book-keeping. • Knowledge of different methods and practices of book-keeping. • Knowledge of types of accounting. • Understanding of financial management. • Knowledge of different methods and practices in financial management.

7	Lab 1 – Based on C++	MCA19106/PGDCS19106	• Skill of application of OOP concept for solving problems.
8	Lab 2 – Based on Mathematical Foundation	MCA19107/PGDCS19107	• Skill of solving mathematical problems using numerical and statistical methods.
9	Lab. 3 – Based on Web Technology	MCA19108/PGDCS19108	• Gain conceptual as well as practical knowledge of web-development Languages and web-designing tools. • Develop skills of basic web-development. • Able to use web design tools and to design and develop web-pages professionally.
10	Data Structures	MCA19109/PGDCS19109	• Knowledge of basic data structures and algorithms. • Understand concepts of searching and sorting techniques • Understand concepts of stacks, queues, lists, trees and graphs. • Able to write algorithms for solving problems with the help of fundamental data structures
11	Operating System	MCA19110/PGDCS19110	• Analyze & Classify different types of operating system • Understand the working of Operating system • Understand the Memory Management policies. • Concepts of input/output, storage and file management • Understand various protection and security mechanisms
12	Database Management System	MCA19111/PGDCS19111	• Define Database Management System, explain fundamental elements of a database management system, compare the basic concepts of relational data model, entity relationship model. • Design entity-relationship diagrams to represent simple database application scenarios, translate entity-relationship diagrams into relational tables, populate a relational database and formulate SQL queries on the data.

			• Understand the basic concepts regarding database, know about query processing and techniques involved in query optimization and understand the concepts of database transaction and related database facilities including concurrency control, backup and recovery. • Analyze a database design and improve the design by normalization • Choose efficient query optimization techniques, select suitable transaction management, concurrency control mechanism and Recovery management techniques. • Explain File organization and use appropriate index structure. • Create and maintain tables using PL/SQL queries. • Design and implement a database schema for a given problem-domain • Prepare reports. • Apply and create different transaction processing and concurrency control applications. • Application development using PL/SQL & front end tools
13	Elective – II (i) E-Commerce	MCA19112/PGDCS19112	• Gain a comprehensive understanding of the E-Commerce landscape, current and emergingbusiness models, and the technology and infrastructure underpinnings of the business. • Leverage the E-Commerce platforms to enhance current business or incubate new businesses. • Gain an understanding on how innovative use of the E-Commerce can help developing competitive advantage. • Develop an understanding on how internet can help business grow. • Gain an understanding on the importance of security, privacy, and ethical issues as they relate to E-Commerce.

14	Elective – II (ii) Operation Research	MCA19112/PGDCS19112	• Model a real-world problem as a mathematical programming model. • Understand the theoretical workings of the simple method for linear • programming and perform iterations of it by hand. • Understand the relationship between a linear program and its dual, including strong duality. • Solve specialized linear programming problems like: Transportation and Assignment Problems. • Solve network models like the shortest path, minimum spanning tree and maximum flow problems.
15	Elective – II (iii) Software Project Management	MCA19112/PGDCS19112	• Able to recognize evolving role of software project management. • Understand and estimate cost for software project. • Identify & analyze aspect in s/w to manage time, process & recourses effectively with quality concept. • Estimate software productivity using metrics and indicator & identify important issues for planning a project. • Judge different testing techniques used to test software. • Evaluate the role of user and software teams.
16	Lab 4 – Based on Data Structures	MCA19114/PGDCS19114	• Skill of application of different data structures for solving problems.
17	Lab 5 – Based on DBMS	MCA19115/PGDCS19115	• Skill of effective use of database management system.
18	Lab 6- Based on Linux and Windows	MCA19116/PGDCS19116	• Able to understand the Basics of Windows & Linux working • Ability to learn the creation of Windows with various components

			• Able to performthe shell scripting programs . • Able tocreate file handling utilities by using Linux shell environment.
19	Operating Systems	3MCA1	• Analyze & Classify different types of operating system. • Understand the working of Operating system. • Understand the Memory Management policies. • Concepts of input/output, storage and file management. • Understand various protection and security mechanisms
20	File Structures & Data Processing	3MCA2	• Design and implement efficient file structure using improved programming skills • To acquire the fundamental tools needed to design intelligent, cost-effective, and appropriate solutions to file structure problems with the fundamentals of file structures and their management. • The software and hardware characteristics that combine to make file structure design important to application development and to organize different file structures in the memory. • Effective use of files for storing and retrieving information by choosing appropriate file structure for storage representation. • Understand the data coding technique, apply data compressing algorithms, use file systems interfaces and apply indexing and hashing to file structures • Select file structures techniques, including direct access I/O, buffer packing and unpacking, consequential processing, B-trees, and external hashing and to identify a suitable sorting technique to arrange the data.
21	Java Programming	3MCA3	• Learn Java programming language which can be utilized to develop windows and internet based software solutions.

			• Able to understand and apply the knowledge of object-oriented principles, applets, graphical user-interface for scientific and business oriented applications.
22	Computer Networks	3MCA4	• Learn data transmission models, modulation, multiplexing. • Understand applications of layers such as application layer, transport layer, network layer, data link layer. • Understand the importance of network security and management by analyzing different threats, principles of cryptography, digital signature, internet network management framework.
23	Computer Oriented Optimization Techniques	3MCA5	• Learn dynamic programming concepts. • Learn linear programming and its model. • Understand transportation problem, its types and related optimization techniques. • Learn machine sequencing problem, branch and bound techniques. • Understands the concept of probability OR model. • Learns game theory concepts and able to draw expected pay-off.
24	F.S.D.P. Lab	3MCA6	• Design programs using a variety of data structures such as stacks, queues, hash tables, binary trees, search trees, heaps, graphs, and B-trees. • Analyze and implement various kinds of searching and sorting techniques. • Implement programs of for insert, delete, update records from file. • Design algorithms for hashing techniques.

25	Java Programming Lab	3MCA7	• Able to write Java applications using OOP concept • Learn to create and implement Java applets. • Learn to implement I/O operations with respect to file. • Able to write GUI based windows applications.
26	C.O.O.T. Lab based on 3MCA5	3MCA8	• Learn to implement dynamic and linear programming. • Learn to implement and apply transportation problem and its related optimization techniques. • Implement machine sequencing problem with branch and bound techniques. • Understands and able to use the concept of probability OR model. • Learns to implement game theory concepts, draw expected pay-off.
27	Computer Lab III	3MCA9	• Manage processes/tasks. • Implement multithreaded applications. • Handle Kernel object and learn to manipulate it. • Implement thread synchroniztion and inter-process communication. • Implement programs related to file systems, directories and memory management. • Implement device drivers and perform I/O Programming.
28	Database Management Systems	4MCA1	• Understand concepts of database system architecture. • Able to understand relational model and perform SQL operations. • Understand the importance of normal forms and learn query optimization. • Learns the impotance of transaction processing and concurreny control.

29	Client-Server Computing	4MCA2	• Learn to implement network related programs with concepts of servers and sockets. • Understand JDBC concepts, prepared and callable statements and able to implement database connectivity applications. • Understand and learn effective implementation of Servlet and JSP technologies which is essential component implementing scalable and sturdy enterprise level applications. • Implement Remote method invocation applications for cross-platform data transaction. • Understand and apply the concept of XML for cross-platform transaction of data. • Understand and apply cascading stylesheets. • Learn advanced Java and able to develop enterprise level web applications.
30	Multimedia Technologies	4MCA3	• Define and discuss the Introduction to Multimedia, Identify the multimedia components, Multimedia Authoring and Tools. • Understand the various multimedia software and tools for customized graphic, video and audio designs. • Understand the hardware requirement and Classification multimedia software. • Understand the Graphics and Image Data Representation, Color in Image & Video, Fundamental Concept in Video, Audio. • Understand analog and digital conversion process. • Understand the audio digitization, audio file format and audio software, digital video standards, formats and technology. • Understand the various techniques for Multimedia Data Compression, Image Compression Standards, Basic Video Compression, MPEG Coding Scheme.

31	Electronic Commerce	4MCA4	• Gain a comprehensive understanding of the E-Commerce landscape, current and emergingbusiness models, and the technology and infrastructure underpinnings of the business. • Leverage the E-Commerce platforms to enhance current business or incubate new businesses. • Gain an understanding on how innovative use of the E-Commerce can help developing competitive advantage. • Develop an understanding on how internet can help business grow. • Gain an understanding on the importance of security, privacy, and ethical issues as they relate to E-Commerce.
32	Elective – I (1)Computer Graphics	4MCA5	• To know the foundations & Core Concepts of computer graphics. • To comprehend the concept of geometric, mathematical and algorithmic concepts necessary for understanding computer graphics. • To understand the comprehension of windows, clipping and view-ports object representation in relation to images displayed on screen. • To understand the concepts of Output primitives, 2D-transformations , 2D-Viewing,Structural & Hierarchical Modeling. • To Understand the concepts of GUI & input methods, • To understand the concept of 3D , object representation in 3D, 3D Transformation & Viewing. • To familiarize the students with graphics concepts like clipping, splines, objects modeling, visible surface detection.
33	Elective – I (2)Modeling & Simulation	4MCA5	

34	Database Management Systems Laboratory	4MCA6	• Implement database models, schemas and instances. • Apply the use of constraints, normal forms and relational algebra operations. • Construct queries using SQL for efficient data transaction in a database. • Implement aggregate functions, joins, views and triggers in relational DBMS. • Handle relational database system like Oracle, MySQL by by applying knowledge of DBMS. • Analyze and implement storage and recovery techniques of database system.
35	Client-Server Computing Lab	4MCA7	• Skill to implement network based applications. • Skill to implement database connectivity application using client-server architecture. • Skill to prepare DTDs for differnet web applications. • Skill to write enterprise-level applications using Servlet and JSP. • Skill to develop RMI application for cross-platform data transaction. • Skill to develop component-based programming using beans. • Skill to implement client-side JavaScript modules for server optimization.
36	Multimedia Technologies Laboratory	4MCA8	• Identify and implement the basic tools and components of a multimedia project. • Apply basic elements and principles of photo editing software. • Design and deploy animations using animation editing software. • Prepare and present a multimedia portfolio containing electronic media that demonstrates multimedia and problem-solving skills.

37	E-Commerce Laboratory	4MCA9	• Learn to constructing Document Type Definitions and XML Schema used to validate XML documents. • Develop dynamic web pages using XSL and learn to apply XSLT transformations and formatting to XML documents (XSL, XPath). • Understand Cascading Style Sheets (CSS) and learn various ways to apply it to web pages
38	Seminar	4MCA10	• To analyze a current topic of professional interest and present it before the audience. • To familiar with basic technical writing concepts and terms, such as audience analysis, jargon, format, visuals, and presentation. • Acquired the basic skills to for performing literature survey and paper presentation • To improve skills to read, understand, and interpret material on technology. • To improve communication and writing skills. • Prepare the report.
39	Artificial Intelligence	5MCA1	• Understand the concepts of Artificial intelligence. • Develop intelligent algorithms for constraint satisfaction problems and also design intelligent systems for Game Playing. • Represent knowledge of the world using logic and infer new facts from that Knowledge. • Demonstrate working knowledge in LISP in order to write simple LISP programs and explore more sophisticated LISP code on their own. • Know various AI search algorithms (uninformed, informed, heuristic, constraint satisfaction).

			• Understand the fundamentals of knowledge representation & inference. • Ability to apply knowledge representation & reasoning to the problems.
40	Software Project Management	5MCA2	• Apply the process to be followed in the software development life-cycle models. • Implement communication, modeling, construction & deployment practices in softwaredevelopment. • Analyze & design the software models using unified modeling language (UML). • Explain the concepts of various software testing methods & be able to apply appropriatetesting approaches for development of software. • Explain the quality management & different types of metrics used in software development. • Apply the concepts of project management & planning. • Estimate project cost and perform cost-benefit evaluation among projects. • Perform project scheduling, activity network analysis and risk management. • Apply schedule and cost control techniques for project monitoring including contractmanagement. • Apply quality models in software projects for maintaining software quality and reliability. • Use suitable project organization structure, leadership, decision and motivation styles,proper safety and ethical practices and be responsible to the society.
41	System Administration and Security	5MCA3	• Understand network security, its types, access control, model of internetwork security, internet standards

			• Understand Cryptography , Encryption principles and various algorithms, standardization process, key distribution, public key cryptography and message authentication. • Understand various encryption & decryption algorithms, message authentication process. • Learn various Network security applications like Kerberos, X.509 directory authentication services, e-mail security PGP, MIME , S MIME functionality, IP Security Web Security, Network Management Security (SNMP, SNMPv1 SNMPv2). • Understand System Security concepts like password protection, password selection strategies, Intrusion detection, viruses, Firewall.
42	Management Information Systems	5MCA4	• Apply a framework and process for aligning and organization's IT objectives with business strategy. • Defend the strategic value of information resources for an organization. • Participate in an organization's information systems and technology decision making processes. • Identify ways information systems & technology may improve an organization's performance, including improving organizational processes, decision-making, collaboration, and personal productivity. • Define what a manager should be able to expect from an IT department in an organization. • Build a business case for IT, addressing key IT acquisition decisions such as make/buy; outsource/insource; project management. • Apply a framework for evaluating information-related ethical dilemmas commonly faced by managers.

43	Elective–II (1) Data Warehousing and Data Mining	5MCA5	• Develop research oriented applications of data mining and data warehousing. • Understand the necessity and importance of data preprocessing, data integration, data discretization. • Learn the concepts of OLAP technology, data mining methods, various classification and prediction methods. • Able to apply accuracy and error measures, methods of cluster analysis, graph mining and mining sequence patterns in data.
44	Elective–II (2) Bioinformatics	5MCA5	
45	Artificial Intelligence Lab	5MCA6	• Exhibit strong familiarity with a number of important AI techniques, including inparticular search, knowledge representation, planning and constraint management. • Interpret the modern view of AI as the study of agents that receive percepts from theenvironment and perform actions. • Build awareness of AI facing major challenges and the complexity of typical problemswithin the field. • Assess critically the techniques presented and apply them to real world problems. • Develop self-learning and research skills to tackle a topic of interest on his/her own or as part of a team
46	SPM Laboratory	5MCA7	• Estimate project cost and perform cost-benefit evaluation among projects. • Perform project scheduling, activity network analysis and risk management. • Apply schedule and cost control techniques for project monitoring including contract management. • Apply quality models in software projects for maintaining software quality and reliability.

			• Use suitable project organization structure, leadership, decision and motivation styles, proper safety and ethical practices and be responsible to the society.
47	System Ad and Security Lab	5MCA8	• Identify Vulnerabilities in a Network. • Solve Problems using various Algorithms. • Identify Various Attacks and Formulate Defence Mechanism. • Understand Wireless Security.
48	Mini Project	5MCA9	• Demonstrate a sound technical knowledge of their selected project topic. • Undertake problem identification, formulation and solution. • Practically understand and implement the concept of linking database and front end. • Design solutions to complex problems utilizing MVC architecture. • Demonstrate the knowledge, skills and attitudes as a professional engineer.
49	Project and Dissertation Full Time	6MCA1	• Avail semeseter long experience of industry working. • Get experience to handle and learn state-of-the art software tools and platform. • Develop skill to work as a part of team, leadership qualities. • Able to write technical reports of the project work undertaken. • Prepare furnished human resource for software/IT industry.

S.No.	Name of the course	Course Code	Course Outcome

Programme code	Programme Name	Department
	M.E. (CSIT)	Computer Science

Programme outcome (POs):

PO1: This program develops human resource with technical skills in the field of Computer Science and Information Technology. This is the best combination of advance Computer science knowledge and it's practical applications in IT industries as well as business, development, administration, system designing and as a researcher.

PO2: This program develops human resource for with the ability to design solutions through research for complex problems and design system components or processes that meet the specified needs with appropriate consideration for the societal and environmental considerations.

PO3: Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.

PO4: Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.

PO5: Communicate effectively in a variety of professional contexts

PO6: Apply computer science and information technology theory and develope computing-based solutions for the society.

Programme Specific Outcomes (PSOs):

PSO1: Students will be able to understand the concept of wireless communication, radio propagation over wireless channels, learn the concepts of systems standards, understand spread spectrum technology, multiple access wireless communication, GSM, GPRS, imode, UMTS, Wireless data networks, RFID, wireless information security, convergence-3G, Future Trends, 4G.

PSO2: Students will be able to apply imaging system knowledge to find imaging system issues, acquire images, find image quality, apply signal processing to acquire images, learn signal & image processing, image resampling, apply super resolution, image debluzzing,image contrast enhancement, non uniformity correction, time scale, image fusion, performance measurement.

PSO3: Students will be able to learn and apply the concepts of software engineering, testing and reliability while dealing with big software projects/ modules in the software industry.

PSO4: Students will be able to learn and apply the concepts of distributed databases management system and standard data minig / data warehousing techniques used in the industry.

PSO5: Students will be able to adapt the skills to implement effective solutions for need based problems by applying knowledge gained through different architectures and models, tools and software covered in the syllabus to have optimum solution through best suited algorithms for the problem.

PSO6: Students will be able to acquire adequate skills to design and analyse the distributed nature of the system. Able to learn working of distributed systems, its models, different architectures and type of operating systems in distributed nature. It's communication protocols, interprocess communication, remote communication, synchronisation, distributed file and memory management, system management through load balancing.

PSO7: Students will be able to acquire adequate skills to protect the data through different algorithms and techniques, mobile security, ICT security, forensics techniques, hacking, cracking, scanning and sniffing tools and various vulnerabilities.

PSO8: Preapare students with knowledge of solving critical problems in area of types of equations, floatimg point representations, numerical differentiation and numerical integration with various iterative, matrix and other relevant techniques.

PSO9: To provide a sound knowledge of database management system to the candidate , so that they can apply this knowledge in development of various projects for the enterprises with efiiciency and conveniency.

PSO10: students will get the knowledge of recent trends in computer architecture, advanced frameworks, various techniques like parallelism, memory hierarchy, and requirements of recent applications.

PSO11: Students will understood the concept of Embedded System, software and hardware architecture of the embedded system, various tools for embedded system application development and recent trends in area along with use in advanced topics like IoT.

Course Outcomes (COs):

S.No.	Name of the course	Course Code	Course Outcome
1	Advanced Computer Architecture	1RNME1	• Understand the theory and architecture of central processing unit. • Analyze some of the design issues in terms of speed, technology, cost, performance. • Design a simple CPU with applying the theory concepts. • Use appropriate tools to design verify and test the CPU architecture. • Learn the concepts of parallel processing, pipelining and interprocessor communication. • Understand the architecture and functionality of central processing unit.

			• Exemplify in a better way the I/O and memory organization.
2	Distributed Operating System Design	1RNME2	• Able to learn Distributed Computing • Able to learn Distributed Computing Models • Able to understand various designing isses in Distributed Systems • Able to understand Remote communication in Distributed systems • Able to understand Distributed systems management with all its resources
3	Distributed Database Systems	1RNME3	• Understand and analyze distributed databse management system concepts, design issues. • Understand distributed file systems, distributed shared memory concepts. • Understand interprocess communication, synchronization, processes, process migration and load balancing in distributed databse management systems. • Understand the importance of normal forms and learn query optimization. • Learns the impotance of transaction processing and concurreny control in distributed computing environment • Learn the concept of data warehousing and data mining. • Analze performance of Market basket analysis, Apriori and other standard algorithms.
4	Wireless Communication & Network Computing	1RNME4	• Understand the concept of wireless communication present scenario and its fundamentals, source coding, channel coding. • Understand radio propagation over wireless channels and brief overview of channel models.

			• Learn the concepts of wireless communication systems standards, MAN, WLAN, WMAN, mimo. • Understand Spread spectrum technology, multiple access wireless communication, GSM. • Learn to use GPRS, imode, UMTS, Wireless data networks, RFID. • Able to apply the knowledge to connecting the last mile, wireless Information Security, convergence-3G, Future Trends, 4G.
5	Elective I (1) Expert System Design & Intelligent Systems	1RNME5	• Able to understand the introduction to ES, Overview of AI, Intelligent systems, knowledge representation, principles & techniques evaluating &comparising ES. • Understanding of TMS, Nonmonotonic justification, maintaining multiple contacts. • Analyses the rule based systems, Canonical systems, production systems, production systems, associate nets & frame systems, OOAD for ES. • Students able to determine the fuzzy systems foundation of fuzzy systems, fuzzy relations, and arithmetic operations of fuzzy numbers, linguistic descriptions and their analytical forms. • Students able to understand the genetic algorithms and evolutionary programming, evolutionary programming, genetic-algorithm based machine learning classifier system. • To explain the swarm intelligent systems, engineering applications of PSIS and future research. • Analyze system with artificial Neural Networks, functional link neural networks, cascasde correlation neural networks.
6	Elective I	1RNME5	• Able to understand the Different types of algorithms and

	(2) Algorithmics		evolutionary programming, evolutionary programming, genetic-algorithm • Analyze system with various algorithms. • Study and analysis of the practical problems based on the algorithms
7	Elective I (3) Information Technology Management	1RNME5	• To learn about the concepts and principles of Information Technology Management • Understanding the concept of Information Technology Management and various services provided. • Understanding of characteristics, fundamentals and infrastructure of Information Technology Management System. • To explore both the concepts and practical issues Information Technology Management • To develop skills of finding solutions and building software for Information Technology Management.
8	CSIT Lab-I	1RNME6	• To implement FCFS scheduling using JCreator • To implement deadlock JCreator LE • To implement process synchronization using Jcreator LE • Program to create one Grid resource with three machines • Program to creates Gridlets and sends them to a grid resource entity • PPogram to how two GridSim entities interact with each other • program to read a string from a user, and print that string back to the QtSpim console. • Design program for a functions NOT using a stack in the QtSpim Simulator. • Study of drcachesim Cache Simulator for DynamoRIO API. • Study of EasyCPU, Little Man Computer, and RTLSim.

9	CSIT Lab-II	1RNME7	• To perform plot function using freemat • create simple client to server wireless scenario using omnett++ • Create Network Using Router And Switches, create OSPF configuration in NETSIM • Neuroph Studio Tool.V2.92 • to create and train MaxNet network • Implement Genetic Algorithm with example by using BETA (IDE). • Implement Fuzzy Logic along with example using BETA Tool. • To perform prediction using Glue viz. • To perform K-means clustering using orange. • To perform text mining using orange. • To perform linear correlation matrix using KNIME • To perform the study of oracle data mining tool. • To perform the study of IBM Cognos tool.
10	Seminar & Technical Paper Writing	1RNME8	• To study the latest happenings in the field of IT for understanding of a new field, to summarise and review them. • Provide an opportunity to pursue their interest in research, theoretical and experimental approach. • To effectively communicate by making an oral presentation before an evaluation committee • To impart skills in preparing details report describing the research and results.
11	Real Time Embedded Systems	2RNME1	• Know what an embedded system is. • Understand the general process of embedded system development.

			• Different design platforms used for an embedded systems application. • Comprehend important embedded system terminology. • Experience common aspects of embedded system development. • Understanding of what an embedded system R&D project is, and the activities it involves. • Suggestion of own product concepts. • Understanding of a concept presentation. • Ability to use ANSI C to develop embedded software. • Interface to peripherals, knowledge of typical interfacing standards. • Development of prototype circuit on breadboard.
12	Performance Analysis for Imaging Systems	2RNME2	• Understand basic principles of imaging, imaging system, Performance and imaging system issues. • Able to acquire images, find image quality, apply signal processing to acquire images and evaluate the performance. • Learn signal & image processing, image resampling and apply it to observe performance issues. • Understand and apply super resolution, image debluzzing, performance analysis. • Able to use image contrast enhancement, non uniformity correction, and observe performance issues. • Understand time scale, image fusion, performance measurement.
13	Information Technology & Security	2RNME3	• Able to understand Data security Techniques • Able to understand Mobile security and Forensics techniques • Able to understand scanning and sniffing tools • Able to understand Hacking, cracking and various vulnerabilities

			• Able to understand Incident Handling
14	Software Engineering, Testing & Reliability	2RNME4	• Understand various phases of Software Devlopment Life Cycle • Understand the concept of system, it's characteristics and types. • Understand various Software development Models viz. Waterfall, Rapid Develpoment, Prototype etc. • Understand software process framework , requirement modeling approaches, Software design, Software quality Assurance (SQA) • Able to apply software metrics and software reliability. • Distinguish characterstics of various testing methods. • Design and conduct a software test process for a software testing project. • Understand and identify various software testing problems and able to solve these problems by designing and selecting software test models, criteria, strategies, and methods. • Able to apply software testing knowledge and engineering methods. • Able to prepare SRS (Software Requirement Specification)
15	Elective II (1) Advanced Compiling Techniques	2RNME5	• To learn about the concepts and principles of Advanced Compiling Techniques • To explore both the concepts and practical issues of Advanced Compiling Techniques • To develop skills of finding solutions and building software for Advanced Compiling Techniques based applications.
16	Elective II (2) Mobile Computing	2RNME5	• To learn about the concepts and principles of mobile computing.

			• Understanding the concept of cellular concept, mobile communication systems, ad hoc and sensor network, wireless MANs, LANs and PAN's, multimedia services requirement. • Understanding of characteristics, fundamentals and infrastructure of cellular system. • Knowledge of satellite system, network protocol, Ad Hoc andsensor network, Wireless MAN's, LAN's and PAN's. • Illustrate the concept of mobile ratio propagation, types of radio waves, propagation mechanism, free space propagation, land propagation, path loss. • Understanding of slow fading, fast fading, Doppler Effect, delay spread, coherence bandwidth,inter symbol and co-channel interferences. • To explore both the concepts and practical issues of mobile computing. • To develop skills of finding solutions and building software for mobile computing applications.
17	Elective – II (3) Digital Media Development	2RNME5	• To learn about the concepts and principles of Digital Media Development • To explore both the concepts and practical issues of Digital Media Development • To develop skills of finding solutions and building software for Digital Media Development applications.
18	CSIT LAB – III	2RNME6	**Based on Real Time Embedded Systems:** • Ability to study differenttools/software like EMU-8086, GUI Turbo Assembler, LabView, Keil uvision-5, Xcode, Android Studio. • Able to Design a Traffic light control system calculator by using 8086 microprocessor.

			• Able to create a stepper motor controller and snake game by using EMU-8086. • Able to convert the string by using 8086 microprocessor. • Able to make your own calculator by using LabView software. • Able to create a virtual instrument “Thermometer” that converts Celsius to Fahrenheit using the F= (9/5 *C) +32 formula by using LabView software. • To perform a Bit operation, Bank operation and LED Blinking operation by using Keiluvision software. **Based on Performance Analysis for Imaging Systems:** • Ability to study different tools/software like GNU Octave, Matlab, OpenCV, Scikit-Image. • Able to perform trigonometric function and axis function in octave. • To perform graph on data point by using GNU Octave. • Able to plot 3D graph, smoother graph by using GNU Octave. • To plot filter design and mesh grid in octave. • Able to perform a basic Gray level transformation and Image enhancement by using Matlab • To perform most basic Morphological operations, histogram equalization and edge detection in Matlab.
19	CSIT LAB – IV	2RNME7	**Based on Information Technology & Security:** • Ability to study differenttools/software like Autospy, Fiddler, Wireshark, PuTTY, Zenmap. • To view delete file, delete file information and recover it by using Autospy software. • Able to view a file by its extension and its size by using Autospy software.

			• To find session and monitor web session by using Fiddler software. • Able to trace the packets of the wifi connection in Wireshark. • To perform Intense scan, Ping scan, Quick scan plus in Zenmap. • Able to perform Quick Traceroute and TCP scan in Zenmap. **Based on Software Engineering, Testing & Reliability:** • Ability to study different tools/software likeDia, Soap UI, Neoload, Ranorex, TestComplete. • Create a component diagram for Bank management system and ER diagram for hotel management system by using Dia. • Create a use- case diagram for tour management system and library domain model by using Dia. • Find out complexities & create route testing for ATM transaction using Dia software. • To perform a positive load testing on web browser by configuring a default server for different pages, request & users by considering response time, response error and alerts by using Neoload testing tool. • Ability to perform a load & stress testing using the custom load variation policy by considering time policy & maximum numbers of users for small & big city population by using Neoload testing tool & display in the form of graph. • Able to perform a negative load testing on web browser by configuring particular server for different pages, requests, users by considering response time, error, alerts by using Neoload testing tool. **Based on Mobile Computing:**

			• Ability to study different tools/software like J2ME(Java 2 Platform, Micro Edition),corona simulator, AngularJS, PhoneGap, firebase tool. • Write programs to implement HelloWorld MIDlet and write the program on to create a photoablum in that to test Chart graph by using J2ME tool. • Create a MIDlet application which contain the multiple games and also create a program which creates to cut, copy, past, delete, select all, unselect all kind of menu by using J2ME • Create a Frame animation and a Flashlight on mobile screen by using corona simulator. • Write program to display the “Hello World!” and create a collision between two objects(fish) using corona simulator. • Write program of container graphics and for moving the fishes on the mobile screen using the corona simulator. • Able to write program on AngularJScontollert,AngularJS operation and apply Bootstrap CSS to AngularJS Form.
20	Seminar	2RNME8	• To study the latest happenings in the field of IT for understanding of a new field, to summarise and review them. • Provide an opportunity to pursue their interest in research, theoretical and experimental approach. • To effectively communicate by making an oral presentation before an evaluation committee
21	Seminar & Dissertation	3RNME1	• To study the latest happenings in the field of IT and the research in the domain of IT for understanding of a new field, to summarise and review them. • Provide an opportunity to pursue their interest in research, theoretical and experimental approach.

			• To effectively communicate by making an oral presentation before an evaluation committee
22	Seminar & Dissertation	4RNME1	**Knowledge:** • To study research papers for understanding of a new field, to summarise and review them. • Provide an opportunity to pursue their interest in research, theoretical and experimental approach. • To effectively communicate by making an oral presentation before an evaluation committee. • Knows basic statistical methods used to describe variables, describe relationships between variables, and to verifyresearch hypotheses through inferential statistics. • Understands the methods and its advantages and limitations. • Knows the basic concepts of intellectual property and uses them in academic life. **Skills:** • To impart skills in preparing details report describing the project and results. • The student is able to find, analyses, evaluate, select and integrate information using various sources, also from fields of knowledge and from critical judgments on its basis, as an exit point to planning his own studies. • Can formulate research questions and hypotheses, and operationalize them. Can create a research plan adequate tothe research question. • To enable the students to identify a topic of interest and complete the preliminary work of undertaking case studies, data collection and feasibility studies.

			• Students get guidance to formulate and develop a design proposal and to effectively communicate the same. • Has advanced research skills, research tools and conducting experiments, whichallow for solving complex problems in research.