DEPARTMENT OF COMPUTER SCIENCE
PROGRAMME: MCA (MASTER OF COMPUTER APPLICATIONS)

PO No.	Programme Outcomes Upon completion of the MCA Programme, the graduate will be able to
PO-1	Acquire the abilities in Computing, Aptitude and Accounts to find novel solutions for the complex problems in IT field.
PO-2	Acquire the knowledge to understand and analyze the problem, design a paradigm and to develop a software product to cater the needs of Industry and Society
PO-3	Instill the confidence in students for self learning to update the current trends in IT to become an efficient Professionals
PO-4	Understand the Code of Ethics and Standards of the computer Professionals and develop the young minds with Social responsibilities and commitments
PO-5	Apply the Management principles and skills to develop a software product as a team member and effectively manage the team as well as the product

PSO No.	Programme Specific Outcomes Upon completion of these courses the student would
PSO-1	Acquire academic excellence with an aptitude for higher studies and research
PSO-2	Understand the concepts of programming, computation and management and apply them in the field of Computer Science
PSO-3	Apply the skills gained to analyse, design and to develop effective software products
PSO-4	Understand the recent technologies and tools to provide innovative ideas and solutions to the existing problems.
PSO-5	Apply the managerial skills in working environment to work effectively with other team members
PSO-6	Apply the appropriate Software Engineering practices to deliver a Quality products catering to the needs of Industry and Society at a large.

SEMESTER I

Course Title	Paper I – Computer Fundamentals and Programming in C	
Code	MCA 1.1	
CO No.	**Course Outcomes**	
CO-1	Understand and design a computational solution for a given problem.	
CO-2	Analyze the flow of the program and various stages in program execution.	
CO-3	Learn the basics of C and the programming constructs.	
CO-4	Apply structures, strings, arrays, pointer and files for solving complex computational problem.	
CO-5	Implement the User defined functions and files in real time Problems.	
CO-6	Able to develop software for solving mathematical and real time problems	

Course Title	Paper II – Data Structures	
Code	MCA 1.2	
CO No.	**Course Outcomes**	
CO-1	Understand the fundamentals of Data Structures and basic concepts of String Processing, Linear Arrays, Records and Pointers.	
CO-2	Analyze the representation of Linked Lists in memory, Stack, Queues and implement real time applications in Stack and Queues.	
CO-3	Explore the structure of Trees, basic operations of Trees, analyze and illustrate the algorithms.	
CO-4	Apply data structures and algorithms in real time applications.	
CO-5	Analyze the various algorithm design and implementation.	
CO -6	Develop solutions using advanced algorithms for various kinds of problems.	

Course Title	Paper III – Discrete Mathematical Structures
Code	MCA 1.3

CO No.	Course Outcomes
CO-1	Understand the fundamentals of Logic-Prepositional Equivalences-Truth tables-Tautologies-Predicates and Quantifiers-Sets- -Sequences and Summations -Growth functions - relations and their properties
CO-2	Know the basics of Counting- Pigeonhole Principle- Combinations and Permutations-Generalized Per mutations and Combinations
CO-3	Solving Recurrence Relations-Divide and Conquer relations- Inclusion and Exclusion-Applications of Inclusion-Exclusion.
CO-4	Understand Graphs-Terminology-Relations and Directed Graphs - Representations of Graphs- Isomorphism-Connectivity- Euler and Hamiltonian Paths - Shortest Path problems- Planar Graphs - Graph Coloring-
CO-5	Acquire the knowledge of trees- Applications of trees- Traversals-Trees and sorting-Spanning Trees-Minimum Spanning Trees.
CO-6	Understand Boolean Functions-Representing Boolean Functions -Logic Gates-Minimizations of Circuits-Languages and Grammars- Finite State Machines with and with no output.

Course Title	Paper IV – Computer Organization
Code	MCA 1.4

CO No.	Course Outcomes
CO-1	Recall and relate the various number systems.
CO-2	Explain the Sequential Circuits and Combinational Circuits.
CO-3	Illustrate the concepts of instruction cycle, instruction code and I/O interrupts.
CO-4	Differentiate different types of addressing modes.
CO-5	Summarize on memory organization.
CO-6	Acquire the knowledge of working principles of computer systems

Course Title	Paper V – Management Accountancy
Code	MCA 1.5

CO No.	Course Outcomes

1.	Understand the nature of accounting ,systems of accounting, concepts and yhe procedure to prepare the trail balance
2.	Explain the financial statements , trading account, profit and loss account and balance sheet with illustrations.
3.	To give an input to find a solution to the problem of liquidity through financial analysis and also explain ratio analysis and funds flow analysis, working capital cycle.
4.	Explain the cost control techniques like budgetary control through budgets and types of budgets.
5.	Understand the marginal costing technique , CVP analysis and the calculation of BEP and its applications.
6.	Explain the Computerized accounting system, coding of logic and codes required and also to understand different files and outputs obtained.

SEMESTER II

Course Title	Paper I – Probability, Statistics & Queuing Theory
Code	MCA 2.1

CO No.	Course Outcomes
CO-1	Discuss the concepts and definitions of Probability theory, Specify the theorems on probability.
CO-2	Explain the discrete and continuous probability distributions and also mathematical expectation concepts
CO-3	Describe concepts of the sampling theory like population, parameter, sample, statistic and so on.
CO-4	Explain the concepts and properties in Testing of hypothesis like proportion tests and mean tests
CO-5	Describe the Small Sample Tests like Test for means, Test for goodness of fit etc.,
CO-6	Define and Explain the Queueing models like FIFO, LIFO, etc.,

Course Title	Paper II – Database Management Systems
Code	MCA 2.2

CO No.	Course Outcomes
CO-1	Explain the basic concepts of database system and fundamental relational algebraic operations.
CO-2	Explain, Apply SQL queries, Create ER model for any database applications.
CO-3	Explain the normalization techniques; learn the basic idea of object – based database.
CO-4	Describe the physical storage media and file structure, compare the file organization techniques; understand, analyze & compare Indexing & Hashing techniques.

CO-5	Discuss the concepts of Transaction and Concurrency control, classify the database system architecture, Understand and apply SQL queries.
CO-6	Acquire the knowledge of working with database.

Course Title	Paper III – Object Oriented Programming With C++ & JAVA
Code	MCA 2.3

CO No.	Course Outcomes
CO-1	Describe the principles of object – oriented programming.
CO-2	Apply the concepts of data encapsulation, inheritance, and polymorphism to large– scale software.
CO-3	Investigate the concepts of Graphical User Interfaces.
CO-4	Test and Formulate problems as steps so as to be solved systematically.
CO-5	Develop C++ & Java applications for problems in current scenario.
CO-6	Apply the programming concepts of Java to solve real time problems.

Course Title	Paper IV – Formal Languages & Automata Theory
Code	MCA 2.4

CO No.	Course Outcomes
CO-1	Understand the basic Concepts of Finite State Systems, Chomsky Hierarchy of Languages, Deterministic and Non-Deterministic Finite Automata, Regular Expressions.
CO-2	Know the Formal Languages and Grammars, Regular Sets and Regular Grammars, Pumping Lemma for Regular Sets, Decision Algorithm for Regular Sets, Minimization of Finite Automata.
CO-3	Context Free Grammars and Languages, Derivation Trees, simplification of Context Free Grammars, Normal Forms, Pumping Lemma for CFL, Closure properties of CFL"s.
CO-4	Concepts of Push-Down Automata and Context free Languages, Parsing and Push-Down Automata.
CO-5	Turing Machine, Construction of Turing Machines, Combining Turing Machines. Universal Turing Machines. The Halting Problem, Decidable & Undecidable Problems - Post Correspondence Problem.
CO-6	Understand the basic Syntax of the Prepositional Calculus & Predicate Calculate Calculus

Course Title	Paper V – Information Systems & Organizational Behavior	
Code	MCA 2.5	
CO No.	**Course Outcomes**	
CO-1	Recognize, Explain the concept of Organization, Background and Foundation of Organizational Behavior.	
CO-2	Explain the models of Man, Personality and learning; analyze the behavior of individuals and groups in organizations.	
CO-3	Discuss the concepts of Attitude, Motivation & Work stress, apply Stress Management in the Personal life.	
CO-4	Describe, Analyse the concepts of Interpersonal behavior, Explain group dynamics & group decision making, compare the different leadership styles and apply them in life situation.	
CO-5	Explain the Organization theory; Compare the various organization structures, Differentiate centralization & decentralization.	
CO-6	Develop good personality as an effective employee in an organization	

SEMESTER III

Course Title	Paper I – Computer Networks
Code	MCA 3.1
CO No.	**Course Outcomes**
CO-1	To educate concepts, vocabulary and techniques currently used in the area of computer networks.
CO-2	To study protocols, network standards, the OSI model, cabling, networking components, and basic LAN design.
CO-3	To accumulate existing state of the art in network protocols, architectures, and applications.
CO-4	To be familiar with contemporary issues in networking technologies.
CO-5	Analyze the various concepts of networks related to OSI and TCP reference models
CO-6	To know various networks such as Wireless Ad-hoc Networks, Sensor Networks, MANETs etc.

Course Title	Paper II – Artificial Intelligence and Expert Systems	
Code	MCA 3.2	
CO No.	**Course Outcomes**	
CO-1	Educate concepts of AI , Terminology of AI, describe agents and its environments	
CO-2	Describe concepts of informed and uniformed search strategies	
CO-3	Explain local search algorithms and optimization problems	
CO-4	Describe knowledge based agents, propositional logic and reasoning patterns in propositional logic.	
CO-5	Explain the concept of uncertainty and uncertain reasoning	
CO-6	Describe the expert systems, applications and domains of expert systems.	

Course Title	Paper III – Design and Analysis of Algorithms	
Code	MCA 3.3	
CO No.	Course Outcomes	
CO-1	Ability to analyze the performance of algorithms.	
CO-2	Ability to choose appropriate algorithm design techniques for solving problems.	
CO-3	Ability to understand how the choice of datasructures and the algorithm design methods impact the performance of programs.	
CO-4	To clear up troubles the usage of set of rules design methods including the grasping approach,devide and overcome, dynamic programming . backtracking and department and criteria.	
CO-5	To understand the variations among tractable and intractable problems	
CO-6	To introduce p and np classes	

Course Title	Paper IV – Operating Systems	
Code	MCA 3.4	
CO No.	Course Outcomes	
CO-1	List and Recognize the various types of operating system.	
CO-2	Explain, Discuss, Compare and Contrast the various scheduling algorithms	
CO-3	Describe, Compute and choose the correct scheduling algorithm for the given problem	
CO-4	Explain the Deadlock concepts and Memory Management Techniques	
CO-5	Discuss the concepts of file systems and mass storage structure, explain the different allocation methods, compare	
CO – 6	Acquire the knowledge of operating system software	

Course Title	Paper V – **Web Technologies**	
Code	**MCA 3.5**	
CO No.	**Course Outcomes**	
CO-1	Explain features of E- commerce, and its applications	
CO-2	List types of Web pages and dynamic web pages with examples	
CO-3	Describe active server pages, Java servlet with examples	
CO-4	Discuss the importance of Java Remote method invocation in sever side applications	
CO-5	Explain the significance of Electronic data interchange in international trade, Architecture of EDI	
CO-6	Discuss the emergence of Wireless application protocol, WAP and it's future	

SEMESTER IV

Course Title	Paper I – **Information Security and Cryptography**	
Code	**MCA 4.1**	
CO No.	**Course Outcomes**	
CO-1	Explain the fundamentals of network security.	
CO-2	Learn the encryption and digital signature techniques.	
CO-3	Illustrate various encryption techniques with applications involved.	
CO-4	Develop enhanced network security algorithms	
CO-5	Analyze the various concepts of networks related to OSI and TCP reference models	
CO-6	Explain the Message Authentication and Hash algorithms	

Course Title	Paper II – Operations Research	
Code	MCA 4.2	
CO No.	**Course Outcomes**	
CO-1	Overview of Operations Research methodologies	
CO-2	Explain different Operations Research Techniques and Procedures	
CO-3	Assessing variant Operations Research Terminologies to evaluate complex problems	
CO-4	Evaluating complex Simplex methods to obtain proper solutions	
CO-5	Discuss complete solutions for Linear Programming Problem	
CO-6	Analyze the Techniques and concepts of Operations Research	

Course Title	Paper III - Elective I - Computer Graphics	
Code	MCA 4.3.2	
CO No.	**Course Outcomes**	
CO-1	Explain Computer Graphics applications and describe Graphic devices and explain I/O devices	
CO-2	Explain different Graphic conversion algorithms and evaluate their applications.	
CO-3	Explain Window and Clipping algorithms and evaluate their mathematical applications.	
CO-4	Explain 2D transformations and evaluate their mathematical applications.	
CO-5	Explain three dimensional perspectives. Geometry and explain different methods	
CO-6	Explain structures and hierarchical modeling methods	

Course Title	Paper IV – Object Oriented Software Engineering
Code	MCA 4.4

CO No.	Course Outcomes
CO-1	Define software, explain the nature of software, software process and software engineering practice, explain and compare the various models.
CO-2	Discuss the requirements, analyze and design the various requirement models.
CO-3	Explain the design concepts, analyze and apply the concepts to design architectural, component level & User interface models, list the golden rules.
CO-4	Explain the quality concepts, Software Quality Assurance tasks, discuss the strategies of testing, explain the types of testing.
CO-5	Explain the Product, process & project metrics, discuss the estimation modeling, understand the emerging trends, Prepare a Product.
CO-6	Become an efficient software developer.

Course Title	Paper V – Data Warehousing and Data Mining
Code	MCA 4.5

CO No.	Course Outcomes
CO-1	Realize the basic terminologies of Data mining principles and techniques
CO-2	Preprocess the data by using various Techniques and algorithms
CO-3	Understand the Data warehousing Models and Architecture
CO-4	Analyzes the various algorithms in Data Mining
CO-5	Identifies different applications involved in Data Mining
CO-6	As a Data analyst can analyze the present data and predict the future events of various fields.

Course Title	Paper I – Wireless and Ad-hoc Networks	
Code	MCA 5.1	
CO No.	Course Outcomes	
CO-1	To understand the basics of Ad-Hoc & Sensor Networks.	
CO-2	To learn various fundamental and emerging protocols of all layers in Ad-Hoc Network.	
CO-3	To study about the issues pertaining to major obstacles in establishment and efficient management of Ad-Hoc and Sensor Networks.	
CO-4	To understand the nature and applications of Ad-Hoc and Sensor Networks.	
CO-5	To understand various security practices and protocols of Ad-Hoc and Sensor Networks.	
CO -6	Build sensor networks in various fields.	

Course Title	Paper II – Cyber Security
Code	MCA 5.2
CO No.	Course Outcomes
CO-1	Educate concepts of information security, principles and concepts of data security
CO-2	Explain the data leakage, Data protection and DLP limitations
CO-3	Describe basic concepts of cyber security and domains of cyber security policy
CO-4	Explain cyber security evolution and it's challenges
CO-5	Describe cyber security metrics, security management goals and security frame works.
CO-6	Explain the cyber user issues and the cyber conflict issues like cyber welfare

Course Title	Paper III – Big Data Analytics	
Code	MCA 5.3	
CO No.	Course Outcomes	
CO-1	Explains the fundamentals and categorize and summarize Big Data and its importance.	
CO-2	Identifies the usage of big data analytics and its applications	
CO-3	Summarizes operational issues of big data in various environments	
CO-4	Differentiate various Big data technologies like Hadoop MapReduce	
CO-5	Distinguish various big data analytic systems and apply tools and techniques to analyze Big Data.	
CO-6	Use advanced big data technologies for handling massive volume of data	

Course Title	Paper IV – Elective II - Cloud Computing	
Code	MCA 5.4.1	
CO No.	Course Outcomes	
CO-1	Discuss the fundamental concepts in cloud.	
CO-2	Analyze the cloud enabling technologies.	
CO-3	Know and explain the Infrastructure oriented mechanisms.	
CO-4	Comprehend the Cloud security mechanisms.	
CO-5	know and distinguish the delivery models from provider and consumer perspective.	
CO-6	Develop secure cloud based applications.	

Course Title	Paper V – Elective III - Software Testing and Quality Assurance
Code	MCA 5.5.3

CO No.	Course Outcomes
CO-1	Discus the Software Testing strategies
CO-2	Analyze the Software Quality Assurance concepts
CO-3	Assessing Software Terminologies and their importance
CO-4	Take the necessary steps to overcome the problems during the software developr In Testing
CO-5	Distinguish various techniques to rectify the errors and enhance the quality in th software development
CO-6	In Software development, the Software Testing and Quality Assurance plays a vi role.

SEMESTER VI

Course Title	Project Work
Code	MCA 6.1

CO No.	Course Outcomes
CO-1	To understand the web designing process based projects.
CO-2	To understand the changes occurring in the field of software through IEEE projects.
CO-3	To review latest technologies and innovation in the field of Industry.
CO-4	To assess the coding process given by the students.
CO-5	Elevate the students to meet the global standards.
CO-6	To give an input to present the project on different areas which are suitable to the present scenario.

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