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Branch: Department of MCA	
Name of Subject: Programming in C With Data Structures	
Subject Code: MCA-101	
Student will be able to:	
CO1	Enhance skills on problem solving and C Programming basics.
CO2	Assess suitability of programming concepts in C like Arrays, functions, Dynamic memory allocation, file handling for solving specific problems.
CO3	Illustrate the underlying principles, theories and applications of data structures.
CO4	Evaluate the efficienoy and performance of different linked list structures, such as singly linked list circular linked list, doubly linked lists in terms of specific operations.
CO5	Illustrate primitive operations on different types of trees and their applications.

Name of Subject: Statistical Mathematics	
Subject Code: MCA-102	
Student will be able to:	
CO1	To know the application of matrix and implementation in the computer.
CO2	Assess suitability of functions of single and multiple variables through the theoretical and numerical concepts of limit continuity and differentiation and theorems.
CO3	To understand about sampling and distribution Calculate different types of test related to distribution.
CO4	Evaluate the probability and probability distribution also estimate probability density function (PDF), probability mass function (PMF) and their properties.
CO5	To derive basic proof techniques and study about graphs and logics.

Name of Subject: Operating system and Architecture	
Subject Code: MCA – 103	
Student will be able to:	
CO1	Identify the skills of Computer Architecture including Registers and Micro operation.
CO2	Assess suitability of Operating system, Types of OS, OS Concept and Structure and Scheduling Algorithms.
CO3	Identify the problems of memory management in the system and configure as per the application needs.
CO4	Explain non-contiguous memory allocation methods using page replacement algorithms.
CO5	Elaborate various issues related to concurrent processing, Inter process communication and Deadlocks.

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Name of Subject: Information Technology	
Subject Code: MCA – 104	
Student will be able to:	
CO1	Analyze the physical layer, network layer and Application layer protocols for developing IOT application.
CO2	Classify the Geographic information System and its components, methods, working and application.
CO3	Utilization of the Information Security including malicious programming, cryptography under identification and authentication.
CO4	Identify the branches of Artificial Intelligence on the various aspects and its need.
CO5	Explain the performance of distributed computing, cluster computing and grid computing.

Name of Subject: Communication Skills	
Subject Code: MCA – 105	
Student will be able to:	
CO1	Apply effective listening skills and public speaking in their professional career and interpersonal context.
CO2	Utilize reading and writing skills in their personal and occupational growth.
CO3	Implement verbal and non-verbal communication to build impactful relationship with others.
CO4	Solve their day to day problems by applying time and stress management along with leadership skills.
CO5	Apply interview skills to crack the rounds of their company recruitment.

Name of Subject: C and DS LAB	
Subject Code: MCA – 106	
Student will be able to:	
CO1	Able to apply control structure looping functions to solve logical problems.
CO2	Utilize pointer and array to solve memory allocation related problems.
CO3	Design and store data permanently in file system.
CO4	Apply stacks, queue to evaluate mathematical equation.
CO5	Apply suitable searching and sorting various types of data efficiently

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Name of Subject: OS LAB	
Subject Code: MCA – 107	
Student will be able to:	
CO1	Design a. program simulate the concept of Dining-philosopher problem.
CO2	Develop programs to implement various scheduling algorithms.
CO3	Develop programs to implement various resource allocation techniques.
CO4	Design a program for Page Replacement Algorithms such as FIFO and LRU.
CO5	Compare different CPU algorithm in different situations.

Name of Subject: DBMS	
Subject Code: MCA – 201	
Student will be able to:	
CO1	Analyze DBMS concept such as database security, Integrity and Concurrency.
CO2	Apply various integrity constraints Primary Keys, Alternate keys,Candidate Keys and Foreign Keys an Check constraints in database to built various types of database application.
CO3	Design a database and solving problems using normalization. of the database using normalization concept and SQL.
CO4	Solve the SQL Queries and apply DDL and DML to manage a Database and analyze various real time problems through SQL.
CO5	Design the application on the basis of given rules and architecture of the database.

Name of Subject: Computer Network	
Subject Code: MCA – 202	
Student will be able to:	
CO1	Describe the hardware and software components of a network and its interrelations, functioning of layers and protocols of OSI reference model.
CO2	Identify the Concept of Protocols and understand the various types of protocols including FDDI Protocol and DQDB Protocols.
CO3	Understand and apply the various components of networks such as Repeaters, Hubs, Bridges, Switches, Routers and Gateways to solve network problems.
CO4	Solve the problems of single destination and single source with single pair of the shortest path using Dijkstra and Bellman-Ford Algorithm.
CO5	Design a network in which a printer shares among number of computers.

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Name of Subject: Software Engineering and UML	
Subject Code: MCA – 203	
Student will be able to:	
CO1	Explain software Engineering and various types of models such as Waterfall Model, Spiral Model and Prototype Model and apply to solve in suitable projects .
CO2	Identify the Software Architecture, Cohesion, Coupling, Abstraction and Modularity.
CO3	Build the Various Diagrams such as Use Case Diagram, Class Diagram, State Diagram, Sequence Diagram, Activity Diagram and Deployment Diagram to explain the entities and flow function in the project.
CO4	Examine the challenges of software maintenance, types of maintenance and maintenance report.
CO5	Design the software by implementing the basic design, principles and methodologies.

Name of Subject: Algorithm Design	
Subject Code: MCA – 204	
Student will be able to:	
CO1	Explain the backtracking and branch & bound methods.
CO2	Apply the greedy paradigm to solve the mathematical and scientific problems.
CO3	Evaluate the use of stack, queue and linked list data structures.
CO4	Apply binary search trees, basic search and traversal techniques for tree and graphs.
CO5	Construct the N-Queens problem and also identify the four-queen and eight-queen problem.

Name of Subject: Object Oriented Programming with Java	
Subject Code: MCA – 205	
Student will be able to:	
CO1	Analyze the different aspects of a specific problem and design Java programs based on object oriented principles like classes, objects, constructors and inheritance.
CO2	Apply the knowledge of JAVA language syntax and semantics to write and execute Java programs.
CO3	Apply threads in java programming to achieve multitasking.
CO4	Explain the use of Java in a variety of technologies and on different platforms.
CO5	Apply java concept for web application using Servlet and JSP.

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Name of Subject: JAVA and OOPS LAB	
Subject Code: MCA – 206	
Student will be able to:	
CO1	Create environment to develop Java application and configure IDE for Java.
CO2	Utilization programming environment, class, objects and OOPs features.
CO3	Develop Java programs using strings, exceptions, threads, files, applets and JDBC.
CO4	Design a web application to insert and retrieve the records to web application.
CO5	Utilization the concept of AWT and Swings to create a user interface.

Name of Subject: DBMS LAB	
Subject Code: MCA – 207	
Student will be able to:	
CO1	Understand, analyze and apply common SQL statements including DDL, DML and DCL statements to perform different operations.
CO2	Identify the user requirements from a typical business situation, and design database accordingly.
CO3	Design different views of tables for different users and to apply embedded and nested queries.
CO4	Design and implement a database for a given problem according to well-known design principles that balance data retrieval performance with data consistency.
CO5	Apply views and triggers in different situation to maintain critical transaction.

Name of Subject: Data Mining	
Subject Code: MCA – 301	
Student will be able to:	
CO1	Elaborate new data mining tools through Knowledge Discovery Data Mining (KDD).
CO2	Develop a database to identify frequent item sets in a dataset & generate an association-based rule based on the itemsets using Apriori Algorithm.
CO3	Define different methodologies used in data mining and data warehousing and apply this knowledge for data analysis.
CO4	Develop the skill in data mining using clustering and association rule mining.
CO5	Illustrate the algorithm of the various data mining, investigate it with given problem and identify better technique increasing reliability.

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Name of Subject: Artificial Intelligence	
Subject Code: MCA – 302	
Student will be able to:	
CO1	Apply the fundamental concepts of Artificial Intelligence such as knowledge representation, problem-solving and expert systems.
CO2	Design a weather Forecasting application using Bayes Theorem.
CO3	Determine heuristic search techniques, Hill climbing, branch and bound techniques, best first search, A* & AO* algorithms.
CO4	Create a AI system using LISP Programming.
CO5	Analyze different learning methods used in artificial intelligence.

Name of Subject: Elective I (Python)	
Subject Code: MCA – 303(1)	
Student will be able to:	
CO1	Implement various control structures and primitive and non primitive data types.
CO2	Identify Python functions and application areas.
CO3	Create and handle files in Python and learn Object Oriented Programming Concepts.
CO4	Design user defined functions, modules, packages and exception handling Methods.
CO5	Design program to perform various matrix operations on numbers.

Name of Subject: Elective I (Web Technology)	
Subject Code: MCA – 303(2)	
Student will be able to:	
CO1	Analyze and apply the role of languages like HTML, CSS, XML and JavaScript.
CO2	Develop the modern web pages using the HTML and CSS features withdifferent layouts as per need of applications.
CO3	Create responsive and attractive webpages using HTML, CSS and JS.
CO4	Apply DOM structure model using Jquery for web programming.
CO5	Develop an interactive website using JQuery or AJAX.

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Name of Subject: Elective I (Introduction to Data Science and Big Data)	
Subject Code: MCA – 303(3)	
Student will be able to:	
CO1	Analyze the concept and challenges of Big data
CO2	Analyze the variety of the data store in Big data .
CO3	Apply knowledge of statistics, science and programming skills, to solve of complex analytical problems related to big data.
CO4	Apply basic data wrangling operations and different data mining algorithms using the tool R.
CO5	Create file management in Hadoop.

Name of Subject: Elective II (Machine Learning)	
Subject Code: MCA – 304(1)	
Student will be able to:	
CO1	Identify the various methods of Machine Learning.
CO2	Develop a Computer vision task like image recognition and classification using CNN() algorithm.
CO3	Build an Artificial Neural Network by implementing the Back propagation algorithm
CO4	Develop program to implement the naïve Bayesian classifier for sample training data set stored.
CO5	Analyze machine learning problem and identify the requirements for its solution.

Name of Subject: Elective II(Soft Computing)	
Subject Code: MCA – 304(2)	
Student will be able to:	
CO1	Identify the components of soft Computing including AI system, Neural networks and Genetic algorithms.
CO2	Identify and apply the Back propagation networks.
CO3	Identify the use of Fuzzy Logic in Numerous Applications such as Business Decision – Making .
CO4	Identify that how to utilize ANN architecture in their project.
CO5	Assess the attempts to connect the psychological and neurological underpinnings of learning's using Hebbian Learning.

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Name of Subject: Elective II(Internet of Things)	
Subject Code: MCA – 304(3)	
Student will be able to:	
CO1	Explain the fundamentals, challenges, and performance techniques of wireless networks.
CO2	Apply the IOT Cloud Based Services in their projects.
CO3	Design an IOT system using Arduino and Raspberry Pi.
CO4	Apply the Sensor Technology in their applications.
CO5	Choose IOT Development Platform for processing IOT data.

Name of Subject: Elective III (Computer Ethics)	
Subject Code: MCA – 305(1)	
Student will be able to:	
CO1	Compare in Morals, Ethics and Laws.
CO2	Identify the integration of ethical principles into technology development.
CO3	Explain ethical behavior for IT workers and IT users.
CO4	Apply for the CEA-IT (Certified Ethics Associate - Information Technology) course for certificates.
CO5	Explain and apply the knowledge of law, intellectual property and express his knowledge in public under the limitation of law.

Name of Subject: Elective III (Advanced Databases)	
Subject Code: MCA – 305(2)	
Student will be able to:	
CO1	Compare the Non – OOPS and OOPS DBMS system and discuss the various features added in the Object Oriented RDBMS.
CO2	Construct simple and moderately advanced database queries using Structured Query Language (SQL) and apply Triggers on database table.
CO3	Apply the concept of Transaction Management & Recovery techniques in RDBMS.
CO4	Design backend structure of a project using Oracle .
CO5	Explain distributed database system and discuss the fragmentation of data in distributed database.

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Name of Subject: Distributed System	
Subject Code: MCA – 305(3)	
Student will be able to:	
CO1	Analyze the concept of Distributed System.
CO2	Identify the Election Algorithms such as Bully and Ring algorithms to get a coordinator that performs function needed by other processes.
CO3	Design a model using **Common Object Request Broker Architecture (CORBA).**
CO4	Identify the challenges of Backward Recovery and Forward Recovery.
CO5	Apply KERBEROS for user authentication in their projects.

Name of Subject: Minor Project	
Subject Code: MCA – 306	
Student will be able to:	
CO1	Finding the facts to design the computer based system.
CO2	Design logical database and apply all the logics to develop user interface and store data.
CO3	Utilization of hardware and software requirements in the project .
CO4	Implement and Apply the coding in any language suitable for the project.
CO5	Design test cases to check the project is working properly or not.

Name of Subject: Elective – I Lab (Python) MCA – 307(1)	
Subject Code:	
Student will be able to:	
CO1	Create a program using list, dictionaries and tuples.
CO2	Create environment to compile, run and debug Python program.
CO3	Apply Python function and modules to solve real world problems.
CO4	Apply OOPS concept in programming such as class, object, polymorphism and inheritance.
CO5	Create Python program to store and retrieve data in data files.

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Name of Subject: Elective – I Lab (Web Technology)	
Subject Code: MCA – 307(2)	
Student will be able to:	
CO1	Identify the services of Internet and the type of application runs in the internet.
CO2	Design web pages using HTML and CSS.
CO3	Apply dynamic functionalities and validations using Java Script.
CO4	Apply the efficiency of webpage and make it interactive using Ajax and Java Script.
CO5	Apply data communication in web using XML.

Name of Subject: Elective – I (Lab)	
Subject Code: MCA – 307(3)	
Student will be able to:	
CO1	Analyze the Big Data framework like Hadoop and NOSQL to efficiently store and process Big Data to generate analytics.
CO2	Design of Algorithms to solve Data Intensive Problems using Map Reduce Paradigm.
CO3	Design and Implementation of Big Data Analytics using pig and spark to solve data intensive problems and to generate analytics.
CO4	Implement Big Data Activities using Hive.
CO5	Applying data modelling techniques to large data sets.

Name of Subject: Advanced Python	
Subject Code: MCA – 401(1)	
Student will be able to:	
CO1	Apply IDE for rapid development of Python program.
CO2	Apply OOPS concept such as class, object, constructor polymorphism and Inheritance to develop Python program.
CO3	Create data file to store data permanently and analyze it from different sources.
CO4	Utlilize python program to communicate data to and from the database.
CO5	Analyze various problems and represent graphically using python.

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Name of Subject: Advanced Web Technology	
Subject Code: MCA – 401(2)	
Student will be able to:	
CO1	Identify the concept of HTML, XML, Java Script, AJAX and PHP.
CO2	Build web applications using PHP, XML documents and XML Schema, and consume web services.
CO3	Apply DOM structure model using jquery for web programming
CO4	Examine the XML HTTP Request Object in different Browsers.
CO5	Design a Live Form Validation using Ajax and PHP.

Name of Subject: Big Data with Analytics	
Subject Code: MCA – 401(3)	
Student will be able to:	
CO1	Analyze the process of Data Science and structure of Big Data.
CO2	Analyze the concept and challenges of Big data
CO3	Apply knowledge of statistics, science and programming skills, to solve complex analytical problems related to big data and business analytics.
CO4	Apply basic data wrangling operations and different data mining algorithms using the tool R.
CO5	Compare Hadoop and various tools in its Framework

Name of Subject: Deep Learning	
Subject Code: MCA – 402(1)	
Student will be able to:	
CO1	Apply mathematical model to understand architecture of neural network.
CO2	Apply CNN (Convolutional Neural Network) to process images.
CO3	Improve the learning process of structured and unstructured problem.
CO4	Utilize Perceptron Learning Algorithm for binary classification.
CO5	Apply Reinforcement model to analyze the behavior of the system and make policy to improve learning process.

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Name of Subject: Cloud Computing	
Subject Code: MCA – 402(2)	
Student will be able to:	
CO1	Explain the core concepts of the cloud computing paradigm.
CO2	Analyze the challenges of Cloud Computing such as Data Security, Cost Management, Multi- Cloud Environments, Performance Challenges etc.
CO3	Identify the Cloud Services and utilize the benefits of SaaS, PaaS, IaaS and DaaS
CO4	Analyze various cloud programming models and apply them to solve problems on the cloud.
CO5	Apply the service providers such as Google App Engine, Amazon EC2, Microsoft Azure etc.

Name of Subject: Digital Marketing	
Subject Code: MCA – 402(3)	
Student will be able to:	
CO1	Identify the concept of Digital Marketing and what is the use of Digital Marketing for Students, Professional and business.
CO2	Apply the website's technical configuration using Search Engine Optimization process.
CO3	Apply the control on optimization parts of the website by using On-Page Search Engine Optimization (SEO).
CO4	Analyze the Search Engine Marketing (SEM) to increase the visibility of a website in search engine result pages.
CO5	Identify the Linking Strategies in their websites.

Name of Subject: Information Security	
Subject Code: MCA – 403(1)	
Student will be able to:	
CO1	Explain the Information Security and need for Security of data saved Virtually.
CO2	Identify the network active and passive attacks and threats.
CO3	Compare the symmetric and asymmetric cryptographic algorithms based on key and block size, number of rounds and keys.
CO4	Identify the concept of SDLC (Software Development Life Cycle) to minimize Project risks through forward planning.
CO5	Utilization of Integrity Policies and Hybrid Policies.

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Name of Subject –Block Chain and Cryptocurrency	
Subject Code – MCA – 403(2)	
Student will be able to:	
CO1	Explain the basic concepts and technology used for blockchain.
CO2	Apply security features in blockchain technologies.
CO3	Illustrate the concepts of Bitcoin and their usage.
CO4	Implement Ethereum block chain contract.
CO5	Learn security measures, and various types of services that allow people to trade and transact with Bitcoins.

Name of Subject –Mobile Computing	
Subject Code – MCA – 403(3)	
Student will be able to:	
CO1	Analyze various protocols of all layers for mobile communication .
CO2	Analyze next generation Mobile Communication System.
CO3	Determine the functionality of MAC, Network layer and Identifying a routing protocol for given Ad-hoc Networks
CO4	Identify the concept of Ad-hoc Network and understand that how Ad-hoc dynamically self-organize in a wireless network without using any pre-established infrastructure.
CO5	Utilize the (Global System for Mobile communication) GSM and understand the Telecommunication systems.

Name of Subject –Major Project	
Subject Code – MCA – 404	
Student will be able to:	
CO1	To provide the hands on experience in analyzing, designing and implementing various projects based on Software Development Lifecycle (SDLC).
CO2	Design Front-end interface using latest IDEs of particular technology.
CO3	Create reports in text and analyze it graphically.
CO4	Students can apply complex business logic separately to design project.
CO5	Identify the challenges to implement the application

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Name of Subject –Lab of Elective –IV, V, VI (Block Chain and Cryptocurrency)	
Subject Code – MCA – 405	
Student will be able to:	
CO1	Understanding Block chain Fundamentals and creating basic blocks.
CO2	Evaluate and Analyze Block chain Systems.
CO3	Develop Block chain Applications in a structured manner.
CO4	Implement smart contracts in Ethereum using different development frameworks.
CO5	Interpret the knowledge of the Bit coin network, nodes, keys, wallets and transactions.

Name of Subject –Lab of Elective IV,V,VI(Advanced Python)	
Subject Code – MCA – 405(1)	
Student will be able to:	
CO1	Utilize advanced data types such as list, tuple, sets and dictionary to frame complex logic.
CO2	Create and handle files in Python and learn Object Oriented Programming Concepts.
CO3	Formulate database application using python.
CO4	Debug a software application written in the python programming language
CO5	Develop a website using python functionalities and libraries

Name of Subject –Lab of Elective –IV, V, VI (Cloud Computing Lab)	
Subject Code – MCA – 405	
Student will be able to:	
CO1	Create virtual machines of different configuration and install various OS such as windows Linux or Mac.
CO2	Configure various virtualization tools such as Virtual Box, VMware workstation.
CO3	Analyze the security of Virtual Machine (VM).
CO4	Analyze the load balancing of the Cloud using various algorithm.
CO5	Analyze various cloud programming models and apply them to solve problems on the cloud.

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Name of Subject –Lab of Elective – IV, V, VI (Deep Learning Lab)	
Subject Code – MCA – 405	
Student will be able to:	
CO1	Determine the key features in a neural network's architecture.
CO2	Analyze the given dataset for designing a neural network based solution.
CO3	Build, train and apply fully connected deep neural networks.
CO4	Identify and implement efficient Convolution Neural Network (CNN) Or Recurrent Neural Network (RNN).
CO5	Design and implementation of deep learning models for signal/image processing applications.

Name of Subject –Lab of Electives IV, V, VI (Digital Marketing)	
Subject Code – MCA – 405	
Student will be able to:	
CO1	Analyze the aspects online marketing and its method.
CO2	Analyze the way to reach to public using digital marketing tools.
CO3	Identify the new technologies to optimize the search engine for online marketing.
CO4	Utilize Social Media marketing like Facebook, Instagram and Youtube.
CO5	Analyze the cost of online marketing and can provide optimum solution.

Name of Subject –Lab of Electives IV, V, VI (Information Security)	
Subject Code – MCA – 405-V	
Student will be able to:	
CO1	Identify basic security attacks and services.
CO2	Utilize symmetric and asymmetric key algorithms for cryptography.
CO3	Make use of Authentication functions.
CO4	Demonstrate the skills learned in the information security into the real life scenarios.
CO5	Assess and critically evaluate techniques for network security

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Name of Subject – Lab of Elective IV, V, VI (Mobile Computing)	
Subject Code – MCA – 405-VI	
Student will be able to:	
CO1	Identify basic security attacks and services.
CO2	Utilize symmetric and asymmetric key algorithms for cryptography.
CO3	Make use of Authentication functions.
CO4	Demonstrate the skills learned in the information security into the real life scenarios.
CO5	Assess and critically evaluate techniques for network security

Name of Subject – Lab of Elective IV, V, VI (Mobile Computing)	
Subject Code – MCA – 405-VI	
Student will be able to:	
CO1	Explain mobile technologies in terms of hardware, software, and communications.
CO2	Evaluate the effectiveness of different mobile computing frameworks.
CO3	Utilize mobile computing nomenclature to describe and analyze existing mobile computing frameworks and architectures
CO4	Describe how mobile technology functions to enable other computing technologies.
CO5	Make use of mobile operating systems in developing mobile applications.

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