MCA Co-Po

1st Year

Program Outcomes (PO)

PO 1	Technical Proficiency
	Gain a thorough understanding of computer science principles, programming
	languages, software engineering, and technology tools.
PO 2	Problem Solving and Analytical Skills
	Analyze complex problems, design solutions using appropriate methodologies,
	and evaluate their effectiveness.
PO 3	Research and Development
	Conduct research contribute to technological advancements and apply innovative
	solutions to practical problems.
PO 4	Project Management and Development
	Manage and lead projects, including planning, execution, and delivery within
	specified constraints.
PO 5	Ethical and Professional Practices
	Demonstrate professionalism, ethical behavior, and the ability to work
	collaboratively in diverse environments.
PO 6	Lifelong Learning
	Engage in continuous learning and adapt to new technologies and industry trends.

Progra	Cognitive Leve	
PSO 1	Software Development Design, develop, and maintain	BT Level 2,3,6
	languages, frameworks, and tools.	
PSO 2	Data Management and Analysis Manage and analyze large datasets using modern database systems, data science techniques, and big data technologies.	BT Level 2 ,3,4
PSO 3	Cyber security and Information Security Understand cyber security principles and practices, protecting information systems from various threats and vulnerabilities	BT Level 2 ,3,5
PSO 4	Emerging Technologies Work with emerging technologies such as artificial intelligence, machine learning, block chain, and cloud computing	BT Level 2 ,3,6

Course Outcomes

<u>Sem I</u>

MCA-411 Object Oriented Programming Using Java:

Course Outcomes : At the end of the course, students will be able to	Cognitive Level (As Per Blooms Taxonomy)
CO1: Recall Java syntax rules, including data types, variables, and control structures.	Remember (1)
CO2: Create Java application development using polymorphism, inheritance, and inner classes.	Create (6)
CO3: Develop GUI interface and event driven applications.	Create (6)
CO4: Manipulate databases through java application.	Apply (4)

MCA-412 Lab on Java Programming:

Course Outcomes : At the end of the course, students will be able to	CognitiveLevel (As PerBloomsTaxonomy)
CO1: Write java programs using inner classes and static fields in implementation of Java application	Apply (3)
CO2: Develop Java application for GUI development and event handling.	Create (6)
CO3: Develop database application using JDBC.	Apply (3)
CO4: Students will be able to apply Java programming constructs to develop simple programs that solve basic computational problems.	Apply (3)

MCA-413 Data Structures and Algorithms

Course Outcomes : At the end of the course, students will be able to	CognitiveLevel (As PerBloomsTaxonomy)
CO1: Understand the concept of Dynamic memory management, data types, algorithms, Big O notation.	Understand (2)
CO2: Understand data structures such as arrays, linked lists, stacks and queues, graphs, trees and hash tables.	Understand (2)

CO3:Understand about hash functions, collision resolution techniques	Understand (2)
like separate chaining and open addressing	
CO4:Study binary trees: representations, operations like insert and	Apply (4)
delete, and traversal methods including in order, preorder, postorder, and	
level order.	

MCA-414 Lab on Data Structures and Algorithms

Course Outcomes : At the end of the course, students will be able to	Cognitive Level (As Per Blooms
	Taxonomy)
CO1: Ability to analyze the time and space complexities of Algorithms	Understand (2)
CO2: Understand the difference between structured data and data structure.	Remember (1)
CO3: Choose the appropriate data structure and algorithm design method	Evaluate (6)
for a specified application.	
CO4: Ability to design programs using a variety of data structures such as	Apply (4)
stacks, queues, binary trees, search trees and etc	

MCA-415 Python Programming:

Course Outcomes : At the end of the course, students will be able to	Cognitive
	Level (As Per
	Blooms
	Taxonomy)
CO1: Understand the basic concept of Python Programming.	Understand (2)
CO2: Understand lists, tuples, dictionaries, strings and files efficiently for solving real world problems	Apply (3)
CO2: Pacell the concents of chiest oriented programming using nuthon	
CO3. Recail the concepts of object-oriented programming using python.	Remember(1)
CO4: Understand modules, packages and GUI based programming for web.	Understand(2)
CO5: Develop Database connectivity steps.	Create (6)

MCA-416 Lab on Python Programming

Course Outcomes : At the end of the course, students will be able to	Cognitive
	Level (As Per
	Blooms
	Taxonomy)
CO1: Recall Python syntax rules, including variables, data types, and basic control structures (loops, conditionals).	Remember(1)
CO2: Demonstrate use and working of various data types, control structures, files, exceptional handling etc.	Apply (3)
CO3: Create, configure and make use of modules.	Create (6)
CO4. Develop console based and GUI applications (both procedural/object oriented) to solve different problems using python programming	Create (6)

MCA-417	Fundamentals	of Artificial	Intelligence
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Course Outcomes : At the end of the course, students will be able to	Cognitive
	Level (As Per
	Blooms
	Taxonomy)
CO1: Understand the informed and uninformed problem types.	Understand (2)
CO2: Identify problems that are amenable to solution by AI methods.	Apply (3)
CO3: Identify appropriate AI methods to solve a given problem.	Apply (3)
CO4: Understand system using different informed search / uninformed search or heuristic approaches.	Understand (2)

MCA-418 (A) Cloud Computing-I

Course Outcomes : At the end of the course, students will be able to	Cognitive
	Level (As Per
	Blooms
	Taxonomy)
CO1: Apply knowledge of cloud computing fundamentals to analyse and	
propose appropriate deployment techniques for specific organizational	Apply (3)
needs.	
CO2: Demonstrate comprehension of virtualization concepts, including	
types (hardware, storage, and network) and their relevance to cloud	Understand (2)
computing.	
CO3: Describe Infrastructure as a Service (IaaS), Platform as a Service	
(PaaS), and Software as a Service (SaaS) models, including their key	Remember (1)
features and use cases.	
CO4: Apply parallel and distributed programming paradigms in cloud	$A \operatorname{pply}(3)$
environments to develop scalable applications.	Appry (3)

MCA-418(B) Lab on Cloud Computing-I

Course Outcomes : At the end of the course, students will be able to	Cognitive
	Level (As Per
	Blooms
	Taxonomy)
CO1: Configure various virtualization tools such as Virtual Box, VMware	$\Delta p p l v (2)$
Workstation.	Apply (5)
CO2: Learn how to simulate a cloud environment to implement new	Croata (6)
schedulers.	Cleate (0)
CO3: Demonstrate the benefits of various distributed computing	$A \operatorname{pnly}(2)$
platforms	Apply (3)
CO4: Deploy applications in a simulated cloud environment	Apply (3)

MCA-419 (A) Data Science-I

Course Outcomes : At the end of the course, students will be able to	Cognitive
	Level (As Per
	Blooms
	Taxonomy)
CO1: Understand the fundamental concepts of data science.	Understand (2)
CO2: Apply data cleaning and preprocessing techniques.	Apply (3)
CO3: Visualize and present the inference using various tools.	Apply (3)
	,Analyze(4)
CO4: Evaluate relationships between variables using correlation and	Analyze(4),
covariance	Evaluate (5)
CO5: Create interactive visualizations and dashboards for business	Create(6),
analytics using Power BI	Apply (3)

MCA-419(B) Lab on Data Science -I

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Course Outcomes : At the end of the course, students will be able to	Cognitive
	Level (As Per
	Blooms
	Taxonomy)
CO1: Demonstrate Proficiency in Setting Up and Using Python Data	$\Delta p p h (2)$
Science Tools	Apply (5)
CO2: Apply Data Preprocessing Techniques for Machine Learning.	$A \operatorname{pnly}(2)$
	Apply (3)
CO3: Conduct Statistical Analysis and Interpret Results	Analyze (4),
	Evaluating (5)
CO4: Develop and Evaluate Machine Learning Models.	Evaluate (5),
	Create(6)

MCA-420(A) Cyber Security

Course Outcomes : At the end of the course, students will be able to	Cognitive
	Level (As Per
	Blooms
	Taxonomy)
CO1: Describe the differences between packet filters and firewalls and how they protect networks.	Understand (2)
CO2: Describe the different types of cloud service models and deployment models, and how they impact security.	Understand (2)
CO3: Apply vulnerability assessment tools like Nessus and OpenVAS to identify vulnerabilities in a given system.	Apply (3)
CO4: Apply digital forensics techniques to a simulated cybercrime scenario	Apply (3)

MCA-420(B) Lab on Cyber Security

Course Outcomes : At the end of the course, students will be able to	Cognitive
	Level (As Per
	Blooms
	Taxonomy)
CO1: Describe methods for analyzing web app security	Understand(1)
CO2: Identify key tools available in Kali Linux for web application analysis.	Understand(1)
CO3: Implement Kali Linux in Virtual Box/VMware and set up network.	Analyze(4)
CO4: Define John the Ripper to decode hashed passwords.	Remember(1)

MCA-421(A) Web Technologies-I

Course Outcomes : At the end of the course, students will be able to	Cognitive
	Level (As Per
	Blooms
	Taxonomy)
CO1: Recall the basic HTML tags and their purposes	Remember (1)
CO 2: Describe how JavaScript can be used to manipulate the DOM and Handle events.	Understand(2)
CO 3: To understand jQuery selectors and methods for DOM manipulation	Understand(2)
CO 4: To analyze the responsiveness and visual appeal of web interfaces Created with Bootstrap.	Analyze(4)

MCA-421(B) Lab on Web Technologies-I

Course Outcomes : At the end of the course, students will be able to	Cognitive
	Level (As Per
	Blooms
	Taxonomy)
CO1: Understand the structure of an HTML document, CSS styling and	Understand(2)
layout using CSS	Older Stalld(2)
CO2: Recall the concept of variables, scope, functions, operators,	Remember (1)
looping, and conditional statements in JavaScript.	Remember (1)
CO3: Implement interactive web applications using advanced event	$A \operatorname{pnly}(3)$
handling techniques in JavaScript	Apply (3)
CO4: Understand the basics of jQuery including selecting elements,	Understand(2)
handling events, and using jQuery effects.	Oliverstallu(2)

MCA SEM – II

MCA-431Database Management System

Course Outcomes: After completion of this course students shall be able to	Cognitive Level (As Per Blooms Taxonomy)
CO1: Understand the fundamental concepts and terminology associated with database systems, including architecture, design, and various models	Understand (2)
CO2: Explain the fundamental concepts of Entity-Relationship (ER) modeling and its purpose in database design	Understand (2)
CO3: Apply the relational model, specify integrity constraints, and explain how to create a relational database using an ER diagram and normalization techniques.	Apply (3)
CO4: Use knowledge to implement and manipulate database schemas, perform SQL queries, and manage transactions and concurrency control.	Apply (3)
CO5: Determine partitioning and distribution of data across networked nodes of a DBMS and data optimization in a distributed environment	Analyze (4)

MCA-432LAB on Database Management System

Course Outcomes: After completion of this course students shall be able to	Cognitive Level (As Per Blooms Taxonomy)
CO1: Understand and Utilize DML (Data Manipulation Language) and DDL commands to create and maintain tables.	Understand (2)
CO2: Develop a relational database schema for a given scenario, including tables, relationships, and constraints	Create (6)
CO3: Utilize the DML/DDL commands and programming PL/SQL including stored procedures, stored functions, cursors, views and Triggers for modify data	Apply (2)
CO4: Execute nested queries and perform various types of JOIN operations to retrieve and combine data from multiple tables.	Analyze (4)
CO5: Establish database connectivity and perform operations using front-end tools.	Apply (2)

MCA-433Software Project Management

Course Outcomes: After completion of this course students shall be able to	Cognitive Level (As Per Blooms Taxonomy)
CO1: Understand the activities during the project scheduling of any software application.	Understand (2)

CO2: Understand about risk management activities and the resource allocation for the projects.	Understand (2)
CO3: Acquire knowledge and skills needed for the construction of highly reliable software project	Apply (3)
CO4: Apply different techniques of project monitoring, control and review.	Apply (3)
CO5: Explain various project management scheduling techniques.	Analyze (4)

MCA-434Machine Learning

Course Outcomes: After completion of this course students shall be able to	Cognitive Level (As Per Blooms Taxonomy)
CO1: Understand and implement the supervised learning algorithms	Understand (2) Apply (3)
CO2: Analyze and apply the machine learning concepts for different	Apply (3)
problems.	Analyze (4)
CO3: Apply the clustering algorithms for various problems.	Apply (3)
CO4: Evaluate and test the performance of the learning algorithms.	Evaluate (5)
CO5: Design and create a learning model for real time applications.	Create (6)

MCA-435(A)Advanced Cloud Computing-II

Course Outcomes: After completion of this course students shall be able to	Cognitive Level (As Per Blooms Taxonomy)
CO1: Explain the evolution, characteristics, service models, and deployment models of cloud computing, analyzing its benefits, challenges, and architecture through real-world applications.	Analysis(4)
CO2: Describe data centers, cloud infrastructure, virtualization, cloud storage, networking, security, and disaster recovery in the cloud.	Remembering(2)
CO3: Compare major cloud service platforms, develop cloud-native applications, and implement micro services, containers, server less computing, cloud databases, and Dev Ops practices.	Analysis(4)
CO4: Apply cloud resource management, auto-scaling, load balancing, monitoring, cost optimization, performance tuning, SLA management, and multi-cloud strategies.	Apply(3)
CO5: Understand and explore emerging trends like edge computing, IoT, AI, machine learning, block chain, quantum computing, green cloud practices, and future innovations in cloud computing.	Understanding(1) Evaluating(4)

MCA-435(B)Lab on Advanced Cloud Computing

Course Outcomes: After completion of this course students shall be able to	Cognitive Level (As Per Blooms Taxonomy)
CO1: Configure cloud infrastructure.	Apply (3)
CO2: Monitor load on cloud, balance load by analyzing	Analyze (4)
CO3: Work with real time cloud solutions.	Apply (3)

MCA 436(A)Data Science II

Course Outcomes: After completion of this course students shall be able to	Cognitive Level (As Per Blooms Taxonomy)
CO1: Understand fundamental concepts of data science and machine learning.	Understand (2)
CO2: Apply machine learning algorithms to solve practical problems using appropriate libraries and frameworks.	Apply (3)
CO3: Utilize big data technologies to process and analyze large datasets.	Apply (3), Analyze(4)
CO4: Analyze advanced machine learning techniques and frameworks.	Analyze(4)
CO5: Develop and implement advanced data science techniques, including time series analysis, natural language processing, and reinforcement learning.	Create (6) Apply (3)

MCA-436(B) Lab on Data Science -II

Course Outcomes: After completion of this course students shall be able to	Cognitive Level (As Per Blooms Taxonomy)
CO1: Explore the fundamental concepts of data science & Machine Learning.	Understand (2)
CO2: Understand data analysis techniques for applications handling large data.	Understand (2) Analyze (4)
CO3.Understand various machine learning algorithms used in data science process	Understand (2)
CO4. Visualize and present the inference using various tools.	Apply(3)

MCA-437(A) Information Security and Mitigation

Course Outcomes: After completion of this course students shall be able to	Cognitive Level (As Per Blooms Taxonomy)
CO1: Identify key concepts related to information security, including confidentiality, integrity, and availability.	Remember (1)
CO2: Describe fundamental principles and practices of network security.	Understand (2)
CO3: Apply vulnerability scanning tools and penetration testing techniques to assess security in a controlled environment.	Apply(3)
Analyze firewall rules and configurations to identify potential weaknesses	Analyze (4)

MCA 437(B)Lab on Information Security and Mitigation

Course Outcomes: After completion of this course students shall be able to	Cognitive Level (As Per Blooms Taxonomy)
CO1: Identify the basic structure and components of the DES encryption algorithm.	Remember (1)
CO2: Describe the AES encryption and decryption processes, including key sizes and block modes.	Understand (2)
CO3: Implement a digital signature scheme in a program and test it for signing and verifying data.	Apply(3)

MCA-438(A)Web Technologies-II

Course Outcomes: After completion of this course students shall be able to	Cognitive Level (As Per Blooms Taxonomy)
CO1: Identify the advantages of Angular JS and its MVC architecture.	Remember (1)
CO2: Describe how to create and use Angular JS modules.	Understand (2)
CO3: Implement controllers in Angular JS, including methods and external controller files.	Apply(3)
CO4: Develop MongoDB queries to perform CRUD operations.	Apply(3)

MCA-438(B)Lab on Web Technologies-II

Course Outcomes: After completion of this course students shall be able to	Cognitive Level (As Per Blooms Taxonomy)
CO 1: Identify the syntax and basic usage of expressions in AngularJS.	Remember (1)
CO 2: Develop a form that includes various validation rules to ensure data integrity.	Apply(3)
CO 3: To understand the designing library like Bootstrap.	Understand(2)
CO 4: Describe the usage of insert and delete commands to manipulate data in MongoDB.	Understand(2)

MCA-439(A)Internet of Things(IOT)

Course Outcomes: After completion of this course students shall be	Cognitive Level
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able to	(As Per Blooms
	Taxonomy)
CO1: Recall fundamental concepts and understanding basic principles related to IoT security	Remember (1)
CO2: To understand essentials of IoT Security.	Understand(2)
CO3: Implement interfacing of various sensors, actuators to the development boards	Apply (3)
CO4: Implementing IoT systems using standard communication protocols and analyzing their effectiveness for interoperability and data exchange.	Apply (3)
CO5: Compare various IoT communication technologies and Design various IoT applications	Analyze (4)

MCA-439(B)Lab on Internet of Things(IOT)

Course Outcomes: After completion of this course students shall be able to	Cognitive Level (As Per Blooms Taxonomy)
CO1: Recall the steps involved in installing operating systems on the Raspberry Pi	Remember (1)
CO2: Describe how each type of sensor works and its applications.	Understand(2)
CO3: Apply Wire IR sensors to a Raspberry Pi or Arduino board and ensure proper connections and functionality.	Apply (3)

MCA-440(A) Big Data Analytics

Course Outcomes: After completion of this course students shall be able to	Cognitive Level (As Per Blooms Taxonomy)
CO1: Recognize the characteristics, applications of big data that make it useful to real world problems.	Remember (1)
CO2: Discuss the challenges and their solutions in Big Data	Understand(2)
CO3: Understand and work on Hadoop Framework and eco systems	Understand(2)
CO4: Explain and analyze the Big Data using Map-reduce programming in Hadoop	Understand(2)

MCA-440(B) Lab on Big Data Analytics

Course Outcomes: After completion of this course students shall be able to	Cognitive Level (As Per Blooms Taxonomy)
CO1: Apply HDFS commands to manage file systems in a distributed environment.	Apply (Level 3)
CO2: Develop Java applications for interacting with HDFS to perform file operations.	Apply (3)
CO3: Utilize Hadoop's built-in commands for efficient file and directory management	Apply (Level 3)
CO4: Design and implement a pipeline of multiple MapReduce jobs for complex data workflows.	Apply (3)
CO5: Formulate and execute HiveQL queries to retrieve and manipulate data stored in Hive.	Apply (Level 3)

MCA-441(A) Natural Language Processing

Course Outcomes: After completion of this course students shall be able to	Cognitive Level (As Per Blooms Taxonomy)
CO 1: Understand issues and challenges in Natural Language Processing and NLP applications and their relevance in the classical and modern context.	Understand (2)
CO 2: Apply text processing techniques and handle language scripts	Apply (3)
CO 3: Understand Semantic Analysis theories and approaches, including Meaning representation, Lexical Semantics, word similarity, and relationships	Understand (2)
CO 4: Study different word classes and their roles in Part-of-Speech (POS) tagging.	Understand (2)

MCA-441(B)Lab on Natural Language Processing

Course Outcomes: After completion of this course students shall be able to	Cognitive Level (As Per Blooms Taxonomy)
CO1: Understand installation and use of NLTK in python.	Understand (2)
CO2: Implement python program to process text files, morphology of Marathi words	Apply (3)
CO3: Understanding text files processing operation and Regular Expressions in NLP	Understand (2)
CO4: Understanding Morphology, PoS Tagging	Understand (2)

MCA-442(A)Digital Image Processing

Course Outcomes: After completion of this course students shall be able to	Cognitive Level (As Per Blooms Taxonomy)
CO1: Students will recall the fundamental elements of digital image perception and models.	Understand (1)
CO2: Students will analyze various methods of image enhancement, restoration, and analysis and understand their application	Apply (4)
CO3: Students will understand how point operations and histogram modeling contribute to image enhancement.	Understand (2)
CO4: Students will recall models and techniques used in image restoration.	Understand (1)

MCA-442(B)LAB on Digital Image Processing

Course Outcomes: After completion of this course students shall be able to	Cognitive Level (As Per Blooms Taxonomy)
CO1: Identify different image enhancement techniques and their purposes.	Remember (1)
CO2: Apply histogram equalization to an image and plot its histogram.	Apply (3)
CO3: Develop gray level slicing (intensity level slicing) on an image and analyze its effects.	Create (6)
CO4: Develop various smoothing spatial filters (e.g., mean, median, Gaussianfilters) on images.	Create (6)

RM-417 Research Methodology

Course Outcomes: After completion of this course students shall be able to	Cognitive Level (As Per Blooms Taxonomy)
CO1: Understand the basic concepts of research and its methodologies, identify appropriate research topics, select and define appropriate research problem and parameters	Remember (1)
CO2: Prepare a research proposal	Understand (2)
CO3: Organize and conduct research in a more appropriate manner, writing research report and thesis.	Apply(3)
CO4: Carry out sampling and data analysis	Apply(3)