



SINHGAD TECHNICAL EDUCATION SOCIETY'S
**SINHGAD INSTITUTE OF BUSINESS
ADMINISTRATION & RESEARCH**



(Approved by AICTE, Recognized by Government of Maharashtra, Affiliated to Savitribai Phule Pune University)

SIBAR MCA COURSE OUTCOMES

2021-23



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**SINHGAD INSTITUTE OF BUSINESS
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VISION

To develop responsible citizens with values and futuristic global perspective emphasising digitalisation, applied research, innovation and sustainable development.

MISSION

To create a center of excellence by imparting quality education through experiential learning, collaborations, incubating inherent talent, encouraging research, entrepreneurial spirit and adoption of technology to excel in the global environment.

SHORT TERM GOALS

- **Digitalisation** - Transforming processes by introducing modern digital infrastructure.
- **Research** - To inculcate research culture among the stakeholders.
- **Industry Academia Collaboration** - To keep pace with the industry expectations and bridge the skill gap.

LONG TERM GOALS

- **Innovation and Incubation** - To nurture ideas and encourage entrepreneurship.
- **Reskilling and Up Skilling** - To enhance knowledge based competencies through extensive development programs.
- **Sustainable Development** - To protect, restore and promote an evolving learning ecosystem.





**Course Outcomes of Each Courses for SIBAR MCA
 (2020 Pattern)**

Sem-I

| | | |
|-------------------|-------------------|-------------------------------|
| Semester-I | | IT11-Java Programming |
| 3 Credits | LTP: 4:0:0 | Compulsory Core Course |

Course Outcomes: Students will be able to

| CO# | COGNITIVE DOMAIN | COURSE OUTCOMES |
|-----|------------------|---|
| CO1 | Understand | Understand Basic Concepts of OOPs, Java, Inheritance, Package. |
| CO2 | Understand | Understand Exception handling, arrays and Strings and multi-threading in Java |
| CO3 | Understand | Understand collection framework |
| CO4 | Apply | Develop GUI using Abstract Windows Toolkit (AWT) and event handling |
| CO5 | Apply | Develop Web application using JSP and Servlet, JDBC |

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|-------------------|-------------------|---|
| Semester-I | | IT12-Data Structure & Algorithms |
| 3 Credits | LTP: 4:0:0 | Compulsory Core Course |

Course Outcomes: Students will be able to

| CO# | COGNITIVE DOMAIN | COURSE OUTCOMES |
|-----|------------------|---|
| CO1 | Apply | Demonstrate linear data structures linked list, stack and queue |
| CO2 | Apply | implement tree, graph, hash table and heap data structures |
| CO3 | Apply | apply brute force and backtracking techniques |
| CO4 | Apply | demonstrate greedy and divide-conquer approaches |
| CO5 | Apply | implement dynamic programming technique |

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|-------------------|-------------------|---|
| Semester-I | | IT13- Object Oriented Software Engineering |
| 3 Credits | LTP: 3:1:0 | Compulsory Core Course |

Course Outcomes: Students will be able to

| CO# | COGNITIVE DOMAIN | COURSE OUTCOMES |
|-----|------------------|--|
| CO1 | Understand | Distinguish different process model for a software development. |
| CO2 | Analyze | Design software requirements specification solution for a given problem definitions of a software system |
| CO3 | Analyze | Apply software engineering analysis/design knowledge to suggest solutions for simulated problems |
| CO4 | Apply | Design user interface layout for different types of applications |
| CO5 | Understand | Recognize and describe current trends in software engineering |

| | | |
|-------------------|-------------------|---|
| Semester-I | | IT14: Operating Systems Concepts |
| 3 Credits | LTP: 3:0:1 | Compulsory Core Course |

Course Outcomes: Students will be able to

| CO# | COGNITIVE DOMAIN | COURSE OUTCOMES |
|------------|-------------------------|--|
| CO1 | Understand | Understand structure of OS, process management and synchronization |
| CO2 | Understand | Understand multicore and multiprocessing OS. |
| CO3 | Understand | Explain Realtime and embedded OS |
| CO4 | Understand | Understand Windows and Linux OS fundamentals and administration. |
| CO5 | Apply | Solve shell scripting problems |

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|-------------------|-------------------|-----------------------------------|
| Semester-I | | IT15: Network Technologies |
| 3 Credits | LTP: 3:0:1 | Compulsory Core Course |

Course Outcomes: Students will be able to

| CO# | COGNITIVE DOMAIN | COURSE OUTCOMES |
|------------|-------------------------|---|
| CO1 | Understand | Understand the basic concepts of Computer Network, and principle of layering |
| CO2 | Apply | Apply the error detection and correction techniques used in data transmission |
| CO3 | Apply | Apply IP addressing schemes and sub netting |
| CO4 | Understand | Understand the concept of routing protocols, Application layer protocols and Network Security |
| CO5 | Apply | Apply the socket programming basics to create a simple chat application |

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|-------------------|-------------------|-------------------------------|
| Semester-I | | IT11L: Practical |
| 5 Credits | LTP: 0:0:5 | Compulsory Core Course |

Course Outcomes: Students will be able to

| CO# | COGNITIVE DOMAIN | COURSE OUTCOMES |
|------------|-------------------------|---|
| CO1 | Apply | Demonstrate Collection framework |
| CO2 | Apply | Develop GUI using awt and swing |
| CO3 | Apply | Develop Web application using JSP and Servlet, JDBC |
| CO4 | Apply | Apply Data Structure to solve problems using JavaScript |

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|-------------------|-------------------|-------------------------------|
| Semester-I | | ITC11: Mini Project |
| 5 Credits | LTP: 0:0:5 | Compulsory Core Course |

Course Outcomes: Students will be able to

| CO# | COGNITIVE DOMAIN | COURSE OUTCOMES |
|------------|-------------------------|---|
| CO1 | Create | Create working project using tools and techniques learnt in this semester |

Sem-II

| | | |
|--------------------|-------------------|---------------------------------|
| Semester-II | | IT21: Python Programming |
| 3 Credits | LTP: 4:0:0 | Compulsory Core Course |

Course Outcomes: Students will be able to

| CO# | COGNITIVE DOMAIN | COURSE OUTCOMES |
|-----|------------------|--|
| CO1 | Understand | Understand Demonstrate the concepts of python and modular programming |
| CO2 | Apply | Apply the concepts of concurrency control in python |
| CO3 | Apply | Solve the real-life problems using object-oriented concepts and python libraries |
| CO4 | Apply | Demonstrate the concept of IO, Exception Handling, database |
| CO5 | Analyze | Analyze the given dataset and apply the data analysis concepts and data visualization. |

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| Semester-II | | IT-22: Software Project Management |
| 3 Credits | LTP: 3:1:0 | Compulsory Core Course |

Course Outcomes: Students will be able to

| CO# | COGNITIVE DOMAIN | COURSE OUTCOMES |
|-----|------------------|---|
| CO1 | Apply | Understand the process of Software Project Management Framework and Apply estimation techniques |
| CO2 | Understand | Learn the philosophy, principles and lifecycle of an agile project. |
| CO3 | Apply | Demonstrate Agile Teams and Tools and Apply agile project constraints and trade-offs for estimating project size and schedule |
| CO4 | Understand | Explain Project Tracking and Interpretation of Progress Report |
| CO5 | Analyze | Analyze Problem statement and evaluate User Stories |

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| Semester-II | | MT-21: Optimization Techniques |
| 3 Credits | LTP: 3:1:0 | Compulsory Core Course |

Course Outcomes: Students will be able to

| CO# | COGNITIVE DOMAIN | COURSE OUTCOMES |
|-----|------------------|---|
| CO1 | Understand | Understand the role and principles of optimization techniques in business world |
| CO2 | Apply | Demonstrate specific optimization technique for effective decision making |
| CO3 | Apply | Apply the optimization techniques in business environments |
| CO4 | Analyze | Illustrate and infer for the business scenario |
| CO5 | Analyze | Analyze the optimization techniques in strategic planning for optimal gain |

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| Semester-II | | IT-23: Advanced Internet Technologies |
| 3 Credits | LTP: 4:0:0 | Compulsory Core Course |

Course Outcomes: Students will be able to

| CO# | COGNITIVE DOMAIN | COURSE OUTCOMES |
|------------|-------------------------|--|
| CO1 | Understand | Outline the basic concepts of Advance Internet Technologies |
| CO2 | Apply | Design appropriate user interfaces and implements webpage based on given problem Statement |
| CO3 | Apply | Implement concepts and methods of NodeJS |
| CO4 | Apply | Implement concepts and methods of Angular |
| CO5 | Apply | Build Dynamic web pages using server-side PHP programming with Database Connectivity |

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| Semester-II | | IT-24: Advanced DBMS |
| 3 Credits | LTP: 4:0:0 | Compulsory Core Course |

Course Outcomes: Students will be able to

| CO# | COGNITIVE DOMAIN | COURSE OUTCOMES |
|------------|-------------------------|---|
| CO1 | Understand | Describe the core concepts of DBMS and various databases used in real applications |
| CO2 | Apply | Design relational database using E-R model and normalization |
| CO3 | Apply | Demonstrate XML database and nonprocedural structural query languages for data access |
| CO4 | Understand | Explain concepts of Parallel, Distributed and Object-Oriented Databases and their applications |
| CO5 | Apply | Apply transaction management, recovery management, backup and security – privacy concepts for database applications |

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|--------------------|-------------------|-------------------------------|
| Semester-II | | IT21L: Practical |
| 5 Credits | LTP: 0:0:5 | Compulsory Core Course |

Course Outcomes: Students will be able to

| CO# | COGNITIVE DOMAIN | COURSE OUTCOMES |
|------------|-------------------------|---|
| CO1 | Apply | Implement python programming concepts for solving real life problems. |
| CO2 | Apply | Implement Advanced Internet Technologies |

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|--------------------|-------------------|-------------------------------|
| Semester-II | | ITC21: Mini Project |
| 5 Credits | LTP: 0:0:5 | Compulsory Core Course |

Course Outcomes: Students will be able to

| CO# | COGNITIVE DOMAIN | COURSE OUTCOMES |
|------------|-------------------------|---|
| CO1 | Create | Create working project using tools and techniques learnt in this semester |

Sem-III

| | | |
|---------------------|-------------------|---|
| Semester-III | | IT31: Mobile Application Development |
| 3 Credits | LTP: 4:0:0 | Compulsory Core Course |

Course Outcomes: Students will be able to

| CO# | COGNITIVE DOMAIN | COURSE OUTCOMES |
|-----|------------------|---|
| CO1 | Understand | Understand Various Mobile Application Architectures. |
| CO2 | Apply | Apply different types of widgets and Layouts. |
| CO3 | Understand | Describe Web Services and Web Views in mobile applications. |
| CO4 | Apply | Implement data storing and retrieval methods in android |
| CO5 | Apply | Demonstrate Hybrid Mobile App Framework |

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|---------------------|-------------------|--|
| Semester-III | | IT-32: Data Warehousing and Data Mining |
| 3 Credits | LTP: 3:0:1 | Compulsory Core Course |

Course Outcomes: Students will be able to

| CO# | COGNITIVE DOMAIN | COURSE OUTCOMES |
|-----|------------------|---|
| CO1 | Understand | Understand Data warehouse concepts, architecture and models |
| CO2 | Understand | Learn and understand techniques of preprocessing on various kinds of data |
| CO3 | Apply | Apply association Mining and Classification Techniques on Data Sets |
| CO4 | Apply | Apply Clustering Techniques and Web Mining on Data Sets |
| CO5 | Understand | Understand other approaches of Data mining |

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| Semester-III | | IT-33: Software Testing and Quality Assurance |
| 3 Credits | LTP: 3:0:1 | Compulsory Core Course |

Course Outcomes: Students will be able to

| CO# | COGNITIVE DOMAIN | COURSE OUTCOMES |
|-----|------------------|---|
| CO1 | Understand | Understand the role of software quality assurance in contributing to the efficient delivery of software solutions |
| CO2 | Apply | Demonstrate specific software tests with well-defined objectives and targets |
| CO3 | Apply | Apply the software testing techniques in commercial environments. |
| CO4 | Analyze | Construct test strategies and plans for software testing. |
| CO5 | Apply | Demonstrate the usage of software testing tools for test effectiveness, efficiency and coverage |

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| Semester-III | | IT-34: Knowledge Representation and Artificial Intelligence: ML, DL |
| 3 Credits | LTP: 4:0:0 | Compulsory Core Course |

Course Outcomes: Students will be able to

| CO# | COGNITIVE DOMAIN | COURSE OUTCOMES |
|------------|-------------------------|--|
| CO1 | Understand | Understand basic building block of Artificial Intelligence and Knowledge Representation. |
| CO2 | Apply | Apply Propositional Logic for knowledge representation. |
| CO3 | Apply | Design various models based on Machine Learning methodology |
| CO4 | Apply | Design various models based on Deep Learning methodology |
| CO5 | Understand | Understand various hardware and software aspect used for AI and its application. |

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|---------------------|-------------------|-------------------------------|
| Semester-III | | IT-35: Cloud Computing |
| 3 Credits | LTP: 4:0:0 | Compulsory Core Course |

Course Outcomes: Students will be able to

| CO# | COGNITIVE DOMAIN | COURSE OUTCOMES |
|------------|-------------------------|---|
| CO1 | Understand | Describe the concepts of Cloud Computing and its Service Models& Deployment Models. |
| CO2 | Understand | Classify the types of Virtualizations |
| CO3 | Understand | Describe the Cloud Management and relate Cloud to SOA. |
| CO4 | Apply | Interpret Architecture and Pharrell Programing of Cloud Computing. |
| CO5 | Apply | Demonstrate practical implementation of Cloud computing. |

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|---------------------|-------------------|-------------------------------|
| Semester-III | | IT31L: Practical |
| 3 Credits | LTP: 0:0:5 | Compulsory Core Course |

Course Outcomes: Students will be able to

| CO# | COGNITIVE DOMAIN | COURSE OUTCOMES |
|------------|-------------------------|------------------------------------|
| CO1 | Apply | Develop mobile application. |
| CO2 | Apply | Develop ML, DL models using Python |

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|---------------------|-------------------|-------------------------------|
| Semester-III | | ITC31: Mini Project |
| 3 Credits | LTP: 0:0:5 | Compulsory Core Course |

Course Outcomes: Students will be able to

| CO# | COGNITIVE DOMAIN | COURSE OUTCOMES |
|------------|-------------------------|---|
| CO1 | Create | Create working project using tools and techniques learnt in this semester |

Sem-IV

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|--------------------|-------------------|-------------------------------|
| Semester-IV | | IT41: DevOps |
| 3 Credits | LTP: 4:0:0 | Compulsory Core Course |

Course Outcomes: Students will be able to

| CO# | COGNITIVE DOMAIN | COURSE OUTCOMES |
|-----|------------------|---|
| CO1 | Understand | describe the evolution of technology & timeline |
| CO2 | Remember | explain Introduction to various Devops platforms |
| CO3 | Understand | demonstrate the building components / blocks of Devops and gain an insight of the Devops Architecture |
| CO4 | Apply | apply the knowledge gain about Devops approach across various domains |
| CO5 | Apply | build DevOps application |

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|--------------------|-------------------|-------------------------------|
| Semester-IV | | BM41: PPM and OB |
| 3 Credits | LTP: 4:0:0 | Compulsory Core Course |

Course Outcomes: Students will be able to

| CO# | COGNITIVE DOMAIN | COURSE OUTCOMES |
|-----|------------------|---|
| CO1 | Understand | Describe and analyze the interactions between multiple aspects of management. |
| CO2 | Analyze | Analyze the role of planning and decision making in Organization |
| CO3 | Analyze | Justify the role of leadership qualities, Motivation and Team Building. |
| CO4 | Analyze | Analyze stress management and conflict management |
| CO5 | Understand | Describe Personality and Individual Behavior |

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|--------------------|--------------------|-------------------------------|
| Semester-IV | | ITC41: Project |
| 22 Credits | LTP: 0:0:22 | Compulsory Core Course |

Course Outcomes: Students will be able to

| CO# | COGNITIVE DOMAIN | COURSE OUTCOMES |
|-----|------------------|--|
| CO1 | Create | Create working project using tools and techniques learnt in the programme. |



**Course Outcomes of Each Courses for SIBAR MCA
 (2024 Pattern)**

Sem-I

| | | |
|-------------------|-------------------|--------------------------------|
| Semester-I | | IT11-Python Programming |
| 3 Credits | LTP: 4:0:0 | Compulsory Core Course |

Course Outcomes: On completion of the course, learners should be able to

| CO# | COGNITIVE DOMAIN | COURSE OUTCOMES |
|-----|------------------|---|
| CO1 | Apply | To learn and apply basic constructs of python such as data, operations, conditions, loops, data types. |
| CO2 | Apply | To understand advance concepts of python and able to apply it for solving the complex problems. |
| CO3 | Apply | To develop Python programs that incorporate OOPS concept, regular expressions and multithreading for complex problem-solving and performance enhancement. |
| CO4 | Apply | To implement various types of database operations in MongoDB. |
| CO5 | Apply | To develop comprehensive web applications using Django Framework. |

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|-------------------|-------------------|---|
| Semester-I | | IT12-Data Structure and Algorithms |
| 3 Credits | LTP: 4:0:0 | Compulsory Core Course |

Course Outcomes: On completion of the course, learners should be able to

| CO# | COGNITIVE DOMAIN | COURSE OUTCOMES |
|-----|------------------|--|
| CO1 | Apply | Implement the array static linear data structure and analyze its various real time applications |
| CO2 | Apply | Demonstrate linked list data structure and its types |
| CO3 | Apply | Demonstrate dynamic linear data structures like stack, queue and analyze their various applications. |
| CO4 | Apply | Implement techniques of Non-Linear data structures like Tree, Graph, Minimum Spanning Tree |
| CO5 | Apply | Demonstrate and compare various technical approaches of Searching, Sorting, Hashing and Heaps. |

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|-------------------|-------------------|-------------------------------|
| Semester-I | | IT13 - Advanced DBMS |
| 3 Credits | LTP: 4:0:0 | Compulsory Core Course |

Course Outcomes: On completion of the course, learners should be able to

| CO# | COGNITIVE DOMAIN | COURSE OUTCOMES |
|------------|-------------------------|--|
| CO1 | Apply | Demonstrating the concept of fundamentals of relational database systems include: data models, database & DDBS architectures, and ER features. |
| CO2 | Apply | Understand the concepts of transaction Concurrency control, Query Processing and Security aspects |
| CO3 | Apply | Apply SQL & NoSQL development tools on different types of Schemas. |
| CO4 | Apply | Demonstrate database design and Computation techniques for parallel and distributed database Technology. |
| CO5 | Apply | Design and Develop Real Time applications using Database tools. |

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|-------------------|-------------------|----------------------------------|
| Semester-I | | MT14: Business Statistics |
| 3 Credits | LTP: 4:0:0 | Compulsory Core Course |

Course Outcomes: On completion of the course, learners should be able to

| CO# | COGNITIVE DOMAIN | COURSE OUTCOMES |
|------------|-------------------------|--|
| CO1 | Understand | Understand the role and importance of statistics in business decision-making. |
| CO2 | Apply | Apply measures of central tendency and dispersion to summarize data. |
| CO3 | Understand | Understand basic probability concepts and rules. |
| CO4 | Apply | Apply correlation and regression techniques to analyze relationships between variables |
| CO5 | Apply | Apply time series analysis techniques to forecast business trends. |

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|-------------------|-------------------|--|
| Semester-I | | IT14: Software Engineering and Project Management |
| 3 Credits | LTP: 4:0:0 | Compulsory Core Course |

Course Outcomes: On completion of the course, learners should be able to

| CO# | COGNITIVE DOMAIN | COURSE OUTCOMES |
|------------|-------------------------|--|
| CO1 | Apply | Apply concepts, principles of software engineering to develop comprehensive Software Requirement Specification. |
| CO2 | Apply | Use software engineering analysis and design modelling technique to represent systems. |
| CO3 | Apply | Illustrate Software Project Management models for effective plan, manage and enhance projects. |
| CO4 | Apply | Implement Agile methodologies to enhance project adaptability and responsiveness to changing requirements. |
| CO5 | Apply | Employ Agile tools effectively to manage, navigate and facilitate collaboration and streamline project workflows in software development |

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|-------------------|-------------------|--|
| Semester-I | | EC11-1: Fundamentals of Cloud Computing |
| 3 Credits | LTP: 4:0:0 | EC11-1 (Elective I) |

Course Outcomes: On completion of the course, learners should be able to

| CO# | COGNITIVE DOMAIN | COURSE OUTCOMES |
|------------|-------------------------|---|
| CO1 | Understand | Describe the concepts of Cloud Computing, Dockers and Container. |
| CO2 | Understand | Explore the various Cloud Service Models and Deployment Models. |
| CO3 | Apply | Implement concepts, hypervisors, virtual machines, VMware, Microsoft Hyper-V, and Open-Source Virtualization Manager. |
| CO4 | Understand | Describe the Cloud Architecture and relate Cloud to SOA along with SLA management, cloud bursting strategies. |
| CO5 | Analyze | Compare different Cloud Platforms – AWS, GCP, IBM Cloud. |

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|-------------------|-------------------|--------------------------------|
| Semester-I | | EC11-2: Web Development |
| 3 Credits | LTP: 4:0:0 | EC11-2 (Elective I) |

Course Outcomes: On completion of the course, learners should be able to

| CO# | COGNITIVE DOMAIN | COURSE OUTCOMES |
|------------|-------------------------|--|
| CO1 | Apply | Design appropriate user interfaces by implementing new features of HTML5 |
| CO2 | Apply | Design user interfaces and implement CSS3 features |
| CO3 | Apply | Demonstrate the concept of responsive web design and its importance |
| CO4 | Apply | Build Dynamic web pages using server-side PHP programming |
| CO5 | Apply | Develop and deploy web application |

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|-------------------|-------------------|--|
| Semester-I | | EC11-3: Fundamental of Data Science |
| 3 Credits | LTP: 4:0:0 | EC11-3 (Elective I) |

Course Outcomes: On completion of the course, learners should be able to

| CO# | COGNITIVE DOMAIN | COURSE OUTCOMES |
|------------|-------------------------|--|
| CO1 | Understand | Understand the core concepts, techniques and methodologies used in data science |
| CO2 | Apply | Apply Computational Mathematics concepts to solve data-related problems effectively. |
| CO3 | Apply | Apply the principles of data collection, cleaning, and preprocessing. |
| CO4 | Apply | Perform exploratory data analysis using Numpy and Pandas to derive insights from datasets. |
| CO5 | Apply | Apply the strategies for visualizing the data. |

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|-------------------|-------------------|---|
| Semester-I | | EC11-4: Introduction to Cyber Security |
| 3 Credits | LTP: 4:0:0 | EC11-4 (Elective I) |

Course Outcomes: On completion of the course, learners should be able to

| CO# | COGNITIVE DOMAIN | COURSE OUTCOMES |
|------------|-------------------------|--|
| CO1 | Understand | Understanding the knowledge of cybercrimes, cyber security and cyber-attacks, vulnerabilities, techniques |
| CO2 | Apply | Illustrate the security aspects of social media, network platforms and ethical aspects associated with use of social media |
| CO3 | Apply | Articulate the importance of personal data theft, financial frauds and identify data privacy and security |
| CO4 | Apply | Apply existing legal framework and laws on cyber security. |
| CO5 | Understand | Understand the need of information security, standards and polices |

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|-------------------|-------------------|-------------------------------|
| Semester-I | | IT11L: Practical |
| 3 Credits | LTP: 0:0:4 | Compulsory Core Course |

Course Outcomes: On completion of the course, learners should be able to

| CO# | COGNITIVE DOMAIN | COURSE OUTCOMES |
|------------|-------------------------|--|
| CO1 | Apply | Demonstrate Basics of Python and OOPs concepts. |
| CO2 | Apply | Demonstrate CRUD Operation using MongoDB. |
| CO3 | Apply | Design and Develop web application using Django. |
| CO4 | Apply | Implement Linear data structure like stack, queue and Linked list and demonstrate various searching and sorting techniques |
| CO5 | Apply | Implement various operation of non-Linear data structure like Tree and Graph |

| | | |
|-------------------|-------------------|-------------------------------|
| Semester-I | | ITC11: Mini Project |
| 3 Credits | LTP: 0:0:4 | Compulsory Core Course |

Course Outcomes: On completion of the course, learners should be able to

| CO# | COGNITIVE DOMAIN | COURSE OUTCOMES |
|------------|-------------------------|--|
| CO1 | Apply | Apply knowledge of software engineering principles and methodologies in designing. |
| CO2 | Apply | Demonstrate the ability to develop a functioning software application or solution that meets specified requirements and objectives |
| CO3 | Apply | Design comprehensive documentation that includes project requirements, design specifications, implementation details, testing strategies, and user manuals |

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|-------------------|-------------------|--|
| Semester-I | | IK11: Indian Knowledge System (IKS) |
| 1 Credit | LTP: 1:0:0 | Compulsory Internal Course |

Course Outcomes: On completion of the course, learners should be able to

| CO# | COGNITIVE DOMAIN | COURSE OUTCOMES |
|------------|-------------------------|--|
| CO1 | Understand | Understand about Indian philosophy, Culture, knowledge in different domains. |
| CO2 | Understand | Explore the ethical and moral perspectives within Indian philosophical and spiritual traditions. |
| CO3 | Apply | Understand Indian knowledge system and apply in current area and applications. |
| CO4 | Understand | Understand the basics of Indian ethics and values |
| CO5 | Understand | Explore the Indian traditions and their application in modern contexts. |

Sem-II

| | | |
|--------------------|-------------------|-------------------------------|
| Semester-II | | IT21: Java Programming |
| 3 Credits | LTP: 4:0:0 | Compulsory Core Course |

Course Outcomes: On completion of the course, learners should be able to

| CO# | COGNITIVE DOMAIN | COURSE OUTCOMES |
|------------|-------------------------|---|
| CO1 | Apply | Apply the concept of Object-Oriented Programming to map and solve simple real world problem |
| CO2 | Apply | To design and develop robust, efficient, multithreaded and scalable Java applications use the collection framework, multithreading, and exception handling. |
| CO3 | Apply | To develop Web application for solving real life problem using Servlet |
| CO4 | Apply | To develop Web application for solving real life problem using JSP, JDBC |
| CO5 | Apply | To develop robust web applications using Spring MVC |

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|--------------------|-------------------|--------------------------------------|
| Semester-II | | MT21: Optimization Techniques |
| 3 Credits | LTP: 4:0:0 | Compulsory Core Course |

Course Outcomes: On completion of the course, learners should be able to

| CO# | COGNITIVE DOMAIN | COURSE OUTCOMES |
|------------|-------------------------|--|
| CO1 | Apply | Understand and formulate linear programming models to solve optimization problems in various business contexts. |
| CO2 | Apply | Apply sequential models to make informed decisions in dynamic and uncertain environments. |
| CO3 | Apply | Utilize Markov chains and simulation techniques to model and solve complex inventory management problems. |
| CO4 | Apply | Apply PERT/CPM techniques to plan, schedule, and control projects effectively, including managing replacement decisions. |
| CO5 | Apply | Analyze decision-making processes and strategic interactions using decision theory and game theory frameworks. |

| | | |
|--------------------|-------------------|--|
| Semester-II | | IT-22: Software Testing and Quality Assurance |
| 3 Credits | LTP: 4:0:0 | Compulsory Core Course |

Course Outcomes: On completion of the course, learners should be able to

| CO# | COGNITIVE DOMAIN | COURSE OUTCOMES |
|------------|-------------------------|--|
| CO1 | Understand | Understand the role of software quality assurance in contributing to the efficient delivery of software solutions. |
| CO2 | Understand | Understand specific software tests with well-defined objectives and targets. |
| CO3 | Apply | Apply the software testing techniques in commercial environments. |
| CO4 | Analyze | Construct test strategies and plans for software testing. |
| CO5 | Apply | Demonstrate the usage of software testing tools for test effectiveness, efficiency, and coverage. |

| | | |
|--------------------|-------------------|-----------------------------------|
| Semester-II | | RM21: Research Methodology |
| 3 Credits | LTP: 4:0:0 | Compulsory Core Course |

Course Outcomes: On completion of the course, learners should be able to

| CO# | COGNITIVE DOMAIN | COURSE OUTCOMES |
|------------|-------------------------|---|
| CO1 | Understand | Understand the basic concepts, purposes, and significance of research methodology in academic and professional contexts. |
| CO2 | Apply | Apply various research designs and their appropriateness for different types of research questions and objectives |
| CO3 | Apply | Apply suitable data collection and sampling methods to gather reliable and valid data for research studies. |
| CO4 | Apply | Use appropriate statistical tools and techniques to demonstrate research data and interpret the results effectively. |
| CO5 | Apply | Apply skills in writing clear, coherent, and well-structured research reports that effectively communicate research findings. |

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| Semester-II | | EC21-1: Cloud Computing Management and Security |
| 3 Credits | LTP: 4:0:0 | EC21-1 (Elective II) |

Course Outcomes: On completion of the course, learners should be able to

| CO# | COGNITIVE DOMAIN | COURSE OUTCOMES |
|------------|-------------------------|--|
| CO1 | Understand | Understand and describe the fundamentals of Cloud Management, Security Concepts, Quality services. |
| CO2 | Understand | Understand and explain the concept of Cloud Database and File System with Cloud Database Services. |
| CO3 | Apply | Demonstrate Security Concepts in AWS and security services. |
| CO4 | Understand | Recognize the Cloud Backup and Disaster Recovery strategies. |
| CO5 | Apply | Use and understand the various Cloud Compute Services. |

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| Semester-II | | EC 21-2: JavaScript |
| 3 Credits | LTP: 4:0:0 | EC21-2 (Elective II) |

Course Outcomes: On completion of the course, learners should be able to

| CO# | COGNITIVE DOMAIN | COURSE OUTCOMES |
|------------|-------------------------|--|
| CO1 | Apply | Utilize Basic JavaScript concepts for writing simple Java script program. |
| CO2 | Apply | Design and develop simple application using build-in objects and browser object Model |
| CO3 | Apply | Implement the concepts of OOPs, event handling and Asynchronous JavaScript for developing simple real life problem solving web application |
| CO4 | Create | Create interactive web page of application for problem solving |
| CO5 | Apply | Demonstrate server-side and client-side aspects of web applications using Node.js and React. |

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| Semester-II | | EC21-3: Machine Learning Techniques |
| 3 Credits | LTP: 4:0:0 | EC21-3 (Elective II) |

Course Outcomes: On completion of the course, learners should be able to

| CO# | COGNITIVE DOMAIN | COURSE OUTCOMES |
|------------|-------------------------|--|
| CO1 | Understand | Describe the workflow of a machine learning project, including data preprocessing, model training, evaluation, and deployment. |
| CO2 | Apply | Apply the various algorithms of supervised and learning |
| CO3 | Apply | Apply the various algorithms of unsupervised learning |
| CO4 | Apply | Apply the fundamental algorithms in semi-supervised and reinforcement learning. |
| CO5 | Apply | Apply real-world applications of supervised and unsupervised learning across diverse domains. |

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| Semester-II | | EC21-4: Essentials of Cyber Security |
| 3 Credits | LTP: 4:0:0 | EC21-4 (Elective II) |

Course Outcomes: On completion of the course, learners should be able to

| CO# | COGNITIVE DOMAIN | COURSE OUTCOMES |
|------------|-------------------------|--|
| CO1 | Understand | Understand the importance of cybersecurity practices, understand how to secure a network against intrusion tactics, understand types cyber crime attacks |
| CO2 | Understand | Understand how data is sent and received over a network, Incidence response, Disaster Recovery |
| CO3 | Apply | Identify common risks, threats, and vulnerabilities, as well as techniques to mitigate them |
| CO4 | Apply | Evaluate risk and identify security management tools, apply cyber security technologies |
| CO5 | Understand | Understand digital forensics and its needs |

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| Semester-II | | EC22-1: Essentials of Cloud Computing and Security |
| 3 Credits | LTP: 4:0:0 | EC22-1 (Elective III) |

Course Outcomes: On completion of the course, learners should be able to

| CO# | COGNITIVE DOMAIN | COURSE OUTCOMES |
|------------|-------------------------|--|
| CO1 | Understand | Describe the concepts of Cloud Software Security Fundamentals. |
| CO2 | Understand | Discuss and Classify different Programming Environments. |
| CO3 | Understand | Define Emerging Trends in Cloud Computing. |
| CO4 | Understand | Discuss Resource pooling, Sharing and Provisioning |
| CO5 | Apply | Demonstration of various applications in cloud computing. |

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| Semester-II | | EC22-2: Advance Web Development |
| 3 Credits | LTP: 4:0:0 | EC22-2 (Elective III) |

Course Outcomes: On completion of the course, learners should be able to

| CO# | COGNITIVE DOMAIN | COURSE OUTCOMES |
|------------|-------------------------|---|
| CO1 | Apply | Implement a Web Server in Node |
| CO2 | Apply | Apply TypeScript features such as decorators, generics, and modules for creating reusable and maintainable code |
| CO3 | Apply | Implement concepts and methods of Angular |
| CO4 | Apply | Implement Angular services, dependency injections and Asynchronous operations |
| CO5 | Create | Develop website using Next.js |

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| Semester-II | | EC22-3: Power BI |
| 3 Credits | LTP: 4:0:0 | EC22-3 (Elective III) |

Course Outcomes: On completion of the course, learners should be able to

| CO# | COGNITIVE DOMAIN | COURSE OUTCOMES |
|------------|-------------------------|--|
| CO1 | Apply | Demonstrate the concepts and importance of data modeling, data source, data cleaning, data transformation in Power BI. |
| CO2 | Analyze | Analyze data relationships and model data using DAX |
| CO3 | Analyze | Assess the interactivity of visualizations using slicers, filters, and drill through features. |
| CO4 | Apply | Use M Queries to extract, transform, and load data from various sources |
| CO5 | Analyze | Examine Power BI solutions that solve real-world business problems as outlined in case studies |

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| Semester-II | | EC22-4: Essentials of Information Security |
| 3 Credits | LTP: 4:0:0 | EC22-4 (Elective III) |

Course Outcomes: On completion of the course, learners should be able to

| CO# | COGNITIVE DOMAIN | COURSE OUTCOMES |
|------------|-------------------------|--|
| CO1 | Understand | Understand the fundamental concepts of cybersecurity, including its importance and various threats in cyberspace. |
| CO2 | Understand | Understand the vulnerable to threats in systems |
| CO3 | Apply | Design and Apply the need for security architecture and its relevance to systems, service continuity and reliability |
| CO4 | Understand | Ability to describe the various auditing tools that can be used in cybersecurity management |
| CO5 | Apply | Identifies the needs of users in the field of developing information systems and building secure computer networks. |

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| Semester-II | | IT21L: Practical |
| 3 Credits | LTP: 0:0:4 | Compulsory Core Course |

Course Outcomes: On completion of the course, learners should be able to

| CO# | COGNITIVE DOMAIN | COURSE OUTCOMES |
|------------|-------------------------|--|
| CO1 | Apply | Demonstrate fundamental concepts of Java |
| CO2 | Create | Design and implement classes and objects in Java, applying principles of inheritance, polymorphism, encapsulation, and abstraction |
| CO3 | Create | Establish database connectivity using JDBC, execute SQL queries, handle result sets, and manage database transactions from Java applications |
| CO4 | Create | Develop dynamic web applications using Java Servlets and JSP, |
| CO5 | Create | Use spring MVC framework to build web application. |

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| Semester-II | | ITC21: Mini Project |
| 3 Credits | LTP: 0:0:4 | Compulsory Core Course |

Course Outcomes: On completion of the course, learners should be able to

| CO# | COGNITIVE DOMAIN | COURSE OUTCOMES |
|------------|-------------------------|--|
| CO1 | Apply | Apply knowledge of software engineering principles and methodologies in designing and implementing the project |
| CO2 | Apply | Demonstrate the ability to develop a functioning software application or solution that meets specified requirements and objectives |
| CO3 | Apply | Design comprehensive documentation that includes project requirements, design specifications, implementation details, testing strategies, and user manuals |



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