SVKM'S
NMIMS
Deemed to be UNIVERSITY

Mukesh Patel School of Technology Management and Engineering

B.Tech (Information Technology)

- **Program Educational Objectives (PEOs)**
- **Program Outcomes (POs)**
- **Course Outcomes (COs)**

Program Educational Objectives (PEOs):

1. **Professional Skills**
2. **Career Growth**
3. **Higher Studies**

Program Outcomes (POs):

PO-1: Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.

PO-2: Problem Analysis: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)

PO-3: Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)

PO-4: Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).

PO-5: Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)

PO-6: Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).

PO-7: Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)

PO-8: Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.

PO-9: Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences

PO-10: Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.

PO-11: Recognize the need for, and have the preparation and ability for independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change.

Courses and Course Outcomes (COs):

Constitution of India

- **CO-1:** Recall the historical evolution of India's democratic values, emphasizing the foundational principles of justice, equality, and liberty as enshrined in the Preamble of the Constitution.
- **CO-2:** Understand the fundamental rights enshrined in the Constitution, their permissible restrictions, and how these rights are balanced with duties, to grasp their application within societal and professional frameworks.
- **CO-3:** Apply the knowledge of the structure of India's polity and the role of the Judiciary in maintaining the basic structure of the Constitution in real-world professional contexts

Embedded System

- **CO-1:** Explain embedded system architecture and RTOS
- **CO-2:** Identify how microprocessor, memory, peripheral components and buses interact in an embedded system design
- **CO-3:** Develop solutions for various real time applications using Embedded programming

Visual Analytics

- **CO-1:** Demonstrate a working knowledge of data visualization
- **CO-2:** Create visualization charts appropriate for the underlying data
- **CO-3:** Apply modern statistical learning techniques on data visualizations
- **CO-4:** Design and implement interactive links between various objects in a data visualization report

Game Design (Open Elective)

- **CO-1:** Interpret the term “game”, incorporating different concepts and multiple perspectives.
- **CO-2:** Analyse the mechanics of paper and digital games, considering how these mechanics affect gameplay and player experiences.
- **CO-3:** Design, develop, and test games using an iterative design process and considering user feedback.
- **CO-4:** Create Design Documents using design template to communicate design ideas.

Machine Learning Algorithms(MLA)

- **CO-1:** Use machine learning algorithms to solve problems
- **CO-2:** Assess the performance of machine learning algorithms
- **CO-3:** Recommend a suitable algorithm for a given problem

Human Computer Interaction(HCI)

- **CO-1:** Discuss the fundamental concepts of human-computer interaction
- **CO-2:** Apply design principles and models to user interface design
- **CO-3:** Analyze various aspects of user experience and design thinking in HCI
- **CO-4:** Evaluate interfaces using experimental methods for usability improvement.
- **CO-5:** Design user interface applications using HCI concepts.

Principles of Artificial Intelligence

- **CO-1:** Explain the history & basic principles of AI in solutions that require problem solving
- **CO-2:** Discuss knowledge representation and apply learning techniques like Neural networks, Bayesian networks etc. in various AI problems
- **CO-3:** Analyze and design a real-world problem for implementation of NLP methods

Cloud Computing

- **CO-1:** Explain and analyze the Physical Layer of cloud computing, including data center architectures, networking, and storage infrastructure.
- **CO-2:** Implement and manage virtualization techniques in the Virtual Layer, including hypervisors, containerization, and resource allocation.
- **CO-3:** Develop and optimize cloud resource management at the Control Layer, using load balancing, auto-scaling, and monitoring techniques.
- **CO-4:** Assess and implement Cloud Security mechanisms, including identity management, encryption, and compliance policies.
- **CO-5:** Design and execute Cloud Orchestration strategies using automation tools, DevOps practices, and multi-cloud management techniques.

Information Systems Security

- **CO-1:** Explain various security threats and the effectiveness of countermeasures.
- **CO-2:** Compare various security technologies and mechanisms.
- **CO-3:** Examine ethical and legal issues in cybersecurity and their impact on practice.
- **CO-4:** Assess the effectiveness of cybersecurity policies and their role in risk management.
- **CO-5:** Implement security measures and best practices to safeguard information systems from cyber threats and attacks.

Cloud Security

- **CO-1:** Classify the cloud reference model and its usage
- **CO-2:** Examine cloud security w.r.t data, platform, infrastructure, application and operations
- **CO-3:** Evaluate the legal, ethical and compliance aspects of cloud

Mobile Device Security and Forensics

- **CO-1:** Describe various threats faced by mobile devices and suggest their counter measures
- **CO-2:** Perform forensics operations on mobile devices
- **CO-3:** Write mobile forensic analysis report

Introduction to Cryptography

- **CO-1:** Explain and implement various symmetric key cryptographic algorithms
- **CO-2:** Explain and implement various asymmetric key cryptographic algorithms
- **CO-3:** Describe various attacks on cryptosystems

Operating Systems

- **CO-1:** Describe the fundamental concepts of Operating system
- **CO-2:** Apply process management strategies
- **CO-3:** Simulate memory management, I/O management and file management strategies.

System Administration

- **CO-1:** Demonstrate various System admin tasks
- **CO-2:** Configure various application servers.
- **CO-3:** Secure Linux system

Ethical Hacking

- **CO-1:** Demonstrate hacking in a lab environment.
- **CO-2:** Describe various countermeasures.
- **CO-3:** Describe various professional, ethical and legal issues related to ethical hacking.

Capstone Project

- **CO-1:** Select an appropriate problem statement after reviewing the literature and identifying the research gaps.
- **CO-2:** Formulate a feasible design model.
- **CO-3:** Implement the prototype/proof of concept, test and validate the results.
- **CO-4:** Work efficiently in a team environment.
- **CO-5:** Summarize the findings into a technical report.

Advanced Data Structures

- **CO-1:** Choose appropriate data structures and algorithms, understand the ADT/libraries, and use it to design algorithms for a specific problem.
- **CO-2:** Design and Implement solution for a given real time problem using hashing techniques.
- **CO-3:** Use and Implement red-black trees, B-trees and Splay trees.
- **CO-4:** Implement pattern matching algorithms for various text processing applications.

Mobile Application Development

- **CO-1:** Design user interfaces using Android Studio and Flutter
- **CO-2:** Implement file handling using text and images
- **CO-3:** Implement database connectivity and location tracking
- **CO-4:** Develop a full-fledged Android/IOS application

Object Oriented Programming

- **CO-1:** Explain and implement the basic concepts in Java such as defining classes, creating objects, invoking methods, handling exceptions etc
- **CO-2:** Design solutions for a given problem using the concepts of Abstraction, Polymorphism, Encapsulation, Inheritance in OOP paradigm.
- **CO-3:** Design Class diagrams for solving a real-world problem.

Programming for Analytics

- **CO-1:** To create data sets suitable for analysis.
- **CO-2:** To generate summary reports.
- **CO-3:** To access and manipulate data stored in excel or raw data files.
- **CO-4:** To understand constructs to perform data transformations and iterative data processing.

Software Engineering

- **CO-1:** Explain the characteristics of various process models used in the development of a Software project
- **CO-2:** Demonstrate an understanding of various Analysis and Design models that provide a basis for the software development
- **CO-3:** Apply UML concepts for modeling software functionality for a given scenario
- **CO-4:** Create test cases for validating the working of the software developed

English Communication

- **CO-1:** Use their knowledge of vocabulary and grammar to articulate their ideas effectively
- **CO-2:** Demonstrate effective listening and speaking skills in oral communication situations such as speeches, conversations, power-presentations, etc.
- **CO-3:** Apply different reading techniques as needed to read passages effectively

Critical Thinking

- **CO-1:** solve problems or take decisions by processing information in a clear, logical, reasoned and reflective manner.
- **CO-2:** recognise, build and appraise arguments
- **CO-3:** analyse contexts effectively
- **CO-4:** recognise bias and its impact on decision making

Software Project Management

- **CO-1:** Explain the process of project planning and design in software development.
  CO-2: Break down a software project to create project schedules and cost estimates.
- **CO-3:** Apply risk analysis techniques to develop a risk management and mitigation plan.
- **CO-4:** Monitor and control the progress of software deliverables throughout the project lifecycle.

DBA

- **CO-1:** Describe the fundamentals of Database Administration
- **CO-2:** Analyze the Network Architecture and implement Database security
- **CO-3:** Design Database backup and recovery procedures, apply performance tuning operations

SQA

- **CO-1:** Classify the various software quality factors
- **CO-2:** Describe and comprehend SQA architecture and its components
- **CO-3:** Identify the different software defects and techniques used for defects removal
- **CO-4:** Evaluate on the basis of Software quality metrics and the standards.