SHRI VILE PARLE KELAVANI MANDAL's

USHA PRAVIN GANDHI COLLEGE OF ARTS, SCIENCE AND COMMERCE

Bhakti Vedanta Swami Marg, North-South Road No. 1

Juhu Scheme, Vile Parle (West), Mumbai 400 056.

Accreditation by NAAC A+ Grade with CGPA 3.27

(AUTONOMOUS)

Affiliated to the

UNIVERSITY OF MUMBAI

Program: Bachelor of Science

B. Sc. (Information Technology)

Semester III & IV

Choice Based Credit System (CBCS)

under NEP 2020

with effect from the Academic year 2025 - 26

Academic Council No:

Agenda No:

Preamble

The **Bachelor of Science in Information Technology (BSc IT)** program is designed to provide students with a **robust foundation** in computing, programming, and emerging technologies. The **Second Year (SYBSc IT)** curriculum builds upon the fundamental concepts introduced in the first year, preparing students for **advanced studies and real-world applications** in data management, networking, and cutting-edge areas of Information Technology.

The **SYBSc IT syllabus** is structured to:

- Develop **core technical competencies** in **programming, database management, networking, and software engineering**, which are essential for modern IT professionals.
- Introduce and deepen understanding of **emerging technologies**, including **Python programming, multimedia applications, advanced networking techniques, and data analysis**, ensuring alignment with industry trends.
- Strengthen **statistical and analytical problem-solving abilities** through **hands-on practicals, live projects, case studies, and algorithm-based learning**.
- Foster **logical thinking, innovation, and research-oriented learning**, encouraging students to explore creative solutions and develop a strong technical mindset.
- Promote **effective communication, teamwork, and leadership skills**, ensuring graduates are well-prepared for dynamic corporate environments and entrepreneurial ventures.
- Instill a sense of **ethical IT practices and cybersecurity awareness**, preparing students to address global challenges in digital security and responsible data management.

The curriculum maintains a **perfect balance between theoretical knowledge and practical exposure**, offering students **real-world learning opportunities** through programming exercises, interactive lab sessions, and project-based applications. By the end of **SYBSc IT**, students will have acquired a **comprehensive understanding of IT principles**, technical expertise, and problem-solving skills, equipping them for specialized studies in their final year and promising careers in the ever-evolving IT industry.

Credit Distribution Structure for

Second Year (B.Sc. (Information Technology))

SEM III				
Sr. No.	**Name of the Module (Subject)**	**Module Code**	**Module Category (Core, Core Elective, OE,VSC, SEC, AEC,VSC, IKS, CC, FP, OJT, RM, CEP, RP)**	**Total no. of credits**
1	Data Structures And Algorithm	UIDSA201	MAJ	**3**
2	Data Structures And Algorithm LAB	UIDSA201P	MAJ	**1**
3	Software Engineering	UISEN202	MAJ	**3**
4	Python Programming LAB	UIPPL203P	MAJ	**1**
5	Networking Technology	UINTE204	MIN	**3**
6	Networking Technology LAB	UINTE204P	MIN	**1**
7	Management Information System	UIMIS205	OE	**2**
8	Multimedia and Animation I	UIMAA206	OE	**2**
9	Linear Algebra Concepts	UILAC207	VSEC	**2**
10	Hindi Level I	UIHIN208	AEC	**2**
11	Marathi Level I	UIMAR209	AEC	**2**
12	Gujarati Level I	UIGUJ210	AEC	**2**
13	Sanskrit Level I	UISAN211	AEC	**2**
14	Professional And Management Skills	UIPMS212	AEC	**2**
15	FIELD PROJECT	UIFPR213	FP	**2**
16	YOGA 3	UIYOG221	CC	**2**
17	DLLE 3	UIDLL222	CC	**2**
18	SPORTS 3	UISPT223	CC	**2**
19	NSS 3	UINSS224	CC	**2**
20	Cultural 3	UICUL225	CC	**2**

SEM IV				
Sr. No.	**Name of the Module (Subject)**	**Module Code**	**Module Category (Core, Core Elective, OE,VSC, SEC, AEC,VSC, IKS, CC, FP, OJT, RM, CEP, RP)**	**Total no. of credits**
1	Database Management System	UIDMS251	MAJ	**3**
2	Database Management System LAB	UIDMS251P	MAJ	**1**
3	Core Java	UICJA252	MAJ	**3**
4	Core Java LAB	UICJA252P	MAJ	**1**
5	Embedded System	UIESY253	MIN	**3**
6	Embedded System LAB	UIESY253P	MIN	**1**
7	Multimedia and Animation II	UIMAA254	OE	**2**
8	Customer Retention and Engagement	UICRE255	OE	**2**
9	Numerical Methods	UINME256	VSEC	**2**
10	Hindi Level II	UIHIN257	AEC	**2**
11	Marathi Level II	UIMAR258	AEC	**2**
12	Gujarati Level II	UIGUJ259	AEC	**2**
13	Sanskrit Level II	UISAN260	AEC	**2**
14	Universal Values And Skills	UIUVS261	AEC	**2**
15	COMMUNITY ENGAGEMENT PROJECT	UICEP262	FP	**2**
16	YOGA 4	UIYOG271	CC	**2**
17	DLLE 4	UIDLL272	CC	**2**
18	SPORTS 4	UISPT273	CC	**2**
19	NSS 4	UINSS274	CC	**2**
20	Cultural 4	UICUL275	CC	**2**

Sign of HOD
Dr. Smruti Nanavaty
Dept. of Information Technology

Sign of Principal
Prof. Dr. A. Kapoor

Syllabus

B.Sc. (Information Technology)

(Semester III & IV)

SEMESTER III

Program: B.Sc. – Information Technology (2025 - 26)		Semester: III	
Course: Data Structures And Algorithm		**Course Code: UIDSA201**	
Teaching Scheme		**Evaluation Scheme**	
Lecture (Hours per week)	**Credit**	**Continuous Assessment (CA) (Marks - 40)**	**Semester End Examinations (SEE) (Marks- 60 in Question Paper)**
3	3	20+20	60

Learning Objectives:

1. To understand basics of various data structures and their functions, design and analysis of algorithm, concept of complexity.
2. To apply these concepts to real life problem solving
3. To evaluate and create solutions to real life problem solving

Learning outcomes:

1. Understanding basics of various data structures and their functions, design and analysis of algorithm, concept of complexity.
2. Ability to apply these concepts to real life problem solving
3. Ability to evaluate and create solutions to real life problem solving

Module	Module Content	Module wise Pedagogy Used	Duration of Module
I	**Introduction:** Data Structure, Algorithm, Importance of Algorithm Analysis, Complexity of an Algorithm, Asymptotic Analysis and Notations, Big O Notation, Big Omega Notation, Big Theta Notation, Rate of Growth and Big O Notation. **Array**: Memory Representation of One-Dimensional Array, Memory Representation of Two-Dimensional Arrays **Linked List:** Linked List, One-way Linked List, Traversal of Linked List, Searching, Memory Allocation and Deallocation, Insertion in Linked List, Deletion from Linked List, Copying a List into Other List, Merging Two Linked Lists, Splitting a List into Two Lists, Reversing One way linked List, Circular Linked List, Applications of Circular Linked List Sparse Arrays, Implementing other Data Structures. Complexity analysis of Link List.	Classroom learning	15

II	**Stack**: Introduction, Operations on the Stack Memory Representation of Stack, Array Representation of Stack, Applications of Stack, Evaluation of Arithmetic Expression, Matching Parenthesis, infix and postfix operations, Recursion**.** **Queue:** Introduction, Queue, Operations on the Queue, Memory Representation of Queue, Array representation of queue, Linked List Representation of Queue, Circular Queue, **Tree**: Tree, Binary Tree, Properties of Binary Tree, Memory Representation of Binary Tree, Operations Performed on Binary Tree, Reconstruction of Binary Tree from its Traversals, Binary Search Tree, Operations on Binary Search Tree, Heap Tree, Operation on Heap, Heap Sort	Classroom	15
III	**Graph**: Introduction, Graph, Graph Terminology, Memory Representation of Graph, Adjacency Matrix Representation of Graph, Adjacency List or Linked Representation of Graph, Operations Performed on Graph, Graph Traversal, Applications of the Graph, Hash function, Address calculation techniques, Common hashing functions Collision resolution, Linear probing, Quadratic, Double hashing, Buckethashing, Deletion and rehashing. Complexity comparison of different sorting algorithms	Classroom learning.	15
Total			30

Reference books:

J. Canning, A. Broder, and R. Lafore, *Data Structures & Algorithms in Python*. Addison-Wesley Professional, 2022.

M. A. Weiss, *Data Structures and Algorithm Analysis in C+*. 2003.

Program: B.Sc. – Information Technology (2025 - 26)		**Semester: III**	
Course: Data structures And Algorithm LAB		**Course Code: UIDSA201P**	
Teaching Scheme		**Evaluation Scheme**	
Lecture (Hours per week)	**Credit**	**Continuous Assessment (CA) (Marks -20)**	**Machine Test**
2	1	20	30

Learning Objectives:

1. Design simple to complex algorithms.
2. To apply these concepts to real life problem solving
3. To evaluate and create solutions to real life problem solving

Learning outcomes:

4. Using basics of various data structures and their functions, design and analysis of algorithm, concept of complexity.
5. Application of these concepts to real life problem solving
6. Application of these solutions to real life problem solving

Outline of Syllabus: (per session plan)

Modules	**Topics**	**Duration (Lecture)**
Module 1	• Implement the following: o Write a program to store the elements in 1-D array and perform the operations like searching, sorting and reversing the elements. [Menu Driven] o Read the two arrays from the user and merge them and display the elements in sorted order. [Menu Driven] o Write a program to perform the Matrix addition, Multiplication and Transpose Operation. [Menu Driven] • Implement the following for Stack: . o Write a program to convert an infix expression to postfix and prefix conversion. • Implement the following for Queue: o Write a program to implement the concept of Queue with Insert, Delete, Display and Exit operations. o Write a program to implement the concept of Circular Queue	**10**

Module 2	• Implement the following for Linked List:
	  o Write a program to create a single linked list and display the node elements in reverse order.
	  o Write a program to search the elements in the linked list and display the same
	  o Write a program to create double linked list and sort the elements in the linked list.
		10

Module 3	• Implement the sorting techniques:
	  o Write a program to implement selection sort.
	  o Write a program to implement insertion sort.
	• Implement Binary Search
		10

Total Lectures		**30**

Program: B.Sc. – Information Technology (2025 - 26)		Semester: III	
Course: Software Engineering		**Course Code: UISEN202**	
Teaching Scheme		**Evaluation Scheme**	
Lecture (Hours per week)	**Credit**	**Continuous Assessment (CA) (Marks - 40)**	**Semester End Examinations (SEE) (Marks- 60 in Question Paper)**
3	3	20+20	60

Learning Objectives:

- To understand the basic concepts of Software Engineering
- To analyze different Software Development Model
- To understand and implement requirements engineering and UML modeling
- To understand and apply software design principles and testing strategies

Course Outcomes:

After completion of the course, learners would be able to:

CO1: To understand the role and concept of Software Engineering.

CO2: To describe various Software Development Models and compare their advantages and limitations in different project scenarios.

CO3: To analyze the different Software Development Model to design an application.

CO4: To design and Implement requirements engineering process and Apply UML modeling for Software Systems.

CO5: To evaluate different software design principles and testing strategies to determine their suitability for specific software projects.

CO6: To create a basic software design using UML modeling and implement a test plan incorporating appropriate testing strategies.

Outline of Syllabus: (per session plan)

Modules	Topics	Duration (Lecture)
Module 1		**15**
	The Nature of Software: Defining Software, Software Application Domains, Legacy Software, The Changing Nature of Software **Software Engineering:** Defining the Discipline, The Software Process: The Process Framework, Umbrella Activities, Process Adaptation, Software Engineering Practice: The Essence of Practice, General Principles **Process Models:** Prescriptive Process Models: The Waterfall Model, Incremental Process Models, Evolutionary Process Models, Concurrent	

	Models, Specialized Process Models: Component-Based Development, The Formal Methods Model, Aspect-Oriented Software Development, The Unified Process: Phases of the Unified Process, Personal and Team Process Models: Personal Software Process, Team Software Process, Process Technology, Product and Process	
Module 2		**15**
	Agile Development: What Is Agility?, Agility and the Cost of Change, What Is an Agile Process?, Agility Principles, The Politics of Agile Development, Extreme Programming, Other Agile Process Models, Scrum, Dynamic Systems Development Method, Agile Modeling, Agile Unified Process, A Tool Set for the Agile Process **Understanding Requirements:** Requirements Engineering, Establishing the Groundwork, Eliciting Requirements, Developing Use Cases, Building the Analysis Model, Negotiating Requirements, Requirements Monitoring, Validating Requirements, Avoiding Common Mistakes **Introduction to UML:** Class Diagram, Deployment Diagram, Use Case Diagram, Sequence Diagram, Communication Diagram, Activity Diagram, State Diagram,	
Module 3	**Design Concepts:** Design within the Context of Software Engineering, The Design Process, Software Quality Guidelines and Attributes, The Evolution of Software Design, Design Concepts, Abstraction, Architecture, Patterns, Separation of Concerns, Modularity, Information Hiding, Functional Independence, Refinement, Aspects, Refactoring, Object-Oriented Design Concepts, Design Classes, Dependency Inversion, Design for Test, The Design Model, Data Design Elements, Architectural Design Elements, Interface Design Elements, Component-Level Design Elements, Deployment-Level Design Elements **Software testing:** A Strategic Approach to Software Testing, Strategic Issues, Unit Testing, Integration Testing, Validation Testing, Validation-Test Criteria, Configuration Review, Alpha and Beta Testing, System Testing, Recovery Testing, Security Testing, Stress Testing, Performance Testing, Deployment Testing	**15**
Total Lectures		**45**

Reference books:

1. Software Engineering: A Practitioner's Approach, 9th Edition, July 2023 by Roger Pressman, Bruce Maxim, McGrawHill Publication.
2. Software Engineering, 10th Edition, May 2017 by Ian Sommerville (Author), Pearson Education.

Program: B.Sc. – Information Technology (2025 - 26)		**Semester: III**	
Course: Python Programming LAB LAB		**Course Code: UIPPL203P**	
Teaching Scheme		**Evaluation Scheme**	
Lecture (Hours per week)	**Credit**	**Continuous Assessment (CA) (Marks- 20)**	**Machine Test**
2	1	20	30

Learning Objectives:

- Remembering and Understanding the use of Software and Syntax of Python.
- Applying and Analyzing the concepts of functions and strings
- Applying and implementing various concepts and data structures such as list, tuples and dictionaries.

Course Outcomes:

After completion of the course, learners would be able to:

CO1: Understand the use of software for developing programs in Python

CO2: Apply and Analyzing the concept of functions and strings in Python

CO3: Applying and implementing various concepts and data structures such as list, tuples and dictionaries.

Outline of Syllabus: (per session plan)

Modules	**Topics**	**Duration**
Module 1	**Introduction and Use of Software and Basic Programs to implement conditional statements, looping and control statements**	**10**
Module 2	**Programs to implement the concept of functions and strings**	**10**
Module 3	**Programs to implement the concept of Lists, Tuples and Dictionaries**	**10**
Total Lectures		**30**

Reference books:

1. Think Python: How to Think Like a Computer Scientist , 3rd Edition, September 2024 by Allen B. Downey, O'Reilly Media publications.
2. Problem Solving and Python Programming, 1st Edition, September 2017, by Balagurusamy, Publisher McGraw Hill Education
3. Python: The Complete Reference, 4th Edition, March 2018, by Martin C. Brown, McGraw Hill Education publication.

Program: B.Sc. – Information Technology (2025 - 26)		**Semester: III**	
Course: Networking Technology		**Course Code: UINTE204**	
Teaching Scheme		**Evaluation Scheme**	
Lecture (Hours per week)	**Credit**	**Internal Continuous Assessment (CA) (Marks - 40)**	**End Semester Examinations (ESE) (Marks- 60 in Question Paper)**
3	3	20+20	60

Learning Objective

1. Define the basic components of data communication
2. Analyse different network topologies (Bus, Star, Mesh, etc.) and explain their advantages and disadvantages in different network scenarios.
3. Describe the concepts of network models and introduction.
4. Apply knowledge of data link and network layer protocols to simulate data transmission in a network environment. Demonstrate the use of TCP/UDP protocols to manage reliable and unreliable data transfer in a network.
5. Compare the functions of routing algorithms like RIP, OSPF, and BGP
6. Understand application layer protocols

Learning Outcomes

1. Identify and define the core components of data communication, including sender, receiver, transmission medium, message, and protocol, and understand how they work together to enable communication.
2. Compare and contrast the various network topologies, understanding how factors like scalability, reliability, cost, and ease of maintenance impact the suitability of each topology for different network environments.
3. Able to explain the fundamental network models (such as OSI and TCP/IP) and their respective layers, understanding how each model contributes to the process of data transmission across networks.
4. Demonstrate the ability to simulate data transmission in a network environment using protocols like Ethernet and IP, and understand how these protocols ensure error handling, addressing, and routing. Evaluate various transmission techniques, network technologies, and communication mediums.
5. A distinguish between TCP and UDP protocols, apply each protocol in relevant scenarios, and simulate the data transfer process to illustrate how TCP ensures reliable communication, while UDP supports faster, less reliable communication. apply knowledge of data link and network layers to solve network-related problem.
6. Analyse and compare different routing algorithms such as RIP, OSPF, and BGP, understanding their purpose in routing decisions, their scalability, convergence time, and efficiency in different network environments. Use of application layer protocol.

Outline of Syllabus: (per session plan)

Modules	Topics	Duration (Lecture)
Module 1	**Introduction:** Data and Information, Characteristics of Data Communication, Components of data communication, Data representation, Data flow: - Simplex, Full Duplex, Half Duplex, Physical structure: - point to point and multipoint, Physical topology: - Bus, Star, Mesh, Ring and Hybrid Categories of network- LAN, WAN and MAN, protocols and standard, Standards in networking: -De facto and Dejure standard, Standard organization **Network Models**: -OSI model, Layers in OSI Model, TCP/IP model, Addressing in TCP/IP **Types of transmission mode-** serial and parallel transmission **Introduction to Physical layer**: - Introduction to Multiplexing, Time division multiplexing, Synchronous and Asynchronous medium, Transmission Media- Guided and unguided media Guided Media-Twisted pair, coaxial and fibre optic cable. Unguided media- wireless, Radio Waves, Microwaves, Infrared Introduction to NIC card, Comparison between switch and hub, Bridge, Router, Gateway	**15**
Module 2	**Introduction to Data link layer and Network layer** **Data link layer**: - Types of error, Detection vs correction, CRC **Introduction to Network layer-** Introduction to switching- packet switching in detail, IPV4 addresses- classful and classless addressing, NAT, Internet protocol version 4 datagram frame format, fragmentation, checksum IPv6 frame format, IPV 6 address ARP – address mapping, packet format RIP, OSPF and BGP- Intra and interdomain routing, distance vector routing algorithm, RIP introduction, Timers in RIP, Link state routing OSPF-Areas, Dijkstra's algorithm, metrics, types of links, OSPF packets, BGP- path vector routing, Types of BGP packets	**15**
Module 3	**Transport and application layer** – Transport layer features and services, TCP packet UDP packet, UDP features, error control, TCP numbering system, TCP connection- three-way handshaking, data transfer, connection termination, Error control in TCP **Application layer**- SMTP, DHCP, FTP	**15**
Total Lectures		**45**

Reference books:

Behrouz Forouzan A., Data Communication and Networking, 6th Edition, Standard Edition, Tata McGrawHill, 2022.

Andrew S. Tanenbaum, Nick Feamster, David J. Wetherall, 6th Edition, Standard Edition, Pearson Education, 2022.

Behrouz A. Forouzan, TCP/IP Protocol Suite, 4th Edition, Standard Edition, Tata McGrawHill, 2020.

<table>
<tr><td colspan="2">Program: B.Sc. – Information Technology (2025 - 26)</td><td colspan="2">Semester: III</td></tr>
<tr><td colspan="2">Course: Networking Technology LAB</td><td colspan="2">Course Code: UINTE204P</td></tr>
<tr><td colspan="2">Teaching Scheme</td><td colspan="2">Evaluation Scheme</td></tr>
<tr><td>Lecture (Hours per week)</td><td>Credit</td><td>Continuous Assessment (CA) (Marks - 20)</td><td>Machine Test</td></tr>
<tr><td>2</td><td>1</td><td>20</td><td>30</td></tr>
<tr><td colspan="4">Learning Objectives
1. To analyze IPV4 addressing and subnetworking.
2. To analyze essential networking utilities and packet information of common protocols.
3. To configure IP routing using static routes, RIP, and OSPF.
4. To implement DHCP, DNS, and virtualization in a network.</td></tr>
<tr><td colspan="4">Learning Outcomes
After completion of the course, learners would be able to:
CLO1: Calculate IPV4 addresses based on subnetting and supernetting
CLO2: Apply different networking commands, routing protocol
CLO3: Configure different networking servers and virtualization.</td></tr>
<tr><td colspan="4"></td></tr>
<tr><td colspan="4">Outline of Syllabus: (per session plan)</td></tr>
</table>

Sr No	List of Practical	30 hours
1	IPv4 Addressing and Subnetting a) Given an IP address and network mask, determine other information about the IP address such as: • Network address • Network broadcast address • Total number of host bits • Number of hosts b) Given an IP address and network mask, determine other information about the IP address such as: • The subnet address of this subnet • The broadcast address of this subnet • The range of host addresses for this subnet • The maximum number of subnets for this subnet mask • The number of hosts for each subnet • The number of subnet bits • The number of this subnet	
2	Use of ping and tracert / traceroute, ipconfig / ifconfig, route and arp utilities.	
3	Configure IP static routing.	
4	Configure IP routing using RIP.	
5	Configuring Simple OSPF.	
6	Configuring DHCP server and client.	
7	Create virtual PC based network using virtualization software and virtual NIC.	
8	Configuring DNS Server and client.	
9	Configuring OSPF with multiple areas.	
10	Use of Wireshark to scan and check the packet information of following protocols • HTTP • ICMP • TCP • SMTP • POP3	

Program: B.Sc. – Information Technology (OE offered by BMS) (2025 - 26)		**Semester: III**	
Course: Management Information System		**Course Code: UIMIS205**	
Teaching Scheme		**Evaluation Scheme**	
Lecture **(Hours per week)**	**Credit**	**Continuous Assessment (CA)** **(Marks - 20)**	**Semester End Examinations (SEE)** **(Marks- 30)**
2	**2**	**10+10**	**30**

Learning Objectives:

- Identify different perspectives on information systems and their impact on organizations.
- Identify different types of information systems and their functions in organizations.
- Examine the role of information systems in global e-business and collaboration.
- Analyse the technology drivers behind IT infrastructure evolution.

Course Outcomes:

After completion of the course, learners would be able to:

CO1: learn the different business processes and contemporary approaches to Information System.

CO2: learn the various IT infrastructure required for Information System.

CO3: understand the enterprise management system, and their applications

CO4: understand ethical issues related to Information system.

Outline of Syllabus: (per session plan)

Modules	**Topics**	**Duration (Lecture)**
Module 1	**Information Systems in Global Business Today:** The role of Information system in Business, perspectives on Information system, contemporary approaches to Information Systems. **Global E-business and Collaboration**: Business processes and information systems, types of Information Systems	**15**

	Information Technology Infrastructure: IT Infrastructure, Technology drivers of Infrastructure Evolution, Contemporary Hardware platform, Contemporary software platform trends, management issues,	
Module 2	**Achieving Operational Excellence and Customer Intimacy:** Enterprise Applications: What is enterprise system, Supply chain management system, customer relational management systems, Enterprise applications new opportunities and challenges **Managing Knowledge**: The knowledge management landscape, Enterprise wise knowledge management, knowledge work system, intelligent techniques **Ethical and Social Issues in Information Systems:** Understanding ethical and Social Issues related to systems, ethics in Information Society, Intellectual Property, System Quality: data quality and system errors	**15**
Total Lectures		**30**

Reference book:

1. **Management Information System**, Simy Joy ,Payal Anand ,Priya Nair Rajeev, **ISBN** 9789389552447, **Imprint** Pearson Education, **Copyright** 2020.

2. **Management Information System**, by Ramesh Behl, James A. O'Brien, George M. Marakas, 2019

Program: B.Sc. – Information Technology (OE offered by BAFTNMP) (2025-26)		Semester: III	
Course: Multimedia and Animation I		**Course Code: UIMAA206**	
Teaching Scheme		**Evaluation Scheme**	
Lecture (Hours per week)	**Credit**	**Continuous Assessment (C.A.)**	**Semester End Examinations (SEE)**
2	2	10+10	30

Learning Objectives:

- Establish a strong foundation in design principles, visual composition, and basic animation.
- Develop practical skills in image editing, composition, and motion graphics using industry-standard software.
- Enhance creative and technical abilities through hands-on projects in multimedia design.

Course Outcomes:

CO1: Understand and apply fundamental design elements, typography, and colour theory to create visually balanced compositions.

CO2: Develop proficiency in Adobe Photoshop for image editing, digital art, and multimedia content creation.

CO3: Apply basic animation techniques to design simple motion graphics and interactive visual elements.

Outline of Syllabus: (per session plan)

Module	Description	No of Hours
1	**Fundamentals of Visual Design**	10
2	**Image Editing and Composition Using Adobe Photoshop**	10
3	**Basics of Animation & Motion Graphics**	10
Total		**30**

Unit	Topic	No. of Hours
Module 1	**Fundamentals of Visual Design**	**10**

	• Understanding design principles (balance, contrast, alignment, repetition, proximity). • Working with visual elements (lines, shapes, forms, textures, and white space). • Basics of colour theory and its application in design. • Role of typography in composition and branding. • Fundamentals of layout and composition techniques.	
Module 2	**Image Editing and Composition Using Adobe Photoshop**	**10**
	• Introduction to Adobe Photoshop: Interface and essential tools. • Working with layers, masks, and blending modes for creative composition. • Applying adjustments (brightness, contrast, hue/saturation) for image enhancement. • Selection tools and retouching techniques for seamless editing. • Exporting images for different formats (web, print, and social media).	
Module 3	**Basics of Animation & Motion Graphics**	**10**
	• Introduction to animation principles (timing, easing, and motion). • Understanding keyframes and timeline-based animation in Photoshop/After Effects. • Creating simple motion effects (opacity, scaling, rotation). • Designing text animations and transitions. • Exporting animated content (GIFs, MP4, and other media formats).	
Total		**30**

Reference Book:

1. Steinmetz, R., & Nahrstedt, K. (2004). Multimedia Fundamentals, Volume 1: Media Coding and Content Processing (2nd ed.). Prentice Hall.
2. Lupton, E. (2015). Graphic Design: The New Basics (2nd ed.). Princeton Architectural Press.
3. Kelby, S. (2021). The Adobe Photoshop Book for Digital Photographers (1st ed.). Rocky Nook.
4. Williams, R. (2014). The Non-Designer's Design Book (4th ed.). Peachpit Press.
5. Thomas, F., & Johnston, O. (1981). The Illusion of Life: Disney Animation. Disney Editions.

Program: B.Sc. – Information Technology (2025 - 26)		**Semester: III**	
Course: Linear Algebra Concepts		**Course Code: UILAC207**	
Teaching Scheme		**Evaluation Scheme**	
Lecture (Hours per week)	**Credit**	**Continuous Assessment (CA) (Marks - 20)**	**Semester End Examinations (SEE) (Marks- 30 in Question Paper)**
2	2	10+10	30

Learning Objectives

This course will enable students to:

1. Represent a system in the form of linear equations.
2. Find the solution of the system of linear equations using matrix operations.
3. Identify vector spaces and subspaces.
4. Transform a vector space of one dimension into another.
5. Factorize a given matrix using different methods.

Learning Outcomes

At the end of the course, student will be able to:

CO-1: Analyze whether a system is consistent or inconsistent and its solution is unique or infinite.
CO-2: Perform row operations on matrices and find bases and dimension of vector spaces.
CO-3: Linearly transform the system from one dimension to another and represent the pertinent linear transformation in matrix form.
CO-4: Compute orthogonal and orthonormal vectors required to analyze image and signal processing problems.
CO-5: Apply techniques of constrained optimization and singular value decomposition for problems arising in power/control system analysis, signals and systems.

Outline of Syllabus: (per session plan)

Modules	**Topics**	**Duration (Lecture)**
Module 1	Linear Equations: Fields; system of linear equations, and its solution sets; elementary row operations and echelon forms; matrix operations; invertible matrices.	**10**
Module 2	Vector Spaces: Vector spaces; subspaces; bases and dimension; coordinates; summary of row-equivalence; computations concerning subspaces.	**10**
Module 3	Symmetric Matrices and Quadratic Forms: Diagonalization; quadratic forms; constrained optimization; Singular value decomposition.	**10**
Total Lectures		**30**

TEXT BOOKS:

1. David C. Lay, “Linear Algebra and its Applications,” 3rd edition, Pearson Education (Asia) Pte. Ltd,2005.
2. Kenneth Hoffman and Ray Kunze, "Linear Algebra," 2nd edition, Pearson Education (Asia) Pte. Ltd/2004.

REFERENCE BOOKS:

1. Bernard Kolman and David R. Hill, "Introductory Linear Algebra with Applications”, Pearson Education (Asia) Pte. Ltd, 7th edition, 2003.
2. Gilbert Strang, "Linear Algebra and its Applications”, 3rd edition, Thomson Learning Asia, 2003

SEMESTER IV

Program: B.Sc. – Information Technology (2025 - 26)		Semester: IV	
Course: Database Management System		**Course Code: UIDMS251**	
Teaching Scheme		**Evaluation Scheme**	
Lecture (Hours per week)	**Credit**	**Continuous Assessment (CA) (Marks - 40)**	**Semester End Examinations (SEE) (Marks- 60 in Question Paper)**
3	3	20+20	60

Learning Objectives:

- To understand the basic concepts of Database Systems
- To apply the concepts of Normalization and Database Design in real world scenarios
- To develop ERD models and Relational Databases and SQL queries based on real world problems

Course Learning Outcomes:

After completion of the course, learners would be able to:

CLO1: Ability to understand the different concepts of Database Systems

CLO2: Ability to apply and implement of normalization and ERD principles on a given dataset

CLO3: Develop the ability to implement a given condition using SQL, Relational Algebra, ERD and Relational models

Outline of Syllabus: (per session plan)

Modules	Topics	Duration (Lecture)
Module 1	**Database and Relational Model**	**15**
	Introduction to Databases, what is database system? purpose of database system, Data Abstraction and View of Data, Database Languages, Database Engine, Database architecture, Database users and administrators, Evolution of Data Models. Introduction to the Relational Model Structure of Relational Databases, E.F. Codd's rules, Database Schema , Keys, Schema Diagrams, Relational Query Languages, Fundamental and Extended Relational algebra Operation.	
Module 2	**ERD and Normalization**	**15**

	Overview of the Database Design Process, The Entity- Relationship Model, Complex Attributes, Mapping cardinality constraints, Types of Attributes Removing Redundant Attributes in Entity Sets, Reducing E-R Diagrams to Relational Schemas, Extended E-R Features: Specialization, Generalization and Aggregation, Entity Relationship Design Issues. Normalization, Atomic domain and Normalization (1NF, 2NF, 3NF, BCNF) and advantages Denormalization	
Module 3	**SQL**	**15**
	Introduction to SQL - SQL Data Definition, SQL Data Types and Schemas Basic Structure of SQL Queries, Set Operations, Null Values, Aggregate Functions, Nested Subqueries, Modification of the Database, Views, comparison between tables and views SQL Transactions, Integrity Constraints, Index Definition in SQL, Authorization, Triggers	
Total Lectures		**45**

Reference books:

1. Database System and Concepts, A Silberschatz, H Korth, S Sudarshan, McGraw-Hill Seventh Edition, 2019
2. Database Systems: Design, Implementation, & Management, 14th Edition by Carlos Coronel (Author), Steven Morris 2022

Program: B.Sc. – Information Technology (2025 - 26)		**Semester: IV**	
Course: Database Management System LAB		**Course Code: UIDMS251P**	
Teaching Scheme		**Evaluation Scheme**	
Lecture (Hours per week)	**Credit**	**Continuous Assessment (CA) (Marks -20)**	**Machine Test**
2	1	20	30

Learning Objectives:

- **Understand database organization and implementation**
- **Understanding application of different operations on data**
- **Implementing integrity constraints on various data formats**

Course Outcomes:

CLO1: Design organizational structures for data.
CLO2: Apply operation to manipulate data in various database structures
CLO3: Building queries for effective data retrieval

Outline of Syllabus: (per session plan)

Modules	**Topics**	**Duration (Lecture)**
1.	a. For given scenario. Draw E-R diagram and convert entities and relationships to table. b. Perform the following: • Viewing all databases • Creating a Database • Viewing all Tables in a Database • Creating Tables (With and Without Constraints) • Inserting/Updating/Deleting Records in a Table • Saving (Commit) and Undoing (rollback) c. Perform the following: • Altering a Table • Dropping/Truncating/Renaming Tables • Backing up / Restoring a Database	**10**

2.	a. Creating Views (with and without check option) • Dropping views • Selecting from a view b. Perform the following: • Simple Queries • Simple Queries with Aggregate functions • Queries with Aggregate functions (group by and having clause) c. Queries involving • Date Functions • String Functions • Math Functions	**10**
3.	a. Join Queries • Inner Join • Outer Join b. Subqueries and Nested Subqueries c. Integrity Constraints • Table Level Constraints • Column Level constraints d. Basics of PL/SQL • Data Retrieval • Exception Handling	**10**
Total Lectures		**30**

Reference books:

Learning SQL, Alan Beaulieu, O'Reilly Media, 2020

SQL for Data Analysis: Advanced Techniques for Transforming Data into Insights, Cathy Tanimura, O'Reilly Media, 2021

Program: B.Sc. – Information Technology (2025 - 26)		**Semester: IV**	
Course: Core Java		**Course Code: UICJA252**	
Teaching Scheme		**Evaluation Scheme**	
Lecture (Hours per week)	**Credit**	**Continuous Assessment (CA) (Marks - 40)**	**Semester End Examinations (SEE) (Marks- 60 in Question Paper)**
3	3	20+20	60

Learning Objectives:

- Remembering and Understand evolution, features and approach of Java
- Applying and implementing various concepts of Object Oriented Programming in Java.
- Analyzing the Relationships between classes through inheritance and Polymorphism
- Creating different user interfaces with the help of AWT and Swings

Course Outcomes:

After completion of the course, learners would be able to:

CO1: Remembering and Understand the History and Features of Java.

CO2: Apply and implement the various concepts of OOP in Java.

CO3: Analyze and implement the relationships of classes through inheritance and polymorphism.

CO4: Will write programs to implement AWT and Swings programming in Java.

Outline of Syllabus: (per session plan)

Modules	**Topics**	**Duration (Lecture)**
Module 1		**15**
	Evolution of Java: Java History, Java Features, Comparison of Java with C and C++, Java Support Systems, Java Environment. **Overview of Java :** Introduction, Java Statements, Java Virtual Machine, main(), public, static, void, string[] args, statements, Command Line Arguments in Java**.** **Arrays,Strings and Vectors :** One and two dimensional arrays, Strings, Vectors, Wrapper Classes. **Classes, Objects and Methods in Java :** Defining a Class, Fields Declaration, Creating Objects, Accessing Class Members, Constructors, Method Overloading, Static Members and Methods.	
Module 2		**15**

	Inheritance: Extending a class, Overriding methods, Final variables and methods, Final classes, Abstract Methods and Classes, Visibility Control. Interfaces: Defining Interfaces, Extending Interfaces, Implementing Interfaces, Accessing Interface Variables. Packages: Java API Packages, Using System Packages, Naming Conventions, Creating Packages, Accessing a Package. Multithreading in Java : Introduction, Creating Thread, Extending the thread class, Life Cycle of a Thread, using Thread methods, Thread Exceptions, Thread Priority, Thread Synchronization, Implementing the Runnable interface.	
Module 3		**15**
	Managing Errors and Exception: Types of Errors, Exceptions, Syntax of Exception Handling code, Multiple Catch Statements, Using Finally Statement. Event Handling: Delegation Event Model, Events, Event classes, Event listener interfaces, adapter classes and inner classes. Abstract Window Toolkit: Window Fundamentals, Component, Container, Panel, Window, Frame, Canvas. Swing components: JFrame, JPanel,JLabel,JTextField,JButton,JTextArea,JCheckBox,JRadioButton,JComboBox,JList,JScrollPane,JTabbedPane,JSplitPane,JTable, JMenu and JMenuItem, JOptionPane, JDialog,JPasswordField. Layouts: Flow Layout, Grid Layout, Border Layout, Card Layout.	
Total Lectures		**45**

Reference books:

1. Programming with Java , 7th Edition, November 2023, McGrawHill Publications.
2. Java: The Complete Reference, 13th Edition –February 2024

Program: B.Sc. – Information Technology (2025 - 26)		Semester: IV	
Course: Core Java LAB		**Course Code: UICJA252P**	
Teaching Scheme		**Evaluation Scheme**	
Lecture (Hours per week)	**Credit**	**Continuous Assessment (CA) (Marks -20)**	**Machine Test**
2	1	20	30

Learning Objectives:

- Remembering and Understand the software and syntax of Java
- Applying and implementing various concepts of Object Oriented Programming in Java.
- Analyzing the Relationships between classes through inheritance and Polymorphism
- Creating different user interfaces with the help of AWT and Swings

Course Outcomes:

After completion of the course, learners would be able to:

CO1: The learner will be able to install the software and write basic programs

CO2: Apply and implement the various concepts of OOP in Java

CO3: Analyze and implement the relationships of classes through inheritance and polymorphism

CO4: Will write programs to implement AWT and Swings programming in Java

Outline of Syllabus: (per session plan)

Modules	Topics	Duration (Lecture)
Module 1	Introduction and Use of Software and Basic Programs to implement conditional statements,looping and control statements Programs to implement creation of Classes and Objects Programs to implement Arrays,Strings and Vectors	**10**
Module 2	Programs to implement different type of inheritance with visibility scope specifiers. Programs to implement the concept of interfaces and multithreading. Programs to create and use an user defined package.	**10**
Module 3	Programs to implement AWT Swing components and layouts	**10**
Total Lectures		**30**

Reference books:

1. Programming with Java , 7th Edition, November 2023, McGrawHill Publications.
2. Java: The Complete Reference, 13th Edition –February 2024

Program: B.Sc. – Information Technology (2025 - 26)		**Semester: IV**	
Course: Embedded System		**Course Code: UIESY253**	
Teaching Scheme		**Evaluation Scheme**	
Lecture **(Hours per week)**	**Credit**	**Continuous Assessment (CA)** **(Marks - 40)**	**Semester End Examinations (SEE)** **(Marks-60 in Question Paper)**
3	3	40	60

Learning Objectives:

- To introduce What is of Embedded System, and its different on-chip peripherals.
- To impart knowledge in sensors and actuators.
- To be familiar with PIC microcontroller

Course Outcomes:

After completion of the course, learners would be able to:

CO1: Differentiate between general-purpose processor and embedded systems
CO2: Learn the operational and non-operational parameters
CO3: Understand the RTOS and its importance
CO4: Understand processor architecture, sensors, actuators and communication
CO5: Understand the architecture of PIC microcontrollers
CO6: Learn the trends in Embedded Industry

Outline of Syllabus: (per session plan)

Modules	**Topics**	**Duration (Lecture)**
Module 1	**Introduction to Embedded System**	**15**
	Introduction: Embedded Systems and general purpose computer systems, history, classifications, applications and purpose of embedded systems **Characteristics and quality attributes of embedded systems:** Characteristics, operational and non-operational quality attributes. **Embedded Systems Application and Domain Specific:** Application specific – washing machine, domain specific - automotive.	**15**

	Real Time Operating System (RTOS): Operating system basics, types of operating systems, Device drivers, How to choose RTOS	
Module 2	**Core of Embedded Systems**	**15**
	Core of embedded systems: microprocessors and microcontrollers, RISC and CISC controllers, Big endian and Little-endian processors, Application specific ICs, Programmable logic devices, COTS, sensors and actuators, communication interface- Onboard Communication Interface and External Communication Interface), embedded firmware, other system components	
Module 3	**PIC Microcontroller**	**15**
	The PIC Microcontrollers: History And Features, Microcontrollers And Embedded Processors, Overview Of The Pic18 Family, PIC 18 registers -wreg, The Pic File Register, Pic Status Register, The Program Counter And Program Rom Space In The Pic, Harvard Architecture In The Pic, RISC Architecture In The Pic, Pic I/O Port, Pic18 Timer Programming, Pic18 Serial Port Programming, Interrupt Programming, Lcd And Keyboard Interfacing. **Design and Development:** Embedded system development Environment – IDE, types of file generated on cross compilation, disassembler/ de-compiler, simulator, emulator and debugging, Trends in embedded industry.	
Total Lectures		**45**

Reference books:

1. Introduction to embedded systems. Shibu K V, 2017, Second Edition, Tata Mcgraw Hill
2. PIC MICROCONTROLLER AND EMBEDDED SYSTEMS Using Assembly and C for PIC18, 2e, Rolin D. McKinlay Muhammad Ali Mazidi, Danny E. Causey, Feb 2021
3. Embedded Artificial Intelligence: Devices, embedded Systems, and Industrial Applications, Ovidiu Vermesan, Mario Diaz Nava, Bjorn Debabillie, River Publisher, 1st Edition, 2023
4. Embedded System Design: Embedded Systems Foundation of Cyber-Physical Systems, and Internet of Things, Peter Marwedel, 4th Edition, 2021, Springer

Program: B.Sc. – Information Technology (2025 - 26)		**Semester: IV**	
Course: Embedded System LAB		**Course Code: UIESY253P**	
Teaching Scheme		**Evaluation Scheme**	
Lecture **(Hours per week)**	**Credit**	**Continuous Assessment (CA)** **(Marks - 20)**	**Machine Test**
2	1	20	30

Learning Objectives:

- To understand PIC and Arduino Uno microcontrollers
- To understand the working of sensors and actuators
- To interface various sensors and actuators with embedded systems.

Course Outcomes:

After completion of the course, learners would be able to:

CO1: Understand PIC microcontroller architecture.

CO2: Develop the simple programs using PIC microcontroller

CO3: Develop the simple Embedded Systems for domestic purpose

CO4: Understand the architecture of Arduino Uno Board.

CO5: Develop a simple program to interface LED and Buzzer with Embedded System

CO6: Develop the program to interface various Sensor devices such as Gas Sensor, Temperature sensor etc, with Arduino Uno

Outline of Syllabus: (per session plan)

Modules	**Topics**	**Duration (Lecture)**
	Practicals using PIC Micro-controller 1. Design and develop a reprogrammable embedded computer using PIC18 microcontrollers and to show the following aspects. a. Programming b. Execution c. Debugging 2. To demonstrate use of general purpose port i.e. Input/ output port of two controllers for data transfer between them. Port I / O: Use one of the four ports of PIC18 for O/P interfaced to eight LED's. Simulate binary counter (8 bit) on LED's 3. To interface 8 LEDs at Input-output port and create different patterns.	**15 hours**

	4. To demonstrate timer working in timer mode and blink LED without using any loop delay routine. 5. To demonstrate interfacing of seven-segment LED display and generate counting from 0 to 99 with fixed time delay. 6. Generate traffic signals. 7. Implement Temperature controller. 8. Implement LCD interfacing	
Module 2	Practicals using Arduino Uno on Tinkercad simulator \ Hardware kit	
	1) Introduction to Arduino circuits and breadboarding 2) Blinking of LEDs and interfacing Buzzer with Arduino Uno 3) Program to interface LCD with Arduino Uno 4) Program using Light Sensitive Sensors 5) Program using temperature sensors, and humidity sensors 6) Programs using Ultrasonic Sensors 7) Programs using digital infrared motion sensors 8) Programs using gas sensors 9) Programs using servo motors 10) Programs making Joystick with Arduino 11) Programs using Line tracking sensors	**15 hours**
Total Lectures		**30 hours**

Program: B.Sc. – Information Technology (OE offered by BAFTNMP) (2025-26)		Semester: IV	
Course: Multimedia and Animation II		**Course Code: UIMAA254**	
Teaching Scheme		**Evaluation Scheme**	
Lecture (Hours per week)	**Credit**	**Continuous Assessment (C.A.)**	**Semester End Examinations (SEE)**
2	2	10+10	30

Learning Objectives:

- Develop advanced skills in multimedia design, image editing, and animation.
- Explore motion graphics, video editing, and interactive media techniques.
- Create professional-quality digital content using industry-standard software.

Course Outcomes:

CO1: Apply advanced design principles and digital compositing techniques to multimedia projects.

CO2: Develop expertise in digital painting, photo manipulation, and motion graphics.

CO3: Create engaging animations and integrate multimedia elements for interactive content.

Outline of Syllabus: (per session plan)

Module	Description	No of Hours
1	**Advanced Image Editing & Digital Art**	5
2	**Motion Graphics & Animation Techniques**	10
3	**Video Editing & Interactive Multimedia**	15
Total		**30**

Unit	Topic	No. of Hours
Module 1	**Advanced Image Editing & Digital Art**	05
	• Advanced selection, masking, and blending techniques. • Digital painting and creating custom brushes in Photoshop. • Photo manipulation and creative compositing. • Colour grading and cinematic effects. • Preparing assets for animation and multimedia projects.	

Module 2	**Motion Graphics & Animation Techniques**	**10**
	• Introduction to After Effects for motion graphics. • Keyframe animation and advanced motion effects. • Working with shape layers and motion paths. • Applying effects, transitions, and 3D layers. • Rendering and exporting animated projects.	
Module 3	**Video Editing & Interactive Multimedia**	**15**
	• Basics of video editing in Premiere Pro (cuts, transitions, timeline). • Adding audio, effects, and text overlays. • Creating interactive elements in multimedia projects. • Exporting videos for different platforms and formats. • Final project: Creating an interactive animation or edited video.	
Total		**30**

Reference Book:

1. Meyer, T., & Meyer, C. (2013). Creating motion graphics with After Effects: Essential and advanced techniques (5th ed.). Routledge.
2. Wells, P. (1998). Understanding animation. Routledge.
3. Block, B. (2020). The visual story: Creating the visual structure of film, TV, and digital media (3rd ed.). Routledge.
4. Bordwell, D., & Thompson, K. (2019). Film art: An introduction (12th ed.). McGraw-Hill Education.
5. Brown, B. (2016). Cinematography: Theory and practice: Image making for cinematographers and directors (3rd ed.). Routledge.

Program: B.Sc. – Information Technology (OE offered by BMS) (2025 - 26)		Semester: IV	
Course: Customer Retention and Engagement		**Course Code: UICRE255**	
Teaching Scheme		**Evaluation Scheme**	
Lecture (Hours per week)	**Credit**	**Continuous Assessment (CA) (Marks - 20)**	**Semester End Examinations (SEE) (Marks- 30 in Question Paper)**
2	2	10+10	30

Learning Objectives:

- To equip students with the knowledge and skills required to retain customers
- To enhance engagement strategies using IT-enabled solutions, data-driven approaches, and behavioral insights

Course Outcomes:

After completion of the course, learners would be able to:

CO1: Explain the significance of customer retention and engagement in IT and management industries.

CO2: Implement CRM and marketing automation tools for customer engagement.

CO3: Evaluate the effectiveness of omnichannel engagement through email, chatbots, and social media and utilize AI-driven personalization and data-driven decision-making for retention strategies.

CO4: Identify and adapt to emerging trends in customer retention for sustainable growth.

Outline of Syllabus: (per session plan)

Modules	Topics	Duration
Module 1	**Introduction and Strategies Customer Retention & Engagement**	**15**
	Understanding Customer Retention & Engagement, Importance in IT & Management Industries, Customer Lifecycle & Relationship Management, Role of IT in Customer Engagement, Customer Segmentation & Personalization, Loyalty Programs & Reward Mechanisms, Proactive vs Reactive Customer Retention Strategies, Case Studies on Successful Retention Practices	
Module 2	**Digital, IT-Enabled Engagement Strategies, Future Trends**	**15**
	CRM & Marketing Automation Tools, Omnichannel Customer Engagement (Email, Chatbots, Social Media), AI-Driven Engagement & Personalization, Data-Driven Decision Making in Retention, Emerging Trends in Retention & Engagement, Ethics in Customer Data Handling & Privacy, Sustainable Retention Strategies for Long-Term Growth, Industry Case Studies & Best Practices	
Total Lectures		**30**

Reference books:

3. Customer Relationship Management: Concepts and Technologies – Francis Buttle & Stan Maklan
4. The Effortless Experience: Conquering the New Battleground for Customer Loyalty
5. – Matthew Dixon
6. Predictive Analytics: The Power to Predict Who Will Click, Buy, Lie, or Die – Eric Siegel
7. Marketing 4.0: Moving from Traditional to Digital – Philip Kotler

Program: B.Sc. – Information Technology (2025 - 26)		**Semester: IV**	
Course: Numerical Methods		**Course Code: UINME256**	
Teaching Scheme		**Evaluation Scheme**	
Lecture (Hours per week)	**Credit**	**Continuous Assessment (CA) (Marks - 20)**	**Semester End Examinations (SEE) (Marks- 30 in Question Paper)**
2	2	10+10	30

Learning Objectives

a. To Solutions to problems in science and engineering.

b. To train students to choose and apply appropriate numerical techniques to solve the problem and interpret the result

Learning Outcomes

At the end of the course, student will be able to:

CO 1: Find the roots of algebraic and transcendental equations.

CO 2: Approximate a given function by means of a polynomial.

CO 3: Choose appropriate numerical methods and determine the solutions to ordinary differential equations

Outline of Syllabus: (per session plan)

Modules	**Topics**	**Duration (Lecture)**
Module 1	**SOLUTION OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS** Introduction, The Bisection Method, , The Method of False Position, The Iteration Method, Newton-Raphson Method, Generalized Newton's Method.	**10**
Module 2	**INTERPOLATION** Introduction : Finite Differences, Forward Differences, Backward Differences, Central Differences, Symbolic Relations and Separation of Symbols, Differences of a Polynomial, Newton's Formula for Interpolation, Central Difference Interpolation Formula, Gauss's Central Difference Formula.	**10**
Module 3	**CURVE FITTING** Introduction, Least-Squares Curves Fitting Procedures, Fitting a Straight Line, Non Linear Curve Fitting. Numerical differentiation and Integration Introduction-, numerical differentiation- Cubic spline method, Numerical IntegrationTrapezoidal Rule,Simpson's 1/3 rule,Simpsons 3/8 Rule.	**10**
Total Lectures		**30**

TEXT BOOKS:

1. S.S.Sastry, Introductory Methods of Numerical Analysis, Publication: Prentice Hall India (4th Edition)

2. G.M. Philips and P. J. Taylor, Theory and Applications of Numerical Analysis Elsevier Publications.

REFERENCE BOOKS:

1. Francis Sched, Numerical Analysis (2nd Edition) By, Schaum's Outlines, Tata Mcgrawhill Publications.
2. M.K Jain, S.R.K. Iyengar, R.K. Jain, Numerical Methods For Scientific And Engineering Computation (4th Edition) New Age International Publications.
3. James E. Miller, David G. Moursund, Charles S. Duris, Elementary Theory And Application of Numerical Analysis