Semester	Module and Topic	Module Specific CO
SEMESTER – I (MAJOR AND MINOR)	**Introduction to Programming using C** Unit-I: Introduction to computers	**Students learn about** CO1: Evolution, Generation of Computers, Computers Hierarchy CO2: Different components of computer CO3: Number System CO4: Introduction to operating environment
	Unit – II: Introduction to Programming	CO5: Program Concept, Characteristics of Programming, Stages in Program Development CO6: Algorithms and Flowcharts Design CO7: Types of Programming Methodologies CO8: Basic Program Structure in C
	Unit – III: Top-Down Design	CO9: Predefined Functions and Programmer-defined Function CO10: Developing Recursive Definition
	Unit – IV: Arrays and Strings	CO11: Declaration and Referring Arrays. CO12: Multi-Dimensional Arrays CO13: Searching in Array CO14: Declaration and Initialization of strings CO15: Arrays of Strings CO16: Standard String Library Functions
	UNIT –V: Pointers	CO17: Simple use of Pointers CO18: Pointers to Pointers CO19: Call-By-Value and Call-By-Reference
	UNIT – VI: Structures and Unions	CO20: Member Accessing of structures CO21: Pointers to Structures and Arrays of Structures CO22: Difference between Structures and Unions
	UNIT – VII: File Handling	CO23: File opening modes CO24: Use of files for data input and output CO25: Merging and copy files
	Programming Practical using C language	CO26: Students gets idea how to formulate problem, develop flowchart/algorithm, write code, execute and test it with given the problem statement.

	Office Automation Software Lab (SEC Paper) (only for Major Students) Unit - I: Windows Basics	CO27: Students gets idea how to use windows operating system like navigating the user interface, opening apps and programs, working with files. CO28: Customizing settings CO29: Control Panel
	Unit - II: MS Word and Google Docs	CO30: Creating and uses of MS Word documents and Google Docs
	Unit - III: MS Excel and Google Sheets	CO31: Creating and uses of MS Excel Worksheets and Google Sheets
	Unit - IV: MS PowerPoint or Google Slides	CO32: Slide creation with PowerPoint, Presenting shows for corporate and commercial using PowerPoint
	Unit - V: Graphics and Image Editing Software	CO33: Students gets idea of graphic design and image editing applications (e.g., Adobe Photoshop, GIMP) CO34: Understanding basic image editing techniques
	Unit - VI: Web Browsing and Internet Applications	CO35: : Navigating web browsers and utilizing essential features CO36: Understanding internet protocols and security considerations CO38: Exploring common internet applications (e.g., email clients, cloud storage, online collaboration tools).
SEMESTER – II (MAJOR & MINOR)	**Data Structures and Algorithms** Unit-I: Basic concepts of Data Structures	CO1: Data Abstraction and ADT CO2: Performance analysis CO3: Linear and Non Linear data structures.
	Unit-II: Linked Lists	CO4: Singly Linked Lists - Operations, Concatenating CO5: Operations for Circularly linked lists CO6: Doubly Linked Lists – Operations CO7: Polynomial and sparse matrix representation using linked list.
	Unit-III: Stack	CO8: Definition and Operations of stack CO9: Array and Linked Implementations of stack CO10: Applications of stack- Valid Expression Checking, Reversal of string, Infix to Postfix Conversion, Postfix Expression Evaluation, Recursion Implementation

	Unit-IV: Queue	CO11: Definition and Operations of queue CO12: Array and Linked Implementations of queue CO13: Circular Queues - Insertion and Deletion Operations CO14: Priority Queue- Definition and Implementation CO15: Dequeue (Double Ended Queue) - Introduction
	Unit-V: Searching and Sorting Methods	CO16: Linear and Binary Search CO17: Bubble, Insertion, Selection, Shell Sorts CO18: Using Divide-Conquer Approach (Quick and Merge sort) CO19: Comparison of Sorting Methods
	Unit VI – Trees and Graph	CO20: Binary tree and Properties of Binary Trees CO21: Binary Tree Representations-Array and Linked Representations, Binary Tree Traversals CO22: Threaded Binary Trees and AVL Trees CO23: Binary Search tree - Creation, Insertion, Deletion and Search CO24: B tree and B+ tree CO25: Heap- Definition, Min heap, Max heap, Insertion and Deletion. Priority Queue using Heap.
	Data Structure Practical	CO26: Students gets idea how to write and practically execute programs to solve problem using various data structures.
	Basics of Python (SEC Paper) (only for Major Students) Unit – I : Introduction to Python	CO27: Features of Python, Execution of a Python CO28: Data types in Python CO29: Python Interpreter and Interactive Mode CO30: Modules and Functions, Function Definition and use, Flow of Execution, Parameters and Arguments
	Unit – II: Operators in Python	CO31: Input and Output operations CO32: Control Statements. Boolean Values and operators, Conditional (if), Alternative (if-else), Chained Conditional (if-elif-else) CO33: Iteration: state, while, for, break, continue, pass

		CO34: Fruitful Functions: Return Values, Parameters, Local and Global Scope, Function Composition, Recursion
	Unit-III: Arrays and Strings in Python	CO35: Strings: String Slices, Immutability, String Functions and Methods, String Module CO36: Lists as Arrays
	Unit – IV: Functions, Lists and Tuples	CO37: List Operations, List Slices, List Methods, List Loop, Mutability, Aliasing, Cloning Lists, List Parameters
	Unit – V: Files and Exception	CO38: Reading and Writing Files CO39: Command Line Arguments CO40: Errors and Exceptions, Handling Exceptions, Modules, Packages
SEMESTER – III (HONOURS)	**Operating System** Unit – I: Introduction to Operating System	C1 : Operating System (OS) Concept C2 : History and Evolution of OS C3 : Basic OS functions C4 : Types of Operating Systems C5 : OS for Personal Computers, Workstations and Hand-held Devices, Process Control & Real time Systems.
	Unit – II: Operating System Organization and Process Characterization	C6 : Processor and User & Kernel Modes C7 : System Calls and System Programs C8 : System View of the Process and Resources C9 : Threads, Threading Issues, Thread Libraries C10: Process Scheduling: Non-Pre-emptive and Preemptive Scheduling Algorithms
	Unit-III: Process Management	C11 : Deadlock Concept, Necessary and Sufficient Conditions for Deadlock, C12: Deadlock Handling Approaches: C13: Deadlock Prevention, Deadlock Avoidance C14: Deadlock Detection and Recovery
	Unit - IV: Inter Process Communication and Synchronization	C15: Concurrent and Dependent Processes C16: Critical Section, Semaphores

		C17: Methods for Inter-process Communication C18: Process Synchronization, Classical Process Synchronization Problems, Producer-Consumer, Reader-Writer.
	Unit – V: Memory Management	C19: Physical and Virtual Address Space C20: Memory Allocation Strategies– Fixed and Variable Partitions, Paging, Segmentation, Virtual Memory; C21: Page Replacement Algorithms
	Unit – VI: File and I/O Management, Disk Scheduling, OS security	C22: Directory Structure, File Operations, File Allocation Methods, C23: Device Management, Pipes, Buffer, Shared Memory, C24: Disk Scheduling algorithms C25: Security Policy Mechanism, Protection, Authentication and Internal Access Authorization.
	Unit - VII: Introduction to Android Operating System	C26: Introduction to Android Operating System C27: Android Development Framework and Android Application Architecture C28: Android Process Management and File System
	Analysis of Algorithms	
	Computer Networks	
	Programming in Java	
	Python Programming	
SEMESTER – IV (HONOURS)	**Software Engineering**	

	Database Management System	
	Object Oriented Programming	
	Mobile Application Development	
	Web Programming	
SEMESTER – V (HONOURS)	**Internet Technologies**	
	Artificial Intelligence	
	Image Processing	
	Data Analytics	
	Computer Ethics	
	System Security	
	Human Computer Interface	
SEMESTER – VI (HONOURS)	**Computer Graphics**	
	Machine Learning	
	Modelling and Simulation	
	Theory of Computation	
	Data Mining	
	Cloud Computing	
	Internet of Things	
SEMESTER - III (GE)	**Operating System and Shell Scripts**	
	Introduction to Computer	

	Networks	
SEMESTER - IV (GE)	**Object Oriented Programming in C++**	
	Introduction to Database Management System	
SEMESTER - III (PROGRAM)	**Basics of Operating Systems**	
	Core Java	
SEMESTER - IV (PROGRAM)	**Basics of Database Management System**	
	Web Programming with PHP	
SEMESTER - V (PROGRAM)	**Basics of Software Engineering**	
	Basics of Computer Networks	
	MATLAB Programming	
	Programming in Python	
SEMESTER - VI (PROGRAM)	**Basics of Artificial Intelligence**	
	Basics of Computer Graphics	
	Basics of Mobile Application Development	
	Basics of Cloud Computing	