B.Sc. (MPCs/MECs/MSCs)
I Year / II Semester
THEORY PAPER – II
Data Structures
(w.e.f 2022-23)

Scheme of Instruction	Scheme of Examination
Total durations Hrs. : 60	Max. Marks : 100
Hours/Week : 06(4T+2P)	Internal Examination :30
Credits : 5	SBT : 10
Instruction Mode: Lecture +practical	External Examinatio:60
Course Code: DS-2-CS-22T	Exam Duration : 3 Hrs.

Course Objective:
To impart students with knowledge on linear and non-linear data structures, sorting, searching, and hashing techniques and file processing.

Course Outcomes: At the end of the course the student will be able to	**Cognitive Level**
CO 1: Develop logical ability to design and implement abstract data types for linear data structures like Stacks and Queues.	BL4
CO 2: Understand and implement linked list Graphs and Graph Search Methods	BL4
CO 3: Understand and Develop programs on Binary Search tree, Spanning Tree, BTree and B+ Tree.	BL4
CO 4: Understand and develop programs on various Hashing, Searching and Sorting techniques.	BL4

SYLLABUS

Unit	Content	Hrs
I	**Basic Data Structures** Basic Data Structures: Introduction, Types of Data Structures, Linear lists, stacks: Definitions, Operations, ADT, Formula-based Representation, and Applications of Stacks. Queues: Definitions, Operations, ADT, Formula-based Representation, Applications of Queues, Priority Queues.	15
II	**Linked List, Searching and Sorting** **Linked List:** Creating linked list, inserting, deleting and searching a node in a linked list, Doubly Linked List, Linked Stack, Linked Queue. **Graphs:** Introduction, Graph Abstract Data Type, Representation of Graphs, Graph Traversal – Depth-First Search, Breadth-First Search, Spanning Tree, Prim's Algorithm, Kruskal's Algorithm.	15

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III	**Hashing, Trees and Graphs** **Trees:** Introduction, Properties of Tree, Binary Tree and Binary Search Tree introduction, Binary Tree Abstract Data Type, Implementation of Binary Trees, Binary Tree Traversals – Preorder, Inorder, Post-order Traversals, Applications of Binary Trees, AVL Tree. , Indexing using B-tree and B+ tree.	15
IV	**File I/O and File Organizations** **Searching:** Internal & external searching, Sequential Search, Binary search. **Hashing**: Introduction, Ideal hashing, hashing with Open Addressing, Hashing with Chains **Sorting:** Bubble Sort, Selection Sort, Insertion Sort, Merge Sort, Quick Sort, and Heap Sort.	15

Text Books:

1. S Sahani. (2005). Data Structures, Algorithms and Applications in C++. Second Edition. University Press.
2. K R Venugopal. (2006). Mastering C++. Tata McGraw Hill. 25th Reprint.

Suggested Readings:

1. D S Malik. (2003). "Data Structures using C++". Thomson Learning.
2. CormenLeiserson& Rivest. (1996). "Introduction to Algorithms". Prentice Hall India.
3. Walter J.Savitch. "Problem Solving with C++". 8th Edition. Addison Wesley Longman.

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