

## DATA STRUCTURES (3-0-3)

### Course Objectives:

- To understand different ways of organizing data in computer's memory.
- To learn different operations on data structures.
- To explore different applications of data structures.

### Unit I: (06 Hours)

Introduction to Data Structures: Definition, Concepts, Classification of Data Structures, Array: Introduction, One-Dimensional Array, Memory representation, Operations: Traversing, Searching, Insertion, Deletion, Merge. Two-Dimensional Array & Memory Representation, Multidimensional Array. Linear Search versus Binary Search, Sorting: Selection Sort, Bubble Sort.

### Unit II: (10 Hours)

Linked Lists: Definition, Single Linked List, Memory representation, Operations: Traversing, Searching, Insertion, Deletion and Merge. Double Linked List, Operations: Insertions, Deletion. Circular, Double Circular Linked list, Operations: Traversing, Insertion. Applications of Linked List, Sparse Matrix and Polynomial representations.

### Unit III: (10 Hours)

Stack: Definition, Representation: Array and Linked List representations, Operations: PUSH, POP, TRAVERSE. Applications: Evaluation of Arithmetic Expressions: Notations, Infix to Postfix Conversion, Evaluation of Postfix expression. Recursion (Factorial and Fibonacci), Tower of Hanoi. Queues: Definition, Representation: Array and Linked List representations, Operations: Enqueue, Dequeue. Structures of Queue: Circular, Deque and Priority Queue. Applications of Queue

### Unit IV: (08 Hours)

Trees: Definition, Terminologies, Binary Tree: Properties, Representations (Linear and Linked List representations). Operations: Traversal (Inorder, Preorder, Postorder), Searching, Introduction to Binary Search Tree, AVL tree, Applications of Trees.

### Unit V: (06 Hours)

Graph: Definition, Terminologies, Representations (Set, Linked List, Matrix), Searching (BFS, DFS), Applications of Graphs.

### Course Outcomes (COs):

Upon completion of this course, students will be able to:

- Learn about data structures and the use of array
- Create linked lists and perform insertion/deletion operations on them
- Represent Stack and Queue in the memory and learn their applications
- Learn the use of various non-linear data structures and their applications

### Text Books:

1. Classic Data Structure, D. Samanta, PHI, 2/ed.
2. Ellis Horowitz, Sartaj Sahni, "Fundamentals of Data Structures", Galgotia Pubs

### Reference Book:

1. Sastry C.V., Nayak R, Ch. Rajaramesh, Data Structure & Algorithms, I. K. International ,Publishing House Pvt. Ltd, New Delhi.