DATA STRUCTURES

Objective:

- To understand the basic structure concept such as Abstract Data Types, Linear and Non Linear Data structures.
- To understand the notations used to analyze the Performance of algorithms.
- To understand the behavior of data structures such as stacks, queues, trees, hash tables, search trees, Graph and their representations.
- To choose the appropriate data structure for a specified application.
- To understand and analyze various searching and sorting algorithms.
- To write programs in C to solve problems using data structures such as array, linked lists, queues, trees, graphs, hash tables, search trees.

UNIT - I

Basic concepts - Algorithm Specification - Introduction, Recursive algorithms, Data Abstraction
Performance analysis - time complexity and space complexity, Asymptotic Notation - Big O, Omega and Theta notations, introduction to Linear and Non Linear data structures.


UNIT- II

Stack ADT, definition, operations, array and linked implementations in C, applications-infix to postfix conversion, Postfix expression evaluation, recursion implementation, Queue ADT, definition and operations ,array and linked Implementations in C, Circular queues-Insertion and deletion operations, Deque (Double ended queue)ADT, array and linked implementations in C.

UNIT- III

Trees – Terminology, Representation of Trees, Binary tree ADT, Properties of Binary Trees, Binary Tree Representations-array and linked representations, Binary Tree traversals, Threaded binary trees, Max Priority Queue ADT-implementation-Max Heap-Definition, Insertion into a Max Heap, Deletion from a Max Heap.

Graphs – Introduction, Definition, Terminology, Graph ADT, Graph Representations- Adjacency matrix, Adjacency lists, Graph traversals- DFS and BFS.

UNIT- IV
Searching- Linear Search, Binary Search, Static Hashing-Introduction, hash tables, hash functions, Overflow Handling.
Sorting- Insertion Sort, Selection Sort, Radix Sort, Quick sort, Heap Sort, Comparison of Sorting methods.

UNIT- V

Search Trees-Binary Search Trees, Definition, Operations-Searching, Insertion and Deletion, AVL Trees-Definition and Examples, Insertion into an AVL Tree,B-Trees, Definition, B-Tree of order m, operations-Insertion and Searching, Introduction to Red-Black and Splay Trees(Elementary treatment-only Definitions and Examples), Comparison of Search Trees.
Pattern matching algorithm- The Knuth-Morris-Pratt algorithm, Tries (examples only).

TEXT BOOKS:


REFERENCE BOOKS:

7. Data Structures, S.Lipscutz, Schaum’s Outlines, TMH.
11. Advanced Data structures, Peter Brass, Cambridge.

Outcomes:

- Learn how to use data structure concepts for realistic problems.
- Ability to identify appropriate data structure for solving computing problems in respective language.
- Ability to solve problems independently and think critically.