

DATA STRUCTURES AND ALGORITHMS

Problem Solving Techniques

RECURSION

Introduction to recursion, Principle of mathematical induction, Fibonacci numbers, Recursion using arrays, Recursion using strings, Recursion using 2D arrays

TIME AND SPACE COMPLEXITY

Order complexity analysis, Theoretical complexity analysis, Time complexity analysis of searching and recursive algorithms, Theoretical space complexity, Space complexity analysis of merge sort

Linear Data Structures

LINKED LISTS

Introduction to linked list, Inserting node in linked list, Deleting node from linked list, Midpoint of linked list, Merge two sorted linked lists, merge sort of a linked list, Reversing a linked list

STACKS AND QUEUES

Introduction to stacks, Stack using arrays, Dynamic Stack class, Stack using linked list, Inbuilt stack, Queue using arrays, Dynamic queue class, Queue using linked list, Inbuilt queue

Trees

GENERIC TREES

Introduction to Trees, Making a tree node class, Taking a tree as input and printing, Tree traversals, Destructor for tree node class

BINARY TREES

Introduction to Binary Trees, Taking a binary tree as input and printing, Binary Tree traversals, Diameter of binary tree

BINARY SEARCH TREES

Introduction to Binary Search Trees, Searching a node in BST, BST class, Inserting and Deleting nodes in BST, Types of balanced BSTs

Advanced Data Structures

PRIORITY QUEUES

Introduction to Priority Queues, Ways to implement priority queues, Introduction to heaps, Introduction to Complete Binary Trees and its implementation, Insert and Delete operations in heaps, Implementing priority queues, Heap sort, Inbuilt Priority Queue

HASHMAPS

Introduction to Hashmaps, Inbuilt Hashmap, Hash functions, Collision handling, Insert and Delete operation implementation in hashmap, Load factor, Rehashing

TRIES

Introduction to Tries, Making a Trie Node class, Insert, Search and Remove operation implementation in Tries, Types of Tries, Huffman Coding

GRAPHS

Introduction to Graphs, Graph Terminology, Graph implementation, Graph Traversals (DFS and BFS), Weighted and Directed Graphs, Minimum Spanning Trees, Cycle Detection in Graphs, Kruskal's algorithm, Prim's Algorithm, Dijkstra's algorithm

Dynamic Programming

INTRODUCTION TO DYNAMIC PROGRAMMING

Introduction to Memoization, Introduction to Dynamic Programming, Fibonacci numbers using recursion, memoization and dynamic programming

APPLICATIONS OF DYNAMIC PROGRAMMING

Longest Common Subsequence (LCS) using recursion, memoization and dynamic programming, Edit distance using recursion, memoization and dynamic programming, Knapsack problem using recursion, memoization and dynamic programming