Data Structures and Algorithms in C++/Java/JavaScript

Basics of Programming

1. Introduction to Programming

- Flowcharts
- Variables
- Input and Output
- Conditionals
- Loops
- Switch statements
- Functions
- Basic Maths for DSA
- Number System
- Patterns Problems

Time and Space Complexity

2. Analysis of Algorithms

- Rate of Growth
- Asymptotic Notations
  - Big Oh Notation
  - Big Omega
  - Theta Notation
- Measuring the Complexity of an Algorithm

- Best Case
- Average Case
- Worst Case
- Asymptotic Analysis

Array and String

3. Arrays

- Introduction to Arrays
- Operations on Arrays (insertion, deletion, searching)
- Dynamic Arrays,2d Array

4. Strings

- Introduction to Strings

Searching and Sorting

5. Searching Algorithms

- Linear Search
- Binary Search

6. Sorting Algorithms

- Bubble Sort
- Selection Sort
- Insertion Sort
- Merge Sort
- Quick Sort

7. 2 Pointer Approach

Recursion and Backtracking

8. Recursion

- Basic Concepts
- Advanced Concepts

9. Backtracking

- Introduction to Backtracking
- N-Queens Problem
- Subset Sum Problem

Object-Oriented Programming (OOPs)

10. OOP Concepts

Linked List

11. Singly Linked List

- Operations (insertion, deletion, traversal)

12. Doubly Linked List

- Operations (insertion, deletion, traversal)

13. Circular Linked List

- Operations (insertion, deletion, traversal)

Stack and Queue

14. Stacks

- Introduction to Stacks
- Stack Operations (push, pop)
- Applications of Stacks

15. Queues

- Introduction to Queues
- Queue Operations (enqueue, dequeue)
- Priority Queues

Tree and Binary Search Tree (BST)

16. Trees

- Binary Trees
- Tree Traversal (in-order, pre-order, post-order)

17. Binary Search Trees (BST)

- Operations on BST

Hashmap and Heap

18. Hashmap

- Introduction to Hashing
- Hash Functions
- Collision Resolution Techniques

19. Heap

- Min Heap and Max Heap
- Heap Operations (insert, delete, heapify)

Sliding Window Technique

20. Introduction to Sliding Window Technique

Tries

21. Introduction to Tries

Dynamic Programming

22. Introduction to Dynamic Programming

- Memoization and Tabulation
- Examples of Dynamic Programming Problems (e.g., Fibonacci sequence, Longest Common Subsequence)

Graphs

23. Introduction to Graphs

- Graph Representation (adjacency matrix, adjacency list)
- Depth-First Search (DFS)

- Breadth-First Search (BFS)

- Shortest Path Algorithms (Dijkstra's, Bellman-Ford).