■ Data Structures & Algorithms (DSA) Roadmap

Phase 1: Basics (Foundations)

- Time & Space Complexity (Big-O, Big-Theta, Big-Omega)
- Practice: min/max in array, reverse string, palindrome, frequency count

Phase 2: Arrays & Strings

- Array traversal, insertion, deletion
- Subarrays, Substrings, Sliding Window, Prefix Sum
- Problems: Two Sum, Kadane's Algorithm, Longest Substring Without Repeating Characters, Rotate Array

Phase 3: Recursion & Backtracking

- Factorial, Fibonacci, Tower of Hanoi
- N-Queens Problem, Rat in a Maze

Phase 4: Linked List

- Singly, Doubly, Circular
- Reverse linked list, Detect cycle (Floyd's), Merge sorted lists

Phase 5: Stacks & Queues

- Stack Problems: Balanced Parentheses, Next Greater Element, Postfix Evaluation
- Queue Problems: Implement Queue using Stacks, Circular Queue, LRU Cache

Phase 6: Searching & Sorting

- Linear Search, Binary Search
- Bubble, Insertion, Selection Sort
- Merge Sort, Quick Sort, Heap Sort

Phase 7: Trees

- Binary Trees, BST
- Traversals: Inorder, Preorder, Postorder, Level-order
- Height, Diameter, Lowest Common Ancestor, Balanced Trees

Phase 8: Graphs

- Representation: Adjacency List, Matrix
- BFS, DFS, Dijkstra, Bellman-Ford, Floyd-Warshall
- Kruskal’s, Prim’s, Topological Sort

Phase 9: Dynamic Programming (DP)

- Beginner: Fibonacci, Climbing Stairs, Coin Change
- Intermediate: LCS, LIS, Knapsack
- Advanced: Matrix Chain Multiplication, DP on Grids

Phase 10: Advanced Topics (Optional)

- Tries, Segment Trees, Fenwick Tree
- Disjoint Set Union (DSU)
- Bit Manipulation tricks

Suggested Practice Path

- Platforms: LeetCode, GeeksforGeeks, HackerRank, CodeChef
- Rule: 1 easy + 1 medium daily, revise weekly
- Timeline: Month 1-5 stepwise coverage