

DSA problems

1. Basics

Beginner

- Swap two numbers without using a third variable
- Check if a number is prime
- Find factorial of a number
- Print Fibonacci series up to N terms
- Find GCD of two numbers
- Reverse a number
- Check if a number is a palindrome
- Count digits in a number
- Find the largest among 3 numbers



2. Arrays



Beginner

- Find maximum and minimum in an array
- Linear search
- Binary search
- Reverse an array
- Check if the array is sorted



Intermediate

- Remove duplicates from sorted array
- Move all zeros to the end
- Rotate array by K steps
- Find second largest and second smallest
- Count frequency of each element



Advanced

- Kadane's Algorithm (maximum subarray sum)
- Merge two sorted arrays without extra space
- Find missing number in range 1 to N
- Two sum problem
- Subarray with given sum (sliding window)
- Longest consecutive sequence



3. Strings



Beginner

- Reverse a string
- Check palindrome string
- Count vowels and consonants
- Convert to uppercase/lowercase



Intermediate

- Check anagram of two strings
- Remove all white spaces
- First non-repeating character
- Count frequency of characters
- Replace characters without using inbuilt functions



Advanced

- Longest repeating substring
- Longest common prefix
- Rabin Karp / KMP Algorithm
- Minimum characters to make palindrome
- Z-algorithm for pattern matching

4. Math

Beginner

- Armstrong number check
- Sum of digits of a number
- Power of a number
- Check for perfect number

Intermediate

- Sieve of Eratosthenes (prime numbers)
- Count trailing zeroes in factorial
- Check if a number is power of 2

Advanced

- Modular exponentiation
- GCD using Euclid's Algorithm
- Fast Inverse Square Root

5. Recursion

Beginner

- Factorial using recursion
- Fibonacci using recursion
- Sum of natural numbers
- Print N to 1 using recursion

Intermediate

- Reverse a string using recursion
- Power of a number using recursion
- Palindrome check recursively

Advanced

- Tower of Hanoi
- Subset generation
- Permutations of string

6. Sorting

Beginner

- Bubble Sort
- Selection Sort
- Insertion Sort

Intermediate

- Merge Sort
- Quick Sort
- Count Sort

Advanced

- Heap Sort
- Radix Sort
- Bucket Sort
- Dutch National Flag Problem (Sort 0s, 1s, 2s)

7. Linked Lists

Beginner

- Create and traverse singly linked list
- Insert at beginning/end
- Delete from beginning/end

Intermediate

- Reverse a linked list
- Detect loop in a list
- Find middle of linked list
- Merge two sorted linked lists

Advanced

- Detect and remove loop
- Add two numbers represented by linked lists
- Clone a linked list with random pointers
- LRU Cache (using LinkedList + HashMap)

8. Stacks

Beginner

- Implement stack using list
- Push, Pop, Peek operations

Intermediate

- Infix to Postfix conversion
- Evaluate Postfix expression
- Check for balanced parentheses
- Next greater element

Advanced

- Min stack
- Largest rectangle in histogram
- Maximum area of binary matrix

9. Queues

Beginner

- Implement queue using list
- Circular queue

Intermediate

- Queue using two stacks
- Deque (Double-ended queue)
- First non-repeating character in stream

Advanced

- Sliding window maximum
- LRU Cache (Queue version)
- Rotten oranges (multi-source BFS)

10. Trees

Beginner

- Create a binary tree
- Inorder, Preorder, Postorder traversals

Intermediate

- Level order traversal
- Height of a binary tree
- Count leaf nodes
- Diameter of binary tree
- Check if tree is balanced

Advanced

- Lowest Common Ancestor
- Top view, Bottom view of binary tree
- Convert Binary Tree to DLL
- Serialize and Deserialize Binary Tree
- Morris Traversal

11. Graphs

Beginner

- Adjacency list and matrix
- BFS and DFS

Intermediate

- Detect cycle in graph (DFS/BFS)
- Topological sort (Kahn's Algorithm)
- Dijkstra's shortest path

Advanced

- Prim's and Kruskal's MST
- Bellman-Ford
- Floyd Warshall
- Kosaraju's Algorithm (SCC)
- Bridges and Articulation Points

12. Searching

Beginner

- Linear search
- Binary search

Intermediate

- First and last occurrence in sorted array
- Count occurrences of a number
- Find square root using binary search

Advanced

- Search in rotated sorted array
- Median of two sorted arrays
- Kth smallest/largest element



13. Backtracking



Beginner

- Generate all subsets of a string
- Generate permutations of a string



Intermediate

- N-Queens Problem
- Sudoku Solver
- Rat in a Maze



Advanced

- Word Search
- M-coloring problem
- Hamiltonian Cycle



14. Dynamic Programming (DP)



Beginner

- Fibonacci with DP
- Climbing stairs



Intermediate

- 0/1 Knapsack
- Longest Common Subsequence (LCS)
- Longest Increasing Subsequence (LIS)
- Matrix Chain Multiplication



Advanced

- Edit Distance
- Palindrome Partitioning
- Egg Dropping Problem
- Maximum profit in job scheduling

BONUS (Asked in FAANG)

- Merge Intervals
- Median of data stream
- Trapping Rain Water
- Longest substring without repeating characters
- Minimum window substring
- Word Ladder
- LFU Cache
- Kth permutation sequence