DSA Topics for FANG

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DS.A Topics

① Time & Space Complexity

- Big O Notation
- Constant Time $O(1)$
- Logarithmic Time $O(\log N)$
- Linear Time $O(N)$
- Logarithmic Linear Time $O(N \log N)$
- Quadratic Time $O(N^2)$
- Cubic Time $O(N^3)$
- Exponential $O(2^N)$
- Factorial Time $O(N!)$

High to Low

Low to High

② Array

- Basic Operation 2D Array

- Two Pointer
- Carry Forward
- Hashing
- Prefix Array
- Sub-Array
- Kadane's Algorithm
- Merging Interval

QUESTION

- Mo's Algorithm
- Sliding Window (Fixed Size)
- Sliding Window (Variable Size)

③ Bit Manipulation

- Basic of Binary Representation
- Bitwise Operator
- XOR Tricks

ANSWER

- Counting Set Bits
- Finding ith Bit
- Flipping Bits
- Bit Masking (DP)

④ Math

- GCD, LCM
- Sieve of Eratosthenes
- Logarithm Tricks

QUESTION

- Binary Exponential
- Factorial, nCr & nPr
- Number of Divisors
- Sum of Divisors
- HCM & LCM using Bitmanipulation
- Catalan Numbers (BST counting, Parenthesis Matching)

ANSWER

⑤ Recursion

- Basics & Recursion Tree (Dry Run)
- Divide & Conquer Recursion (Searching & Sorting)
- Recursion DP (DP)
- Recursion with String
- DFS (Tree, Graph)
- BackTracking

QUESTION

⑥ Searching Sorting

- Linear Search
- Binary Search
- Bubble Sort
- Selection Sort

ANSWER

- Insertion Sort
- Merge Sort
- Quick Sort
- Heap Sort

⑦ String

- Pattern Matching
- Palindrome Pattern
- Character frequency
- KMP Algorithm
- Robin-Karp Algorithm

⑧ Backtracking

- Sub-Array v/s Subset v/s Sub-sequence

QUESTION

ANSWER

- Permutations & Combinations
- Subsets
- Subsequence
- Palindromic Partition
- Path in Grid & Possible direction

⑨ Linked List

- LL Basics & Types
- LL Implementation
- Floyd's Algo (Cycle Detection)
- Sort LL
- Merge LL
- Clone LL

(10) Stack

- Basic Operations & Implementation
- Monotonic Stack
- Parenthesis Problems
- Min & Max Stack
- Expression Evalution

(11) Queue

- Basic Operations
- Types & Implementations
- BFS Traversal (Tree, Graph)

(12) Binary Search

- Classic Binary Search on 1D Array

- Binary Search on 2D Array
- Binary Search on Answer
- Binary Search on Index
- Binary Search on Continous Space
- Binary Search on Graph.

(12) Tree

- Tree Basics & Types
- Tree Traversal
  (preOrder, InOrder, postOrder, levelOrder)
  DFS — BFS
- Search & Path Sum in Tree
- Height of Tree
- Diameter of Tree

- LCA of Tree
- Different view (Left, Right, Top, Bottom)
- Mirror, Symmetric Tree
- Balanced Tree
- Identical Tree
- Tree Iterator
- Morris Traversal

QUESTION

- BST search, Insertion, Deletion
- Kth smallest / largest in BST
- Flatten Tree

(13) Dynamic Programming

- Basics of DP, T.C & S.C
- Simple / Linear / Fibonacci DP
- DP on grid.

ANSWER

- Subset & Partition DP
- 0/1 Knapsack Pattern
- Unbounded Knapsack Pattern
- Longest Common Subsequence (LCS)
- Longest Increasing Subsequence (LIS)
- Matrix Chain Multiplication (MCM)
- DP on Tree
- DP on Graph
- Bitmasking DP

(14) Graph

- Basics, Types of Graphs
- Graph Representation Adjency Matrix & List

- Graph Traversal (BFS, DFS)
- Cycle Detection
- Grid Based Graph Problems
- Topological Sort
- Strongly Connected components
- Union - Disjoint set (DSU) Pattern

QUESTION

- Minimum Spanning Tree (MST)
- Shortest Path Algorithms
- Graph + Dp Problems

ANSWER