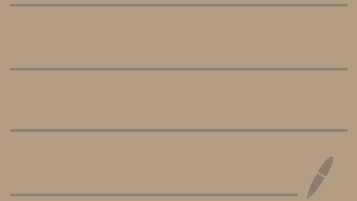


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DSA Topics  
for

FANG

Asma Shaikh  
SDE-III



# 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  $O(N!)$

## ② Array

- Basic Operation 2D Array

High to Low

Low to High

- Two Pointers
- Carry Forward
- Hashing
- Prefix Array
- Sub-Array
- Kadane's Algorithm
- Merging Interval
- Mo's Algorithm
- Sliding Window (Fixed Size)
- Sliding Window (Variable Size)

### ③ Bit Manipulation

- Basic of Binary Representation
- Bitwise Operators
- XOR Tricks

- Counting Set Bits
- Finding  $i$ th Bit
- Flipping Bits
- Bit Marking (DP)

#### ④ Math

- GCD, LCM
- Sieve of Eratosthenes
- Logarithm Tricks
- Binary Exponential
- Factorial,  $nCr$  &  $nPr$
- Number of Divisors
- Sum of Divisors
- HCF & LCM using Bitmanipulation
- Catalan Numbers (BST counting, Parenthesis Matching)

QUESTION

ANSWER

## ⑤ Recursion

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

## ⑥ Searching Sorting

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

- 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

## ② 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 Evaluation

## 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 Continuous space
- Binary search on Graph.

## 12 Tree

- Tree Basics & Types
- Tree Traversal  
(preOrder, InOrder, postOrder, level Order)  
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
- 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.

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

### ⑭ Graph

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

- Graph Traversal (BFS, DFS)
- Cycle Detection
- Grid Based Graph Problems
- Topological Sort
- Strongly Connected components
- Union - Disjoint set (DSU) Pattern
- Minimum Spanning Tree (MST)
- Shortest Path Algorithms
- Graph + DP Problems

QUESTION

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ANSWER