DSA in 30 Days

Day 1 - 2 : Basic Maths and Basics of any Programming Language

- Data types & ranges , operators , conditional statements , loops
- Pattern problems , Fibonacci series , prime or not
- Permutations & Combinations , Set Theory , Puzzles (Hour Glass Puzzle)
- Basics of Time & Space Complexity (Big O Notation)

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Day 3 - 5 : Arrays

- Basic Questions - Sum of array elements, min element, max element, subarrays based
- Pointer Arithmetic
- Array rotation
- Trapping Rain Water
- Pair Sum problem — Brute force — or
- Two pointer approach
- Merge two sorted arrays
- Sliding Window
- Subarray with given sum
- Maximum Subarray Sum
- Kadane's Algorithm
- Dutch National Flag Algorithm (Sort 0s, 1s and 2s)
- Median of Two sorted arrays

Day 6 : 2D Arrays / Matrix

- Traversal Based Problems - Wave Order , Spiral Order
- Rotation Based Problems - Transpose of a matrix, rotate a matrix by 90^0
- Matrix Multiplication

Day 7 - 8 : Strings

- Basic questions - traversal based, palindromic or not
- Word Count in strings
- Reverse String
- Sliding Window for strings

Day 9 - 10 : Searching & Sorting

- Linear Search
- Binary Search - Concepts of Upper Bound, Lower Bound
- First & Last Occurrence
- Aggressive Cows Problem
- Book Allocation Problem
- Painter's Partition Problem
- Bubble Sort
- Selection Sort
- Insertion Sort
- Counting Sort

Day run

Day 11 - 13 : Recursion & Backtracking

- Basic Recursion Question - factorial , fibonacci , binary search using recursion
- Divide & Conquer Algo - Merge Sort , Quick Sort
- Tower of Hanoi
- String based recursion problems
  - Subsequences of a string
  - Letter Combinations of Phone Number
- Backtracking
  - Subsets of an array
  - N queens problem
  - Rat In a Maze
  - Sudoku Solver

Day 14 - 15 : Linked List

- Basic Traversal based problems - Find ith Node, insert / delete a node
- Reverse a Linked List
- Slow and Fast Pointers
- Midpoint in LL
- Detect Loop in Linked List
- Merge Sort / Quick Sort on LL
- Merge two sorted Linked Lists
- Add two numbers

Day 16 - 17 : Stacks

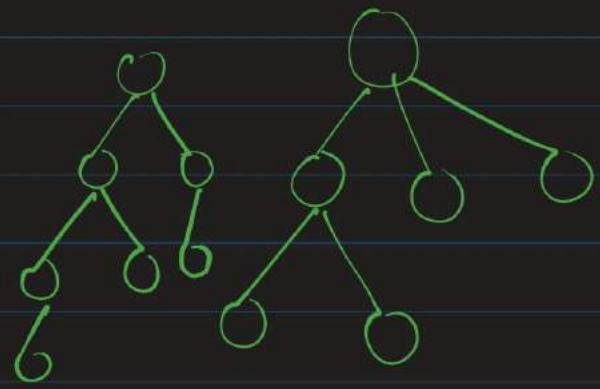
- Implementation
  - Using arrays
  - Using linked list
- Prefix to Infix Conversion
- Prefix to Postfix Conversion
- Postfix to Prefix Conversion
- Balanced Parenthesis
- Stock Span

Day 18 : Queue

- Implementation
  - Using arrays
  - Using linked list
- Application Based Questions

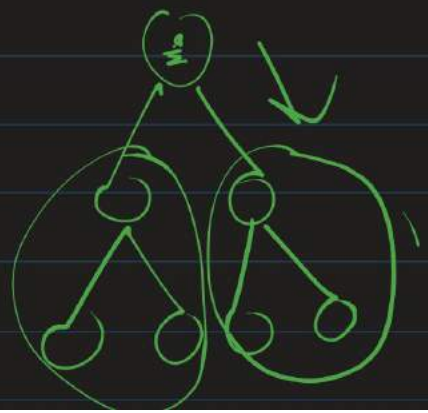
Day 19 -20 : Trees

- Basics - TreeNode class, input, print elements, height, depth
- Binary Trees basics
- Traversals - preorder, inorder, postorder
- Construct tree from preorder and inorder
- Construct tree from postorder and inorder
- Diameter of Binary Tree
- Views - Top, Bottom, Left, Right
- Lowest Common Ancestor (LCA) of Binary Tree



Day 21 : BST (Binary Search Tree)

- Basic Problems - Search in BST, Check if BST
- Construction based - BST from sorted array / Linked List
- Insert / Delete in BST
- LCA in BST
- Second Largest Element in BST
- Sum of k smallest elements in BST



Day 22 - 23 : Priority Queues & Heaps

- Implement a priority queue
- Heap - BST, Heap - Array
- Heap sort (In place)
- K-based problems
- Merge k sorted arrays
- Merge k sorted LL
- Kth largest / smallest element

Day 24 : Hashmap

- Inbuilt hashmap - unordered_map<data_type1,data_type2> , map<data_type1,data_type2>
- Maximum frequency number
- Pairs with difference k
- Longest Consecutive Subsequence

Day 25 - 26 : Graphs

- Adjacency Matrix , Adjacency List
- Traversals - DFS, BFS
- Connected Components
- Word Search
- Detect Cycle in a graph
- Shortest Path Algos
  - Djiktra's Algorithm
  - Bellman ford
  - Floyd Warshall
- MST
- Prim's algorithm
- Topological Sort
- Graphs in Matrix (Problems)

Day 27 - 29 : Dynamic Programming

3

- Recursion revise
- Memoization - Top Down
- Tabulation - Bottom Up
- Approach - Recursion - Memoization - Tabulation
- Basic Problems - Fibonacci number, staircase problem
- Longest Common Subsequence
- Longest Increasing Subsequence
- Longest Common Substring (length)
- Edit Distance
- Min Cost Path
- 0-1 Knapsack problem
- Palindrome Partitioning
- Matrix Chain Multiplication

Day 30 : Greedy Algorithms

- Activity Selection Problem
- Job Sequencing Problem
- Fractional Knapsack Problem
- N meetings in one room
- Gas Station
- Minimum Number of Platforms