

# SUMMER VACATION DSA PROBLEM SHEET

By: Ankit Verma



## 1. Arrays (5 days)

- a. Array Basics (2 days)
  - i. Theory (0.5 days)
    - 1. [C++ Arrays \(With Examples\)](#)
    - 2. [Java Array \(With Examples\)](#)
    - 3. [Python Array \(With Examples\)](#)
  - ii. Problems (1.5 days)
    - 1. [Wave Array | Practice | GeeksforGeeks](#)
    - 2. [Sort an array of 0s, 1s and 2s | Practice | GeeksforGeeks](#)
    - 3. [Subarray with given sum | Practice | GeeksforGeeks](#)
    - 4. [Kadane's Algorithm | Practice | GeeksforGeeks](#)
    - 5. [Missing number in array | Practice | GeeksforGeeks](#)
- b. Binary Search (2 days)
  - i. Theory (0.5 days)
    - 1. <https://www.geeksforgeeks.org/binary-search/>
  - ii. Problems (1.5 days)
    - 1. [Search Insert Position - LeetCode](#)
    - 2. [Sqrt\(x\) - LeetCode](#)
    - 3. [Find Smallest Letter Greater Than Target - LeetCode](#)
    - 4. [Kth Smallest Element in a Sorted Matrix - LeetCode](#)
- c. Two Pointers (1 day)
  - i. Theory (about 1 hr)
    - 1. <https://www.geeksforgeeks.org/two-pointers-technique/>
  - ii. Problems (1 day)
    - 1. [3 Sum | Interviewbit](#)
    - 2. [Merge Two Sorted Lists II | Interviewbit](#)
    - 3. [Remove Duplicates from Sorted Array | Interviewbit](#)

## 2. Strings (2 days)

- a. String Basics (2 days)
  - i. [Integer To Roman | Interviewbit](#)
  - ii. [Reverse the String | Interviewbit](#)
  - iii. [Implement StrStr | Interviewbit](#)
  - iv. [Vowel and Consonant Substrings! | Interviewbit](#)
  - v. [Longest Common Prefix | Interviewbit](#)
  - vi. [Longest Palindromic Substring | Interviewbit](#)

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## 3. Linked Lists (4 days)

- a. Theory (1 day)
  - i. <https://www.programiz.com/dsa/linked-list>
- b. Problems (3 days)
  - i. [Reverse a linked list - GeeksforGeeks](#)
  - ii. [Rotate a Linked List - GeeksforGeeks](#)
  - iii. [Function to check if a singly linked list is palindrome - GeeksforGeeks](#)
  - iv. [Nth node from end of linked list | Practice | GeeksforGeeks](#)
  - v. [Detect Loop in linked list | Practice | GeeksforGeeks](#)
  - vi. [Find the middle of a given linked list - GeeksforGeeks](#)
  - vii. [Delete N nodes after M nodes of a linked list - GeeksforGeeks](#)
  - viii. [Reverse a Linked List in groups of given size. | Practice | GeeksforGeeks](#)
  - ix. [Reverse alternate K nodes in a Singly Linked List - GeeksforGeeks](#)

## 4. Stacks and Queues (5 days)

- a. Theory (2 days)
  - i. <https://www.programiz.com/dsa/stack>
  - ii. <https://www.geeksforgeeks.org/stack-in-cpp-stl/>
  - iii. <https://www.geeksforgeeks.org/stack-class-in-java/>
  - iv. <https://www.geeksforgeeks.org/stack-in-python/>
  - v. <https://www.programiz.com/dsa/queue>
  - vi. <https://www.geeksforgeeks.org/queue-cpp-stl/>
  - vii. <https://www.geeksforgeeks.org/queue-interface-java/>
  - viii. <https://www.geeksforgeeks.org/queue-in-python/>
- b. Problems (3 days)
  - i. [Balanced Parantheses! | Interviewbit](#)
  - ii. [Redundant Braces | Interviewbit](#)
  - iii. [Nearest Smaller Element | Interviewbit](#)
  - iv. [Largest Rectangle in Histogram | Interviewbit](#)
  - v. [Min Stack | Interviewbit](#)
  - vi. [First Unique Character in a String - LeetCode](#)
  - vii. [Implement Stack using Queues - LeetCode](#)
  - viii. [Time Needed to Buy Tickets - LeetCode](#)
  - ix. [Implement Queue using Stacks - LeetCode](#)

## 5. Hashing (3 days)

- a. Theory (1 day)
  - i. <https://www.programiz.com/dsa/hash-table>
  - ii. [https://www.geeksforgeeks.org/unordered\\_map-in-cpp-stl/](https://www.geeksforgeeks.org/unordered_map-in-cpp-stl/)
  - iii. <https://www.geeksforgeeks.org/java-util-hashmap-in-java-with-examples/>
  - iv. <https://www.geeksforgeeks.org/hash-map-in-python/>

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## b. Problems (2 days)

- i. [Largest subarray of 0's and 1's | Practice | GeeksforGeeks](#)
- ii. [Find All Four Sum Numbers | Practice | GeeksforGeeks](#)
- iii. [Array Subset of another array | Practice | GeeksforGeeks](#)
- iv. [Sorting Elements of an Array by Frequency | Practice | GeeksforGeeks](#)
- v. [Union of Two Linked Lists | Practice | GeeksforGeeks](#)
- vi. [Top K Frequent Elements in Array - | Practice | GeeksforGeeks](#)

## 6. Tree-based Data Structures (7 days)

### a. Binary Tree & BST (5 days)

#### i. Theory (1 day)

1. <https://www.geeksforgeeks.org/introduction-to-tree-data-structure/>
2. <https://www.geeksforgeeks.org/binary-tree-set-1-introduction/?ref=lbp>
3. <https://www.geeksforgeeks.org/binary-tree-set-2-properties/?ref=lbp>
4. <https://www.geeksforgeeks.org/binary-tree-set-3-types-of-binary-tree/?ref=lbp>

#### ii. Problems (4 days)

1. [Inorder Traversal | Interviewbit](#)
2. [Preorder Traversal | Interviewbit](#)
3. [Postorder Traversal | Interviewbit](#)
4. [Max Depth of Binary Tree | Interviewbit](#)
5. [Right view of Binary tree | Interviewbit](#)
6. [Sorted Array To Balanced BST | Interviewbit](#)
7. [Root to Leaf Paths With Sum | Interviewbit](#)
8. [ZigZag Level Order Traversal BT | Interviewbit](#)
9. [Symmetric Binary Tree | Interviewbit](#)
10. [Balanced Binary Tree | Interviewbit](#)
11. [Valid BST from Preorder | Interviewbit](#)
12. [Kth Smallest Element In Tree | Interviewbit](#)

### b. Heaps (1 day)

#### i. Theory

1. <https://www.geeksforgeeks.org/binary-heap/>

#### ii. Problems

1. [K Largest Elements | Interviewbit](#)
2. [Merge K Sorted Lists | Interviewbit](#)

### c. Trie (1 day)

#### i. Theory

1. <https://www.geeksforgeeks.org/advantages-trie-data-structure/?ref=lbp>
2. <https://www.geeksforgeeks.org/trie-insert-and-search/?ref=lbp>
3. <https://www.geeksforgeeks.org/trie-delete/?ref=lbp>

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## ii. Problems

1. [Hotel Reviews | Interviewbit](#)
2. [Shortest Unique Prefix | Interviewbit](#)

## 7. Dynamic Programming (8 Days)

### a. Theory (3 days)

- i. [https://www.youtube.com/watch?v=OQ5jsbhAv\\_M&list=PLcDimPvbmfT8qAxD6JH\\_kmXiQwTNcoK78](https://www.youtube.com/watch?v=OQ5jsbhAv_M&list=PLcDimPvbmfT8qAxD6JH_kmXiQwTNcoK78)
- ii. [https://www.youtube.com/watch?v=ENyox7kNKeY&list=PLcDimPvbmfT8qAxD6JH\\_kmXiQwTNcoK78&index=2](https://www.youtube.com/watch?v=ENyox7kNKeY&list=PLcDimPvbmfT8qAxD6JH_kmXiQwTNcoK78&index=2)
- iii. [https://www.youtube.com/watch?v=ocZMDMZwhCY&list=PLcDimPvbmfT8qAxD6JH\\_kmXiQwTNcoK78&index=3](https://www.youtube.com/watch?v=ocZMDMZwhCY&list=PLcDimPvbmfT8qAxD6JH_kmXiQwTNcoK78&index=3)
- iv. <https://www.geeksforgeeks.org/program-for-nth-fibonacci-number/>
- v. <https://www.geeksforgeeks.org/0-1-knapsack-problem-dp-10/>
- vi. <https://www.geeksforgeeks.org/longest-increasing-subsequence-dp-3/>
- vii. <https://www.geeksforgeeks.org/longest-common-subsequence-dp-4/>
- viii. <https://www.geeksforgeeks.org/longest-common-substring-dp-29/>

### b. Problems (5 Days)

- i. [Nth Fibonacci Number | Practice | GeeksforGeeks](#)
- ii. [0 - 1 Knapsack Problem | Practice | GeeksforGeeks](#)
- iii. [Coin Change | Practice | GeeksforGeeks](#)
- iv. [nCr | Practice | GeeksforGeeks](#)
- v. [Longest Increasing Subsequence | Practice | GeeksforGeeks](#)
- vi. [Longest Common Subsequence | Practice | GeeksforGeeks](#)
- vii. [Longest Common Substring | Practice | GeeksforGeeks](#)
- viii. [Edit Distance | Interviewbit](#)
- ix. [Ways to Decode | Interviewbit](#)
- x. [Longest valid Parentheses | Interviewbit](#)
- xi. [Dungeon Princess | Interviewbit](#)
- xii. [Max Product Subarray | Interviewbit](#)
- xiii. [Max Sum Without Adjacent Elements | Interviewbit](#)
- xiv. [Best Time to Buy and Sell Stocks I | Interviewbit](#)
- xv. [Best Time to Buy and Sell Stocks II | Interviewbit](#)

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## 8. Graphs (8 Days)

### a. Theory (3 days)

- i. <https://www.geeksforgeeks.org/graph-and-its-representations/>
- ii. <https://www.geeksforgeeks.org/breadth-first-search-or-bfs-for-a-graph/>
- iii. <https://www.geeksforgeeks.org/depth-first-search-or-dfs-for-a-graph/>
- iv. <https://www.geeksforgeeks.org/dijkstras-shortest-path-algorithm-greedy-algo-7/>
- v. <https://www.geeksforgeeks.org/prims-minimum-spanning-tree-mst-greedy-algo-5/>
- vi. <https://www.geeksforgeeks.org/kruskals-minimum-spanning-tree-algorithm-greedy-algo-2/>
- vii. <https://www.geeksforgeeks.org/floyd-warshall-algorithm-dp-16/>
- viii. <https://www.geeksforgeeks.org/union-find-algorithm-union-rank-find-optimized-path-compression/>

### b. Practice (5 days)

- i. [BFS of graph | Practice | GeeksforGeeks](#)
- ii. [DFS of Graph | Practice | GeeksforGeeks](#)
- iii. [Find the number of islands | Practice | GeeksforGeeks](#)
- iv. [Implementing Dijkstra Algorithm | Practice | GeeksforGeeks](#)
- v. [Detect cycle in a directed graph | Practice | GeeksforGeeks](#)
- vi. [Detect cycle in an undirected graph | Practice | GeeksforGeeks](#)
- vii. [Topological sort | Practice | GeeksforGeeks](#)
- viii. [Minimum Spanning Tree | Practice | GeeksforGeeks](#)
- ix. [Unit Area of largest region of 1's | Practice | GeeksforGeeks](#)
- x. [Floyd Warshall | Practice | GeeksforGeeks](#)
- xi. [Shortest path from 1 to n | Practice | GeeksforGeeks](#)
- xii. [Covid Spread | Practice | GeeksforGeeks](#)
- xiii. [Distance from the Source \(Bellman-Ford Algorithm\) | Practice | GeeksforGeeks](#)
- xiv. [Biconnected Graph | Practice | GeeksforGeeks](#)
- xv. [Union-Find | Practice | GeeksForGeeks](#)