Data Structures & Algorithms Course Content

Introduction:

1. **Why to Learn DSA?**
2. **Why companies are giving importance to DSA?**
3. **What are the pre-requisite to attend this batch?**
4. **Fundamental of DSA**

Pattern Printing

5. Pattern-1 13 | DSA IT-World Question | Contests | HackerRank
6. Pattern-2 8 | DSA IT-World Question | Contests | HackerRank
7. Pattern-3 3 | DSA IT-World Question | Contests | HackerRank
8. Pattern-4 3 | DSA IT-World Question | Contests | HackerRank
9. Pattern-5 3 | DSA IT-World Question | Contests | HackerRank
10. Pattern-6 | DSA IT-World Question | Contests | HackerRank
11. Pattern-7 | DSA IT-World Question | Contests | HackerRank
12. Pattern-8 | DSA IT-World Question | Contests | HackerRank
13. Print half diamond pattern 1 | DSA IT-World Question | Contests | HackerRank

Hollow rectangle pattern

Hollow rectangle pattern | DSA IT-World Question | Contests | HackerRank

Inverted pyramid pattern

Inverted pyramid pattern | DSA IT-World Question | Contests | HackerRank

Rectangle pattern

Rectangle pattern | DSA IT-World Question | Contests | HackerRank

Print pyramid pattern

Palindrome pyramid pattern | DSA IT-World Question | Contests | HackerRank

Diamond Pattern

Number Diamond Pattern 1 | DSA IT-World Question | Contests | HackerRank

Down Facing Triangle:

Number Diamond Pattern 1 | DSA IT-World Question | Contests | HackerRank

Binary Pattern:

Binary pattern 3 | DSA IT-World Question | Contests | HackerRank

Alphabet Pattern:

Down Facing Triangle | DSA IT-World Question | Contests | HackerRank

Fundamentals of Array

Simple Array Sum

Simple Array Sum | DSA IT-World Question | Contests | HackerRank

Mini-Max Sum

Mini-Max Sum | DSA IT-World Question | Contests | HackerRank

Min and Max element in the array

Min and Max element in the array | DSA IT-World Question | Contests | HackerRank

Unique Elements of an array

Unique Elements of an array | DSA IT-World Question | Contests | HackerRank

Use Recursion to reverse the array

https://www.hackerrank.com/contests/ashok-it-dsa/challenges/use-recursion-to-reverse-the-array

Duplicate elements of an array

Duplicate elements of an array | DSA IT-World Question | Contests | HackerRank

Search for the missing number

Search for the missing number | DSA IT-World Question | Contests | HackerRank

\Fundamental of Matrix

Matrix Addition:
Matrix Addition 8 | DSA IT-World Question | Contests | HackerRank

Row wise sum of matrix

Row wise sum of matrix | DSA IT-World Question | Contests | HackerRank

Column wise Sum of Matrix

Column wise Sum of Matrix | DSA IT-World Question | Contests | HackerRank

Transpose of a Matrix:

Transpose of a Matrix | DSA IT-World Question | Contests | HackerRank

Sparse Matrix:

Check whether matrix is sparse matrix or not | DSA IT-World Question | Contests | HackerRank

Print Diagonal:

Print Diagonals of a Matrix | DSA IT-World Question | Contests | HackerRank

Rotation of a Matrix:

Rotation Of a Matrix | DSA IT-World Question | Contests | HackerRank

Fundamental of Mathematics

Sum of a digit:

Sum of a digit | DSA IT-World Question | Contests | HackerRank

Valid Triangle:

Check for a valid triangle | DSA IT-World Question | Contests | HackerRank

Compute a power b

Calculate a power b | DSA IT-World Question | Contests | HackerRank

Factorial of a number

Find factorial for small input range | DSA IT-World Question | Contests | HackerRank

Nth Fibonacci number

Find the Nth fibonacci number | DSA IT-World Question | Contests | HackerRank

Find the multiple of 3 and 5

Find number of multiple of 5 and 3 | DSA IT-World Question | Contests | HackerRank

Sum of first N Natural Number

Sum of first N Natural Number 1 | DSA IT-World Question | Contests | HackerRank

Find the sum of squares

square-sum | DSA IT-World Question | Contests | HackerRank

Find the sum of cubes

Find the sum of cubes | DSA IT-World Question | Contests | HackerRank

Check Armstrong number

Check Armstrong number | DSA IT-World Question | Contests | HackerRank

Check-Narcissistic numbers

Check-Narcissistic numbers | DSA IT-World Question | Contests | HackerRank

Prime or not

Prime or not 1 | DSA IT-World Question | Contests | HackerRank

Harshad numbers :

Harshad numbers | DSA IT-World Question | Contests | HackerRank

Basic Implementation

1. https://www.hackerrank.com/challenges/simple-array-sum/problem
2. https://www.hackerrank.com/challenges/diagonal-difference/problem
3. https://www.hackerrank.com/challenges/plus-minus/problem
4. https://codeforces.com/problemset/problem/4/A
5. https://codeforces.com/problemset/problem/112/A
6. https://codeforces.com/problemset/problem/266/A

Time & Space Complexity

- **Asymptotic Notations**

Bit Manipulation

Miscellaneous Question

- **Recursion**
- **Basic concept**
- **Sum, Fact, Fib, AP Sum.**
- **Mathematical analysis of time complexity.**
- **Master theorem**

- **Tower Of Hanoi**
- **Recursion to Generate Sum Set**
- **Balanced Bracket**
- **Magic Square**
- **Miscellaneous String Problem**

Sorting

Bubble sort

Bubble Sort implementation | DSA IT-World Question | Contests | HackerRank

Insertion sort

Insertion sort implementation | DSA IT-World Question | Contests | HackerRank

https://www.hackerrank.com/challenges/insertionsort1/problem

https://www.hackerrank.com/challenges/insertionsort2/problem

https://www.hackerrank.com/challenges/insertion-sort/problem

Selection sort:

Selection Sort Implementation | DSA IT-World Question | Contests | HackerRank

Counting Sort

https://www.hackerrank.com/challenges/countingsort1/problem

https://www.hackerrank.com/challenges/countingsort2/problem

Merge sort/ Quick sort & Merge sorted array:

https://leetcode.com/problems/merge-sorted-array/

Pair difference:

www.interviewbit.com/problems/diffk/

Triplet sum: https://leetcode.com/problems/3sum/

Linear & Binary Search: https://leetcode.com/problems/two-sum/

Finding floor: Finding The Floor 1 | DSA IT-World Question | Contests | HackerRank

Square Root: Square Root 10 | DSA IT-World Question | Contests | HackerRank

Cube Root: Cube Root 1 | DSA IT-World Question | Contests | HackerRank

Find First and Last Position of Element in Sorted Array

https://leetcode.com/problems/find-first-and-last-position-of-element-in-sorted-array/

AGGRCOW - Aggressive cows: https://www.spoj.com/problems/AGGRCOW/

- **Hashing**
- **Why hashing?**
- **Hashing Techniques**
- **Collision Resolutions**

LinkedList

Introduction

Insert (Head/Tail/Middle)

https://www.hackerrank.com/challenges/insert-a-node-at-the-head-of-a-linked-list/problem

https://www.hackerrank.com/challenges/insert-a-node-at-a-specific-position-in-a-linked-list/problem

https://www.hackerrank.com/challenges/insert-a-node-at-the-tail-of-a-linked-list/problem

Delete (Head/Tail/Middle)

https://www.hackerrank.com/challenges/delete-a-node-from-a-linked-list/problem

Print:

https://www.hackerrank.com/challenges/print-the-elements-of-a-linked-list-in-reverse/problem

https://www.hackerrank.com/challenges/print-the-elements-of-a-linked-list/problem

https://www.hackerrank.com/challenges/get-the-value-of-the-node-at-a-specific-position-from-the-tail/problem

Compare two Linked list :

https://www.hackerrank.com/challenges/compare-two-linked-lists/problem

Merge 2 sorted Linked List

https://www.hackerrank.com/challenges/merge-two-sorted-linked-lists/problem

Cyclic detection

https://www.hackerrank.com/challenges/detect-whether-a-linked-list-contains-a-cycle/problem

Merge point of 2 Linked List

https://www.hackerrank.com/challenges/find-the-merge-point-of-two-joined-linked-lists/problem

Trees

- **Basic concepts**
- **In order traversal:** https://www.hackerrank.com/challenges/tree-inorder-traversal/problem
- **Post order traversal:** https://www.hackerrank.com/challenges/tree-postorder-traversal
- **Preorder traversal:** https://www.hackerrank.com/challenges/tree-preorder-traversal/problem
- **Height of A Tree:** https://www.hackerrank.com/contests/ashok-it-dsa/challenges/height-of-tree-1
- **Fill Depth:** https://www.hackerrank.com/contests/ashok-it-dsa/challenges/find-depth
- **Sum OF all the Elements Present in a Tree**
- **Max Element Present in a Tree**
- **Level order traversal :** https://www.hackerrank.com/challenges/tree-level-order-traversal/problem

- **Vertical order traversal : https://leetcode.com/problems/vertical-order-traversal-of-a-binary-tree/**
- **Diameter of a tree : https://leetcode.com/problems/diameter-of-binary-tree/**
- **Distance Between 2 Nodes in BST : https://leetcode.com/problems/minimum-distance-between-bst-nodes/**
- **Binary Tree Paths : https://leetcode.com/problems/binary-tree-paths/**
- **Left-View of A Tree : https://www.hackerrank.com/contests/ashok-it-dsa/challenges/left-view-of-tree-1**
- **Nodes at K distance**
- **Right-View Of A Tree**
- **Top-View Of A tree**
- **Ceil Of Given Element**

Dynamic Programming

Graphs

- **Basic Concept**
- **BFS**
- **DFS**
- **Number of Connected Components**
- **Given a graph, check whether its tree or not**
- **Find the longest path in a graph**
- **No of Island**