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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](#)

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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

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[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](#)

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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

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[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

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- 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/

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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:

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<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>

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- 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

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