**DATA STRUCTURES**

**BASIC DATA-STRUCUTURE:**

* Arrays
* Strings
* Linked List
  + Singly Linked List
  + Double Linked List
  + Circular Linked List
* Stacks
* Queues

**INTERMEDIATE DATA-STRUCTURE:**

* Hashing
  + Hash-Tables
  + Hash-Maps
  + Hashing functions / Collision handling
* Trees
  + Binary Trees
  + Binary Search Trees (Modified Binary Tree)
  + AVL Trees
  + B-Trees (Self Balancing)
  + Tries
  + Red-Black Tree
* Heaps
  + Min-Heap
  + Max-Heap
  + Fibonacci Heap
* Graph
  + Adjacency Matrix
  + Adjacency List
  + Weighted/Unweighted Graph
  + Directed/Acyclic Graph (DAG)

**ALGORITHMS**

* **Sorting**
  + Bubble
  + Selection
  + **Insertion Sort**
  + **Merge Sort**
  + Quick Sort
  + Heap Sort
  + Radix Sort
  + Bucket Sort
  + Counting Sort
* **Searching**
  + Linear
  + Binary
  + Ternary
  + Exponential
  + Interpolation
* **Divide and Conquer**
  + Merge Sort
  + Quick Sort
  + Binary Search
  + Matrix Multiplication (Strassen's algorithm)
* **Greedy Algorithms**
  + Activity Selection Problem
  + Huffman Coding
  + Kruskal's Algorithms
  + Prim's Algorithms
  + Dijkstra's Algorithms
* **Dynamic Programming**
  + Fibonacci Sequence
  + 0/1 Knapsack Problem
  + Longest Common Subsequence
  + Longest Increasing Subsequence
  + Matrix Chain Multi
  + Coin Change Problem
  + Edit Distance
  + Rod Cutting Prob
* **Backtracking** 
  + N-Queens Problem
  + Sudoku Solver
  + Subset Sum Problem
  + Knight's Tour
  + Rat in a Maze
* **Graph Algorithm**
  + Depth-First Search (DFS)
  + Breadth-First Search (BFS)
  + Dijkstra's Algorithm (Shortest Path)
  + Bellman-Ford Algorithm (Shortest Path with Negative Weights)
  + Floyd-Warshall Algorithm (All-Pairs Shortest Path)
  + Topological Sort
  + Kruskal’s Algorithm (Minimum Spanning Tree)
  + Prim’s Algorithm (Minimum Spanning Tree)
  + Tarjan’s Algorithm (Strongly Connected Components)
  + Kosaraju’s Algorithm (Strongly Connected Components)

**Advanced Algorithms:**

* **String Matching Algorithms**
  + KMP (Knuth-Morris-Pratt)
  + Rabin-Karp
  + Boyer-Moore
* **Number Theory Algorithms**
  + Sieve of Eratosthenes (Prime Finding)
  + Euclid’s GCD Algorithm
  + Modular Exponentiation
  + Chinese Remainder Theorem
* **Bit Manipulation**
  + XOR-based tricks
  + Count set bits
  + Finding subsets using bits
* **Miscellaneous**
  + Convex Hull Algorithm (Graham Scan, Jarvis March)
  + Fast Fourier Transform (FFT)
  + Dynamic Connectivity (Union-Find/Disjoint Set)
  + Mo’s Algorithm (Efficient range queries)