1. Sorting Algorithms

- Bubble Sort
- Selection Sort
- Insertion Sort
- Merge Sort
- Quick Sort
- Heap Sort
- Counting Sort
- Radix Sort
- Bucket Sort
- Shell Sort
- Cycle Sort
- Tree Sort
- Bitonic Sort

2. Searching Algorithms

- Linear Search
- Binary Search
- Ternary Search
- Jump Search
- Interpolation Search
- Exponential Search

- Fibonacci Search
- Uniform Binary Search

3. Array Algorithms

- Prefix Sum
- Suffix Sum
- Difference Array
- Sliding Window
- Two Pointer Technique
- Kadane’s Algorithm
- Moore’s Voting Algorithm
- Dutch National Flag Algorithm
- Majority Element Algorithms
- Array Rotation Algorithms
- Subarray Sum Algorithms
- Maximum / Minimum Range Queries

4. String Algorithms

- Naive Pattern Matching
- Rabin–Karp Algorithm
- Knuth–Morris–Pratt (KMP)
- Z Algorithm
- Boyer–Moore Algorithm

- Aho–Corasick Algorithm
- Suffix Array Construction
- Suffix Tree
- Longest Common Subsequence (LCS)
- Longest Common Substring
- Longest Palindromic Substring
- Manacher’s Algorithm
- String Hashing
- Trie-based Algorithms

5. Linked List Algorithms

- Floyd’s Cycle Detection
- Reverse Linked List (Iterative & Recursive)
- Merge Two Sorted Lists
- Intersection Detection
- Palindrome Check
- Middle of Linked List
- Copy List with Random Pointer
- Detect and Remove Loop
- Flatten Linked List

6. Stack Algorithms

- Next Greater Element

- Next Smaller Element
- Stock Span Algorithm
- Largest Rectangle in Histogram
- Valid Parentheses
- Infix → Postfix / Prefix Conversion
- Expression Evaluation
- Min Stack / Max Stack
- Monotonic Stack

7. Queue & Deque Algorithms

- Sliding Window Maximum
- Circular Queue Algorithms
- Priority Queue Algorithms
- Deque-based Window Algorithms
- LRU Cache (Deque + HashMap)

8. Hashing Algorithms

- Direct Addressing
- Separate Chaining
- Open Addressing
- Linear Probing
- Quadratic Probing
- Double Hashing

- Rolling Hash
- Perfect Hashing

9. Recursion & Backtracking

- Tower of Hanoi
- Subset Generation
- Permutation Generation
- Combination Sum
- N-Queens
- Sudoku Solver
- Rat in a Maze
- Word Search
- Palindrome Partitioning
- Generate Parentheses
- Knight’s Tour

10. Tree Algorithms

Binary Tree

- Tree Traversals (Inorder, Preorder, Postorder)
- Level Order Traversal
- Diameter of Tree
- Height / Depth
- Lowest Common Ancestor (LCA)

- Boundary Traversal
- Vertical Order Traversal
- Zigzag Traversal
- Serialize & Deserialize Tree

Binary Search Tree (BST)

- Insert / Delete / Search
- Floor and Ceil
- Kth Smallest / Largest
- Validate BST
- Convert BST to Balanced BST

Advanced Trees

- AVL Tree
- Red-Black Tree
- B-Tree
- B+ Tree
- Segment Tree
- Fenwick Tree (Binary Indexed Tree)
- Trie
- Cartesian Tree
- Treap

11. Graph Algorithms

Traversal

- Breadth First Search (BFS)
- Depth First Search (DFS)

Shortest Path

- Dijkstra's Algorithm
- Bellman–Ford Algorithm
- Floyd–Warshall Algorithm
- Johnson's Algorithm
- 0-1 BFS

Minimum Spanning Tree

- Kruskal's Algorithm
- Prim's Algorithm

Connectivity & Components

- Union–Find (Disjoint Set Union)
- Connected Components
- Strongly Connected Components
    - Kosaraju's Algorithm
    - Tarjan's Algorithm

Cycle Detection

- Cycle Detection in Undirected Graph

- Cycle Detection in Directed Graph

Topological

- Topological Sort (Kahn's Algorithm)
- DFS-based Topological Sort

Flow & Matching

- Ford–Fulkerson
- Edmonds–Karp
- Dinic's Algorithm
- Bipartite Matching
- Hopcroft–Karp Algorithm

Other Graph Algorithms

- Articulation Points
- Bridges in Graph
- Euler Path & Circuit
- Hamiltonian Path
- Graph Coloring
- Shortest Path in DAG

12. Greedy Algorithms

- Activity Selection
- Fractional Knapsack

- Job Sequencing
- Huffman Coding
- Gas Station
- Minimum Platforms
- Interval Scheduling
- Candy Distribution

13. Dynamic Programming (DP)

Classic DP

- Fibonacci
- Climbing Stairs
- Coin Change
- Knapsack (0/1, Unbounded)
- Subset Sum
- Partition Equal Subset Sum

Sequence DP

- Longest Increasing Subsequence (LIS)
- Longest Decreasing Subsequence
- Edit Distance
- LCS
- Palindrome DP

Grid DP

- Unique Paths
- Minimum Path Sum
- Cherry Pickup
- Dungeon Game

Advanced DP

- Bitmask DP
- Digit DP
- DP on Trees
- DP on Graphs
- Matrix Chain Multiplication
- Egg Dropping
- Optimal BST

14. Divide and Conquer

- Merge Sort
- Quick Sort
- Binary Search
- Closest Pair of Points
- Karatsuba Algorithm
- Strassen’s Matrix Multiplication

15. Bit Manipulation Algorithms

- Bit Masking

- Brian Kernighan’s Algorithm
- XOR Tricks
- Power of Two Checks
- Subset Generation Using Bits
- Bitwise Sieve Techniques

16. Mathematical Algorithms

- Euclidean Algorithm (GCD)
- Extended Euclidean Algorithm
- Sieve of Eratosthenes
- Segmented Sieve
- Modular Exponentiation
- Modular Inverse
- Fast Exponentiation
- Chinese Remainder Theorem
- Prime Factorization
- Fibonacci (Matrix Exponentiation)

17. Geometry Algorithms

- Line Intersection
- Convex Hull
    - Graham Scan
    - Jarvis March

- Closest Pair of Points
- Point Inside Polygon
- Sweep Line Algorithm

18. Advanced / Specialized Algorithms

- Mo’s Algorithm
- Heavy Light Decomposition
- Centroid Decomposition
- KMP on Trees
- Persistent Data Structures
- Randomized Algorithms
- Bloom Filters
- Skip Lists

19. Amortized & Design Techniques

- Amortized Analysis
- Lazy Propagation
- Path Compression
- Union by Rank
- Caching Algorithms (LRU, LFU)

20. Competitive Programming Specific

- Offline Queries
- Coordinate Compression

- Meet in the Middle
- Two SAT
- Fast I/O Algorithms

How to use this list (important advice)

- **Interviews**: Master **Sorting, Searching, DP, Trees, Graphs, Greedy**
- **FAANG**: DP + Graphs + Trees + Sliding Window + Binary Search
- **Competitive Programming**: Graphs + Advanced DP + Math + Bitmask