Algorithm and Programming Technique list

Mathematics:

1. Prime finding(sieve), Prime Generation
2. Prime factorization
3. GCD, LCM
4. Factorial
5. Fibonacci
6. Counting, Permutation, combination
7. Exponentiation
8. Modular Arithmetic
9. Euclid, Extended Euclid

Data Structure:

1. Stack
2. Queue
3. Priority Queue
4. Linked list
5. Heap
6. Hash table
7. Disjoint Set, Union Find
8. Binary Search Tree
9. Tire, Suffix Array
10. Segmented Tree, Range minimum Query
11. Binary Indexed Tree(BIT)
12. Heavy light Decomposition

Sorting:

1. Bubble Sort
2. Selection Sort
3. Insertion Sort
4. Quick Sort
5. Merge Sort
6. Counting Sort
7. Radix Sort
8. Bucket Sort
9. Heap Sort

Searching:

1. Linear Search
2. Binary Search
3. Ternary Search
4. Map, Hash Map

Dynamic Programming:

1. Rod Cutting
2. Maximum Sum (1D, 2D)
3. Coin Change
4. Longest Common Subsequence
5. Longest Increasing subsequence, Longest Decreasing Subsequence
6. Matrix Chain multiplication
7. Edit Distance
8. Knapsack problem, 0-1 Knapsack
9. Bitmask DP
10. Traveling Salesman problem
11. Digit DP

Greedy Algorithm:

1. Activity selection/Task scheduling problem
2. Huffman coding

Graph Theory:

1. Graph Representation (matrix, list/vector)
2. Breadth First Search(BFS)
3. Depth First Search(DFS)
4. Topological Sort
5. Strongly Connected Component(SCC)
6. Minimum Spanning Tree (Kruskal, Prim)
7. All pair's shortest path (Floyd Warshall)
8. Djkastra algorithm
9. Bellman Ford Algorithm
10. Directed Acyclic Graph
11. Bipartite Matching
12. Max-Flow, Min-cost max-flow
13. Cayley's Theorem
14. Articulation Point, Bridge
15. Euler tour/path
16. Hamiltonian Cycle
17. Stable Marriage problem
18. Chinese Postman problem

Number Theory:

1. Josephus Problem
2. Farey Sequence
3. Euler's phi
4. Catalan numbers
5. Burnside's lemma/circular permutation
6. Modular inverse
7. Probability
8. Chinese Remainder Theorem
9. Gaussian Elimination method
10. Dilworth's Theorem
11. Matrix Exponentiation
12. Determinant of a matrix
13. RSA public key crypto System
14. GCD
15. LCM
16. Euler Totient

Computational Geometry:

1. Pick's Theorem
2. Convex hull
3. Line Intersection
4. Point in a polygon
5. Area of a polygon
6. Line Sweeping
7. Polygon intersection
8. Closest Pair
9. *Game Theory:*
10. Take Away game
11. Nim
12. Sprague-grundy Number
13. *String:*
14. Naive String matching
15. Rabin karp Algorithm
16. Finite Automata
17. Knuth-Marris-Pratt Algorithm
18. Manacher's Algorithm
19. Aho korasick's Algorithm
20. Boyer-Moore Algorithm

Others:

1. Recursion
2. C++ Standard Template Library(STL)
3. Backtracking
4. Hungarian Algorithm