**ALGEBRA**

**Fundamentals**

* Binary Exponentiation

**Prime numbers**

* Sieve of Eratosthenes
* Primality tests – Trial division
* Integer factorization

**Modular arithmetic**

* Modular inverse

**Miscellaneous**

* Enumerating submasks of a bitmask

### DATA STRUCTURES

**Trees**

* Disjoint set union
* Segment tree

### STRING PROCESSING

**Fundamentals**

* String Hashing
* Prefix function - Knuth-Morris-Pratt

### COMBINATORICS

**Fundamentals**

* Finding Power of Factorial Divisor
* Binomial Coefficients

**Techniques**

* The Inclusion-Exclusion Principle
* Stars and bars

**Tasks**

* Balanced bracket sequences

### NUMERICAL METHODS

**Search**

* Ternary Search

### GEOMETRY

**Elementary operations**

* Basic Geometry

### GRAPHS

**Graph traversal**

* Breadth First Search
* Depth First Search

**Connected components, bridges, articulations points**

* Finding connected components
* Finding bridges online
* Finding Articulation Points in O(N+M)
* Strongly connected components and Condensation graph
* Strong orientation

**Single-source shortest paths**

* Dijkstra - finding shortest paths from given vertex
* Dijkstra on sparse graphs
* Bellman-Ford - finding shortest paths with negative weights
* 0-1 BFS

**All-pairs shortest paths**

* Floyd-Warshall - finding all shortest paths

**Spanning trees**

* Minimum Spanning Tree - Prim's Algorithm
* Minimum Spanning Tree - Kruskal
* Minimum Spanning Tree - Kruskal with Disjoint Set Union

**Cycles**

* Checking a graph for acyclicity and finding a cycle in O(M)
* Finding a Negative Cycle in the Graph

**Lowest common ancestor**

* Lowest Common Ancestor
* Lowest Common Ancestor - Binary Lifting
* Lowest Common Ancestor - Farach-Colton and Bender algorithm

**Matchings and related problems**

* Bipartite Graph Check

**Miscellaneous**

* Topological Sorting

### MISCELLANEOUS

**Sequences**

* RMQ task (Range Minimum Query - the smallest element in an interval)
* Longest increasing subsequence
* Search the subsegment with the maximum/minimum sum

**Game Theory**

* Games on arbitrary graphs
* Sprague-Grundy theorem. Nim