

# Competitive Programming



Detailed  
Course Syllabus

## WEEK 01:

- **Introduction to Competitive Programming**  
- Understanding time complexity.
- **Introduction to Prefix Arrays**
- **Binary Search and Sorting Algorithms**  
Solving Problems on binary search and sorting.

## WEEK 02:

- **Introduction to Competitive Programming**  
Prime factorization in sqrt time complexity.
- **Introduction to Sieve Algorithm and its applications.**
- **Introduction to various exponentiation techniques**  
- Binary Exponentiation  
- Modular Exponentiation
- **Introduction to Fermat's theorem and Modular inverse.**
- **Introduction to Combinatorics and Bit Manipulation.**  
Solving problems on Combinatorics and Bit Manipulation

## WEEK 03:

- **Introduction to Stack, Queues, and Priority Queue**  
Solving Cp Problems based on Stack, Queues, and Priority Queues
- **Introduction to String Hashing Concepts**

## WEEK 04:

- **Introduction to Recursion.**
- **Basics of Advanced to Backtracking**

## WEEK 05:

- **Basics of Greedy Algorithm and Dynamic Programming**
- **Dynamic Programming**  
Solving Dp problems based on Knapsack  
Solving Dp Problems based on Combinatorics  
Solving Dp Problems based on Divide and Conquer.

## WEEK 06:

- **Dynamic Programming Continued**  
- Solving Dp Problems based on Digit Dp and Bitmask DP

## WEEK 07:

- **Basics Graphs and Trees**  
Representation of Graphs and Trees  
DFS and BFS Traversal of Graphs and Trees

## WEEK 08:

- Solving Problems based on Dp on trees
- Introduction to various Shortest Path Algorithms
- Applications of Shortest Path Algorithms and Solving Problems on the same.

## WEEK 09:

- **Introduction to Disjoint Set Union**  
Solving Problems based on DSU.
- **Introduction to Minimum Spanning Tree**  
Solving Problems based on MST
- **Introduction to Sparse tables and Lowest Common Ancestor**  
Solving Problems based on Sparse tables and LCA.

## WEEK 10:

- Introduction to Segment trees, Problems on Segment Trees.