

Programme Name	F.Y. B.Tech. (Common to all branches)
Course Code	
Course Title	C++ and Introduction to Competitive Programming

Course Outcomes

After completion of the Course, the student should be able to -

1. Understand fundamental C++ syntax, program structure, and control flow constructs.
2. Apply object-oriented programming principles to design modular and reusable C++ code.
3. Implement functions, classes, and STL basics to structure solutions to programming problems.
4. Analyse and solve algorithmic problems on platforms such as Codeforces, CodeChef, and LeetCode.
5. Apply logical, mathematical, and pattern-based reasoning to competitive programming problems.

Course Contents

Introduction to C++ (6 hours)

Structure of a C++ program, variables, data types, constants and operators, input-output operations, conditional statements and logical operators, loops and nested loops for number-based and pattern problems.

Object-Oriented Programming in C++ (6 hours)

Classes and objects, constructors and destructors, encapsulation, inheritance, polymorphism and abstraction, applying OOP concepts to structure problem-solving programs in C++.

Working with Classes and Functions (6 hours)

Functions, parameters and return values, scope and lifetime of variables, recursion, function overloading, arrays and strings, and STL basics used in competitive programming.

Introduction to Competitive Programming (6 hours)

Introduction to Codeforces, CodeChef and LeetCode, interpreting problem statements and constraints, time and space complexity basics, contest formats and rating systems, solving beginner-level implementation problems.

Patterns and Logical Thinking (6 hours)

Pattern generation problems, mathematical and logical reasoning for problem solving, brute-force and ad-hoc strategies, basic greedy thinking, dry-running and tracing program logic.

Total : 30 hours

Recommended Reading

1. The C++ Programming Language, Bjarne Stroustrup, 4th Edition, Addison-Wesley
2. Object-Oriented Programming with C++, E. Balagurusamy, 8th Edition, McGraw Hill
3. Competitive Programmer's Handbook, Antti Laaksonen
4. Introduction to Algorithms, T. H. Cormen, C. E. Leiserson, R. L. Rivest, C. Stein, MIT Press
5. Codeforces, CodeChef, and LeetCode - websites for Competitive Programming practice.