TECHNOCATION FREELANCING TRAINING INSTITUTE & SOFTWARE HOUSE

Professional C++ Programming Course Outline

Module 1: Introduction to C++

- History & Evolution of C++
- Features & Applications of C++
- Setting Up the Development Environment (IDE, Compilers)
- Writing & Running Your First C++ Program

Module 2: Basics of C++ Programming

- Data Types, Variables & Constants
- Operators (Arithmetic, Logical, Bitwise)
- Input & Output (cin, cout)
- Type Casting & Type Modifiers

Module 3: Control Flow & Functions

- Conditional Statements (if-else, switch-case)
- Loops (for, while, do-while)
- Functions & Function Prototypes
- Recursion & Inline Functions

Module 4: Arrays, Strings & Pointers

- One-Dimensional & Multi-Dimensional Arrays
- Working with Strings (String Functions, String Class)
- Understanding Pointers & Memory Addresses
- Pointer Arithmetic & Dynamic Memory Allocation (new, delete)

Module 5: Object-Oriented Programming (OOP) in C++

- Introduction to OOP & Its Principles
- Classes & Objects
- Constructors & Destructors
- Friend Functions & Static Members

Module 6: Inheritance & Polymorphism

- Types of Inheritance (Single, Multiple, Multilevel, Hybrid)
- Function Overloading & Overriding
- Virtual Functions & Pure Virtual Functions
- Abstract Classes & Interfaces

Module 7: Encapsulation & Data Abstraction

- Access Specifiers (Public, Private, Protected)
- Getters & Setters for Data Security
- Abstract Classes & Virtual Base Classes
- Implementing Encapsulation in Large Projects

Module 8: File Handling & Exception Handling

- File Operations (Read, Write, Append)
- Handling Binary & Text Files
- Exception Handling (try, catch, throw)
- Custom Exception Classes

Module 9: Standard Template Library (STL)

- Introduction to STL & Its Components
- Working with Vectors, Lists, and Deques
- Understanding Sets, Maps, and Multimaps
- Implementing Stacks & Queues

Module 10: Advanced C++ Concepts

- Smart Pointers & Memory Management
- Lambda Expressions & Function Objects
- Move Semantics & R-value References
- Multi-Threading & Concurrency

Module 11: Data Structures & Algorithms in C++

- Linked Lists, Stacks, and Queues

- Trees (Binary Tree, BST, AVL Tree)
- Graphs & Graph Algorithms (DFS, BFS, Dijkstra's)
- Sorting & Searching Algorithms

Module 12: C++ for Real-World Applications

- C++ for Game Development (SFML, Unreal Engine)
- C++ in System Programming & Embedded Systems
- Competitive Programming with C++
- Performance Optimization & Best Practices

Final Project & Certification Preparation

- Hands-on Project: Building a Complete C++ Application
- Debugging & Optimizing C++ Code
- Preparing for C++ Certification Exams (CPP Institute, Microsoft)
- Career Opportunities & Industry Best Practices