C++ Complete Roadmap 2025

Step 1. Introduction to C++ Programming

- Introduction to C++.

- History of C++.

- Installation and Setup of C++

- Application and Features of C++

- C vs C++

- C++ vs Java

- C++ vs C#.

- C++ vs Python

- Basic Structure of C++

- First Program of C++

- Compilers vs Interpreters

- Comments and New Line in C++

- cin and cout in C++

Step 2. Basic Concept of C++ Programming

Data Types in C++:

       Built-in Data Type.

       User-defined Data Type.

       Derived Data Type.

Tokens and its type:

       Keywords

       Identifiers

       Constants

       String

       Special Characters

Storage Classes in C++:

       Automatic

       External

       Static.

Register

Mutable.

Step 3. Operators in C++ Programming

Arithmetic Operators.

Relational Operators.

Logical Operators.

Bitwise Operators.

Assignment Operators.

Misc Operators.

Scope Resolution Operator.

Memory Management Operators.

Step 4. C++ Derived Concept

Reference and Dereference in C++

Type Conversion

Implicit

Explicit

Type Casting

Array in C++

Pointer in C++

Pointers vs References in C++.

Namespaces in C++

Wild Pointers in C++

Strings in C++.

Structure in C++

Union in C++

Enumeration in C++

Step 5. Control Structure in C++ Programming

Sequence structure (straight line paths).

Selection structure (one or many branches):

       If

       If Else

       Switch Statements

Loop structure (repetition of a set of activities):

       For loop

       While loop

       Do-while loop

Continue Statement

Break Statement.

Goto Statement.

Step 6. Function in C++ Programming

Types of Function

       Built-in Function

       User-defined Function

The Main Function.

Call by value

Call by reference

Recursion.

Inline Function

Formal and Actual Parameters

Step 7. OOPs Concept in C++ Programming

Classes and Objects

Access Specifiers:

       Public.

       Protected.

       Private.

Constructors in C++:

       Default Constructors

Parameterized Constructors

Copy Constructors

Destructors in C++

Inheritance in C++:

Single Inheritance.

Multiple Inheritance.

Multilevel Inheritance.

Hierarchical Inheritance.

Hybrid Inheritance.

Polymorphism in C++

Function Overloading in C++.

Operator Overloading in C++

Unary and Binary Operator Overloading

Function overriding in C++

Friend Function in C++

Virtual Function in C++

Pure Virtual Function in C++

Pointers to Derived Classes

Abstraction in C++:

Abstract Class.

Interfaces.

Step 8. File Handling in C++ Programming

Files and Streams in C++

Formatted and Unformatted I/O Operation

Dynamic Memory Allocation in C++

malloc() vs new in C++.

Opening and Closing a File.

Templates in C++

Class Templates

Function Templates

Step 9. Exception Handling & Multithreading in C++ Programming

Exception Handling in C++.

Signal Handling in C++

Try/catch.

Throwing Mechanism

Catching Mechanism.

Stack Unwinding

Multithreading in C++.

POSIX Threads

Step 10. Advance Concept in C++ Programming

C++ STL

Containers in C++

Vectors in C++

List

Stack

Queue.

Map

Multimap.

Bitset

Algorithm

C++ Iterators

Step 11. Top Header Files of C++ Programming

include<iostream>

include<climits>

include<cstring>

include<cmath>.

include<cstdio>

include<cctype>.

include<csignal>

include<map>

include<vector>

include<ctime>

Step 12. C++ Projects for Python Beginners

1. Student Management System in C++

2. Contact Management System in C++

3. Bank Management System in C++

4. Bus Reservation System in C++

5. Payroll Management System in C++