C Plus Plus Programmig

1. Introduction to C++

- History and features of C++
- Difference between C and C++
- Structure of a C++ program
- Compiling and running a C++ program

2. C++ Basics

- Tokens, keywords, identifiers
- Data types, variables, and constants
- Input/Output (`cin`, `cout`)
- Operators: Arithmetic, Relational, Logical, Assignment, Bitwise, etc.
- Type conversion

3. Control Structures

- Decision-making: `if`, `else if`, `switch`
- Loops: `for`, `while`, `do-while`
- Jump statements: `break`, `continue`, `goto`

4. Functions

- Defining and calling functions
- Function arguments and return values
- Function overloading
- Default arguments
- Inline functions
- Recursion

5. Arrays and Strings

- One-dimensional and multi-dimensional arrays
- Character arrays and string manipulation
- C++ string class (optional for beginners)

6. Pointers

- Pointer declaration and usage
- Pointer arithmetic

- Pointers and arrays
- Pointers to functions
- `new` and `delete` operators (Dynamic memory allocation)

7. Object-Oriented Programming (OOP)

- Basic concepts: Class, Object, Abstraction, Encapsulation, Inheritance, Polymorphism
- Defining classes and creating objects
- Access specifiers: public, private, protected
- Member functions (inside and outside the class)
- Constructors and destructors
- Static members

8. Inheritance

- Types: Single, Multiple, Multilevel, Hierarchical, Hybrid
- `protected` access
- Constructor behavior in inheritance

9. Polymorphism

- Function overloading
- Operator overloading
- Runtime polymorphism: Virtual functions and abstract classes
- `this` pointer
- Virtual destructor

10. File Handling

- File streams: `ifstream`, `ofstream`, `fstream`
- Opening, reading, writing, and closing files
- File modes and operations

11. Templates

- Function templates
- Class templates
- Introduction to Standard Template Library (STL) *(optional for basic syllabus)*