Modern C++ Language Syllabus

1. Introduction to C++

- History and evolution of C++
- Features of C++
- Structure of a C++ program
- Compiling and running a C++ program

2. Basics of C++ Programming

- Tokens, keywords, identifiers
- Data types and variables
- Input and Output (cin, cout)
- Operators and expressions
- Type conversions

3. Control Structures

- Decision making (if, if-else, switch)
- Loops (while, do-while, for)
- Nested loops
- Jump statements (break, continue, goto)

4. Functions in C++

- Function definition and declaration
- Function call and return
- Default arguments
- Function overloading
- Inline functions
- Recursion

5. Arrays and Strings

- Single and multidimensional arrays
- Array operations
- Character arrays and strings
- String manipulation functions

6. Pointers

- Pointer basics
- Pointer arithmetic
- Pointers and arrays
- Pointers and functions
- Pointers to pointers

7. Object-Oriented Programming (OOP) Concepts

- Introduction to OOP
- Classes and objects
- Encapsulation, Abstraction, Inheritance, Polymorphism
- Access specifiers (public, private, protected)

8. Classes and Objects in Detail

- Defining classes and creating objects
- Constructors and destructors
- Static members
- Friend functions and friend classes
- This pointer

9. Inheritance

- Types of inheritance
- Function overriding
- Virtual base classes
- Constructor invocation in inheritance

10. Polymorphism

- Compile-time vs Runtime polymorphism
- Function overloading and operator overloading
- Virtual functions and pure virtual functions
- Abstract classes

11. File Handling

- File streams
- Opening and closing files
- Read/write operations on files
- File modes and error handling

12. Templates and Exception Handling

- Function templates and class templates
- Standard Template Library (STL) basics
- Exception handling try, catch, throw

13. Advanced Topics (Optional)

- Namespaces
- Dynamic memory management (new/delete)
- Smart pointers
- Lambda expressions in C++11
- Move semantics and rvalue references