C++

1. Introduction to C++
- History of C++
- Difference between C and C++
- Structure of a C++ Program
- Compiling and Running a C++ Program

2. Basic Syntax
- Comments (single-line and multi-line)
- Data Types (int, char, float, double, bool)
- Variables and Constants
- Input/Output in C++ (cin, cout)
- Operators (Arithmetic, Relational, Logical, Assignment)

3. Control Structures
- Conditional Statements:
  - if, if-else, nested if
  - switch-case
- Loops:
  - for, while, do-while
- Break and Continue Statements

4. Functions
- Function Declaration, Definition, and Calling
- Passing Arguments (by value and by reference)
- Return Statement
- Function Overloading
- Recursion

5. Arrays and Strings
- Declaring and Initializing Arrays
- Accessing and Modifying Array Elements
- Multi-dimensional Arrays
- String Handling in C++ (using C-style strings and string class)

6. Pointers
- Pointer Basics
- Pointer Arithmetic
- Pointers and Arrays
- Pointers to Functions
- Dynamic Memory Allocation (new, delete)

7. Object-Oriented Programming (OOP) Concepts
- Classes and Objects
- Constructors and Destructors
- Access Modifiers (public, private, protected)
- Inheritance (Single and Multiple)
- Polymorphism (Function Overriding, Virtual Functions)
- Abstract Classes
- Friend Functions and Friend Classes

8. Operator Overloading
- Overloading Basic Operators (Arithmetic, Assignment, etc.)
- Overloading Input/Output Operators

9. File Handling
- Opening and Closing Files (ifstream, ofstream)
- Reading from and Writing to Files
- File Modes

10. Exception Handling
- Try, Catch, and Throw Statements
- Handling Multiple Exceptions
- Nested Exception Handling

11. Standard Template Library (STL) (Optional)
- Introduction to STL
- Containers (Vectors, Lists, Stacks, Queues, Maps)
- Iterators
- Algorithms (sort, search, etc.)

12. Advanced Topics (Optional)
- Templates (Function and Class Templates)
- Namespaces
- Lambda Expressions
- Smart Pointers (unique_ptr, shared_ptr)