C++ Syllabus

Basics of C++

- Introduction to C++
- Different paradigms of problem solving
- POP vs OOP
- Features of Object Oriented Programming Languages
    - Object
    - Class
    - Abstraction
    - Encapsulation
    - Inheritance
    - Polymorphism
    - Dynamic Binding
    - Message Communication
- Constants
- Variables
- Keywords
- Data types
- Declaration of Variables
- Output Stream (cout) & Manipulators
- Input Stream (cin)
- Comments
- Operators
    - Arithmetic operators
    - Relational operators
    - Logical operators
    - Assignment operators & compound assessment operations
    - Increment & decrement operators
    - Conditional operators
    - Bitwise operators
    - Shift operators
    - Type casting
    - Compound assignment operators
    - Address operators

    - Comma operator
    - Pointer operator
    - Sizeof operator
    - new operator
    - delete operator
    - .*
    - *::
    - ::
- Control Statements
- Conditional Control Statements
    - If, if-else
    - nested if-else, if-else-if ladder
- Multiple Branching Control Structure
    - switch-case
- Loop Control statements
    - while
    - do-while
    - for
- Nested Loops
- Jump Control structures
- break
- continue
- goto
- return
- Arrays
- Strings
- Structures
- Pointers
- Dynamic memory allocation using new and delete

Functions

- Defining a Function
- Calling a Function
- Return statement
- Function Prototype
- Basic Function Designs
- Scope

- Reference variables
- Recursion
- Parameter Passing Methods
    - Call by value
    - Call by address
    - Call by reference
- Function Overloading
- Default Arguments
- Inline Functions

Classes and Objects

- Defining a Class
- Creating Objects
- Access specifiers
- Accessing Class Members
- Scope Resolution Operator (::)
- Defining Member Functions
    - Outside the class
    - Inside the class
- Member function with argument
- This pointer
- Passing Objects as Arguments
- Returning Objects
- Array of objects
- Pointer to object
- Dynamic objects
- **Friend Functions**
- **Friend Class**
    - **Composition**
        - Container class
        - Contained class
    - Programs
    - Student Class
    - Employee Class
    - Complex Class
    - Matrix Class
    - Rational Class

    - Circle Class
    - Rectangle Class

Constructors & Destructors

- Constructors
- Properties of constructors
- Types of constructors
    - Default Constructors
    - Parameterized Constructors
    - Copy Constructors
- Constructor Overloading
- Constructors with Default Arguments
- Destructors
- Differences between Member functions & Constructors
- Differences between Constructors & Destructors
- Static Data Members
- Static member functions
- Constant data members
- Constant Member Functions

Operator Overloading

- Defining Operator Overloading Function
- Overloading Unary Operators
- Overloading Binary Operators
- Overloading Unary Operators using Friend Functions
- Overloading Binary Operators using Friend Functions
- Overloading << & >>
- Programs

Inheritance

- Class hierarchies
- Base classes
- Derived Classes
- Derived Class Definition
- Access specifier: protected
- Types of Inheritance & Programs

    - Single inheritance
    - Multiple inheritance
    - Hierarchical inheritance
    - Multi-level inheritance
    - Hybrid inheritance
    - Multi-path inheritance
- Constructors in Derived Classes
- Destructors in Derived Classes

Polymorphism and Virtual Functions

- Static Binding
- Dynamic Binding
- Virtual Destructor
- Function Overriding
- Accessing Members using Pointers
- Virtual Functions
- Pure Virtual Functions
- Abstract Classes
- Virtual Destructors

Templates

- Introduction
- Advantages
- Function Templates
- Over loading function template
- Class Templates
- Inheritance Class Templates

Exception Handling

- Types of Errors
- Benefits of exception handling
- try, catch, throw keywords
- Throwing an exception
- ‘try’ block
- Catching an exception
- Exception objects

- Rethrowing an exception
- Exception Handling Mechanism
- Catching all exceptions
- Nested try blocks

Files

- File Streams Classes
- Opening & Closing a File
- Detection End of File
- File Pointers & Their Manipulation
- Sequential Files
- Random Access Files

I-O Streams

- I-O stream Class hierarchies
- Unformatted I-O Operation
  - get(), put(), getline()
  - write()
  - in cout
  - cin
- Formatted I-O Operations
  - width(), precision()
  - fill(), setf()
  - unsetf()
- Manipulators
  - Manipulator operators
    - Endl, ends
  - manipulator functions
    - setw(), setfill()
    - setprecision()
    - setiosflags()
    - setbase()
    - resetiosflags()
  - User defined manipulators
  - Operator and Overloading

Standard Template Libraries

- Containers
- vector
- list, deque
- arrays
- forward_list
- queue
- priority_queue
- stack
- set, multiset
- map, multimap
- Algorithms
    - Sorting, Searching
    - Important STL Algorithms
    - Useful Array algorithms
    - Partition Operations
- Iterators