Course Description: This complete C++ professional course transforms beginners into skilled developers, covering fundamental to advanced concepts. Students master core C++ features, object-oriented design, memory management, templates, STL, and multithreading. Through hands-on projects mirroring real-world scenarios, participants learn to design and optimize complex applications. By completion, participants will be proficient in creating efficient, maintainable C++ code for diverse applications.

Professional C++ Programming

1. **Introduction to C++**
   - History and features of C++
   - Setting up a C++ development environment
   - Basic syntax and structure of a C++ program
2. **Fundamentals**
   - Data types and variables
   - Operators and expressions
   - Control structures (if, switch, loops)
   - Functions and function overloading
3. **Arrays and Strings**
   - Arrays and multidimensional arrays
   - C-style strings
   - std::string class
4. **Pointers and References**
   - Pointer basics
   - Dynamic memory allocation (new and delete)
   - References
5. **Object-Oriented Programming**
   - Classes and objects
   - Encapsulation
   - Inheritance
   - Polymorphism
6. **Advanced C++ Features**
   - Templates
   - Exception handling
   - Namespaces
   - Type casting

7. **Standard Template Library (STL)**

- Containers
- Iterators
- Algorithms
- Function objects

8. **File I/O and Streams**

- File handling
- Input/output streams

9. **Memory Management**

- Dynamic memory allocation
- Smart pointers
- RAII (Resource Acquisition Is Initialization)

10. **C++11/14/17 Features**

- Auto keyword
- Lambda expressions
- Move semantics
- Variadic templates

11. **Multithreading and Concurrency**

- Thread creation and management
- Synchronization primitives
- Atomic operations