2/4 B.Tech. FIRST SEMESTER

CS3T2 OBJECT ORIENTED PROGRAMMING THROUGH C++ Credits: 4

(Common to CSE & IT)

Required

Lecture: 4 periods/week **Internal assessment: 30 marks**

Tutorial: 1 period /week **Semester end examination: 70 marks**

Course context and Overview: This course provides in-depth coverage of object-oriented programming principles and techniques using C++. Topics include classes, overloading, data abstraction, information hiding, encapsulation, inheritance, polymorphism, file processing, templates, exceptions, container classes, and low-level language features.

Prerequisites: Basic C Language

Objectives:

1. Provide students with knowledge of a computer program structure, design, development/ implementation and testing.
2. Provide students with knowledge of object-oriented and generic programming concepts: objects, classes, inheritance, polymorphism, encapsulation, and type-independent algorithms.
3. Provide students with knowledge of lower level programming using pointers and memory management.
4. Provide students with knowledge of standard libraries, classes, and algorithms.

Learning Outcomes:

1. Understand the knowledge of the Object Oriented Programming concepts and development life cycle in C++.
2. Use stream I/O and File I/O in C++ programs.
3. Design simple graphical user interface.
4. Demonstrate the use of standard library functions.
5. Implement containers using STL.

UNIT – I

Introduction:

Programs, The Classic First Program, Compilation, Linking & Programming Environments, Objects, Types & Values, Computation, Objectives & Tools, Expressions, Statements, Functions, Vector & Language Features. Errors and Exceptions.

UNIT - II

Writing a Program: A Problem, Thinking about a Problem, Calculator Example, Grammars, Turning a Grammar into Code, First Version, Second Version, Token Streams, and Program Structure.

Completing a Program: Introduction, Input & Output, Error Handling, Negative Numbers, Reminder, Cleaning of the Code, Recovering from Errors and Variables.

UNIT – III

Technicalities (Functions, etc.,): Declarations and Definitions, Header Files, Scope, Function Call and Return, Order of Evaluation and Namespaces.

UNIT – IV
Classes:
User – Defined types, Classes and Members, Interface and Implementation, Evolving a Class, Enumerations, Operator Overloading, Class Interfaces and the Date class.

UNIT - V
Input & Output Streams: Input and Output, I/O Stream Model, Files, Opening a File,Reading and Writing a File, I/O Error Handling, Reading a Single Value, User-Defined Output Operators, User-Defined Input Operators, A Standard Input Loop and Reading a Structured File.

Customizing Input and Output: Regularity and Irregularity, Output Formatting, FileOpening and Positioning, String Streams, Line Oriented Input, Character Classification, Non Standard Separators.

UNIT – VI
Display Model:
Using a GUI Library, Coordinates, Shapes, Using Shape Primitives.

Graphics Classes, Graphics Class Design: Design Principles, Shape, Base and Derived Classes (Inheritance & Polymorphism) and Benefits of Object Oriented Programming.

UNIT - VII
Vector & Free Store: Introduction, Vector Basics, Memory, Addresses and Pointers, FreeStore and Pointers, Destructors, Access to Elements, Pointers to Class Objects, Messing with Types, Pointers and References, The *this* Pointer.

Vectors and Arrays: Introduction, Copying, Essential Operations, Access to VectorElements, Arrays and Examples.

UNIT –VIII
Vector, Templates, and Exceptions: The Problems, Changing Size, Templates, Range Checking and Exceptions, Resources and Exceptions. Containers and Iterators: Storing and Processing Data, STL Ideals, Sequences and Iterators, Linked Lists, Generalizing Vector, A Simple Text Editor, Vector, List and String, Adapting Vector to the STL, Adapting Built-in Arrays to the STL and Container Overview.

Learning Resources

Text Book:

1. Programming: Principles and Practice Using C++, 1st Edition (2009), Bjarne Stroustrup, Addison-Wesley (Pearson Education).

Reference Books:

1. C++ for Programmers, Paul J. Deitel, Harvey M. Deitel, Pearson Education, 2009