GUJARAT TECHNOLOGICAL UNIVERSITY

COMPUTER ENGINEERING (07), INFORMATION TECHNOLOGY (16) & INFORMATION & COMMUNICATION TECHNOLOGY (32)

OBJECT ORIENTED PROGRAMMING WITH C++
SUBJECT CODE: 2140705
B.E. 4th SEMESTER

Type of course: Core Course

Prerequisite: Programming Fundamentals

Rationale: The object oriented approach for software development has become the de-facto standard for the industry to develop the product based or customized software based on customer demand. The software libraries developed for various fields also follows the phenomena of object oriented development. The subject covers the basic concepts of the object oriented paradigm and popular object oriented programming language C++. The subject covers the basics of C++, objects and classes, Inheritance, Polymorphism, I/O and file management, and advance topics including templates, exceptions and STL (Standard Template Library).

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
L	T	P	C	Theory Marks			Practical Marks			
				ESE (E)	PA (M)		ESE (V)		PA (I)	
					PA	ALA	ESE	OEP		
4	0	4	8	70	20	10	20	10	20	150

Content:

Sr. No.	Topics	Teaching Hrs.	Module Weightage
1	**Concepts of OOP :** Introduction OOP, Procedural Vs. Object Oriented Programming, Principles of OOP, Benefits and applications of OOP	4	8%
2	**C++ Basics** : Overview, Program structure, namespace, identifiers, variables, constants, enum, operators, typecasting, control structures	6	10%
3	**C++ Functions :** Simple functions, Call and Return by reference, Inline functions, Macro Vs. Inline functions, Overloading of functions, default arguments, friend functions, virtual functions	6	12%
4	**Objects and Classes :** Basics of object and class in C++, Private and public members, static data and function members, constructors and their types, destructors, operator overloading, type conversion	8	15%
5	**Inheritance :** Concept of Inheritance, types of inheritance: single, multiple, multilevel, hierarchical, hybrid, protected members, overriding, virtual base class	8	15%
6	**Polymorphism :** Pointers in C++, Pointes and Objects, this pointer, virtual and pure virtual functions, Implementing polymorphism	6	10%
7	**I/O and File Management :** Concept of streams, cin and cout objects, C++ stream classes, Unformatted and formatted I/O, manipulators, File stream, C++ File stream classes, File management functions, File modes, Binary and random Files	8	15%
8	**Templates, Exceptions and STL :** What is template? function templates and class templates, Introduction to exception, try-catch-throw, multiple catch, catch all, rethrowing exception, implementing	8	15%

	user defined exceptions, Overview and use of Standard Template Library		

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks				
R Level	U Level	A Level	N Level	E Level
14	24	24	4	4

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

1. Object Oriented Programming With C++, E Balagurusamy, TMH
2. C++ Programming, Black Book, Steven Holzner, dreamtech
3. Object Oriented Programming in Turbo C++, Robert Lafore, Galgotia
4. Object Oriented Programming with ANSI and Turbo C++, Ashok Kamthane, Pearson
5. The Compete Reference C++, Herbert Schlitz, TMH
6. C++ and Object Oriented Programming Paradigm, PHI
7. C++ : How to Program, 9th Edition, Deitel and Deitel, PHI
8. Object Oriented Programming with C++, Saurav Sahay, Oxford

Course Outcome:

After learning the course the students should be able to:
- Describe the important concepts of object oriented programming like object and class, Encapsulation, inheritance and polymorphism
- Write the skeleton of C++ program.
- Write the simple C++ programs using the variables, operators, control structures, functions and I/O objects cin and cout
- Write the simple object oriented programs in C++ using objects and classes.
- Use features of C++ like type conversion, inheritance, polymorphism, I/O streams and files to develop programs for real life problems.
- Use advance features like temples and exception to make programs supporting reusability and sophistication.
- Use standard template library for faster development.
- Develop the applications using object oriented programming with C++.

List of Experiments:

Practical list should be based on the topics covered. Following guideline is to be kept in mind while framing the list:

- At least 25 programs are to be assigned
- Programs should cover particular feature from syntactic concepts together with OOP feature and definition based on real life problem.
- Practical list should cover entire syllabus.

Design based Problems (DP)/Open Ended Problem:

1. Develop an object oriented application to perform all the basic operations like insert, delete, search on binary tree.
2. Develop an object oriented application to compute the Income-tax for the salaried person.
3. Develop an object oriented system "Visiting Card Management" which allows user to add, delete and update and search the visiting card details.
4. Develop an object oriented system "Student Attendance Management" for recording and analyzing the student attendance.
5. Develop a library for performing various Matrix operations. Use templates to make them generalized for any data type.

Major Equipment:
- Latest Desktop PCs with any C++ compiler

List of Open Source Software/learning website:
- Open source software dev C++
- www.nptel.ac.in
- www.learncpp.com

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to GTU.