

GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT**COURSE CURRICULUM
COURSE TITLE: OBJECT ORIENTED PROGRAMMING
(Code:3341602)**

Diploma Programme in which this course is offered	Semester in which offered
Information Technology	4 th Semester

1. RATIONALE

Large programs are very complex to write and to understand and prone to errors which can prove to be expensive in software development and maintenance process. Object-oriented programming offers a powerful way to cope with this complexity. Its goal is to develop clearer, more reliable, more easily maintained programs.

This course is designed to help students developing the basic understanding of object oriented paradigm and its advantages. By the end of this course, students will be able to understand the Object Oriented Programming and able to write C++ programs using the Object oriented design, and use the standard C++ library. The programming skills thus acquired using C++ language can be used in developing programs for the scientific, and business purposes. This course may also act as backbone to all other courses that are based on Object Oriented concept.

2. COMPETENCY

The course content should be taught and implemented with the aim to develop different types of skills so that students are able to acquire following competency:

- **Design and Develop program following Object Oriented concept in C++ to solve given problem.**

3. COURSE OUTCOMES

The theory should be taught and practical should be carried out in such a manner that students are able to acquire different learning outcomes in cognitive, psychomotor and affective domain to demonstrate following course outcomes.

- Explain Object Oriented Programming concepts.
- Use the basic programming constructs of C++
- Apply object-oriented approaches to software problems in C++
- Develop small scale programs in 'C++'.
- Debug and fix common errors in C++ programs

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	ESE	PA	ESE	PA	200
3	0	4	7	70	30	40	60	

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P - Practical; C - Credit; ESE - End Semester Examination; PA - Progressive Assessment

5. COURSE DETAILS

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Unit – I Introduction of object oriented programming	1a.Explain concepts of Object oriented Paradigm and Object Oriented programming	1.1 Introduction of Object Oriented Design 1.2 Object oriented programming and procedure oriented programming 1.3 Basic concept of Object oriented programming 1.4 Advantages of Object oriented programming 1.5 Application of Object oriented programming
	1b. Explain Basic of C++ programme	1.6 Basic structure of C++ 1.7 Library files in C++ 1.6.1 ios, conio, math, stdlib 1.8 Input /Output operators
	1c.Use C++ Data types and Variables	1.9 Data types 1.8.1 Basic data type 1.8.2 User defined data type 1.8.3 Derived data type 1.10 Declaration of variable with memory concept 1.11 Variables 1.10.1 Reference variable 1.10.2 Dynamic variable
	1d. Use different types of operators in C++	1.12 Basic operators in C++ 1.13 Scope resolution operator 1.14 Memory management operator and manipulators 1.15 Memory reference operator 1.16 Type casting
Unit – II Class and Object	2a. Explain concept of class and object	2.1 Difference between class and structure 2.2 Implementation of class 2.3 Creating object of class 2.4 Memory allocation for object 2.5 Data member and member function

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
		2.6 Access modifier 2.6.1 Public 2.6.2 Private 2.6.3 Protected 2.7 Static data member and function 2.8 Array of object 2.9 'this' keyword 2.10 Namespaces
	2b. Use Functions in C++	2.11 Function Return type 2.12 Function prototype 2.13 Call by value 2.14 Call by reference 2.15 Call by address 2.16 Different types of function 2.16.1 Inline function 2.16.2 Recursive function 2.16.3 Friend function 2.17 Types of argument 2.17.1 Default argument 2.17.2 Constant value as a argument
Unit – III Constructor and destructor	3a. Use constructor and destructor	3.1 Constructor with its characteristic 3.2 Types of constructor 3.2.1 Parameterized constructor 3.2.2 Copy constructor 3.4 Implement destructor 3.5 Comparison between constructor and destructor
Unit – IV Inheritance	4a. Use Inheritance to create re-usable codes in C++	4.1 Concept of Inheritance 4.2 Utilities of Inheritance 4.3 Declaration of inheritance 4.4 Protected Access Specifier 4.5 Types of inheritance 4.5.1 Single Inheritance 4.5.2 Multiple Inheritance 4.5.3 Multi level Inheritance 4.5.4 Hirerchical Inheritance 4.5.5 Hybrid Inheritance 4.6 Function overridding
	4b Create and use abstract class	4.7 Concept of constructor in sub class 4.8 Virtual base class 4.9 Abstract class
Unit – V	5a. Understand	5.1 Concept of polymorphism

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Polymorphism and Virtual function	Polymorphism	5.2 Use of polymorphism 5.3 Types of polymorphism 5.3.1 Function overloading 5.3.2 Operator overloading
	5b. Describe the Virtual function	5.4 Utility of Virtual function 5.5 Virtual function characteristics 5.6 Pure virtual function.
Unit – VI Managing Input/Output Stream	6a. Use file stream in C++	6.1 File stream classes 6.2 Formatted Input/Output operations 6.3 Unformatted Input/Output operations 6.4 Managing output with manipulators

6. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (THEORY)

Unit	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Introduction of object oriented programming	11	4	8	2	14
II	Class and Object	8	2	4	8	14
III	Constructor and destructor	4	2	2	4	08
IV	Inheritance	8	4	4	8	16
V	Polymorphism and Virtual function	7	2	4	4	10
VI	Managing Input /Output stream	4	2	2	4	08
Total		42	16	24	30	70

Legends: R = Remember; U = Understand; A = Apply and above levels (Bloom's revised 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.

7. SUGGESTED LIST OF EXERCISES/PRACTICAL

The practical/exercises should be properly designed and implemented with an attempt to develop different types of skills (**outcomes in psychomotor and affective domain**) so that students are able to acquire the competencies/programme outcomes. Following is the list of practical exercises for guidance.

*Note: Here only outcomes in psychomotor domain are listed as practical/exercises. However, if these practical/exercises are completed appropriately, they would also lead to development of certain outcomes in affective domain which would in turn lead to development of **Course Outcomes** related to affective domain. Thus over all development of **Programme Outcomes** (as given in a common list at the beginning of curriculum document for this programme) would be assured.*

Faculty should refer to that common list and should ensure that students also acquire outcomes in affective domain which are required for overall achievement of Programme Outcomes/Course Outcomes.

Sr. No.	Unit No.	Practical/Exercise (outcomes in psychomotor domain)	Apprx. Hrs. Required
1	I	Develop programs using Input/Output operators.	2
2	I	Develop programs using Control structure.	4
3	I	Develop programs using array of object.	4
4	II	Develop programs using call by value ,call by reference and function overloading	4
5	II	Develop programs on default arguments, constant arguments	4
6	II	Develop programs on function overloading	4
7	II	Develop programs using different classes such as student, distance, shape, employee, feet, time, data etc. with data member & member functions.	4
8	II	Develop Programs using array of objects and static member functions.	4
9	II	Develop programs using Friend function.	2
10	III	Develop programs using various types of constructors and destructor.	4
11	IV	Develop programs using single, multilevel, multiple Inheritance	2
12	IV	Develop programs using inheritance and constructors.	2
13	IV	Develop programs using Virtual base class.	2
14	V	Develop programs using 'this' key word.	4
15	V	Develop programs using virtual function.	2
16	VI	Develop programs using unformatted input/output functions.	4
17	VI	Develop programs using formatted input/output functions.	4
Total Hours			56

8. SUGGESTED LIST OF STUDENT ACTIVITIES

Following is the list of proposed student activities such as:

- i. Develop program with real life applications
- ii. Develop Mini Projects

9. SPECIAL INSTRUCTIONAL STRATEGIES (if any)

Supervised Practical Exercises should be carried out as above and student group size should be as minimum as possible for effective learning.

10. SUGGESTED LEARNING RESOURCES

(A) List of Books:

Sr.No.	Title of Books	Author	Publication
1	Object Oriented Programming with C++ (Second edition)	Sourav Sahay	Oxford
2	Object Oriented Programming with C++	E.Balagurusamy	McGrawHill
3	Object Oriented Programming in C++	Robert Lafore	SAMS
4	Mastering C++	Venugopal	Tata McGrawHill
5	Programming in c++	Ashok Kamthane	Pearson

(B) List of Major Equipment/Materials with Major Specifications.

Hardware : Desktop Computer P-IV processor or higher

Software : Turbo C++/ Borland C++/ any other C++ compiler with integrated GUI Environment.

(C) List of Learning Websites.

- i. C++ Fundamentals:<http://www.oupinheonline.com>
- ii. C++ Tutorials:
http://www.tutorialspoint.com/cplusplus/cpp_overview.htm
- iii. Video tutorials :
<http://nptel.iitm.ac.in/video.php?subjectId=106106093>

11. COURSE CURRICULUM DEVELOPMENT COMMITTEE

Faculty Members from Polytechnics

- **Prof. Priti.N.Parikh**, Lecturer (I.T), Government Polytechnic,Ahmedabad
- **Prof. Sandeep Modi**, Lecturer (I.T), K.P.T.I.T. Sokali

Coordinator and Faculty Members from NITTTR Bhopal

- **Dr. Priyanka Tripathi**, Associate Professor, Dept. of Computer Engineering and Applications.
- **Dr. R. K. Kapoor**, Associate Professor, Dept. of Computer Engineering and Applications.