Semester: III

Subject Name: Object Oriented Programming with C++

Subject Code: 09CE2301

Objective: The objective of course is to develop programming skills of students, using object oriented programming concepts, learn the concept of class and object using C++ and develop classes for simple applications.

Credits Earned: 5 Credits

Course Outcomes: After completion of this course, student will be able to

- Identify importance of object oriented programming and difference between structured oriented and object oriented programming features.
- Able to make use of objects and classes for developing programs.
- Able to use various object oriented concepts to solve different problems.

Pre-requisite of course: Programming Fundamentals

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE	IA	CSE	Viva	Term work	
3	0	4	5	50	30	20	25	25	150

Contents:

Unit	Topics	Contact Hours
1	**Introduction to Object Oriented Concepts** Concept of Object Oriented Programming, Characteristics of Object Oriented Programming, Object oriented programming vs procedure programming, Pros of OOP, Applications of OOP	3
2	**Programming Basics** Introduction to C++ programming, C++ basic structure, Using I/O Operators, Directives, end1 Manipulator, setw manipulator, Library Functions	4
3	**Functions** Passing argument and returning values from function, Call and return by reference, Inline functions, Default and const function arguments, concept of function overloading and Friend Function	5
4	**Classes and Objects** Revisited structure in C, Limitation of Structure in C, Introduction to Class, Scope of class and accessing members of class, Class Object, Constructors, types of constructors, Destructors	6
5	**Inheritance** Introduction to Inheritance, Derived Class, Levels of Inheritance, Class Hierarchies Multiple Inheritance, Hybrid Inheritance, Abstract class and Virtual base class	4
6	**Virtual Functions and polymorphism** Concept of objects and pointers, Virtual Functions and Pure Virtual Functions ,this pointer, Virtual Constructor and destructors	4
7	**Streams** Concept of Stream, C++ Stream Classes, Formatted and unformatted I/O operations, Manipulators	2
	Total Hours	**28**

References:

1. Object Oriented Programming with C++ by E Balagurusamy, 2001, Tata McGraw-Hill
2. Object Oriented Programming in Turbo C++ by Robert Lafore , 1994, The WAITE Group Press.
3. Compete Reference C++, Herbert Schlitz, TMH

Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
35%	35%	30%	0%	0%	0%

Suggested List of Experiments:

1. Write a program to prints numbers, alphabets and special characters on the output screen.

2. Write a program to that accept age in years from user as input and displays his age in months and days.

3. Write a program that demonstrate the use of arithmetic and assignment operators by getting two numbers from user.

4. Write a program that to calculate area of circle, square, rectangle and triangle using switch-case statements

5. Write a program to that accepts number from user and displays all the factors of that number.

6. Write a program that accepts a number from keyboard and find its factorial.

7. Write a program that accepts 9 numbers in form of matrix and display transpose of that matrix.

8. Write a program to count number of words in a sentence.

9. Write a program to create structure of book which contains book title, author name, publication and price as its members and displays book records for n books.

10. Write a program which accepts value of base and power from user and displays its value (base^ power) using UDF.

11. Write a program which should work like a strlen function using UDF.

12. Write a program that demonstrate the basic class program to get department, name and salary of an employee.

13. Create a class **"Bank_Account"** that contains Depositor_Name , Acc_No , Acc_type ,Balance as its data members. Also create member functions for account creation, deposit, withdraw and balance inquiry for class. Demonstrate its use in main.

14. Define a class **"Time"** that contains following data members and member functions.

    Data members:

    1. Hours
    2. Minutes
    3. Seconds

    Member Functions:

    1. To get time from user
    2. To display time on the screen
    3. To calculate sum of two time objects

    Write a program that can read values of Time for two objects **T1** and **T2**, calculate sum and display sum using defined member functions

15. Create class **"Sales"** having following data members and member functions:

    Data Members:

    1. Name of Salesman
    2. Sales of Salesman

    Member functions to calculate commission

    1. Commission is Rs. 10 per thousand if sales are at least Rs. 25000 or more
    2. Commission is Rs. 5 otherwise

    Write a program that calculate and print name and sales of salesman.

16. Write a program to count number objects created for particular class using constructor.

17. Create class **"Person"** having a two data members as person name and nationality. Also create two constructors for this class in which one has two arguments and second has one argument.

18. Write a program to declare two classes, each one have one int data member. Find the sum of data members of both classes using friend function. Create suitable objects and functions

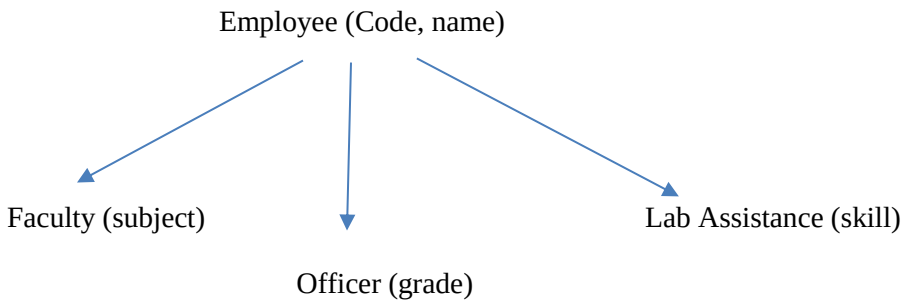
19. Create Class **"Circle"** having radius as data member, constructor and member function to calculate area of circle. Class should overload = = operator to compare two circle objects whether they are equal in radius.

20. Implement following class relationship and test with main class.

Vehicle

1. Two-Wheeler
   a. Bike
   b. Bicycle
2. Four-Wheeler
   a. Car
   b. Truck
   c. Taxi

21. Implement the following class relationship with main class.



22. Define two classes **"12 HH"** and **"24 HH"** to represent time. Write a program to convert one time format to another using **type conversion** concept.

Instructional Method:

a. The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

b. The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.

c. Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.

d. Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory.

Supplementary Resources:

1. Open source software dev C++
2. www.learncpp.com

3. www.nptel.ac.in