COURSE TITLE	**OBJECT ORIENTED PROGRAMMING WITH C++**
COURSE CODE	**09CE3301**
COURSE CREDITS	**5**

Objective:

1 The objective of this course is to enhance the programming abilities of students by introducing the fundamental concepts of Object-Oriented Programming using C++. It aims to help students understand classes and objects and apply these concepts to design and develop simple object-oriented applications.

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

1 Apply the concepts of Object-Oriented Programming to differentiate procedural and object-oriented approaches in program design.

2 Use C++ programming constructs such as variables, control structures, namespaces and I/O operations to develop basic programs.

3 Implement functions, classes and objects in C++ programs using concepts like function overloading, inline functions and friend functions.

4 Apply constructors and destructors to initialize and manage objects in C++ applications.

5 Use inheritance concepts to design derived classes and demonstrate different types of inheritance.

6 Implement polymorphism, virtual functions and file handling techniques to develop object-oriented C++ applications.

Pre-requisite of course: Basic of C Language.

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
3	0	4	50	30	20	25	25

Contents : Unit	Topics	Contact Hours
1	**Introduction to Object Oriented Concepts** Concept of Object-Oriented Programming, Applications of Object-Oriented Programming, Characteristics of Object-Oriented Programming, Object-Oriented Programming vs Procedure Programming , Pros of OOP	4
2	**Programming Basics** Introduction to C++ programming, Basic structure of C++, Namespace , Directives, Using I/O Operators , Manipulators, Variables, Control Structure	6

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Contents : Unit	Topics	Contact Hours
3	**Classes, Objects and Functions** Introduction to Class, Scope of class and accessing members of class, Class Object, Function Prototype , Function Calling, Call and return by reference, Inline functions , Default and const function arguments, Function overloading, Function overriding, Virtual Function, Friend Function	10
4	**Constructor and Destructor** Define Constructor, Types of Constructors: Default constructor, Parameterized constructor, Copy constructor, Dynamic Constructor Destructor	4
5	**Inheritance** Introduction to Inheritance, Derived Class, Types of Inheritance: Single, Multi-level, Multiple, Hierarchical, Hybrid Inheritance, Abstract class and Virtual base class	6
6	**Virtual Functions and polymorphism** Concept of objects and pointers, this pointer, Virtual Functions, Pure Virtual Functions, Types of Polymorphism , Advantages of Polymorphism, Implementing polymorphism	6
7	**Streams and File Management** Concept of Stream, C++ Stream Classes, Formatted and unformatted I/O operations, File stream , C++ File stream classes, File management functions , File modes, Binary and random files , Exception handling	6
Total Hours		**42**

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	**Practical-1** Write a program to print numbers, alphabets and special characters on the output screen.	2
2	**Practica-2** Write a program to check whether a number is even or odd.	2
3	**Practical-3** Write a program that accept age in years from user and display age in months and days.	2
4	**Practical-4** Write a program to check whether a number is palindrome or not.	2
5	**Practical-5** Write a program that demonstrate the use of arithmetic and assignment operators by getting two numbers from user.	2
6	**Practical-6** Write a program to calculate area of circle, square, rectangle and triangle using switch-case statements.	2

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Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
7	**Practical-7** Write a program that accept number from user and display all factors of that number.	2
8	**Practical-8** Write a program that accept number and find factorial.	2
9	**Practical-9** Write a program that accept 9 numbers in matrix and display transpose of matrix.	2
10	**Practical-10** Write a program to count number of words in a sentence.	2
11	**Practical-11** Write a program to create structure of book (Title, Author, Publication, Price) and display records for N books.	2
12	**Practical-12** Write a program for doing arithmetic operations using function that program includes the following functions – Addition, Subtraction, Multiplication, Division and Modulus.	2
13	**Practical-13** Write a program to find GCD of two numbers using function.	2
14	**Practical-14** Write a program to convert Fahrenheit to centigrade and centigrade to Fahrenheit using function.	2
15	**Practical-15** Write a program to create a class `Bank_Account` with data members Depositor_Name, Acc_No, Acc_Type, and Balance, and implement member functions for account creation, deposit, withdrawal, and balance inquiry.	2
16	**Practical-16** Write a program to create a class Sales that stores salesman name and sales amount, and calculates commission as Rs. 10 per thousand for sales = 25000 and Rs. 5 per thousand otherwise, then displays the result	2
17	**Practical-17** Define class Time containing following: 1. Data Members like: Hours, Minutes and Seconds. 2. Member Functions like: Get time, Display time and perform Sum of two time objects.	2
18	**Practical-18** Write a program to calculate Volume of Box using Constructor.	2
19	**Practical-19** Create class Person having: 1.Name 2.Nationality and also create a Constructors like : 1. One constructor with two arguments 2. One constructor with one argument	2
20	**Practical-20** Write a program to demonstrate the concept of Destructor.	2

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Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
21	**Practical-21** Write a program for Enter Patient details using Inheritance.	3
22	**Practical-22** Write a program to show access to Private Public and Protected using Inheritance.	3
23	**Practical-23** Write a program to declare two classes each having one integer data member and find sum using friend function.	2
24	**Practical-24** Define two classes 12 HH and 24 HH to represent time and convert one format to another using type conversion concept.	2
25	**Practical-25** Write a C++ Program to Demonstrate try, catch block using exception handling.	3
26	**Practical-26** Write a program to Read and Write File Operation in File Handling.	3
Total Hours		**56**

Textbook :

1 Beginning C++20: From Novice to Professional, Ivor Horton , Peter Van weert, Apress, 2021

2 Object-Oriented Programming with C++ , 8th Edition, E. Balagurusamy, Tata McGraw Hill, 2021

References:

1 Programming: Principles and Practice Using C++ ,3rd Edition, Programming: Principles and Practice Using C++ ,3rd Edition, Bjarne Stroustrup, Addison-Wesley Professional, 2024

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as 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 / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking / Creative
0.00	0.00	35.00	35.00	30.00	0.00

Instructional Method:

1 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.

Instructional Method:

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

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

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

Supplementary Resources:

1 https://www.learncpp.com/

2 https://cplusplus.com/doc/tutorial/polymorphism/

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