

**0944 - DIPLOMA IN INFORMATION TECHNOLOGY & ENGINEERING**  
**SEMESTER -IV**  
**094441 - OBJECT ORIENTED PROGRAMMING USING C++**

**RATIONALE**

Object orientation is a new approach to understand the complexities of the real world. In contrast to the earlier approaches like procedural etc, object orientation helps to formulate the problems in a better way giving high reliability, adaptability and extensibility to the applications. The students are already familiar with this concept of programming in C which is the basic for C++. This course offers the modern programming language C++ that shall help the students to implement the various concept of object orientation practically. The students will be able to programme in the object oriented technology with the usage of C++.

**DETAILED CONTENTS**

**1. Introduction and Features**

- 1.1 Fundamentals of object oriented programming – procedure oriented programming Vs. object oriented programming (OOP)
- 1.2 Object oriented programming concepts – Classes, reusability, encapsulation, inheritance, polymorphism, dynamic binding, message passing

**2. Language Constructs**

Review of constructs of C used in C++ : variables, types and type declarations, user defined data types; increment and decrement operators, relational and logical operators; if then else clause; conditional expressions, input and output statement, loops, switch case, arrays, structure, unions, functions, pointers; preprocessor directives

**3. Classes and Objects**

- 3.1 Creation, accessing class members
- 3.2 Private Vs Public
- 3.3 Constructor and Destructor
- 3.4 Objects

**4. Member Functions**

- 4.1 Method definition
- 4.2 Inline Implementation
- 4.3 Constant member functions

**5. Overloading Member Functions**

Need of operator overloading, prefix and postfix, overloading binary operators, operator overloading, instream/outstream operator overloading

**6. Inheritance**

Definition of inheritance, protected data, private data, public data, inheriting constructors and destructors, constructor for virtual base classes, constructors and destructors of

derived classes, and virtual functions, size of a derived class, order of invocation, types of inheritance, single inheritance, hierarchical inheritance, multiple inheritance, hybrid inheritance

## 7. Polymorphism and Virtual Functions

Importance of virtual function, function call binding, virtual functions, implementing late binding, need for virtual functions, abstract base classes and pure virtual functions, virtual destructors

## 8. File and Streams

Components of a file, different operation of the file, communication in files, creation of file streams, stream classes, header files, updating of file, opening and closing a file, file pointers and their manipulations, functions manipulation of file pointers, detecting end-of-file.

## LIST OF PRACTICALS

1. Write a function using variables as arguments to swap the values of a pair of integers
2. An election is contested by five candidates. The candidates are numbered 1 to 5 & voting is done by marking the candidate number on the ballot paper. Write a program to read the ballot & count the votes cast for each candidate using an array, variable count. In case, a number read is outside the range 1 to 5, the ballot should be considered as a 'spoilt ballot' and the program should also count the number of spoilt ballot.
3. Write a program to read a matrix of size  $m \times n$  from the keyboard and display the same on the screen.
4. Write a macro that obtains the largest of three numbers.
5. As in practical 4, using inline function. Test the function using the main program.
6. Define a class to represent a bank account including the following members:-  
Data members
  - a) Name of the depositors
  - b) Account number
  - c) Type of accountBalance amount in the account  
Member function
  - To assign initial values
  - To deposit an amount
  
  - To withdraw an amount after checking the balance
  - To display the name and balance.
7. Modify the class and the program of practical 6 for handling 10 customers.
8. Create 2 classes OM and DB which store the value of distance. OM stores distances in meters and cm and DB in feet and inches. Write a program that can read values for the class objects and add 1 object OM with another object of DB. .  
Use a friend function to carry out the addition operation the object that stores the results may be a DM object or a DB object, depending upon the units in which the results are required. The display should be in the format of feet and inches or meters and cms depending on the object on display.
9. A book shop maintains the inventory of books that are being sold at the shop the list includes details such as author, title and publisher and stock position. Whenever a customer wants the book, the sales person inputs the title and author and the system

search the list and display whether it is available or not. If it is not, an appropriate message is displayed, if it is, then the system displays the book details and requests for the number of copies required. If the requested are available, the total cost of the required copies is displayed; otherwise the message "Required copies not in stock" is displayed. Design a system using a class called books with suitable member functions and constructors. Use new operator in constructor to allocate memory space required.

10. Define a class string that could work as a user-defined string type include constructors that will enable us to create an uninitialized string  
 String s1; // string with length 0  
 And also to initialize an object with string constant at the time of creation like  
 String s2("well done");  
 Include a function that adds two strings to make a third string.
11. Create a class float that contains 2 float data member. Overload all the 4 arithmetic operators so that they operate on the objects of float.
12. Create a class MAT of size m\*n. Define all possible matrix operations for MAT type objects
13. Define 2 classes POLAR and RECTANGLE to represent points in the POLAR and RECTANGLE systems. Use conversion routines to convert from one system to the other.
14. Create a base class called shape use this class to store two double type values that could be used to compute the area of fig. Derive the specific class called TRIANGLE and RECTANGLE from the data shape. Add to base class, a member function get - data () to initialize base class data members and another member and another member function display - area () to compute and display the area of the fig.. Make display - area () as a virtual function and redefine function in the derived classes to suit their requirements, Using these 3 classes design a program that will accept dimension of RECTANGLE or TRIANGLE interactively and display the area.  
 Remember the 2 values given as input will be treated as length of 2 sides in the case of rectangle and as base and height in the case of triangles and used as follows:  
 Area of rectangle = x\*y  
 Area of triangle = 1/2 \*x\*y
15. Exercise on file handling
- 16.

## RECOMMENDED BOOKS

1. C++: An introduction to programming by Jense Liberty Tim Keogh: BPB Publications, New Delhi
2. OO Programming in C++ by Robert Lafore: , Galgotia Publications Pvt. Ltd., Daryaganj, New Delhi
3. Object Oriented Programming Using C++, Sanjeev Sofat, Cyber Tech. Publication, New Delhi
4. Object Oriented Programming in C++ by E. Balaguruswamy, TMH Publishing Co. Ltd., New Delhi
5. C++ Primer by Stephen Parata , TMH Publishing Co. Ltd., New Delhi
6. C++ Primer by SB Lippman and J Lajoie; Addison Wesley (Singapore) Pvt. Ltd., New Delhi
7. Mastering C++ by KR Venugopal and Rajkumar, T Ravishankar; Tata McGraw Hill Publishing Co. Ltd., New Delhi
8. Object Oriented Data Structuring using C++ by KS Easwarakumar; Vikas Publishing House Pvt. Ltd., New Delhi

9. Programming in C and C++ by SS Khandare; S Chand and Company Ltd. New Delhi
10. Object Oriented Programming using C++ by B Chandra, Narosa Publishing House Pvt Ltd., Daryaganj, New Delhi 110002
11. Object Oriented Programming using C++ by R Rajaram , New age International (P) Ltd, Publishers New Delhi
12. . Programming in C++ by N Dale, C. Weems and Headington, Narosa Publishing House Pvt Ltd., Daryaganj, New Delhi 110002