**END-SEMESTER EXAMINATION, May-2024**

# Object-Oriented Programming with C++
# (CSE 3943)

**Programme: B.Tech(CSIT)** **Semester: 6th**

**Full marks: 60** **Time: 3 hours**

| Subject / Course Learning Outcome | *Taxonomy Level | Question Number | Marks |
|---|---|---|---|
| Design programs that show how to use the variables, data types, and operators with the basic concepts of Object-Oriented Programming. | L1, L2 | 1a, 1b, 1c, 2a, 2b, 2c | 12 |
| Understand the various concepts of functions such as return by reference, inline functions, default arguments and function overloading in C++. | L1, L2, L3 | 5b, 5c, 7a | 6 |
| Understand the concept of classes and objects in Object-Oriented Programming. | L1, L2 | 3a, 3b, 3c, 4b, 4c, 5a | 12 |
| Learn to apply the concept of constructors and destructors in the program. | L2, L3 | 4a, 6a, 6b, 6c | 8 |
| Demonstrate the use of operator overloading and type conversions in the development of the programs. | L2, L3 | 7b, 7c, 8a, 8b, 8c | 10 |
| Design programs that show how to use the concept of inheritance, pointers and virtual functions in C++. | L1, L2, L3 | 9a, 9b, 9c, 10a, 10b, 10c | 12 |

*Bloom's taxonomy levels: Remembering (L1), Understanding (L2), Application (L3), Analysis (L4), Evaluation (L5), Creation (L6)



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(c) Write a program for increment operator overloading by considering the operator function as a member function. **[2]**

8. (a) Rewrite problem no. 7(c) by considering the operator function as a friend function. **[2]**

   (b) Write a program to create a class that represents Complex numbers containing real and imaginary parts. Use the overloaded addition operator to add two complex values. **[2]**

   (c) How many arguments are required in the definition of an overloaded binary operator? **[2]**

9. (a) What is the difference between a public derivation and a private derivation? **[2]**

   (b) How to make a private member of a class inheritable? Describe with an example. **[2]**

   (c) Explain the ambiguity that arises in multiple inheritance. Also, mention how the ambiguity can be resolved. **[2]**

10. Write a program that would

    (a) Create a class named Student with data members for name and roll number. Create another class Test inheriting the Student class, is used to define marks in three individual subjects. Initialize all the data members using a member function. **[2]**

    (b) Create class Result inheriting the Test class, is used to calculate the total marks of the student using the display() function. **[2]**

    (c) Invoke the display() function in the main function to print the name, roll number, marks in individual subjects and total marks of the student. **[2]**

*End of Questions*

***Answer all questions. Each question carries equal marks.***

1. (a) What is object-oriented programming? How is it different from procedure-oriented programming? **[2]**
   (b) What is a token? Describe various tokens present in C++. **[2]**
   (c) What is a namespace in C++? **[2]**

2. (a) What is the application of the scope resolution operator? **[2]**
   (b) Distinguish between inheritance and polymorphism. **[2]**
   (c) How do the following statements differ for an integer variable 'a'?
   int *p = &a; **[2]**
   int &b = a;

3. Write a program that would
   (a) Create an Employee class having the following functions. **[2]**
      1. getInfo() which takes the salary and number of hours of work per day of an employee as parameters.
      2. AddSal() which adds ₹10 to the salary of the employee if it is less than ₹500.
      3. AddWork() which adds ₹5 to the employee's salary if the number of hours of work per day is more than 6 hours.
   (b) Consider both AddSal() and AddWork() are private member functions. **[2]**
   (c) Print the final salary of an employee. **[2]**

4. Write a program that would
   (a) Create two classes DF and DI which store the value of distances. DF stores distances in feet and DI in inches. Initialize the objects of the class using constructors. **[2]**



   (b) Add one object of DF with another object of DI. Use a friend function to carry out the addition operation. **[2]**
   (c) Store the results in an object, which may be a DF object or DI object, depending on the units in which the results are required. The display should be in the format of feet or inches, depending on the object on display. **[2]**

5. (a) Rewrite the main function of the problem no. 3 for handling 10 managers as objects of the Employee class. **[2]**
   (b) Write a function area() to calculate the area of a rectangle. The function takes double values for both length and breadth. Use a default value of 2.5 for length to make the function to calculate area when this argument is omitted. Invoke the above function in the main function. **[2]**
   (c) Write a function that calculates the area of a triangle. Here, the function takes int values for both base and height. Use the function from the above program 5(b) to calculate the area of a rectangle. Both functions should have the same name. Write a main that calls both functions. **[2]**

6. (a) Write down all the methods of object initialization using constructors. **[2]**
   (b) What is the difference between a default constructor and a default argument constructor? **[2]**
   (c) What is a copy constructor? Write down a C++ program that demonstrates a copy constructor. **[2]**

7. (a) Explain the concept of inline functions with an example. Mention in which situations an inline expansion may not work. **[2]**
   (b) What is an operator function? Describe the syntax of an operator function. **[2]**