B.TECH/ECE/6TH SEM/CSEN 3208/2022

OBJECT ORIENTED PROGRAMMING CONCEPT BY USING C++
(CSEN 3208)

Time Allotted : 3 hrs **Full Marks : 70**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and
any 5 (five) from Group B to E, taking at least one from each group.

Candidates are required to give answer in their own words as far as practicable.

Group – A
(Multiple Choice Type Questions)

1. Choose the correct alternative for the following: **10 × 1 = 10**

(i) Where should we initialize static data member?
(a) In main() (b) Inside class
(c) In member function (d) After class definition.

(ii) What is the correct syntax for declaring pure virtual function named fun()?
(a) Void fun() = pure virtual (b) Pure virtual void fun() = 0
(c) Virtual void fun() = 0 (d) Pure virtual void fun().

(iii)
```
Student s[30];
Student();
```
Student is the name of a class. How many times destructor will be invoked?
(a) 1 (b) 30 (c) 29 (d) 31.

(iv) #define fun(x) x*x
Let a=3. Evaluate fun(fun(a+2)).
(a) 25 (b) 23 (c) 625 (d) 123.

(v) Default constructor is created
(a) always by default (b) if copy constructor is present
(c) if the class has a friend function (d) if no constructor is written.

(vi) If a class is derived privately from a base class then
(a) no members of the base class is inherited
(b) only private members of the base class are inherited
(c) all the members are inherited but none of them are accessible
(d) all the members other than private members are inherited.

(vii) Which of the following relationship is known as inheritance relation?
(a) Is-a relationship (b) Has-a relationship
(c) Association relationship (d) Aggregation relationship.

(viii) Run time polymorphism is achieved by the use of ___________________
(a) friend function (b) virtual function
(c) operator overloading (d) function overloading.

(ix) Ambiguity problem occurs in which type of inheritance?
(a) Multilevel (b) Multiple (c) Multipath (d) Hierarchical.

(x) Which operator cannot be overloaded?
(a) :: operator (b) + operator (c) * operator (d) >> operator.

Group- B

2. (a) Create a 2D array using dynamic memory allocation technique. [(CO1)(Remember/LOCQ)]

(b) Write a program to determine whether the given string is palindrome or not. Use string data type. [(CO2)(Understand/IOCQ)]

(c) Write a function having prototype int addnatural(int, int) such that it adds all the natural numbers between the two parameters, if the function is called with two parameters. If the function is called with one parameter, it adds from 1 to that parameter. [(CO2)(Analyze/HOCQ)]

2 + 5 + 5 = 12

3. (a) Differentiate:
(i) int *a = new int(5); (ii) int *y = new int[5]; [(CO1)(Remember/LOCQ)]

(b) Express the following if...else using ternary operator:

```
if( a > b )
        value = a;
else
        value = b;
```

[(CO1)(Understand/IOCQ)]

(c) Give an example to convert an if...elseif...else structure into switch...case. When it is not possible to convert an if...else if...else structure into switch...case? [(CO1)(Understand/IOCQ)]

(d) Write *any two* rules those are to be followed to write a destructor? [(CO2)(Remember/LOCQ)]

4 + 2 + (2 + 2) + 2 = 12

Group - C

4. (a) Overload * operator to multiply two complex numbers. [(CO3)(Analyze/IOCQ)]

(b) Write a programme to calculate area of square and rectangle using constructor overloading. [(CO3)(Analyze/IOCQ)]

(c) Why destructor overloading is not possible? [(CO3)(Analyze/HOCQ)]

(d) State if there is any error?

```
#include<iostream>
using namespace std;
class A{
        int x;
      public:
          A(int n){
              x=n;
          }
          void show(){
              cout<<"\n x="<<x;
          }
    };
    int main()
    {
        A obj1(10), obj2;
        obj1.show( );
        return 0;
    }
```

[(CO3)(Analyze/HOCQ)]

4 + 4 + 2 + 2 = 12

5. (a) Declare a class Time with two data members *hh* (to hold hour) and *mm* (to hold minute). Overload pre-increment and post-increment operators to increment the mm by 1. Also overload == operator to check whether two times are equal or not. [(CO3)(Understand/IOCQ)]

   (b) When it is necessary to use a friend function to overload an operator? [(CO3)(Remember/LOCQ)]

(3 + 3 + 3) + 3 = 12

Group - D

6. (a) Discuss different types of inheritances with examples in C++. [(CO2)(Remember/LOCQ)]

   (b) What is runtime polymorphism? [(CO2)(Remember/LOCQ)]

   (c) Write a C++ program to demonstrate runtime polymorphism. [(CO4)(Understand/IOCQ)]

8 + 1 + 3 = 12

7. (a) What is virtual base class? Write an example. [(CO4)(Apply/IOCQ)]

   (b) What is abstract class? What is the prerequisite to implement an abstract class in C++? [(CO4)(Apply/IOCQ)]

   (c) How to write constructor using initializer list? Give an example. How it is different where we initialize instance variables inside constructor body? [(CO3)(Analyze/IOCQ)]

(2 + 2) + (1 + 2) + (2 + 3) = 12

Group – E

8. (a) Give an example to show the application of namespace? What is class template? Explain with example. [(CO6)(Develop/IOCQ)]

(b) Write the syntax of function template and explain it. Is it possible to overload function template? If yes then write suitable program to illustrate that.
[(CO6)(Develop/HOCQ)]
(2 + 1 + 2)+ (3 + 1 + 3) =12

9. (a) What is exception handling and what are the advantages of it?
[(CO5)(Evaluate/IOCQ)]

(b) Write a user defined exception OutOfRange, with what method. When the exception is being thrown it will give the output “your input”<input>”is out of range”. Take age of an user as an user input, if the age falls outside 18yrs-60yrs, throw OutOfRange exception with the message “your input <age input> is out of range”. If the age is in between the range, just show the input age.
[(CO5)(Evaluate/IOCQ)]

(c) What do you mean by rethrow (of exception)? [(CO5)(Remember/LOCQ)]
(2 + 2) + 6 + 2 = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	22.92	60.41	16.67

Course Outcome (CO):

After the completion of the course students will be able to

1. Learn object oriented concepts and various syntax and semantics using C++ and merits of object oriented approach over procedural approach.
2. Understand various properties of OOP for appropriate use in problem solving.
3. Analyze the real life problem to identify the related objects and abstract them to classes
4. Apply various object oriented properties and reusable components in solution building.
5. Evaluate for using standard patterns and for improving performance of solution using exception handling.
6. Develop the object oriented application using++.

*LOCQ: Lower Order Cognitive Question; IOCQ: Intermediate Order Cognitive Question; HOCQ: Higher Order Cognitive Question