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

Time Allotted : 2½ hrs **Full Marks : 60**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 4 (four) from Group B to E, taking one from each group.

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

Group – A

1. Answer any twelve: **12 × 1 = 12**

Choose the correct alternative for the following

(i) What is the output of the following code?

```
#include <iostream>
using namespace std;
class A{
public:
    A(){
        cout<<"Constructor called\n";
    }
    ~A(){
        cout<<"Destructor called\n";
        }
    };
int main(int argc, char const *argv[])
{
    A();
    A *a = new A[5];
    delete[] a;
    return 0;
}
```

(a) Segmentation fault
(b) “Constructor called” five times and then “Destructor called” Five times
(c) “Constructor called” six times and then “Destructor called” six times
(d) Error

(ii) Ambiguity problem can arise in which type of inheritance?
(a) Multiple (b) Multi level (c) Multipath (d) Hierarchical.

(iii) How structures and classes in C++ differ?
(a) In Structures, members are private by default whereas, in Classes, they are public by default
(b) Structures by default hide every member whereas classes do not
(c) Structures cannot have private members whereas classes can have
(d) In Structures, members are public by default whereas, in Classes, they are private by default

(iv) Where should we initialize static data member?
(a) in main() (b) inside class
(c) in member function (d) after class definition.

(v) We use the following keyword when we try to do Runtime Polymorphism
(a) new (b) const (c) virtual (d) namespace

(vi) Which of the following operator is used to access the members using the pointer to the object of a class?
(a) . (b) -> (c) :: (d) None of the above.

(vii) Operator overloading is
(a) Making C++ operators work with objects (b) Giving C++ operators more than they can handle
(c) Making new C++ operators. (d) None of the above.

(viii) Actual code for a template function is generated when
(a) the function declaration appears in the source code (b) the function definition appears in the source code
(c) a call to the function appears in the source code (d) the function is executed at runtime.

(ix) How many parameters can be accepted by a default constructor?
(a) 0 (b) 1 (c) 2 (d) infinite

(x) Why references are different from pointers?
(a) A reference cannot be made null
(b) A reference cannot be changed once initialized
(c) No extra operator is needed for dereferencing of a reference
(d) All of the mentioned.

Fill in the blanks with the correct word

(xi) Assume a class Derv that is privately derived from class Base. An object of class Derv located in main()can access_____ members of Base class.

(xii) #define fun(x) x+x
Let a=5 then the value of fun(fun(a*3)) is _____.

(xiii) The _____ operator is used to dynamically allocate memory.

(xiv) The _____ member of a class cannot be accessed from outside the class.

(xv) A member function which does not alter any data members in the class can be declared as a _____ member function.

Group - B

2. (a) Can a destructor be overloaded? Reason your answer.
Suppose there are three objects obj1 local to a function f1() and obj2 local to main() and global object obj3 of a class Test. Write a code in C++ such that we get to know the sequence of object creation and deletion properly. Please note that, there must not be any printing (cout) statements within the main function but function f1 is called in main.
[(CO2) (CO3)(Understand/LOCQ)]

(b) What do you mean by a reference variable? Write proper syntax to declare a reference variable.
[(CO1)(CO2)(Learn, Understand/LOCQ)]

(c) What will be the output of the following code?

```
#include<iostream>
using namespace std;
int n=50;
int& setvalue(){    return n;}
void f1(){cout<<"n="<<n<<endl;}
int main() {
   int n=120;
   cout << "n=" << n << endl;
   f1();
   n=setvalue();
   cout << "n=" << n << endl;
   setvalue() = 30;
   int x=setvalue();
   cout << "x=" << x << endl;
   f1();
return 0;}
```

[(CO1) (CO2)(Apply/IOCQ)]
(2 + 4) + 2 + 4 = 12

3. (a) Write a C++ program to find the transpose of a matrix. *[(CO1)(CO4)(Learn,Apply/LOCQ)]*
(b) Write a program in C++ to concatenate two string without using any library function. *[(CO3)(Analyse/IOCQ)]*
(c) Write the difference between object oriented programming language and procedural programming language?
[(CO1)(Understand/LOCQ)]
4 + 4 + 4 = 12

Group - C

4. (a) Overload binary operator **+** to add two matrix objects. *[(CO3)(Apply/IOCQ)]*
(b) Overload insertion operator **<<** to display a matrix object. *[(CO3)(Apply/IOCQ)]*
8 + 4 = 12

5. (a) What do you mean by static class members? Explain the characteristics of static members (data and function) with suitable examples. *[(CO3)(Apply/IOCQ)]*
(b) Write a program as follows:
Create a class Employee with three instance variables employee_id, name, and salary. Write one parameterized constructor and one show method (display the details of the employee). Create a class Manager with three instance variables manager_id, name, and salary. Write one parameterized constructorand one show method (display the details of the manager). Write one method promote, which will increase the salary of a particular employee, i.e. employee reference should be passed as an argument to promote function. Create multiple employee objects and one Manager Object. Call the promote method. Provide output. *[(CO3)(Apply/IOCQ)]*
4 + 8 = 12

Group - D

6. (a) What is a virtual base class? Write an example. *[(CO4)(Understand/IOCQ)]*
   (b) What is early and late binding? Explain both of these using sample programs along with probable output. *[(CO4)(Analyze/IOCQ)]*

4 + 8 = 12

7. (a) Write the syntax of pure virtual function in C++.How to achieve runtime polymorphism in C++? Explain your answer with an example code. *[(CO6)(Develop/HOCQ)]*
   (b) In which case virtual destructor is required? Can constructor of the class be virtual? Reason your answer with proper example. *[(CO4)(Analyze/LOCQ)]*

(2 + 4) + 6 = 12

Group - E

8. (a) Write a program in C++ that accepts a number and check whether it lies within the range 10-50. If it lies below 10 then throw exception very_small and above 50 then throw exception very_large. If it lies within the range then call myterminate() which prints "Successful". *[(CO5)(Evaluate/HOCQ)]*
   (b) What is class template? Explain with example, how to define a method outside class using class template. *[(CO2)(Unsedstand/LOCQ)]*

6 + 6 = 12

9. (a) What is namespace? Explain with a suitable example. *[(CO5)(Understand/IOCQ)]*
   (b) How can you use object **cin** and **cout** without using "using namespace std" in C++? *[(CO5)(Understand/IOCQ)]*
   (c) Define a namespace named Mynamespace1 that contains declaration of constant MyPI and another namespace named Mynamespace2 . Mynamespace2 contains function area() which calculate area of circle using MyPI. Write a program in C++ that use area() function to calculate area of a circle. *[(CO6)(Develop/IOCQ)]*

4 + 2 + 6 = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	29.17	58.33	12.5

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 C++.

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