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) Say you have defined a header file myhead.h. Which of the following is the correct syntax of including a user defined header files in C++?
(a) #include [myhead] (b) #include < myhead.h>
(c) #include “myhead” (d) #include < myhead >

(ii) Say you have defined a Student class and run following code snippet. How many times constructor and destructor will be called?

```
int main(int argc, char const *argv[])
{
            Student *std = new Student[5];          delete[] std;
            return 0;
}
```

(a) Error
(b) “Constructor called” five times and then “Destructor called” five times
(c) “Constructor called” five times and then “Destructor called” once
(d) “Constructor called” once and then “Destructor called” five times

(iii) When destructors are called?
(a) When a program ends (b) When a function ends
(c) When a delete operator is used (d) All of the mentioned

(iv) What is the purpose of the ‘friend’ keyword in C++?
(a) It signifies a function or class that can access private and protected members of another class
(b) It is used to declare a function or class inside another class
(c) It denotes a function or class that is inherited from a base class
(d) It specifies a function or class that cannot be overridden.

(v) Consider the following code and select the correct option.

```
class employee
{
                int basicPay;
                public : int* fun()   {   return &basicPay;    }
};
main()  {
                employee emp;
                int *ptr= emp.fun();
                return 0;
}
```

(a) This code is syntactically correct and execute (b) It may result in undesirable conditions
(c) It will generate error (d) It violates encapsulation

(vi) Which of the following is correct about static variables?
(a) Static functions do not support polymorphism
(b) Static data members cannot be accessed by non-static member functions
(c) Static member functions can access only static data members
(d) Static member functions can access both static and non-static data members.

(vii) What is not inherited from the base class?
(a) Private members (b) Its constructor and its destructor
(c) Its friends (d) All of them.

(viii) Why does diamond problem arise due to multiple inheritance?
(a) Methods with same name creates ambiguity and conflict
(b) Methods inherited from the superclass may conflict
(c) Derived class gets overloaded with more than two class methods
(d) Derived class can't distinguish the owner class of any derived method.

(ix) What is the use of Namespace?
(a) To define a declarative region that provides a scope to the identifiers
(b) To organize code into logical groups and to prevent name collisions
(c) To make all identifiers at namespace scope visible to one another without qualification
(d) All of them.

(x) Which keyword can be used in template?
(a) class (b) typename
(c) both class & typename (d) function

Fill in the blanks with the correct word

(xi) The ______ specifier indicates the compiler that code substitution is preferred to the usual function call mechanism for a specific function.

(xii) If you want all public members of the base class are inherited as protected in the derived class you must use _________ access specifier before __________ in inheritance syntax.

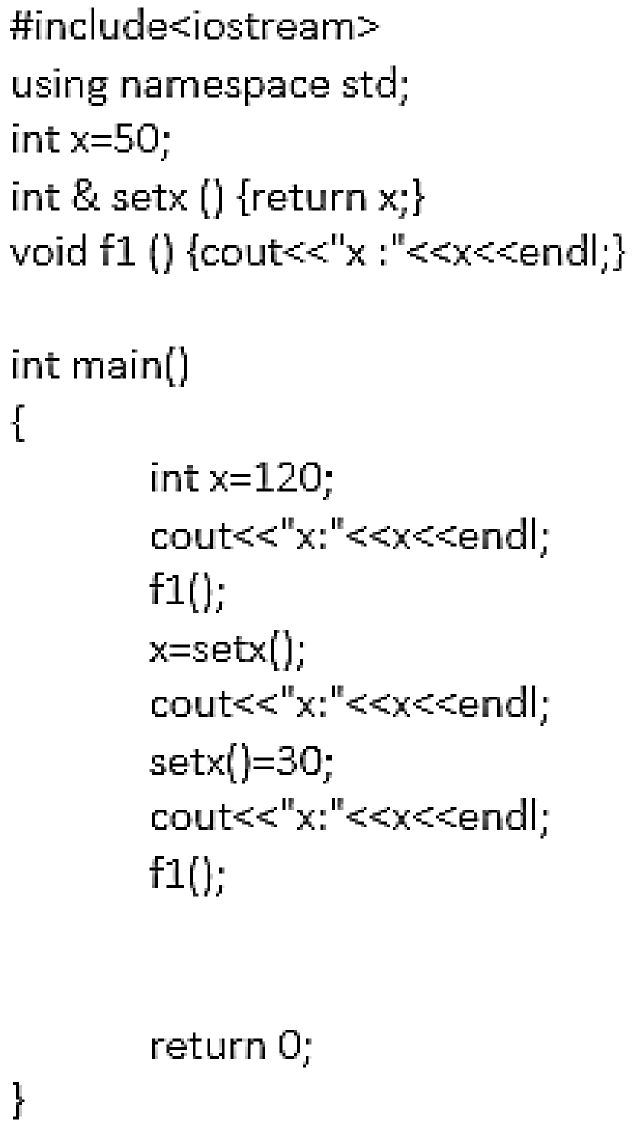
(xiii) You should make a member function in Base class _______ if you want to access the overridden function of derived class using ______ ________ reference.

(xiv) Static member functions can only access ________ member data and ______ keyword in not available inside this function.

(xv) A _____ _________ is a member function that initializes an object using another object of the same class.

Group - B

2. (a) Consider the following snippet and explain the output



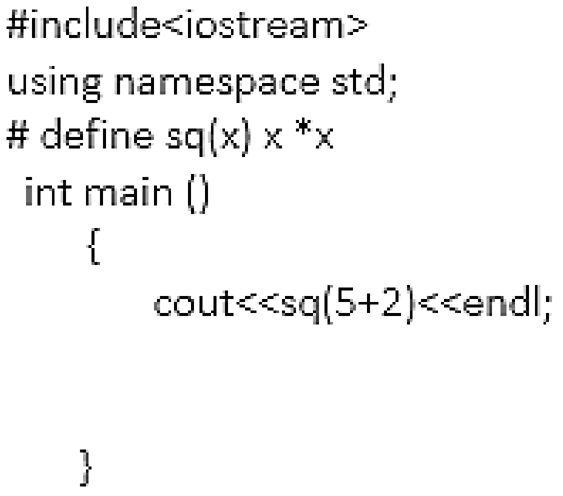
```
#include<iostream>
using namespace std;
int x=50;
int & setx () {return x;}
void f1 () {cout<<"x :"<<x<<endl;}

int main()
{
        int x=120;
        cout<<"x:"<<x<<endl;
        f1();
        x=setx();
        cout<<"x:"<<x<<endl;
        setx()=30;
        cout<<"x:"<<x<<endl;
        f1();


        return 0;
}
```

[(CO1)(understand /IOCQ)]

(b) Consider the following snippet and explain the output



```
#include<iostream>
using namespace std;
# define sq(x) x *x
 int main ()
     {
       cout<<sq(5+2)<<endl;


     }
```

[(CO1)(understand/IOCQ)]

(c) What is constructor and destructor in C++? *[(CO2)(understand/IOCQ)]*

4 + 4 + (2 + 2) = 12

3. (a) Create a class Stack to implement Stack data structure with constructors & destructors. Define suitable member functions for insertion & deletion of elements to and from the Stack. Write a program in C++ to do this by clearly specifying the overflow and overflow conditions. *[(CO3,CO6)(Apply/IOCQ)]*

(b) Explain Deep copy and Shallow copy with the example of Stack. *[(CO2,CO3)(Apply/HOCQ)]*

7 + 5 = 12

Group - C

4. (a) Implement M3=M1*M2, where M1, M2 and M3 are the matrix objects.
class matrix will have the following details:
data members : r, c, *arr;
methods:
matrix(int, int)- constructor
void inz()-initialize matrix elements
void disp()- display matrix
matrix operator *(matrix &); *[(CO3,CO6)(analyze/HOCQ)]*

(b) Consider a **length** class with feet and inch instance variable. Now apply **> =** and **<** operator to compare two lengths. *[(CO3,CO6)(analyze/IOCQ)]*

8 + (2 + 2) = 12

5. (a) Write a class Mystring with the following details
(i) data attribute char * ptr
(ii) a default constructor and parameterized constructor Mystring() and Mystring(char *)
(iii) show- print the string
(iv) Mystring operator +(Mystring &) : Concatenate two Mystring objects using + operator
(v) bool operator ==(Mystring &): Compare two Mystring using == operator
You are not allowed to use any library function. *[(CO3,CO6)(analyze/HOCQ)]*

(b) Differentiate static and non-static functions. *[(CO2,CO3)(understand/IOCQ)]*

(4 + 4) + 4 = 12

Group - D

6. (a) What are the different types of inheritance supported by C++. Explain them with diagram and syntax. *[(CO4)(Analyse/LOCQ)]*

(b) Write a C++ program to create a class Shape. Shape is inherited by Polygon and Polygon is inherited by Triangle. Create appropriate base and derived class. Input the details using constructor and output them. What type of inheritance is this? *[(CO4)(Remember/IOCQ)]*

(c) What is the order of construction and destruction of objects in case of multiple inheritance? *[(CO4)(Remember/LOCQ)]*

5 + (4 + 1) + 2 = 12

7. (a) What is the output of following code snippet? Justify your answer.

```
#include <iostream>
using namespace std;
class B{
    public:
    B(int a){
       cout<<"Constructor of B"<<endl;
     }
};
class D:public B{
    public:
    D(int a){
       cout<<"Constructor of class D"<<endl;
    }
};
int main{
   D ob(10);
   return 0;
}
```

[(CO4)(Analyse/HOCQ)]

(b) Write a C++ code to implement the following problem: a class Student has data member roll_no and name. Internal and External are the two subclasses of Student. In Internal and External class write appropriate member function to calculate total internal marks and total external marks of student. Sem_Mark is the subclass of Internal and External. It has appropriate member function to calculate the total marks and grade. Each class has its own show() function. What type of inheritance is this? By creating object of Sem_Mark class implement all the member functions. What type of inheritance is this? *[(CO4)(Apply/LOCQ)]*

(c) Why cannot you instantiate an abstract class? *[(CO2)(Apply/IOCQ)]*

4 + 6 + 2 = 12

Group - E

8. (a) What do you understand by synchronous and asynchronous exception? *[(CO5)(Remember/LOCQ)]*
   (b) What are the different steps to perform exception handling? Explain all steps. *[(CO5)(Remember/LOCQ)]*
   (c) Write difference between logical and syntactic error. *[(CO5)(Remember/LOCQ)]*

4 + 6 + 2 = 12

9. (a) Write a suitable code to illustrate the use of catch(…). *[(CO5)(Analyse/IOCQ)]*
   (b) Write a C++ program to implement array-index out of bound exception, where exception is thrown as object. *[(CO5)(Apply/LOCQ)]*
   (c) Create two custom exception or user defined exception classes viz. TooHot and TooCold.
   Write a program and throw TooHot if the temperature exceeds 40 degrees and throw TooCold if the temperature be less than 20 degrees. *[(CO5)(HOCQ)]*

3 + 4 + 5 = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	30.21	38.54	31.25