OBJECT ORIENTED PROGRAMMING
(CSEN 3103)

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) Which of the following cannot be declared static in c++?
(a) Class (b) Function (c) Object (d) Variable.

(ii) What is the output of the following program?

```
#include <iostream>
using namespace std;
int& setx(){   return x; }
int main(){
setx() = 22;
cout << "x=" << x<< endl;
return 0;
}
```

```
int  x=20;
```

(a) Compilation error (b) Runtime error (c) 20 (d) 22.

(iii) Given int *ptr= new int[10]; what is the correct syntax for releasing this allocated memory size of 10 integers?
(a) delete ptr (b) delete ptr [ ] (c) delete [ ] ptr (d) delete ptr[5].

(iv) Which of the following is true about inline functions and macros?
(a) Macros are processed by pre-processor and inline functions are processed in later stages of compilation.
(b) Inline functions do type checking for parameters, macros don't
(c) Macros are prone to bugs and errors, inline functions are not
(d) All of the above.

(v) Assume a class Derv that is privately derived from class Base. An object of class Derv located in main() can access
(a) public members of Derv (b) protected members of Derv.
(c) public members of Base (d) protected members of Base.

(vi) If ‘f’ is a virtual function in a class X, then
(a) ‘f’ must return an int
(b) ‘f’ must be overridden in all classes inherited from X
(c) there cannot be any non virtual function named ‘f’ with identical signature in X
(d) none of the above.

(vii) Output of following Java Program?

```
class Base {
   public void show() {
     System.out.println("Base::show() called");
   }
}
class Derived extends Base {
   public void show() {
     System.out.println("Derived::show() called");
   }
}
public class Main {
   public static void main(String[] args) {
      Base b = new Derived();
      b.show();
   }
}
```

(a) Derived::show() called (b) Base::show() called
(c) Compiler error (d) Runtime error

(viii) Which of the following is FALSE about abstract classes in Java?
(a) If we derive an abstract class and do not implement all the abstract methods, then the derived class should also be marked as abstract using 'abstract' keyword
(b) Abstract classes can have constructors
(c) A class can be made abstract without any abstract method
(d) A class can inherit from multiple abstract classes.

(ix) Which of the following is true about interfaces in java?
1) An interface can contain following type of members
....public, static, final fields (i.e., constants)
....default and static methods with bodies
2) An instance of interface can be created.
3) A class can implement multiple interfaces.
4) Many classes can implement the same interface.
(a) 1, 3 and 4 (b) 1, 2 and 4 (c) 2, 3 and 4 (d) 1, 2, 3 and 4.

(x) Which of the following is/are true about packages in Java?
1) Every class is part of some package.
2) All classes in a file are part of the same package.
3) If no package is specified, the classes in the file go into a special unnamed package
4) If no package is specified, a new package is created with folder name of class and the class is put in this package.
(a) Only 1, 2 and 3 (b) Only 1, 2 and 4 (c) Only 4 (d) Only 1 and 3.

Group- B

2. (a) When do we declare a member of class static and how to initialize static variable, write proper syntax in c++? State the three restrictions that are to be followed by a static method. [(CO1)(Understand/IOCQ)]

(b) What do you mean by reference variable? Write proper syntax to declare reference variable. Suppose you have pairs of numbers in your program, and you want to be sure that the smaller one always precedes the larger one. Write a C++ program that calls a function order () which checks two numbers passed to it by reference and swaps the originals if the first is larger than the second. [(CO2)(Understand/IOCQ)]

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

3. (a) What are the characteristics of friend function? State difference between friend class and friend function. Write a syntax how a function f () of class Y can be the friend of a class X. [(CO1,CO2)(Remember/LOCQ)]

(b) Write a program to show how C++ allows a non-member function to access private and protected data of a class. [(CO2)(Understand/LOCQ)]

(c) How do you differ encapsulation from abstraction? [(CO1)(Understand/LOCQ)]

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

Group - C

4. (a) Write operator overloading function to distinguish between prefix and postfix increment operation on object of a class. [(CO2)(Understand/IOCQ)]

(b) Please add proper function in the following incomplete code snippet such that it runs and give the following output:

```
#include<iostream>
using namespace std;
class test{
   int i;
   };

int main(){
test obj;
cout<<"Enter input"<<endl;
cin>>obj;
cout<<obj;
return 0;
}
```

Expected Output:
Enter input
5
5 [(CO6)(Design/HOCQ)]

(c) What do you understand by namespace? Explain with example. [(CO2)(Understand/IOCQ)]

4 + 4 + 4 = 12

5. (a) Write a function template for adding two inputs. Specialize the template such that for string input, it appends the given string inputs. [(CO5)(Apply/HOCQ)]

(b) Write a program to implement array index out of bound exception, where exception is thrown as object. [(CO3)(Understand/HOCQ)]

(c) Explain in which situation virtual destructor is needed with example. [(CO1,CO2)(Analyze/HOCQ)]

5 + 4 + 3 = 12

Group - D

6. (a) Write a program in java to print command line arguments and show the output. [(CO6)(Design/HOCQ)]
   (b) Why Java is called platform independent where C++ is not? [(CO2)(Compare/LOCQ)]
   (c) What are the uses of super keyword in Java? [(CO1)(Understand/LOCQ)]
   5 + 4 + 3 = 12

7. (a) How to experience runtime polymorphism in Java? Write a Java code and explain. [(CO5)(Apply/HOCQ)]
   (b) Give an example code to explain compile time polymorphism. Give output. [(CO5)(Apply/HOCQ)]
   (c) What is inner class in Java? How to instantiate an inner class from main? [(CO1)(Understand/IOCQ)]
   5 + 3 + 4 = 12

Group - E

8. (a) What is the difference between a thread created as a subclass of thread class and one created as an implementation of runnable interface? What is the trade–off between extending the thread class and implementing the runnable interface, while creating a thread? [(CO4) (Analyze/HOCQ)]
   (b) Define throw, throws, finally in Java with example. [(CO3) (Understand/IOCQ)]
   (c) What is partial implementation of an interface? [(CO2) (Understand/LOCQ)]
   4 + (2 + 2 + 2) + 2 = 12

9. (a) Write a Java swing program which will accept two value in text boxes and display addition result in third text box. [(CO6)(Analyse/IOCQ)]
   (b) Draw and describe Applet life cycle. Can init() method be called more than once? Justify your answer. [(CO6)(Analyse/IOCQ)]
   6 + 6 = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	21.88	43.75	34.37

Course Outcome (CO):

After the completion of the course students will be able to

CSEN3103.1 Learn the features of C++ and Java supporting object oriented programming

CSEN3103.2 Understand the relative merits of C++ and Java as object oriented programming language.

CSEN3103.3 Apply the features learned to design object-oriented software template using C++ and Java

CSEN3103.4 Estimate the performance of the software written in C++ and Java

CSEN3103.5 Evaluate the performance of the software and compare the effectiveness of two different language (C++ and Java)

CSEN3103.6 Develop the object oriented software using C++ and Java.

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