

OBJECT ORIENTED PROGRAMMING (CSE2203)

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) Which of the following correctly declares an array in C++?
 (a) array{10}; (b) array array[10];
 (c) int array; (d) int array[10];
- (ii) What is the correct syntax of accessing a static member of a class in C++?
 Example class:

```
class A {
    public:
    static int value;
};
```

 (a) A->value (b) A^value
 (c) A.value (d) A::value
- (iii) What will be the output of the following C++ code?

```
#include <iostream>
using namespace std;
int func(int x=5, int y) {
    int c;
    c = x + y;
    return c;
}
int main() {
    cout << func(10);
}
```

 (a) 10 (b) 15
 (c) compile time error (d) 5
- (iv) What is a pure virtual function?
 (a) A virtual function defined inside the base class
 (b) A virtual function that has no definition relative to the base class
 (c) A virtual function that is defined inside both base and derived class
 (d) Any function that is made virtual
- (v) Which of the following cannot be used with the virtual keyword?
 (a) Class (b) Member function
 (c) Constructor (d) Destructor
- (vi)

```
#include <iostream>
using namespace std;
class Base {
    public:
    virtual void show() = 0;
};
int main()
{
    Base b;
    Base *bp;
    return 0;
}
```

 (a) There are compiler errors in lines, "Base b;" and "Base bp;"
 (b) There is compiler error in line "Base b;"
 (c) There is compiler error in line "Base bp;"
 (d) There is no compiler error

- (vii) Which of the following Java data types is NOT a primitive data type?
 (a) int (b) float
 (c) String (d) double
- (viii) What is the output of the following code?
 String s1 = "Hello";
 String s2 = "Hello";
 System.out.println(s1 == s2);
 (a) true (b) false
 (c) compilation error (d) runtime error
- (ix) Which is true ?
 (a) "X extends Y" is correct if and only if X is a class and Y is an interface.
 (b) "X extends Y" is correct if and only if X is an interface and Y is a class.
 (c) "X extends Y" is correct if X and Y are either both classes and both interfaces.
 (d) "X extends Y" is correct for all combinations of X and Y being classes and / or interfaces.
- (x) The full form of AWT is
 (a) Applet Window Toolkit (b) Abstract Window Toolkit
 (c) Absolute Window Toolkit (d) Artistic Window Toolkit

Fill in the blanks with the correct word

- (xi) _____ operator is used to free the memory allocated using new operator.
- (xii) Constructors are used to _____ the data members automatically, whenever an object of a class is instantiated.
- (xiii) The concept of deciding which function to invoke during runtime is called _____.
- (xiv) The _____ method in Java is automatically called when an object is garbage collected.
- (xv) In OOP, the _____ specifier is used to declare variables and methods that belong to the class itself, rather than to individual objects.

Group - B

2. (a) What are the characteristics of friend function? State the difference between friend class and friend function. Write a syntax for how a function f () of class Y can be the friend of class X. [[CO1](Apply/LOCQ)]
- (b) Write a C++ program to show the order of construction and destruction of a global object, static object, nameless object, an object declared in the main function, an object declared in f() which is invoked from main(), object declared in a block of code. [[CO1](Understand/IOCQ)]
(2 + 2 + 2) + 6 = 12
3. (a) Define a class to represent a bank account. Include the following members.
Data members
 (i) Account number
 (ii) Balance amount in the account.
Member functions.
 (i) To assign initial values
 (ii) To display account number and balance.
 (iii) void moneyTransfer(...) To transfer amount from one account from one account to other.
 Write a program to test the successful transfer of money from one account to other.
 Use the concept of passing object by reference and object by value to solve the problem. [[CO5](Apply/IOCQ)]
- (b) Differentiate Deep copy and shallow copy constructor with proper code and figure. [[CO5](Analyze/HOCQ)]
6 + 6 = 12

Group - C

4. (a) 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

[[C06] (Analysis and Design/LOCQ)]

(b) How to define an abstract class in C++? What is the use of an abstract class? Why cannot you instantiate an abstract class?

[[C05] (Demonstrate/LOCQ)]

(c) How to implement multiple inheritance in C++?

[[C05] (Demonstrate/LOCQ)]

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

5. (a) Write operator overloading function to distinguish between prefix and postfix increment operation on object of a class.

[[C05] (Understand/LOCQ)]

(b) Write a program in C++ to read three integers x, y and z and evaluate r given by $r = z / (x - y)$.

Use exception handling to throw an exception in case division by zero is attempted.

[[C03] (Apply/LOCQ)]

6 + 6 = 12

Group - D

6. (a) Explain the concept of Garbage Collection and its importance in memory management Java.

[[C03] (Understand/IOCQ)]

(b) Is it recommended to manually invoke the garbage collector, or should we rely solely on automatic garbage collection?

[[C03] (Understand/IOCQ)]

6 + 6 = 12

7. (a) What are the differences between final, finally, and finalize in Java?

[[C01] (Understand/LOCQ)]

(b) Provide examples demonstrating the use of final, finally, and finalize keywords in Java.

[[C01] (Understand/LOCQ)]

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

Group - E

8. (a) What is the difference of use of default and protected access specifier?

[[C04] (Understand/LOCQ)]

(b) Write a Java program to do the following:

Create three threads named one, two, and three in the main thread. Each thread will print multiples of 3, 4, and 5, respectively. The main thread waits for the child threads to join it.

[[C04] (Remember/LOCQ)]

(c) Write a Java program to implement a JApplet to do the following:

There is an input textfield taking any string as input from the user. Your program will convert lowercase letters to uppercase and vice versa and show that in the output textfield. For example, if AbCd is given as input, aBcD will be shown as the output.

[[C04] (Apply/IOCQ)]

2 + 4 + 6 = 12

9. (a) Write a sample Java code to demonstrate about
ArrayIndexOutOfBoundsException, ArithmeticException, NullPointerException exceptions.

[[C03] (Apply/IOCQ)]

(b) Create a package shape containing classes Circle, Triangle and Rectangle.

Every class of this package should contain two methods, viz., area and perimeter. Write a sample Java code that can import shape package and use the methods to calculate area and perimeter of the respective shape.

[[C06] (Apply/HOCQ)]

6 + 6 = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	50	37.5	12.5

