OBJECT ORIENTED PROGRAMMING WITH JAVA
(MCA1101)

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 packages needs to be imported to use the StringTokenizer class?
(a) java.io (b) java.util
(c) java.lang (d) java.net

(ii) What will be the output of the following Java program?

```
class Abc{
        public static void main(String[]args){
                String[] elements = { "for", "tea", "too" };
                String first = (elements.length > 0) ? elements[0]: null;
        }
}
```

(a) Compilation error (b) An exception is thrown at run time
(c) The variable first is set to null (d) The variable first is set to elements[0]

(iii) XXX = new Integer("155").toString();
What datatype or class is XXX in the above code segment?
(a) byte (b) char[]
(c) StringBuffer (d) String

(iv) Which of the following is used for implementing inheritance through class?
(a) inherited (b) using
(c) extends (d) implements

(v) Which of the below is not a memory leak solution?
(a) Code changes (b) JVM parameter tuning
(c) Process restart (d) GC parameter tuning

(vi) Which of these is correct way of calling a constructor having no parameters, of superclass A by subclass B?
(a) super(void); (b) superclass.();
(c) super.A(); (d) super();

(vii) How can you have a "try" block that invokes methods that throw two different exceptions?
(a) Catch one exception in a "catch" block and the other in a "finally" block.
(b) Setup nested "catch" blocks for each exception.
(c) Catch one exception in a "catch" block and the other via the return value.
(d) Include a "catch" block for each exception.

(viii) Which of the given methods are of Object class?
(a) notify(), wait(long msecs), and synchronized()
(b) wait(long msecs), interrupt(), and notifyAll()
(c) notify(), notifyAll(), and wait()
(d) sleep(long msecs), wait(), and notify()

(ix) A monitor called "m" has two threads waiting with the same priority. One of the threads is "thread3". How can you inform "thread3" so that it alone moves from the Waiting state to the Ready state?
(a) thread3.notify( ) (b) m.notify(thread3)
(c) thread3.start( ) (d) notify(thread3)

(x) Which of the following are not the methods of the Thread class?
(a) yield() (b) sleep(long msec)
(c) go() (d) stop()

Fill in the blanks with the correct word

(xi) An _____ in Java is a block of memory that contains space to store all the instance variables.

(xii) A try statement must always have a _____associated with it.

(xiii) The ability to take more than one forms is called _____.

(xiv) Every Java application has a _____ method that tells how and in what sequence other methods are used.

(xv) _____ members are accessible from object and the sub class objects.

Group - B

2. (a) Write a program to find the subarray (containing at least one element) which has the maximum possible sum, and return that sum. Note: Given an integer array arr[], A subarray is a continuous part of an array.
Examples: Input: arr[] = [2, 3, -8, 7, -1, 2, 3] Output: 11
[(CO2) (Evaluate/HOCQ)]

(b) What are the bitwise operators in Java? Explain the function of the shift operator.
[(CO2) (Remember/LOCQ)]

(c) Is it necessary to save a Java program with a filename same as the name of the class containing the main method? Illustrate with an example. *[(CO2) (Analyse/IOCQ)]*

5 + 4 + 3 = 12

3. (a) A person wants to determine the most expensive computer keyboard and USB drive that can be purchased with a give budget. Given price lists for keyboards

and USB drives and a budget, find the cost to buy them. If it is not possible to buy both items, return -1.Example b=60 keyboards = [40,50,60] drives = [5,8,12] The person can buy a keyboards=50 drives=5 Total=55, or a keyboards=50 drives=8 Total=58. Write a program to choose the latter as the more expensive option and return 58. *[(CO2)(Apply/IOCQ)]*

(b) "String is immutable". State whether the statement is true or false. Justify with an example. *[(CO1)(Analyze/IOCQ)]*

(c) What is the composition of Java and State the difference between Composition and Aggregation? Explain with an example. *[(CO1)(Analyze /IOCQ)]*

5 + 3 + 4 = 12

Group - C

4. (a) What are inner class and anonymous class? State one application of anonymous classes. *[(CO3)(Remember/LOCQ)]*

(b) If a class is declared without any access modifiers, where may the class be accessed? *[(CO3)(Analyse/IOCQ)]*

(c) Create a class containing an inner class that itself contains an inner class. Repeat this using static inner class. What are the names of the .class files produced by the compiler? *[(CO3)(Apply/IOCQ)]*

5 + 2 + 5 = 12

5. (a) Show that an inner class has access to the private elements of its outer class. Determine whether the reverse is true. *[(CO3)(Analyze/IOCQ)]*

(b) What is a Singleton Class? Illustrate with an example. *[(CO3)(Remember/LOCQ)]*

(c) How can a method be protected from being overridden? What benefit is achieved by preventing overriding? *[(CO3)(Understand/LOCQ)]*

5 + 3 + 4 = 12

Group - D

6. (a) Create an interface with at least one method, in its own package. Create a class in a separate package. Add a protected inner class that implements the interface. In a third package, inherit from your class and, inside a method, return an object of the protected inner class, up casting to the interface during the return. *[(CO4)(Apply/IOCQ)]*

(b) If an exception isn't caught in a user-defined class, where does it go and what does it do? *[(CO4)(Analyse/IOCQ)]*

(c) Why cannot we create objects of abstract classes? *[(CO4)(Remember/LOCQ)]*

6 + 3 + 3 = 12

7. (a) Can a Java class be private in a package? What are the access modifiers applicable to classes and instance variable in Java? *[(CO4)(Remember/LOCQ)]*

(b) How do we design a package? How do we add a class or an interface to a package and use it from other package? Illustrate with an example. *[(CO4)(Analyze/IOCQ)]*

(c) In general which catch statement should come first? The one that catches the subclass or the one that catches the superclass? Why? *[(CO4)(Analyze/IOCQ)]*

5 + 5 + 2 = 12

Group - E

8. (a) How do you start a thread? What happens if a thread is started with the run ( ) method? *[(CO5)(Remember/LOCQ)]*

(b) "The main thread must be the last thread to finish execution. When the main thread stops, the program terminates." Is it true? *[(CO4)(Remember/LOCQ)]*

(c) Write a program in Java to explain how different priorities can be assigned to different threads. *[(CO5)(Apply/IOCQ)]*

4 + 4 + 4 = 12

9. (a) What do you mean by deadlock in a multithreaded environment? *[(CO5)(Remember/LOCQ)]*

(b) What's the difference between a thread created as a subclass of java.lang.Thread and one created as an implementation of Runnable? *[(CO4)(Remember/LOCQ)]*

(c) Write a Java program that illustrates the use of the yield( ), stop( ) and sleep( ) methods. *[(CO5)(Apply/IOCQ)]*

3 + 4 + 5 = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	40.63	54.17	5.20