

**OBJECT ORIENTED PROGRAMMING WITH JAVA
(MCAP 1101)**

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 one of the following describes the difference between StringBuffer and String?
(a) StringBuffer is used only to buffer data from an input or output stream
(b) StringBuffer allows text to be changed after instantiation
(c) StringBuffer holds zero length Strings
(d) StringBuffer supports Unicode.
- (ii) Which of the following is not true about an interface?
(a) It can be partially implemented by a class
(b) It can be implemented by an interface
(c) It can be implemented by several classes
(d) A particular class can implement several interfaces.
- (iii) What is the output of the following code?
double x = 0, y = 5.4324;
try {
 System.out.println((y/x));
}
catch (Exception e) { System.out.println("Exception"); }
catch (IOException ie) { System.out.println("Error"); }
(a) -1 (b) 0 (c) Compiler Error (d) Infinity.
- (iv) Which code declares class A to belong to the mypackage.financial package?
(a) package mypackage; package financial; (b) import mypackage.*;
(c) package mypackage.financial.A; (d) package mypackage.financial;
- (v) Which one of the following is NOT a valid java.lang.String declaration?
(a) String myString = new String("Hello"); (b) String myString = new String(5);
(c) String cde = "cde"; (d) String myString = new String();
- (vi) Identify the correct restriction on static methods.
I) They must access only static data
II) They can only call other static methods.
III) They cannot refer to this or super
(a) I and II (b) I and III (c) I (d) I, II, III

- (vii) How can you have a "try" block that invokes methods that throw two different exceptions?
- Catch one exception in a "catch" block and the other in a "finally" block
 - Setup nested "catch" blocks for each exception
 - Catch one exception in a "catch" block and the other via the return value
 - Include a "catch" block for each exception.
- (viii) Which of the following for loop declaration is not valid?
- for (int i = 99; i >= 0; i / 9)
 - for (int i = 7; i <= 77; i += 7)
 - for (int i = 20; i >= 2; -i)
 - for (int i = 2; i <= 20; i = 2* i).
- (ix) Which of these classes are the direct subclasses of the Throwable class?
- RuntimeException and Error class
 - Exception and VirtualMachineError class
 - Error and Exception class
 - IOException and VirtualMachineError class.
- (x) Which of the given methods are of Object class?
- notify(), wait(long msec), and synchronized()
 - wait(long msec), interrupt(), and notifyAll()
 - notify(), notifyAll(), and wait()
 - sleep(long msec), wait(), and notify().

Group – B

2. (a) Write a method (not the entire application) called CountVowels, which takes the input arguments as character and checks whether it is a vowel; increment the instance variable called vCnt by 1. [[CO2](Apply/IOCQ)]
- (b) "String is immutable"-State whether the statement is true or false and justify with an example. [[CO1](Analyze/IOCQ)]
- (c) Why is Java called a fully object-oriented language but not a pure (or true) object oriented language? [[CO1](Understand/LOCQ)]

6 + 3 + 3 = 12

3. (a) A unique digit is a positive integer (without leading zeros) with no duplicate digits. For example 7, 135 and 214 are all. Whereas 33, 3121 and 300 are not. Given two positive integers, m and n, where m<n. Write a program to determine how many unique digit integers are there in the range of m and n (both inclusive) and display them. [[CO2](Create/IOCQ)]
- (b) What is the role of the Java interpreter? What purpose does the Just-in-Time-Compiler serve? [[CO2](Remember/LOCQ)]
- (c) How are symbolic constants declared in Java? What purpose do they serve? [[CO2](Remember/LOCQ)]

6 + 4 + 2 = 12

Group – C

4. (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

5. (a) Write a program to create a class named Vehicle having protected instance variables regnNumber, speed, color, ownerName and a method showData() to show "This is a vehicle class". Inherit the Vehicle class and create two subclasses named Bus and Car having individual private instance variables routeNumber in Bus and manufacturerName in Car and both of them having showData () method showing all details of Bus and Car respectively with content of the super class's showData () method. [[CO3](Evaluate/HOCQ)]
 (b) How can a programmer define a class that cannot be inherited? Give an example. [[CO3](Remember/LOCQ)]
 (c) In what order are constructors invoked along the inheritance chain, when a derived class object is created? [[CO3](Analyze/IOCQ)]
7 + 2 + 3 = 12

Group – D

6. (a) What are the similarities and dissimilarities between an abstract class and interface? [[CO4](Remember/LOCQ)]
 (b) Is all the methods in an interface are automatically public? Justify with example. [[CO4](Analyze/IOCQ)]
 (c) Create a private inner class that implements a public interface. Write a method that returns a reference to an instance of the private inner class, up cast to the interface. Show that the inner class is completely hidden by trying to downcast it. [[CO4](Evaluate/HOCQ)]
3 + 4 + 5 = 12
7. (a) Write a program that outputs the name of the capital of the country entered at the command line. The program should throw a "NoMatchFoundException" when it fails to print the capital of the country entered at the command line. [[CO5](Apply/IOCQ)]
 (b) Can there be a try block without a matching catch block? Can there be a catch block without a matching try block? [[CO5](Analyze/IOCQ)]
 (c) Why cannot we create objects of abstract classes? [[CO4](Remember/LOCQ)]
6 + 4 + 2 = 12

Group – E

8. (a) What are daemon threads? How would you find out if a thread is daemon? If not, how would you make it a daemon thread? [[CO5](Remember/LOCQ)]
 (b) How do you start a thread? What happens if a thread is started with the run () method? [[CO5](Remember/LOCQ)]
 (c) What are synchronized methods and synchronized statements? Explain with a example. [[CO5](Remember/LOCQ)]
3 + 4 + 5 = 12

9. (a) Differentiate between ArrayList and LinkedList. [(C06)(Understand/LOCQ)]
 (b) Write a generic method that can perform the sorting of any type of data. [(C06)(Apply/IOCQ)]
 (c) Write the following methods that return a lambda expression performing a specified action:
isPrime(): The lambda expression must return true if a number is prime or false if it is composite. [(C06)(Apply/IOCQ)]

3 + 4 + 5 = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	39.58	47.9	12.5

Course Outcome (CO):

After the completion of the course students will be able to

CO1. Recall the basic concepts of object oriented programming.

CO2. Identify the Java language features and programming constructs.

CO3. Demonstrate the concepts of classes, objects, constructors, method overloading, access control, inheritance and polymorphism.

CO4. Examine the use of packages and interface.

CO5. Apply the concepts of multithreading and exception handling to develop efficient and error free codes.

CO6. Evaluate the application using of collection framework, generics to solve real life problem.

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