B.TECH/IT/4TH SEM/INFO 2202/2022

OBJECT ORIENTED PROGRAMMING
(INFO 2202)

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) Protected members are accessible from
(a) only within the owner class (b) within owner class hierarchy only
(c) within the package only (d) none of the above.

(ii) Identify the output of the following program.
String str = "Hellow";
System.out.println(str.indexOf('t));
(a) 0 (b) false (c) true (d) -1.

(iii) How many public classes can be there in a java source code?
(a) 1 (b) 2 (c) any number (d) 0.

(iv) To which of the following does the class string belong to.
(a) java.lang (b) java.util (c) java.io (d) java.string.

(v) What do you mean by chained exceptions in Java?
(a)Exceptions occurred by the VirtualMachineError
(b) An exception caused by other exceptions
(c) Exceptions occur in chains with discarding the debugging information
(d) None of the above.

(vi) What will be the output of the following program?

```
public class Test2 {
 public static void main(String[] args) {
     StringBuffer s1 = new StringBuffer("Complete");
     s1.setCharAt(1,'i');  s1.setCharAt(7,'d');
     System.out.println(s1);
   }
 }
```

(a) Complete (b) Iomplede (c) Cimpletd (d) Coipletd.

(vii) What will be the output of the following code snippet?

```
public class Solution{
    public static void main(String[] args){
            byte x = 127;
            x++; x++;
System.out.print(x);
    }
}
```

(a) 129 (b) 2 (c) -127 (d) 0.

(viii) What is the output of the below Java program with an abstract class?

```
final abstract class Bell { }
class DoorBell extends Bell{
DoorBell() {
System.out.println("DoorBell ringing..");
 }
}
public class AbstractClassTesting2{
 public static void main(String[] args) {
  Bell bell = new DoorBell();
 }
}
```

(a) DoorBell ringing. (b) No output
(c) Compiler error (d) None of the above.

(ix) Identify the output of the following program.

```
String str = “abcde”;
System.out.println(str.substring(1, 3));
```

(a) abc (b) bc (c) bcd (d) cd.

(x)

```
public class Test{
static int start = 2;
final int end;
public Test(int x) {
        x = 4;
        end = x;
}
public void fly(int distance) {
        System.out.println(end-start+" ");
        System.out.println(distance);
}
  public static void main(String []args){
new Test(10).fly(5);
  }
}
```

What will be the output of the given code?

(a) Compilation Error (b) 8 5 (c) 13 (d) 2 5.

Group- B

2. (a) Compare the concept of generalization and specialization using proper java code example. [(CO1)(Analyse/IOCQ)]
   (b) "Java is not a purely object-oriented programming language" – Justify this statement. [(CO1)(Evaluate/HOCQ)]
   (c) Compare the concepts of IS-A, HAS-A and PART-OF relationships with Java code examples. [(CO1)(Evaluate/HOCQ)]

4 + 2 + 6 = 12

3. (a) "Static variables are class variables." – Justify this statement. [(CO3)(Remember/LOCQ)]
   (b) What will be the output of the following code? Explain your answer.

```
String[] ary = {"KITE", "AIR"};
String str = "PLANE";
ary[1] = str;
str = "FLY";
System.out.println(ary[1]);
```

[(CO2)(Evaluate/HOCQ)]

   (c) Explain the concept of garbage in Java with example. Can we execute the garbage collector manually? [(CO3)(Remember/LOCQ)]
   (d) What is the output of the following program? Explain your answer.

```
public class Test{
private static int value = 20;
publicint s = 15;
public static int temp = 10;
public static class Nested    {
private void display()     {
System.out.println(temp + s + value);
    }
  }
public static void main(String args[])    {
Test.Nested inner = new Test.Nested();
inner.display();
  }
}
```

[(CO2)(Evaluate/HOCQ)]

2 + 3 + (2 + 1) + 4 = 12

Group - C

4. (a) Write a Java program to create a class Complex having private int variables real and imaginary and the following public methods:
   (i) getData() - reads complex number from user
   (ii) printData() - prints complex number as x+iy
   (iii) addCom(Complex) - Adds two complex data and returns resultant Complex value

(iv) multCom(Complex,Complex) - multiplies two Complex data and returns the result. [(CO4)(Analyze/IOCQ)]

(b) "It is possible to implement multiple inheritance in Java" - Criticize this statement. [(CO5)(Evaluate/HOCQ)]

(c) "It is better to import only the required class instead of the entire package" - Give proper reason for your agreement or disagreement on this statement. [(CO3)(Evaluate/HOCQ)]

8 + 2 + 2 = 12

5. (a) What is the difference between abstract class and interface? Explain with code examples. [(CO5)(Understand/LOCQ)]

(b) While we write
String str="Abcd";
str="Pqrs";
How string str is remaining immutable here? Explain. [(CO3)(Analyze/IOCQ)]

(c) What is the difference between reference and objects? Why super class's reference can refer to sub class's objects but the reverse is not true? [(CO3)(Understand/LOCQ)]

(d) What will be the output of the following code snippets? Explain your answers, also in case of compilation errors (if any)

(i)
```
public class Prg {
public static void main(String args[]){
System.out.print(20+ 1.34f + "A" + "B");
   }
}
```

(ii)
```
class Result{
public static void main(String args[])    {
      B b = new B();
System.out.println("x = " + b.getResult(0, 1));
   }
}
class A{
final public intgetResult(int a, int b) { return a * b; }
}
class B extends A{
publicintgetResult(int a, int b) { return a + b; }
}
```

[(CO2)(Analyze/IOCQ)]

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

Group - D

6. (a) What is the difference between throw and throws in Java. Explain with code examples. [(CO5)(Understand/LOCQ)]

(b) Design an user defined exception to handle the exception for email id format error. [(CO4)(Apply/HOCQ)]

(c) "Catch block to handle Exception class should be the last one in case of try with multiple catch." – Justify. [(CO5)(Evaluate/HOCQ)]

4 + 5 + 3 = 12

7. (a) Explain BufferedReaderbr=new BufferedReader (new InputStreamReader (System.in)) [(CO5)(Understand/LOCQ)]

(b) What is the advantage of using PrintWriter and Scanner classes for I/O operations? Explain. [(CO5)(Analyze/IOCQ)]

(c) Write a Java code to read a list of names present in an input file, sort them and store the sorted list in another file. [(CO4)(Apply/IOCQ)]

2 + 3 + 7 = 12

Group - E

8. (a) What is the difference between blocked, sleep and wait states in the Thread Life-Cycle in Java? [(CO5)(Remember/LOCQ)]

(b) When should one go for implementing Runnable interface instead of extending Thread class while creating threads in Java program? Justify your answer. [(CO5)(Evaluate/HOCQ)]

(c) Using a Java program demonstrate how interdependency between child thread and main thread can be created. [(CO4)(Understand/LOCQ)]

5 + 3 + 4 = 12

9. (a) State the difference between applet and swing. [(CO6)(Understand/LOCQ)]

(b) Which packages are required to develop an applet program and why are they required? [(CO4)(Apply/IOCQ)]

(c) Write a Java program to create two Java threads among which one will sort the elements of an array and the other will find the average of the array elements parallelly. Both the threads will return their results to the parent thread where the parent thread will insert the average value into the correct position in the sorted array. [(CO6)(Remember/LOCQ)]

3 + 2 + 7 = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	37.50	31.25	31.25

Course Outcome (CO):

After the completion of the course students will be able to

1. Recall the knowledge of procedural language and map it to paradigm of Object oriented concept.
2. Relate the real world problem with object oriented approach.
3. Describe and illustrate the features of object oriented programming.

4. Analyze any real world problem with object oriented approach and formulate a solution for the same.
5. Manage the complexity of procedural language by using the concept polymorphism, inheritance, abstraction, and encapsulation.
6. Create and explain some GUI and thread based application

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