CLASS: BTECH
BRANCH: CSE/ AIML

SEMESTER : III/ADD
SESSION : MO/2024

SUBJECT: CS233 OBJECT ORIENTED PROGRAMMING & DESIGN PATTERNS

TIME: 3 Hours

FULL MARKS: 50

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Before attempting the question paper, be sure that you have got the correct question paper.
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

			CO	BL
Q.1(a)	Explain the characteristics of Object-oriented Programming. How to achieve data hiding in java .	[3+2]	1	1,2

Q.1(b)	Briefly discuss about JVM heap and stack memory.
	Two strings are defined as follows:
	String st1 = "JAVA"; //Line 1
	String st2 = new String("JAVA"); // Line 2
	What is the difference between Line 1 and Line 2?
		[3+2]	2	1

Q.2(a)	(i) Identify the error, if any in the following java class. Justify your answer properly.	[2+3]	2	4

```
public class A{

        private int var1 = 10;
        private static int var2 = 20;

        public static void method1(int param){
                System.out.println(var1+param);
        }

        public void method2(int param){
                System.out.println(var2 + param);
        }
}
```

(ii) Given a super class "A" and its subclass "B", and "A" has a function f1.
Consider the following scenario and answer accordingly
  (i)   "B" also has a function f1 with the same parameter list and same
          return type. What condition does this represent?
  (ii)   "B" also has a function f1 with the same parameter list and different
          return type. What condition does this represent?
  (iii)   "B" also has a function f1 with different parameter list but same return
          type. What condition does this represent?

Q.2(b)   [5]   2   3

Suppose you have a matrix of positive integers with m rows and n columns. Write a program in java that will find all the duplicate elements in the matrix and then sort them (the duplicate elements) to convert into a final number.

For example, suppose you took a 3X4 positive integer matrix as follows:

3	5	9	6
1	8	5	2
7	1	3	9

So, duplicate elements are 3, 5, 9, 1 After sorting it will be 1,3,5, 9. Then, convert it into a single number: 1359.

Q.3(a)   (i) Explain the two usages of super keyword in Java with examples.   [2+3]   2   2,4
          (ii) A super class has a static variable defined in it with default access specifier.
          Does the subclass inherit this static variable? If yes then how do we access it from
          the subclass. Explain with example.

Q.3(b)   (i) Assume the following scenario.   [2+3]   2   4
          Consider a java program, which contains two interfaces, namely interfaceA and
          interfaceB, and a class 'Test'. Both interfaces have a default method with same
          name and signature. The class 'Test' implementing both interfaceA and interfaceB.
          Is this java program will be compiled without any error? Justify your answer.
          (iii) Differentiate between an abstract class and an interface.

Q.4(a)   What is the advantage of catching more specific exceptions before more general   [1+2+2]   2   3
          ones? Provide an example where multiple exceptions are caught. Differentiate
          between finally { } and finalize().

Q.4(b)   Write a Java program to open a file called "ABC.txt" in Byte stream and read the   [5]   4   3
          contents into a byte array. Open another file "XYZ.txt" and copy only the words
          that start with a vowel.

Q.5(a)   Explain the lifecycle of a Thread in Java with a proper diagram. What is the   [3+2]   5   3, 4
          significance of yield() and wait() method?

Q.5(b)   Differentiate between '==' and 'equals( )' in the context of string handling, with   [2+3]   4   3, 4
          a suitable example.

Write a Java function that validates an email address using regular expressions. The function should return true if the email is valid (i.e., contains a username (any length), "@" symbol, a dot (.) and a domain (3 letters), and false otherwise. Implement the regular expression that captures this pattern, and explain your approach

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