Qn. Set Code-7

Semester: 3rd
Programme: B.Tech
Branch: CSSE, IT

AUTUMN END SEMESTER EXAMINATION-2024

3rd Semester B.Tech

OBJECT ORIENTED PROGRAMMING USING JAVA

CS20004 / IT20004 / CM20004

(For 2024 (L.E), 2023 & Previous Admitted Batches)

Time: 2 Hours 30 Minutes | Full Marks: 50

Answer any FIVE questions.
Question paper consists of two SECTIONS i.e. A and B.
Section A is compulsory.
Attempt any Four question from Sections B.
The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable and all parts of a question should be answered at one place only.

SECTION-A

1. Answer the following questions. [1 × 10]

(a) Differentiate encapsulation from abstraction. Can a single class achieve both at the same time?

(b) If you compile a Java program on Windows, can it run on a Linux machine without recompiling? Justify your answer.

(c) Find the output / error for the below code with brief justification -

```
class Parent {
    static void display() {
        System.out.println("Display from Parent");
    }
}
```

```
class Child extends Parent {
    static void display() {
        System.out.println("Display from Child");
    }
}
public class Test {
    public static void main(String[] args) {
        Parent obj = new Child();
        obj.display();
    }
}
```

(d) Why does Java not allow a constructor to be final?

(e) What is the purpose of join method in multi-threading?

(f) Write the output of the following java code -

```
class B32 {
 public static void main (String args[]){
   String s1= "pqr";
    String s2= new String("pqR");
   System.out.println("s1 compare s2 :"+ s1.compareTo(s2));
    System.out.println("s1 == s2 :"+(s1==s2));
   }
 }
```

(g) Differentiate between the StringBuilder and StringBuffer classes in Java.

(h) Explain the purpose of package in Java.

(i) Can we write constructor in abstract class (Y/N)? State with justification.

(j) How do you write output to the console using the PrintWriter class in Java?

SECTION-B

2. (a) Write a Java program that defines an array to store information about students, including their names, IDs, and grades. Implement various operations to manage this array, such as adding a new student, displaying the details of all students, and calculating the average grade of the students. [5]

   (b) Create a class in Java named Employee with a method calculate Salary(). Then, derive two subclasses- manager and staff, which override the calculate Salary() method to provide their specific salary calculations such as manager gets special Allowance and staff gets Bonus. In the main program, illustrate Dynamic Method Dispatch technique by creating instances of these subclasses. [5]

3. (a) Write a Java program that takes two strings as input and checks if they are anagrams of each other (i.e., if they contain the same characters in different orders). Ignore case and spaces while comparing. [5]

   (b) Write a program to read the content of a file and convert all letters to lowercase and write it into another file. Get names of the input file and output file from the user through standard input. [5]

4. (a) Design a Java program that defines a class named Shape, which includes a data member area and a member function show Area(). Next, create its two subclasses, Circle and Rectangle. Each subclass should have the appropriate data members and methods to calculate and display the area of the circle and rectangle, respectively. Ensure that your program demonstrates the functionality of these classes effectively. [5]

   (b) How multiple inheritance is achieved in Java? Explain with a suitable example. [5]

5. (a) Explain the roles of the keywords try, catch, throw, and throws in Java exception handling. Provide a brief example for each keyword to illustrate its usage in handling exceptions. [5]

(b) In a banking application, it's essential to maintain a minimum balance to ensure account validity. Write a Java program that demonstrates the use of a user-defined exception – Insufficient Balance. The program should throw an exception whenever the account balance falls below ₹1000, indicating that the account has insufficient funds to proceed with a transaction. Ensure to handle this exception appropriately in your program. [5]

6. (a) What is synchronization in Java? Discuss how 'synchronized' keyword help to prevent thread interference with example. [5]

(b) Develop a Java program that reads a text file specified by the user and displays the following statistics: the total number of characters, the number of lines and the number of words contained within the file. The program should prompt the user to enter the file name and handle potential errors, such as the file not existing. [5]

7. (a) Design a program in Java to insert values like rollno, name and age into a Student database where the values are given by user. [5]

(b) Design a user registration form for a Java application using Swing, incorporating four common Swing components such as Label, TextBox, Button, RadioButton. The form should include fields for username, email, gender and contact number and upon clicking the button, the textbox should display "Submitted". [5]

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