VIT
Vellore Institute of Technology
CHENNAI

Reg. Number:	

Continuous Assessment Test (CAT) – II April 2024

Programme	:	MCA	Semester	:	Winter Sem 23-24
Course Code & Course Title	:	PMCA502L & Java Programming	Class Number	:	CH2023240501374
Faculty	:	Dr. K. Madheswari	Slot	:	D1+TD1
Duration	:	90 minutes	Max. Mark		50

General Instructions:

- Write only your registration number on the question paper in the box provided and do not write other information.
- Use statistical tables supplied from the exam cell as necessary
- Use graph sheets supplied from the exam cell as necessary
- Only non-programmable calculator without storage is permitted

Answer all questions

Q. No	Sub Sec.	Description	Marks
1		Write the Java program by defining two arrays : **Fruits** - A string array to store the names of fruits and **Costs** - A double array to store the costs of fruits. • Prompt the user to input the name and cost of each fruit, storing the information in the respective arrays. (Say N) • Display the list of fruits and their costs. • Define a method **sortArrays** to sort the fruits and costs arrays in ascending order based on the costs. • Define another method called **applyDiscount** to offer a 4% discount on each fruit's cost. • Create a method named **displayLowestAndHighestCostFruit** to display the fruit with the lowest and highest costs after applying the discount.	10
2		Define a base class called **Vehicle**, and create two derived classes: **Car** and **Bicycle**. The Vehicle class should contain attributes such as the brand and price of the vehicle, along with a method to calculate the total cost of ownership over a specified 'N' of number of years. The **Car** class should extend Vehicle and include additional attributes like the number of seats, and override the ownership cost by including both maintenance and fuel expenses. Similarly, the **Bicycle** class should extend Vehicle, with its unique attribute being the number of gears, and override the ownership cost calculation to include maintenance expenses. As a programmer, write the java program to implement the above scenario and display the results. **Note:** • Provide a detailed class diagram illustrating the relationships between the classes. • Consider 2% of depreciation per year for calculating total owner ship cost.	10

3		Design a Java calculator application using object-oriented principles. Follow the steps below to complete the task: **Define an abstract class Calculator with the following specifications:** • Include three abstract methods for addition, subtraction, and power. • Define two concrete methods for multiplication and division. **Implement three subclasses:** • TwoVariableCalculator to handle operations with two variables. • ThreeVariableCalculator to handle operations with three variables. • FourVariableCalculator to handle operations with four variables. • Write appropriate methods in each subclass to implement the abstract methods for addition, subtraction, and power. **In the main method of the Main class:** • Create instances of the TwoVariableCalculator, ThreeVariableCalculator, and FourVariableCalculator. • Perform sample calculations such as addition, subtraction, multiplication, division, and power using each instance. • Display the results of the calculations.	10
4		Design a class named ExceptionDemo with methods to demonstrate handling of each of these exceptions. • Implement a method parseNumber(String str) that takes a string str as input and attempts to parse it into an integer. Handle the NumberFormatException gracefully and prompt the user to enter a valid numeric string. • Develop a method accessNullPointer(String[] arr) that tries to access an element of the array 'arr' at index 5. Handle the NullPointerException by displaying a custom error message indicating that the array is null or insufficient in size. • Create a method readFile(String fileName) to read the content of a file specified by fileName. Handle the FileNotFoundException and notify the user appropriately if the file is not found. • Finally, implement a method accessArrayIndex(int[] nums) that attempts to access the element at index 10 of the array nums. Catch the ArrayIndexOutOfBoundsException and notify the user about the invalid index access. Write the java application to implement the about scenario	12
5		Design a simple Java application to represent geometric shapes by declaring an interface named Shape with the following methods: **double area():** This method should return the area of the shape. **double perimeter():** This method should return the perimeter of the shape. **Implement two classes:** Rectangle and Circle, each representing a specific geometric shape: • Rectangle class implements Shape interface and include appropriate attributes such as length, width and methods **area** () and **perimeter** () to compute area and perimeter of a rectangle. • Circle class also implement the Shape interface with attributes such as radius and methods **area** () and **perimeter** () to compute area and perimeter of a circle.	8

**********All the best **********