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B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

June 2025 Semester End Main Examinations

Programme: B.E. **Semester: III**

Branch: Computer Science and Engineering **Duration: 3 hrs.**

Course Code: 23CS3PCOOJ **Max Marks: 100**

Course: Object Oriented Java Programming

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

		UNIT - I	*CO*	*PO*	Marks
1	a)	"Classes and objects are not fundamentally the same". If this statement is true, then justify your claim by providing striking differences between them.	*CO 1*	*PO1*	**5**

	b)	Analyze the output of the following program:
		class Test {
		static int counter = 0;
		final String instanceName;
		public Test(String name) {
		this.instanceName = name;
		counter++;
		}
		public static int getCounter() {
		return counter;
		}
		public void display() {
		System.out.println("Instance Name: " + this.instanceName);
		System.out.println("Total Instances: " + Test.getCounter());
		}
		}
		public class Main {
		public static void main(String[] args) {
		Test obj1 = new Test("Object1");
		Test obj2 = new Test("Object2");
		obj1.display();
		obj2.display();
		System.out.println("Final Count of Instances: " + Test.getCounter());
		System.out.println("Total static counter value after all instances: " + Test.counter);
		System.out.println("The final name of the second instance: " + obj2.instanceName);
		}
		}
			CO 2	*PO 2*	**7**

		c)	Design a simple java program with classes and objects to calculate current market stock price if shares go up by 23%. The Output of the program should be similar to the sample output given below: Expected Output: Stock Name: ABC Corp Current Price: Rs 100.0 New Price after 23.0% increase: Rs 123.0	*CO 3*	*PO 3*	**8**
			OR			
	2	a)	Outline and explain various primitive data types with valid examples.	*CO 1*	*PO 1*	**5**
		b)	Differentiate between constructors and methods. Also explain a functional program as an example that depicts the same.	*CO 2*	*PO 2*	**7**
		c)	Design a modular Java program that takes user inputs for customer name, units consumed, and rate per unit to calculate the electricity bill: Formula: billAmt=unitsConsumed*ratePerUnit. Customize the program to accommodate multiple customers and display the final bill.	*CO 3*	*PO 3*	**8**
			UNIT - II			
	3	a)	Consider that you are building a library system and need to represent different types of books. Use inheritance to create a class called Book and derived classes EBook and AudioBook. Show how a function named "displayInfo" is overridden in the subclasses. Note: Book Class has: title, author , price. EBook Class has a fileSize while the AudioBook Class has duration.	*CO 3*	*PO 3*	**8**
		b)	Identify the various types of inheritance that exist in the Java programming language. Explain the same using suitable syntax.	*CO 1*	*PO 1*	**6**
		c)	Specify the return type of the following methods that belong to the string class while briefly explaining their functionalities. trim(), toLowerCase(), matches(), indexOf(), charAt() and substring()	*CO 1*	*PO 1*	**6**
			OR			
	4	a)	KIA motors are updating their software to accommodate their new range of two wheelers, in this scenario you as an employee are tasked with creating a program for a vehicle management system. The system should define a hierarchy of vehicles with common and specific functionalities. As a good programmer with a vision of code reusability and easy upgradation you develop an incomplete class which can be used by any mode of transport. The super class has to have a compulsory method that displays the message saying "KIA motors since 1944". The subclasses should override at least 2 methods of the parent class while displaying the above message. You may choose cars and bikes as the two variants of this class and give the implementation to display the colour with	*CO 3*	*PO 3*	**8**

			model name and calculate its fuel consumption given the fuel efficiency. Formula: fuelConsumption=distance / fuelEfficiency			
		b)	Method Overloading and Method Overriding sound very similar, but are they actually the same? Justify your claim with a suitable example.	*CO 1*	*PO 1*	**6**
		c)	Identify the number of constructors that exist in a StringBuffer class. Outline them with valid syntaxes.	*CO 2*	*PO 2*	**6**
			UNIT - III			
	5	a)	Design a system to manage smart home appliances like Lights, Fans, and Air Conditioners. Use an interface to define common functionality like turning the appliance on and off. Define an interface SmartAppliance with Methods: void turnOn() void turnOff() Create the following classes that implement the SmartAppliance interface: Light: Includes additional behavior for dimming. Fan: Includes additional behavior for adjusting speed. AirConditioner: Includes additional behavior for setting temperature. In the main class, create objects of each appliance, turn them on, perform the additional behavior, and then turn them off.	*CO 3*	*PO 3*	**10**
		b)	List and explain any 10 built in exceptions in Java	*CO 1*	*PO 1*	**10**
			OR			
	6	a)	Design a program that demonstrates handling of exceptions in inheritance tree. Create a base class called "Father" and a derived class called "Son". In Father class, implement a constructor which takes the age and throws the exception WrongAge( ) when the input age<0. In Son class, implement a constructor that uses both father and son's age and throws an exception if son's age is >=father's age.	*CO 3*	*PO 3*	**10**
		b)	Differentiate between abstract classes and interfaces while providing a suitable example for each.	*CO 1*	*PO 1*	**10**
			UNIT - IV			
	7	a)	What are the different methods of creating a thread? Explain the advantages and disadvantages of using those techniques.	*CO 1*	*PO 1*	**6**
		b)	Explain briefly different methods of the thread class that are used to control a thread.	*CO 1*	*PO 1*	**4**
		c)	Write a java program to print multiplication table of 2 and 10 in a synchronous manner. Use either synchronized method or synchronized block by creating two threads.	*CO 3*	*PO 3*	**10**
			OR			
	8	a)	Outline the different types of threads that exist in Java programming and explain their functionalities and features.	*CO 1*	*PO 1*	**6**

		b)	Explain the Java Streams classifications briefly.	*CO 1*	*PO 1*	**4**
		c)	Write a multi-threaded Java program to print numbers from 1 to 20. Where, Thread 1: Prints all odd numbers and Thread 2: Prints all even numbers. Ensure the numbers are printed sequentially (e.g., 1, 2, 3, 4, ...).Note: Use methods wait() and notifyAll()	*CO 3*	*PO 3*	**10**
			UNIT - V			
	9	a)	Explain the AWT class hierarchy with a neat diagram.	*CO 1*	*PO 1*	**6**
		b)	Write a java program using the abstract window toolkit to draw a 10 sided polygon in the form of a star and fill the same with red colour.	*CO 3*	*PO 3*	**6**
		c)	Develop a Java program that changes the background and foreground colors (random colors of your choice) on the press of the left mouse button and changes to default colors when the mouse is released.	*CO 3*	*PO 3*	**8**
			OR			
	10	a)	Explain the delegation event model with a neat diagram.	*CO 1*	*PO 1*	**6**
		b)	Write a java program using the abstract window toolkit to draw a circle using only arcs and the circumference is blue in colour.	*CO 3*	*PO 3*	**6**
		c)	Write a java program that can incorporate any five MouseListener methods to develop a cohesive program.	*CO 3*	*PO 3*	**8**

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