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

Autonomous Institute Affiliated to VTU

January / February 2025 Semester End Main Examinations

Programme: B.E.   **Semester: V**

Branch: Artificial Intelligence and Machine Learning   **Duration: 3 hrs.**

Course Code: 22AM5PCOPJ   **Max Marks: 100**

Course: Object Oriented Programming using Java

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

<div style="writing-mode: vertical">**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.</div>

				CO	PO	Marks
			UNIT - I	*CO*	*PO*	**Marks**
1	a)		Explain the role of bytecode in Java.	*CO1*	*PO1*	**5**
	b)		Design a class to represent a bank account. Which include contains account number, name of the depositor, type of the account, balance amount in the account. Use constructors to assign initial values, to Deposit an amount, to Withdraw amount after checking balance, to display name and balance.	*CO2*	*PO2*	**8**
	c)		Describe the use of `this` keyword with an example.	*CO1*	*PO1*	**7**
			OR			
2	a)		Create a class to represent a Library. The class should include attributes such as bookID, title, author, genre, and availabilityStatus. Use constructors to initialize these attributes. Provide methods to: Borrow a book: Update the availability status if the book is available. Return a book: Mark the book as available. Display book details: Print the book's title, author, and availability status. Write a program to demonstrate these functionalities.	*CO2*	*PO2*	**10**
	b)		Explain the significance of garbage collection in Java and illustrate how `finalize()` works.	*CO1*	*PO1*	**10**
			UNIT - II			
3	a)		Define inheritance and explain the role of `super` with an example.	*CO1*	*PO1*	**5**
	b)		Create an abstract class called Vehicle that contains two attributes: speed and capacity, along with an abstract method named displayDetails(). Class contains three subclasses named Car, Bike, and Bus, each extending the Vehicle class. In each subclass, implement the displayDetails() method to print specific details	*CO2*	*PO2*	**10**

			about the vehicle type, such as speed, capacity, and any unique feature of that vehicle.			
		c)	Explain how interfaces can be extended with an example.	*CO1*	*PO1*	**5**
			OR			
4	a)		Write a program to implement multiple inheritance using interfaces in Java.	*CO1*	*PO1*	**10**
	b)		Assume that there are two different companies: one develops a student package and other develops a staff package containing relevant classes. Implement a simple university system that makes use of classes provided by these two packages.	*CO3*	*PO2*	**10**
			UNIT - III			
5	a)		Explore the characteristics of **enum** in Java by creating a public enum named **Season** with constants SPRING, SUMMER, FALL, and WINTER. The enum should have two instance methods: 1. **boolean isHot()**: Returns `true` for SUMMER and `false` for the other seasons. 2. **boolean isCold()**: Returns the opposite of `isHot()`. Write a program that demonstrates how this enum can be used by implementing a method that takes a **Season** as an argument and prints a message depending on whether the season is hot or cold.	*CO3*	*PO2*	**8**
	b)		Write a program to read from a file and count the number of words.	*CO3*	*PO2*	**8**
	c)		Explain the `StringBuffer` class and its methods with examples.	*CO1*	*PO1*	**4**
			OR			
6	a)		Illustrate any two string handling functions in Java. For the given string "The whole world is suffering from Economic crisis" Using appropriate string methods. Perform the following: i. Replace "Economic" with "Pandemic" and print the new string. ii. Return the index of the letter 'w'. iii. In the given string, check if a word starts with "su". iv. In the given string, check if a word ends with "mic".	*CO1*	*PO1*	**10**
	b)		Explain the role of character streams in Java I/O with an example.	*CO2*	*PO1*	**10**
			UNIT - IV			
7	a)		Given two integers x and y as input, compute x/y. Implement a class which raise an exception if x and y are not signed integers or if y is zero.	*CO3*	*PO3*	**8**
	b)		Describe life cycle of thread with suitable diagram.	*CO1*	*PO1*	**5**
	c)		Elucidate Exception hierarchy in java also explain the following with examples: i. Uncaught exceptions ii. Multiple catch clauses	*CO1*	*PO1*	**7**
			OR			

	8	a)	Write a java program that correct implements of producer consumer program implements Runnable	*CO1*	*PO1*	**10**
		b)	Write a Java program that implements a multi-thread application that has three threads. First thread generates a random integer for every 1 second; second thread computes the square of the number and prints; third thread will print the value of cube of the number.	*CO3*	*PO3*	**10**
			UNIT - V			
	9	a)	Explain the Delegation Event Model in Java.	*CO1*	*PO1*	**6**
		b)	Describe the steps to create a windowed program using AWT.	*CO1*	*PO1*	**6**
		c)	Write a program to handle key events and mouse events in a frame.	*CO2*	*PO1*	**8**
			OR			
	10	a)	Write a program to draw shapes (circle, rectangle, and line) using Java's AWT library.	*CO1*	*PO1*	**10**
		b)	Explain the key differences between event sources and event listeners with examples.	*CO2*	*PO1*	**10**

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