

Model Question Paper**Second Semester MCA Degree Examination****Object-Oriented Programming with Java****Time: 3 Hours****Max. Marks: 100**

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M: Marks, L: RBT (Revised Bloom's Taxonomy) level, C: Course outcomes.*

Module -1			M	L	C
Q1	a.	Explain the concept of Polymorphism in Java. Demonstrate the types of Polymorphism with a suitable example.	10	L2	CO1
	b.	Demonstrate the process of type conversion in Java. Discuss the different types of type conversion available, provide code examples for each type. Explain the potential issues that can arise with each type.	10	L2	CO1
OR					
Q2	a.	Summarize the different access control levels and their application in securing sensitive data in Java. Give example for each.	10	L2	CO1
	b.	Classify different types of constructors in Java. Explain how Constructors in Java supports Object Oriented Programming features.	10	L2	CO1
Module- 2					
Q3	a.	Demonstrate how Command Line Arguments work in Java. Write a Java code to print grade card of a student by passing USN, Name and marks through Command Line Argument.	10	L2	CO1
	b.	Explain the role of JVM in the Java environment. Demonstrate how it contributes to Java's Platform Independence?	06	L2	CO1
	c.	Compare the usage of for-each looping with for statement in Java. Give example	04	L2	CO1
OR					
Q4	a.	Compare any five methods from Java String class. Explaining their functionalities and differences. Give examples for each.	10	L2	CO1
	b.	Summarize the switch statement in Java with syntax and functionality. Illustrate with examples how switch statement handles different case labels and the default case.	06	L2	CO1
	c.	Classify the Jumping statements used in java based on their functionality. Give examples.	04	L2	CO1
Module – 3					
Q5	a.	Build a payroll management system using multi-level inheritance in Java Consider the following requirements: <ul style="list-style-type: none"> Create an Employee class with attributes like EmployeeID and Name. 	10	L3	CO2

	<ul style="list-style-type: none"> • Create a Salary class that extends Employee and adds attributes like basicSalary and allowance. • Create a Deduction class that extends Salary and calculates the tax and netSalary. • Implement methods to display employee details, salary details, and net salary. 			
b.	<p>Construct a bank account system using method overriding in Java. Consider the following requirements:</p> <ul style="list-style-type: none"> • Create an Account class with methods deposit(), withdraw(), and displayBalance(). • Create subclasses SavingsAccount and CheckingAccount that extend the Account class and override the withdraw() method to implement specific withdrawal rules. • Add additional methods addInterest() to SavingsAccount and writeCheck() to CheckingAccount. • Demonstrate the usage of method overriding by creating objects of different account classes and performing transactions. 	10	L3	CO2

OR

a.	<p>Make use of Interface to achieve following inheritance structure in Java.</p> <pre> classDiagram class Circle class Rectangle class Shape Circle -- > Shape Rectangle -- > Shape </pre> <p>Note: Use suitable variables and methods for classes and interface to calculate the area of Circle and Rectangle. Use super keyword to access members and constructor of super class.</p>	10	L3	CO2
b.	<p>Create a subclass Car that inherits from a superclass Vehicle. The Vehicle class has a constructor that takes a brand parameter and a method printBrand() that prints the brand. The Car class should have additional fields model and year and a method printCarDetails() that prints the brand, model, and year.</p> <p>Identify the use of super keyword in java. Demonstrate how super keyword can be used access the members and constructors of super class.</p>	10	L3	CO2

Module – 4

a.	<p>Make use of Java Build in Exception Handling classes to handle the different Exceptions and re-write the java code with Exception handling code.</p> <ol style="list-style-type: none"> Divide an integer by zero. Access an array element with an index that is out of bounds. 	10	L3	CO3
b.	<p>Write a Java program that attempts to read a file named "clientData.txt" from the system. If the file does not exist, the program should handle the exception properly and display a user-friendly message: "File not found". Explain the mechanism of handling Exception in Java.</p>	10	L3	CO3

OR

Q8	a.	<p>Write a Java code that requires validation of enter their username and password. Validate the username to ensure it meets the following criteria:</p> <ul style="list-style-type: none"> • Is at least 8 characters long • Contains at least one uppercase letter • Contains at least one lowercase letter • Contains at least one digit <p>. Validate the password to ensure it meets the following criteria:</p> <ul style="list-style-type: none"> • Is at least 10 characters long • Contains at least one uppercase letter • Contains at least one lowercase letter • Contains at least one digit • Contains at least one special character (!, @, #, \$, etc.) <p>If either the username or password is invalid, manually throw a RuntimeException with a meaningful error message. Handle the exception and print an error message to the user.</p>	10	L3	CO3
	b.	<p>Build a Java program that manages a university's course registration system. The program should include a user defined exception to handle course enrollment limits exceeded. The custom exception should include the course code, current enrollment, and a descriptive error message. Explain the purpose of the I user defined exception in Java and its role in exception handling</p>	10	L3	CO3
Module - 5					
Q9	a.	<p>Construct three separate threads to perform mathematical operations:</p> <ul style="list-style-type: none"> • Thread 1: Calculate the square of a number • Thread 2: Calculate the cube of a number • Thread 3: Find the square root of a number <p>Demonstrate the usage of wait(), sleep(), suspend(), notify() and resume() methods to handle thread communication.</p>	10	L3	CO4
	b.	<p>Write a Java code which constructs thread to create a ticket booking system with methods such as book() and cancel() where multiple users (threads) are trying to book tickets from a shared pool. The method is synchronized to ensure that no two users can book the same ticket at the same time, and exception handling is used to manage cases where the requested tickets exceed the available tickets.</p>	10	L3	CO4
OR					
Q10	a.	<p>Develop a java code which creates a class called Calculation by implementing Runnable interface, which accepts 3 integers as input, calculates basic arithmetic operation on 3 integers and display the results separately. Explain how implementing Runnable interfaces is benefits over extending the Thread class.</p>	10	L3	CO4
	b.	<p>Build a Java program that construct three separate threads to perform the following operations.</p> <ul style="list-style-type: none"> • Thread 1: Display the natural numbers from 1 to 100. • Thread 2: Display even numbers from 2 to 100 • Thread 3: Display odd numbers from 1 to 99. <p>Set Thread Properties so that thread 2 must run at beginning followed by thread 3 and at last thread 1 must be executed.</p>	10	L3	CO4
