Graphic Era
HILL UNIVERSITY
Established by an Act of the State Legislature of Uttarakhand (Uttarakhand Sarkar ka 12 of 2011)
University under section 2(f) of UGC Act, 1956

Term Evaluation (Even) Semester Examination March 2025

Roll no.....

Name of the Course and semester: MCA 2
Name of the Paper: Advanced Java Programming
Paper Code: TMC202
Time: 1.5 hour Maximum Marks: 50

Note:

(i) Answer all the questions by choosing any one of the sub questions
(ii) Each question carries 10 marks.
(iii) Please specify COs against each question.

Q1. (10 Marks) CO1

a. Provide a detailed explanation of the Java Virtual Machine (JVM) and its various components. Additionally, include a well-structured, clear, and neatly labeled diagram that visually represents the JVM and its key components to enhance understanding.

OR

b. Define any three terms in the context of Java:
(i) Class
(ii) method overriding
(iii) Dynamic Method dispatch
(iv) Garbage Collection

Q2. (10 Marks) CO1

a. Explain the difference between default constructor and parameterized constructor with suitable examples in Java. Is it possible to define a constructor in an abstract class and explain the reason.

OR

b. Explain command-line arguments in Java with an example. How can they be accessed in a Java program, and what is their significance? Write a Java program that accepts number as command-line arguments, calculate the factorial of that number, and displays the result. If the user does not provide argument, display an error message.

Q3. (10 Marks) CO1

a. Explain the key differences between mutable and immutable strings in Java, providing appropriate examples to illustrate their behavior. Additionally, compare the equals() method when used with objects of the String class and StringBuffer class by demonstrating their functionality through Java code. Furthermore, provide a detailed comparison between the equals() method and the equality operator (==), highlighting their differences in how they compare objects in Java, along with relevant examples to clarify their usage.

OR

b. Explain the concept of a Jagged Array in Java. How does it differ from a regular two-dimensional array? Write a Java program to create and display a jagged array with different column sizes in each row.

Q4. (10 Marks) CO1

a. Explain the concept of multilevel inheritance in Java. How does Java handle the order of constructor execution in a multilevel inheritance hierarchy? Provide an example to illustrate your explanation.

OR

b. Explain wrapper classes in Java, their importance, and the commonly used methods of wrapper classes. Also, define autoboxing and unboxing, providing an example of how they work in Java.

PTO

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Q5. (10 Marks) CO1, CO6

a. Java allows multiple inheritance using interfaces but not with classes. Analyze and justify this design choice by discussing potential problems that arise from multiple inheritance in classes. Provide an example to support your explanation.

OR

b. Design a Java application using packages and interfaces to calculate the area and perimeter of different shapes. Create a package named shapes that contains an interface Shape with two methods: double area(), and double perimeter(). Inside the shapes package, implement three classes—Circle, Rectangle, and Triangle—that provide concrete definitions for these methods. Additionally, create another package named mainpackage containing a MainClass that accepts user input, creates objects of the shape classes, and displays their area and perimeter. Ensure proper package declarations, modularity, and adherence to interface-based abstraction principles.