PAPER ID—21135

B. Tech. EXAMINATION, 2024

(Fourth Semester)

COMPUTER SCIENCES ENGINEERING

Programming in Java

Time : 3 *Hours* *Maximum Marks :* 70

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Five* questions in all, selecting *one* question from each Section. Q. No. **1** is compulsory. All questions carry equal marks.

1. (a) Discuss portability in the context of Java. 2

(b) Differentiate between method overloading and method overriding. 2

(c) Write a small code snippet to show constructor overloading. 2

(d) What are two different ways of creating threads in Java ? 2

(e) What is MVC ? Explain in brief. 2

(f) Discuss types of JDBC drivers. 2

(g) Differentiate between enumerator and iterator. 2

Section I

2. (a) Analyze the security challenges associated with client-side programming in Java, particularly in web applications. How do Java's security features address common threats such as cross-site scripting (XSS), cross-site request forgery (CSRF) and injection attacks in client-server interactions ?

(b) Illustrate the compilation and execution process of Java program with the help of a flow chart. 7+7

3. (a) Explain the key components and principles of the JVM security model, including bytecode verification, access control and the sandbox environment. Discuss how these elements work together to provide a secure execution environment for Java applications, mitigating risks associated with malicious code and unauthorized access to system resources.

(b) Discuss various data types available in Java. Explain size of each data type. What type casting options are available among them ? 7+7

Section II

4. Design a Java program to model a hierarchy of vehicles using inheritance. Create a superclass 'Vehicle' with attributes such as

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Section I

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'make', 'model' and 'year.' Implement subclasses for specific vehicle types such as 'Car', 'Truck' and 'Motorcycle' inheriting from the Vehicle superclass. Each subclass should include additional attributes and methods specific to its type, such as 'numDoors' for cars and 'payloadCapacity' for trucks. Ensure proper encapsulation and provide methods for accessing and modifying attributes. Test the program by creating instances of each vehicle type and demonstrating inheritance and polymorphism. **14**

5. Develop a Java program to create a simple calculator using method overloading. Define a class 'Calculator' with overloaded methods for basic arithmetic operations such as addition, subtraction, multiplication and division. Each method should accept different combinations of parameters, such as two integers, two doubles, or an integer and a double. Ensure proper error handling for division by zero and invalid inputs. Provide a user interface for

inputting numbers and selecting operations and display the result of each calculation. Test the program with various input scenarios to validate the correctness of method overloading implementation. **14**

Section III

6. (a) Explain the importance of thread synchronization in preventing race conditions in concurrent programs. Discuss synchronized blocks and methods as mechanisms for achieving synchronization, along with their implications for shared resource consistency and performance.

(b) Describe common AWT events such as ActionEvent, FocusEvent, KeyEvent, MouseEvent and WindowEvent. Discuss their associated event-handling methods and demonstrate their implementation in GUI applications. **7+7**

7. (a) Analyze the concept of private inheritance in Java and its implications for code design and extensibility. Discuss the use of access modifiers (public, protected, private, and default) in managing the visibility and accessibility of class members and how they contribute to encapsulation and data hiding ?

(b) Write a Java program that reads data from a text file and performs operations on it. Implement exception handling to deal with potential file-related errors such as file not found or unable to read. Use try-catch blocks to manage these exceptions gracefully, ensuring the program remains robust in various file input scenarios. 7+7

Section IV

8. Write short notes on the following. Also write the example code : 7+7

(a) Set

(b) Vector.

9. (a) Discuss I/O streams in Java. Elaborate on stream filters and buffered streams.

(b) Illustrate how PL/SQL stored procedures are created with an example. 7+7