

Instructions:

1. All questions are compulsory.
2. Each question is labelled with its type (Theory and Code).

**Q1. Short Answers -**

**PART-A [ 25 Marks]**

**[ 10 Marks]**

- i) What is the difference between "abstract class" and "interface" in Java? **[Theory, 2 Marks]**
- ii) What are the four pillars of Object-Oriented Programming (OOP)? Explain each briefly. **[Theory, 2 Marks]**
- iii) Describe the Java Virtual Machine (JVM) and its role in Java application execution. **[Theory, 2 Marks]**
- iv) Explain the concept of Dependency Injection (DI) in Spring. How is it achieved in Spring Boot? **[Theory, 2 Marks]**
- v) Variable Arguments Handling in Java Through Single method. Write down code snippet. **[Code, 2 Marks]**

**Q2. Answer the following -**

**[15 Marks]**

- i) Write a program that demonstrates the use of an Iterator to traverse through a List. **[Code, 3 Marks]**
- ii) Write a program that uses a HashMap to store student names (String) and their marks (Integer). Print out all the students and their marks **[Theory, 3 Marks]**
- iii) What is the difference between HashSet and TreeSet in Java? When would you prefer one over the other? **[Theory, 3 Marks]**
- iv) Write the code to demonstrate loose and tight coupling in java. **[Code, 3 Marks]**
- v) Explain the difference between ArrayList and LinkedList in Java with examples. **[Code, 3 Marks]**

**PART-B [15 Marks]**

**Q3. Explain the concept of a Stack data structure and implement it in Java using an Interface. **[Code + Theory, 5Marks]****

**Q4. You have been tasked with creating a full-stack web app using React for the frontend and Spring Boot for the backend in this subject. Outline your approach for architecture, data flow, and communication between frontend and backend. Discuss state management in React and data persistence in Spring Boot. Explain tool choices for development and testing. **[Theory, 10 Marks]****

■ End of the Paper, All the very best