COMSATS Institute of Information Technology
Abbottabad
Department of Computer Science

Examination – Final-Term Exam (Fall 2025-26)

Class: BCS 4R | Date: 05 January, 2026

Subject: OOP in Java. | Instructor: Mr. Mohsin Ali

Total Time Allowed: 3 hours | Max Marks: 40 + 60 = 100

Name: _____ | Registration # _____

SECTION-A (Time allowed: 1 hour) (Marks: 40)

Answer the following questions concisely.

1. Explain the key features of Object-Oriented Programming in Java? (CLO-1)
2. What is the difference between method overloading and method overriding? (CLO-3)
3. Write a short code snippet to demonstrate encapsulation in Java. (CLO-1)
4. How is an interface different from an abstract class in Java? (CLO-1)
5. Describe the purpose of the `final` keyword in Java with examples. (CLO-2)
6. What is the role of the Objects in Java? (CLO-1)
7. Explain how exception handling is implemented in Java. (CLO-2)
8. Define polymorphism in Java. Explain its basic concept and significance in object-oriented programming. (CLO-3)

SECTION-B (Time allowed: 2 hour) (Marks: 60)

Answer the following questions in detail.

1. Food Express is an online food delivery platform that processes multiple customer orders at the same time. Each order involves preparing the meal, packaging it, and assigning it to a delivery person. To handle multiple orders efficiently, each order should be processed in its own thread, so that meals can be prepared and delivered simultaneously.

Write a Java program that uses the Runnable interface to simulate the order processing system:

a) Create at least three threads, each representing a different customer order.

b) Each thread should print messages showing which stage of processing it is in (e.g., "Order 1: Cooking", "Order 2: Packaging", "Order 3: Out for Delivery").

(CLO-3) 12 marks

CamScanner

2. A banking system needs to process multiple customer transactions such as fund transfers, bill payments, and balance inquiries simultaneously.

a. Apply your knowledge of inheritance to design a solution where each transaction type is implemented as a subclass of a common base class Transaction.

b. Write a Java program using the Runnable interface that:

- Creates a base class Transaction with common properties: customerName and amount.
- Creates subclasses FundTransfer, BillPayment, and BalanceInquiry, each with a method to process the transaction.
- Prints clear messages indicating which transaction is being processed for which customer.

(CLO-3) 12 marks

3. Design Apply your knowledge of Java classes and objects to implement a Student Management System. Your program should:

a) Allow the user to add new student details (name, ID, and marks).

b) Allow the user to update existing student details based on student ID.

c) Use classes and objects to structure your program, and demonstrate encapsulation by using private fields and public methods. (CLO-3) 12 marks

4. A software company is developing a student management system where student scores and details need to be stored and processed.

a) Apply your knowledge of arrays to represent the data:

- Use a one-dimensional array to store the marks of students in a subject.
- Use a two-dimensional array to store marks of multiple students in multiple subjects.
- Write examples in Java to demonstrate both cases.

b) Write a Java program that:

- Finds the largest and smallest marks in a one-dimensional array of student scores.
- Prints the results clearly with descriptive messages.

(CLO-3) 12 Marks

5. Write a Java program to demonstrate polymorphism:

a) Implement method overloading in a class by creating a method that calculates the area of different shapes (e.g., square, rectangle, and circle) using different parameter lists.

b) Implement method overriding by creating a base class `Shape` with a method `displayShapeInfo()`, and create subclasses `Circle` and `Rectangle` that override this method to display specific details of each shape.

c) In the `main` method, create objects of the subclasses and demonstrate polymorphic behavior using overridden methods. (CLO-3) 12 Marks

CamScanner