Daffodil International University

Faculty of Science & Information Technology

Department of Computer Science and Engineering

Midterm Examination, Spring 2025

Course Code: CSE221, Course Title: Object Oriented Programming

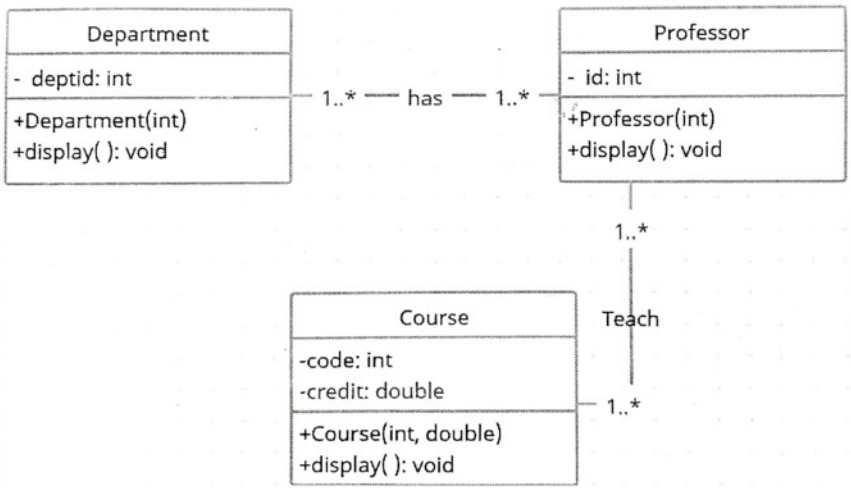
Level:2 Term:2 Batch: ALL

Time: 1.5 Hours **Marks: 25**

Answer ALL Questions

[The figures in the right margin indicate the full marks and corresponding course outcomes. All portions of each question must be answered sequentially.]

1.	a)	Explain how the concepts of Encapsulation, Inheritance, and Polymorphism contribute to solving real-world problems. Provide one real-world example for each concept demonstrating its application and benefit.	3	CO1
	b)	Consider the following UML Class Diagram representing a **"University System"** where:	7	CO2



- A **Department** has multiple **Professors**.
- Each **Professor** teaches multiple **Courses**.
- Each **Course** has a **Course Code** and **Credit Hours**.

Task:

- Implement the above scenario in Java by:
  - Defining classes Department, Professor, and Course.
  - Establishing appropriate **association relationships** between the classes.
  - Implementing methods to:
    - Add a professor to a department.
    - Assign courses to a professor.
    - Display department details, including professors and their assigned courses.

		[N.B. Java collection class may be used as needed or simple association] *(Full correct implementation: 7 marks, Partial correctness: 4-5 marks, Minor issues: 2-3 marks)*		
2.		**a)** Differentiate between a **class** and an **object** in Java. Provide suitable Java code snippets to illustrate your answer. **b)** Design a **Library Management System** where: • The **Library** contains multiple **Books**. • Each **Book** is associated with one **Author**. • The **Library** manages memberships for **Members**, who can borrow multiple books. **Task:** • Draw a **UML Class Diagram** covering the **association relationships** between the classes Library, Book, Author, and Member. • Include attributes such as bookTitle, ISBN, authorName, and memberID. [assume appropriate data type] • Indicate multiplicities for associations. [e.g. 1 to many or 1 to 1 etc] *(Full correct implementation: 8 marks, Partial correctness: 5-6 marks, Minor issues: 3-4 marks)*	**2** **8**	**CO1** **CO2**
3.		**Problem Solving (Analysis & Synthesis Level)** **Problem Scenario:** You are tasked with designing a system for an **Online Shopping Platform**. The platform includes: • A **Customer** who can place multiple **Orders**. • Each **Order** contains multiple **Products**. • Each **Product** has a productID, productName, and price. • The **Customer** has details such as customerID, name, and address. **Task:** • Analyze the problem specification. • Design a **UML Class Diagram** to represent the system, ensuring correct association relationships between classes. • Explain the multiplicity in associations and how the **Encapsulation** principle can be applied in this context.	**5**	**CO2**

Good Luck