



UNIVERSITY EXAMINATIONS

FIRST SEMESTER 2025/2026 ACADEMIC YEAR

**SECOND YEAR EXAMINATION FOR THE DEGREE OF
BACHELOR OF SCIENCE IN INFORMATION
COMMUNICATION AND TECHNOLOGY**

BICT 212: OBJECT ORIENTED SYSTEMS AND DESIGN

STREAM: R

TIME: 2 HRS

DAY: WEDNESDAY [11.30 – 13.30 P.M]

DATE: 28/01/2026

THIS QUESTION PAPER CONSISTS OF THREE (3) PAGES

PLEASE DO NOT OPEN UNTIL THE INVIGILATOR SAYS SO.

INSTRUCTIONS:

1. Answer Question **ONE** (compulsory) and any other **TWO** questions.
2. Begin each question on a new page.
3. Diagrams must be neat and properly labelled.
4. All answers must demonstrate clarity of thought, organization, and practical application.

QUESTION ONE (30 MARKS – COMPULSORY)

- a) Describe what the following terms are in Object Oriented analysis and Design concepts with examples:
 - i) Class
 - ii) Object
 - iii) Inheritance
 - iv) Polymorphism
 - v) Encapsulation
 - vi) Abstraction **(12 Marks)**
- b) Differentiate between procedural programming and object-oriented programming, giving at least three distinctions with examples. **(6 Marks)**
- c) With the aid of a well-labelled diagram, draw and explain a UML Use Case Diagram for a Library Management System showing at least four actors and their use cases. **(12 Marks)**

QUESTION TWO (20 MARKS)

- a) Describe the role of requirements engineering in OOAD **(4 Marks)**
- b) Explain the difference between functional and non-functional requirements, giving examples. **(4 Marks)**
- c) Draw a UML Class Diagram for a simple Online Shopping System with classes: Customer, Product, ShoppingCart, and Order. Show attributes, methods, and relationships (association, aggregation, inheritance, where applicable). **(12 Marks)**

QUESTION THREE (20 MARKS)

- a) Discuss any **three** Object-Oriented Design Patterns (e.g., Singleton, Observer, Factory). **(6 Marks)**

- b) For each above(a), describe the problem it solves, its structure, and one real-world application. **(6 Marks)**
- c) Explain how the Rational Unified Process (RUP) supports software development. Briefly discuss its four phases. **(8 Marks)**

QUESTION FOUR (20 MARKS)

- a) Define and explain the Model-View-Controller (MVC) architecture. How does it enhance modularity and maintainability in software systems? **(6 Marks)**
- b) Explain the following software architectures, giving one advantage and one disadvantage of each:
 - i. Layered Architecture
 - ii. Client-Server Architecture **(6 Marks)**
- c) Draw and explain an Activity Diagram for the process of a student registering for a course online. **(8 Marks)**

QUESTION FIVE (20 MARKS)

Given this UML **Class Diagram**:

Class: Student

- name: str
 - student_id: str
 + enroll(course: str)
 + display_info()

Class: Course

- course_name: str
 - course_code: str
 + add_student(student: Student)
 + show_students()

Task: Implement the classes in Python. Create 2 students and enroll them in a course. **(20 Marks)**