



UNIVERSITY EXAMINATIONS

THIRD YEAR EXAMINATION FOR THE AWARD OF THE

DEGREE OF BACHELOR BACHELOR OF SCIENCE IN COMPUTER
SCIENCE/BACHELOR OF INFORMATION TECHNOLOGY

FIRST SEMESTER, 2023/2024

(AUGUST-DECEMBER, 2023)

COMP 389/BIT 301: OBJECT ORIENTED ANALYSIS & DESIGN

STREAM: Y3 S1

TIME: 2 HOURS

DAY: WEDNESDAY, 12:00–02:00 PM

DATE: 29/11/2023

INSTRUCTIONS

- 1. Do not write anything on this question paper.**
- 2. Answer Question ONE [Compulsory] and any other TWO Questions.**

QUESTION ONE [30 MARKS]

- Describe the four elements of an effective analysis model [4 Marks]
- Explain how the following object oriented principles are achieved during analysis and design of object oriented systems [6 Marks]
 - Abstraction
 - Inheritance
 - Message Passing
- Assume you have the following classes: Student, Course and Unit. Use these classes to demonstrate the different relationships which can exist between classes [6 Marks]

- d. Give four reasons why it's necessary to model using use case diagrams [4 Marks]
- e. Explain four ways through which a sequence diagram can demonstrate compatibility with the class diagram from where it's derived. [4 Marks]
- f. A transition from one state to another may have a trigger, a guard or an effect. With the use of an example, distinguish between a trigger, a guard and an effect [3 Marks]
- g. An activity diagram is often confused with a flow chart. Explain what aspects of a system you will model using an activity diagram instead of a flow chart [3 Marks]

QUESTION TWO [20 MARKS]

- a. A hospital receptionist schedules patient's appointment and admission to the hospital, collects information from the patient by phone and/or upon patient's arrival to the hospital. For the patient that will stay in the hospital ("inpatient") she or he should have a bed allotted in a ward. Receptionists might also receive patient's payments, record them in a database and provide receipts, file insurance claims and medical reports. Draw a use case diagram to represent this information.
- b. Assume you are developing a mobile banking application
 - i. State five important functional requirements that you will define for your application
 - ii. Draw a use case diagram to depict the main interactions for any one of the requirements identified above

QUESTION THREE [20 MARKS]

- a. Consider the following events that takes place when a customer withdraws money from an ATM machine:
User arrives at the ATM machine and inserts a bank card. The card is verified by the Card Controller. The issuing bank is contacted to verify its validity. The ATM system issues pin request to user. User enters pin number. ATM system verifies account with issuing bank. ATM system prompts for service. User request withdrawal with amount indicated. Withdrawal request forwarded to issuing bank. ATM system indicates successful withdrawal. ATM system ejects card and dispense cash.
Model this using a sequence diagram. [10 Marks]
- b. Draw an activity diagram to show the type of activities that takes place when a student registers on a Learning management system [10 Marks]

QUESTION FOUR [20 MARKS]

- a) While referring to class Employee, describe how the access modifiers are used to decide the visibility of attributes and operations in a class [10 marks]
- b) A bank system contains data on customers (identified by name and address) and their accounts. Each account has a balance and there are 2 type of accounts: one for savings which offers an interest rate, the other for investments, used to buy stocks. Stocks are bought at a certain quantity for a certain price (ticker) and the bank applies commission on stock orders. Each customer is issued with an an ATM card which they can use to perform transactions which can be a withdraw of transfer transaction. Customers can also be issued with a debit card. Model this information using a class diagram [10 Marks]

QUESTION FIVE [20 MARKS]

An e-commerce company wants to create an online shopping cart system that allows customers to purchase products online. The company needs to develop a system that can handle a large number of transactions and provide an easy-to-use interface for customers. The system should also be able to handle multiple payment methods, such as credit cards and PayPal. The system should allow customers to browse for items, add items to their cart, view their cart, make payment and checkout.

- i. Create a use case diagram for this online shopping system [10 Marks]
- ii. Browse items is one of the use case in this system. Elaborate this use case using an activity diagram [10 Marks]