INTERNATIONAL UNIVERSITY OF EAST AFRICA
'Learning to Succeed'

# FACULTY OF SCIENCE AND TECHNOLOGY

## END OF SEMESTER EXAMINATIONS - APRIL 2025

**PROGRAMME: MIT**
**YEAR/SEM: YEAR 1/SEMESTER 1**
**COURSE CODE: MIT712**
**NAME: SYSTEM ANALYSIS AND DESIGN-M**

**DATE:**
**TIME:**

**INSTRUCTIONS TO CANDIDATES:**

## SECTION A

*Attempt all questions*

**Question 1:**

a. Name five key benefits of conducting systems analysis in an organization. (5 marks)

b. List any 4 key attributes a system analyst must poses

**(4 marks)**

c. There are three categories of information related to managerial levels and the decision managers make. Describe these 3 categories

**(6 marks)**

d. Why is stakeholder involvement essential in system analysis?

**(2 marks)**

e. Explain the role of key system elements—inputs, processes, outputs, feedback, and control—in ensuring a system functions effectively. How can this understanding be applied in the analysis of a business system? **(5 marks)**

f. Describe any 4 types of systems

**(8 marks)**

g. A university is struggling with managing student records efficiently. Students often complain about errors in their academic transcripts. How would you use systems analysis to identify the root cause of the problem and recommend improvements? (10 marks)

**Question 2:**

a. Define the terms system analysis and system design

**(4 marks)**

b. Giving an example of each, differentiate between an open system and a closed system

**(4 marks)**

c. With the aid of a diagram, point out any 6 elements of a system

**(6 marks)**

d. Explain any 3 major constraints of a system

**(6 marks)**

e. List any 4 main roles of a System Analyst

**(4 marks)**

f. Explain any 4 properties of a system

**(8 marks)**

g. A hospital's patient appointment system is causing long wait times and patient dissatisfaction. Describe how you would use systems analysis to identify the issues and propose a more efficient system.

(8 marks)

## SECTION B

*Attempt any 3 questions*

**Question 1:**

a) How does systems analysis contribute to improving efficiency and effectiveness in a business system? Use real-world examples to illustrate your points. (4 marks)

b) Identify at least Requirements three elicitation techniques you would use for gathering requirements from the following groups:

- employees (users),
- department heads (managers),
- And the IT team (technical staff).
- Production department (production team)

For each group, explain why you chose the technique(s) and how you would apply them to ensure that you collect comprehensive and actionable requirements. **(16 marks)**

**Question 2:**

a) Explain the use of DFDs design

**(2 marks)**

b) What is the difference between a context diagram and a Level 0 DFD? **(4 marks)**

c) An online bookstore allows customers to browse books, place orders, and make payments. The system also manages inventory and generates reports for the admin. Customers can create accounts, search for books, and view order history. Admins can update book

details and manage inventory levels.

Construct a context diagram and level 0 DFD to design this scenario

**(14 marks)**

**Question 3:**

a) Describe the key phases of the Waterfall methodology.

**(10 marks)**

b) Point out the key differences between the traditional Waterfall model and the Iterative Waterfall model?

**(4 marks)**

c) Why is documentation particularly important in the Waterfall model? How does it support the development process?

**(3 marks)**

d) Point out any shortfalls of the waterfall method

**(3 marks)**

**Question 4:**

a. Explain the role of a data dictionary in system design and analysis. How does it contribute to the clarity and efficiency of a system?

(5 marks)

b. A customer in a grocery store is purchasing three items. Write a pseudocode that performs the following tasks:

i. Prompt the user to enter the name of the first item purchased and its cost. Ensure the program is user-friendly by incorporating the item name into the prompt (e.g., if the user enters "milk," the program should ask, "What is the cost of the milk?").

ii. Request the user to input the name and cost of the second item.

iii. Request the user to input the name and cost of the third item.

iv. Calculate the total cost of all three items.

v. Compute the sales tax on the total cost, given that the sales tax rate is **5%**.

vi. Display the following information to the user:

- The name and price of each item entered.
- The total cost before tax.
- The amount of sales tax due.
- The final total amount payable (including sales tax).

Write the pseudocode for this scenario while ensuring clarity and logical flow. (15 marks)

**Question 5:**

a. During the development of a school management system, the team is struggling to understand how students, courses, and instructors are related. How would an ERD help clarify these relationships?

**(5 marks)**

b. Create an ERD for a hotel management system. The system includes the following entities:

- Guest (with attributes: GuestID, Name, Address, Phone)
- Reservation (with attributes: ReservationID, CheckInDate, CheckOutDate, NumberOfGuests)
- Room (with attributes: RoomID, RoomNumber, RoomType, PricePerNight)
- Payment (with attributes: PaymentID, PaymentDate,

AmountPaid)

Identify the relationships between these entities, Include primary keys, foreign keys, and any necessary relationships in your ERD.
(15 marks)

**Question 6:**

a) What are the four components of a SWOT analysis, and how are they defined?

**(4 marks)**

b) Create a SWOT analysis matrix for a business of your choice (e.g., a restaurant, tech start up, Retail Company). Describe the organisation and fill in the matrix with at least two strengths, weaknesses, opportunities, and threats. **(16 marks)**

**Question 7:**

a) Define a user interface

(2 marks)

b) Describe the 8 steps of designing the user interface

(8 marks)

c) What do you understand by the prototype model?

**(2 marks)**

d) In which types of projects (e.g., small-scale vs. large-scale, well-defined vs. evolving requirements) would this model be most appropriate? **(4 marks)**

e) Discuss the advantages and disadvantages of the Prototyping Model.

**(4 marks)**

**Question 8:**

a) What is the role of an actor in a Use Case Diagram? Provide an example of an actor in a typical e-commerce system.

(4 marks)

b) Explain the association, include and extend relationships in regards to use case Diagram design

**(6 marks)**

c) Create a use case UML diagram for the following scenario

**(10 marks)**

An automated teller machine (ATM) or the automatic banking machine (ABM) is a banking subsystem (subject) that provides bank customers with access to financial transactions in a public space without the need for a cashier, clerk, or bank teller. Customer (actor) uses bank ATM to Check Balances of his/her bank accounts, Deposit Funds, Withdraw Cash and/or Transfer Funds (use cases). ATM Technician provides Maintenance and Repairs. All these use cases also involve Bank actor whether it is related to customer transactions or to the ATM servicing.

**Question 9:**

a) What do you understand by the term feasibility?

**(2 marks)**

b) Explain all four major feasibility categories

**(8 marks)**

c) How do decision tables simplify complex logical relationships?

**(2 marks)**

d) Consider a decision table used in a parking lot system. The conditions are:

- Is the parking lot full? (Yes/No)
- Is the car a VIP? (Yes/No)

The actions are:

- Allow parking
- Direct to overflow parking

Create a decision table for this parking lot system, listing all possible combinations of conditions

(8 marks)

**Question 10:**

a) There are three categories of information related to managerial levels and the decision managers make**.** With an aid of a diagram, explain the 3 categories of information **(6 marks)**

b) Explain how each category of information could be used at different levels of the organization, from front-line healthcare providers to senior management **(6 marks)**

Explain any 4 main reasons for system requests **(8 marks)**

**Question 11:**

a) With the help of an illustration, describe the incremental model **(10 marks)**

b) Discuss any 2 advantages and 2 disadvantages of the Incremental Model. **(4 marks)**

c) Provide examples of scenarios where the Incremental Model would be a better fit for software development **(6 marks)**

**Question 12:**

a. Explain the Spiral Model in detail, including its diagrammatic representation and the significance of its loops.
**(8 marks)**

b. When to use Spiral Model?
**(4 marks)**

c. Explain any Selection Process Parameters for a Software Life Cycle Model **(8 marks)**