THE OPEN UNIVERSITY OF SRI LANKA
DEPARTMENT OF COMPUTER SCIENCE
B.Sc. DEGREE PROGRAMME 2024/2025
FINAL EXAMINATION
CSU4302: SYSTEM ANALYSIS AND SOFTWARE ENGINEERING
DURATION: **TWO HOURS ONLY (2 HRS)**

Date: 26th May 2025 **Time: 1:30pm – 3.30pm**

- **Question Q1 is compulsory. Answer any THREE out of the remaining.**
- **Please refer to the following case study and use it as necessary to answer the following questions.**

CASE STUDY

"MyBookStore" Library is part of a regional library network. The Library Manager has requested the development of a system to assist staff in tracking and managing library assets (books, equipment, and furniture) across different sections of the library.

The staff members have asked for a web-based application to help record the location and condition of items (e.g., bookshelves, computers, reading desks, printers, projectors). Staff will regularly inspect these items, recording the date of inspection, the staff member involved, the condition of the item, and whether any maintenance is required.

The system must also manage maintenance tasks. These tasks may result from inspections (e.g., broken chair, printer out of order) or other reported issues. Each maintenance task includes a priority level, a description, assigned staff member, start and completion dates, and status updates.

The library is organized into floors, with each floor divided into zones (e.g., Children's Section, Reference Section, IT Zone). Each item is recorded with its Floor, Zone, and specific location details (such as shelf number or room number).

All data is initially stored in the application's local database and is later synchronized with a central cloud server for backup and reporting purposes.

Currently, the library does not have any existing digital infrastructure to support such a system, and the Library Manager has requested that the new software be developed and deployed within six months from the start of the contract.

Q1)

a. Fill out the following table by considering how different UML diagrams (Class Diagram, Use Case Diagram, Sequence Diagram, Activity Diagram and State Chart Diagram) complement each other in the analysis of the "MyBookStore" Library system.

Diagram name	**Whether Static view or Dynamic View (behavior)**	**How the diagram help for the analysis of the system?**

b.

i. Draw a class diagram for the above case.

ii. Suppose that some maintenance tasks will be handled by **external vendors** rather than in-house staff members. A **maintenance task** must be assignable to either a **staff member or** a **vendor**. Update your class diagram to reflect this new requirement.

c. Draw an **Activity Diagram** that shows the workflow of **Recording an Inspection** and **Creating a Maintenance Task if a problem is found**.

Q2)

a. Briefly explain the following software development approaches:

i. Waterfall Model

ii. Throwaway Prototyping

iii. Exploratory Prototyping

b. What are the **disadvantages** of using the **Waterfall model** over **incremental model** for the "MyBookStore" Library system case study?

c.

i. Based on the "MyBookStore" Library system case study, discuss the appropriateness of using the **Waterfall** and **Throwaway Prototyping** approaches for developing the system.

ii. Consider the following statement:

" Nowadays, it is often suggested that all systems should be developed using an agile approach."

Critically evaluate this statement by presenting arguments in support of and against the use of Agile methodologies.

Q3)

a. Explain the key principles and characteristics of **Rapid Application Development (RAD)**.

b. Critically analyze the **advantages** and **limitations** of using **RAD** for developing a system like the "MyBookStore" Library system. In your discussion, consider aspects such as project size, user involvement, and time constraints.

c.

i. What are the **main two types of software testing**?

ii. Discuss how testing activities are integrated into a **RAD-based development** lifecycle compared to a **traditional development** lifecycle.

Q4)

a. For the "MyBookStore" Library system, outline a **software implementation plan**.

b.

i. Software maintenance is often the longest phase in a system's life cycle. List the **four main types of software maintenance activities**.

ii. For each of the following scenarios, identify the type of **maintenance,** from those listed in answer to part Q4) b) i) above.

a. A software application experiences unexpected crashes due to a coding error, and the development team releases a patch to fix the bug.

b. A company upgrades its hardware infrastructure, and the existing software must be modified to remain compatible with the new environment.

c. Developers optimize the user interface of a system to improve usability and enhance the overall user experience without any reported issues.

d. Security patches are applied regularly to the system to protect against potential future vulnerabilities, even though no incidents have occurred.

c. Assume that the **"MyBookStore"** Library Management System has been successfully deployed. However, ongoing maintenance is essential to ensure its long-term effectiveness. Critically analyze how the **four main types of software maintenance** would apply to **MyBookStore** after deployment. Provide **specific examples** of changes or updates that might be required under each category.

Q5)

a. Discuss **key productivity measures for software development** and the challenges associated with applying them in practice.

b.

i. Briefly describe **four (04)** common **software cost estimation techniques.**
ii. For the development of the "MyBookStore" Library system, **select and justify the most appropriate cost estimation technique** to estimate the project cost.

c. Discuss how having a formal **quality assurance plan would help ensure the successful delivery** of the "MyBookStore" library system.
Note : In your response, discuss the importance of quality reviews, testing strategies, and process audits in ensuring the project's success, with reference to principles from software quality management.

Q6)

a. ***"Managing software projects is no different from managing projects in other business sectors".*** Critically discuss this statement by presenting arguments both in favor of and against it. Give examples where appropriate.

b. ***"Software configuration management (SCM) is often seen only as a version control activity".*** Critically discuss this statement. In your answer, explain the broader role of SCM in modern software development projects, especially in environments with continuous integration and frequent releases.

c. ***"Risk management should not only identify technical risks but also business and project risks".*** Critically evaluate this statement, explaining the consequences of focusing only on technical risks during the software project lifecycle.