



University of Ruhuna - Faculty of Technology
Bachelor of Information and Communication Technology
Level 2 (Semester II) Examination, November/December 2025
Academic year 2023/2024

Course Unit: ICT 2232 Software Engineering (Theory)

Duration: 2 hours

.....
This question paper contains **five (05) pages**, including this instruction page.

IMPORTANT INSTRUCTIONS

- The medium of this examination is **English**.
- This is a **closed-book** examination.
- The paper consists of **four (04) questions**, each carrying **equal marks**.
- You **must answer all four (04) questions**.

Q1)

a)

- i. What is meant by the term "Software"? [15 marks]
- ii. Differentiate between Stand-alone Applications and Embedded Control Systems, providing suitable examples for each. [10 marks]
- iii. Using three (03) key points, explain why legacy software systems must be changed or adapted. [15 marks]
- iv. Briefly explain the following Software Engineering framework activities.
A) Communication
B) Modeling
C) Deployment [15 marks]

b)

- i. Define the term "Process Pattern" in the context of Software Engineering. [10 marks]
- ii. State three (03) types of Software Process Patterns and briefly discuss each of them. [15 marks]
- iii. Explain the differences between Plan-driven and Agile processes with respect to the following criteria.
A) Documentation
B) Customer Involvement [20 marks]

Q2)

a) Consider the following scenario to answer the questions i-v.

A university wants to develop an online course enrollment system for students and academic staff. The system should allow students to browse available courses, register for subjects, view timetables, and drop courses before deadlines. Academic staff should be able to add new courses, manage student enrollment, and update course schedules. The system should provide instant feedback within 2 seconds after each student action and must be accessible through both computers and mobile devices.

- i. Identify two (02) stakeholders of the system. [10 marks]
- ii. Distinguish between **functional** and **non-functional** requirements. [10 marks]
- iii. Identify three (03) functional requirements of the software system. [15 marks]
- iv. Identify two (02) non-functional requirements of the software system. [10 marks]
- v. Suggest two (02) possible risks that might occur during the software development process of this system and explain how each can be mitigated. [10 marks]

- b) Given the following narrative description, draw a **context diagram** and a **Level 1 DFD** diagram.

State if any assumptions are made.

At the end of each month, the electricity company prepares customer electricity bills. The process starts when the data entry operator records meter readings into the meter file. These records are then sorted, and the results are saved in a sorted meter file. Using this file, customer payments are calculated and updated in the customer master file. The master file is then used to generate electricity bills for customers. All payments made by customers are stored in the payment file, and both the master file and payment file are used to produce management reports.

[45 marks]

Q3)

- a) Deployment is a crucial activity within the system implementation phase.
- Briefly explain what is meant by **Deployment**. [10 marks]
 - Briefly explain each of the following deployment strategies and support your explanation with relevant examples.
 - Direct Cutover
 - Parallel Running
 - Phase implementation

[30 marks]

- b) Software testing is the process of verifying and validating that a software product is correct, complete, reliable, and performs as intended.
- Identify and briefly explain two (02) main sources of software problems that create the need for software testing. [10 marks]
 - Explain the roles of **stubs** and **drivers** in a unit testing environment. [10 marks]
 - Integration testing can be performed using either a **Top-Down** or **Bottom-Up** approach. Differentiate between these two integration testing approaches. [10 marks]

- c) For each of the following statements, indicate whether it is "True" or "False".
- Configuration management helps control and track software changes systematically.
 - A baseline marks the official completion of a phase and can be modified freely afterward.
 - Version Control Systems (VCS) are used to manage and record code changes over time.
 - In Centralized VCS, every developer keeps a complete local copy of the repository's history.
 - A Change Request (CR) can originate from developers, testers, or users.

- vi. Data integrity and information sharing are two functions provided by software configuration management repository.

[30 marks]

Q4)

a)

- i. Describe the following primary architectural views commonly used to represent software architecture.

- A) Logical view
- B) Process view

[10 marks]

- ii. **Event-driven architecture** is an architectural style where components communicate through the production, detection, and consumption of events. List down three (03) core elements of this architecture.

[15 marks]

- iii. Write short notes on the following three (03) main components of a **Service-Oriented architecture**.

- A) Service Provider
- B) Service Consumer
- C) Service Registry

[15 marks]

- b) "TechVision Solutions" is a software development company specializing in custom enterprise systems. The company has recently secured a contract to develop EduSmart, an Online Learning Management System (LMS) for a university network.

After analyzing the project requirements and development environment, the management has decided to adopt the Scrum framework for this project.

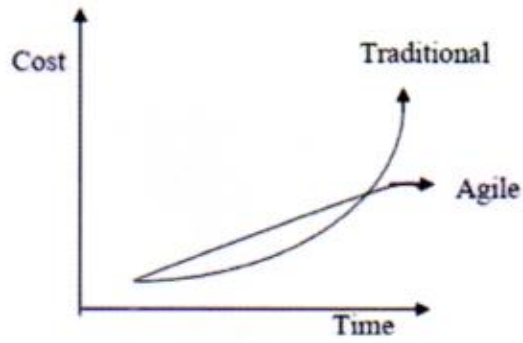
Explain which specific features of the Scrum framework best support the following project characteristics and justify your reasoning.

- i. The project requirements are likely to change based on continuous feedback from lecturers and students during development.
- ii. The university expects an early release of key features such as course registration and online assessments, while additional modules can be added later.
- iii. The project requires frequent communication between the development team and the academic staff to ensure the system meets user expectations.
- iv. The development team aims to continuously improve their work practices and productivity after each sprint.

[40 marks]

- c) The following graph shows the cost of change curve (cost vs. time) for both **traditional** and **agile** software development.

Briefly explain possible reasons for the two curves (Traditional and Agile) to be different.



[20 marks]

_____ End of the Paper _____