

University of Ruhuna - Faculty of Technology
Bachelor of Information & Communication Technology Honours Degree
Level 2 (Semester II) Examination, November/December 2023
Academic year 2021/2022

Course Unit: ICT 2232 Software Engineering (Theory)

Duration: 2 hours

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This question paper contains **four (04) pages** including this instruction page.

IMPORTANT INSTRUCTIONS

- The medium of this examination is **English**.
- This is a **Closed Book** examination.
- This Examination consists of **four (04)** questions that carry equal marks.
- You must **answer all four (04) questions** in this examination.

1.

a) *“Software engineering is an **engineering discipline** that is concerned with **all aspects of software production**”*. Explain what is meant by ‘engineering discipline’ & ‘all aspects of software production’.

[10 marks]

b) *“Legacy Software must be changed”*. Using three (03) key points, explain why.

[15 marks]

c)

i. Using two (02) key points explain why software designs are important.

[10 marks]

ii. Briefly explain the terms cohesion and coupling and how they are related to one another.

[15 marks]

iii. Explain the following types of coupling.

- I. Data coupling
- II. Stamp coupling
- III. Common coupling

[30 marks]

iv. Describe four (04) user interface design principles.

[20 marks]

2. Consider the following scenario to answer the questions below.

SpeedyRide Solutions is a medium-sized transportation firm specializing in local transportation services. It is currently managing vehicles, drivers, customers, and payment details manually. At the end of each business day, all transactions are recorded in a spreadsheet by the administrative team. SpeedyRide Solutions maintains a weekly backup of these transactions. As the company expands, the owner has made the strategic decision to implement an effective and efficient automated system, enhancing the management of taxi bookings. The new system will enable customers to conveniently book rides and make online payments. Moreover, the system should be developed in a manner that ensures that the system is accessible to users with disabilities. Additionally, customers will have the ability to share comments on a blog integrated into the company’s website.

a) Identify two (02) functional requirements of the above system.

[15 marks]

b) Identify two (02) non-functional requirements of this system.

[10 marks]

- c) *“Spiral Model is the most suitable software process model to develop the above software system”*. State whether you agree or disagree with the above statement with justifications.

[15 marks]

- d) Identify the four (04) major sectors of the Spiral model and briefly explain each of the identified sectors.

[20 marks]

- e) List down three (03) advantages and two (02) disadvantages of the Spiral Model.

[20 marks]

- f) Compare and contrast Waterfall approach with Spiral Model in software development based on the following criteria.

- Capability to accommodate Risk Analysis.
- Respond to changing requirements.

[20 marks]

3.

- a) Using three (03) key points explain the difference between verification and validation in software engineering.

[15 marks]

- b) Briefly explain the followings:

- i. Alpha testing
- ii. Beta testing

[20 marks]

- c) *“A general principle of good requirements engineering practice is that requirements should be testable”*.

- i. Briefly explain what is meant by requirements-based testing. [05 marks]

- ii. Consider the following requirements of a Mental Health Care – Patient Management System and list down three (03) requirements-based test cases with its results.

- If a patient is known to be allergic to any medication, then a prescription of that medication shall result in a warning message being issued to the system user.
- If a prescriber chooses to ignore an allergy warning, they shall provide a reason why this has been ignored.

[18 marks]

- d) *“Debugging is the process of fixing a bug in the software.”*

- i. List down four (04) debugging techniques.

[12 marks]

ii. Provide brief explanations for any two (02) techniques identified in part i. [10 marks]

e) "Change control is a function of configuration management".

i. Briefly explain what configuration management is. [06 marks]

ii. A change in the configuration of a product goes through six (06) main steps. Identify the six steps and briefly describe any two (02) of them.

[14 marks]

4.

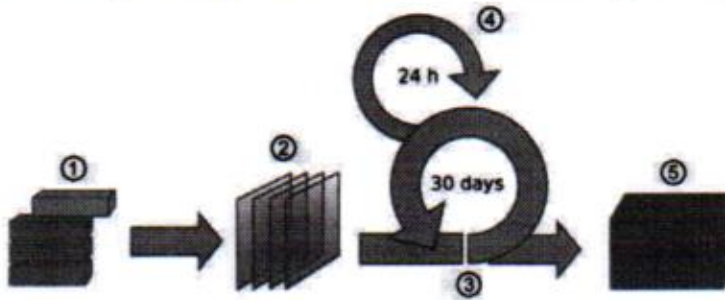
a) Given the following narrative description, draw a **context diagram** and a **Level 1 DFD** diagram. State if any assumptions are made.

An electricity company prepares electricity bills at the end of the month. The process involves writing meter records to the meter file. The data entry operator is responsible for this action. The data will be next sorted, and results are stored in the sorted meter file. Using this file, payment is calculated and written to the customer master file. The master file is used to generate electricity bills to be given to the customers. Customer payments are written on the payment file. The payment and master files are used to generate various reports to the management.

[56 marks]

b) "Scrum approach is a general agile method".

i. Following is a diagram which shows the basic steps of a Scrum.



Identify what are the most suitable terms to replace the labels from ① to ⑤.

[15 marks]

ii. Briefly explain ① and ② artifacts identified in the above part (i). Use three (03) key points for each artifact.

[18 marks]

iii. "Scrum encourages more frequent and smaller releases." Do you agree with this statement? Justify your answer.

[11 marks]

End of the Paper