The Open University of Sri Lanka
Faculty of Engineering Technology
Department of Electrical and Computer Engineering

Study Programme	:	Bachelor of Software Engineering Honours
Name of the Examination	:	Final Examination
Course Code and Title	:	**EEI6567 - Software Architecture and Design**
Academic Year	:	2024/25
Date	:	03rd March 2026
Time	:	0930 -1230h
Duration	:	3 hours

General instructions

1. Read all instructions carefully before answering the questions.
2. This question paper consists of **Five (5)** questions in **Four (4)** pages.
3. Answer **all** questions from **Section A**, and answer any **Three (03)** question from **Section B**.
4. **Section A** carries **40** marks and all questions from **Section B** carry **20** marks each.
5. Answer for each question should commence from a new page.
6. This is a Closed Book Test (CBT).

Section A

Question 01

Your company is asked to develop a software system for Automating Room Service Management in a Hotel, and you are the architect.
Currently, room service requests in the hotel are handled manually via phone calls, leading to delays, miscommunication, and lack of real-time tracking. Guests often experience long wait times, and staff struggle to prioritize and manage orders efficiently. These issues negatively impact guest satisfaction and operational efficiency.
How can we implement an automated room service management system that enables guests to place orders digitally, tracks order status in real-time, and optimizes staff workflows to improve service quality and reduce delays?

Key Considerations:

- Guest Interface: Mobile app or in-room tablet for placing orders and tracking status.
- Order Management: Real-time dashboard for staff to view, prioritize, update order progress.
- Integration: Connect with kitchen and billing systems for seamless operations.
- Notifications: Automated alerts for guests and staff on order status.
- Analytics: Reports on order trends, peak times, and staff performance.

a. Discuss the significance of automating room service management for hotels, highlighting the benefits and drawbacks of the associated costs. (05 marks)

b. As an architect, what do you consider your responsibilities in designing this system? (05 marks)

c. List down the stakeholders of this system. (05 marks)

d. Draw a use case diagram for this system. (06 marks)

e. Identify major software components required for this system. (05 marks)

f. Draw a diagram to depict the high-level logical architecture of this system you are going to design. (10 marks)

g. Discuss two non-functional requirements that need to be considered in this system and explain why these are important. (04 marks)

Section B

Question 02

Modern software systems increasingly rely on cloud computing and flexible architectures to achieve scalability, reliability, and cost efficiency. Please answer the following questions on cloud computing concepts, service models, deployment models, and architectural patterns.

a. Explain the key characteristics of cloud computing and discuss two advantages and two disadvantages of adopting cloud technology for enterprise applications. (05 marks)

b. Compare the four cloud deployment models in terms of security, cost, and control. Provide one example use case for each model. (06 marks)

c. Differentiate between the three cloud service models. For each, describe its primary purpose and give one real-world example. (06 marks)

d. Highlight three key differences between Monolithic Architecture and Microservices Architecture and explain why microservices are preferred for large-scale applications. (03 marks)

Question 03

Software architects must ensure systems remain adaptable and maintainable throughout their lifecycle. Please answer the following questions on software evolution, maintenance strategies, legacy systems, and impact analysis.

a. Explain the difference between Software Evolution and Software Maintenance. Provide two scenarios where each is required. (05 marks)

b. Describe the four types of software maintenance with one example for each. (06 marks)

c. Legacy systems pose challenges for modernization. Discuss two risks of keeping legacy systems and two benefits of replacing them. (04 marks)

d. What is Impact Analysis in software evolution? Explain its importance and outline the two main steps involved in performing it. (05 marks)

Question 04

Documenting software architecture is essential for effective communication and system maintainability. Please answer the following questions on architecture documentation, advanced design considerations, and modern architectural practices.

a. Explain why documenting software architecture is important. Mention three key benefits and provide one example scenario where poor documentation can cause issues. (05 marks)

b. Analyze the consequences of incomplete or outdated architecture documentation during system evolution. How can this impact maintainability, scalability, and team productivity? (07 marks)

c. Design patterns are considered best practices in software development. Briefly describe any two design patterns and explain how they improve maintainability and flexibility in a system. (04 marks)

d. Explain the four phases of the Rational Unified Process (Inception, Elaboration, Construction, Transition). For each phase, describe its main objectives and deliverables. (04 marks)

Question 05

Software architects play a critical role in designing robust systems that meet both functional and non-functional requirements. Please answer the following questions on architectural views, design strategies, quality attributes, and design patterns.

a. Explain the 4+1 View Model in software architecture. For each view, describe its purpose and provide one example diagram type that can be used to represent it. (05 marks)

b. Compare three software design strategies: Structured Design, Object-Oriented Design, and Aspect-Oriented Design. Highlight their key principles and give one real-world example where each strategy would be most suitable. (06 marks)

c. Discuss the importance of Non-Functional Requirements (NFRs) in software architecture. Select any two quality attributes and explain why they are critical for enterprise applications. (05 marks)

d. Non-Functional Requirements often conflict with each other. Select two conflicting NFRs (e.g., Performance vs Security, Maintainability vs Developer Productivity) and discuss how an architect can balance these trade-offs in a real-world scenario. (04 marks)

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