UNIVERSITI
TEKNOLOGI
PETRONAS

FINAL EXAMINATION
MAY 2024 SEMESTER

COURSE	**:**	**TEB3423 - SOFTWARE DESIGN AND ARCHITECTURE**
DATE	**:**	**5 AUGUST 2024 (MONDAY)**
TIME	**:**	**9:00 AM - 12:00 NOON (3 HOURS)**

INSTRUCTIONS TO CANDIDATES

1. Answer **ALL** questions in the Answer Booklet.
2. Begin **EACH** answer on a new page in the Answer Booklet.
3. Indicate clearly answers that are cancelled, if any.
4. Where applicable, show clearly steps taken in arriving at the solutions and indicate **ALL** assumptions, if any.
5. **DO NOT** open this Question Booklet until instructed.

Note :

i. There are **SIX (6)** pages in this Question Booklet including the cover page

ii. **DOUBLE-SIDED** Question Booklet.

1. You are part of a development team tasked with designing an E-Health system that integrates various medical data sources to provide a comprehensive view of patient health records. Your system must accommodate the dynamic nature of healthcare data and ensure robust interactions between different system components.

   a. Explain the following diagramming approaches. Provide **ONE (1)** example for each approach based on the given scenario.

      i. Context

      [2 marks]

      ii. Interaction

      [2 marks]

      iii. Behavioral

      [2 marks]

      iv. Structural

      [2 marks]

      v. Data driven

      [2 marks]

   b. Develop **ONE (1)** context model for the E-Health system.

      [**NOTES**: This shall consider the system's operational environment, including external entities like healthcare providers, insurance companies, and patient portals.]

      [5 marks]

   c. Create **ONE (1)** use case diagram for the E-Health system that includes use cases for patient registration, appointment scheduling, medical record access, and prescription management.

      [5 marks]

2. A design project involves creating a Smart Home Automation System that integrates various home devices to provide a seamless and automated living experience. The system must accommodate the dynamic nature of home automation, ensure robust interactions between different system components, and maintain high levels of security and reliability.

   a. Design **ONE (1)** logical view that outlines the key components and illustrates their interactions.

   [8 marks]

   b. Develop ONE **(1)** layered architecture that identifying layers and their specific responsibilities.

   [6 marks]

   c. Explain how security measures can be implemented at different layers to enhance system security.

   [6 marks]

3. An e-commerce platform needs to integrate various functionalities to offer a seamless shopping experience for users. The system must ensure high performance, scalability, and security while maintaining availability and ease of use.

Develop an architectural design for the E-Commerce platform focusing on key quality attributes: performance, scalability, and security.

a. Design **ONE (1)** logical view consists of key components of the system.

[8 marks]

b. Explain **THREE (3)** strategies to ensure performance of the system.

[6 marks]

c. Explain **THREE (3)** scalability techniques to handle increased user loads and data volume of the system.

[6 marks]

4. There is a cloud-based Customer Relationship Management (CRM) system that integrates various business processes to provide a comprehensive view of customer interactions. In this context, the system must ensure scalability, performance, and security while maintaining high availability.

a. i. Explain **ONE (1)** impact of peak loads on system performance

[2 marks]

ii. Propose **TWO (2)** strategies to mitigate this impact.

[4 marks]

b. Explain any **TWO (2)** methods on how the system will manage increasing numbers of simultaneous connections.

[6 marks]

c. Discuss **ONE (1)** example scenario illustrating how the system scales from handling 100 to 10000 concurrent users without performance degradation.

[8 marks]

5. You are assigned a task in designing an online Learning Management System (LMS) that integrates various educational tools to provide a comprehensive and interactive learning experience for students and educators. The system must ensure scalability, performance, and security while maintaining high availability and ease of use by using an N-Tier Client-Server pattern.

a. Analyse how the architecture supports the relevant quality attributes.

[10 marks]

b. Propose major components within the chosen architectural pattern.

[10 marks]

-END OF QUESTION-