ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)
ORGANISATION OF ISLAMIC COOPERATION (OIC)
Department of Computer Science and Engineering (CSE)

SEMESTER FINAL EXAMINATION   SUMMER SEMESTER, 2021-2022
DURATION: 3 HOURS   FULL MARKS: 100

CSE 4407: System Analysis and Design

Programmable calculators are not allowed. Do not write anything on the question paper.
Answer **all 6 (six)** questions. Figures in the right margin indicate full marks of questions whereas corresponding CO and PO are written within parentheses.

1. A fitness enthusiast, Shigeo Kageyama, recently moved to a new city and was looking for a personal trainer to help him achieve his fitness goals. He did not know any trainers in the area and was having trouble finding the right fit online. That is when he came up with the idea of developing a new mobile application naming it FitConnect with the following functionality in mind.

    FitConnect will be a mobile application that will help users search for fitness trainers in their area. A user will be able to search for trainers based on their location, experience, fees, and availability. Users will be able to view the profiles of the trainers, read reviews from other users, and even see their certifications.

    a) Discuss about the operational, technical, and economic feasibility of the mobile Application FitConnect. Do you think the application will be feasible in terms of operational, technical, and economic feasibility? Justify your answer.

        9
        (CO2)
        (PO1)

    b) Identify the functional and the non-functional requirements of the FitConnect application.

        8
        (CO1)
        (PO1)

2. Table 1 presents the revenues and costs of Scranton Mailing Company that provides mailing services to small companies.

    Table 1: Cash flow of the new system by year for Question 2.a)

	Year 1				Year 2
	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Quarter 1
Revenue	5,000	20,000	24,960	31,270	39,020
Costs					
Development	10,000	-	-	-	-
Personnel	8,000	8,400	8,800	9,260	9,700
Training	3,000	6,000	-	-	-
Hardware	4,000	4,000	4,000	4,000	4,000
Supplies	1,000	2,000	2,370	2,990	3,730
Maintenance	-	2,000	2,200	2,420	2,660

    a) Using cash-flow analysis, identify the year when Scranton Mailing Company is expected to show a profit.

        12
        (CO1)
        (PO1)

    b) When should a company use break-even analysis, cash-flow analysis, or payback? Justify your answer.

        5
        (CO2)
        (PO1)

3. Bob Vance (from Vance Refrigeration) and his colleagues often order lunch from their favorite sandwich and coffee shop, Brew Crew. However, they always struggle to remember the exact order details and their colleagues' preferences when placing the order over the phone. To solve this problem, Brew Crew has decided to install a new system to record orders for food and drinks.

Now, when Bob and his colleagues call Brew Crew on the phone, they are prompted to enter their phone number. The system automatically brings up their name, address, and last order details on the screen. Bob and his colleagues can then easily place their order, with the system calculating the total cost, including tax and delivery charges. The order is sent directly to the kitchen, and a receipt is printed for the customer. Occasionally, the system prints special offers, such as coupons, for customers to use on their next visit. When the order is ready, a delivery driver is assigned to bring the food and drinks to Bob and his colleagues' office. The driver provides a copy of the receipt and any coupons to the customers, ensuring they receive the correct order and any applicable discounts. Brew Crew's new system also keeps track of weekly sales totals, allowing the shop to compare their performance to the previous year. This helps them identify areas for improvement and ensure they are providing the best possible service to their customers.

   a) Define context-level data flow diagram. Discuss the differences between a context-level diagram and level 0 DFD (data flow diagram).

   b) Identify the external entities and the major processes for Brew Crew's new system and draw a Context Diagram and a Level 0 diagram for the new system.

4. Mrs. Green, a working mother with two kids, is always on the go and finds it hard to take the time to shop for groceries. She heard that Zomazon's Supermarket, a small chain of grocery stores, recently launched a new website where customers can place orders for groceries and other items. Excited to try this new service, Mrs. Green visits Zomazon's Supermarket website and creates a new customer account. She browses through the online catalog, and after selecting the items she needs, she proceeds to the checkout page. At the checkout page, Mrs. Green selects the option for home delivery and provides her address and payment details. Once she completes her order, the customer database is updated, and an order record is created. The order is then sent to the nearest Zomazon's Supermarket store that offers home delivery. The store employees receive the order, and they start picking the items from the shelves. Once the order is complete, it is handed over to a delivery driver who then heads to Mrs. Green's home. As soon as the delivery driver reaches Mrs. Green's home, she receives a notification on her phone that her order has arrived. The delivery driver hands her the order, and she checks the items to make sure everything is in order.

Mrs. Green is delighted with the service and convenience of ordering online from Zomazon's Supermarket. She recommends it to her colleagues and friends who also have busy lives and find it challenging to shop for groceries.

Zomazon's Supermarket continues to improve its online ordering service, ensuring that customers like Mrs. Green have an easy and seamless shopping experience.

   a) Identify the actors and the use cases from the scenario given in question 4.

   b) Draw a use case diagram and identify the relationships between the actors and the use cases.

Identify the classes that will be needed to implement the new website for Zomazon's Supermarket (if they follow the object-oriented system design) from the scenario given in Question 4.

6
(CO1)
(PO1)

b) Identify the major activities that a user will be able to perform on the website (Refer to the scenario given in Question 4.

Draw an activity diagram for Mrs. Green showing the customer using the website to place an order, verification of the order, order confirmation, order details sent to the local store, and a customer email sent to the customer.

10
(CO1)
(PO1)

6. a) Briefly describe different prototyping techniques.

8
(CO1)
(PO1)

b) Define agile modeling. Does Scrum framework follow the agile development methodology? Justify your answer.

8
(CO1)
(PO1)