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**ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)**  
**ORGANISATION OF ISLAMIC COOPERATION (OIC)**

**DEPARTMENT OF BUSINESS AND TECHNOLOGY MANAGEMENT**

Semester Final Examination

Course No. : BTM 4763

Course Title : Systems Analysis

Winter Semester, A. Y. 2022-2023

Time : 3 hours

Full Marks : 150

Answer all 6 (six) questions. All questions carry equal marks. Marks of each question and corresponding CO and PO are written in the right margin with brackets.

1. a) Assume you are a systems analyst for a consulting company and have been asked to assist the chief executive officer (CEO) of a regional bank. The bank recently implemented a plan to reduce the number of staff, including loan officers, as a strategy to maintain profitability. Subsequently, the bank has experienced chronic problems with backlogged loan requests because of the limited number of loan officers who are able to review and approve or disapprove loans. The CEO of the bank is interested in solutions that would allow the approval process to move faster without increasing the number of loan officers, and has engaged your company to come up with suggestions. What is one type of system that you might recommend to the bank? Justify your answer. 05 (CO2) (PO2)
- b) Your company has a contract with a local firm to link all of their systems so they can transparently work together. Their applications include a number of existing legacy systems, which were built at different times by different developers using a variety of languages and platforms, as well as several newer contemporary applications. What is the term for this type of linking? Describe the type of tool would you most likely use, and what are some examples of these tools? 07 (CO2) (PO2)
- c) Your company has asked you to develop a new web-based system to replace its existing legacy system. There will be very little change in business requirements and functionality from the existing legacy system. Suggest which system development process you might use? Explain your answer. 13 (CO3) (PO3)
2. a) As a systems analyst, you will be exposed to and use many different approaches to systems analysis throughout your career. It is important that you understand the conceptual basis of each type of approach, and their essential differences, strengths and weaknesses. Explain the differences in structured analysis, information engineering data modeling, and object-oriented analysis. 07 (CO1) (PO1)
- b) System developers use fact-finding techniques in every project phase. Is fact-finding more important during the requirement analysis phase than for other phases? Why or why not? Explain three fact-finding methods along with merits and demerits. 13 (CO3) (PO3)
- c) Suppose you are managing a project that was postponed twice because its funding was diverted to higher priority projects. The system owners do not want that to happen again. So, they are very anxious to get the new system started and built as quickly as possible. They are putting a great deal of pressure on you to spend more than a couple of days on requirements discovery. If anything is missed, they tell you, it can be fixed later on. You really want to make them happy, but a little voice of caution is going off. What are the potential consequences and costs of rushing through the requirements discovery process? 05 (CO2) (PO2)

3. ABC Software Solutions is a mid-sized software development company that specializes in creating custom software applications for clients in various industries. Over the past few years, the company has faced challenges with inconsistent software quality, project delays, and client dissatisfaction. To address these issues, the company's management has decided to adopt the Capability Maturity Model (CMM) framework. The company's management has initiated the process of implementing CMM within the organization. They have formed a CMM team composed of senior software engineers, project managers, and quality assurance experts. The team has started by assessing the current software development processes and identifying areas that need improvement. They have also defined specific goals and objectives for each maturity level. The CMM team has made progress in implementing CMM practices, including defining standard processes, establishing metrics for process improvement, and providing training to employees. However, they have encountered some resistance from certain team members who are resistant to change. Additionally, there have been budget constraints and a need to balance short-term project demands with long-term process improvement goals.
- Based on the above case answer the following questions:

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| a) | Discuss the key steps involved in implementing the Capability Maturity Model (CMM) framework.  | 07 | (CO2)<br>(PO1) |
| b) | What are the challenges that organizations might face during this process?   | 05 | (CO2)<br>(PO2) |
| c) | Provide recommendations on how ABC Software Solutions can overcome the challenges to achieve higher maturity levels in their software development processes. | 13 | (CO2)<br>(PO3) |

4. A University is exploring ways to modernize its education system and provide students with more flexible learning opportunities. Suppose you are working as a system designer for this university and currently you have been assigned the task of conducting a feasibility analysis and proposing a system for the development of a new online learning platform. The University currently relies on traditional classroom-based teaching methods. With the growing demand for remote learning and flexible schedules, there is a need for an online platform to supplement the existing education system. Therefore, the University is considering the development of a new online learning platform. The initial investment for In-House Platform is \$800,000. The projected annual cash inflows from the platform are estimated as follows: Year 1: \$200,000 Year 2: \$300,000, Year 3: \$250,000, Year 4: \$150,000 Year 5: \$100,000 and Annual Operational Costs: Year 1: \$50,000, Year 2: \$60,000, Year 3: \$70,000, Year 4: \$80,000, Year 5: \$90,000. Whereas the initial investment for collaboration with an External eLearning Provider is: \$500,000 and Annual Cash Inflows: \$200,000.

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| a) | What are the different tests for this project feasibility? How is each test for feasibility measured?   | 07 | (CO3)<br>(PO3) |
| b) | Describe the popular techniques to assess economic feasibility. Considering payback and ROI, determine which project is economically feasible for implementation at the university. | 13 | (CO1)<br>(PO1) |
| c) | Develop a sample candidate system matrix for three candidates by using characteristics of this system.  | 05 | (CO3)<br>(PO3) |

5. a) A hotel chain, "StayLux Hotels," wants to implement a database to manage reservations, guest information, room details, and staff assignments. The system needs to handle guest bookings, room availability, staff information, and ensure smooth check-in and check-out processes. 10 (CO2) (PO5)

<b>Guest:</b>	<b>Reservation:</b>	<b>Room:</b>	<b>Staff:</b>	<b>Hotel Branch:</b>
GuestID	ReservationID	RoomID	StaffID	BranchID
Name	GuestID	Room Number	Name	Branch Name
Email	RoomID	Room Type	Position	Location
Phone	Check-in Date	Price per Night	Hotel BranchID	Manager Name
Address	Check-out Date	Availability	Email	
	Total Amount		Phone	

- Identify the candidate keys, a possible primary key and any foreign keys for each entity and the degree of "Reservation" entity.
- Develop an ER diagram based on the above table.
- Explain the relationship among different entities.

b) Reservation Table:

10 (CO3) (PO3)

ReservationID	GuestID	RoomID	GuestName	Check-In	Check-Out	TotalAmount
1	G101	R201	Mary	2023-01-15	2023-01-20	5000
2	G102	R202	John	2023-02-05	2023-02-10	7500
3	G103	R203	Ibrahim	2023-03-12	2023-03-18	6500

Explain different types of normalization forms by considering the "Reservation Table".

- c) What is a good data model and why is it important to normalize a database? 05 (CO1) (PO1)

### Online Ticket Booking and Travel Information System

In the heart of the vibrant city, ExploreEase, a renowned travel agency, stood as a gateway to exciting adventures. The office echoed with the hum of anticipation and the lively conversations of the staff. Amanda, the head of customer service, and Chris, the IT specialist, aimed to elevate the travel agency's efficiency to new heights, providing customers with seamless and memorable journeys.

One day, as Amanda and Chris brainstormed ways to enhance the booking process, they crossed paths with Alex, a tech enthusiast with a profound love for exploration. Recognizing Alex's passion, they decided to entrust him with the task of designing a use case diagram for a revolutionary Online Ticket Booking and Travel Information System.

Amanda envisioned this system as a pivotal tool for ensuring customers could effortlessly book tickets and access comprehensive travel information. She wanted users to easily search for available routes, view schedules, and book tickets without any hassle. Managing bookings efficiently, including cancellations and viewing booking history, was crucial for maintaining customer satisfaction and loyalty.

Chris, on the other hand, prioritized building a robust backend system. He aimed to manage travel routes effectively, update schedules seamlessly, and provide reliable customer support. Implementing features like seat selection, applying promo codes, and offering travel insurance options were key components that Chris believed would enhance the overall user experience. To complete the trio, Amanda recognized the importance of managing the financial aspect of the agency. She emphasized the need for a well-integrated billing system to ensure the agency could continue providing quality service. Simultaneously, Chris needed a comprehensive admin view, allowing him to monitor system activities, review bookings, and address any technical issues promptly.

With a shared vision, Amanda, and Chris entrusted Alex to bring their ideas to life. Alex embraced the challenge, setting to work on carefully designing the use case diagram. His goal was to capture all the functionalities and intricate relationships that would make ExploreEase the epitome of convenience and reliability in the travel industry.

As the diagram took shape, it became apparent that each use case contributed to a seamless journey for the travelers and efficient operations for the staff. From the initial search for routes to the final step of reviewing booking history, the Online Ticket Booking and Travel Information System promised to transform ExploreEase into a beacon of exploration, guiding travelers to their dream destinations with ease. And so, the tale of Amanda, Chris, and Alex continued, with each use case representing a step in the grand adventure of exploration. The Online Ticket Booking and Travel Information System, designed with precision and passion, aimed to redefine travel experiences, and elevate ExploreEase to new heights in the ever-evolving world of travel.

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| a) What is Use-Case Modeling? What are the benefits of Use-Case Modeling?   | 05 | (CO1)<br>(PO1) |
| b) Make a list of all actors and use cases by considering the above case study and develop a Use-Case diagram to capture all the functionalities and their relationships. | 13 | (CO2)<br>(PO5) |
| c) What are the different types of relationship employed in the use-case diagram? Explain their purpose.  | 07 | (CO3)<br>(PO3) |