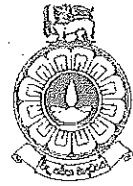


The Open University of Sri Lanka
Faculty of Engineering Technology
Department of Electrical & Computer Engineering



Study Programme	: Bachelor of Software Engineering Honors
Name of the Examination	: Final Examination
Course Code and Title	: EEI3566/ECI3266 Information Systems and Data Management
Academic Year	: 2019/2020
Date	: 3 rd October 2020
Time	: 0930-1230hrs
Duration	: 3 hours

General Instructions

1. Read all instructions carefully before answering the questions.
2. This question paper contains five (05) questions in five (05) pages.
3. Answer ANY FOUR (4) questions.
4. This is a Closed Book Test (CBT).
5. Answers should be in clear handwriting.
6. Do not use red colour pen

Q1.

- (i) In the context of MIS, describe each of the following applications and evaluate their benefits. Provide appropriate examples. **(3 marks each)**
- Customer Relationships Management (CRM) systems.
 - Enterprise Resource Planning (ERP) systems.
 - E-Government
 - Transaction Processing System (TPS)
 - Expert System
 - Business-to-Business (B2B)
 - Software as a Service (SAAS)
- (ii) Draw the three-tier database architecture. Discuss the functions of each layer. **(4 marks)**

Q2.

- Describe the characteristics of a table that violates first normal form (1NF) with an example and then describe how such a table is converted to 1NF. **(2 marks)**
- Describe the characteristics of a table in second normal form (2NF). **(3 marks)**
- Describe what is meant by full functional dependency and describe how this type of dependency relates to 2NF. Provide an example to illustrate your answer. **(5 marks)**
- Describe what is meant by transitive dependency and describe how this type of dependency relates to 3NF. Provide an example to illustrate your answer. **(5 marks)**
- Consider Table 1 and answer the following questions:

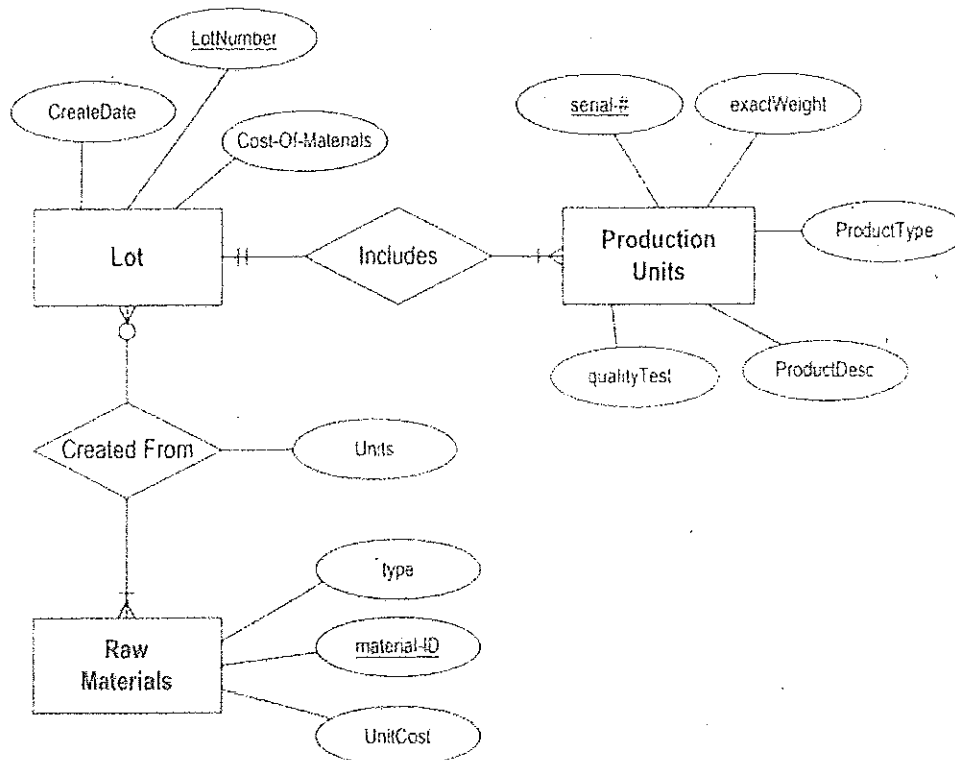
Table 1

empNo	deptNo	deptAddress	empName	designation	days/month
E1111	D002	2/1, Lotu str.	Sheila	Clerk	18
E1111	D004	5, Ritu Mw	Sheila	Clerk	10
E3333	D002	2/1, Lotu str.	Peter	Clerk	15
E3333	D004	5, Ritu Mw	Peter	Clerk	11

- Why is this table not in 2NF? **(3 marks)**
- Describe and illustrate the process of normalizing the data shown in Table 1 to third normal form (3NF). **(5 marks)**
- Identify the primary and foreign keys in your 3NF relations. **(2 marks)**

Q3.

Production tracking is important in many manufacturing environments (e.g., the pharmaceuticals industry, toy manufacturing, etc.). The following ER diagram captures important information in the tracking of production. Specifically, the ER diagram captures relationships between production lots (or batches), individual production units, and raw materials.



- i. Convert the above ER diagram into a relational database schema. Indicate primary keys and referential integrity constraints clearly. (25 marks)

Q4.

Assume we have the following application that models volleyball teams, the games they play, and the players in each team. In the design, we want to capture the following:

- ii. Set of teams, each team has an ID (unique identifier), name, main stadium, and to which city this team belongs.
- iii. Each team has many players, and each player belongs to one team. Each player has a number (unique identifier), name, DoB, year joined and shirt number of the player uses.
- iv. Teams play matches, in each match there is a host team and a guest team. The match takes place in the stadium of the host team.
- v. For each match we need to keep track of the following:

- The date on which the game is played
 - The final result of the match
 - The players participated in the match. For each player, how many goals scored, whether or not the player took yellow card or the red card.
 - During the match, one player may substitute another player. We want to capture this substitution and the time at which it took place.
- vi. Each match has exactly three referees. For each referee we have an ID (unique identifier), name, DoB, years of experience. One referee is the main referee and the other two are assistant referees.

Draw an ER diagram to model the above scenario. Represent it as accurately as possible, including cardinality and key constraints. Make sure to include necessary assumptions.

(25 marks)

Q5.

- i. List THREE (3) kinds of anomaly, and give an example for each. (3 marks)
- ii. List FOUR (4) Data Manipulation Commands (DML) in SQL. (2 marks)
- iii. Consider the following tables for a vehicle rent-out company that operates online and requires to keep a record of its customers and the rentals.

Client

<u>ClientID</u>	Client Name	Address
123	Sarath	23, Lily Avenue
456	Peter	45, Ladies Road
789	Tom	22, Downtown

Vehicles

<u>VehicleID</u>	Name
11	Toyota Van
12	Vitz Car
13	Jeep

Rentals

<u>ClientID</u>	<u>VehicleID</u>	Rental_Start_Date	Rental_End_Date
123	11	10/07/2020	16/07/2020
123	11	11/10/2020	12/10/2020
789	13	01/07/2020	30/07/2020

- a. Write the SQL statements to create the following tables. Show the appropriate constraints: **(5 marks)**
- Client
 - Vehicles
 - Rentals
- b. Write an SQL statement to insert the following data into the Client table:
- ClientID: 234,
 - Client Name: Jane,
 - Address: 414, Rose Avenue **(5 marks)**
- c. Write an SQL statement to change the name of the vehicle 'Jeep' to 'Pajero'. **(5 marks)**
- d. Write an SQL statement to delete Tom as a client. **(5 marks)**

-END-

