The Open University of Sri Lanka
Faculty of Engineering Technology
Department of Electrical and Computer Engineering
Bachelor of Science Honours in Engineering - Level 3
EEX3266 - Information Systems and Data Management
Final Examination - 2022/2023

072

Date: 08th February 2024 **Time: 13.30 – 16.30 hrs**

Read the following instructions before answering the paper.

1. This question paper contains four (04) questions. All four (4) questions are compulsory.
2. Answer all questions.
3. Answers should be in clear handwriting.

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1. a. Briefly outline the phases in the Software Development Life Cycle (SDLC). **(7 marks)**

   b. What is data modeling used in software development and name 2 such models? **(3 marks)**

   c. List the data abstraction layers and describe the purpose of each. **(4 marks)**

   d. Explain the concept of data independence in database management. In what ways does data independence ensure the resilience of user applications or databases to modifications in the software development process? **(6 marks)**

   (Total=20 marks)

2. Assume we have the following application that models soccer teams, their games, and the players in each team. In the design, we want to capture the following:

   a. We have a set of teams, each team has an ID (unique identifier), name, main stadium, and to which city the team belongs.
   b. Each team has many players, and each player belongs to one team. Each player has a number (unique identifier), name, DoB, start year, and shirt number that he uses.
   c. 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.
   d. For each match we need to keep track of the following:
      i The date on which the game is played
      ii The final result of the match
      iii The players participated in the match.
      iv For each player, how many goals he scored,
      v Whether a player is given a yellow or a red card.
      vi During the match, a player can be substituted due to specific reasons. If so, the substitution details and the time need to be recorded.

e. Each match has exactly three referees. For each referee, we have an ID (unique identifier), name, DoB, and number of years of experience. One referee is the main referee and the other two are assistant referees.

Design an ER diagram to capture the above requirements specifically indicating the below.

- Identify the Entities and the attributes with the relationships among them.
- Mark the Primary keys, strong and weak entities, and relationships with cardinalities.
- State any assumptions you have that affect your design,

(Total = 30 marks)

3. ABC airline operates to several destinations. A part of its database table is shown below.

Flight No	Date	Destination	Departure Time	Type	Capacity	Seats Reserved
102	11/12/2023	Memphis	9:00 AM	B727	165	124
329	11/12/2023	Los Angeles	9:10 PM	DC9	248	260
507	11/12/2023	Chicago	12:45 PM	B747	440	372
102	11/14/2023	Memphis	9:00 AM	DC9	248	188
329	11/15/2023	Los Angeles	9:10 PM	DC9	248	230
507	11/15/2023	Chicago	12:45 PM	DC9	248	157
329	11/16/2023	Los Angeles	9:10 PM	B727	165	131

i Describe what is normalization? **(2 marks)**

ii Identify the reasons why the given table is not in 2NF and describe the steps need to be done to get the table into Second Normal Form. **(4 marks)**

iii Identify the functional dependencies in the above table and make the table in 2NF. **(6 marks)**

iv Define the properties of a table in the Third Normal Form. **(2 marks)**

v Decompose the given table so that it meets the 3NF properties. **(4 marks)**

vi Draw the functionality diagram. **(2 marks)**

(Total=20 marks)

4. The resale bookshop has a few old computer books. The details are on a database table as shown below.

No.	Title	Author	Subject	Publisher	Quantity	Price
1	Data Structure	Lipschute	DS	McGraw	4	217.00
2	DOS Guide	NORTRON	OS	PHI	3	175.00
3	Turbo C++	Robert Lafore	Prog	Galgotia	5	270.00
4	Dbase Dummies	Palmer	DBMS	PustakM	7	130.00
5	Mastering Windows	Cowart	OS	BPB	1	225.00
6	Computer Studies	French	FND	Galgotia	2	75.00
7	COBOL	Stern	Prog	John W	4	1000.00
8	Guide Network	Freed	NET	Zpress	3	200.00
9	Basic for Beginners	Norton	Prog	BPB	3	40.00
10	Advanced Pascal	Schildt	Prog	McGraw	4	350.00

Write SQL commands for the following.

a. Get the total number of books available. **(02 marks)**
b. Show the Titles of the least two expensive books. **(02 marks)**
c. How many books are written by each author? **(02 marks)**
d. Display the titles of the books having their price over LKR 500/= and all the Prog books. **(02 marks)**
e. Find the total value of all the books. **(02 marks)**
f. Correct the prices of the books published by PHI if the prices should have marked 10% more. **(02 marks)**
g. Enter the new addition of the book Titled "SQL Commands" by Paul published by BPB and priced at LKR 700/=. **(02 marks)**
h. ISBN should be added to the database and that would be the uniquely identified key. **(04marks)**
i. The book "Guide Network" was sold. How do you remove that entry? **(04 marks)**
j. The seller decides to expand his service to a lending facility. The borrower needs to be registered before borrowing with their details NIC, name, address, and contact numbers. **(04 marks)**
k. The shopkeeper needs to find out whether the book is lent once a customer asks for it. The lending table will do so. Define the Lending table with necessary referential keys to find out who the person the book is borrowed. **(04 marks)**

(Total=30 marks)

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