PART C — (1 × 15 = 15 marks)

16. (a) Given a relation R (P, Q, R, S, T, U, V, W, X) and Functional Dependency set (FD). Determine whether the given R is in which normal form.

(i) $FD = \{PQ \rightarrow R, QS \rightarrow TU, PS \rightarrow VW, \text{and } P \rightarrow X\}$

(ii) $FD = \{PQ \rightarrow R, P \rightarrow ST, Q \rightarrow U, \text{and } U \rightarrow VW\}$

(iii) $FD = \{PQ \rightarrow R, SR \rightarrow PT, T \rightarrow U\}$

Or

(b) Design the database which manages information about publishers, authors, and books with the following information about the system: -

Publisher: name and address of the headquarters, set of branches, branch address, branch phone nos. (consider two phone numbers).

Author: name and address

The book is published by a publisher and has a list of address associated with it. An author can publish several books, but a book is published by at most one publisher.

(i) Draw an EER diagram for the above specifications. (5)

(ii) Specify an object-relational database scheme that represents the above properties. (5)

(iii) Describe the steps for mapping the EER schema to an ODB schema. (5)

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Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 90040

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2022.

Fourth Semester

Artificial Intelligence and Data Science

AD 8401 – DATABASE DESIGN AND MANAGEMENT

(Regulations 2017)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Who is a DBA? What are the responsibilities of a DBA?

2. State the different phases of the database development Life cycle in DBMS.

3. Differentiate DDL And DML Command In DBMS.

4. Give any four SQL commands used in Data Manipulation Language.

5. What is meant by lossless-join decomposition? Give an example.

6. Differentiate specialization and generalization.

7. State the two types of locks.

8. What are the four conditions of deadlock?

9. Define UDT. Give example.

10. What is the CRUD operation? Where are CRUD operations used?

PART B — (5 × 13 = 65 marks)

11. (a) (i) What is Data Modelling? Discuss types of Data Models in DBMS. (7)

(ii) Draw an object diagram of an order management system. (6)

Or

(b) (i) Define the Component of ER Diagram: Entity (Weak), Attribute (Key, Composite, Multivalued, Derived), Relationship (One-to-One, One-to-many, Many-to-many) (7)

(ii) What is the main difference between the Primary key, Candidate key, Super key, Foreign key, and Artificial key? (6)

12. (a) (i) Discuss types of integrity constraints? (4)

(ii) Explain any five SQL aggregate function. (4)

(iii) Given Customers table. Write the SQL command: (5)

customer_id	first_name	last_name	age	country
1	John	Doe	31	USA
2	Robert	Luna	22	USA
3	David	Robinson	22	UK
4	John	Reinhardt	25	UK
5	Betty	Doe	28	UAE

- Select all customers from the Customers table having first_name John.
- Select all customers from the Customers table having an age greater than 25.
- Select all customers from the Customers table having last_name Doe and country USA.

Or

(b) (i) Discuss different types of data independence. (4)

(ii) What is the difference between the WHERE clause and the HAVING clause? (4)

(iii) Write the SQL command: create a table, delete a table, change a table name, delete a row, create a database. (5)

13. (a) (i) What is Normalization? Discuss various types of Normal Forms up to BCNF. (7)

(ii) Mention the advantages and disadvantages of Normalization. (6)

Or

(b) (i) What is the Inference Rule (IR)? Discuss six types of IR of Functional Dependency (FD). (7)

(ii) Find the Trivial, Non-trivial, and complete non-trivial FD. (6)

- $A \rightarrow B$ where B is a subset of A.
- $A \rightarrow B$ where B is not a subset of A.
- $A \rightarrow A$ and $B \rightarrow B$
- $A \rightarrow B$ where $A \cap B$ = NULL.

ID $\rightarrow$ Name, Name $\rightarrow$ DOB

14. (a) (i) Explain ACID Properties with examples. (7)

(ii) Consider the following schedules involving two transactions. Which one of the following statements is true? (6)

S1: R1 (X) R1(Y) R2(X) R2(Y)W2(Y)W1(X)

S2: R1 (X) R2(X) R2(Y) W2(Y) R1(Y) W1(X)

- Both S1 and S2 are conflict serializable
- Only S1 is conflict serializable\column break
- Only S2 is conflict serializable

None

Or

(b) (i) What is Concurrency in the database? What are the potential problems of Concurrency? (7)

(ii) Explain the Two-phase locking method and Timestamp-based protocol. (6)

15. (a) (i) What is the difference between SQL and NoSQL databases? (4)

(ii) Discuss the CAP theorem. (4)

(iii) Discuss User-defined routines. (5)

Or

(b) (i) What is the MongoDB model? Explain with an example. (3)

(ii) Where do we use MongoDB? Who's using MongoDB? (3)

(iii) What is the difference between RDBMS and MongoDB? (3)

(iv) Which language is used in MongoDB? (4)