2/136 **2406E552** Candidate's Seat No :_____

IMSc (CS) (NEP) Sem.-2 Examination

DSC-M-CS-123T

Database Mgmt Systems

Time : 1-00 Hour] **June-2024** [Max. Marks : 25

Instructions:

- **Draw Diagrams wherever necessary.**
- **Make Assumptions wherever necessary.**

Q-1 **Define the following** **05**

a. Multivalued Attribute 02

b. Functions in SQL 02

c. Functional Dependency 01

Q-2 **Attempt the following :** **08**

1. Explain Three tier Database architecture with diagram
2. Discuss the Codd's Rules (Any 7)

OR

Q-2 **Attempt the following :** **08**

1. Explain the Armstrong's Axioms in detail with appropriate examples
2. Discuss different Data Models and discuss any **one** in detail.

Q-3 **Draw Entity Relationship diagram for the following case study** **04**

(Note: Make proper assumptions and identify all the entities and attributes. Make use of all different types of symbols for ER diagram

Computer Sciences Department frequent fliers have been complaining to Dane County Airport officials about the poor organization at the airport. As a result, the officials have decided that all information related to the airport should be organized using a DBMS, and you've been hired to design the database. Your first task is to organize the information about all the airplanes that are stationed and maintained at the airport. The relevant information is as follows:

- Every airplane has a registration number, and each airplane is of a specific model.
- The airport accommodates a number of airplane models, and each model is identified by a model number (e.g., DC-10) and has a capacity and a weight.
- A number of technicians work at the airport. You need to store the name, SSN, address, phone number, and salary of each technician.
- Each technician is an expert on one or more plane model(s), and his or her expertise may overlap with that of other technicians. This information about technicians must also be recorded.
- Traffic controllers must have an annual medical examination. For each traffic controller, you must store the date of the most recent exam.
- All airport employees (including technicians) belong to a union. You must store the union membership number of each employee. You can assume that each employee is uniquely identified by the social security number.
- The airport has a number of tests that are used periodically to ensure that air-planes are still airworthy. Each test has a Federal Aviation Administration (FAA) test number, a name, and a maximum possible score.
- The FAA requires the airport to keep track of each time that a given airplane is tested by a given technician using a given test. For each testing event, the information needed is the date, the number of hours the technician spent doing the test, and the score that the airplane received on the test.

Draw an ER diagram for the airport database. Be sure to indicate the various attributes of each entity and relationship set; also specify the key and participation constraints for each relationship set.

P.T.O

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OR

Q-3 **Attempt the following :** **04**

Discuss various stages of Normalization in detail with appropriate example

Q-4 **Normalize** the following structure **04**

You have derived the entities and attributes from the previous ER Diagram structure of **Q-3.** Plot the unnormalized form first with sample data then derive the Normalized structure upto 3NF. Also mention whether the schema goes to BCNF? If so , why?

You are expected to mention all the rules of normalization at each stage.

OR

Q-4 **Attempt the following :** **04**

Explain native relational algebra operators in detail with example

Q-5 Write **Relational Algebra** queries for the following **04**

1. Find the names of pilots certified for some Boeing aircraft.
2. Find the names of pilots who are certified for **ALL** aircraft
3. Find the names of pilots who can operate planes with a range greater than 3,000 miles but are not certified on any Boeing aircraft
4. Find the eids of employees who are certified for exactly three aircraft.

OR **04**

Q-5 **Attempt the following**:

Explain metadata? What information is stored in system catalog? (Explain with reference to each object) 04