K. J. SOMAIYA INSTITUTE OF MANAGEMENT STUDIES AND RESEARCH
MCA SEM- I Examination December 2019

Database Management Systems

Note: Question 1 is compulsory.   **Maximum Marks: 50**
       Solve any 4 from Questions 2 to 7.   **Duration: 3 hrs**

1. Consider an application that models soccer teams, the games they play, and the players in each team. In the design, capture the following details:
   • A set of teams, each team has an ID, name, main stadium, and to which city this team belongs.
   • Each team has many players, and each player belongs to one team. Each player has a number, name, DoB, start year, and shirt number that he uses.
   • 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.
   • For each match we need to keep track of the following:
       o The date on which the game is played
       o The final result of the match
       o The players participated in the match. For each player, how many goals he scored, whether or not he took yellow card, and whether or not he took red card.
       o During the match, one player may substitute another player. Also capture this substitution and the time at which it took place.
   • Each match has exactly three referees. Each referee have an ID, name, DoB, years of experience. One referee is the main referee and the other two are assistant referee.
   Design an **ER diagram** to capture the above requirements. Make sure cardinalities and primary keys are clear**.**   **[10]**

2. **a**. Explain functional dependency and multivalued dependency with example. **[5]**

   b. Describe lossless and dependency preserving decomposition.   **[5]**

3. **a**. Describe the responsibilities of database administrator and users.   **[5]**

   b. Apply normalization on the following relation.   **[5]**

   PATIENT (Patient#, Name, DOB, Address, Prescription#, Drug, Date, Dosage,

   Doctor#, Doctor, Secretary)

4. **a.** Write the queries in relational algebra to retrieve the data using the relational

schema

> student(id, name)
>
> enrolledIn(id, code)
>
> subject(code, lecturer)
>
> **[5]**

   i.   The names of students who are taking a subject not taught by Rahul.

  ii.   Who teaches at least two different subjects?

 iii.   The codes of all the subjects taught.

 iv.   The names of students in both cs1500 and cs1200.

   b.   Explain the concept of generalization and specialization.   **[5]**

5. a. Explain two phase locking protocol in detail.   **[5]**

   b. Write notes on serializability. Give an example.   **[5]**

6. a. Describe transaction processing with the state diagram.   **[5]**

   b. Explain Bell-lapadula model in detail.   **[5]**

7. Convert the following ER diagram to relational model. Write the necessary description wherever necessary.   **[10]**