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R V College of Engineering, Bengaluru-59

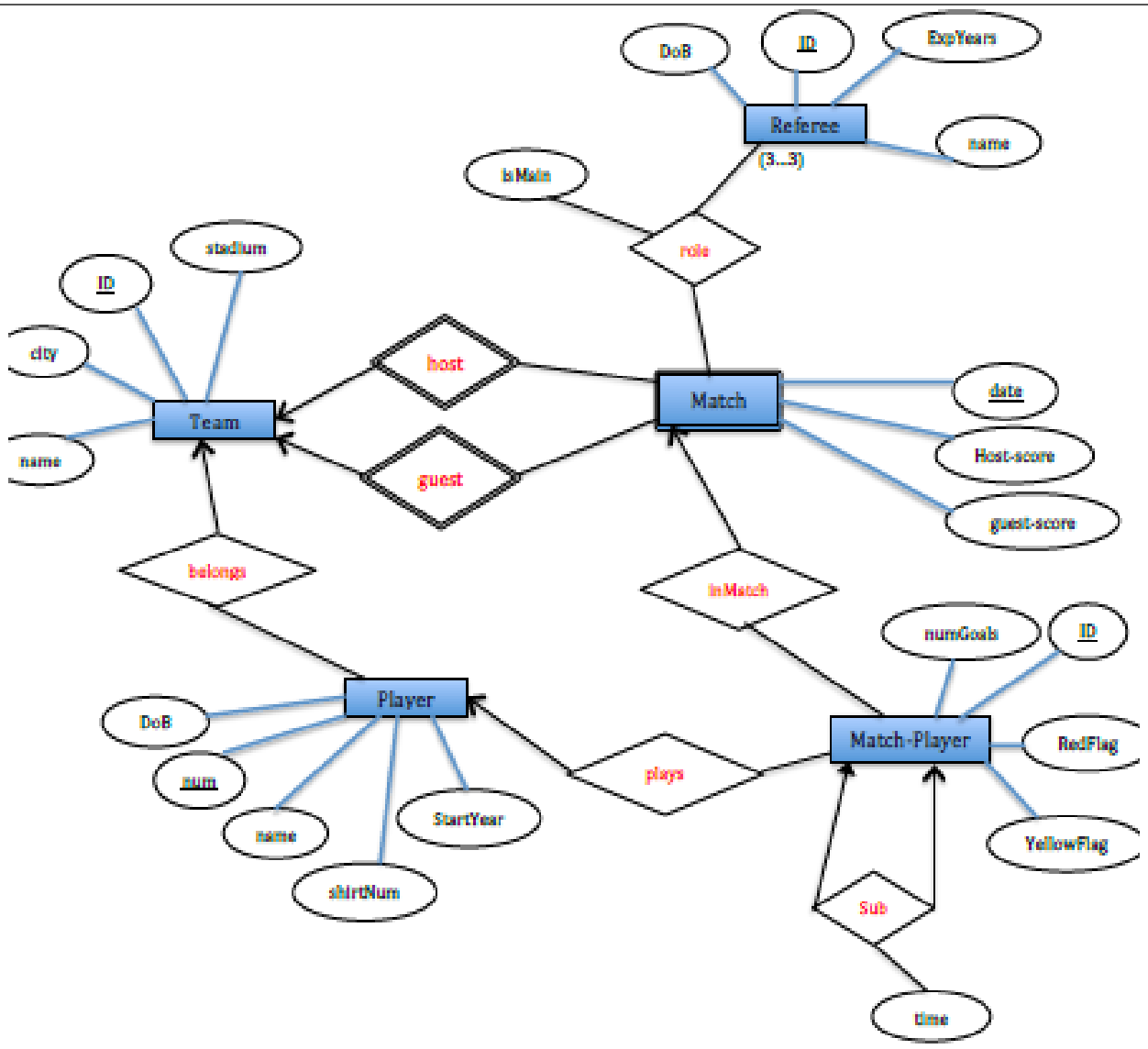
(An Autonomous Institution Affiliated toVisvesvarayaTechnologicalUniversity, Belagavi)

Department of Computer Science and Engineering
B.E Computer Science and Engineering (CSE)
CIE-I: Question Paper

Course:	**Introduction to database systems**	**Course Code: 21CS53**	**Semester : V**
Date :	**Duration : 90** minutes	**Max Marks:** 50	**Staff : SG/CNS/PD**

Note: **Answer all questions**

Sl. No.	PART A
1.	a. If you were designing a web based application for a Hotel Management System, design and sumarize the schema architecture preferred by you with the help of a neat diagram and proper justification 3 schema architecture – program data Independence + multiple views of files b. Can DBMS excecute variey of applications at a same time? Justiy your answer. Yes - metadata
2.	Assume we have the following application that models soccer teams, the games they play, and the players in each team. In the design, we want to capture the following: • We have a set of teams, each team has an ID (unique identifier), 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 (unique identifier), 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. We want to capture this substitution and the time at which it took place. • 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 referee. Design an ER diagram to capture the above requirements. State any assumptions you have that affects your design Make sure cardinalities and primary keys are clear.



5 ET - 5 Marks
Relation type - 3 Marks
Key – 2 Marks

3.	Discuss the stepts used to covert ER diagram to tables and convert the ER diagram of Q.No 2 to tables.

```
Create Table Team (
 ID: int Primary Key,
City: varchar(100),
Name: varchar(100),
Stadium: varchar(100));
```

```
Create Table Player (
 num: int Primary Key,
DoB: date,
Name: varchar(100),
StartYear: int,
ShirtNum: int,
TeamID: int Foreign Key References Team(ID));
```

```
Create Table Referee (
 ID: int Primary Key,
DoB: date,
Name: varchar(100),
ExpYear: int);
```

```
Create Table Match (
 HostID: int Foreign Key References Team(ID),
GuestID: int Foreign Key References Team(ID),
Date: date,
Host-score: int,
Guest-score: int,
Primary Key (HostID, GuestID, Date));
```

```
Create Table RefereeRole (
 HostID: int,
GuestID: int,
Date: date,
RefID: int Foreign Key References Referee(ID),
isMain: Boolean,
Foreign Key (HostID, GuestID, Date) References Match (HostID, GuestID, Date),
Primary Key (HostID, GuestID, Date, RefID);
```

```
Create Table Match-Player (
 ID: int Primary Key,
PlayerNum: int Foreign Key References Player(num),
MatchDate: date,
HostID: int,
GuestID: int,
numGoals: int,
redFlag: Boolean,
yellowFlag: Boolean,
subID: int Foreign Key References Match-Player(ID),
subTime: int,
Foreign Key (HostID, GuestID, MatchDate) References Match (HostID, GuestID, Date));
```

3

7 stepts 7 Marks

Schema – 3 Marks

4. Consider the following relations:

Doctor(SSN, FirstName, LastName, Specialty, YearsOfExperience, PhoneNum)

Patient(SSN, FirstName, LastName, Address, DOB, PrimaryDoctor_SSN)

Medicine(TradeName, UnitPrice, GenericFlag)

Prescription(Id, Date, Doctor_SSN, Patient_SSN)

	Prescription_Medicine(Prescription Id, TradeName, NumOfUnits) Write the relational algebra expressions for the following queries 1. List the first and last name of patients whose primary doctor named 'John Smith' 2 M $R1 \leftarrow \Pi_{SSN}(\sigma_{FirstName = 'John' \text{ and } LastName = 'Smith'}(Doctor))$ $Result \leftarrow \Pi_{FirstName, LastName}(R1 \bowtie_{SSN=PrimaryDoctor\_SSN}(Patient))$ 2. List the first and last name of doctors who are not primary doctors to any patient. – 2 M $R1 \leftarrow \Pi_{SSN}(Doctor) - \Pi_{SSN \leftarrow PrimaryDoctor\_SSN}(Patient)$ $Result \leftarrow \Pi_{FirstName, LastName}(R1 \bowtie Doctor)$ 3. For medicines written in more than 20 prescriptions, report the trade name and the total number of units prescribed. 3 M $R1 \leftarrow \pi_{SSN}(Patient \bowtie_{SSN=Patient\_SSN \text{ AND } Doctor\_SSN<>PrimaryDoctor\_SSN} Prescription)$ $R2 \leftarrow \pi_{SSN}(Patient) - R1$ $Result \leftarrow \pi_{FirstName, LastName}(R2 \bowtie Patient)$ 4. List the SSN of patients who have 'Aspirin' and 'Vitamin' trade names in one prescription. 3 M $R1 \leftarrow \pi_{Id \leftarrow PM1.Prescription\_Id}(\rho_{PM1}(Prescription\_Medicine) \bowtie_{PM1.Prescription\_Id = PM2.Prescription\_Id \text{ AND } PM1.TradeName='Aspirin' \text{ AND } PM2.TradeName='Vitamin'} \rho_{PM2}(Prescription\_Medicine))$ $Result \leftarrow \pi_{Patient\_SSN}(R1 \bowtie Prescription)$
5	a. Summarize different types of anomalies which can occur in referencing and referenced relation for the university database.

	Deletion anamoly with foreign key constraints 2 M for explaination + 2 examples b. Create an ER diagram foir the following scenario. Provide (min,max) constraints for the same Assume an employee may work in up to two departments or may not be assigned to any department. Assume that each department must have one and may have upto three phone numbers. Each employee must have atleast one phone and may have upto three phones. Supply (min,max) constraints on this diagram. Under what conditions would the relationship between Employee and phone be redundant in this example Emp Works_in Dept (0,2) (1,10) Dept Contains phone 1,3) (1,1) Emp has-phone Phone (1.3) (1,5) Relation has-phone would be redundant i. Each Emp is assigned to all the phones of each department that he/she works ii. An Emp cannot have any other phones outside the department he/she works

Course Outcomes

1. Understand and explore the needs and concepts of relational database management, non-relational database, transaction processing and related relational database facilities.
2. Apply the knowledge of logical database design principles to real time issues.
3. Analyse and design relational and document-based data model concepts.
4. Develop applications using relational database, NoSQL database and Elastic Search

Marks Distribution									
L1	L2	L3	L4	L5	L6	CO1	CO2	CO3	CO4
	6	23	21			12	10	28	