# National Institute of Technology, Silchar
## (UG) End Semester Examination, December 2021

Subject Code: CS 302            Subject:  Database Management System
Semester: 5$^{th}$            Department: Computer Science and Engineering
Duration: 1 hour 15 minutes            Total Marks: 30

**Answer five questions.**
**Q1 to Q4 are compulsory.  Choose any one from Q5 and Q6**

| Q No. | Question | Marks | CO |
|---|---|---|---|
| 1 | Define the following | | |
| | a) Data | 1 | CO1 |
| | b) Data model | 1 | CO1 |
| | c) Entity instance | 1 | CO1 |
| | d) Full functional dependency | 1 | CO1 |
| | e) Atomicity | 1 | CO1 |
| | f) Pseudo transitivity | 1 | CO1 |
| 2 | Consider the following database schema<br><br>***Emp(eid, ename, age, salary)***<br>***Works(eid, did, pct-time)***<br>***Dept(did, dname, managerid)***<br><br>a) List the names and ages of each employee who works in both the hardware department and the software department. ***Write the query in Tuple Relational Calculus***.<br><br>b) List the name of each employee whose salary exceeds 1 lakh that he or she works in same/different departments. ***Write the query in Relational Algebra.***<br><br>c) Find the managerid of managers who manage only departments. ***Write the query in SQL.*** | 2<br><br>2<br><br>2 | CO3<br><br>CO3<br><br>CO3 |
| 3 | (see table below) | 2<br><br>2<br><br>2 | CO2<br><br>CO2<br><br>CO2 |

| City_Code | City_Name | Team_ID | Team_Name | Player_ID | Player_Name | Citizen_Country ID | Citizen_Country Name | Role | Owner_ID | Owner_Name | Coach_ID | Coach_Name | Web |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| KK | Kolkata | KKR | Kolkata Knight Riders | P1 | Gautam Gambhir | IND | India | Batsman | A1 | Knight Riders Sports Private Ltd | C1 | Trevor Bayliss | www.kkr.com |
| KK | Kolkata | KKR | Kolkata Knight Riders | P2 | Brett Lee | AUS | Australia | Bowler | A1 | Knight Riders Sports Private Ltd | C1 | Trevor Bayliss | www.kkr.com |
| KK | Kolkata | KKR | Kolkata Knight Riders | P3 | Brad Haddin | AUS | Australia | Wicket keeper | A1 | Knight Riders Sports Private Ltd | C1 | Trevor Bayliss | www.kkr.com |
| CH | Chennai | CSR | Chennai Super Kings | P5 | Mahendra Singh Dhoni | IND | India | Wicket keeper | A2 | The India Cements Ltd | C2 | Stephen Fleming | www.chennai superkings.com |
| CH | Chennai | CSR | Chennai Super Kings | P6 | Suresh Raina | IND | India | Batsman | A2 | The India Cements Ltd | C2 | Stephen Fleming | www.chennai superkings.com |
| CH | Chennai | CSR | Chennai Super Kings | P7 | Ravindra Jadeja | IND | India | All-rounder | A2 | The India Cements Ltd | C2 | Stephen Fleming | www.chennai superkings.com |
| MB | Mumbai | MI | Mumbai Indian | P8 | Sachin Tendulkar | IND | India | Batsman | A3 | IndiaWin Sports Pvt Ltd | C3 | John Wright | www.mumbai indians.com |
| MB | Mumbai | MI | Mumbai Indian | P9 | Rohit Sharma | IND | India | Batsman | A3 | IndiaWin Sports Pvt Ltd | C3 | John Wright | www.mumbai indians.com |
| MB | Mumbai | MI | Mumbai Indian | P10 | Lasith Malinga | SL | Sri Lanka | Bowler | A3 | IndiaWin Sports Pvt Ltd | C3 | John Wright | www.mumbai-indians.com |

Consider the above Table which describes data related to IPL cricket matches. Answer the following questions,
  a) Find the primary key of the table
  b) List the fully-functional, partial and transitive dependencies
  c) Decompose the above table based on the given *FD*
       *Team_ID → City_code, City_name, Team_name, Owner_ID, Owner_name, Coach_ID, Coach_Name, Web*

| Q No. | Question | Marks | CO |
|---|---|---|---|
| 4 | a) Write Armstrong rules and show that other rules are derived from Armstrong rules. | 3 | CO4 |
| | b) Consider the following two transactions: | 3 | CO4 |

| | | | |
|---|---|---|---|
| | **T1**: read(A);<br>read(B);<br>if A=0 then B := B+1;<br>write(B).<br>**T2**: read(B);<br>read(A);<br>if B=0 then A := A+1;<br>write(A).<br>Show a concurrent execution of T1 and T2 that produces a conflict serializable schedule. | | |
| 5 | A bank has many branches, with many customers. A customer can open many different kinds of accounts with the bank. Any customer of the bank can take loan from the bank. All branches can give loans. Banks have also installed automatic teller machines, from which a customer can withdraw from his/her bank. Draw the ER-diagram for the bank specifying aggregation, generalization or specialization hierarchy, if any. Create 3NF tables of your design. Make suitable assumptions, if any | 6 | CO5 |
| 6 | A construction company has many branches spread all over the country. The company has two types of constructions to offer: Housing and Commercial. The housing company provides low income housing, medium style housing and high end housing schemes, while on the commercial side it offers multiplexes and shopping zones. The customers of the company may be individuals or corporate clients. Draw the ER diagram for the company showing generalization or specialization hierarchies and aggregations, if any. Also create 3NF tables of your design. | 6 | CO5 |

**Course Outcomes (CO)**:

1. Understand the basic terms and concepts related to database design and management.
2. Describe, define and apply the major components of the relational database model to design database systems.
3. Learn and apply the Structured Query Language (SQL) for database definition and manipulation in the database development process.
4. Understand and implement the principles and concepts of normalization, information integrity constraints, security and privacy issue.
5. Design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementation of DBMS.

**CO distribution Mark wise**