Birla Institute of Technology & Science-Pilani
Hyderabad Campus
II semester 2019-20
Database Systems (CSF 212) Mid-Semester Test (Regular)

Dt: 07.03.2020(Sat) Weightage: 30% Max marks:60 Type: Close Book

Instructions: (i) No additional sheets booklet will be supplied. Hence use the space accordingly. (ii) Do not ask for clarification of doubts. If you feel that some data which is essential to answer a question is really missing, you can assume the same and go ahead. But, clearly write your assumptions. (iii) Answers to all sub-parts of a question must appear together.

Q.1. (a) What is a *bound variable* in Tuple Relational Calculus(TRC) ? Give a TRC query expression that would get eid, ename for those whose salary is greater than 50000, from the table-
EMP (eid, ename, sal ,dno, age) .

(b) What are possible approaches to map 1:1 binary relationship in ER (when both entity types have partial participation in the relationship), into relation schemas. Give your comments indicating for each approach, when can we to go for it, and pros and cons.

(c) Brief on the concept of ***Deletion anomalies*** in relational database design, with a simple example. [3+4+4=11]

Q.2. Look at the following description about some sport Premier League (like IPL in India) scenario in a country. We have some Franchises to participate in the League. Each Franchise has a name, CEO, address. Franchise name is unique. A franchise can be either an Owner-Franchise (owned by an individual) or a Corporate-Franchise (owned by a company), but not both. If it is an Owner-Franchise, it will have owner's name and contact as additional details. If it is a Corporate-Franchise, it will have Company-name and address as extra details. Every Franchise has some players (min 15 - max 25). Every player belongs to only one Franchise and has name, player_ID, contact number (can be multiple), rank, and nationality as attributes. Note that the player_ID is unique within a Franchise. But different Franchises can have players with same ID. Every Franchise plays zero or more matches with other Franchises. Each match played between any two Franchises is identified by a matchCode and will be played on a given date, in a specified location (city). We also maintain Points_tally for Franchises, with details- number of matches played, won, lost, drawn, and points.

Now, draw an ER/EER diagram as suitable for the above requirement. Assume necessary data which is missing in the question and clearly write your assumptions. The diagram should include- Entity types, sub-typing (if necessary), relationships, min-max, cardinality, participation, and all other relevant constraints. [10]

Q.3. Design *Relational Schemas* (tables) with PKs/FKs, that capture all the information and constraints that are depicted in ER/EER diagram you have drawn, as an answer to Q.2, above. [10]

Q.4. Look at the following Database schema. [(3+3)X3=18]

Student(sid, sname, sbranch)	// sid is PK
Company(cid, cname, clocation)	// cid is PK
Interview(sid, cid, intdate)	// PK is- (sid, cid) ; sid and cid are FKs
Placement_Offer(sid, cid, salary)	// PK is- (sid, cid) ; sid and cid are FKs

Now, for each of the following data retrieval requirements, give both **Relational Algebraic expression** and **SQL query statement** separately.

(i) Get the *sid* and the *sname* for those students who have been offered by all companies located in 'Mumbai'.

(ii) Get the *cid* and *cname* for those companies who have interviewed at least 30 students but not offered to any student.

(iii) Get *cid*, and *cname* for those not made offer to any of the 'CSE' branch students.

Note: No need to rename attributes in results. Do not define VIEWS as part of your answers, while writing SQL statements. Only DML query statements are allowed. Do not use any sort of Outer joins.

For each of the sub-part of Q.4, SQL query statement is for 3 marks and Relational algebraic expression is for 3 marks. Hence Q4. Is for total of 18 marks.

Q.5.

(i) Assume that we have a relation ***R*** with schema ***R(A, B, C, D, E)***, and with the following set (***F)*** of functional dependencies.
F={AB→C; B→D; D→E } . What is the highest Normal form satisfied by ***R***? If ***R*** is not in 3NF, bring it to 3NF, by applying appropriate decomposition.

(ii) Assume that we have a relation ***S*** with schema ***S(A, B, C, D, E)***, and with the following set (***F)*** of functional dependencies.
F={AB→CDE; E→A }. What is the highest Normal form of ***S***? If ***S*** is not in 3Nf bring it to 3NF, by applying appropriate decomposition.

(iii) If the given set of FDs is ***{ A→B; BC→E},*** check if each of the following inferred FD is right or wrong. If right prove it.
(a)AC→E (b) B→E (c) AC→BE (d) AB→E

[4+3+4=11]

***** End*****