University of Gujrat

CS-243 Database Systems | Final-Term Exam (Spring 2021)

Total Marks: 50 | Time: 9:30a.m.-1:00p.m.

Note:

a. **Understanding is part of question paper.**
b. **Don't use multi-color pens on answer sheets.**
c. **Don't submit image files (.JPEG).**
d. **Submit written based non-editable pdf files.**
e. **Ensure submission in stipulated time.**

Attempt all questions:

10-Marks

Question 1: Draw an entity-relationship diagram for the following scenario. Your diagram must include entities, attributes, relationships, primary keys for entities. Cardinality for all relationships as stated in the scenario using crow feet notation.

Scenario: Design ER Diagram for examination department of an Educational Institution. The institution offers different programs in which students are enrolled and each program has specified courses. Students, programs, courses, teacher and semesters are uniquely identified by their identifier named as Std-ID, Prog-Code, Crs-Code, T-ID, Sem-Code respectively. Some additional attribute for each course are Crs-Title, Cr-Hrs. Experience, name and mobile-no are the attributes of teacher. More description of the system is given as:

- Students are enrolled in programs. A student can be enrolled in only one program at a time.
- The programs are based on courses. Each program can has multiple courses. Two or more programs may have such courses that have same title but their crscode must be different for each program.
- Different courses are offered at the start of the semester. In each semester, multiple courses can be offered and each course must be different with other offered course.
- Students enroll themselves for these courses at the start of semesters. Semesters are uniquely identify by their name (semName), either they are Fall-2017 or Spring-2017.
- Enrolled courses by students and offered courses must not be same. The difference is due to the individual situation of every student, because if one student has not pass a certain course 'A' in the previous semester he will not be able to register for a course 'B' offered in this semester as the course 'A' is the prerequisite for course 'B'.
- After valid registration classes start.
- A Course offered in a program, is assigned to a teacher also. A teacher may teach multiple courses but a course having same crscode must be teach by same teacher.

- There can be any midterm exams and in this system we have only one midterm. And there will be a final term exam.
- All the students are given assignments and quizzes and are awarded grades against their performance in assignment, quizzes, mid and final term exam for each course. SGPA (semester grade point average) for each student is evaluated by using his/her grades and CGPA (cumulative GPA) is evaluated by using SGPA and total credit hours for each semester.

Question 2:

(a) Following is the table that is used in a Hospital Database. Normalize the table into 3NF. Draw all those relations that are created in 1NF, 2NF and 3NF. **10-Marks**

Patient ID	Patient Name	Address	Appointment Date	Doctor	Dieses	Fee	Room	Test
P-1	Sarfraz Ahmad	13-B Shadman Colony Gujrat	10-12-2017	Dr. Imran	Blood Pressure	1000	110	Blood Sugar
			12-08-2017	Dr. Nasir	Fever	850	115	ERCCI
			05-04-2017	Dr. Imran	Anxiety	Free	110	ABL Mutation
			01-02-2017	Dr. Shahid	Blood Pressure	1000	120	Blood Sugar
P-2	Shahid	7-A Marghzar Colony Gujrat	10-12-2017	Dr. Nasir	Fever	850	115	Blood Sugar
			09-10-2017	Dr. Imran	Anxiety	Free	110	ERCCI
			02-08-2017	Dr. Shahid	Blood Pressure	1000	120	ABL Mutation

(b) Write SQL statements to Create tables of 3NF for Question No-2. Carefully create relationship between tables where required. **5-Marks**

Question 3: Suppose a relational database with following three tables **10-Marks**

table	key attributes
X(xid, D)	xid
Y(yid, E)	yid
Z(xid, yid, F)	xid, yid, F

The following referential integrity constraints exist on the table Z. for Every xid-value in Z is the key of a record available in table X and yid-value in Z is the key of a record in table Y.

(a) Consider the following two queries.

```
Q1 = SELECT X1.D AS D, Z1.F AS F
     FROM Z AS Z1
     JOIN Z AS Z2 ON Z2.yid = Z1.yid
     JOIN X AS X1 ON X1.xid = Z1.xid
     JOIN X AS X2 ON X2.xid = Z2.xid
```

and

```
Q2 = SELECT DISTINCT X1.D AS D, Z1.F AS F
     FROM Z AS Z1
     JOIN Z AS Z2 ON Z2.yid = Z1.yid
     JOIN X AS X1 ON X1.xid = Z1.xid
     JOIN X AS X2 ON X2.xid = Z2.xid
```

Note that the only difference is the use of DISTINCT in Q2.

(i) What are the results of Q1 and Q2, does this return same results? Explain.

(ii) Suppose we add this where-clause to each query:

```
WHERE Z1.F = Z2.F AND X1.xid <> X2.xid
```

Explain whether Q1 and Q2 return the same results, Explain

(iii) Create the views for above mentioned table.

Question 4: What is meant by data abstraction in DBMS and how is it an advantage, How is productivity increased? How is data independence an advantage? Justify your answer.

5-Marks

Question 5:

Consider the following tables and create the views for tables and illustrate different types of joins. **4-Marks**

P_Id	LastName	FirstName	Address	City
1	Hansen	Ola	Timoteivn 10	Sandnes
2	Svendson	Tove	Borgvn 23	Sandnes
3	Pettersen	Kari	Storgt 20	Stavanger

O_Id	OrderNo	P_Id
1	77895	3
2	44678	3
3	22456	1
4	24562	1
5	34764	15

Question 6: Consider the following table: **6-Marks**

ID	NAME	GENDER	SALARY	CITY
1	Tom	Male	4000	london
2	Pam	female	3000	New yark
3	John	male	3500	london
4	Sam	male	4500	Sydney

Perform following queries:

a. You have to get the total number of employee.

b. Find the minimum and maximum , average salary of employee.

c. You have to find the total salary of employee and must name the column total salary.

d. Calculate the total salary for each city. (hint use group by)

e. After calculating the total salary for each city now you have to find the total salary for city and gender wise.

f. Now you must only show the totally salary of each city whose gender are 'Male'.

g. Order the name Field in Dec order.

Good Luck