B.Sc. Engg. CSE / HD CSE 3rd Semester   14 March 2018 (Morning)

ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)
ORGANISATION OF ISLAMIC COOPERATION (OIC)
Department of Computer Science and Engineering (CSE)

MID SEMESTER EXAMINATION   **WINTER SEMESTER, 2017-2018**
DURATION: 1 Hour 30 Minutes   **FULL MARKS: 75**

CSE 4307: Database Management Systems

Programmable calculators are not allowed. Do not write anything on the question paper.
There are **4 (four)** questions. **Question No. 2 is mandatory**. Answer any **2 (two)** from the remaining
questions. Figures in the right margin indicate marks.

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1. a) File-processing system may introduce data redundancy and inconsistency. Explain it with   10
       a suitable example.
    b) Explain the usefulness of 1-1 cardinality using a real-life example.   5
    c) What is a sub-query (or nested query)? A sub-query can be placed in two places. Briefly   5
       mention them with suitable examples.
    d) What are Selection and Projection operations in relational algebra? Use a table with few   5
       records and show how these operations work. Is it possible to combine Selection and
       Projection? Justify it.

[Mandatory]

2. a) Define super key, candidate key, primary key and foreign key. Now consider the following   3+6+7
       system description of a typical bank automation:

    Branch Part: ABC is a large bank with more than 150 branches all over the country.
    Each branch has its geographical location, year of establishment, total no. of employee and
    current manager name. But management also wants to preserve the history of mangers at
    different branches with these information: branch name, manger name, joining date, end
    date.

    Account Part: Before opening account a customer must supply his/her basic information
    such as : name, DOB, address, phone and introducer. Introducer is an existing customer.
    There are 3 basic types of accounts such as i) Current ii) Saving and iii) Student. Each type
    is different only by one attribute (i.e. Interest Rate). Assume other attributes are identical.
    After fulfilling personal information he/she can open account with the following
    information: Account No, Title of Account, Owner of the Account (person), Type of
    Account (either of the 3 already mentioned). One person may have multiple accounts but
    he/she will fulfill the personal data only once.

    Transaction Part: There are two basic types of transaction as such i) Deposit and ii)
    Withdraw. Each transaction must include the following information: transaction no,
    amount, type of operation, date time, account no.

    Your tasks are now:
    i. Design the ERD with appropriate cardinality. In each step comment on how your
        design satisfy the given requirements.
    ii. Convert ERD into DDL using standard SQL (you should mention the appropriate
        primary key and foreign key in each definition).

b) Consider the following entities:

Depts(<u>Code</u>, Name)
Students (<u>ID</u>, Name,GPA, Dept (Foreign Key Referring to Depts))

Write SQL for the followings:
i. List the Student Name whose GPA is above the average GPA of the students.
ii. List the ID and Name of 2 students: one who got the highest GPA and the other one who got the lowest GPA. (A single list will show these two students information).
iii. List of Dept Name, Dept Code and total number of student of that department.

3×3

3. a) Differentiate between the followings using proper example data:
i. Cartesian Product and Natural Join   ii. Left Outer Join and Right Outer Join

5

b) Create tables as described using standard SQL:

10

Table: Division

Attribute	Description and/or Data Type	Requirement / Other information
ID	Numeric with no decimal part.	Primary key
Name	50 characters	It may be used by other than English language such as Chinese.
Size	In Squire KM	Division size cannot be less than 20 squire KM

Table: Person

Attribute	Description and/or Data Type	Requirement / Other
ID	Numeric with no decimal part.	Primary key
Name	50 characters	It may be used by other than English language such as Chinese.
DOB	Date	No date before January 1, 1950 is allowed.
DivisionCode	Foreign Key (Division)	It cannot be empty.
Salary	Monthly Basic Salary	May be null only for unemployed.
BloodGroup	Character	Any value from List{A+ve, A-ve, B+ve, B-ve, AB+ve, AB-ve}

Note that the table Person has only division information. In reality a division has a number of districts. How can you include district information in the person table? Explain.

c) Write SQL for the followings:
i. List the division name and its size according to its size.
ii. List the person ID and name who live in divisions that start with 'D'.
iii. List the person ID and name who live in division with the largest size (in squire KM)
iv. List the division name and its total inhabitants.
v. List the division name and its total inhabitants where total inhabitants is at least 10000.

2×5

4. a) What are total participation and partial participation? Explain with example.   5

   b) Consider a result processing system of a large university. The followings are some   8
requirements given with `pseudo code`. Also some additional instructions (marked as **I**)
are given. Your task is to convert the pseudo code to appropriate DDL satisfying the
additional instructions.

```
Dept(ID, Name)
Prog(ID,Name)
```

I: Correct it so that it preserves *one to many* relationship.

```
Student(ID, Name, DOB, CGPA)
```

I: Make the DDL such that Student maintains one to many relationship with both Dept and
Prog.

```
Emp(ID, Name, Dept)
```

I: Now create another entity to store the grades for the individual courses of each students.
First justify its relationship (cardinality) and present your solution.

   c) What are weak entity set and discriminator? Present an example in this regard.   7

   d) Discuss the various ways to impose constraints on generalization.   5