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CS 33007 Introduction to Database System Design, Spring 2021

Midterm

Instructions:

- *If needed you can use pen and paper. Do not forget to take a snapshot of the paper and attached to the answer script.*
- *You must submit your answer script at Blackboard (Pdf format Preferable).*

Total Points: 50+5Bonus   **Time:** 11AM – 12:10PM

Section 01: 10 Points

    a. What are the advantages of DBMS over traditional File Management System?
- Elimination of Data Redundancy
- Data Consistency and Integrity
- Elimination of duplicate data
- Secure - DBMS is highly secure system
- Privacy
- Better querying and reporting mechanism

    b. Is the following table a Relation? If not, why?

EmployeeNumber	Phone	Name	Name
101	3304567898,6754326677	Robin	John
102	3456727891	Mike	Haris
100	4534457897	Dip	Saha
101	4568738923	Nur	Ali
102	3456727891	Mike	Haris

No , because there are two same employee number. Thus cannot be a relation due to a repeate therefore no uniqueness to them.

Section 02: 10 Points[05+05]

a) Write an equivalent SQL query using natural join for the following expression of relational algebra

$$\prod_{A,\ r.B,\ C,\ r.D,\ E}\left(\sigma_{r.B\ =\ s.B\ \wedge\ r.D\ =\ s.D}\left(r \times s\right)\right)$$

Answer: select A, B, C, D, E from r natural join s; --- or --- select A, r.B, C, r.D, E from r natural join s;

b) Perform the right outer join on Table A and Table B. Show the result using the following table. There are some extra rows and columns
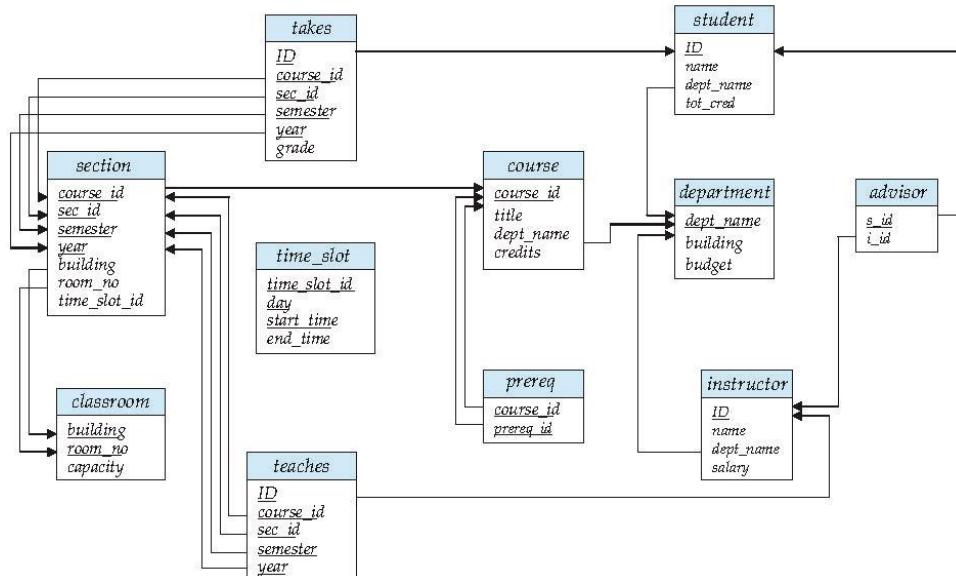
Table A		Table B	
ID	**Num1**	**ID**	**Num2**
Mango	8	Avocado	4
Orange	5	Tomato	6
Banana	20	Melon	7
Apple	8	Apple	8

.

Table A *natural right outer join* Table B

ID	Number			
Mango	8			
Orange	5			
Banana	20			
Apple	8			
Avocado	4			
Tomato	6			
Melon	7			

Section 03: 10 Points

Write SQL queries for the following sentences considering the given relational schema of university database.

(i)   Suppose full name of the instructors are stored as atomic value where parts of names are separated by blank space. Find all instructors who has last name "Rob".

SELECT nane FROM Instructor WHERE name like '%Rob'

Make sure there is a space before rob.

(ii)   Find the name of those departments whose total salary of the instructors is greater than 600000.
select dept_name, SUM(salary) as Total_salary from instructor GROUP BY dept_name having Total_salary>600000;

(iii)   Delete courses having ID beginning with "CS";

Answer: Delete from course where course_id like "CS%";

Section 04: 10 Points

Write a SQL function that takes department name as input and increase the salary 15% only for the instructors whose salary is less than the average salary of the instructors of the department.

DELIMITER //

CREATE procedure increment_on_salary(in dept_name varchar(30))

BEGIN

   DECLARE avg_salary float;

SELECT AVG(salary) into avg_salary from instructor where instructor.dept_name = dept_name; update instructor

   set salary = 1.15*salary where salary<avg_salary and instructor.dept_name = dept_name;
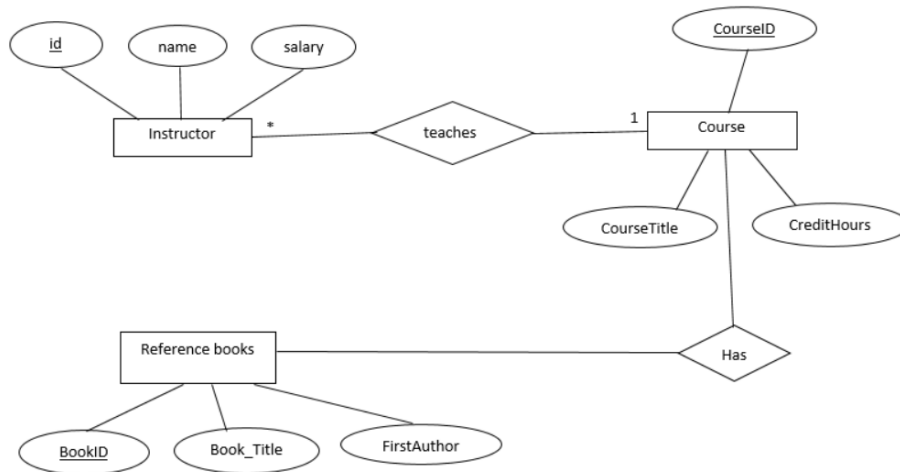
END //

DELIMITER ;

Section 05: 15 Points

Suppose computer science department has three entity sets *instructors(i_id*, name, salary), *courses(course_id*, course_title, credit_hours) and reference_books(*book_id*, book_title, first_author).

    a. Draw an ER diagram for the entity sets. Please note that each course must have at least one reference book.

    b. Convert the ER diagram to non-redundant relation schemas.