

Rajiv Gandhi Institute of Petroleum Technology, Jais, Amethi
B. Tech CSE/IT/CSD/MC/IDD Mid Semester Examination 2024 – 25
Subject: CS212 Database Management System

Time 2 hrs

Full Marks 30

Note: Attempt all questions. The marks of the questions are provided along with the questions. You need to explain your answers. Whenever you make any assumption, write it.

1. Answer the following questions:

(a) Given a relation $r(A, B, C, D, E)$. All the possible candidate keys of the relation are AB, CD and E . Find all the super keys of the relation r with two attributes. [2]

(b) Given two entity sets `instructor` and `student`. The attributes of the `instructor` are as follows – `iid, name, salary` where `iid` is the primary key attribute. The attributes of the `student` are as follows – `sid, name, credit` where `sid` is the primary key attribute. We have created two separate tables for each entity considering the corresponding attributes. These two entity sets are related via a relationship set `advisor`. Show the table corresponding to the relationship set `advisor` along with the primary key, in the following scenarios –

- A student cannot be advised by more than one instructor and an instructor cannot advise more than one student.
- A student cannot be advised by more than one instructor and an instructor can advise more than one student.
- A student can be advised by more than one instructor and an instructor can advise more than one student.

[6]

2. Answer the following questions:

(a) Consider two tables are created as follows.

- **CREATE TABLE** `tab1(A INT, B INT, PRIMARY KEY(A));`
- **CREATE TABLE** `tab2(A INT, C INT, FOREIGN KEY(A) REFERENCES tab1(A));`

Mention the order in which we should delete these tables (using **DROP** in SQL) and why. [2]

(b) Given two tables as follows.

- **CREATE TABLE** `t1(A INT PRIMARY KEY, B INT NOT NULL)`
- **CREATE TABLE** `t2(A INT NOT NULL, C INT NOT NULL)`

The number of tuples in `t1` is $N_r \geq 1$ and in `t2` is $N_s \geq 1$. What is the maximum / minimum number of tuples in the following (using MySQL)

- `SELECT * FROM t1 CROSS JOIN t2`
- `SELECT * FROM t1 NATURAL JOIN t2`

[4]

3. Consider the Employee database which consists of the following tables.

- `employee (person_name, street, city)`
- `works (person_name, company_name, salary)`
- `company (company_name, city)`

Write an expression in the relational algebra to express each of the following queries:

- Find the name of each employee who lives in "Amethi" city.
- Find the name of each employee whose salary is greater than 500.
- Find the name of each employee who does not work for company "XYZ".

[3*2=6]

4. Consider the Student database which consists of the following tables.

- `department (dept_name, building, budget)`
- `student (roll_no, name, age, dept_name)`

`dept_name` in the `student` table is a foreign key referring to `department` table. Write the following queries in MySQL:

- Find the name of the youngest student(s). In case there are more than one student with minimum age, then show all such names.
- Find the name of the students where there is at-least one student who is younger to them.
- Find the name of the departments where the average age of students is more than 20.
- Find how many students name starts with 'A'.
- Find the name of the department(s) with maximum students. In case there are more than one such department, then show all such department names.

[5*2 = 10]

*create view, view name as
select * from*