Sample questions on Relational Algebra and Corresponding SQL

**(For all of the following relational algebra expressions, you have to write SQL as well)**

The relational schema for student course registration are as follows

Student (Sid, name, street, city. Mobile, email, CGPA, age)

Takes (course-id, Sid, semester, year, GP)

Course (course-id, title, credit-hour)

Teacher (Tid, name, street, city, Mobile, email, salary, date-of-birth)

Teach (course-id, Tid, semester, year)

Q. 1: Write relational algebra expression find Sid, name, street and city of all students who have taken 3 credit-hour course.

Q. 2: Write relational algebra expression for the following queries

1. Find Sid, name, street and city of all students who live in ‘Dhaka’ and CGPA is higher than 3.5.
2. Find the names of the cities where any students or teachers live.

Q. 3: Write relational algebra expression for the following queries

1. Find all distinct cities where students live.
2. Find all cities for students with Ids between 1111 and 6666. There will be no duplicate in the result.
3. Find all Id, name and course id of all students who took courses in the year 2000.
4. Find a single list of name and email of all teachers and students of Dhaka city.

Q. 4: Given the relational schema as follows:

*branch*(*branch name*, *branch city, assets*)

*customer* (*customer name*, *customer street, customer city*)

*loan* (*loan number*, *branch name, amount*)

*borrower* (*customer name*, *loan number*)

*account* (*account number*, *branch name, balance* )

*depositor* (*customer name*, *account number*)

1. Find the list of customer name, branch name and branch city of all customers who lives in ‘Dhaka’.
2. There are some customers who have no account (account closed) and also some customers who have no loan (loan paid). Find these customer name, customer street and customer city for the above using joins.
3. Find names of customers who have both account and loan.
4. Find names of customers who have account but no loan.
5. Find names of customers who have both account, loan or both.

Q. 5: Given the relational schema as follows:

*employee* (*person name*, *street*, *city*)

*works* (*person name*, *company name*, *salary*)

*company* (*company name*, *city*)

Write relational algebra expression for the following queries:

1. Find person name, street, employee.city, company name, company.city for all employees salary greater than 10000.

Q.6: Write relational expression for the SQL statement as follows:

SELECT Tid, name

FROM teacher, teach, course

WHERE teacher.Tid = teach.Tid and teach.course-id = course.course-id and year = 2016

Q. 7: Write relational algebra expression find Tid, name, street and city of all teachers who teaches 3 credit-hour course.

Q. 8: Find all cities where any student or teacher lives.

Q.9: Find those cities where student but no teacher live.

Q10.: Find cities where both teachers and students live.

Q.11: Write relational expression for the SQL statement as follows:

SELECT Tid, salary

FROM teacher, teach, course

WHERE teacher.Tid = teach.Tid and teach.course-id = course.course-id and year = 2018

Q12:

The relational schema for student course registration are as follows

Student (Sid, name, street, city. Mobile, email, CGPA, Fee-paid)

Takes (course-id, Sid, semester, year, GP)

Course (course-id, title, credit-hour)

Teacher (Tid, name, street, city, Mobile, email, salary, date-of-birth)

Teach (course-id, Tid, semester, year)

Write equivalent relational algebra expressions using cartesian product ×.

Πname, street, city (Student ⋈ takes)

σcity = ‘Dhaka’ ∧ year = 2024 (Student ⋈ takes)

Πname, street, city (σcity = ‘Dhaka’ ∧ year = 2024 (Student ⋈ takes))