Class Test CS2008

Dt. 26 Feb 2021 @ 04.15 PM

Keep your camera on

Write your name and roll number on few white pages before exam starts

Scan and submit your answers to bakshisambit@ieee.org

Exam duration: 04:20PM – 05:05PM

Time for submission of copies to mail: 05:05PM – 05:15PM

1 Consider the following relational database:

`EMPLOYEE(e-name, street, city)`

`COMPANY(c-name, city)`

`WORKS_FOR(e-name, c-name, salary)`

`MANAGED_BY(e-name, m-name)`

For each of the following queries, give an expression using: relational algebra, tuple relational calculus, domain relational calculus, and SQL.

i. Find the names of all employees who live in the same city as the company for which they work.

ii. Find the names of all employees who live in the same city and on the same street as do their managers.

iii. Find the names of all employees who do not work for 'State Bank of India'. Assume that no person can work for more than one companies.

iv. Find the name of all employees who earn more than every employee of 'State Bank of India'. Assume that all people work for at most one company.

v. Assume the companies may be located in several cities. Find all companies located in every city in which 'State Bank of India' is also located. $[(1 + 1.5) + (1 + 1.5) + 5 \times (0.5 \times 4)]$

2. *a.* Is division an associative operator? Provide answer supported by one example.
   b. When a language is called *relationally complete*?
   c. What is the property of *theta* in theta-join?
   d. Find the content of `A,B,C,D,E,F,G,H` from the following tables `R` and `S`:

$A \leftarrow R \bowtie_{A=D} S \quad B \leftarrow R \ltimes_{A=D} S \quad C \leftarrow R \rtimes_{A=D} S \quad D \leftarrow R \lhd_{A=D} S$

$E \leftarrow R \rhd_{A=D} S \quad F \leftarrow R ⟕_{A=D} S \quad G \leftarrow R ⟖_{A=D} S \quad H \leftarrow R ⟗_{A=D} S$

[3.5 + 2 + 1.5 + 1 × 8]

R(A, B, C)

A	B	C
a_1	b_1	c_1
a_1	b_2	c_1
a_2	b_1	c_1
a_3	b_2	c_2
a_4	b_3	c_3

S(D, E, F)

D	E	F
a_1	e_1	f_1
a_1	e_2	f_3
a_2	e_2	f_2
a_5	e_2	f_3

3. Given a relational database schema with the following relation schema:
   `Student(roll, name)`, `Sem_subject_offer(subcode, subname)`, `Sub_registration(roll, subcode, grade)`
   Write the following queries using SQL: [2 × 2.5]
   (a) Find the roll number and name of the students who have not registered for all the subjects.
   (b) Find the names of the students who could not secure 'EX' or 'A' grade in all his/her registered subjects.