Started on	Tuesday, 8 March 2022, 10:45 AM
State	Finished
Completed on	Tuesday, 8 March 2022, 11:25 AM
Time taken	40 mins 1 sec
Marks	31.00/50.00
Grade	**6.20** out of 10.00 (**62**%)

Question **1**

Complete

Mark 3.00 out of 3.00

The relation **studInfo**(studId, name, sex) keeps the information about the students. The relation **enroll**(studId, courseId) gives which student has enrolled for (or taken) what course(s). Assume that every course is taken by at least one male and at least one female student. What does the following relational algebra expression represent?

$\prod_{courseId}((\prod_{studId}(\sigma_{sex="female"}(studInfo)) \times \prod_{courseId}(enroll)) - enroll)$

- Courses in which all the female students are enrolled.
- None of the mentioned
- Courses in which only male students are enrolled.
- Courses in which a proper subset of female students are enrolled.

Question **2**

Complete

Mark 0.00 out of 4.00

Consider the following relations,

manage

name	manage
'A'	'E'
'B'	'C'
'C'	'G'
'D'	'E'
'F'	'E'
'E'	'G'

Emp

name	street	city
'A'	'x'	1
'B'	'y'	2
'C'	'z'	3
'D'	'x'	1
'E'	'x'	4
'F'	'y'	2
'G'	'z'	3

$\pi_{emp1.name}(\sigma_{manage.manage=emp2.name \wedge emp1.street = emp2.street}((\sigma_{emp1.name = manage.name}(\rho_{emp1}(emp) \times manage)) \times \rho_{emp2}(emp)))$

Output of the above query will include the following names,

- C only
- A, B, D, G only
- B, F, C only
- A, C, D only
- A, B, D, E, F only

Question **3**

Complete

Mark 0.00 out of 4.00

Consider the following relations

employee

empId	empName	empAge
1	'AB'	25
2	'CD'	23
3	'EF'	31
4	'QW'	27
5	'BD'	30
6	'AD'	32
7	'EQ'	26

dependent

depId	eId	depName	depAge
1	1	'ab'	29
2	1	'bd'	12
3	2	'eq'	15
4	3	'qr'	33
5	3	'tr'	30
6	4	'rt'	13
7	6	'we'	36
8	7	'ut'	35

$\pi_{empId}(\sigma_{empId=eId}(employee \times \rho_{A}(\pi_{depId, eId, depName, depAge}(dependent) - \pi_{d1.depId, d1.eId, d1.depName, d1.depAge}(\sigma_{d1.depAge > d2.depAge}(\rho_{d1} dependent \times \rho_{d2} dependent)))))$

The above query will give the following employee ids.

- 1, 2
- 3
- 1
- 2
- 2, 4

Question **4**

Complete

Mark 3.00 out of 3.00

Let R and S be two relations with the following schema
R (P,Q,R1,R2,R3)
S (P,Q,S1,S2)
Where {P, Q} is the key for both schemas. Which of the following queries are equivalent?

I. $\prod_p (R \bowtie S)$
II. $\prod_p (R) \bowtie \prod_p (S)$
III. $\prod_p (\prod_{p,Q} (R) \cap \prod_{p,Q} (S))$
IV. $\prod_p (\prod_{p,Q} (R) - (\prod_{p,Q} (R) - \prod_{p,Q} (S))$

- I, III and IV only
- III and IV only
- II, III and IV only
- I and III only
- I, II and III only

Question **5**

Complete

Mark 4.00 out of 4.00

Consider the following relations

employee

empId	empName	empAge
1	'AB'	25
2	'CD'	23
3	'EF'	31
4	'QW'	27
5	'BD'	30
6	'AD'	32
7	'EQ'	26

dependent

depId	eId	depName	depAge
1	1	'ab'	29
2	1	'bd'	12
3	2	'eq'	15
4	3	'qr'	33
5	3	'tr'	30
6	4	'rt'	13
7	6	'we'	36
8	7	'ut'	35

π_{empId} (employee) - π_{empId} ($\sigma_{employee.empId = dependent.eId \wedge employee.empAge < depAge}$ (employee × dependent))

The above query will give the following employee ids.

- 1, 4, 6
- 1, 3, 5
- 2, 3, 4
- 2, 4, 5
- 6, 7

Question **6**

Complete

Mark 0.00 out of 4.00

Consider the following relations,

manage

name	manage
'A'	'E'
'B'	'C'
'C'	'G'
'D'	'E'
'F'	'E'
'E'	'G'

Emp

name	street	city
'A'	'x'	1
'B'	'y'	2
'C'	'z'	3
'D'	'x'	1
'E'	'x'	4
'F'	'y'	2
'G'	'z'	3

$\sigma_{manage.manage=emp2.name}$ (($\sigma_{emp1.name\ =\ manage.name}$ (ρ_{emp1} (emp) × manage)) × ρ_{emp2} (emp))

How many tuples will be there in the output of the above query?

- 7
- 4
- None of the mentioned
- 6
- 5

Question **7**

Complete

Mark 4.00 out of 4.00

Consider the following relations,

manage

name	manage
'A'	'E'
'B'	'C'
'C'	'G'
'D'	'E'
'F'	'E'
'E'	'G'

Emp

name	street	city
'A'	'x'	1
'B'	'y'	2
'C'	'z'	3
'D'	'x'	1
'E'	'x'	4
'F'	'y'	2
'G'	'z'	3

$\pi_{manage.name}(\sigma_{emp1.city = emp2.city \wedge manage.manage=emp2.name}((\sigma_{emp1.name = manage.name}(\rho_{emp1}(emp) \times manage)) \times \rho_{emp2}(emp)))$

Output of the above query will include the following names,

- A, D only
- C only
- A, C, D only
- A, C only
- A only

Question **8**

Complete

Mark 4.00 out of 4.00

Consider the following relations

employee

empId	empName	empAge
1	'AB'	25
2	'CD'	23
3	'EF'	31
4	'QW'	27
5	'BD'	30
6	'AD'	32
7	'EQ'	26

dependent

depId	eId	depName	depAge
1	1	'ab'	29
2	1	'bd'	12
3	2	'eq'	15
4	3	'qr'	33
5	3	'tr'	30
6	4	'rt'	13
7	6	'we'	36
8	7	'ut'	35

$\pi_{depId, eId, depName, depAge}$ (dependent) - $\pi_{d1.depId, d1.eId, d1.depName, d1.depAge}$ ($\sigma_{d1.depAge > d2.depAge}$ (ρ_{d1} dependent × ρ_{d2} dependent))

How many number of tuples will be there in the output of the above query?

- 3
- 1
- 2
- 5
- 4

Question **9**

Complete

Mark 0.00 out of 4.00

Consider the following relations,

manage

name	manage
'A'	'E'
'B'	'C'
'C'	'G'
'D'	'E'
'F'	'E'
'E'	'G'

Emp

name	street	city
'A'	'x'	1
'B'	'y'	2
'C'	'z'	3
'D'	'x'	1
'E'	'x'	4
'F'	'y'	2
'G'	'z'	3

$\pi_{manage.manage}(\sigma_{manage.manage=emp2.name}(((\sigma_{emp1.name \neq emp2.name \wedge emp1.street = emp2.street \wedge emp1.city=emp2.city}(\rho_{emp1}(emp) \times \rho_{emp2}(emp)))) \times manage))$

How many tuples will be there in the output of the above query?

- 4
- 2
- None of the mentioned
- 3
- 1

Question **10**

Complete

Mark 3.00 out of 3.00

Consider the following relations,

Student

StID	StName	Major	Age
2	'Smith'	'cs'	23
3	'Anil'	'ee'	21
4	'Amit'	'cs'	21
5	'Aakash'	'ee'	24
6	'Vikas'	'ece'	22
7	'Pahal'	'ece'	23

Course

Course_code	Course_name	Credit
'CS401'	'DC'	3
'CS204'	'DBMS'	3
'CS301'	'CN'	3
'IT101'	'CP'	3

Student_course

StID	Course_code
3	'CS301'
4	'CS401'
5	'IT101'
3	'CS401'
2	'CS204'
4	'CS301'
5	'CS204'
4	'IT101'
3	'CS204'
5	'CS301'
2	'IT101'
4	'CS204'
3	'IT101'

π StID (Student) - (Student_course ÷ π Course_code (Course))

Output of the above query will include the following StID,

- 2, 3, 5, 7 only
- 6 only
- 3, 4, 5, 6, 7 only
-

- 2, 5, 6, 7 only
- 2, 4, 5, 6 only
- 3, 4, 5, 6 only

Question **11**

Complete

Mark 4.00 out of 4.00

Consider the following relation,

R

Name	Number
Amit	2
Akash	4
Arif	3
Akhil	5

$\pi_{r1.Number,\ r2.Name}(\sigma_{r1.Number < r2.Number}((\rho_{r1}(R)) \times (\rho_{r2}(R))))$

The output of the above query will include the following names,

- Akash and Arif
- Only Amit
- Akash, Arif, Akhil
- Amit, Akash, Arif
- Only Akhil

Question **12**

Complete

Mark 3.00 out of 3.00

If we apply the following relational algebra query in the given relation A. Then, how many tuples will be there in the answer.

$\pi_{A1.col1}(\text{sigma}_{A1.col2>A2.col2}(\rho_{A1} A \times \rho_{A2} A))$

A

A.col1	A.col2
'a'	4
'r'	7
'e'	9
'q'	10
'u'	5
'w'	8
'u'	2

- 5
- 6
- 7
- 8
- 4

Question **13**

Complete

Mark 0.00 out of 3.00

Consider the following relation,

R

Name	Number
Amit	2
Akash	4
Arif	3
Akhil	5

$\pi_{r1.Number,\ r2.Name}(\sigma_{r1.Number > r2.Number}((\rho_{r1}(R)) \times (\rho_{r2}(R))))$

In the output of the above query the missing numbers are,

- Number 2 and 3 only
- Number 5 only
- Number 4 and 5 only
- Number 3 only
- Number 2 only

Question **14**

Complete

Mark 3.00 out of 3.00

Select the relational algebra expression which matches with the relational algebra expression $\pi_{A1}(\pi_{A2}(\sigma_{F1}(\sigma_{F2}(r))))$, where $A1$, $A2$ are sets of attributes in r with $A1 \subset A2$ and $F1$, $F2$ are Boolean expressions based on the attributes in r?

- $\pi_{A2}(\sigma_{(F1 \vee F2)}(r))$
- $\pi_{A2}(\sigma_{(F1 \wedge F2)}(r))$
- $\pi_{A1}(\sigma_{(F1 \vee F2)}(r))$
- $\pi_{A1}(\sigma_{(F1 \wedge F2)}(r))$

◄ Mid Semester Online Part 1 (8 March 2022)

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