Branch : CSE & IT Batch : English

Database Management System
Query Language

DPP 01

[MCQ]

1. Consider the following statements:

S_1: $\pi_{List\ N}(\pi_{List\ N-1}.....(\pi_{List\ 1}(R))$

$\equiv \pi_{List\ 1}(\pi_{List\ 2}.....(\pi_{List\ N}(R))$

S_2: $\sigma_{c_n}\left(\sigma_{c_{n-1}}.....\left(\sigma_{c_1}(R)\right)\right) \equiv \sigma_{c_1}\left(\sigma_{c_2}....\left(\sigma_{C_N}(C)\right)\right)$

Which of the following statement(s) is/are correct?

(a) S_1 only

(b) S_2 only

(c) Both S_1 and S_2 only

(d) Neither S_1 nor S_2

[NAT]

2. Consider the following relations-

Enroll (CandidateID, Papercode) with 5000 tuples and Count(Papercode, Number_of_appearing_candidates) with 29 tuples.

Assume, one candidate can enroll for multiple Papercode. Let p and q be the maximum and minimum number of records in Count ⋈ Enroll then the value of p + q is _____.

[MCQ]

3. Let R_1 and R_2 be two relations which are union compatible with the same set of attributes.

S_1: $R_1 \cap R_2 = T_1 \bowtie T_2$

S_2: $R_1 \cup R_2 = T_1 \bowtie T_2$

Which of the above statement(s) are INCORRECT?

(a) S_1 only

(b) S_2 only

(c) Both S_1 and S_2 only

(d) Neither S_1 nor S_2

[MSQ]

4. Consider the following relations:

Enroll (Sid, Papercode), Paper(Papercode, Desc)

Which of the following relational algebra displays the sid's who only enrolled for Papercode having descriptions (Desc) as "CS"?

(a) $\pi_{sid}(\text{Enroll} \underset{\text{Desc = CS}}{\bowtie} \text{Paper})$

(b) $\pi_{sid}(\text{Enroll}) - \pi_{sid}((\text{Enroll} \bowtie \underset{\text{Desc = CS}}{\sigma}(\text{Paper}))$

(c) $\pi_{sid}(\text{Enroll}) - \pi_{sid}((\text{Enroll} \bowtie \underset{\text{Desc < > CS}}{\sigma}(\text{Paper}))$

(d) None

[MCQ]

5. Consider a relations work (EmpiD, Project ID)

The suitable relational algebra expression that projects the employee ids who work exactly in one project is-

(a) $\pi_{Empid}(\text{Work}) - \pi_{Empid}(\text{Work} \underset{\substack{\text{Empid = E} \\ \wedge \\ \text{Project Id = P}}}{\bowtie} \rho_{E,P}(\text{work}))$

(b) $\pi_{Empid}(\text{Work} \underset{\substack{\text{Empid = E} \\ \wedge \\ \text{Project ID} \neq \text{P}}}{\bowtie} \rho_{E,P}(\text{work}))$

(c) $\pi_{Empid}(\text{work}) - \pi_{Empid}(\text{work} \underset{\substack{\text{Empid = E} \\ \wedge \\ \text{Project ID} \neq \text{P}}}{\bowtie} \rho_{E,P}(\text{work}))$

(d) None

[MCQ]

6. Consider two relations R and S with *x* and *y* number of distinct record. Let p and q be the minimum and maximum number of records in the resultant R/S, then-

(a) p = 0, q = x + 1 (b) $p = 0, q = \left\lfloor \frac{x}{y} \right\rfloor$

(c) $p = x, q = y$ (d) $p = x, q = \left\lfloor \frac{x}{y} \right\rfloor$

[MCQ]

7. Let R_1 and R_2 be two relations with n and m tuples.

S_1: The maximum number of records in $R_1 - R_2$ is n.

S_2: The minimum number of records in $R_1 \cup R_2$ is max (n, m)

(a) S_1 only
(b) S_2 only
(c) Both S_1 and S_2
(d) Neither S_1 nor S_2

[MCQ]

8. Consider the following RA expression-

P: $\pi_{sid}(\text{student}) - \pi_{sid}(\text{student} \bowtie \rho_{\substack{I, G, M \\ \text{Marks} < M \\ \wedge\ \text{Gender} = G}}(\text{Student}))$

On a relation student (sid, Gender, Marks) and $\rho_{I = sid}$, $\rho_{G = Gender}$, $\rho_{M = Marks}$.

The above R.A displays?

(a) The sid of the student who obtained the maximum marks.
(b) The sids of the male and female students who obtained the maximum marks in their respective gender.
(c) The sids of male student who scored higher than all the female students
(d) None

[MSQ]

9. Consider the relation-

Works (<u>Eid Pid</u>) project (Pid, Name)

The relational algebra expression that displays the Eids who work in every project Name = 'M____.

(a) $\pi_{Eid, Pid}(\text{works}) / \pi_{Pid}(\sigma_{Name = M}(\text{Project}))$

(b) $\pi_{Eid}(\text{Work}) - \pi_{Eid}\left[\pi_{Eid}(\text{Work}) \times \pi_{pid}\left(\sigma_{Name = m}(\text{Project})\right) - \pi_{Eid\ Pid}(\text{works})\right]$

(c) $\pi_{Eid}(\text{Work}) - \left[\pi_{Eid}(\text{Work}) \times \pi_{pid}\left(\sigma_{Name <> m}(\text{Project})\right) - \pi_{Eid\ Pid}(\text{works})\right]$

(d) None

[MCQ]

10. Consider the two relations R_1 and R_2 such that they have no attributes in common then-

S_1: $R_1 \bowtie R_2 = R_1 \times R_2$

S_2: $R_1 \bowtie R_2 = \phi$

Which of the given statement(s) is/are correct?

(a) S_1 only
(b) S_2 only
(c) Both S_1 and S_2
(d) Neither S_1 nor S_2

Answer Key

1. **(b)**
2. **(10000)**
3. **(b)**
4. **(a, c)**
5. **(c)**
6. **(b)**
7. **(c)**
8. **(b)**
9. **(a, b)**
10. **(a)**

Hints & Solutions

1. (b)

Selection is commutative whereas projection is not commutative.

Consider the following relation R

A	B	C
3	2	0
1	2	5
2	3	4

I. Statement S_1: Incorrect

$\pi_B(\pi_{B,C}(R))$ $\quad$ $\pi_{B,C}(\pi_B(R))$

$\pi_B\begin{bmatrix} B & C \\ 2 & 0 \\ 2 & 5 \\ 3 & 4 \end{bmatrix}$ $\quad$ $\pi_{B,C}\begin{bmatrix} 2 \\ 2 \\ 3 \end{bmatrix} \rightarrow$ Not Possible

II. Statement S_2: Correct

$\sigma_{B=2}(\sigma_{c>0}(R)) = [1 \quad 2 \quad 5]$

$\sigma_{c>0}(\sigma_{B=2}(R)) = [1 \quad 2 \quad 5]$

2. (10000)

$\therefore$ Papercode is candidate key in Count with 29 records and a foreign key in Enroll. Papercode can also not Contain NULL values in Enroll as it is the candidate.

Maximum number of records in Count $\bowtie$ Enroll (P) = maximum (5000, 29) = 5000

Now as we know that FK always store subset value of its parent key attribute.

Minimum number of records Counts $\bowtie$ Enroll (q) = maximum (5000, 29) = 5000

$\therefore$ p + q = 5000 + 5000 = 10000

3. (b)

R_1 and R_2 are union compatible means they have the same number of attributes and the domains of the attributes also the same.

4. (a, c)

Side who enrolled for only 'CS' Papercode-

= All sids – Sid who enrolled for some non CS Courses/ Papers

$= \pi_{sid}(\text{Enroll}) - \pi_{sid}(\text{Enroll} \bowtie \underset{\text{Desc} < >\text{cs}}{\sigma}(\text{Paper}))$

$\therefore$ Option a and c is correct.

5. (c)

Retrieve employee ID's work exactly in one project

= All emp IDs – Emp IDs who work in at least two projects etc.

$= \text{All emp IDs} - \pi_{\text{Empid}}(\text{Work} \bowtie \underset{\substack{\text{Empid} = E \\ \wedge \\ \text{Project ID} \neq P}}{\rho_{E,P}}(\text{work}))$

6. (b)

The minimum number of records in R/S is 0.

The maximum number of records in R/S is at most *x*, if y = 0

But it will be $\left\lfloor \frac{x}{y} \right\rfloor$ if y > 0.

7. (c)

S_1: R_1 with n tuples

R_2 with m tuples

When m = 0, then $R_1 - R_2 = n$

So, Statement S1 is true.

S_2: Let *x* be the tuple set of R, and *y* be the tuple set of R_2

If $x \cap y \neq \phi$, then min m number of tuples in $R_1 \cup R_2$ is max (n, m). Hence, statement S2 is also true.

8. (b)

$R : \pi_{sid}(\text{Student} \bowtie \underset{\substack{\text{Marks} < m \\ \wedge \\ \text{Gender} = G}}{\rho_{I,G,M}}(\text{Student}))$

The R will results: The sids of student of the same gender who scored less marks than the same student of the same gender

π_{sid} (Student) – R ≡ The sids of the students who scored maximum marks in a particular gender category.

$\therefore$ Hence, b is correct.

9. (a, b)

Relative Eid who works in every project having name = 'M' is equivalent to division operation in relational algebra.

So, (a) is correct.

(b)

Works (Eid, Pid)		Project (Pid, Name)	
A	1	1	M
B	2	2	P
A	2	3	M
C	3		
C	2		
C	1		
A	3		

$$P: \pi_{Eid}(works) \times \pi_{Pid}\left(\underset{Name = M}{\sigma}(Project)\right)$$

$$\begin{bmatrix} A \\ B \\ C \end{bmatrix} \qquad \begin{bmatrix} 1 \\ 3 \end{bmatrix}$$

P:		
	A	1
	A	3
	B	1
	B	3
	C	1
	C	3

$$\underbrace{\pi_{Eid}\left[P - \pi_{EidPid}(Works)\right]}_{Q} = \begin{bmatrix} A & 1 \\ A & 3 \\ B & 1 \\ B & 3 \\ C & 1 \\ C & 3 \end{bmatrix} - \begin{bmatrix} A & 1 \\ B & 2 \\ A & 2 \\ C & 3 \\ C & 2 \\ C & 1 \\ A & 3 \end{bmatrix}$$

$$\text{Gives Eid who dose not} \leftarrow = \underset{Eid}{\pi}\begin{bmatrix} B & 1 \\ B & 3 \end{bmatrix} = [B]$$

$$\pi_{Eid}\ (Works) - Q = \begin{bmatrix} A \\ B \\ C \end{bmatrix} - [B] = \begin{bmatrix} A \\ B \end{bmatrix} \leftarrow \text{Eids who}$$

works in all 'M' projects

10. (a)

If the relations R_1 and R_2 have no attributes in common, the result of natural join is equal to the cross product of R_1 and R_2.

The condition of equijoin is not inaccessibility between two same attributes. So, S1 is CORRECT.