Branch : CSE & IT Batch : Hinglish

WEEKLY TEST – 07

Subject : Database Management System

Topic : Query Language

Maximum Marks 15

Q.1 to 5 Carry ONE Mark Each

[MCQ]

1. Consider the following statements-

I: Let R_1 be a relation having attribute set (A, B, C) and R_2 be a relation having attribute set (P, Q, R), then the attribute set of $R_1 \cup R_2$ is (P, Q, R).

II: There always exists unique tuples in $R_1 \cup R_2$.

Which of the given statements is/are correct?

(a) Both I and II
(b) Neither I nor II
(c) I only
(d) II only

[MSQ]

2. Consider the following relation:

Student (Sid, Gender, Subject, Marks)

SQL Query:

```
SELECT A.Subject FROM Student A
WHERE A.Gender = Male
GROUP BY Subject
HAVING Avg(Marks)> (SELECT Avg(Marks)
                    FROM Student B
                    WHERE B.gender = female
                    and B. Subject = A. Subject)
```

The above SQL query retrieves-

(a) Subject where the average marks of the male students is more than that of the female students.
(b) Subject where the average marks of the female students is more than that of the male students.
(c) Subject where a male student scored more than all the female students.
(d) None of the above.

[MCQ]

3. Consider the following relation-

Student (Sid Marks)

SQL query:

```
SELECT A.Sid FROM student A
WHERE (SELECT COUNT (DISTINCT B.Marks)
        FROM Students B
        WHERE A. marks < B.marks) < 2
```

The above SQL query results into-

(a) Sids of students who scored less than any two students
(b) Sids of the students who scored the top 2 highest marks
(c) Sids of the students who scored the bottom 2 least marks
(d) Sids of the students who scored the 2^{nd} highest marks

[NAT]

4. Consider the relations:

Supply (SupplierID, Itemcode) with 1000 tuples

Inventory (Itemcode, color) with 2500 tuples

Let p and q be the number of maximum and minimum records in Supply JOIN Inventory, the value of p + q is _____. (Itemcode is FK in Supply table)

[MCQ]

5. Consider the following relations:

Supply (SupplierID, ItemCode)

Inventory (Itemcode, Color)

SQL Query:

```
Select distinct A. SupplierID from Supply as A where
NOT UNIQUE (Select B. SupplierID
from Inventory, Supply as B
```

Where A. SupplierID = B. SupplierID

and A. Itemcode = Inventory. Itemcode

and Inventory. Color = "Green");

The above SQL query finds all suppliers who-

(a) Do not supply any green item.

(b) Supply exactly one green item.

(c) Supply at least one green item.

(d) Supply at least two green items.

Q.6 to 10 Carry TWO Mark Each

[NAT]

6. Consider a Database of the Dealer of Product-info as following.

Product -info

Dealer-no	Part-no	Color Code
A_{66}	P_2	C_{11}
A_{22}	P_1	C_{21}
A_{77}	P_4	C_{31}
A_{55}	P_3	C_{41}
A_{22}	P_3	C_{51}
A_{77}	P_2	C_{61}
A_{99}	P_1	C_{71}

Consider the following query:

Select A·Color Code, A· Dealer-no

FROM Product-info A, Product -info as B

WHERE A·Dealer-no = B· Dealer-no and A·Part no < > B· Part-no;

The number of tuples in the output of above will be_____.

[MSQ]

7. Consider the following relations-

Supply (SupplierID, Itemcode)

Inventory (Itemcode, color)

S_1: Those supplier IDs are to be found who supply SOME items of red or green color.

Which of the following relational algebra expression(s) is/are equivalent to statement S_1?

(a) $\pi_{\text{SupplierID}}\left(\text{Supply} \bowtie \sigma_{\substack{\text{color = Red} \\ \vee \\ \text{color = green}}} (\text{Inventory})\right)$

(b) $\pi_{\text{SupplierID}}\left(\sigma_{\substack{\text{color = Red} \\ \wedge \\ \text{color = green}}} (\text{Supply} \bowtie \text{Inventory})\right)$

(c) $\pi_{\text{SupplierID}}(\text{Supply} \bowtie \sigma_{\text{color = green}}(\text{Inventory})) \cup \pi_{\text{SupplierID}}(\text{Supply} \bowtie \sigma_{\text{color = red}}(\text{Inventory}))$

(d) $\pi_{\text{SupplierID}}\left(\text{Supply} \bowtie_{\substack{\text{color = red} \\ \wedge \\ \text{color green}}} \text{Inventory}\right)$

[MCQ]

8. Consider the following relations:

Supply (SupplierID, Itemcode)

Inventory (Itemcode, Color)

Retrieve the suppliers who supply every item of colors red and green.

S_1: $\dfrac{\prod_{\text{SupplierID,Itemcode}}(\text{Supply})}{\prod_{\text{Itemcode}}\left(\sigma_{\substack{\text{Color = red} \\ \vee \\ \text{Color = green}}}(\text{Inventory})\right)}$

S_2:

$$\frac{\prod_{\text{SupplierID Itemcode}}(\text{Supply})}{\prod_{\text{Itemcode}}\left(\sigma_{\text{Color = red}}(\text{Inventory})\right)} \cap \frac{\prod_{\text{SupplierID Itemcode}}(\text{Supply})}{\prod_{\text{Itmecode}}\left(\sigma_{\text{Color = green}}(\text{Inventory})\right)}$$

Which of the given statements is/are CORRECT?

(a) S_1 only (b) S_2 only

(c) Both S_1 and S_2 (d) Neither S_2 nor S_2

[MCQ]

9. Consider the following relations-

Supply (SupplierID, Itemcode)

Relational Algebra Expression-

P:

$$\sigma_{\substack{\text{A.SupplierID = B.SupplierID} \\ \text{and} \\ \text{B.SupplierID = C.SupplierID} \\ \text{and} \\ \text{A.Itemcode} \neq \text{B.Itemcode} \\ \text{and} \\ \text{C.Itemcode} \neq \text{A.Itemcode}}} \left(\rho(\text{A,Supply}) \times \rho(\text{B,Supply})\ \rho(\text{C,Supply})\right)$$

$\prod_{\text{SupplierID}}(\text{Supply}) - \prod_{\text{SupplierID}}(\text{P})$ retrieves-

(a) Suppliers who supply at least two items
(b) Suppliers who supply at most two items
(c) Suppliers who supply at least three items
(d) Suppliers who supply at most three items

[MCQ]

10. Consider the following relation and query Sailors (Sid, Sname, rating, age)

SELECT S. Sname
FROM Sailors S
WHERE S.age >
(SELECT Max(S_2. age)
FROM Sailors S_2
WHERE S_2. rating = 10**)**

The above Query returns:

(a) Name of sailors who are older than the oldest sailor with a rating of 10.
(b) Name of sailors who are younger than the oldest sailor with a rating of 10.
(c) Name of sailors who are older than the youngest sailor with a rating of 10.
(d) Name of sailor who are younger than the youngest sailor with a rating of 10.

Answer Key

1. **(d)**
2. **(a)**
3. **(b)**
4. **(2000)**
5. **(d)**
6. **(4)**
7. **(a, c)**
8. **(c)**
9. **(b)**
10. **(a)**

Hints and Solutions

1. (d)

I: INCORRECT, $R_1 \cup R_2$ is the schema of R_1 (A, B, C) itself. The attribute set of $R_1 \cup R_2$ is (A, B, C).

II: CORRECT, $R_1 \cup R_2$ always contain unique tuples.

2. (a)

The above SQL query is a correlated query that finds the subject in which the average marks of the male student is more than the average marks of the female students.

A			
(Sid	**Gender**	**Subject**	**Marks)**
1	F	P	10
2	M	P	20
3	F	P	30
4	M	P	30

B			
(Sid	**Gender**	**Subject**	**Marks)**
1	F	P	10
2	M	P	20
3	F	P	30
4	M	P	30

Average (marks) of male stduents in (A) = 25
Average (marks) of female student in (B) = 20
$25 > 20 \rightarrow$ P is selected.

3. (b)

Consider

A		B	
Student		**Student**	
(Sid	**Marks)**	**(Sid**	**Marks)**
1	10	1	10
2	40	2	40
3	30	3	30
4	40	4	40

A. Marks < B. marks

$10 < \begin{bmatrix} 40 \\ 30 \\ 10 \end{bmatrix} \Rightarrow$ select count (Distinct B. marks)

$\Downarrow$

$2 < 2 \rightarrow$ False

$\boxed{1 \quad 10}$ Not Selected

A. Marks < B. marks

$40 < [\ ] \rightarrow$ select count (Distinct B. marks)

$\Downarrow$

$0 < 2 \rightarrow$ true

$\boxed{2 \quad 40}$ Selected

A. Marks < B. marks

$30 < \begin{bmatrix} 40 \\ 40 \end{bmatrix} \rightarrow$ select count (Distinct B. marks)

$\Downarrow$

$1 < 2 \rightarrow$ true

$3 \ \boxed{30} \rightarrow$ Selected

A. Marks < B. marks

$40 < [\ ] \Rightarrow$ select count (Distinct B. marks)

$\Downarrow$

$0 < 2 \rightarrow$ true

$\boxed{4 \quad 40} \rightarrow$ Selected

Hence, students who score top two highest marks are selected.

4. (2000)

Since a foreign key dependency exists between Supply and Invertory.

Minimum number of tuples in Supply $\bowtie$ Inventory = 1000

Maximum number of tuples in Supply $\bowtie$ Inventory = 1000

$\therefore$ p + q = 1000 + 1000 = 2000

5. (d)

Not unique returns TRUE for repeated values

Inner Query will give SupplierID who supplies at least one green item. If the suppliers supply more than one green item, then only NOT UNIQUE condition is true, and that (SupplierID) is selected.

$\therefore$ The above SQL query supply at least two green items.

6. (4)

Product-info A

Dealer-no.	Part-no.	Color Code
A_{66}	P_2	C_{11}
A_{22}	P_1	C_{21}
A_{77}	P_4	C_{31}
A_{55}	P_3	C_{41}
A_{22}	P_3	C_{51}
A_{77}	P_2	C_{61}
A_{99}	P_1	C_{71}

Product-info B

Dealer-no.	Part-no.	Color Code
A_{66}	P_2	C_{11}
A_{22}	P_1	C_{21}
A_{77}	P_4	C_{31}
A_{55}	P_3	C_{41}
A_{22}	P_3	C_{51}
A_{77}	P_2	C_{61}
A_{99}	P_1	C_{71}

Output:-

Dealer-no	Color Code
A_{22}	C_{21}
A_{77}	C_{31}
A_{22}	C_{51}
A_{77}	C_{61}

7. (a, c)

SOME is equivalent to $\bowtie$.

(a) $\pi_{SupplierID}(Supply \bowtie \sigma_{color = Red \vee color = green}(Inventory))$

(c) $\pi_{SupplierID}(Supply \bowtie \sigma_{color = red}(Inventory)) \cup_{\pi_{SupplierID}} (Supply \bowtie \sigma_{color = green}(Inventory))$

8. (c)

To retrieve suppliers who supply every red and green item-

$$= \Pi_{SupplierID}(Supply) - \Pi_{SupplierID}\left(\Pi_{SupplierID}^{(Supply)} \times \Pi_{Itemcode}\left(\sigma_{Color = red \vee Color = green}(Inventory)\right) - \Pi_{SupplierID, Itemcode}(Supply)\right)$$

$$= \frac{\Pi_{SupplierID, Itemcode}(Supply)}{\Pi_{Itemcode}\left(\sigma_{Color = red \vee Color = green}^{(Inventory)}\right)}$$

9. (b)

$\Pi_{SupplierID}(P)$ is a relational algebra expression that finds the supplier who sells at least 3 items.

$\Pi_{SupplierID}(Supply) - \Pi_{SupplierID}(P)$

$\Downarrow$

finds the supplier who sells atmost two items.

10. (a)

Name of sailors who are older than the oldest sailor with a rating of 10.