

CS43002: Database Management Systems: Class Test I

Name: _____

Roll: _____

1. Consider the following relations A, B and C:

A:

Id	Name	Age
12	Arun	60
15	Shreya	24
99	Rohit	11

B:

Id	Name	Age
15	Shreya	24
25	Hari	40
98	Rohit	20
99	Rohit	11

C:

Id	Phone	Area
10	220	02
99	2100	01

i. How many tuples does the result of the following SQL query contain?

[5]

```
SELECT A.Id FROM A
```

```
WHERE A.Age > ALL ( SELECT B.Age FROM B
```

```
WHERE B.Name = 'Rohit')
```

2

ii. How many tuples does the result of the following relational algebra expression contain?

 $(A \cup B) \bowtie C$

1

iii. How many tuples does the relation $A \div \pi_{Id}(C)$ contain?

1

iv. How many tuples does the relation $(A \bowtie C)$ contain?

5

v. How many tuples does the relation $(A \bowtie B \bowtie C)$ contain?

1

2. Consider a database table T containing two columns X and Y each of type integer. After the creation of the table, one record (X= 1, Y=1) is inserted in the table. Let MX and MY denote the respective maximum values of X and Y among all records in the table at any point in time. Using MX and MY, new records are inserted in the table 128 times with X and Y values being MX+1, 2*MY+1 respectively. It may be noted that each time after the insertion, values of MX and MY change. What will be the output of the following SQL query after the steps mentioned above are carried out? [3]

```
SELECT Y FROM T WHERE X=7;
```

127

3. Consider the following relational schema:

[2+3]

Suppliers(sid:integer, sname:string, city:string, street:string)

Parts(pid:integer, pname:string, color:string)

Catalog(sid:integer, pid:integer, cost:real)

Consider the following relational query on the above database: (<> stands for not equal to)

```
SELECT S.sname FROM Suppliers as S
      WHERE S.sid NOT IN (SELECT C.sid FROM Catalog as C
                        WHERE C.pid NOT IN (SELECT P.pid FROM Parts as P WHERE P.color <> 'blue'))
```

i. Which one of the following is the correct interpretation of the above query?

(A) Find the names of all suppliers who have supplied a non-blue part.

(B) Find the names of all suppliers who have not supplied a non-blue part.

(C) Find the names of all suppliers who have supplied only blue parts.

(D) Find the names of all suppliers who have not supplied only blue parts.

ii. Write the equivalent relational algebra expression for the above query.

$\pi_{\text{sname}}(\sigma_{\text{color} \neq \text{'blue'}}(\text{Parts}) \bowtie \text{Catalog} \bowtie \text{Suppliers})$ (variations are possible)

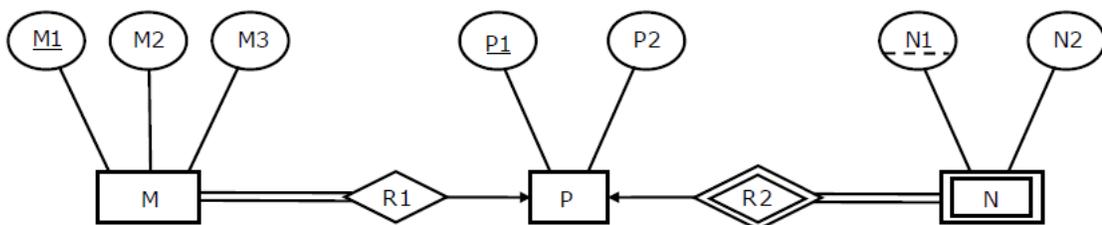
4. Let R and S be two relations with the following schema: $R(P, Q, R1, R2, R3), S(P, Q, S1, S2)$. $\{P, Q\}$ is the key for both relations. Which of the following queries are equivalent? [2]

- I. $\pi_P(R \bowtie S)$
- II. $\pi_P(R) \bowtie \pi_P(S)$
- III. $\pi_P(\pi_{P,Q}(R) \cap \pi_{P,Q}(S))$
- IV. $\pi_P(\pi_{P,Q}(R) - (\pi_{P,Q}(R) - \pi_{P,Q}(S)))$

I, III and IV

5. Consider the following ER diagram.

[2 +3]



i. The minimum number of tables needed to represent M, N, P, R1, R2 is?

3

ii. Which one of the following is a correct attribute set for one of the tables in previous answer?

- (A) {M1, M2, M3, P1}
- (B) {M1, P1, N1, N2}
- (C) {M1, P1, N1}
- (D) {M1, P1}