1. Consider the two relations:
customer (customer_name, credit_info, cus_id) and
branch (cus_id, branch_name, branch_address)
Tell about the query that cannot be stated using basic relational algebra operations?
(a) Address of the branch of every customer
(b) customer names which is similar to their branch_name
(c) The average of all the credit info of the customers
(d) All customers of a given branch
Answer: (c)

2. **Comparisons with null values are regarded as unknown in SQL. If all comparisons that involve a null value are considered to be false then which of the given pair is not equal?**
 (a) y = 15, $\neg$ ($\neg$ (y= 15)
(b) y = 15, y > 14 and y < 16, where y is an integer
(c) y < 15, $\neg$ (y= 15)
(d) None of the above
Answer (c)

3) **Consider the two relations:**
customer (customer_name, credit_info, cus_id) and
branch (_id cus, branch_name, branch_address). **Cus_id in branch relation is a foreign key that refers to Cus_id in customer relation. If both relations satisfy the constraints on referential integrity, then which is always correct?**

(A) $\pi_{cus\_id}(\text{branch}) - \pi_{cus\_id}(\text{customer}) = \text{null}$
(B) $\pi_{cus\_id}(\text{customer}) - \pi_{cus\_id}(\text{branch}) = \text{null}$
(C) $\pi_{cus\_id}(\text{branch}) = \pi_{cus\_id}(\text{customer})$
(D) $\pi_{cus\_id}(\text{branch}) - \pi_{cus\_id}(\text{customer}) \neq \text{null}$
Answer (A)

4) **Consider the following relations A, B, C. How many tuples does the result of the following relational algebra expression contain? Assume that the schema of A U B is the same as that of A.**

$(A \cup B) \bowtie_{A.Id>40 \ v \ C.Id<15} C$

```
Table A
Id   Name    Age
---------------
12   Arun    60
15   Shreya  24
99   Rohit   11


Table B
```

```
Id    Name
------------
15    Shreya
98    Rohit
99    Rohit


Table C
Id    Phone  Area
-----------------
10    2200   02
99    2100   01
```
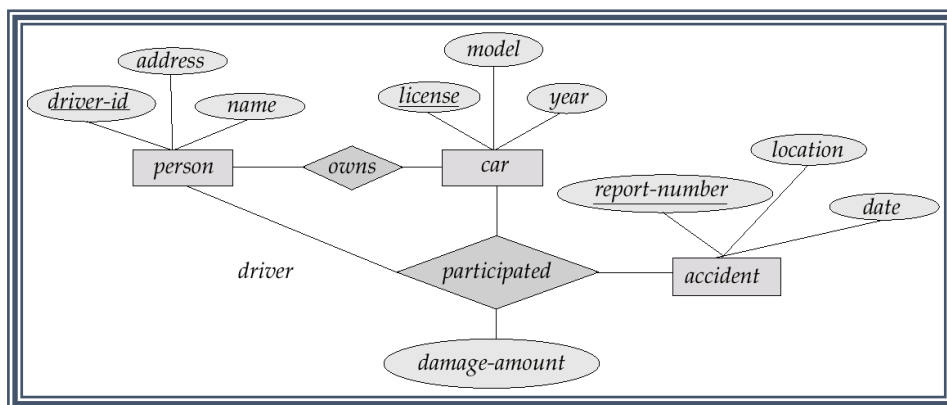(A) 7
(B) 4
(C) 0
(D) Error

Answer (D)

5) Consider the following ER diagram. While converting to relational model, how many tables are possible at maximum?

   (A) 3
   (B) 4
   (C) 5
   (D) 6

        Answer: (c)

6. Consider the two relations:

Branch:

branch-name	branch-city	assets
Brighton	Brooklyn	7100000
Downtown	Brooklyn	9000000
Mianus	Horseneck	400000
North Town	Rye	3700000
Perryridge	Horseneck	1700000
Pownal	Bennington	300000
Redwood	Palo Alto	2100000
Round Hill	Horseneck	8000000

Account:

account-number	branch-name	balance
A-101	Downtown	500
A-102	Perryridge	400
A-201	Brighton	900
A-215	Mianus	700
A-217	Brighton	750
A-222	Redwood	700
A-305	Round Hill	350

How many tuples do $\sigma_{branch.branch-name="Pownal"}$branch $\times$ Account have?

 (A) 0
 (B) 7
 (C) 2
 (D) 5

Ans; (B)

7. **Consider the following ER diagram. While converting to relational model, how many tables are possible?**
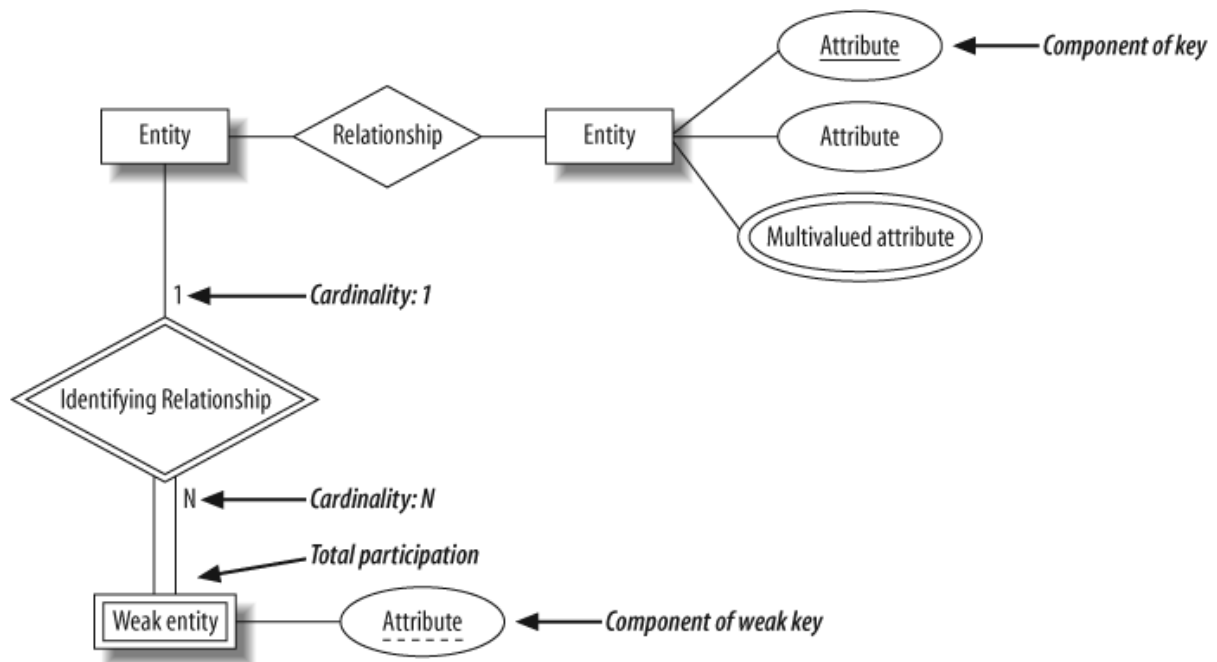
(A) 4

(B) 5

(C) 6

(D) 7

Ans

(B) -correct

8. Database table by name Loan_Records is given below.

Borrower	Bank_Manager	Loan_Amount
Ramesh	Sunderajan	10000.00
Suresh	Ramgopal	5000.00
Mahesh	Sunderajan	7000.00
Prabhas	Sunderajan	8000.00
Sharan	Ramgopal	9000.00

How many tuples more does the following query contains rather than original Loan_Records?

```
(SELECT Borrower, Bank_Manager
     FROM    Loan_Records) AS S
        NATURAL JOIN (SELECT Bank_Manager,
                             Loan_Amount
                      FROM    Loan_Records) AS T
```

(A) 11
(B) 8
(C) 13
(D) 5

Answer (B)

9) Consider the Customer_all relation

branch-name	branch-city	assets	customer-name	loan-number	amount
Downtown	Brooklyn	9000000	Jones	L-17	1000
Redwood	Palo Alto	2100000	Smith	L-23	2000
Perryridge	Horseneck	1700000	Hayes	L-15	1500
Downtown	Brooklyn	9000000	Jackson	L-14	1500
Mianus	Horseneck	400000	Jones	L-93	500
Round Hill	Horseneck	8000000	Turner	L-11	900
Pownal	Bennington	300000	Williams	L-29	1200
North Town	Rye	3700000	Hayes	L-16	1300
Downtown	Brooklyn	9000000	Johnson	L-18	2000
Perryridge	Horseneck	1700000	Glenn	L-25	2500
Brighton	Brooklyn	7100000	Brooks	L-10	2200

Q1: Find all branches with loan amount<1000 (calculate the number of tuples)

```
Temp_relation: (SELECT branch-name, branch-city, assets, customer-name
        FROM    Customer_all) AS S
          NATURAL JOIN (SELECT Customer-name,
                              Loan-number, amount
                       FROM    Customer_all) AS T
```

Q2: Find all branches with loan amount<1000 for the above query. (calculate the number of tuples)
How many more tuples does Temp_relation has over Customer_all and how many more tuples Q2 has over Q1.
(A). 4,3
(B). 3,2
(C). 3,1
(D). 4, 1

Ans: (D)

10. Consider two relations customer (cus_name, cus_street) and branch (branch_name, branch_city. When would be the result of
select distinct cus_name, cus_street
from customer, branch
is same as customer relation?
(a) when the customer relation has no duplicate values and branch relation has atleast one tuple
(b) when customer and branch relations have no duplicate values
(c) when branch relation has no duplicate values and customer relation has atleast one tuple
(d) both customer and branch have the same number of tuples
Answer: (a)

11. Consider the two relations:

customer (cus_id, cust_name, age) **and**
branch (branch_id, branch_name, branch_city)

```
Table: Customer
cus_id   cust_name   age
--------------------------
 0        Sachin      35
 1        Rahul       36
 2        Sourav      37
 3        Anil        39

Table : branch
Branch-id  Branch_name   Branch_city
-------------------------------------
 0           Brighton       XY
 1           Brighton       ZY
 2           Pownal         XZ
 5           Brighton       XY
 1           Pownal         ZY
 3           Brighton       YZ
```

What branch_ids are returned by the following SQL query for the above instance of the tables?

```
SELECT branch_id

FROM branch

WHERE branch_name= "Brighton" AND

    EXISTS (SELECT *

        FROM customer

        WHERE age > 35 AND

        Cust_id = branch_id)
```

(A) 1, 0
(B) 1, 2
(C) 1, 3
(S) 1, 5
Answer (C)

12. Consider the two relations:
customer (cus_name, branch_id, age) **and**
branch (branch_id, branch_name, branch_city)
Where, branch_id is the candidate key of customer. **The relation customer has 1000 tuples and the relation branch has 500 tuples. What is the maximum number of tuples feasible in customer natural join branch?**

(A) 1000
(B) 500
(D) 1500
(D) 2000
Answer (B)

13. Consider an ER diagram with 3 entity sets A, B and C and two relationship sets X and Y where, A&B are strong entity sets and C is a weak entity set. X is a many to one binary relationship between A and B and the participation is total. Y is an identifying relationship set between B and C. The attributes for A are {A1, **A2, A3}, B are {B1, B2}, C are {C1, C2}. Which of the following is a correct attribute set for one of the tables while converting to minimum number of tables?**
(A) {A1, A2, A3, B1}
(B) {A1, B1, C1, C2}
(C) {A1, B1, C1}
(D) {A1, B1}
Answer (A)

14. The following table has two attributes A and C where A is the primary key and C is the foreign key referencing A with on-delete cascade.

A	C
2	4
3	4

4	3
5	2
7	2
9	5
6	4

The set of all tuples that must be additionally deleted to preserve referential integrity when the tuple (3,4) is deleted is:
(a) No tuples
(b) All tuples
(c) (5,2), (7,2) and (9,5)
(d) (2,4), (4,3) and (6,4)

Answer (B)

15. Consider the two relations:
Branch:

branch-name	branch-city	assets
Brighton	Brooklyn	7100000
Downtown	Brooklyn	9000000
Mianus	Horseneck	400000
North Town	Rye	3700000
Perryridge	Horseneck	1700000
Pownal	Bennington	300000
Redwood	Palo Alto	2100000
Round Hill	Horseneck	8000000

Account:

| account-number	branch-name	balance
A-101	Downtown	500
A-102	Perryridge	400
A-201	Brighton	900
A-215	Mianus	700
A-217	Brighton	750
A-222	Redwood	700
A-305	Round Hill	350

How many tuples do branch Full outer Join account have?

   (A) 9
   (B) 7
   (C) 8
   (D) 5

Ans; (A)

16. Consider the following ER diagram. Where the attribute Access data which describes the date on which the loan has been accessed recently, can be placed to avoid null values?
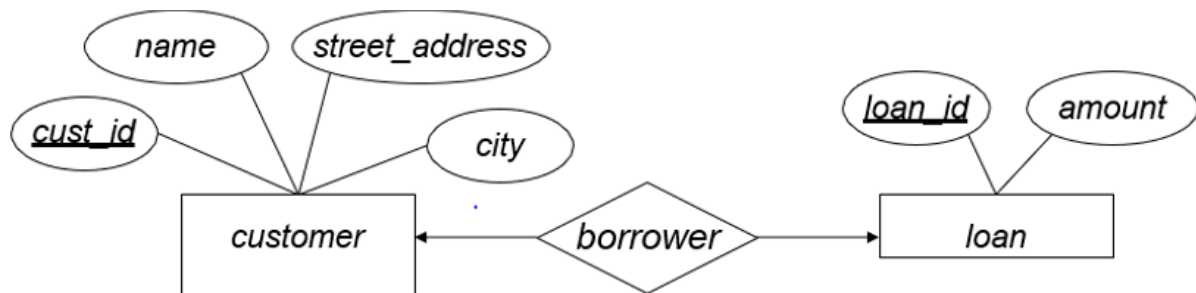
(A)   Only Loan entity set
(B)   Only Customer entity set
(C)   Borrower Relationship set or Customer entity set
(D)   Borrower Relationship set or loan entity set

(A) is correct

17. Consider the following schema:
Suppliers(SID:integer, SName:string, Address:string)
Parts(PID:integer, PName:string, Color:string)
Catalog(SID:integer, PID:integer, Cost:real)

Given the following relational algebra statement which of the following statements are correct to returns the supplier name who supplies the red parts with cost less than 100 Rupees.

I $\pi_{sname}(\pi_{sid}((\sigma_{color='red'}Parts) \bowtie (\sigma_{cost<100}Catalog)) \bowtie Suppliers)$

II $(\pi_{sname}((\sigma_{color='red'}Parts) \bowtie (\sigma_{cost<100}Catalog) \bowtie Suppliers))$

III $\pi_{sname}(\pi_{sid}((\sigma_{color='red'}Parts) \bowtie (\sigma_{cost<100}Catalog) \bowtie Suppliers))$

IV $\pi_{sname}((\pi_{sid,sname}((\sigma_{color='red'}Parts) \bowtie (\sigma_{cost<100}Catalog) \bowtie Suppliers))$

a. Only I and II are correct
b. Only I, II and III are correct
c. Only I, II and IV are correct
d. All four statements are correct
   Ans: c

18. Consider a relational instance of *customer (customer_name, credit_info, cus_id)* in which customer id can hold distinct values and NULL. Which is true regarding cus_id?

A. Cus_id is a candidate key

B. Cus_id is not a primary key

C. Cus_id is a primary Key

D. Both (A) and (B)

Ans D

19. Consider the following relational schema.

Customers (cus_id: integer, cus_name: string)
loan (cus_id: integer, loan_id: integer amount: integer)
branch (branch_name: integer, cus_id: integer, assets: integer)

Which of the following queries are equivalent to this query?

"Find the distinct names of all customers whose assets are

more than 10000 in the Perryridge branch"

(I) $\pi_{cus\_name}(\sigma_{branch\_name='Perryridge'\text{ and }assets>10000\text{ and B. }cus\_id=C.\ cus\_id}(branch \bowtie customers))$

(II) $\pi_{cus\_name}(\sigma_{branch\_name='Perryridge'\text{ and }assets>10000}(branch \bowtie customers))$

(III) $\sigma_{cus\_name}(\pi_{branch\_name='Perryridge'\text{ and }assets>10000\text{ and B. }cus\_id=C.\ cus\_id}(branch \bowtie customers))$

(IV) $\pi_{cus\_name}(\sigma_{branch\_name='Perryridge'\text{ and }assets>10000\text{ and B. }branch\_name=C.\ branch\_name}(branch \bowtie customers))$

(A) I and II only
(B) II only
(C) I, II and IV only
(D) II, III and IV only

Answer: (B)

20. Consider the following ER diagram. While converting to relational model, how many tables are possible at maximum?

ER Diagram of a Bank
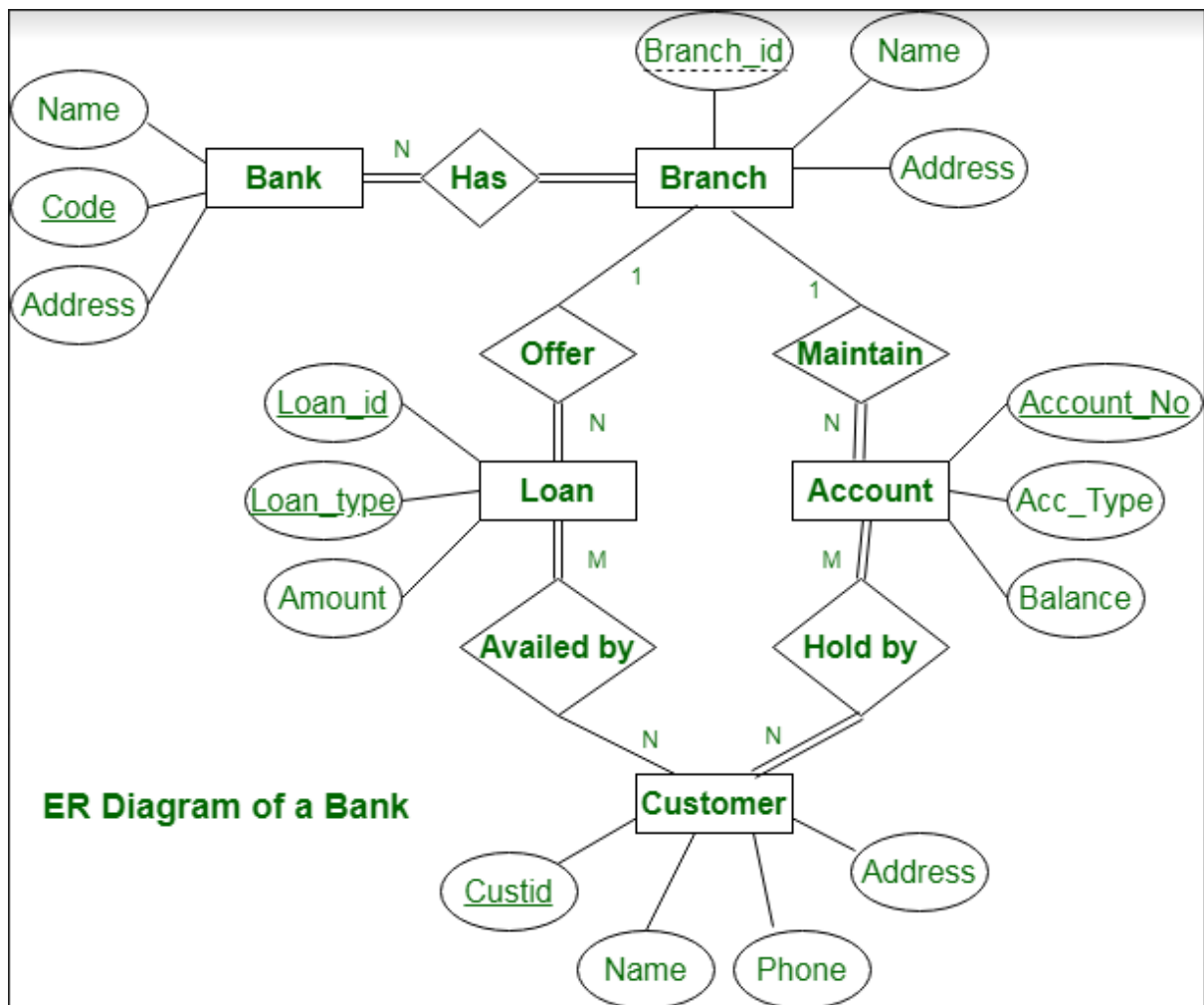
(E) 7
(F) 8
(G) 9
(H) 10

Ans: (d)

21. Consider the two relations:

Branch:

branch-name	branch-city	assets
Brighton	Brooklyn	7100000
Downtown	Brooklyn	9000000
Mianus	Horseneck	400000
North Town	Rye	3700000
Perryridge	Horseneck	1700000
Pownal	Bennington	300000
Redwood	Palo Alto	2100000
Round Hill	Horseneck	8000000

Account:

account-number	branch-name	balance
A-101	Downtown	500
A-102	Perryridge	400
A-201	Brighton	900
A-215	Mianus	700
A-217	Brighton	750
A-222	Redwood	700
A-305	Round Hill	350

How many tuples do $\sigma_{branch.branch-name="Pownal"}(branch \times Account)$ V $\sigma_{branch.branch-name="Northtown"}(branch \times Account)$ have?

(E) 12
(F) 7
(G) 14
(H) 0

Ans: (C)

22. **Consider the following ER diagram. While converting to relational model, how many tables are possible at minimum without having null values?**
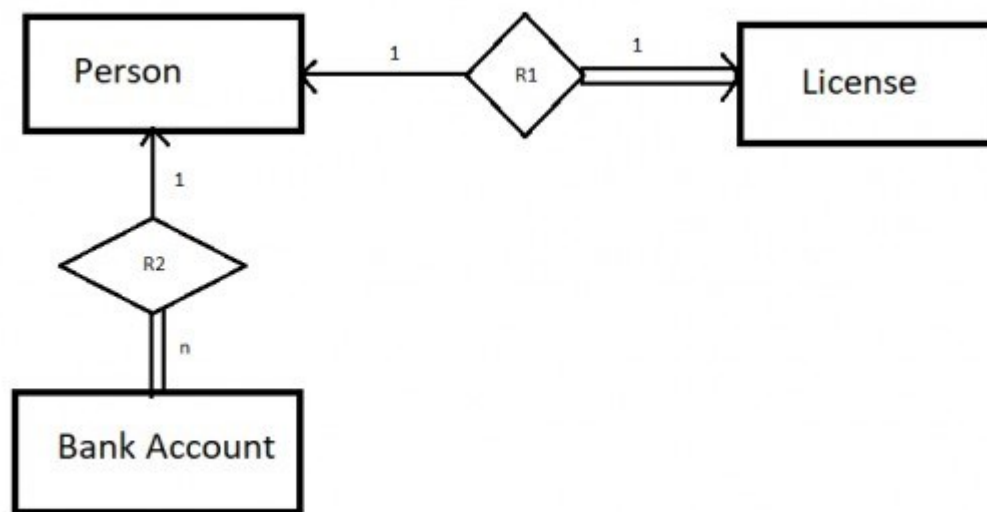
(a) 2
(b) 3
(c) 4
(d) 5

Ans : B

23. Consider the two relations:

Branch:

loan-number	branch-name	amount
L-11	Round Hill	900
L-14	Downtown	1500
L-15	Perryridge	1500
L-16	Perryridge	1300
L-17	Downtown	1000
L-23	Redwood	2000
L-93	Mianus	500

Lending:

branch-name	branch-city	assets	customer-name	loan-number	amount
Downtown	Brooklyn	9000000	Jones	L-17	1000
Redwood	Palo Alto	2100000	Smith	L-23	2000
Perryridge	Horseneck	1700000	Hayes	L-15	1500
Downtown	Brooklyn	9000000	Jackson	L-14	1500
Mianus	Horseneck	400000	Jones	L-93	500
Round Hill	Horseneck	8000000	Turner	L-11	900
Pownal	Bennington	300000	Williams	L-29	1200
North Town	Rye	3700000	Hayes	L-16	1300
Downtown	Brooklyn	9000000	Johnson	L-18	2000
Perryridge	Horseneck	1700000	Glenn	L-25	2500
Brighton	Brooklyn	7100000	Brooks	L-10	2200

How many tuples do Lending Full outer Join loan have?

(E) 5
(F) 7
(G) 9
(H) 12

Ans: D

24. Customer (ACCCNO, NAME)

Loan (LNO, Amount)

Sanction (ACCCNO,LNO)

Choose the query from the options which correctly returns the name of the customer who haven't receive any loan amount.

I.   SELECT X.Name FROM Customer X LEFT OUTER JOIN Sanction S ON X.ACCNO = S.ACCNO WHERE S.LNO = NULL

II.   SELECT X.Name FROM Customer X WHERE X.ACCNO NOT IN (SELECT A.ACCNO FROM Sanction S)

III.   SELECT X.name FROM Customer X INNER JOIN Sanction S ON X.ACCNO = S.ACCNO HAVING count (*)=0

IV.   SELECT X.name FROM Sanction S INNER JOIN Loan L ON X.ACCNO = S.ACCNO HAVING count (*)=0

   A. I and II only

   B. I, II. III only

   C. I, II, III, IV only

   D. I only

Ans: A

8.

25. Question

Suppose we are having relation schema as Employee (name, Emp-id, degree-level) with primary key as Emp-id.
(i) INSERT INTO Employee VALUES("AAA", 1000, "B.E.")
(ii) DELETE FROM Employee
(iii) INSERT INTO Employee VALUES ("BBB", 1220, "B. Tech")
(iv) ALTER TABLE Employee ADD (Dept varchar(20))
(v) ALTER TABLE Employee DROP Dept.
What will be the results of the above sequence?

a. Gives error, since we are Dropping the column. ✕

b. In Employee table new attribute Dept is added.

c. In Employee table we have one tuple with values "BBB", 1220,"B.tech". ✓

d. In Employee table we have one tuple with values "AAA", 1000,"B.E".