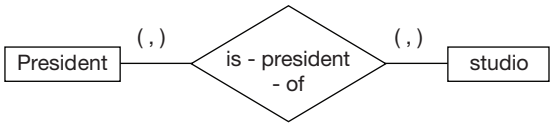
DATABASE TEST 3

Number of Questions: 25 **Section Marks: 30**

Directions for questions 1 to 25: Select the correct alternative from the given choices.

1. A studio can have at most one president and a president can preside at most one studio.



Which of the following is correct cardinality ratio, for the above description?

(A) (0, 1), (1, *n*) (B) (0, 1), (0, 1)
(C) (1, *n*), (0, 1) (D) (1, *n*), (1, *n*)

2. A movie award goes exactly to one movie. A movie may be awarded multiple awards (but may be none at all). Which of the following is correct cardinality ratio, for the above description?

(A) (0, 1), (1, *n*) (B) (1, 1), (1, *n*)
(C) (1, 1), (0, ∗) (D) (1, 1), (1, ∗)

3. Match the following:

I. Conceptual Database design
II. Logical Database design
III. Physical Database design
P. Transforms the conceptual schema into the data model supported by the DBMS.
Q. Design indexes, table distribution, buffer size etc.
R. Produces the initial model.

(A) I–R, II–P, III–Q (B) I–P, II–Q, III–R
(C) I–Q, II–P, III–R (D) I–Q, II–R, III–P

Common Data for Questions 4 and 5:

```
CREATE TABLE Emp        (EId INT
    Name CHAR(50)
    mgr-Id : INT
    SSNo: INT UNIQUE
    DNo: INT
    Salary: INT
    Primary key (EId)
    Foreign key DNo  References Dept  (DNo))
```

4. If a tuple is inserted into the table Emp, which violation would never occur?

(A) Key constraint
(B) Entity Integrity constraint
(C) Referential Integrity constraint
(D) Unique constraint

5. If a tuple value is updated in Emp table, which violations would never occur?

(A) Key constraint
(B) Referential Integrity constraint
(C) UNIQUE Constraint
(D) None of the above

6. Student (RNo, Name, Marks, Subject)
For each Subject, Retrieve the Subject, maximum marks in that subject.
In the SQL query which clause will not appear?

(A) SELECT
(B) GROUPBY
(C) FROM
(D) WHERE

7. Which of the following is NOT a Relational algebra operator used in basic queries?

(A) JOIN (B) PROJECT
(C) SELECT (D) LOCATE

8. What does the asterisk (∗) in SQL mean?

(A) It is a standard symbol used to start a query.
(B) It is a wild card symbol that requests inclusion of all attributes.
(C) It is an interruption symbol used to abort a query if it takes longer to process than a prescribed time length.
(D) None of the above

9. Consider the given functional dependencies
$R(A, B, C, D)$:
$FD = \{A \rightarrow B$
$C \rightarrow B$
$D \rightarrow B\}$
The given Relation is in which Normal Form?

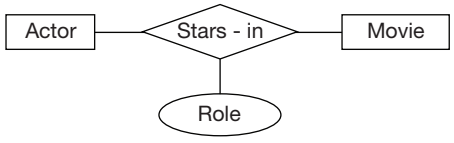
(A) 1 NF (B) 2 NF
(C) 3 NF (D) BCNF

10. For a Relation scheme R(ABC), Assume that all attributes are prime attributes, Then minimum '*R*' is in which Normal Form?

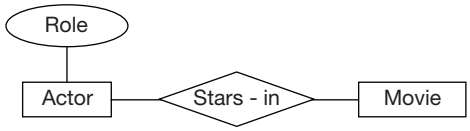
(A) 1 NF (B) 2 NF
(C) 3 NF (D) BCNF

11. Which of the following model, describes the fact that a role is stored for every pair of actor '*X*' and movie '*Y*' such that '*X*' starred in '*Y*'.

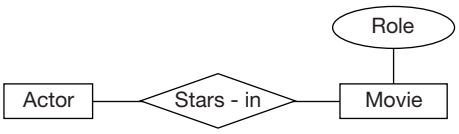
(A)



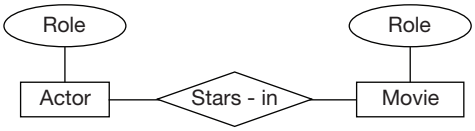
(B)



(C)



(D)



12. Consider the given ER-Diagram:

Which of the following is TRUE?

(A) one instructor teaches many courses, but each course is run by exactly one instructor.
(B) One instructor teaches atmost one course.
(C) An instructor may not take even a single course.
(D) One instructor teaches one course, but each course is run by many instructors.

13. Consider the given Functional dependencies.
For a Relation R(ABCDE):
$A \rightarrow B$
$B \rightarrow C$
$BC \rightarrow A$
$A \rightarrow D$
$E \rightarrow A$
$D \rightarrow E$
Which of the following is not a key?

(A) B (B) C
(C) D (D) E

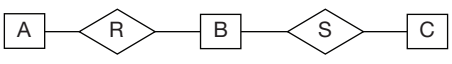
14. Consider a Relation $R(ABCDE)$ with following functional dependencies:
$ABC \rightarrow DE$
$D \rightarrow AB$
What is the number of candidate keys for the Relation R?

(A) 0 (B) 1
(C) 2 (D) 3

15. Suppose relation $R(A, B)$ currently has tuples $\{(2, 3), (2, 4), (4, 5)\}$ and Relation $S(B, C)$ currently has $\{(3, 6), (5, 7), (8, 9)\}$. What is the number of tuples in the result of the SQL query
SELECT * FROM R NATURAL OUTER JOIN S?

(A) 2 (B) 3
(C) 4 (D) 5

16. Consider the following ER-Diagram:



What is the minimum number of tables required to represent given ER-Diagram?

(A) 1 (B) 2
(C) 3 (D) 4

17. To find the EId of the Employees that are managed by people who are managed by the employee with EId 456.
Consider the following Queries:

I. SELECT E.EId
FROM Emp E, Emp F
WHERE E.MgrId = F.EId AND F.MgrId = 456

II. SELECT EId
FROM Emp
WHERE MgrId IN (SELECT EId
FROM Emp
WHERE MgrId = 456)

Which query will correctly get the desired set of Employee IDs?

(A) I only (B) II only
(C) Both I and II (D) Neither I nor II

18. Consider the following functional dependencies
$AB \rightarrow C$
$C \rightarrow D$
$AB \rightarrow D$
Which of the following is CORRECT minimal set?

(A) $A \rightarrow C$ $C \rightarrow D$
(B) $AB \rightarrow C$ $C \rightarrow D$
(C) $B \rightarrow C$ $C \rightarrow D$
(D) $AB \rightarrow C$ $AB \rightarrow D$

19. Consider the following functional dependencies:
$R(ABCD)$
$AB \rightarrow C$
$C \rightarrow A$
$D \rightarrow B$
$AB \rightarrow D$
What are the keys possible for Relation R?

(A) AC, BD, CD (B) AB, BC, CD
(C) AB, AD, BC, CD (D) AC, BC, BD

20. Sailor (Sid, Sname, Rating, age)
Reserves (Sid, bid)
Boats (bid, bname, color)
To select the names of sailors who have reserved all the boats, which Relational algebra operation is used specifically, to do the under lined part?

(A) OUTER JOIN (B) UNION
(C) DIVISION (D) EXCEPT

21. Student1 (RNo, Name, CNo, CName)
Student2 (RNo, Name, CNo, CName)

I. $\pi_{Name}(\sigma_{CNO = 'C2'}(\text{student1} - \text{student2}))$
II. $\pi_{Name}(\sigma_{CNO = 'C2'}(\text{student2} - \text{student1}))$

Which of the following is TRUE in most of the cases about Number of tuples appear in the result of I and II?

(A) I ≠ II (B) I < II
(C) I > II (D) I = II

22. Consider the following:

I. $\{P/\exists S \in \text{student } \exists D \in \text{Department}$ (S.RNo = D.RNo. $\wedge$ D. DNo. = 5 $\wedge$ P.Sname = S.Sname)

II. $\{< S_N > / \exists\ S_R, S_N (< S_R, S_N > \in \text{student} \wedge \exists\ D_R, D_N (< D_R, D_N > \in \text{Department} \wedge S_R = D_R\, D_N = 5))\}$

Which of the following is TRUE about given expressions?

(A) I – Tuple Relational Calculus
II – Relational algebra
(B) I – Tuple Relational Calculus
II – Domain Relational Calculus
(C) I – Domain Relational Calculus
II – Tuple Relational Calculus
(D) I – Relational Algebra
II – Domain Relational Calculus

23. Consider 2 Relations R and S, If we want to Retrieve all the tuples from both R and S without losing any tuple, which Relational Algebra operator is used?

(A) NATURAL JOIN
(B) LEFT OUTER JOIN
(C) INNER JOIN
(D) FULL OUTER JOIN

24. Assume that table A has 5 columns, table B has 4 columns, one column is common in both the tables. What is the number of columns appear in the result of NATURAL JOIN, LEFT OUTER JOIN, FULL OUTER JOIN respectively?

(A) 8, 9, 9 (B) 8, 8, 9
(C) 8, 8, 8 (D) 8, 9, 8

25. Consider the following Query in English:

"Retrieve the names of students who scored more than 90% but whose age is not more than 15?"

Which Relational operator is compulsory in SQL?

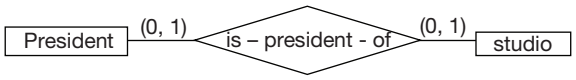
(A) INTERSECTION (B) NATURAL JOIN
(C) OUTER JOIN (D) SET-DIFFERENCE

Answer Keys

1. B	**2.** C	**3.** A	**4.** C	**5.** D	**6.** D	**7.** D	**8.** B	**9.** A	**10.** C
11. A	**12.** A	**13.** B	**14.** B	**15.** C	**16.** C	**17.** C	**18.** B	**19.** C	**20.** C
21. A	**22.** B	**23.** D	**24.** C	**25.** D					

Hints and Explanations

1.



Choice (B)

2. "*" may be used as maximum if there is no limit (0, *) means no restriction at all (general relationship)
– "A movie award goes exactly to one movie" (1, 1)
– A movie may be awarded multiple awards but may be none at all (0, *). Choice (C)

3. The correct match is I – R, II – P, III – Q.
Choice (A)

4. – If we insert some value which already exists, under primary key column, key constraint is violated.
– If we insert NULL value under primary key column Entity Integrity constraint is violated.
– If we insert some value which already exists under the column 'SSNO' which is declared as UNIQUE in the schema, UNIQUE constraint is violated.
Choice (C)

5. All violations are possible with updation operation. Refer above solution. Choice (D)

6. The query will be
SELECT Subject, MAX(Marks)
FROM Student
GROUPBY Subject Choice (D)

7. LOCATE is NOT a Relational algebra operator.
Choice (D)

8. It is a wild card symbol that requests inclusion of all attributes. Choice (B)

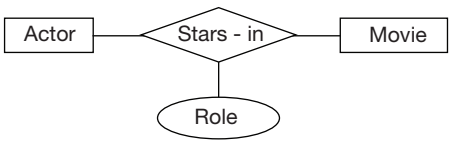
9. $A \rightarrow B$
$C \rightarrow B$
$D \rightarrow B$

L	M	R
ACD		B

$(ACD)^+ = \{ACDB\}$ Prime Attributes = ACD
Non prime Attributes = B
$A \rightarrow B$
$\downarrow$ Non prime Attribute
Partial Key
It violates 2NF.
$\therefore$ The Relation is in 1 NF. Choice (A)

10. If All attributes are prime attributes, then a Relation R is in minimum 3 NF. Choice (C)

11.



Describes the fact that a Role is stored for every pair of actor '*X*' and '*Y*' such that *X* starred in *Y*. Choice (A)

12. One instructor teaches many courses (0, ∗). Each course is run by exactly one Instructor (1, 1).
Choice (A)

13. $A \to B$
$B \to C$
$BC \to A$
$A \to D$
$E \to A$
$D \to E$

L	M	R
	ABCD E	

$A^+ = \{ABCDE\}$
$B^+ = \{BCADE\}$
$C^+ = \{C\}$
$D^+ = \{DEABC\}$
$E^+ = \{EABCD\}$
$\therefore$ '*C*' is not the key. Choice (B)

14.

L	M	R
C	ABD	E

$C^+ = \{C\}$ *x*
$CA^+ = \{CA\}$
$CB^+ = \{CB\}$
$CD^+ = \{CDABE\}$
Candidate key = *CD* Choice (B)

15.
R S

A	B
2	3
2	4
4	5

B	C
3	6
5	7
8	9

R NATURAL OUTER JOIN S

A	B	C
2	3	6
2	4	NULL
4	5	7
NULL	8	9

$\therefore$ 4-Tuples appear in the Result. Choice (C)

16. Minimum, for every entity one table is required. Since there are 3 entities *A*, *B*, *C*, we need minimum 3 tables.
Choice (C)

17. Both queries will correctly give the desired set of Employee Ids. Choice (C)

18. $AB \to C$
$C \to D$
$AB \to D$
Minimal cover:
$AB \to C$
$C \to D$ Choice (B)

19. $AB \to C$
$C \to A$
$D \to B$
$AB \to D$

L	M	R
	ABCD	

$A^+ = \{A\}$
$B^+ = \{B\}$
$C^+ = \{CA\}$
$D^+ = \{DB\}$
$AB^+ = \{ABCD\}$
$AC^+ = \{AC\}$
$AD^+ = \{ADBC\}$
$BC^+ = \{BCAD\}$
$BD^+ = \{BD\}$
$CD^+ = \{CDAB\}$
Keys are *AB*, *AD*, *BC*, *CD*. Choice (C)

20. If an SQL query contains "Select – all" term, DIVISION operation is used. Choice (C)

21. (Student1 – Student2) ≠ (Student2 – Student1) option (B) and option (C) depends on the number of tuples in first specified Relation. Choice (A)

22. Both Queries return the names of students Whose department number is 5.
I – Tuple Relational Calculus
II – Domain Relational Calculus Choice (B)

23. FULL OUER JOIN returns all the tuples of Both the tables. Choice (D)

24. Table *A* has 5 columns
Table *B* has 4 columns
One column is common to both the tables. In the Result of NATURAL JOIN, LEFT OUTER JOIN, FULL OUTER JOIN, duplicate columns are not allowed, (5 columns + 3 columns) = 8 columns. Choice (C)

25. The query will be as follows
SELECT name
FROM student
WHERE marks > 90
SET DIFFERENCE
SELECT name
FROM student
WHERE age > 15. Choice (D)