Branch : CSE & IT Batch : Vijay (Hinglish)

Database Management System

FD's & Normalization

Practice Set 02

[MCQ]

1. Consider the following FD sets:

$S_1 = \{P \to R, PR \to S, T \to PS, T \to U\}$

$S_2 = \{P \to S, QR \to PS, R \to Q, T \to P, T \to S, T \to U\}$

$S_3 = \{P \to S, R \to P, R \to Q, T \to PU\}$

Which of the following sets is equivalent?

(a) $S_1 \equiv S_2$ (b) $S_2 \equiv S_3$

(c) $S_1 \equiv S_3$ (d) $S_1 \equiv S_2 \equiv S_3$

[NAT]

2. Consider a relation R = {P, Q, R, S, T, U, V, W} with the functional dependency sets S = {PR→V, S→TV, QR→S, RV→QS, PRS→Q, RT→PV}

The minimum numbers of simple functional dependency in the minimal cover of F is _____?

[NAT]

3. Consider a relation R(P, Q, R, S, T) with the following functional dependencies: PQR→ST and S→PQ, then the number of super keys in R is_____?

[MCQ]

4. Consider the following two decomposition of R(P Q R S T U) with the set of dependencies

$F = \{PQ \to R, PR \to Q, PS \to T, Q \to S, QR \to P, T \to U\}$.

S_1: $R_1(PQ), R_2(QR), R_3(PQST), R_4(TU)$

S_2: $R_1(PQR), R_2(PRST), R_3(PSU)$

Which of the statements is are dependency preserving and lossless-join decomposition of R?

(a) S_1 Only

(b) S_2 Only

(c) Both S_1 and S_2

(d) None of these

[MCQ]

5. Consider a relation R(P, Q, R, S, T, U, V, W) be a relation schema, in which of the following FD sets are known to hold = {P → Q, P → R, P → S, PT → W, T → S, T → U}. Suppose we decompose the relation into two relations, R_1(PQRS), and R_2(STUVW). The above decomposition is

(a) lossless join and dependency preserving.

(b) lossless join but not dependency preserving.

(c) dependency preserving but not lossless join.

(d) neither dependency preserving nor lossless join.

[MCQ]

6. Consider the following statements

S_1: The decomposition $R_1, R_2 \ldots\ldots R_n$ for a relation schema R are said to be lossless if their natural join results in the original relation R.

S_2: The decomposition $R_1, R_2 \ldots\ldots R_n$ for a relation schema R are said to be lossy if their natural join results into addition of extraneous tuples with the original relation R.

(a) Only S_1 is true

(b) Only S_2 is true

(c) Both S_1 and S_2 are true

(d) Neither S_1 nor S_2 are true

[MCQ]

7. Consider the relation R(P, Q, R, S, T, U, V, W) with the following set of functional dependencies:

$F = \{P \to QRS, P \to T, TUV \to W \text{ and } U \to VW\}$

Which one of the FD in the F is redundant?

(a) $P \to QRS$ (b) $PS \to T$

(c) $TUV \to W$ (d) $U \to VW$

[MCQ]

8. Which are the major and important properties of FD's?

(a) There should be one to one relationship between attributes in FDs.

(b) FDs must be defined in schema.

(c) FDs should be non-trivial.

(d) All of the above

[MCQ]

9. Assume a relation R(P, Q, R, S, T) with the following functional dependencies

{PQ → RST, P → R, Q → S}. which of the following decomposition of R satisfies BCNF?

(a) R_1 (P, R), R_2(Q, S), R_3(P, Q, R, S, T)
(b) R_1(P, R), R_2(Q, S), R_3(P, Q, R, T)
(c) R_1(P, R), R_2(Q, S), R_3(P, Q, S, T)
(c) R_1(P, R), R_2(Q, S), R_3(P, Q, T)

[MCQ]

10. Assume a relation R = (P, Q, R, S) and a set F of functional dependencies:

F = {PR → S, S → P, S → Q, S → R}, Highest normal form satisfied by the relation R is?

(a) 2NF (b) 3NF
(c) BCNF (d) 1NF

[MCQ]

11. Assume the relation R(P, Q, R, S, T) with candidate key PQ is in atleast 3NF. which of the following functional dependencies given in option are invalid?

(a) PQ → R (b) ST → Q
(c) PQ → S (d) RS → T

[MCQ]

12. Assume a relation R(P, Q, R, S, T, U) with the following dependencies

1. PQ → RS 2. T → R 3. Q → TU

Given the functional dependencies as shown above which among the options shows the decomposition of relation R is normalized to 3NF?

(a) R_1(P, Q, R, S, T, U) R_2(T, R) R_3(Q, T, U)
(b) R_1(P, Q, R, S) R_2(R, T) R_3(T, U, Q)
(c) R_1(P, Q, R, S) R_2(R, T) R_3(Q, T, U)
(d) R_1(P, Q, S), R_2(T, R) R_3(Q, T, U)

[MCQ]

13. Consider a relation R(P, Q, R, S, T, U, V, W) with the following functional dependencies:

{RW→V, P→QR, Q→RUW, T→P, U→TV}, then the relation R is in _____.

(a) 1NF (b) 2NF
(c) 3NF (d) BCNF

[MCQ]

14. Consider a table/Relation R has one candidate key, then which of the following is always true?

(a) If R is in 2NF, then it is also in 3NF
(b) If R is in 3NF, then it is also in BCNF
(c) If R is in 2NF, but it is not in 3NF
(d) None of the above.

[MCQ]

15. Consider a relation R(P, Q, R, S, T) with the set of FD's {PQR→ ST and T → QRS} which of the following statements is true?

(a) R is not in 2NF
(b) R is in 2NF but not in 3NF
(c) R is in 3NF but not in BCNF
(d) R is in BCNF

[MCQ]

16. Consider a relation R (L, M, N, O) with the functional dependencies:

L → M,

M → N,

N → O

which one of the following decompositions is not lossless?

(a) R_1 (L, M), R_2(M, N), R_3 (N, O)
(b) R_1(L, M), R_2(L, N), R_3 (L, O)
(c) R_1(L, O), R_2(M, O), R_3 (N, O)
(d) All of the above are lossless

[MSQ]

17. Consider a relation X (P, Q, R, S, T) with the FD's:

PQ → R

Q → S

ST → P

Q → S is a BCNF violation for X. Suppose we decide to decompose X into X_1(Q, S), and X_2 (P, Q, R, S, T).

Which of the following statements are incorrect?

(1) {PQ → R} is a minimal cover for the FD's that hold in X_2.
(2) PQ → R is a BCNF violation for X_2.
(3) X_2 should be decomposed further into X_3(P, Q, R) and X_4 (R, T)

(a) (1) (b) (2)
(c) (3) (d) (1) and (2) only

[MCQ]

18. Suppose functional dependency Q → R holds in relation R (P, Q, R, S) which additional FD will make R be in 3NF, but not BCNF?

(a) S → PQ (b) PR → S
(c) RS → Q (d) PS → Q

Answer Key

1. (b)	6. (c)	11. (d)	16. (c)
2. (6)	7. (c)	12. (d)	17. (a, c)
3. (10)	8. (d)	13. (a)	18. (c)
4. (d)	9. (d)	14. (b)	
5. (d)	10. (c)	15. (a)