1. Consider the table below:

A	B	C
a1	b1	c1
a1	b2	c2
a2	b3	c1
a2	b3	c2

For each of the functional dependencies that are listed below, indicate whether it holds or not.

a. $B \rightarrow A, B \rightarrow C, C \rightarrow B$
b. $B \rightarrow A, A \rightarrow C, BC \rightarrow A$
c. $BC \rightarrow A, B \rightarrow A, A \rightarrow B$
d. $AC \rightarrow B, BC \rightarrow A, B \rightarrow A$

Ans: d

2. Consider relation R (A, B, C, D, E) with functional dependencies:
$AB \rightarrow C, \quad C \rightarrow D, BD \rightarrow E$
Which of the following attribute sets does not functionally determine E?

a) AB
b) AC
c) BC
d) ABC

Ans:b

3. Let relation R (A, B, C, D) satisfy the following functional dependencies:
$A \rightarrow B, B \rightarrow C, C \rightarrow A$

Call this set S1. A different set S2 of functional dependencies is equivalent to S1 if exactly the same FDs follow from S1 and S2. Which of the following sets of functional dependencies is equivalent to the set above?

a) $B \rightarrow AC, C \rightarrow AB$

b) $A \rightarrow B, B \rightarrow A, C \rightarrow A$

c) $A \rightarrow BC, C \rightarrow AB$

d) $A \rightarrow BC, B \rightarrow AC, C \rightarrow AB$

Ans:d

4. Suppose relation R (A, B, C) has tuples (0,0,0) and (1,2,0), and it satisfies the functional dependencies $A \rightarrow B$ and $B \rightarrow C$. Which of the following tuples may be inserted into R legally?

a. (0,0,1)

b. (1,2,1)
c. (0,1,1)
d. None of the above.

Ans: d

5. Relation R has eight attributes ABCDEFGH. Fields of R contain only atomic values. F = {CH -> G, A -> BC, B -> CFH, E -> A, F -> EG} is a set of functional dependencies (FDs) so that F+ is exactly the set of FDs that hold for R. How many candidate keys does the relation R have?
a. 2
b. 3
c. 4
d. 5
Ans: c

6. Which of the following statements is TRUE?
D1: The decomposition of the schema R(A, B, C) into R_1(A, B) and R_2 (A, C) is always lossless.
D2: The decomposition of the schema R(A, B, C, D, E) having AD → B, C → DE, B → AE and AE → C, into R_1 (A, B, D) and R_2 (A, C, D, E) is lossless.

A. Both D1 and D2
B. Neither D1 nor D2
C. Only D1
D. Only D2
Ans:D

7. How many superkeys are possible in the relation R(ABCDE) with Functional dependencies F: {AB→C, DE→B, CD→E}?
a. 7
b. 4
c. 5
d. 6
Ans: a

8. Consider a relation R(A, B, C, D, E, F, G, H) and FD's {A→E, BE→D, AD→BE, BDH→E, AC→E, F→A, E→B, D→H, BG→F, CD→A }. Find the minimal cover.
a. A→E, E→D, BD→E, F→A, E→B, D→H, BG→F, CD→A
b. A→E, BE→D, AD→BE, BDH→E, AC→E, F→A, E→B, D→H, BG→F, CD→A
c. A→E, AD→BE, AC→E, F→A, E→B, D→H, BG→F, CD→A
d. A→E, BE→D, AD→BE, F→A, E→B, D→H, BG→F, CD→A

Ans: A

9. Consider the relation R (A, B, C) with Functional dependencies F= {A→B, BC→D}. How many Functional dependencies are there in F^+.
   a. 128
   b. 119
   c. 132
   d. 167

   Ans: A

10. Consider a relation with schema R (P, Q, R, S) and FDs {PQ -> R, R -> S, S -> P}. which dependencies are not preserved by the BCNF decomposition.
   a. PQ -> R, R -> S
   b. R -> S, S -> P
   c. PQ -> R, S -> P
   d. None of the above

   Ans: C