

Mixed Mode Questions on Functional Dependencies in DBMS

1. Given a relation $R(A, B, C, D)$ with the following FDs:

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

Find the candidate key(s) of R .

2. Consider a relation $R(A, B, C, D, E)$ with FDs:

$A \rightarrow BC, CD \rightarrow E, B \rightarrow D, E \rightarrow A.$

Find the closure of $\{C\}$ and determine if it is a superkey.

3. Given a decomposition of $R(A, B, C, D)$ into $R_1(A, B, C)$ and $R_2(A, D)$,

is the decomposition lossless if $A \rightarrow B$ and $C \rightarrow D$?

4. For a relation $R(A, B, C, D, E)$ with FDs:

$AB \rightarrow C, BC \rightarrow D, CD \rightarrow E.$

Is the relation in 2NF? Justify your answer.

5. Consider a relation $R(A, B, C, D)$ with FDs:

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

Is the decomposition into $R_1(A, B), R_2(B, C), R_3(C, D)$ dependency-preserving?

6. Given FDs for a relation $R(A, B, C, D)$:

$A \rightarrow B, B \rightarrow C, AB \rightarrow D.$

Identify the highest normal form the relation satisfies.

7. For a relation $R(A, B, C, D)$ with FDs:

$A \rightarrow BC, B \rightarrow D.$

Determine if A is a candidate key.

8. For FDs: $AB \rightarrow C, C \rightarrow D, A \rightarrow E$ in relation $R(A, B, C, D, E)$:

Find all candidate keys of R.

9. Is the relation $R(A, B, C)$ with FDs:

$A \rightarrow B$, $B \rightarrow C$, $A \rightarrow C$ in BCNF?

Explain your reasoning.

10. A relation $R(A, B, C, D)$ is decomposed into $R_1(A, B)$ and $R_2(A, C, D)$.

Check if the decomposition is lossless and dependency-preserving when FDs are:

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