



DEPARTMENT OF COMPUTER SCIENCE &

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Experiment - 4

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Semester: 5th

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Date of Performance: 8/9/25

FUNCTIONAL DEPENDENCIES -

1. Consider a relation R having attributes as R(ABCD), functional dependencies are given below:

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

Identify the set of candidate keys possible in relation R. List all the set of prime and non prime attributes.

Sol.

B is missing on the right-side of given functional dependencies , so it is sure that it will be the part of our candidate key so taking **Closures-**

$B(+) - B$ (Not determines all the attributes so use it by combining with other attributes)

$BA(+) - BACD$

$BC(+) - BCDA$

$BD(+) - BDAC$

Candidate keys :- (BA,BC,BD) Prime

attributes are - A,B,C,D

Non-prime attributes are - 0

NORMAL FORM: 3NF .



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**2. Relation R(ABCDE) having functional dependencies as :
 $A \rightarrow D$, $B \rightarrow A$, $BC \rightarrow D$, $AC \rightarrow BE$**

Identify the set of candidate keys possible in relation R. List all the set of prime and non prime attributes.

Sol.

C is missing on right-side so it will be our candidate key or a part of it.

Closures-

$C(+) - C$

$AC(+) - ACBED$

$BC(+) - DBCAE$

$DC(+) - DC$

Candidate keys :- (AC,BC) Prime

Attributes are - A,B,C

Non-prime Attributes are – D,E

NORMAL FORM: 1NF .



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3. Consider a relation R having attributes as R(ABCDE), functional dependencies are given below:

$B \rightarrow A$, $A \rightarrow C$, $BC \rightarrow D$, $AC \rightarrow BE$

Identify the set of candidate keys possible in relation R. List all the set of prime and non prime attributes.

Sol.

Closures -

$B(+) - BACDE$

$A(+) - ACBED$

$C(+) - C$

$D(+) - D$

Candidate keys :- (A,B)

Prime attributes are - A,B

Non-prime attributes are – C,D,E

NORMAL FORM: BCNF .



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4. Consider a relation R having attributes as R(ABCDEF), functional dependencies are given below:

$A \rightarrow BCD$, $BC \rightarrow DE$, $B \rightarrow D$, $D \rightarrow A$

Identify the set of candidate keys possible in relation R. List all the set of prime and non prime attributes.

Solution

Closures-

$F(+) - F$

$AF(+) - AFBCDE$

$BF(+) - BFDACE$

$CF(+) - CF$

$DF(+) - DFABCE$

$EF(+) - EF$

(AF,BF,DF) Prime attributes are -

A,B,D,F

Non-prime attributes are – C,E

NORMAL FORM: 1 NF .



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5. Designing a student database involves certain dependencies which are listed below:

$X \rightarrow Y$

$WZ \rightarrow X$

$WZ \rightarrow Y$

$Y \rightarrow W$

$Y \rightarrow X$

$Y \rightarrow Z$

Identify the set of candidate keys possible in student database. List all the set of prime and non prime attributes.

Sol.

Closures-

$X(+) - XYWZ$

$Y(+) - YXWZ$

$Z(+) - Z$

$WZ(+) - YXWZ$

Candidate keys :- **(X, Y, WZ)**

Prime attributes are **X, Y, W, Z**

NORMAL FORM: BCNF .



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**6. Debix Pvt Ltd needs to maintain database having dependent attributes ABCDEF. These attributes are functionally dependent on each other for which functionally dependency set F given as:
 $\{A \rightarrow BC, D \rightarrow E, BC \rightarrow D, A \rightarrow D\}$**

Consider a universal relation $R1(A, B, C, D, E, F)$ with functional dependency set F, also all attributes are simple and take atomic values only. Find the highest normal form along with the candidate keys with prime and non-prime attribute.

Sol.

A and F are missing so they will be considered as a part of the candidate key.

AF(+) - AFBCDE

B(+) - B

A(+) - ABCDE (F is still missing)

Candidate key is $:= (AF)$

Prime attributes are A,F.

Non-prime attributes are B,C,D,E

NORMAL FORM: 1NF .