

Course Name: **A Level (1st Sem)**

Subject : **Introduction to DBMS**

Topic: **FD – Exercise Practices (Part 3)**

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Functional Dependency – Exercise Practices

As in our previous lectures we have seen that functional dependency $A \rightarrow B$ means that B is dependent on A i.e. from the value of A we can find the value of B from the relation.

Important!

Therefore, to prove $A \rightarrow B$ holds in a relation, **one of the following conditions must be true:**

Condition1: either all the value of A must be unique

Or

Condition2: all the value of B must be same

Or

Condition3: If two or more tuples/rows of the relation have same value for attribute A then there must be also same value for attribute B i.e. **if $t_1[A] = t_2[A]$ then there must be $t_1[B] = t_2[B]$.**

Q.1 Which functional dependency holds in given relation R (A, B, C) and why?

1. $AB \rightarrow C$ && $C \rightarrow B$
2. $BC \rightarrow A$ && $B \rightarrow C$
3. $BC \rightarrow A$ && $A \rightarrow C$
4. $AC \rightarrow B$ && $B \rightarrow C$

A	B	C
7	1	8
7	2	5
7	3	5
5	8	8

Solution:

$AB \rightarrow C$ satisfies condition1 (all the values of AB are unique), but $C \rightarrow B$ does not satisfy any of the three conditions (C has not unique values, B has not all same values and the value of C is repeated two times (8, 5) then the value of B is not repeated), so **option 1 is incorrect.**

$BC \rightarrow A$ satisfies condition1, and $B \rightarrow C$ also satisfies condition1, so **option 2 is correct.**

$BC \rightarrow A$ satisfies condition1, but $A \rightarrow C$ does not satisfy any of the three conditions, so **option 3 is incorrect.**

$AC \rightarrow B$ does not satisfy any of the three conditions, and $B \rightarrow C$ satisfies condition1, so **option 4 is incorrect.**

Since $BC \rightarrow A$ && $B \rightarrow C$ holds in above relation, **option 2 will be the answer.**

Q.2 Which functional dependency holds in given relation and why?

1. $v \rightarrow wx$
2. $yz \rightarrow x$
3. $x \rightarrow yz$

v	w	x	y	z
7	8	c	9	4
8	7	c	9	4
7	8	c	2	4
7	8	c	2	2

Solution:

$v \rightarrow wx$ satisfies condition 3 i.e. value of v is repeated 3 times (7) then value of wx is also repeated . so option 1 is correct.

$yz \rightarrow x$ satisfies condition 2, i.e. all values of x are same, so option 2 is correct.

$x \rightarrow yz$ does not satisfy any of the three conditions, so option 3 is incorrect.

Option 1 & 2 will be the answer.

Exercise (Attempt by yourself):

Q.1 List all functional dependencies satisfied by the relation R (A, B, C) :

A	B	C
a ₁	b ₁	c ₁
a ₁	b ₁	c ₂
a ₂	b ₁	c ₁
a ₂	b ₁	c ₃

Hint: To list all the FDs satisfied by the relation, first identify all possible FDs then check one by one that which one is satisfied by the relation

Q.2 Which functional dependency holds in given relation R (α , β , γ) and why?

1. $\alpha \rightarrow \beta$ && $\beta \gamma \rightarrow \alpha$
2. $\gamma \rightarrow \beta$ && $\alpha \rightarrow \beta$
3. $\beta \rightarrow \gamma$ && $\alpha \beta \rightarrow \gamma$
4. $\alpha \rightarrow \gamma$ && $\beta \gamma \rightarrow \alpha$

α	β	γ
6	1	7
4	3	7
4	8	1
6	7	1

