CSE370
Database Systems

Student Name : Rejwan Shafi

Student ID : 23241108

Section : 08

Semester : Fall 2023

Assignment No : 02

Date of Submission : 01 / 12 / 2023

Answer to the question no 1

(A)

Given, Functional Dependancy is as follows:

$XY \longrightarrow A$

This functional dependency will be valid if and only if: for the same value of XY, the corresponding value of A is same. Now, from the given table we can notice that (xy z, 2) is the repeated value for X and Y in row 2 and row 4. The corresponding value of A is 11 and 13. respectively; therefore, this functional dependency is not valid.

(B)

Given, functional depency is as follows:

$X \longrightarrow YZ$.

This functional dependency is valid. As, according to the given dependency it will be valid if for the same value of X; the corresponding value of YZ is same. Now, from the given table we can notice that (xyz) is the repeated

value for X in row 2 and row 4. The corresponding value for YZ is (2, 8) and (2, 8) repeatedly. So, as we can see for the same value of X we are getting the corresponding value of YZ to be also same. Therefore, this functional dependency is valid.

(c)

$A \longrightarrow XYZ$

This functional dependency is not valid. The given functional dependency would have been valid if for the same value of A, the corresponding value of XYZ is also the same. Now from the given table we can notice that, 10 is the repeated value for A in row 1 and row 5. The corresponding value in XYZ is (abcefg, 1, 2) and (abcdefg, 3, 2) respectively. Therefore, this functional dependency is not valid.

(D)

$YZ \rightarrow X$

This functional dependency is not valid. The given functional dependency would have been valid if for the same value of YZ, the corresponding value of X is also the same. Now, from the given table, we can see that (2, p) is repeated twice for the YZ value. But for (2, p) we get the same value of X which in xyz.

But we can also notice that, (3, 2) is also repeated value for YZ in row 3 and row 5. The corresponding value of X when YZ is (3, 2) is (feg, abcdefg) respectively.

Therefore, this functional dependency is not valid

(E)

$Y \rightarrow Z$

This functional dependency is valid. The functional dependancy will be valid if and only if for the same value of Y; Corresponding values of Z remains same. Now from the given table we can see that 3 is the repeated value for X in row 3 and row 5. The corresponding value for Z is (2, 2) respectively. So, we can see that for repeted occurence of Y we get the same value of Z.

So, therefore, the given functional dependency is valid.

Answer to the question no 2

(a)

The given relation is in 1NF.. Because it has primary keys and no composite / multivalued attributes. Neither the given relation have any nested relation so, therefore, it is in 1NF formal

(b)

As the given relation is already in 1 NF. Therefore, we have to check if it's in 2NF or not. From the given functional dependencies we can see that FD1, FD2 and FD3 are not fully functional dependent. Rather, they are partially dependent because, in the relation the primary key was the combination of (Comp ID, Engineer ID, Date assigned) but the functional dependencies FD1, FD2 and FD3 doesn't depend fully on the three primary key attributes at a time. Therefore, it's partial functional dependency. And for FD4 and FD5 they are transistive dependency.

Now after de composing it into 2 NF formal it would look like the following.

Computer Repair

Comp_ID	Engineer_ID	Date_Assigned	Date_repaired

Engineer

Engineer_ID	Engineer_Name	Engineer_Phone	Total_Repairs	Comission_Percentage

Service

Comp_ID	Date Assigned	Issue	Priority_Level	Service_Charge

Customer Record

Comp_ID	Customer_Name	Customer_Phone

(c)

Right now the Relation is on 2NF normalized form. But from the given functional dependencies we can see FD 4 and FD 5 are transistive functional dependency. Now we have to decompose it into its corresponding 3NF format. After 3 NF normalizatio -n it would look like the following

Computer Repair

Comp_ID	Engineer_ID	Date_Assigned	Date_repaired

Engineer

Engineer_ID	Engineer_Name	Engineer_Phone	Commission_Percentage

Service

Comp_ID	Date_Assigned	Issue	Service_Charge

Customer Record

Comp_ID	Customer_Name	Customer_Phone

Priority

Priority_Level	Service_Charge

Repair History

Total_Repairs	Commission_Percentage