4NF and 5NF

Multivalued dependency

- Multivalued dependency requires a minimum of three columns in which there should be at least two attributes that depend on the third one. And those two attributes are dependent on each other. Conditions for Multi-valued dependency.

1. There should be at least 3 columns in a table.

2. For every dependency A-> B, for every value of A multiple values of B exists then the dependency is referred to as a multi-valued dependency.

3. In the relation of 3 columns R(XYZ), if there exists a multi-valued dependency between X and Y then Y and Z should be independent of each other.

For example

1.The dependencies in this relation are:
Student_Roll_No —> Subject_Enrolled
Student_Roll_No —> Activity Enrolled

Student_Roll_No	Subject_Enrolled	Activity_Enrolled
45	Economics	Painting
45	History	Hockey
33	Physics	Drawing
59	Chemistry	Singing
40	Python	Journalism

- A relation should satisfy the below two conditions to be in 4NF. The conditions are:

1. It should be in BCNF.

2. There should be no Multi-valued Dependency.

4NF

Course	Instructor	TextBook_Author
Management	X	Churchil
Management	Y	Peters
Management	Z	Peters
Finance	A	Weston
Finance	A	Gilbert

Course

Course	Instructor
Management	X
Management	Y
Management	Z
Finance	A

Textbook_Author

Course	TextBook_Author
Management	Churchil
Management	Peters
Finance	Weston
Finance	Gilbert

- **Advantages of Fourth Normal Form**
- Following are the advantages given.
- Helps in removing redundancy and anomalies in the database.
- Data integrity and consistency can be maintained through normalization and restricted constraints.

Fifth normal form (5NF)

- A relation is in 5NF if it is in 4NF and not contains any join dependency and joining should be lossless.

- 5NF is satisfied when all the tables are broken into as many tables as possible in order to avoid redundancy.

- 5NF is also known as Project-join normal form (PJ/NF).

SUBJECT	LECTURER	SEMESTER
Computer	Anshika	Semester 1
Computer	John	Semester 1
Math	John	Semester 1
Math	Akash	Semester 2
Chemistry	Praveen	Semester 1

SEMESTER	SUBJECT
Semester 1	Computer
Semester 1	Math
Semester 1	Chemistry
Semester 2	Math

P2

SUBJECT	LECTURER
Computer	Anshika
Computer	John
Math	John
Math	Akash
Chemistry	Praveen

P3

SEMSTER	LECTURER
Semester 1	Anshika
Semester 1	John
Semester 1	John
Semester 2	Akash
Semester 1	Praveen