ASSIGNMENT - 3

Considering 3 unnormalized tables :-

(i) Table 1 : Students

Student_ID	Student_Name	Course_IDs	Course_Name
101	Alice	C101, C102	DBMS, AI
102	Bob	C103	Data structures
103	Charlie	C101, C104	DBMS, PM [illegible]

(ii) Table 2 : Orders

Order_ID	Customer_Name	Items	Price
201	John	Laptops, Mouse	1000, 50
202	Emma	Keyboard	100
203	Sam	Laptops, Headphones	1000, 200

(iii) Table 3 : Employees

EID	Employee_Name	Dept	Skills
E01	David	IT	Java, Python
E02	Sarah	HR	Communication
E03	Tom	IT	Java, SQL

I Convert to First Normal Form (1NF)

1. Rules :

- Each row should have atomic values.
- No repeating groups.
- Each column has only one value per row.

2. Table : Students (1NF)

(i)

Student-ID	Student_Name	Course_IDs	Course_Name
101	Alice	C101	DBMS
101	Alice	C102	AI
102	Bob	C103	Data Structures

103	Charlie	C101	DBMS
103	Charlie	C104	PM

(ii) Table : Orders (1NF)

Order_ID	Customer_Name	Items	Price
201	John	Laptops	1000
201	John	Mouse	50
202	Emma	Keyboard	100
203	Sam	Laptops	1000
203	sam	Headphones	200

(iii) Table : Employee (1NF)

EID	Employee_Name	Dept	Skills
E01	David	IT	Java
E01	David	IT	Python
E02	Sarah	HR	Communication
E03	Tom	IT	Java
E03	Tom	IT	SQL

3. Justification.

- Atomicity Ensured : Each column contains only one value, making data easier to query.
- Data Integrity Improved : Eliminates inconsistent storage formats.
- simplifies Queries : Makes searching and filtering easier by ensuring each pieces of data is stored in a single cell.

II Convert to Second Normal Form (2NF)

1. Rules :
- It should be in 1NF.
- No partial dependency i.e all non-key columns depend

on the entire primary key not just part of it.

2. Table : Students (2NF)

(i)

Student_ID	Student_Name
101	Alice
102	Bob
103	Charlie

Table : Courses (2NF)

Course_ID	Course_Name
C101	DBMS
C102	AI
C103	Data Structures
C104	PM

Table : Course_Enrollment (2NF)

Student_ID	Course_ID
101	C101
101	C102
102	C103
103	C101
103	C104

(ii) Table : Orders (2NF)

Order_ID	Customer_Name
201	John
202	Emma
203	Sam

Table : Items (2NF)

Order_ID	Item	Price
201	Laptop	1000

201	Mouse	50
202	Keyboard	100
203	Laptop	1000
203	Headphones	200

3. Justification

- Eliminates Partial Dependencies: Every non-key column is fully dependent on the entire primary key.
- Reduce Data Redundancy: Removes duplication of student name, course name etc...
- ~~Ump~~ Avoids update anomalies: Ensures updates happen in one place instead of multiple rows.

(ii) Convert to Third Normal Form (3NF)

1. Rules:
   - It should be 2NF.
   - No transitive dependencies i.e. non-key attributes should should not depend on other non-key attributes.

2. Table: Items (3NF)

Item	Price
Laptop	1000
Mouse	50
keyboard	100
Headphones	200

3. Justification.

- Eliminates transitive dependencies.
- Reduces D. Redundency.
- Increases Data Consistency - Updates affect only one table instead of multiple places.