Functional Dependency and Normalization of Database

Relational Schema 1

User (id, name, email, password, join_date, user_type)
Primary Key:- id
Functional Dependency: (id) → (name, email, password, join_date, user_type)

For a table to satisfy **2NF**, it must satisfy 2 conditions.

1) It must be in 1NF. Our table is in **1NF** form because all attributes are atomic, each column contains value of its domain and each attribute name is unique.
2) There should be no partial dependency. As our table contain only one primary key, so there won't be any partial dependency.

So our table satisfy 2NF.

For a table to satisfy **3NF** it must satisfy 2 conditions.

1) It must satisfy 2NF. We have already show this above.
2) It should not have any Transitive dependency. In our table no non-prime attribute depends on other non-prime attribute. No tuple will be unique in our table.

For a table to satisfy **BCNF** , functional dependency (x → y), x should be the super key of the table. Since id is the super key then our schema is in **BCNF**.

Relational Schema 2

Staff (id, user_id, address, salary)
Primary Key:- id
Functional Dependency: (id) → (user_id, address, salary)
For **2NF, 3NF, BCNF** same explanation as in relational schema 1.
This Relational schema is in **BCNF** and also satisfy **1NF**, **2NF** and **3NF**.

Relational Schema 3

Customer (id, user_id, address, age, weight, membership_plan)
Primary Key:- id
Functional Dependency: (id) → (user_id, address, age, weight, membersship_plan)
For **2NF, 3NF, BCNF** same explanation as in relational schema 1.
This Relational schema is in **BCNF** and also satisfy **1NF**, **2NF** and **3NF**.

Relational Schema 4

Membership_Plan (id, title, duration, price, description)
Primary Key:- id
Functional Dependency: (id) → (title, duration, price, description)
For **2NF, 3NF, BCNF** same explanation as in relational schema 1.
This Relational schema is in **BCNF** and also satisfy **1NF**, **2NF** and **3NF**.

Relational Schema 5

Equipments (id, name, date_purchased, price, quantity)
Primary Key:- id
Functional Dependency: (id) → (name, date_purchased, price, quantity)
For **2NF, 3NF, BCNF** same explanation as in relational schema 1.
This Relational schema is in **BCNF** and also satisfy **1NF**, **2NF** and **3NF**.