Q1.

1. Insertion Anomaly : To insert new VisitNo ‘V10022’ we would have to add a new ‘ProvNo’
2. Update Anomaly: To update age of patient ‘P1’ we would have to update all occurrences of ‘P1’.
3. Delete Anomaly: To delete ‘ProvNo’ D3, entries of ‘VisitNo’ V82110 wouldalso be deleted

Q2.

Step 1: Group FDs

PatNo → PatAge, PatZip9

PatZip9 → PatCity

VisitNo→ VisitDate, PatNo

ProvNo → ProvSpeciality, ProvEmail

VisitNo, ProvNo → Diagnosis

ProvEmail → ProvNo

Step 2: For each FD group, make a table with the determinant as the primary key. In the table list, the primary keys are underlined.

Patient (PatNo, PatAge, PatZip9)

FOREIGN KEY (PatZip9) REFERENCES Zip (PatZip9)

Zip (PatZip9, PatCity)

VisitDetails (VisitNo, VisitDate, PatNo)

FOREIGN KEY (PatNo) REFERENCES Patient (PatNo)

ProvDetails (ProvNo, ProvSpeciality, ProvEmail)

FOREIGN KEY (ProvEmail) REFERENCES ProvMail (ProvEmail)

VisitProv (VisitNo, ProvNo, Diagnosis)

FOREIGN KEY (VisitNo) REFERENCES VisitDetails (VisitNo)

FOREIGN KEY (ProvNo) REFERENCES ProvDetails (ProvNo)

ProvMail (ProvEmail, ProvNo)

FOREIGN KEY (ProvNo) REFERENCES ProvDetails (ProvNo)

Step 3: Merge tables with the same columns. Merging tables ProvDetails and ProvMail

Patient (PatNo, PatAge, PatZip9)

FOREIGN KEY (PatZip9) REFERENCES Zip (PatZip9)

Zip (PatZip9, PatCity)

VisitDetails (VisitNo, VisitDate, PatNo)

FOREIGN KEY (PatNo) REFERENCES Patient (PatNo)

ProvDetails (ProvNo, ProvSpeciality, ProvEmail)

UNIQUE (ProvEmail)

VisitProv (VisitNo, ProvNo, Diagnosis)

FOREIGN KEY (VisitNo) REFERENCES VisitDetails (VisitNo)

FOREIGN KEY (ProvNo) REFERENCES ProvDetails (ProvNo)

Q3.

All the tables are in BCNF form.

Even if we split the tables on the basis of unique keys, the resultant tables will be subset of previous tables and they will be combined in the final step.

Q4.

|  |  |
| --- | --- |
| **FD** | **Falsifications** |
| OrdNo → ItemNo | (1,2), (3,4) |
| OrdNo →QtyOrd | (3,4) |
| OrdNo →CustNo | None |
| OrdNo →CustBal | None |
| OrdNo →CustDisc | None |
| OrdNo →ItemPrice | (1,2), (3,4) |
| OrdNo →OrdDate | None |