**Relation:**

Person(ID,Gender,Email ID,Contact No,Street Address,DOB,Fname,Lname,Mname,PIN,City,Country,State)

**FDs:**

ID → {Gender,Street Address,DOB,Fname,Lname,Mname,PIN,City,Country,State}

PIN → {City,Country,State}

Email ID → ID

Contact No → ID

Here, We can’t Find out Email Id and Contact No from any attribute So

**Possible Key(s) : {ID,Mail ID,Contact No}**

**FD Violates BCNF constraint:-**

* PIN → {City,Country,State}

**First Decomposition:**

**Closure of PIN:**

* PIN+:{PIN,City,Country,State}

**Relation R1:**

R1(PIN,City,Country,State)

**FDs:**

PIN → {City,Country,State}

**Relation R2:**

R2(ID,Gender,Email ID,Contact No,Street Address,DOB,Fname,Lname,Mname,PIN)

**FDs:**

ID → {Gender,Street Address,DOB,Fname,Lname,Mname,PIN}

Email ID → ID

Contact No → ID

**FD Violates BCNF constraint:-**

* Email ID → ID

**Second Decomposition:**

**Relation:**

R2(ID,Gender,Email ID,Contact No,Street Address,DOB,Fname,Lname,Mname,PIN)

**Closure of Email ID:**

* Email ID+: {Email ID,ID}

**Relation R21:**

R21(Email ID,ID)

**FDs:**

Email ID → ID

**Relation R22:**

R22(ID,Gender,Contact No,Street Address,DOB,Fname,Lname,Mname,PIN)

**FDs:**

ID → {Gender,Street Address,DOB,Fname,Lname,Mname,PIN}

Contact No → ID

**FD Violates BCNF constraint:-**

* Contact No → ID

**Third Decomposition:**

**Relation:**

R22(ID,Gender,Contact No,Street Address,DOB,Fname,Lname,Mname,PIN)

**Closure of Contact No:**

* ContactNo+: {Contact No,ID}

**Relation R221:**

R221(Contact No, ID)

**FDs:**

Contact No → ID

**Relation R222:**

R222(ID,Gender,Street Address,DOB,Fname,Lname,Mname,PIN)

**FDs:**

ID → {Gender,Street Address,DOB,Fname,Lname,Mname,PIN}

**Final Decomposition:**

Contact\_No(Contact No, ID)

Email\_ID(Email ID,ID)

Person(ID,Gender,Street Address,DOB,Fname,Lname,Mname,PIN)

PIN (PIN,City,State,Country)

**Relation:**

Student (StudentID,NameofSchool,GaurdianContactNumber,BoardseaNo,ProgID,ACPCNo,

Attempts,HSC Board,Grade Obtained,JEE Roll No,Medium,JEE score,Yearofpassing,Addressofschool)

**FDs:**

StudentID → {NameOfSchool,GurContactNo,BoardSeatNo,ProgID,ACPCNo,Attempts,

HSCBoard,GOB,JEERollNo,Medium,JEEScore,YearOfPassing,AddressOfSchool}

GurdianContactNo → {NameOfSchool,StudentID,BoardSeatNo,ProgID,ACPCNo,Attempts,

HSCBoard,GOB,JEERollNo,Medium,JEEScore,YearOfPassing,AddressOfSchool}

BoardSeatNo → {NameOfSchool,StudentID,GurContactNo,ProgID,ACPCNo,Attempts,

HSCBoard,GOB,JEERollNo,Medium,JEEScore,YearOfPassing,AddressOfSchool}

ACPCNo → {NameOfSchool,StudentID,GurContactNo,ProgID,BoardSeatNo,Attempts,

HSCBoard,GOB,JEERollNo,Medium,JEEScore,YearOfPassing,AddressOfSchool}

JEERollNo → {NameOfSchool,StudentID,GurContactNo,ProgID,BoardSeatNo,Attempts,

HSCBoard,GOB,ACPCNo,Medium,JEEScore,YearOfPassing,AddressOfSchool}

**Possible Key(s) : {StudentID}**,**{GurContactNo}**,**{BoardSeatNo}**,**{ACPCNo}**,**{JEERollNo}**

**Relation:**

Staff (Staff ID,Appointment Date,experience)

**FDs:**

Staff ID → {Appointment Date,experience}

**Possible Keys: Staff ID.**

**Relation:**

Program (ProgID,ProgramName)

**FDs:**

ProgID → ProgramName

ProgramName → ProgID

**Possible key(s): {ProgID},{ProgramName}**

**Relation:**

Faculty (FacultyID,VisitingorNot,Designation,Specialization)

**FDs:**

FacultyID → {VisitingorNot,Designation,Specialization}

**Possible key(s): {Faculty ID}**

**Relation:**

Degree (StaffID,Degree)

**FDs:**

Here there will only be trivial FDs hence they are not included.

**Possible key(s): {StaffID,Degree}**

**Relation:**

Fee(AcademicYear,Semester,StudentID,ReceiptNumber,Chequenumber,BankName,Date, Amount)

**FDs:**

ReceiptNumber → {AcademicYear,Semester,ProgramID,StudentID,Chequenumber,BankName, Date,Amount}

Cheque Number → {BankName,ReceiptNumber,StudentID,ProgID,Semester,Acadyear, Date, Amount}

**Possible key(s): {ReceiptNumber},{Cheque Number}**

**Relation:**

Salary (StaffID,chequenumber,BankName,Payslipnumber,Amount,Date)

**FDs :**

Payslipnumber → {StaffID,Date,Amount,Chequenumber,BankName}

Chequenumber → {StaffID,Date,Amount,Payslipnumber,BankName}

**Possible key(s): {Payslipnumber},{Cheque Number}**

**Relation:**

SupportStaff (StaffID, Designation ,Type of Work)

**FDs:**

StaffID → {Designation,TypeOfWork}

**Possible key(s): {StaffID}**

**Relation:**

Peon (PeonID, TypeofWork)

**FDs:**

PeonID → {TypeOfWork}

**Possible key(s): {PeonID}**

**Relation:**

CommiteeMember (MemberPosition,MemberId,CommiteeID)

**FDs:**

MemberID → {MemberPosition,CommitteeID}

**Possible key(s): {MemberID}**

**Relation:**

Committee (CommitteeName,CommitteeID,Member ID,Member Position,Since)

**FDs:**

CommitteeID → CommitteeName

CommitteeName → CommitteeID

**Possible Key(s):** **{CommitteeID}**,**{CommitteeName}**

**Relation:**

Course (CourseName, Since, Credit,CourseID)

**FDs:**

CourseID → {CourseName,since,Credit}

CourseName → {CourseID,since,Credit}

**Possible Key(s):** **{CourseID}**,**{CourseName}**

**Relation:**

Offers (CourseID,Type ,AcademicYear,FacultyID)

**FDs:**

Here there will only be trivial FDs hence they are not included.

**Possible Key(s):** **{CourseID,Type,AcademicYear,FacultyID}**

**Relation:**

Result (StudentID,GPA,CGPA,AcademicYear,Type)

**FDs:**

{StudentID,AcadYear,Type} → {GPA,CGPA}

**Possible Key(s):** **{StudentID,AcadYear,Type}**

**Relation:**

Seller (Seller Email-ID , SellerAddress , SellerID,Seller Name,PhoneNumber )

**FDs:**

Seller ID → {Seller Name,Seller Phone Number,Seller Email-ID,Seller Address}

Seller Email-ID → {Seller Name,Seller Phone Number,Seller Address}

Seller Phone Number → {Seller Email-ID , SellerAddress , SellerID,Seller Name}

**Possible Key(s): {Seller ID},{Seller Email-ID},{Seller Phone Number}**

**Relation:**

Accessories (SellerID,Company name , Product Name ,Warranty Period ,DeviceId, Invoice No,Purchase Date, Purchase Amount)

**FDs:**

DeviceID → {Companyname,ProductName, WarrantyPeriod, PurchaseAmount,InvoiceNo,Purchase Date,Seller ID}

Invoice Number can not determine Device Id because two stores can have the same invoice number.

**Possible Key(s): {DeviceID}**

**Relation:**

Prerequisite (PrerequisiteID,CourseID)

**FDs:**

Here there will only be trivial FDs hence they are not included.

**Possible Key(s): {PrerequisiteID,CourseID}**

**Relation :**

Book (BookID , NameofBook,Edition, Publisher,CourseID)

**FDs:**

BookID → {NameofBook , Edition ,Publisher,CourseID}

**Possible Key(s) : {BookID}**

**Relation:**

**Author(Author Name,Book ID)**

**FDs:**

Here there will only be trivial FDs hence they are not included.

**Possible Key(s): {Author Name,Book ID}**

**Relation:**

Register (StudentID,Grade,CourseID,Type,AcademicYear)

**FDs:**

StudentID,CourseID,AcademicYear,Type→ Grade

**Relation:**

Semester (Type ,Academic Year)

**Possible Key(s): {Author Name,Book ID}**