**Problem Set**

**Problem Set 1: First Normal Form**

1. Give a set of FDs for the relation schema *R(A,B,C,D)*with primary key *AB*under which *R*is in 1NF but not in 2NF.

Answer:-

FD: AB → CD ,B → C. AB is a key for this relation since AB → CD means AB → ABCD.

FD: B → C violates 2NF since:

C is non prime key attribute FD

B is not a superkey

C is not part of some key for R

1. Convert the following Relation into a database tables by applying 1st normalization. R = {Student ID, Last Name, First Name, Course ID, Course Section, Course Name, Grade, Professor Last Name, Professor First Name, Bldg,  Office #}

Answer:-

Student (Student\_Id, LastName,First Name,Grade)

Student course (Student\_Course (Studentno, course\_no, course\_name,instructor\_no,instructor\_name, instructor\_location, grade))

1. Convert the bellow image into a database tables by applying 1st normalization.

Answer:-

Employee (EmployeeNumber,EmployeeName,JobClass)

ProjectCharge(ProjNum,ProjectName,EmployeeNumber,ChgHour,HoursBilled,TotalCharge)

1. Grade\_report (StudNo, StudName, (Major, Adviser,  (CourseNo, Ctitle, InstrucName, InstructLocn,Grade)))

Advisor -> Major,  
 StudNo,CourseNo,Major -> Grade,   
 StudNo,Major -> Advisor  
 Convert the above relation into 1NF

Answer:-

Student (StudNo,StudName,Major,Grade,CourseNo)

Course (CourseNo,Ctitle,InstrucName,Adviser,Major)

Instructor (InstucName,Adviser,InstrucLocn,CourseNo)

**Problem Set 2:Second Normal Form**

1. Give a set of FDs for the relation schema *R(A,B,C,D)*with primary key *AB*under which *R*is in 2NF but not in 3NF.

Answer:-

AB → CD and C → D. AB is obviously a key for this

relation since AB → CD implies AB → ABCD. The FD: C → D violates

3NF but not 2NF since:

D -> C is not a trivial FD

C is not a superkey

D is not part of some key for R

1. Apply 2nd Normalization for the above 2nd problem?

Answer:-

Student (Studentno,student\_name,major)

Course\_Grade (studentno,course\_no,grade)

Course\_Instructor (Course\_no, course\_name, instructor\_no, instructor\_name, instructor\_location)

1. Apply 2nd Normalization for the above 3rd problem?

Answer:-

Employee (EmployeeNumber,EmployeeName,JobClass)

Project (ProjNum,ProjectName,EmployeeNumber)

Charge (ProjNum,EmployeeNumber,ChgHour,HoursBilled,TotalCharge)

1. Apply 2nd Normalization for the above 4th  problem?

Answer:-

Student (Studentno,student\_name,major)

Course\_Grade (studentno,course\_no,grade)

Course\_Instructor (Course\_no, course\_name, instructor\_no, instructor\_name, instructor\_location)