**Database system**

**Implimentation 1 Task 2 Solution**

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# Highest Normal form

{courseCode}+

={ courseCode, offeringDept, creditHours, courseLevel}

{roomNum,daysHours,semester,year}+

={ roomNum,daysHours,semester,year,lectNum ,courseCode ,sessionNum,OfferingDept, creditHours,courseLevel}

(using courseCode🡪offeringDept, creditHours, courseLevel)

roomNum,daysHours,semester,year 🡪 lectNum ,courseCode ,sessionNum,OfferingDept, creditHours,courseLevel is a valid Functional dependency.

NumOfStudent🡪 NumOfStudent is trival Functional dependency

Hence, the minimal super key is( roomNum,dayHours,semester,year, NumOfStudent).

**Step 2: Find the highest Normal Form**

Since, (roomNum,dayHours,semester,year, NumOfStudent) is the minimal super key. there exist a partial Functional dependency,

**courseCode, sessionNum,semester,year🡪dayHours, roomNum, numOfStudent ,lectNum.** Which violates 2NF requirements.

A diagram of a course code

Description automatically generated

**Ans: Hence, the relational schema R is in 1NF**

# Decompose the relational schema R into BCNF

Since there exist a partial dependency in the relational schema R, to transform the relational schema to BCNF, we need to remove the partial dependency, **courseCode, sessionNum,semester,year🡪dayHours, roomNum, numOfStudent ,lectNum,** and split it into three relational

shcemas

**R1**=( roomNum,dayHours,semester,year, NumOfStudent),

**R2**=( roomNum,dayHours,semester,year,lectNum ,courseCode ,sessionNum,OfferingDept, creditHours,courseLevel)

and

**R3**= (semester,year, courseCode ,sessionNum, roomNum,daysHours, numOfStudent,lectNum)

**In relational schema R1=**

**(** roomNum,dayHours,semester,year, NumOfStudent **),**

the minimal super key is R **(** roomNum,dayHours,semester,year, NumOfStudent),

and the relational shcema R have no partial dependency, transitive dependency and non-trivial dependency violations. Hence, the relationasl schema R1= (roomNum ,dayHours ,semester,year, NumOfStudent) is in BCNF.

**In relational schemaR2=**

**(** roomNum,dayHours,semester,year,lectNum ,courseCode ,sessionNum,OfferingDept, creditHours,courseLevel**),**

the minimal super key is (roomNum,dayHours,semester,year),

and the relational shcema R have no partial dependency, transitive dependency and non-trivial dependency violations. Hence, the relationasl schema R2=(roomNum,dayHours,semester,year,lectNum ,courseCode ,sessionNum,OfferingDept, creditHours,courseLevel) is in BCNF.

**In relational schema R3=**

**(**courseCode ,offeringDept,creditHours,courseLevel**),**

the minimal super key is (courseCode),

and the relational shcema R have no partial dependency, transitive dependency and non-trivial dependency violations.

Hence, the relationasl schema R3=( courseCode ,offeringDept,creditHours,courseLevel) is in BCNF.