

Question 1:

Emp (eid: number, ename: string, age: number, salary: real)

Works (eid: number, dno: number, work_load_time: time)

Dept (dno: number, dname: string, budget: real, managerid: number)

- i) FOREIGN KEY Works (eid) REFERENCES Emp (eid)
FOREIGN KEY Works (dno) REFERENCES Dept (dno)
FOREIGN KEY Dept (managerid) REFERENCES Emp (eid)
- ii) CREATE TABLE Emp(eid int, ename varchar(25), age int, salary real, PRIMARY KEY(eid));

CREATE TABLE Dept(
dno int,
dname varchar(25),
budget real,
managerid int not null,
PRIMARY KEY(Dno),
FOREIGN KEY (Managerid) REFERENCES Emp(eid));

CREATE TABLE Works (
eid int, dno int, work_load_time int, PRIMARY
KEY(eid,dno), FOREIGN KEY (eid) REFERENCES Emp(eid),
FOREIGN KEY (dno) REFERENCES Dept(dno));
- iii) Select d.dname from dept d, work w where w.dno=d.dno
group by d.dname having count(*)>60
- iv) Select e.eid,e.ename, sum(d.work_load_time) from emp
e,works d where e.eid=d.eid group by(e.eid,e.ename)
- v) Select e.eid,e.ename, d.dno,sum(d.work_load_time) from emp
e,works d where e.eid=d.eid group by(e.eid,e.ename,d.dno)
having sum(d.work_load_time)>(select avg(work_load_time)
from works d1 where d1.dno=d.dno);

Question 2:

- i) A) SID
B) SID, Sname
C) SID, Email

D)SID, Age

E) SID, CGPA

ii) SID, Email Primary Key(SID)

3. A->C

C->D

CD->I

EC->AB

EI->C

4. A, 2NF

5. Tables Required to convert this ER-Diag to Relation models:

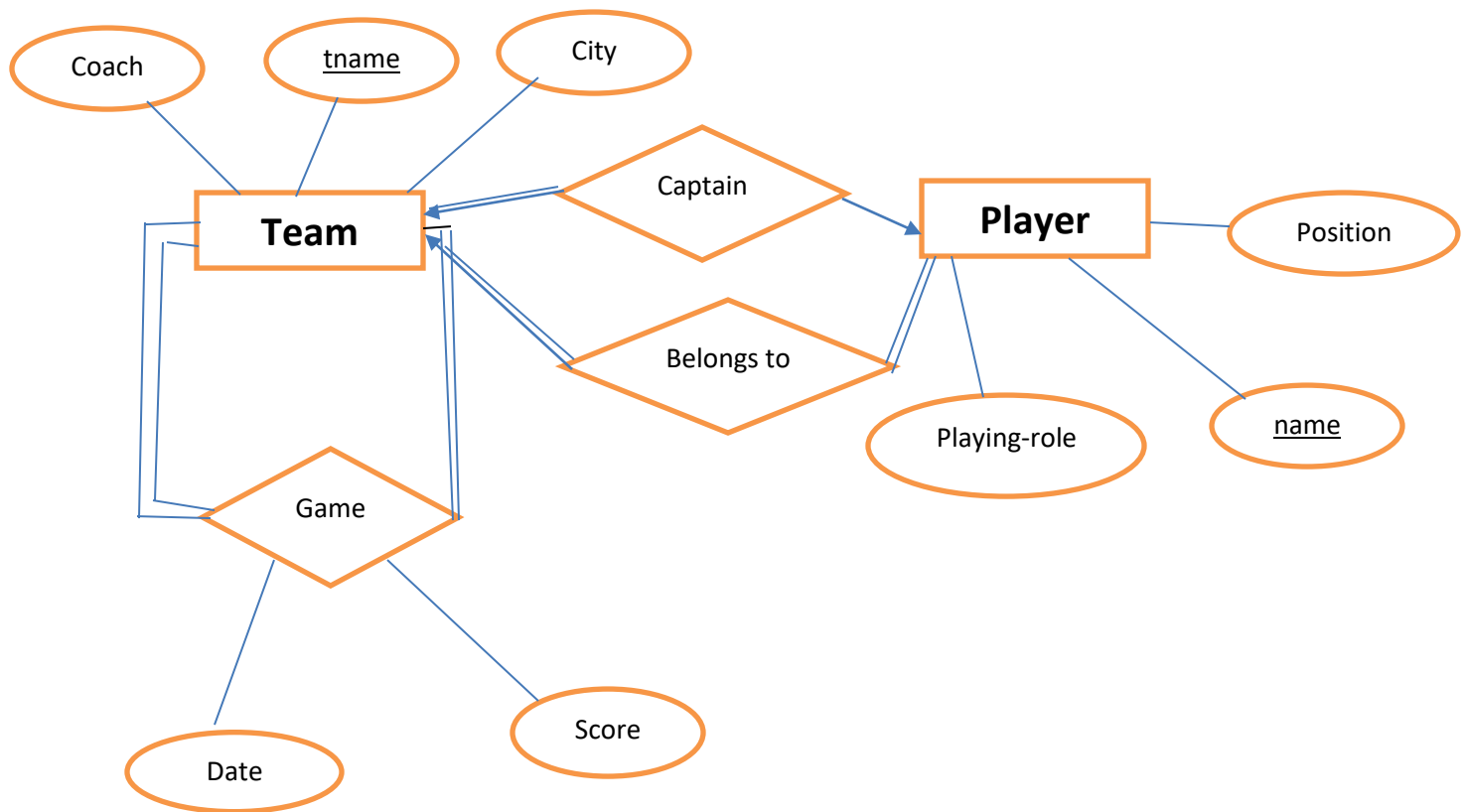
Team(tname, city, coach,captainid)

Player(name, position,playing-role,tname)

Game(tname1,tname2,date,score)

Foreign key Team(captained) references player(name)

Foreign key player(tname) references team(tname)



6. CK: AD,BD,ED,FD

1) NOT IN 3NF

DECOMPOSITION

R1(CHG)

R2(ABC)

R3(BCFH)

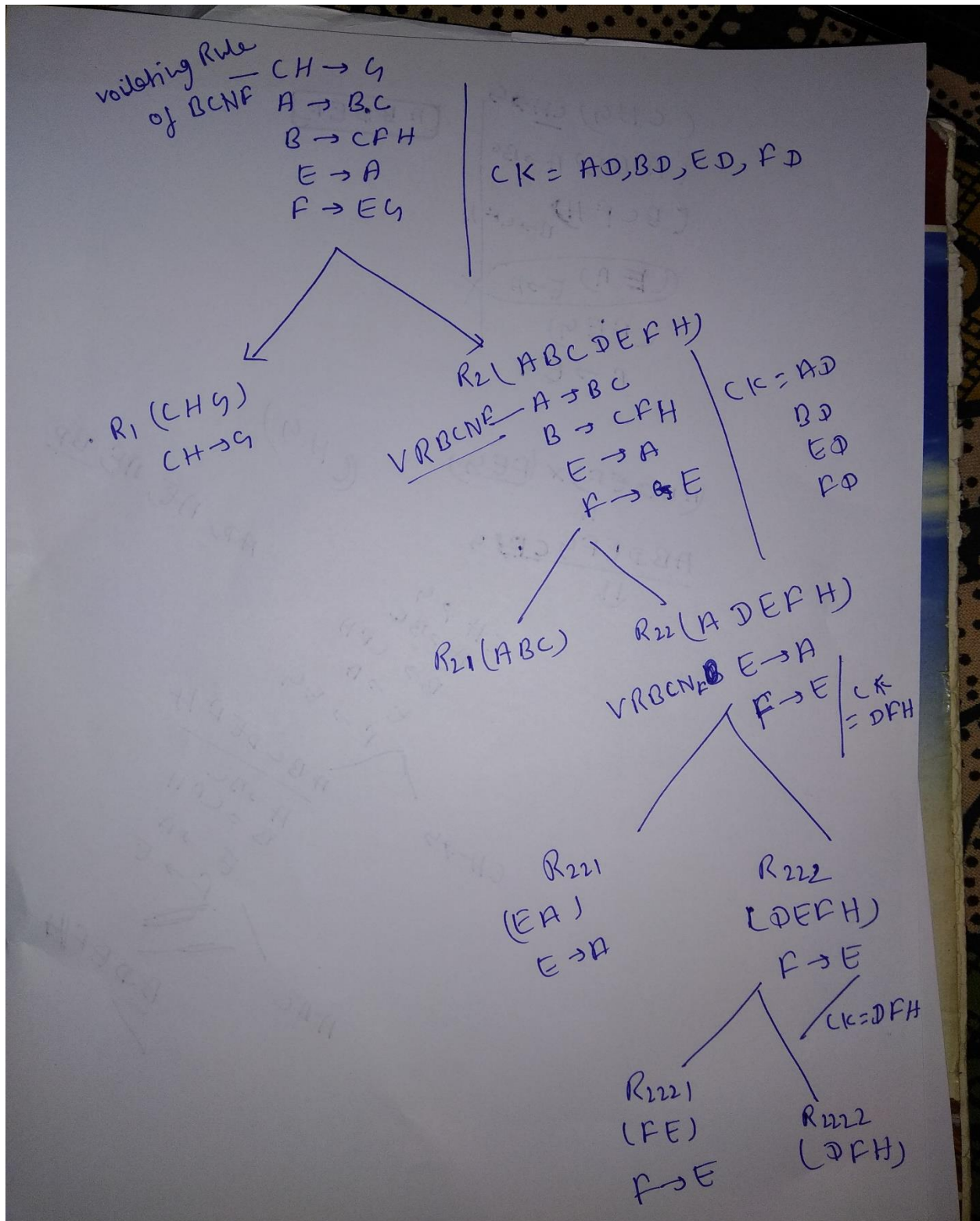
R4(EA)

R5(FEG)

R6(ABDEF)

YOU CAN REMOVE R4 BECAUSE ALL ATTRIBUTE OF R4 PRESENT IN R6

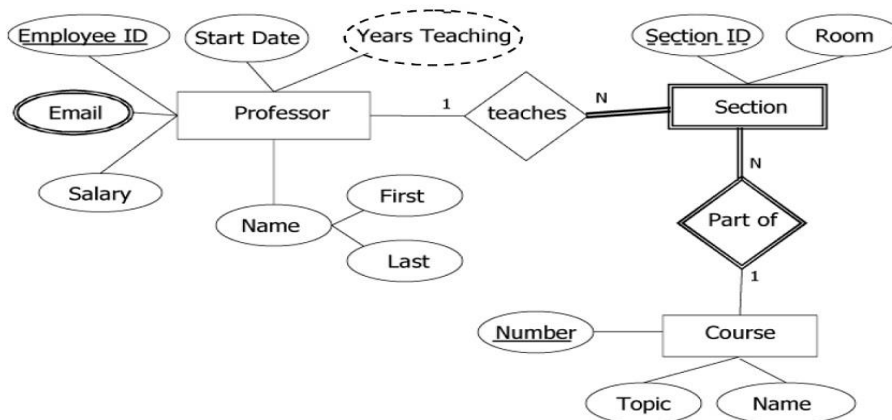
II) NOT IN BCNF



- iii. Both are Lossless.
- iv. 3NF is preserving dependency
But BCNF is not preserving dependency

7.

E-R Diagram



Professor(Employee_ID, Start_date, First, Last, Salary)

Professor_Email(Employee_ID, Email)

Section(Section_id, number, employee_ID, room)

Course(number, topic, name)

8. i) Relational Model

- Collection of tables to represent both data and the relationships among those data.
- Each table has multiple columns, and each column has a unique name
- Tables are also known as **relations**.

Entity-Relationship Model

- The entity-relationship (E-R) data model uses a collection of basic objects, called *entities*, and *relationships among these objects*.

Object-Based Data Model

- Extension of the E-R model with notions of encapsulation, methods (functions), and object identity.

- The object-relational data model combines features of the object-oriented data model and relational data model.
- ii) **Single valued Attributes** : An attribute, that has a single value for a particular entity. For example, age of a employee entity.
Multi valued Attributes : An attributes that may have multiple values for the same entity. For example colors of a car entity.
Compound /Composite Attribute : Attribute can be subdivided into two or more other Attribute. For Example, Name can be divided into First name, Middle name and Last name.
Derived Attribute : Attributes derived from other stored attribute. For example age from Date of Birth and Today's date.

violating Rule
of BCNF

$CH \rightarrow G$
 $A \rightarrow B, C$
 $B \rightarrow CFH$
 $E \rightarrow A$
 $F \rightarrow EG$

$CK = AD, BD, ED, FD$

$R_1(CHG)$
 $CH \rightarrow G$

$R_2(ABCDEFGHI)$
~~VRBCNF~~
 $A \rightarrow BC$
 $B \rightarrow CFH$
 $E \rightarrow A$
 $F \rightarrow EG$

$CK = AD$
 BD
 ED
 FD

$R_{21}(ABC)$

$R_{22}(ADEFH)$

~~VRBCNF~~
 $E \rightarrow A$
 $F \rightarrow E$
 $CK = DFH$

$R_{221}(EA)$
 $E \rightarrow A$

$R_{222}(DEFH)$

$F \rightarrow E$
 $CK = DFH$

$R_{2221}(FE)$
 $F \rightarrow E$

$R_{2222}(DFH)$

III) LOSSLESS

IV) IN CASE BCNF: NOT DEPENDENCY PRESERVING