Assignment 2

Relational Schema

Problem 1: **[20 marks]** Consider the below company database

EMPLOYEE

Fname	Minit	Lname	Ssn	Bdate	Address	Sex	Salary	Super_ssn	Dno
John	B	Smith	123456789	1965-01-09	731 Fondren, Houston, TX	M	30000	333445555	5
Franklin	T	Wong	333445555	1955-12-08	638 Voss, Houston, TX	M	40000	888665555	5
Alicia	J	Zelaya	999887777	1968-01-19	3321 Castle, Spring, TX	F	25000	987654321	4
Jennifer	S	Wallace	987654321	1941-06-20	291 Berry, Bellaire, TX	F	43000	888665555	4
Ramesh	K	Narayan	666884444	1962-09-15	975 Fire Oak, Humble, TX	M	38000	333445555	5
Joyce	A	English	453453453	1972-07-31	5631 Rice, Houston, TX	F	25000	333445555	5
Ahmad	V	Jabbar	987987987	1969-03-29	980 Dallas, Houston, TX	M	25000	987654321	4
James	E	Borg	888665555	1937-11-10	450 Stone, Houston, TX	M	55000	NULL	1

DEPARTMENT

Dname	Dnumber	Mgr_ssn	Mgr_start_date
Research	5	333445555	1988-05-22
Administration	4	987654321	1995-01-01
Headquarters	1	888665555	1981-06-19

DEPT_LOCATIONS

Dnumber	Dlocation
1	Houston
4	Stafford
5	Bellaire
5	Sugarland
5	Houston

WORKS_ON

Essn	Pno	Hours
123456789	1	32.5
123456789	2	7.5
666884444	3	40.0
453453453	1	20.0
453453453	2	20.0
333445555	2	10.0
333445555	3	10.0
333445555	10	10.0
333445555	20	10.0
999887777	30	30.0
999887777	10	10.0
987987987	10	35.0
987987987	30	5.0
987654321	30	20.0
987654321	20	15.0
888665555	20	NULL

PROJECT

Pname	Pnumber	Plocation	Dnum
ProductX	1	Bellaire	5
ProductY	2	Sugarland	5
ProductZ	3	Houston	5
Computerization	10	Stafford	4
Reorganization	20	Houston	1
Newbenefits	30	Stafford	4

DEPENDENT

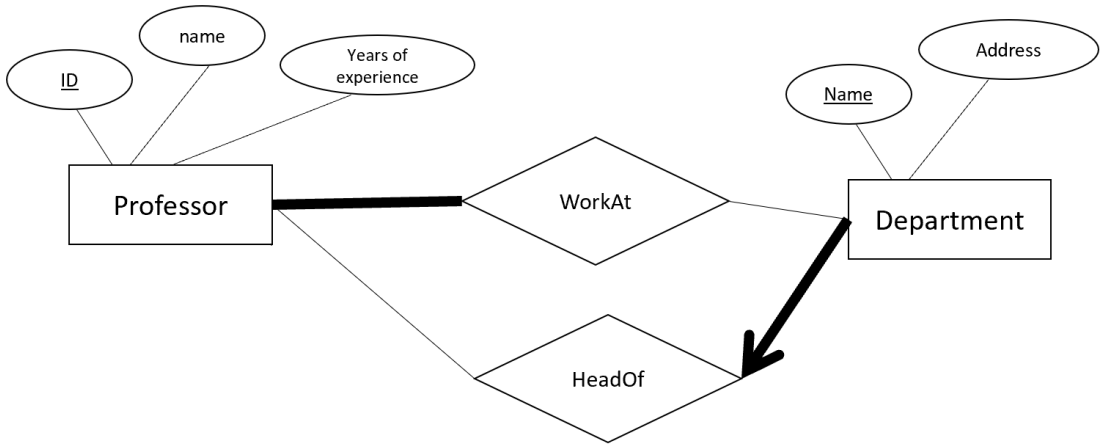
Essn	Dependent_name	Sex	Bdate	Relationship
333445555	Alice	F	1986-04-05	Daughter
333445555	Theodore	M	1983-10-25	Son
333445555	Joy	F	1958-05-03	Spouse
987654321	Abner	M	1942-02-28	Spouse
123456789	Michael	M	1988-01-04	Son
123456789	Alice	F	1988-12-30	Daughter
123456789	Elizabeth	F	1967-05-05	Spouse

Suppose each of the following operations are applied directly to the COMPANY database.

Operations	IC violated by operation. (Ex: no violation, referential integrity violation, key constraint violation etc)	Write different ways of enforcing these constraints.
1. Insert < 'Robert', 'F', 'Scott', '943775543', '21-JUN-42', '2365 Newcastle Rd, Bellaire, TX', M, 58000, '888665555', 1 > into EMPLOYEE.	No Violation	
2. Insert < 'ProductA', 4, 'Bellaire', 2 > into PROJECT.	Referential Integrity Violation	1. Reject the insertion unless singing up a new department location with Dnum = 2 2. add a new location with Dum = 2 in department_location table
3. Insert < 'Production', 4, '943775543', '01-OCT-88' > into DEPARTMENT.	Referential Integrity Violation	for referential, either ensure employee table has employee with ssn desired to insert or reject the insertion
4. Insert < '453453453', 'John', M, '12-DEC-60', 'SPOUSE' > into DEPENDENT.	No Violation	
5. Delete the WORKS_ON tuples with ESSN= '333445555'.	No Violation	
6. Delete the EMPLOYEE tuple with SSN= '987654321'.	Referential Integrity Violation	Restrict deletion - prevent deletion if we can find reference Cascade Deletion - using on delete cascade to delete all the records in all different tables

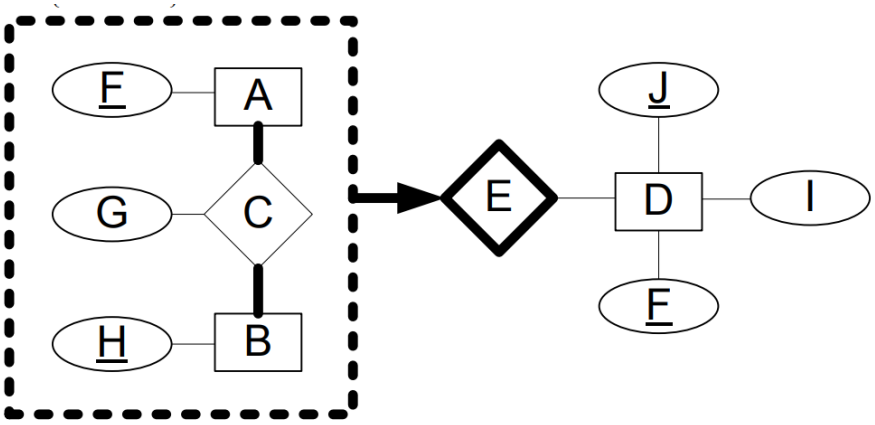
7.	Delete the PROJECT tuple with PNAME= 'ProductX'.	Referential Integrity Violation	Restrict deletion - prevent deletion if we can find reference Cascade Deletion - using on delete cascade to delete all the records in all different tables
8.	Modify the MGRSSN and MGRSTARTDATE of the DEPARTMENT tuple with DNUMBER=5 to '123456789' and '01-OCT-88', respectively.	No Violation	
9.	Modify the SUPERSSN attribute of the EMPLOYEE tuple with SSN= '999887777' to '943775543'.	Referential Integrity Violation	made 999887777 available (insert) in super_ssn
10.	Modify the HOURS attribute of the WORKS_ON tuple with ESSN= '999887777' and PNO= 10 to '5.0'.	No Violation	

Ques 2. **[10 marks]** Use the DDL to declare relational schema for below ERD. You should use appropriate domain values.



```
CREATE TABLE Professor(
   ID INT PRIMARY KEY,
   name VARCHAR(50),
   YearsExperience INT,
);

CREATE TABLE Department(
   Name VARCHAR(50) PRIMARY KEY,
   Address VARCHAR(50),
 );

CREATE TABLE WorkAt (

   Prof_ID INT,
   Dept_Name VARCHAR(50),
   PRIMARY KEY (Prof_ID, Dept_Name),
   FOREIGN KEY (Prof_ID) REFERENCES Professor(ID) ON DELETE CASCADE,
   FOREIGN KEY (Dept_Name) REFERENCES Department(Name) ON DELETE CASCADE
);

CREATE TABLE HeadOf (
   Prof_ID INT UNIQUE,
   Dept_Name VARCHAR(50) UNIQUE,
   PRIMARY KEY (Dept_Name),
   FOREIGN KEY (Prof_ID) REFERENCES Professor(ID) ON DELETE SET NULL,
   FOREIGN KEY (Dept_Name) REFERENCES Department(Name) ON DELETE CASCADE
);
```

Ques 3. **[10 marks]** Translate ERD to Relational Model. Underline the PK and bold the FKs. No SQL is required.



A (F)

B (H)

D (F J I)

C (
G
PRIMARY KEY (A, B),
FOREIGN KEY (A) REFERENCES A(A), FOREIGN KEY (B) REFERENCES B(B)
)

E (
D
PRIMARY KEY (A, B, D),
FOREIGN KEY (A) REFERENCES A(A), FOREIGN KEY (B) REFERENCES B(B), FOREIGN KEY (D) REFERENCES D(D)
)