**Instructions:**

**In a word document, answer the following questions.**

**Keep question in the exact order they are listed in.**

**Questions should be in bold font.**

**Answers should be in non-bold font.**

**All questions are worth the same points**

**Question 1 (CHAPTER 5) Suppose each of the following Update operations is applied directly to the following database. Discuss *all* integrity constraints violated by each operation, if any, and the different ways of enforcing these constraints:**

**(a) Insert < 'Robert', 'F', 'Scott', '943775543', '21-JUN-42', '2365 Newcastle Rd,**

**Bellaire, TX', M, 58000, '888665555', 1 > into EMPLOYEE.**

The form of birthday could cause an error, or it could be converted to the proper form accepted by the table. This would be the only error.

**(b) Insert < 'ProductA', 4, 'Bellaire', 2 > into PROJECT.**

There is no department 2. To fix this, just change it to a different department number.

**(c) Insert < 'Production', 4, '943775543', '01-OCT-88' > into DEPARTMENT.**

Dnumber 4 is already taken, and it should be unique. To fix this, change the tuple to have a different Dnumber. Possibly the birthday error as with part (a).

**(d) Insert < '677678989', null, '40.0' > into WORKS\_ON.**

The Pno can’t be null because it’s a primary key.

**(e) Insert < '453453453', 'John', M, '12-DEC-60', 'SPOUSE' > into DEPENDENT.**

This works, unless, again, the birthday thing.

**(f) Delete the WORKS\_ON tuples with ESSN= '333445555'.**

This works as there is nothing depending on this tuple.

**(g) Delete the EMPLOYEE tuple with SSN= '987654321'.**

As there are tuples in different tables dependent on this tuple, it can’t be deleted unless cascaded.

**(h) Delete the PROJECT tuple with PNAME= 'ProductX'.**

Works\_on references this tuple, so it can’t be deleted.

**(i) Modify the MGRSSN and MGRSTARTDATE of the DEPARTMENT tuple with DNUMBER=5 to '123456789' and '01-OCT-88', respectively.**

That seems fine to do.

**(j) Modify the SUPERSSN attribute of the EMPLOYEE tuple with SSN= '999887777' to**

**'943775543'.**

It’s fine, but it seems bad since the new SSN isn’t a manager of the departments.

**(k) Modify the HOURS attribute of the WORKS\_ON tuple with ESSN= '999887777' and**

**PNO= 10 to '5.0'.**

That’s all good because nothing references Hours.

**3 tables list tuples under Employee, Department and Department locations.
Table 1 titled, employee has 8 rows and 9 columns. The columns have the following headings from left to right. F name, M i n i t, L name, S s n, B date, Address, Sex, Salary, Super s s n, D n o. The row entries are as follows. Row 1. F name, John. M i n i t, B. L name, Smith. S s n, 123 45 6789. B date, 19 65 01 09. Address, 731 Fondren, Houston, T X. Sex, M. Salary, 30,000. Super s s n, 333 44 5555. D n o, 5. Row 2. F name, Franklin. M i n i t, T. L name, Wong. S s n, 333 44 5555. B date, 19 55 12 08. Address, 638 Voss, Houston, T X. Sex, M. Salary, 40,000. Super s s n, 888 66 5555. D n o, 5. Row 3. F name, Alicia. M i n i t, J. L name, Zelaya. S s n, 999 88 7777. B date, 19 68 01 19. Address, 3321 Castle, Spring, T X. Sex, F. Salary, 25,000. Super s s n, 987 65 4321. D n o, 4. Row 4. F name, Jennifer. M i n i t, S. L name, Wallace. S s n, 987 65 4321. B date, 19 41 06 20. Address, 291 Berry, Bellaire, TX. Sex, F. Salary, 43,000. Super s s n, 888 66 5555. D n o, 4. Row 5. F name, Ramesh. M i n i t, K. L name, Narayan. S s n, 666 88 4444. B date, 19 62 09 15. Address, 975 Fire Oak, Humble, TX. Sex, M. Salary, 38,000. Super s s n, 333 44 5555. D n o, 5. Row 6. F name, Joyce. M i n i t, A. L name, English. S s n, 453 45 3453. B date, 19 72 07 31. Address, 5631 Rice, Houston, TX. Sex, F. Salary, 25,000. Super s s n, 333 44 5555. D n o, 5. Row 7. F name, Ahmad. M i n i t, V. L name, Jabbar. S s n, 888 66 5555. B date, 19 69 03 29. Address, 980 Dallas, Houston, TX. Sex, M. Salary, 25,000. Super s s n, 987 65 4321. D n o, 4. Row 8. F name, James. M i n i t, E. L name, Borg. S s n, 987 98 7987. B date, 19 37 11 10. Address, 450 Stone, Houston, T X. Sex, M. Salary, 55,000. Super s s n, NULL. D n o, 1. Table 2 titled, Department has 3 rows and 3 columns. The columns have the following headings from left to right. D name, D number, M g r s s n, M g r start date. The row entries are as follows. Row 1. D name, Research. D number, 5. M g r s s n, 333 44 5555. M g r start date, 19 88 05 22. Row 2. D name, Administration. D number, 4. M g r s s n, 987 65 4321. M g r start date, 19 95 01 01. Row 3. D name, Headquarters. D number, 1. M g r s s n, 888 66 5555. M g r start date, 19 81 06 19. Table 3 titled, DEPT LOCATIONS has 5 rows and 2 columns. The columns have the following headings from left to right. D number, D locations. The row entries are as follows. Row 1. D number, 1. D locations, Houston. Row 2. D number, 4. D locations, Stafford. Row 3. D number, 5. D locations, Bellaire. Row 4. D number, 5. D locations, Sugarland. Row 5. D number, 5. D locations, Houston.**

**3 tables list the database of the entities Works ON, Project and Dependent. Table 1 titled, WORKS ON. The Table has 16 rows and 3 columns. The columns have the following headings from left to right. E s s n, P n o, Hours. The row entries are as follows. Row 1. E s s n, 123 45 6789. P n o, 1. Hours, 32.5. Row 2. E s s n, 123 45 6789. P n o, 2. Hours, 7.5. Row 3. E s s n, 666 88 4444. P n o, 3. Hours, 40.0. Row 4. E s s n, 453 45 3453. P n o, 1. Hours, 20.0. Row 5. E s s n, 453 45 3453. P n o, 2. Hours, 20.0. Row 6. E s s n, 333 44 5555. P n o, 2. Hours, 10. Row 7. E s s n, 333 44 5555. P n o, 3. Hours, 10. Row 8. E s s n, 333 44 5555. P n o, 10. Hours, 10. Row 9. E s s n, 333 44 5555. P n o, 20. Hours, 10. Row 10. E s s n, 999 88 7777. P n o, 30. Hours, 30. Row 11. E s s n, 999 88 7777. P n o, 10. Hours, 10. Row 12. E s s n, 987 98 7987. P n o, 10. Hours, 35. Row 13. E s s n, 987 98 7987. P n o, 30. Hours, 5. Row 14. E s s n, 987 65 4321. P n o, 30. Hours, 20. Row 15. E s s n, 987 65 4321. P n o, 20. Hours, 15. Row 16. E s s n, 888 66 5555. P n o, 20. Hours, NULL. Table 2 titled, Project. The Table has 6 rows and 3 columns. The columns have the following headings from left to right. P name, P number, P location, D n u m. The row entries are as follows. Row 1. P name, Product X. P number, 1. P location, Bellaire. D n u m, 5. Row 2. P name, Product Y. P number, 2. P location, Sugarland. D n u m, 5. Row 3. P name, Product Z. P number, 3. P location, Houston. D n u m, 5. Row 4. P name, Computerization. P number, 10. P location, Stafford. D n u m, 4. Row 5. P name, Reorganization. P number, 20. P location, Houston. D n u m, 1. Row 6. P name, New benefits. P number, 30. P location, Stafford. D n u m, 4. Table 3 titled, Dependent. The Table has 7 rows and 4 columns. The columns have the following headings from left to right. E s s n, Dependent name, sex, B date, Relationship. The row entries are as follows. Row 1. E s s n, 333 44 5555. Dependent name, Alice. sex, F. B date, 19 86 04 05. Relationship, Daughter. Row 2. E s s n, 333 44 5555. Dependent name, Theodore. sex, M. B date, 19 83 10 25. Relationship, Son. Row 3. E s s n, 333 44 5555. Dependent name, Joy. sex, F. B date, 19 58 05 03. Relationship, Spouse. Row 4. E s s n, 987 65 4321. Dependent name, Abner. sex, M. B date, 19 42 02 28. Relationship, Spouse. Row 5. E s s n, 123 45 6789. Dependent name, Michael. sex, M. B date, 19 88 01 04. Relationship, Son. Row 6. E s s n, 123 45 6789. Dependent name, Alice. sex, F. B date, 19 42 12 30. Relationship, Daughter. Row 7. E s s n, 123 45 6789. Dependent name, Elizabeth. sex, F. B date, 19 67 05 05. Relationship, Spouse.**

**Question 2 (CHAPTER 5) Consider the AIRLINE relational database schema shown in the following figure, which describes a database for airline flight information. Each FLIGHT is identified by a flight NUMBER, and consists of one or more FLIGHT\_LEGs with LEG\_NUMBERs 1, 2, 3, etc. Each leg has scheduled arrival and departure times and airports, and has many LEG\_INSTANCEs--one for each DATE on which the flight travels. FARES are kept for each flight. For each leg instance, SEAT\_RESERVATIONs are kept, as is the AIRPLANE used in the leg, and the actual arrival and departure times and airports. An AIRPLANE is identified by an AIRPLANE\_ID, and is of a particular AIRPLANE\_TYPE. CAN\_LAND relates AIRPLANE\_TYPEs to the AIRPORTs in which they can land. An AIRPORT is identified by an AIRPORT\_CODE. Consider an update for the AIRLINE database to enter a reservation on a particular flight or flight leg on a given date.**

**(a) Give the operations for this update.**

If you insert a tuple into the SEAT\_RESERVATION table, then it should be okay. Without having more information, it’s difficult to make a specific insert query.

**(b) What types of constraints would you expect to check?**

I think Seat\_number would have to check against LEG\_INSTANCE for Number\_of\_available\_seats, Flight\_number, Leg\_number, and Date.

It also wouldn’t hurt to keep the seat numbers unique, if possible since it’s already a primary key.

**(c) Which of these constraints are key, entity integrity, and referential integrity constraints and which are not?**

Key – The candidate keys are Flight\_number, Leg\_number, Date, and Seat\_number. I’d pick Leg\_number as the primary key.

Entity Integrity (no null primary keys) – would have to apply to all of them. If any of the values were NULL, then there would be an issue with booking and the person could be placed on the wrong flight.

Referential Integrity (consistency among referenced tuples) – would have to check for the consistency of Flight\_number, Leg\_number, and Date in LEG\_INSTANCE to be sure that the information doesn’t get crossed with a different flight.

**(d) Specify all the referential integrity constraints on the figure.**

Airport\_code is a Foreign Key (FK) of AIRPORT in CAN\_LAND.

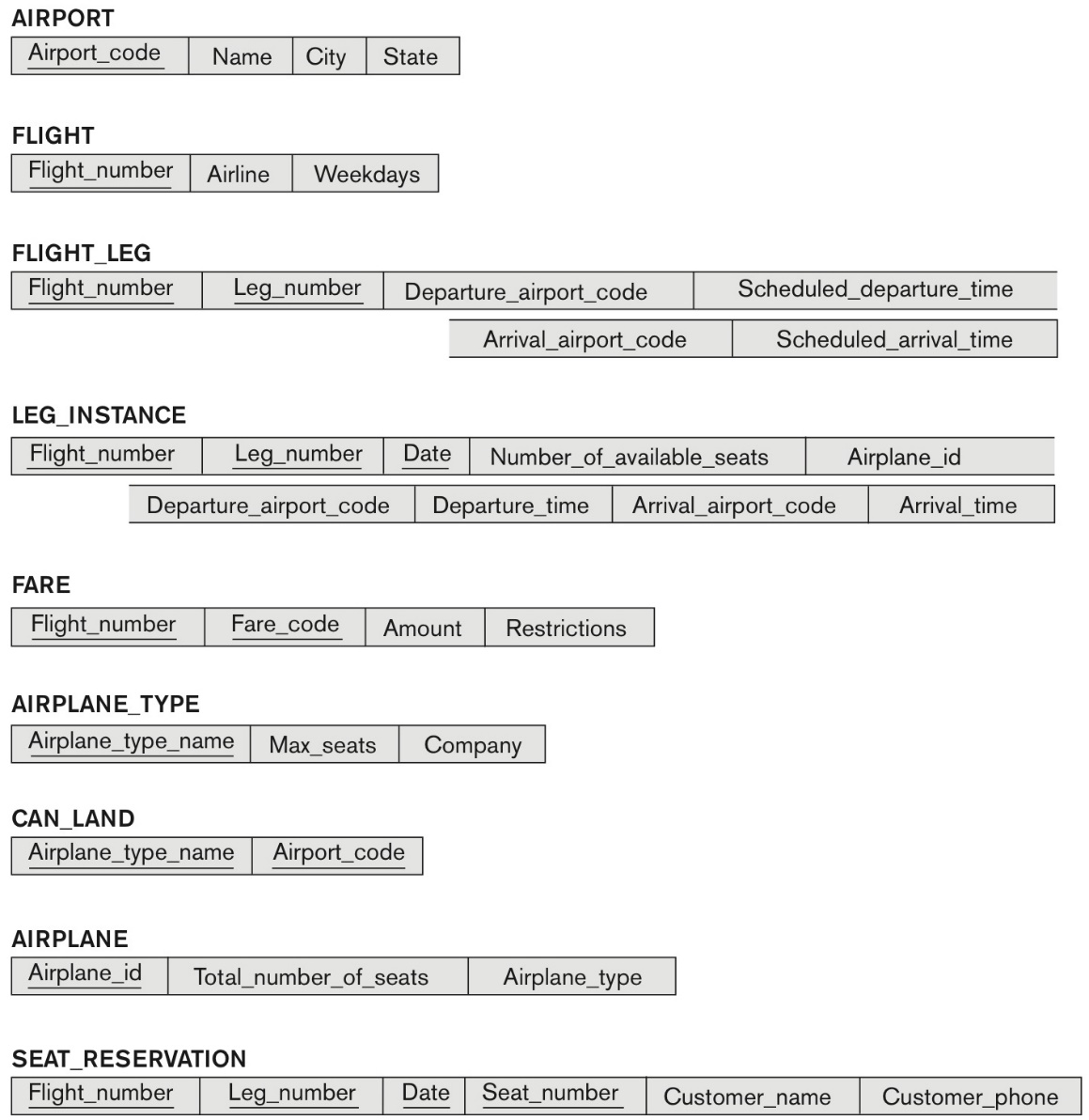
Flight\_number is an FK of FLIGHT in FLIGHT\_LEG, LEG\_INSTANCE, FARE, and SEAT\_RESERVATION.

Leg\_number is FK of FLIGHT\_LEG in LEG\_INSTANCE and SEAT\_RESERVATION.

Date is an FK of LEG\_INSTANCE in SEAT\_RESERVATIONS.

Airplane\_type\_name is an FK of AIRPLANE\_TYPE in CAN\_LAND.

Airplane\_id is an FK of LEG\_INSTANCE for AIRPLANE.

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