

Name:- Stewart DulaneyId#:- 1545566Part A:- Multiple Choice

[10 Points]

Circle the letter of the best choice.

1. The maintenance and evolution phase of the Database Life Cycle (DBLC) involves \_\_\_\_.
  - a) Defining objectives
  - b) introducing changes
  - c) testing the database
  - d) installing the DBMS
  
2. At the implementation level, the supertype and its subtype(s) depicted in a specialization hierarchy maintain a(n) \_\_\_\_ relationship.
  - a) self-referencing
  - b) 1:1
  - c) 1:M
  - d) M:N
  
3. In the context of the database design process, the conceptual design step that determines end-user views, outputs, and transaction-processing requirements is \_\_\_\_.
  - a) data analysis and requirements
  - b) entity relationship modeling and normalization
  - c) data model verification
  - d) distributed database design
  
4. A table that has all key attributes defined, has no repeating groups, and all its attributes are dependent on the primary key is said to be in \_\_\_\_.
  - a) 1NF
  - b) 2NF
  - c) 3NF
  - d) 4NF
  
5. Which query is used to list a unique value for V\_CODE, where the list will produce only a list of those values that are different from one another?

a) SELECT ONLY V_CODE FROM PRODUCT;	b) SELECT UNIQUE V_CODE FROM PRODUCT;
c) SELECT DIFFERENT V_CODE FROM PRODUCT;	<input checked="" type="radio"/> d) SELECT DISTINCT V_CODE FROM PRODUCT;

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6. If a table has multiple candidate keys and one of those candidate keys is a composite key, the table can have \_\_\_\_\_ based on this composite candidate key even when the primary key chosen is a single attribute.
- a) Boyce-Codd normal forms
  - b) Redundancies
  - c) time-variances
  - d) partial dependencies
7. A(n) \_\_\_\_\_ exists when there are functional dependencies such that Y is functionally dependent on X, Z is functionally dependent on Y, and X is the primary key.
- a) partial dependency
  - b) repeating group
  - c) atomic attribute
  - d) transitive dependency
8. In the context of the database design process, the conceptual design step that defines the fragmentation and allocation strategy is \_\_\_\_\_. must be able to guarantee unique attribute values.
- a) database analysis and requirements
  - b) ER modeling and normalization
  - c) data model verification
  - d) distributed database design
9. The syntax for a left outer join is \_\_\_\_\_.
- a) SELECT column-list  
FROM table1 OUTER JOIN table2 LEFT  
WHERE join-condition
  - b) SELECT column-list  
FROM table1 LEFT [OUTER] JOIN table2  
ON join-condition
  - c) SELECT column-list  
WHERE LEFT table1 = table
  - d) SELECT column-list  
FROM table1 LEFT table2 [JOIN]  
WHERE join-condition
10. How many rows would be returned from a cross join of tables A and B, if A contains 8 rows and B contains 18?
- a) 8
  - b) 18
  - c) 26
  - d) 144

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**Part B**:- Answer all 3 questions in spaces provided. Write all answers in spaces provided.

**Question 1:-**

[10 Points]

The ABC Car Service & Repair Centers are owned by the SILENT car dealer; ABC services and repairs only SILENT cars. Three ABC Car Service & Repair Centers provide service and repair for the entire state.

- Each of the three centers is independently managed and operated by a shop manager, a receptionist, and at least eight mechanics. Each center maintains a fully stocked parts inventory.
- Each center also maintains a manual file system in which each car's maintenance history is kept: repairs made, parts used, costs, service dates, owner, and so on. Files are also kept to track inventory, purchasing, billing, employees' hours, and payroll.
- You have been contacted by the manager of one of the centers to design and implement a computerized system. Given the preceding information, do the following:-

Indicate the most appropriate sequence of activities by labeling each of the following steps in the correct order. (For example, if you think that "Load the database." is the appropriate first step, label it "1.")

- 7 Normalize the conceptual model.
- 3 Obtain a general description of company operations.
- 9 Load the database.
- 4 Create a description of each system process.
- 11 Test the system.
- 6 Draw a data flow diagram and system flowcharts.
- 5 Create a conceptual model, using ER diagrams.
- 10 Create the application programs.
- 2 Interview the mechanics.
- 8 Create the file (table) structures.
- 1 Interview the shop manager.

Name:- Stewart DulaneyId#:- 1545566Question 2:-

[40 Points]

The table structure shown below contains many unsatisfactory components and characteristics. For example, there are several multivalued attributes, naming conventions are violated, and some attributes are not atomic.

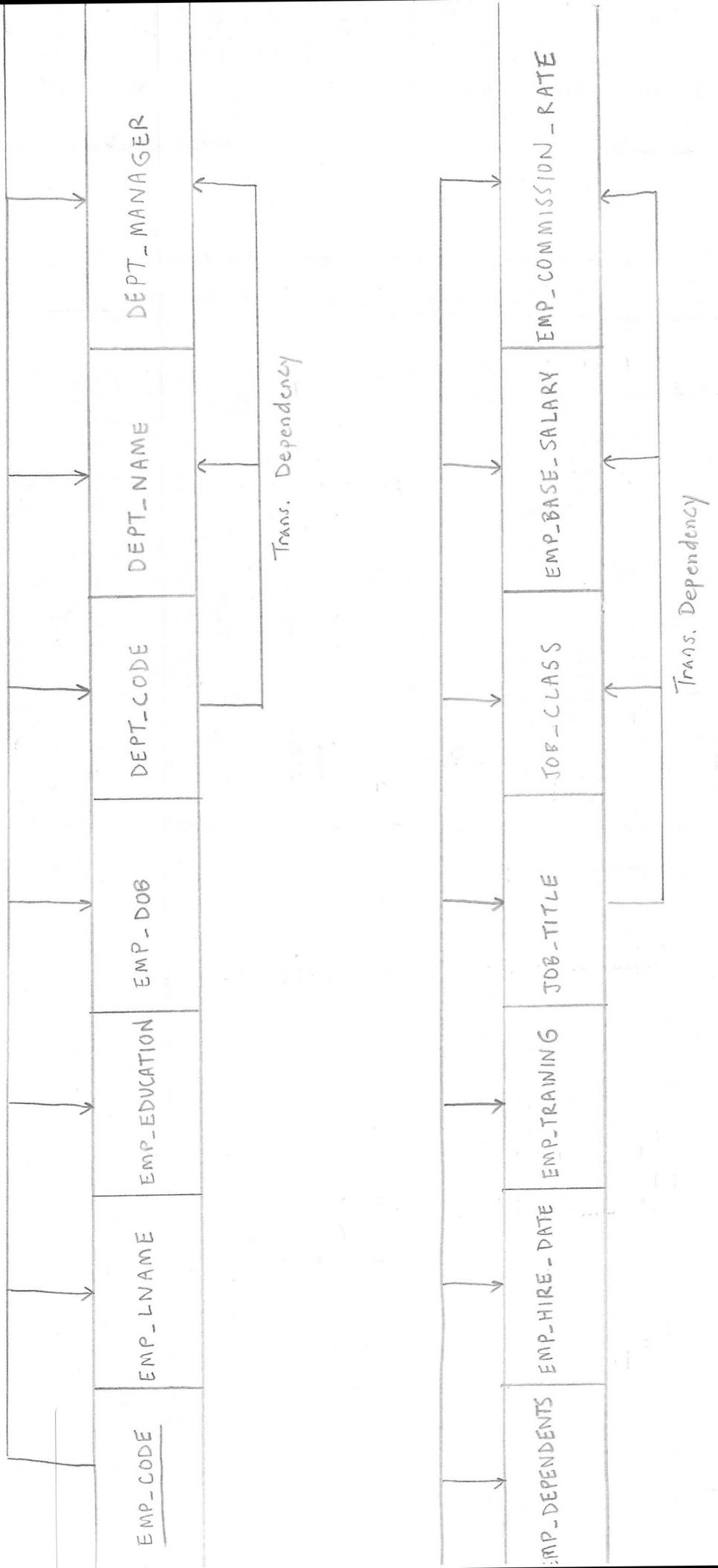
EMP_NUM	EMP_CODE	1003	1018	1019	1023
EMP_LNAME	Willaker	Smith	McGuire	McGuire	
EMP_EDUCATION	BBA, MBA	BBA		BS, MS, Ph.D.	
JOB_CLASS	SLS	SLS	JNT	DBA	
EMP_DEPENDENTS	Gerald (spouse), Mary (daughter), John (son)		JoAnne (spouse)	George (spouse) Jill (daughter)	
DEPT_CODE	MKTG	MKTG	SVC	INFS	
DEPT_NAME	Marketing	Marketing	General Service	Info. Systems	
DEPT_MANAGER	Jill H. Martin	Jill H. Martin	Hank B. Jones	Carlos G. Ortez	
EMP_TITLE	Sales Agent	Sales Agent	Janitor	DB Admin	
EMP_DOB	23-Dec-1968	28-Mar-1979	18-May-1982	20-Jul-1959	
EMP_HIRE_DATE	14-Oct-1997	15-Jan-2006	21-Apr-2003	15-Jul-1999	
EMP_TRAINING	L1, L2	L1	L1	L1, L3, L8, L15	
EMP_BASE_SALARY	\$38,255.00	\$30,500.00	\$19,750.00	\$127,900.00	
EMP_COMMISSION_RATE	0.015	0.010			

- a) Given the structure shown above, write the relational schema and draw its dependency diagram.

Label all transitive and/or partial dependencies.

[10 Points]

EMPLOYEE ( EMP\_CODE, EMP\_LNAME, EMP\_EDUCATION, JOB\_CLASS,  
 EMP\_DEPENDENTS, DEPT\_CODE, DEPT\_NAME, DEPT\_MANAGER, EMP\_TITLE,  
 EMP\_DOB, EMP\_HIRE\_DATE, EMP\_TRAINING, EMP\_BASE\_SALARY,  
 EMP\_COMMISSION\_RATE )



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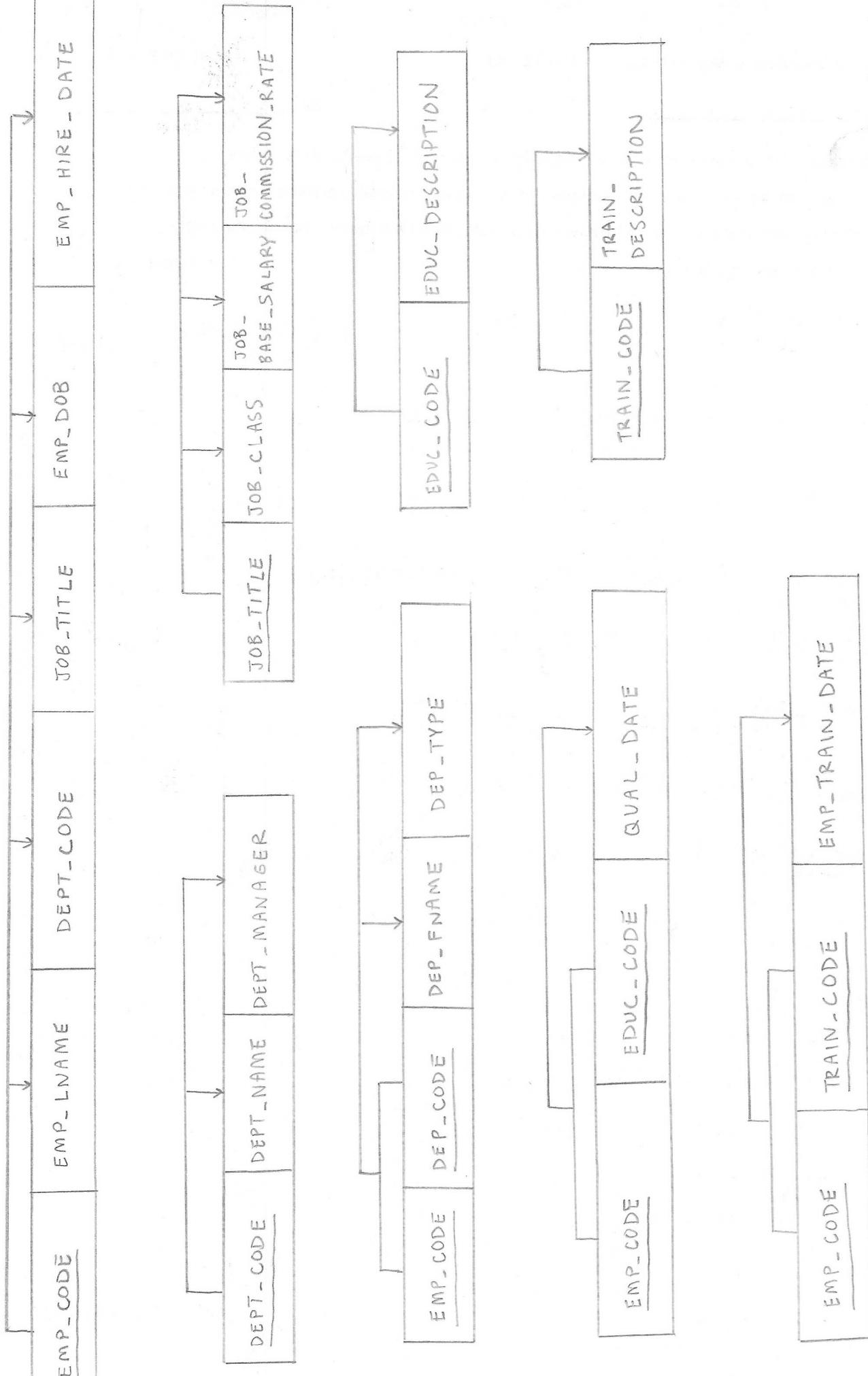
- b) Draw the dependency diagrams that are in 3NF. (Hint: You might have to create a few new attributes. Also make sure that the new dependency diagrams contain attributes that meet proper design criteria; that is, make sure that there are no multivalued attributes, that the naming conventions are met, and so on.)

[10 Points]

EMPLOYEE (EMP\_CODE, EMP\_LNAME, DEPT\_CODE, JOB\_TITLE, EMP\_DOB, EMP\_HIRE\_DATE)DEPARTMENT (DEPT\_CODE, DEPT\_NAME, DEPT\_MANAGER)JOB (JOB\_TITLE, JOB\_CLASS, JOB\_BASE\_SALARY, JOB\_COMMISSION\_RATE)DEPENDENT (EMP\_CODE, DEP\_CODE, DEP\_TYPE, DEP\_FNAME)EDUCATION (EDUC\_CODE, EDUCATION, DESCRIPTION)QUALIFICATION (EMP\_CODE, EDUC\_CODE, QUAL\_DATE)TRAINING (TRAIN\_CODE, TRAIN\_DESCRIPTION)EMP\_TRAINING (EMP\_CODE, TRAIN\_CODE, EMP\_TRAIN\_DATE)

Note the following:

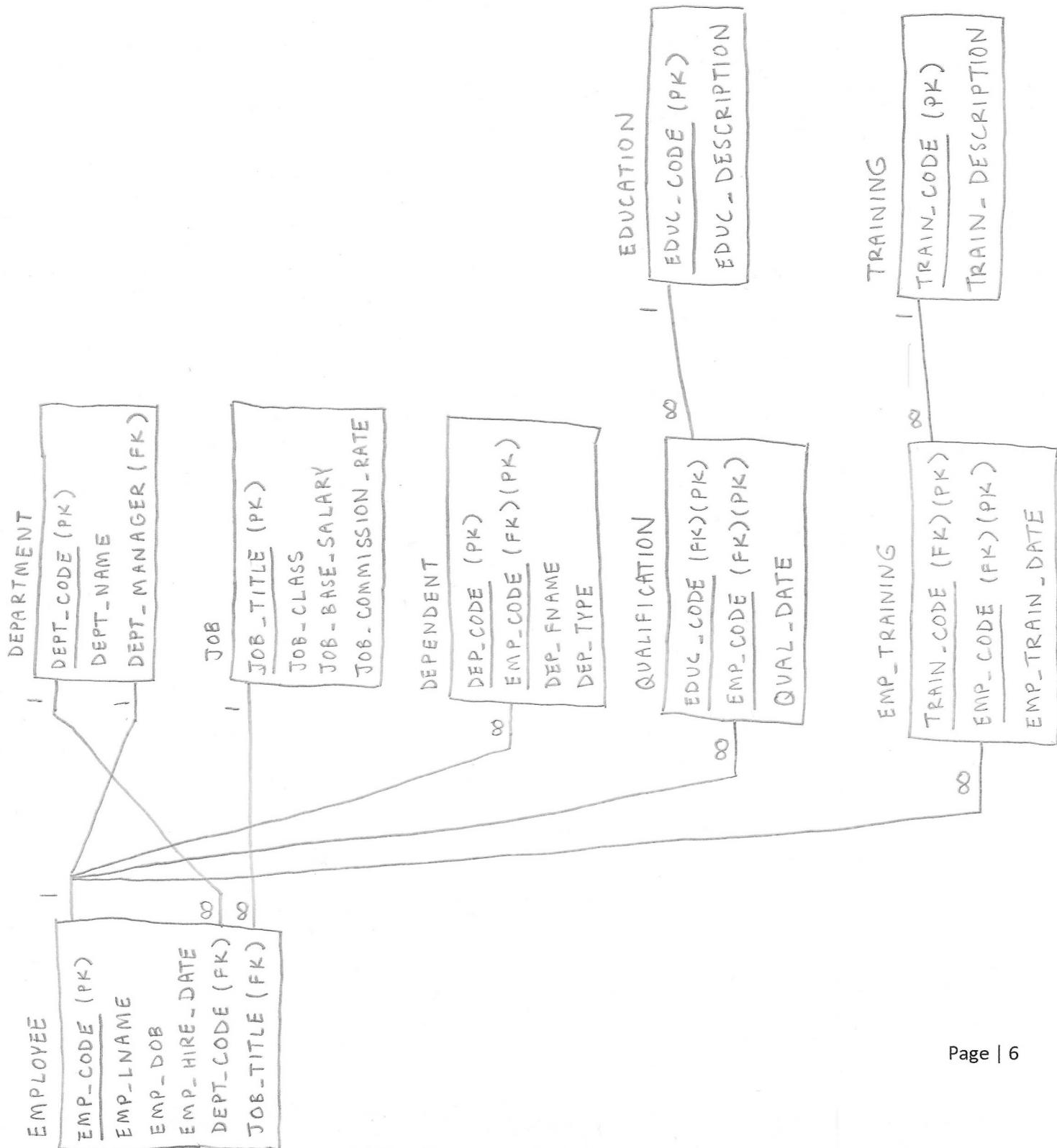
- Given the sample data, the multivalued attributes in the original table structure are EMP\_EDUCATION, EMP\_DEPENDENTS, and EMP\_TRAINING. We will break these multivalued attributes as well as the transitive dependencies off into new tables in order to produce dependency diagrams that are in 3NF.



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c) Draw the relational diagram.

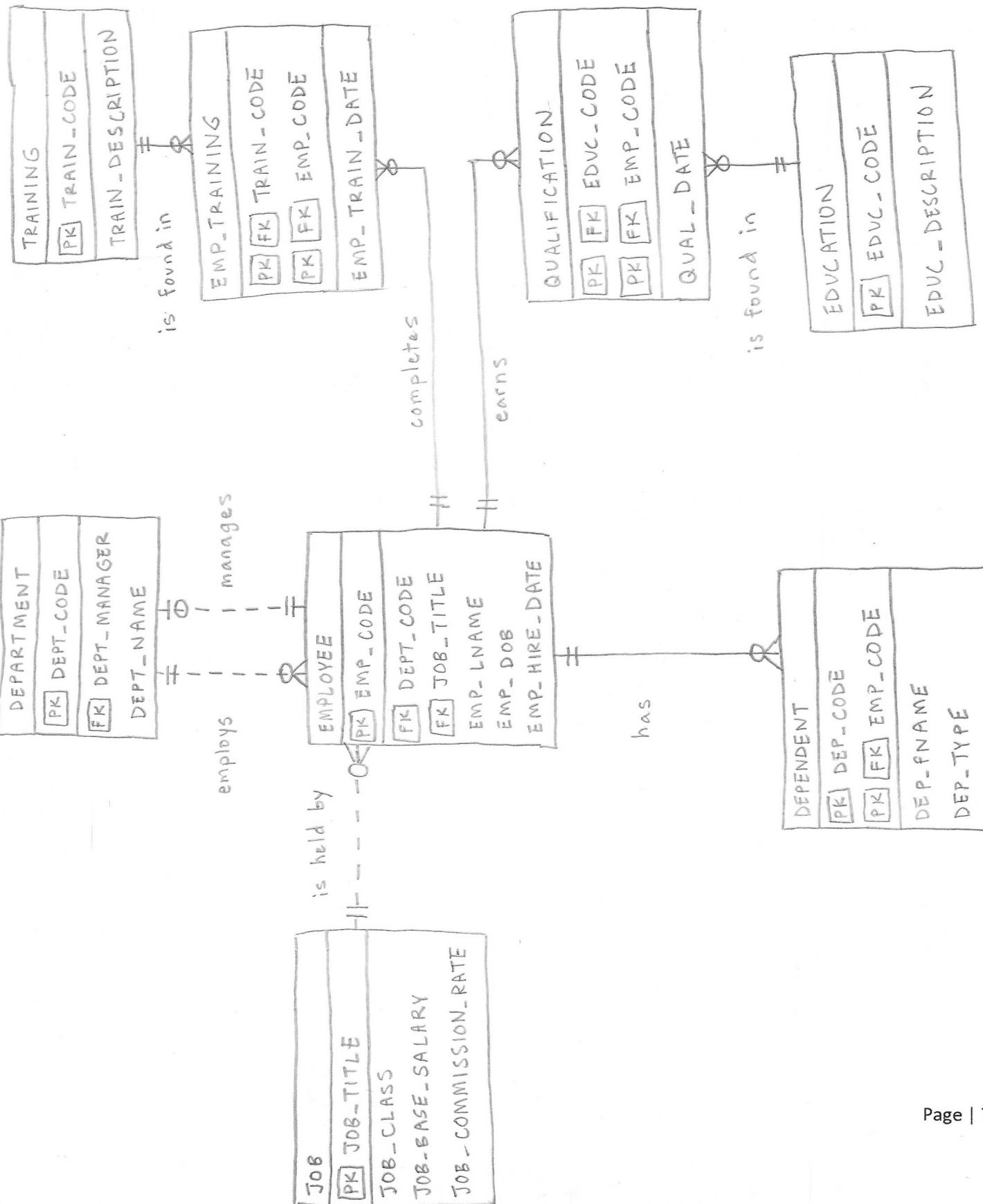
[10 Points]



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d) Draw the Crow's Foot ERD.

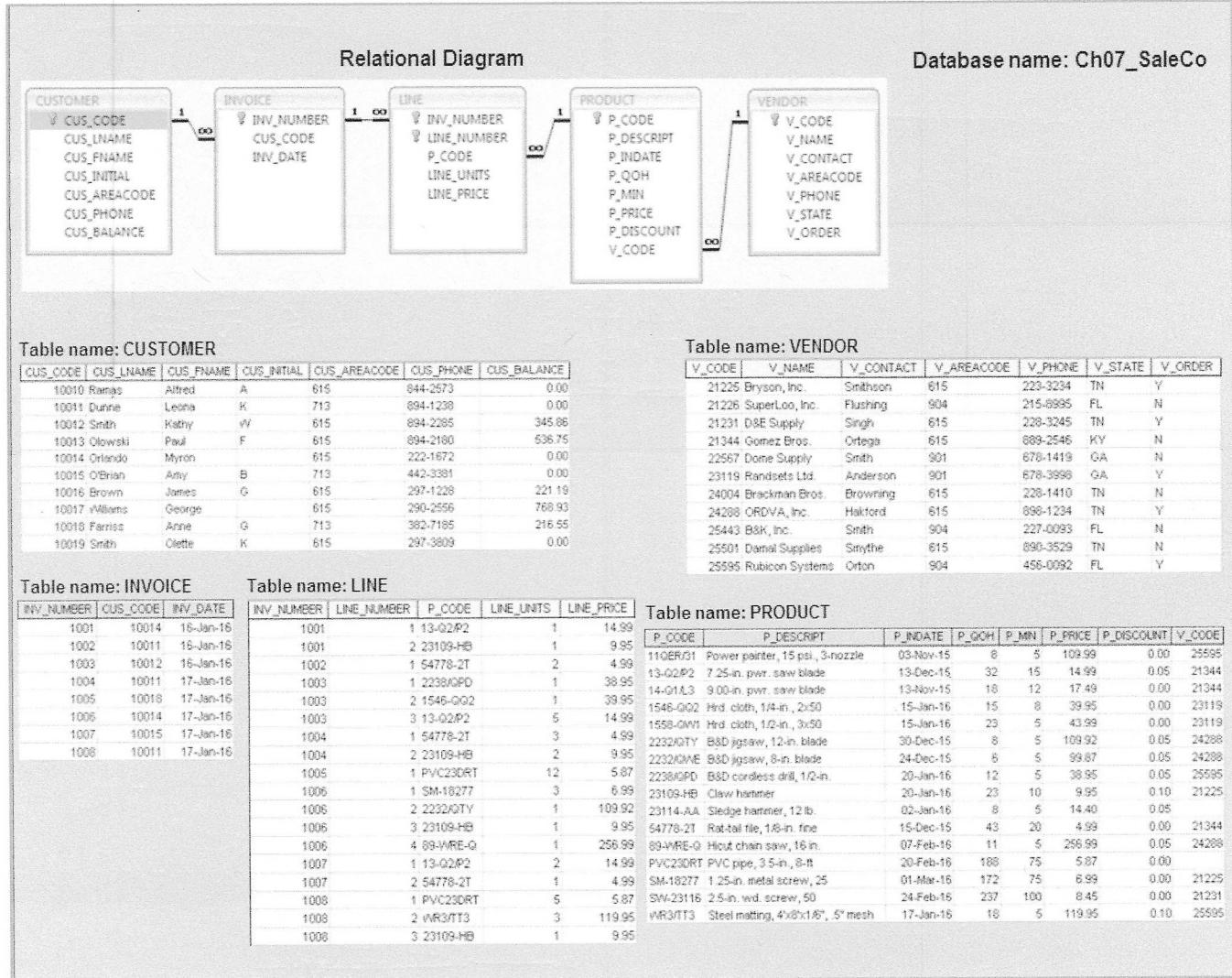
[10 Points]



Name:- Stewart DulaneyId#:- 1545566Question 3:-

[20 Points]

Use the tables below to answer parts (a) to (e) below.



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- a) Write a query to
- count
- the number of invoices.

[3 Points]

```
SELECT COUNT(*) FROM INVOICE;
```

- b) Write a query to
- count
- the number of customers with a customer balance over \$500. [5 Points]

```
SELECT COUNT(*)
FROM CUSTOMER
WHERE CUS-BALANCE > 500;
```

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- c) Generate a listing of all purchases made by the customers, using the output shown in the Figure below as your guide. (Hint: Use the ORDER BY clause to order the resulting rows as shown)

[6 Points]

CUS_CODE	INV_NUMBER	INV_DATE	P_DESCRPT	LINE_UNITS	LINE_PRICE
10011	1002	16-Jan-16	Rat-tail file, 1/8-in. fine	2	4.99
10011	1004	17-Jan-16	Claw hammer	2	9.95
10011	1004	17-Jan-16	Rat-tail file, 1/8-in. fine	3	4.99
10011	1008	17-Jan-16	Claw hammer	1	9.95
10011	1008	17-Jan-16	PVC pipe, 3.5-in., 8-ft	5	5.87
10011	1008	17-Jan-16	Steel matting, 4'x8'x1/6", .5" mesh	3	119.95
10012	1003	16-Jan-16	7.25-in. pwr. saw blade	5	14.99
10012	1003	16-Jan-16	B&D cordless drill, 1/2-in.	1	38.95
10012	1003	16-Jan-16	Hrd. cloth, 1/4-in., 2x50	1	39.95
10014	1001	16-Jan-16	7.25-in. pwr. saw blade	1	14.99
10014	1001	16-Jan-16	Claw hammer	1	9.95
10014	1006	17-Jan-16	1.25-in. metal screw, 25	3	6.99
10014	1006	17-Jan-16	B&D jigsaw, 12-in. blade	1	109.92
10014	1006	17-Jan-16	Claw hammer	1	9.95
10014	1006	17-Jan-16	Hicut chain saw, 16 in.	1	256.99
10015	1007	17-Jan-16	7.25-in. pwr. saw blade	2	14.99
10015	1007	17-Jan-16	Rat-tail file, 1/8-in. fine	1	4.99
10018	1005	17-Jan-16	PVC pipe, 3.5-in., 8-ft	12	5.87

```

SELECT INVOICE.CUS_CODE, INVOICE. INV_NUMBER, INVOICE. INV_DATE,
       PRODUCT. P_DESCRPT, LINE. LINE_UNITS, LINE. LINE_PRICE
  FROM CUSTOMER, INVOICE, LINE, PRODUCT
 WHERE CUSTOMER.CUS_CODE = INVOICE.CUS_CODE
   AND INVOICE. INV_NUMBER = LINE. INV_NUMBER
   AND PRODUCT. P_CODE = LINE. P_CODE
 ORDERBY INVOICE.CUS_CODE, INVOICE. INV_NUMBER, PRODUCT. P_DESCRPT;

```

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- d) List the balance characteristics of the customers who have made purchases during the current invoice cycle—that is, for the customers who appear in the INVOICE table. The results of this query are shown below. [6 Points]

CUS_CODE	CUS_BALANCE
10011	0.00
10012	345.86
10014	0.00
10015	0.00
10018	216.55

```
SELECT CUS_CODE, CUS_BALANCE  
FROM CUSTOMER  
WHERE CUSTOMER.CUS_CODE IN (SELECT DISTINCT CUS_CODE FROM INVOICE);
```