

### Problem Set 3

Total – 37.5 Points

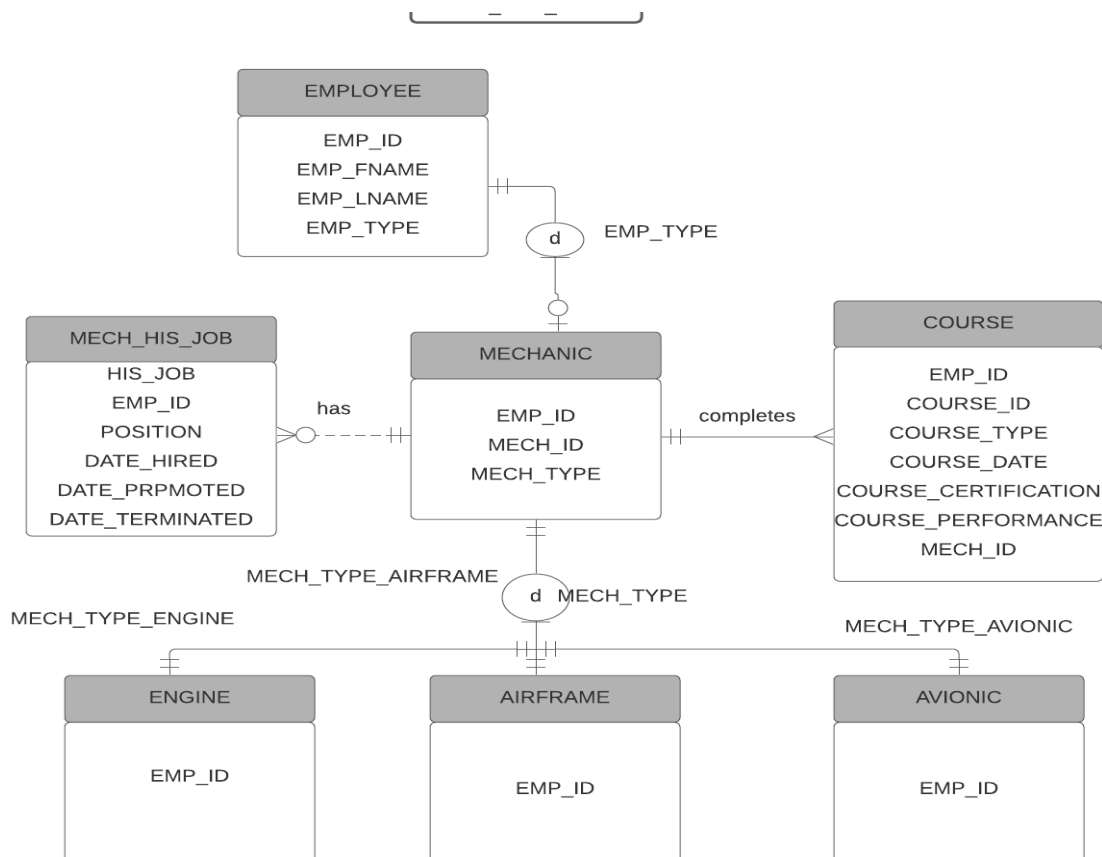
Instructions:- This Problem Set covers materials from Chapters 4, 5 and 6.

- For Problems that require explanations, create space below the question and write your answers.
- For drawing type problems, you can use MS Word, Lucid Charts, ERD Plus or Visio. Refer to Problem Set 1 for links to access Lucid Charts, ERD Plus or Visio. Be sure to name your files appropriately.

#### Problem 1:-

[10 Points]

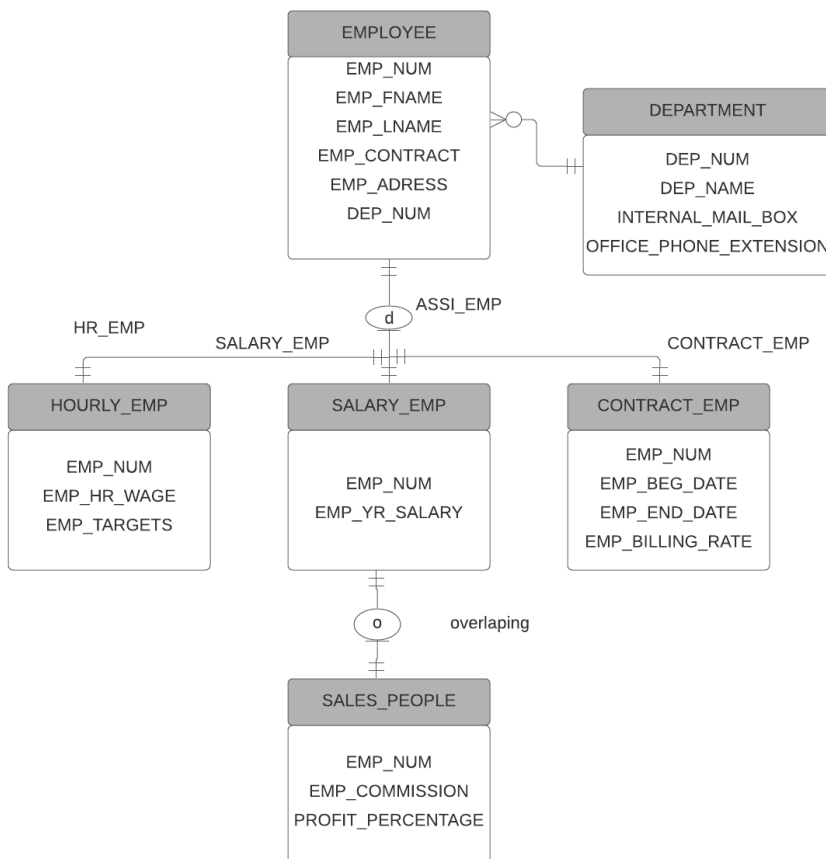
The FlyRight Aircraft Maintenance (FRAM) division of the FlyRight Company (FRC) performs all maintenance for FRC's aircraft. Produce a data model segment that reflects the following business rules: All mechanics are FRC employees. Not all employees are mechanics. Some mechanics are specialized in engine (EN) maintenance. Some mechanics are specialized in airframe (AF) maintenance. Some mechanics are specialized in avionics (AV) maintenance. (Avionics are the electronic components of an aircraft that are used in communication and navigation.) All mechanics take periodic refresher courses to stay current in their areas of expertise. FRC tracks all courses taken by each mechanic—date, course type, certification (Y/N), and performance. FRC keeps a history of the employment of all mechanics. The history includes the date hired, date promoted, date terminated, and so on. (Note: The “and so on” component is, of course, not a real-world requirement. Instead, it has been used here to limit the number of attributes you will show in your design.) Given those requirements, create the Crow's Foot ERD segment.



**Problem 2:-****[10 Points]**

Given the following business scenario, create a Crow's Foot ERD using a specialization hierarchy if appropriate.

Eastern Sales Company keeps information on employees and the departments that they work in. For each department, the department name, internal mail box number, and office phone extension are kept. A department can have many assigned employees, and each employee is assigned to only one department. Employees can be salaried employees, hourly employees, or contract employees. All employees are assigned an employee number. This is kept along with the employee's name and address. For hourly employees, hourly wage and target weekly work hours are stored (e.g. the company may target 40 hours/week for some, 32 hours/week for others, and 20 hours/week for others). Some salaried employees are salespeople that can earn a commission in addition to their base salary. For all salaried employees, the yearly salary amount is recorded in the system. For salespeople, their commission percentage on sales and commission percentage on profit are stored in the system. For example, John is a salesperson with a base salary of \$50,000 per year plus 2-percent commission on the sales price for all sales he makes plus another 5 percent of the profit on each of those sales. For contract employees, the beginning date and end dates of their contract are stored along with the billing rate for their hours.



**Problem 3:-**

[17.5 Points]

Using the STUDENT table structure shown, do the following:

Attribute Name	Sample Value	Sample Value	Sample Value	Sample Value	Sample Value
INV_NUM	211347	211347	211347	211348	211349
PROD_NUM	AA-E3422QW	QD-300932X	RU-995748G	AA-E3422QW	GH-778345P
SALE_DATE	15-Jan-2018	15-Jan-2018	15-Jan-2018	15-Jan-2018	16-Jan-2018
PROD_LABEL	Rotary sander	0.25-in. drill bit	Band saw	Rotary sander	Power drill
VEND_CODE	211	211	309	211	157
VEND_NAME	NeverFail, Inc.	NeverFail, Inc.	BeGood, Inc.	NeverFail, Inc.	ToughGo, Inc.
QUANT_SOLD	1	8	1	2	1
PROD_PRICE	\$49.95	\$3.45	\$39.99	\$49.95	\$87.75

- a) Write the relational schema, draw its dependency diagram and identify all dependencies, including all partial and transitive dependencies. You can assume that the table does not contain repeating groups and that any invoice number may reference more than one product. (*Hint: This table uses a composite primary key.*)

[5 Points]

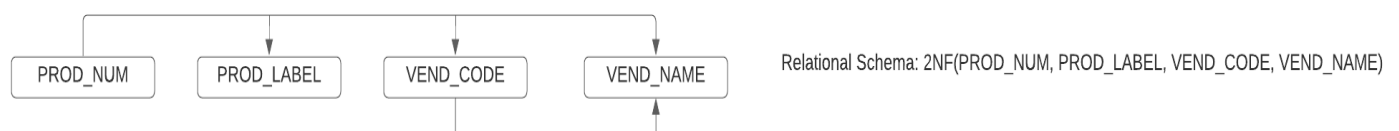


Primary keys : INV\_NUM, PROD\_NUM

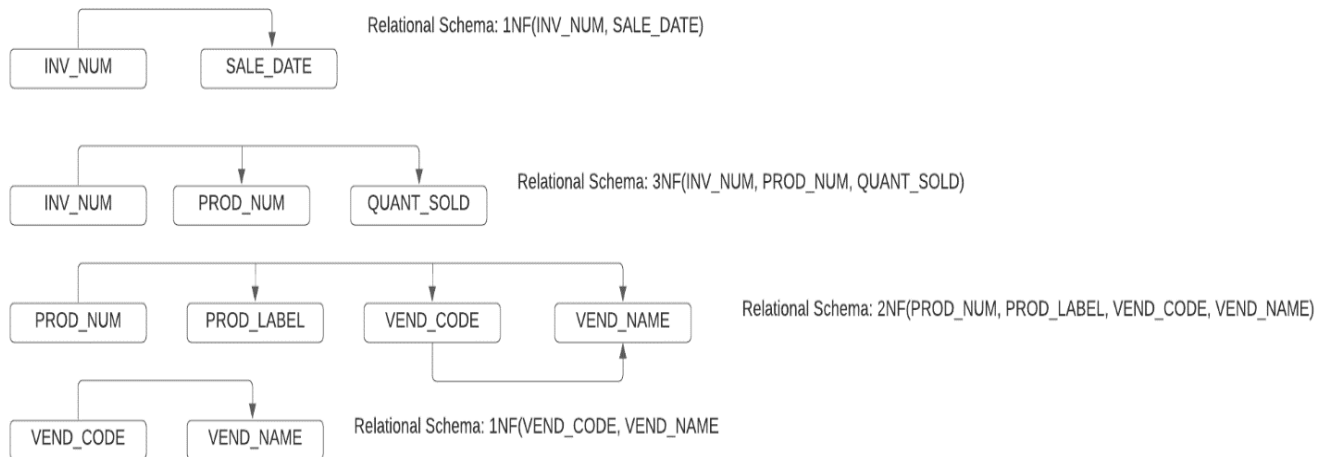
Partial Dependency: PROD\_NUM --&gt; PROD\_LABE, VEND\_CODE, PROD\_PRICE,

INV\_NUM --&gt; SALE\_DATE

- b) Remove all partial dependencies, write the relational schema, and draw the new dependency diagrams. Identify the normal forms for each table structure you created. [4 points]



- c) Remove all transitive dependencies, write the relational schema, and draw the new dependency diagrams. Also identify the normal forms for each table structure you created. [4 Points]



- d) Draw the Crow's Foot ERD. [4.5 Points]

