Part I:

Entities in the UFO application:
1. Customer (<u>customer_id</u>, customer_fname, customer_lname billing_address, phone)
2. Furniture (<u>item_code</u>, item_name, price, quantity_in_stock) Order_form (<u>order#</u>, order_date, <u>customer_id(fk)</u>, delivery_address, total_price, <u>emp_id(fk)</u>)
3. Shipment (<u>shipment#</u>, shipment_date, truck_number(fk), order_number)
4. Truck (<u>truck#</u>, license_plate#, license_exp_date(unsure), inspection_exp_date, emp_id(fk))
5. Employee (<u>emp_id</u>, ssn, employee_fname, employee_lname, address, phone, salary, department_id(fk))
6. Driver (<u>emp_id(fk)</u>, <u>driver_license#</u>, license_exp_date)
7. Sales Rep (<u>emp_id(fk)</u>, <u>commission_rate</u>)
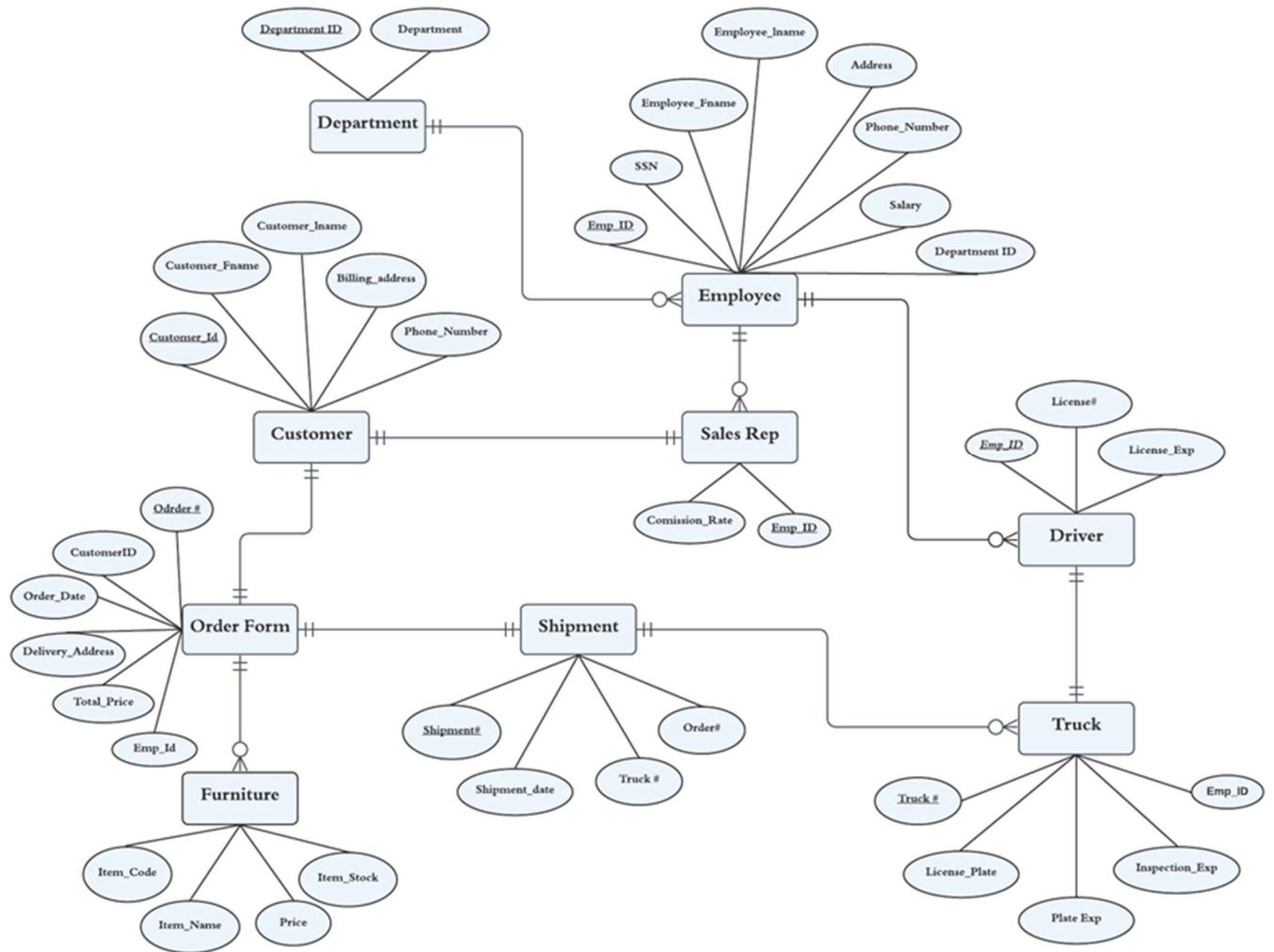8. Department (<u>department_id</u>, department_name)

Business rules:
9. Each Customer places one or more Order(s). Each Order is placed by one Customer.
10. Each Order_form includes one or more Furniture(s). Each Furniture is included in one or more Order_form(s).
11. Each Order_form is used by one Sales Rep. Each Sales Rep uses one or more Order_form(s).
12. Each Order_form consists of one or more Shipment(s). Each Shipment belongs to one Order_form.
13. Each Shipment is delivered by one or more Truck(s). Each Truck delivers one or more Shipment(s).
14. Each Truck is assigned to one. Each Driver is assigned to one Truck.
15. Each Employee is associated with one Department. Each Department has one or more Employees.
16. Each Sales Rep is associated with one Department. Each Department has one or more Sales Reps.
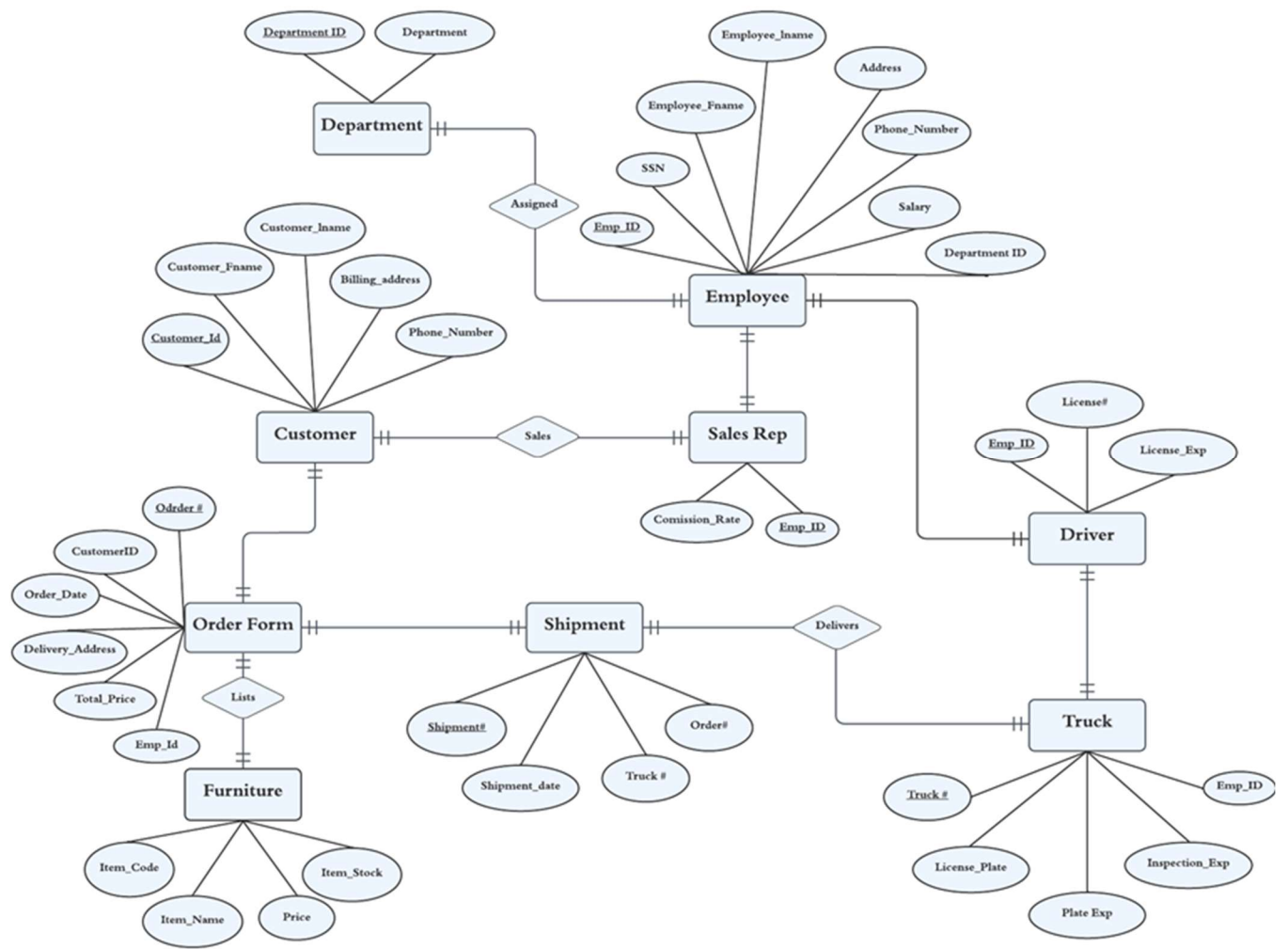17. Each Driver is associated with one Department. Each Department has one or more Drivers.

Supertype-subtype relationships:
18. Driver is a kind of Employee. Employee can be a Driver.
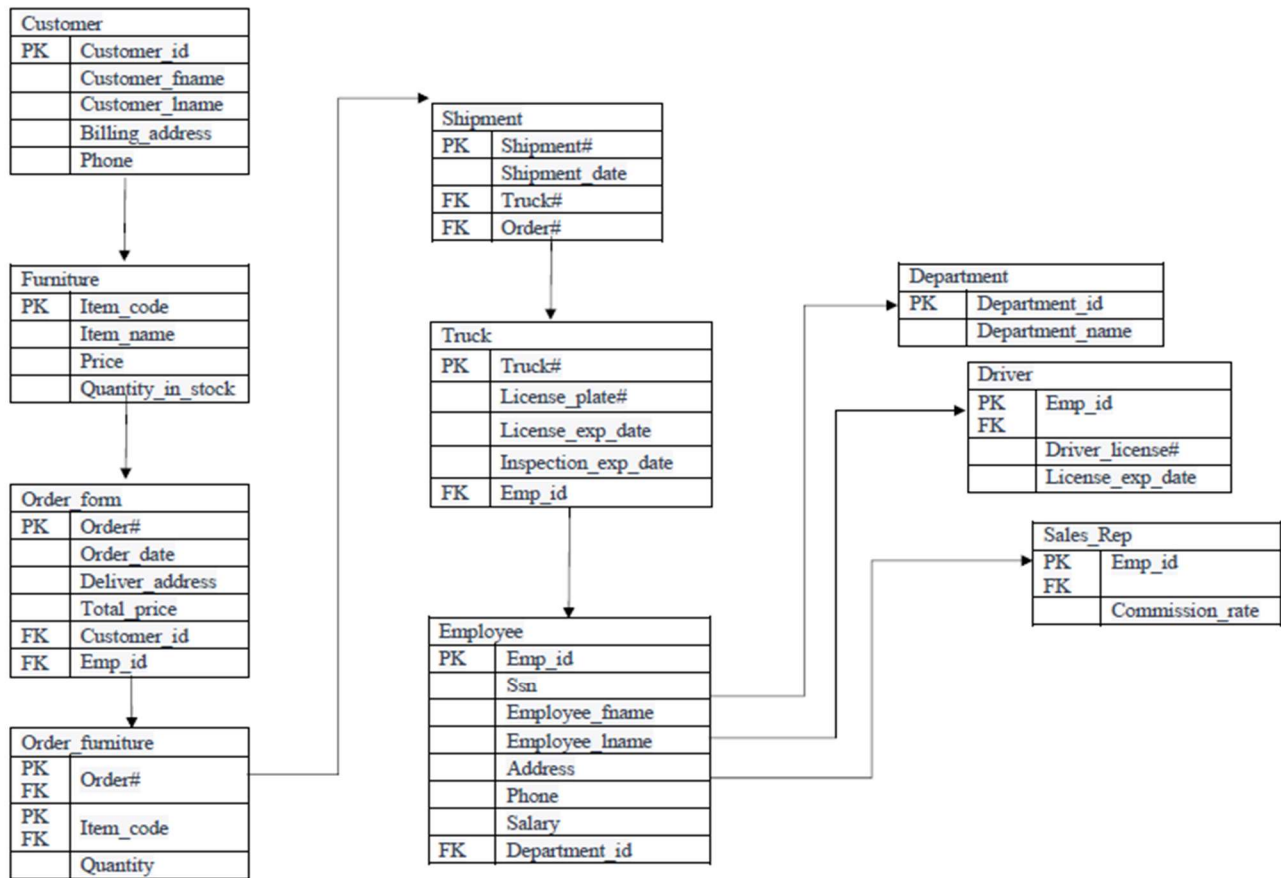19. Sales Rep is a kind of Employee. Employee can be a Sales Rep.

Part II:

## a. E-R diagrams

Entity-Relationship Diagram

**Department** ( Department ID, Department )

**Assigned** relationship between Department and Employee

**Employee** ( Emp_ID, SSN, Employee_Fname, Employee_lname, Address, Phone_Number, Salary, Department ID )

**Customer** ( Customer_Id, Customer_Fname, Customer_lname, Billing_address, Phone_Number )

**Sales** relationship between Customer and Sales Rep

**Sales Rep** ( Comission_Rate, Emp_ID )

**Order Form** ( Odrder #, CustomerID, Order_Date, Delivery_Address, Total_Price, Emp_Id )

**Lists** relationship between Order Form and Furniture

**Furniture** ( Item_Code, Item_Name, Price, Item_Stock )

**Shipment** ( Shipment#, Shipment_date, Truck #, Order# )

**Delivers** relationship between Shipment and Truck

**Driver** ( Emp_ID, License#, License_Exp )

**Truck** ( Truck #, License_Plate, Plate Exp, Inspection_Exp, Emp_ID )

## b. Relational schema:

**Customer**

| PK | Customer_id |
|----|-------------|
|    | Customer_fname |
|    | Customer_lname |
|    | Billing_address |
|    | Phone |

**Furniture**

| PK | Item_code |
|----|-----------|
|    | Item_name |
|    | Price |
|    | Quantity_in_stock |

**Order_form**

| PK | Order# |
|----|--------|
|    | Order_date |
|    | Deliver_address |
|    | Total_price |
| FK | Customer_id |
| FK | Emp_id |

**Order_furniture**

| PK FK | Order# |
|-------|--------|
| PK FK | Item_code |
|       | Quantity |

**Shipment**

| PK | Shipment# |
|----|-----------|
|    | Shipment_date |
| FK | Truck# |
| FK | Order# |

**Truck**

| PK | Truck# |
|----|--------|
|    | License_plate# |
|    | License_exp_date |
|    | Inspection_exp_date |
| FK | Emp_id |

**Employee**

| PK | Emp_id |
|----|--------|
|    | Ssn |
|    | Employee_fname |
|    | Employee_lname |
|    | Address |
|    | Phone |
|    | Salary |
| FK | Department_id |

**Department**

| PK | Department_id |
|----|---------------|
|    | Department_name |

**Driver**

| PK FK | Emp_id |
|-------|--------|
|       | Driver_license# |
|       | License_exp_date |

**Sales_Rep**

| PK FK | Emp_id |
|-------|--------|
|       | Commission_rate |

## c. Data Dictionary:

| Table Name | Attribute Name | Contents | Type | Format | Range | Required | PK or FK | FK Referenced Table |
|---|---|---|---|---|---|---|---|---|
| customer | Customer_id | Customer account number | CHAR(8) | 99999999 | 100000000-999999999 | Y | PK | |
| | Customer_fname | Customer first name | VARCHAR(20) | Xxxxxxxx | | | | |
| | Customer_lname | Customer last name | VARCHAR2(20) | Xxxxxxxx | | Y | | |
| | Billing_address | Customer Billing Address | VARCHAR2(35) | 9999Xxxxxxx | | Y | | |
| | phone | Customer Phone Number | CHAR(11) | 999-999-9999 | 10000000000-99999999999 | Y | | |
| Furniture | Item_code | Item code | CHAR(10) | 99999999999 | 1000000000-9999999999 | Y | PK | |
| | Item_name | Item name | VARCHAR2(15) | Xxxxxxxxx | | Y | | |
| | price | Price of each furniture type | NUMBER(9,2) | 9,999,999.99 | | | | |
| | Quantity_in_stock | Quantity in stock | VARCHAR2(4) | 9999 | 1000-9999 | | | |
| Order_form | Order# | Order number | CHAR(8) | 99999999 | 100000000-999999999 | Y | PK | |
| | Order_date | Order date | DATE | dd-mmm-yyyy | | Y | | |
| | Customer_id | Customer number | CHAR(8) | 99999999 | 100000000-999999999 | Y | FK | Customer |
| | Delivery_address | Delivery address | VARCHAR2(35) | 9999Xxxxxxx | | Y | | |
| | Total_price | Total price of furniture | NUMBER(9,2) | 9,999,999.99 | 1000000.00-9999999.99 | | | |
| | Emp_id | Employee number | CHAR(8) | 999999999 | 100000000-999999999 | Y | FK | Employee |
| Shipment | Shipment# | Shipment number | VARCHAR2(10) | 999999999999 | 1000000000-9999999999 | Y | PK | |
| | Shipment_date | Shipment Date | DATE | dd-mmm-yyyy | | Y | | |
| | Truck_number | Truck number | VARCHAR2(8) | 99999999 | 100000000-999999999 | Y | FK | |
| | Order_number | Order number | VARCHAR2(10) | 9999999999 | 1000000000-9999999999 | Y | | |
| Truck | Truck# | Vehicle number | VARCHAR2(8) | 999999999 | 100000000-999999999 | Y | PK | |
| | License_plate# | License plate number | VARCHAR2(7) | XXX9999 | | Y | | |

| | Attribute | Description | Data type | Format | Range | Req | Key | References |
|---|---|---|---|---|---|---|---|---|
| | License_exp_date | License expiration date | DATE | dd-mmm-yyyy | | | | |
| | Inspection_exp_date | Inspection expiration date | DATE | dd-mmm-yyyy | | | | |
| | Emp_id | Employee number | CHAR(8) | 99999999 | 100000000-999999999 | Y | FK | Employee |
| Employee | Emp_id | Employee number | CHAR(8) | 99999999 | 100000000-999999999 | Y | PK FK | Department Driver Sales Rep |
| | ssn | Employee social security number | CHAR(9) | 999999999 | 100000000-999999999 | | | |
| | Employee_fname | Employee First name | VARCHAR2(30) | Xxxxxxxxxxx | | Y | | |
| | Employee_lname | Employee last name | | | | | | |
| | address | Employee address | VARCHAR2(35) | 9999Xxxxxxx | | Y | | |
| | phone | Employee phone | CHAR(10) | 9999999999 | 1000000000-9999999999 | Y | | |
| | salary | Employee salary | NUMBER(9,2) | 9,999,999.99 | 1000000.00-9999999.99 | | | |
| | Department_id | Employee department number | CHAR(8) | 99999999 | 100000000-999999999 | Y | FK | Department |
| Driver | Emp_id | Employee number | CHAR(8) | 99999999 | 100000000-999999999 | Y | PK FK | Truck |
| | Driver_license# | Drivers license number | CHAR(8) | 99999999 | 100000000-999999999 | Y | | |
| | License_exp_date | Drivers license expiration date | DATE | dd-mmm-yyyy | | | | |
| Sales Rep | Emp_id | Sales employee number | CHAR(8) | 99999999 | 100000000-999999999 | Y | PK FK | Employee |
| | Commission_rate | Commission rate | NUMBER(6,2) | 9999.99 | 1000.00-9999.99 | Y | | |
| Department | Department_id | Department number | CHAR(8) | 99999999 | 100000000-999999999 | Y | PK | |
| | Department_name | Department name | VARCHAR2(20) | Xxxxxxxxxxx | | Y | | |

## d. SQL Tables script

```
create table customer (
    customer_id char(8) primary key,
    customer_fname varchar2(20),
    customer_lname varchar2(20) not null,
    billing_address varchar2(35) not null,
    phone char(11) not null
    );

create table furniture (
    item_code char(10) primary key,
    item_name varchar2(15) not null,
    price number(9,2),
    quantity_in_stock varchar2(4)
    );

create table department (
    department_id char(8) primary key,
    department_name varchar2(20) not null
    );

create table employee (
    emp_id char(8) primary key,
    ssn char(9),
    employee_fname varchar2(30) not null,
    employee_lname varchar2(30),
    address varchar2(35) not null,
    phone char(10) not null,
    salary number(9,2),
    department_id char(8) references department(department_id)
    );

create table truck (
    truck_number varchar2(8) primary key,
    license_plate varchar2(7) not null,
    license_exp_date date,
    inspection_exp_date date,
    emp_id char(8) references employee(emp_id)
    );

create table driver (
    emp_id char(8) references employee(emp_id),
    driver_license char(8) not null,
    dr_license_exp_date date
```

```sql
    );

create table sales_rep (
    emp_id char(8) primary key references employee(emp_id),
    commission_rate number (6,2) not null
    );

create table order_form (
    order_number char(8) primary key,
    order_date DATE not null,
    customer_id char(8) references customer(customer_id),
    delivery_address varchar2(25) not null,
    total_price number(9,2),
    emp_id char(8) references employee(emp_id)
    );

create table shipment (
    shipment_number varchar2(10) primary key,
    shipment_date date not null,
    truck_number varchar2(8) references truck(truck_number),
    order_number char(8) references order_form(order_number)
    );

insert into customer values (10012345, 'Laura', 'Jackson', '3301 Blue Road', 46928017761);
insert into customer values (12980022, 'Robert', 'Smith', '1100 Autumn Lane', 98795090023);
insert into customer values (13359231, 'Joshua', 'Wells', '1959 Kingdom Drive', 12110438004);
insert into customer values (19866097, 'Zoe', 'Patrick', '7070 Mayfield Road', 23788900299);
insert into customer values (17606549, 'Matthew', 'Jordan', '2348 Lakewood Drive', 81776407985);

insert into furniture values (8755509821, 'coffee_table', 500.00, 2300);
insert into furniture values (9008712343, 'sofa', 899.99, 1040);
insert into furniture values (8076440228, 'tv_stand', 300.00, 3000);
insert into furniture values (3220998471, 'bookshelf', 450.00, 1500);
insert into furniture values (6500895422, 'accent_chair', 550.00, 1800);

insert into department values (19876000, 'Management');
insert into department values (98760332, 'IT');
insert into department values (21887609, 'Finance');
insert into department values (11255479, 'Sales');
insert into department values (80770652, 'Marketing');

insert into employee values (22009987, 213908456, 'Wendy', 'Daniel', '1911 Pleasant Ridge Lane',
3445789006, 30000, 19876000);
insert into employee values (90076893, 377080975, 'John', 'Greenfield', '804 Pecan Avenue', 0057894221,
45000, 98760332);
```

```sql
insert into employee values (77566432, 901558763, 'Layla', 'Perkins', '6040 West Park Lane', 9728845081, 40000, 21887609);
insert into employee values (14415602, 887551107, 'Brock', 'Hunt', '9045 Lovefield Road', 2145789039, 39500, 11255479);
insert into employee values (38901117, 460937689, 'Harold', 'Jackson', '5541 Ranch Hill', 4698740099, 41000, 80770652);

insert into truck values (10092771, 3312903, '12-FEB-25', '30-APR-24', 22009987);
insert into truck values (87760921, 1212093, '23-MAY-24', '17-JAN-25', 90076893);
insert into truck values (90087531, 8874353, '14-JUN-23', '29-MAY-23', 77566432);
insert into truck values (88657423, 7165463, '27-DEC-26', '14-NOV-25', 14415602);
insert into truck values (10045824, 2234778, '19-OCT-23', '04-AUG-23', 38901117);

insert into driver values (22009987, 35778612, '09-JAN-29');
insert into driver values (90076893, 70054410, '13-FEB-26');
insert into driver values (77566432, 33223456, '17-MAY-27');
insert into driver values (14415602, 55674891, '09-DEC-29');
insert into driver values (38901117, 33214790, '18-OCT-28');

insert into sales_rep values (22009987, 2300.00);
insert into sales_rep values (90076893, 2200.00);
insert into sales_rep values (77566432, 2500.00);
insert into sales_rep values (14415602, 2400.00);
insert into sales_rep values (38901117, 2100.00);

insert into order_form values (90123480, '13-APR-23', 10012345, '1415 Pinewood Drive', 3150.00, 22009987);
insert into order_form values (70098174, '14-APR-23', 12980022, '8009 Greenfield Avenue', 1400.00, 90076893);
insert into order_form values (54003211, '16-APR-23', 13359231, '4321 East Park Lane', 1275.00, 77566432);
insert into order_form values (30069182, '20-APR-23', 19866097, '1888 Whitegrass Drive', 1550.00, 14415602);
insert into order_form values (82340056, '21-APR-23', 17606549, '6707 Lockit Lane', 2300.00, 38901117);

insert into shipment values (4557066982, '19-APR-23', 10092771, 90123480);
insert into shipment values (8970004322, '20-APR-23', 87760921, 70098174);
insert into shipment values (1190887326, '21-APR-23', 90087531, 54003211);
insert into shipment values (5577059805, '24-APR-23', 88657423, 30069182);
insert into shipment values (2214453123, '25-APR-23', 10045824, 82340056);

grant select on customer to ssk7315;
grant select on furniture to ssk7315;
grant select on department to ssk7315;
grant select on employee to ssk7315;
grant select on truck to ssk7315;
grant select on driver to ssk7315;
```

```
grant select on sales_rep to ssk7315;
grant select on order_form to ssk7315;
grant select on shipment to ssk7315;

describe customer;
select * from customer;

describe furniture;
select * from furniture;

describe department;
select * from  department;

describe employee;
select * from employee;

describe truck;
select * from truck;

describe driver;
select * from driver;

describe sales_rep;
select * from sales_rep;

describe order_form;
select * from order_form;

describe shipment;
select * from shipment;
```

## e. SQL Queries

```
/*SQL queries*/

/*1*/
Select customer_fname, customer_lname, billing_address, phone
From Customer;


/*2*/
Alter Table Order_Form
Add(Customer_Fname varchar(20),
   Customer_Lname varchar(20),
   Billing_Address varchar(20),
   Shipment_Number varchar(10),
   Shipment_Date date,
   Truck_Number varchar(8));

/*EDIT for above - Add phone number of customer to order_form.*/
Alter Table Order_Form
Add Phone CHAR(11 );

/*Add Records to Laura's row in the order form table*/
Update Order_Form
Set Customer_Fname = 'Laura',
Customer_Lname = 'Jackson ',
Billing_Address= '3301 Blue Road ',
Shipment_Date= '19-APR-23',
Truck_Number = 1009277
Where Order_Number = 90123480;

/*EDIT for above- Add phone and order number records as string values for Laura into her row.*/
Update Order_Form
Set Phone = '46928017761 ',  Truck_Number = '1009277 '
Where Order_Number = 90123480;


/*3*/
Select Employee.Phone
From Order_Form, Employee
Where Order_Form.Emp_Id = Employee.Emp_Id
And Order_Form.Order_Number = 90123480;

/*4*/
Select Customer_Id
```

```
From Driver, Order_Form
Where Driver.Emp_Id = Order_Form.Emp_Id
And Driver.Emp_Id = 22009987;

/*5*/
Select Item_Name as "Item", (price * quantity_in_stock) as "Total Value"
From Furniture
Where price > 25;
```