Question 1

Create the following tables and enter at least 10 records with appropriate constraints :- Employees(employee_id, first name, last_name, age, email, phone number, hire date, job id, salary, commission pct, manager id, department id) Departments(Department_Id, Department_ Name, Manager Id, Location Id) Locations(location id, street address, postal_code city, state_province, country id) Countries(country id, country name, region id)

Answer

- Create Queries :

```
create table countries(country_id number primary key,country_name varchar(20) not
null,region_id number);

create table locations(location_id number primary key,street_address varchar(10) not
null,postal_code varchar(7),city varchar(15) not null,state_province varchar(5),country_id
number references countries(country_id));

create table departments(department_id number primary key,department_name varchar(15)
not null,manager_id number,location_id number references locations(location_id));
create table employees(employee_id number primary key,first_name varchar(10) not
null,last_name varchar(10) not null,age number,email varchar(20) not null,phone_number
number,hire_date date,job_id number,salary number,commission_pct number,manager_id
number references departments(manager_id),department_id number references
departments(department_id));
```

- Insert Quries :

```
INSERT INTO countries VALUES(1,'India',1);
INSERT INTO countries VALUES(2,'Japan',1);
INSERT INTO countries VALUES(3,'China',1);
INSERT INTO countries VALUES(4,'U.S.A',2);
INSERT INTO countries VALUES(5,'Canada',2);
INSERT INTO countries VALUES(6,'Mexico',2);
INSERT INTO countries VALUES(7,'U.K.',3);
INSERT INTO countries VALUES(8,'France',3);
INSERT INTO countries VALUES(9,'Germany',3);
INSERT INTO countries VALUES(10,'Brazil',4);
```

```
INSERT INTO locations VALUES(101,'135 main street','14567','New York','NY',4);
INSERT INTO locations VALUES(102,'321 Broadway','10001','New York','NY',4);
INSERT INTO locations VALUES(103,'3331 3rd ave','10021','Paris','Pa',8);
INSERT INTO locations VALUES(104,'341 4th st','L5L 5L5','London','LA',7);
INSERT INTO locations VALUES(105,'5142 5th ave','20001','Washington','DC',5);
INSERT INTO locations VALUES(106,'5th Rajmarg st','39457','Surat','ST',1);
INSERT INTO locations VALUES(107,'Vinod Sohjab st','254461','Delhi','DL',1);
INSERT INTO locations VALUES(108,'Yonaka St','45751','Tokoyo','TO',2);
INSERT INTO locations VALUES(109,'910 king St','V5V 5V5','Vancover','BC',3);
INSERT INTO locations VALUES(110,'11111st Ave','98101','Seattle','WA',4);
```

```
INSERT INTO departments VALUES(201,'Sales',301,101);
INSERT INTO departments VALUES(202,'Marketing',302,102);
INSERT INTO departments VALUES(203,'HR',303,103);
INSERT INTO departments VALUES(204,'Finance',304,104);
INSERT INTO departments VALUES(205,'IT',305,105);
INSERT INTO departments VALUES(206,'Operations',306,106);
INSERT INTO departments VALUES(207,'Development',307,107);
INSERT INTO departments VALUES(208,'Executive',308,108);
INSERT INTO departments VALUES(209,'Customer Service',309,109);
INSERT INTO departments VALUES(210,'Research',310,110);
```

```
Insert into employees values
(401,'Rahul','Rawat',35,'rahulrawat09@gmail.com',9685743212,'10-july-2012',1,56000,0.1,301,201);
Insert into employees values
(402,'Jayesh','Gosami',39,'jayeshgow22@gmail.com',8596742455,'07-jun-2012',2,89000,0.6,302,202);
Insert into employees values
(403,'Atul','Patil',37,'atulpatil15@gmail.com',7859486151,'27-jun-2013',3,68000,0.4,303,203);
Insert into employees values
(404,'Robert','Jackes',42,'robertjk08@gmail.com',9856748210,'05-jun-2010',4,98000,0.9,304,204);
Insert into employees values
(405,'Neel','Patel',38,'neelalex@gmail.com',8576548256,'15-jun-2011',5,56000,0.59,305,205);
Insert into employees values
(406,'Jayant','Oja',34,'jayantoja05@gmail.com',9685745760,'25-jun-2014',6,39000,0.29,306,206);
Insert into employees values
(407,'Dhoni','Rao',29,'dohnirao07@gmail.com',7854869546,'12-jun-2017',7,35000,0.2,307,207);
Insert into employees values
(408,'Ujjval','Chauhan',32,'ujjvalchauhan10@gmail.com',8579684513,'19-jun-2016',8,45000,0.5,308,208);
Insert into employees values
(409,'Ankush','Patel',31,'ankushpatel33@gmail.com',9845217801,'11-jun-2015',9,57500,0.14,309,209);
Insert into employees values
(410,'Ramesh','Patil',39,'rameshpatil3@gmail.com',7596842131,'16-jun-2012',10,67750,0.26,310,210);
```

- Table View:

```
sqlite> select * from countries;
```

country_id	country_name	region_id
1	India	1
2	Japan	1
3	China	1
4	U.S.A	2
5	Canada	2
6	Mexico	2
7	U.K.	3
8	France	3
9	Germany	3
10	Brazil	4

```
sqlite> select * from locations;
```

location_id	street_address	postal_code	city	state_province	country_id
101	135 main street	14567	New York	NY	4
102	321 Broadway	10001	New York	NY	4
103	3331 3rd ave	10021	Paris	Pa	8
104	341 4th st	L5L 5L5	London	LA	7
105	5142 5th ave	20001	Washington	DC	5
106	5th Rajmarg st	39457	Surat	ST	1
107	Vinod Sohjab st	254461	Delhi	DL	1
108	Yonaka St	45751	Tokoyo	TO	2
109	910 king St	V5V 5V5	Vancover	BC	3
110	11111st Ave	98101	Seattle	WA	4

```
sqlite> select * from departments;
```

department_id	department_name	manager_id	location_id
201	Sales	301	101
202	Marketing	302	102
203	HR	303	103
204	Finance	304	104
205	IT	305	105
206	Operations	306	106
207	Development	307	107
208	Executive	308	108
209	Customer Service	309	109
210	Research	310	110

```
sqlite> select * from employees;
┌─────────────┬────────────┬───────────┬─────┬──────────────────────┬──────────────┬──────────────┬────────┬────────┬─────────────┬────────────┬────────────────┐
│ employee_id │ first_name │ last_name │ age │        email         │ phone_number │  hire_date   │ job_id │ salary │ commission_ │ manager_id │ department_id  │
├─────────────┼────────────┼───────────┼─────┼──────────────────────┼──────────────┼──────────────┼────────┼────────┼─────────────┼────────────┼────────────────┤
│ 401         │ Rahul      │ Rawat     │ 35  │ rahulrawat09@gmail.com │ 9685743212 │ 10-july-2012 │ 1      │ 56000  │ 0.1         │ 301        │ 201            │
│ 402         │ Jayesh     │ Gosami    │ 39  │ jayeshgow22@gmail.com  │ 8596742455 │ 07-jun-2012  │ 2      │ 89000  │ 0.6         │ 302        │ 202            │
│ 403         │ Atul       │ Patil     │ 37  │ atulpatil15@gmail.com  │ 7859486151 │ 27-jun-2013  │ 3      │ 68000  │ 0.4         │ 303        │ 203            │
│ 404         │ Robert     │ Jackes    │ 42  │ robertjk08@gmail.com   │ 9856748210 │ 05-jun-2010  │ 4      │ 98000  │ 0.9         │ 304        │ 204            │
│ 405         │ Neel       │ Patel     │ 38  │ neelalex@gmail.com     │ 8576548256 │ 15-jun-2011  │ 5      │ 56000  │ 0.59        │ 305        │ 205            │
│ 406         │ Jayant     │ Oja       │ 34  │ jayantoja05@gmail.com  │ 9685745760 │ 25-jun-2014  │ 6      │ 39000  │ 0.29        │ 306        │ 206            │
│ 407         │ Dhoni      │ Rao       │ 29  │ dohnirao07@gmail.com   │ 7854869546 │ 12-jun-2017  │ 7      │ 35000  │ 0.2         │ 307        │ 207            │
│ 408         │ Ujjval     │ Chauhan   │ 32  │ ujjvalchauhan10@gmail.com │ 8579684513 │ 19-jun-2016 │ 8      │ 45000  │ 0.5         │ 308        │ 208            │
│ 409         │ Ankush     │ Patel     │ 31  │ ankushpatel33@gmail.com │ 9845217801 │ 11-jun-2015  │ 9      │ 57500  │ 0.14        │ 309        │ 209            │
│ 410         │ Ramesh     │ Patil     │ 39  │ rameshpatil3@gmail.com │ 7596842131 │ 16-jun-2012  │ 10     │ 67750  │ 0.26        │ 310        │ 210            │
└─────────────┴────────────┴───────────┴─────┴──────────────────────┴──────────────┴──────────────┴────────┴────────┴─────────────┴────────────┴────────────────┘
```

- Query 1 : select e.first_name as "First Name",e.last_name as "Last Name" from employees e;

```
sqlite> select e.first_name as "First Name",e.last_name as "Last Name" from employees e;
┌────────────┬───────────┐
│ First Name │ Last Name │
├────────────┼───────────┤
│ Rahul      │ Rawat     │
│ Jayesh     │ Gosami    │
│ Atul       │ Patil     │
│ Robert     │ Jackes    │
│ Neel       │ Patel     │
│ Jayant     │ Oja       │
│ Dhoni      │ Rao       │
│ Ujjval     │ Chauhan   │
│ Ankush     │ Patel     │
│ Ramesh     │ Patil     │
└────────────┴───────────┘
```

- Query 2 : select * from employees limit 10;

- Query 3 : select last_name from employees where length(last_name) = 6;

```
sqlite> select last_name from employees where length(last_name) = 6;
┌───────────┐
│ last_name │
├───────────┤
│ Gosami    │
│ Jackes    │
└───────────┘
```

- Query 4 : select department_id , sum(salary) as total_salary from employees group by department_id;

```
sqlite> select department_id , sum(salary) as total_salary from employees group by
   ...> department_id;
```

department_id	total_salary
201	56000
202	89000
203	68000
204	98000
205	56000
206	39000
207	35000
208	45000
209	57500
210	67750

- Query 5 : select e.first_name,e.last_name from employees e join employees m on e.manager_id = m.employee_id join departments d on m.department_id = d.department_id where d.location_id = 'U.S.A';

- Query 6 : select e.first_name,e.last_name,e.salary from employees e join departments d on e.department_id = d.department_id where e.salary > (select avg(salary) from employees) and d.department_name like '%IT%';

- Query 7 : select e.employee_id, e.last_name,m.employee_id as manager_id,m.last_name as manager_name from employees e join employees m on e.manager_id = m.manager_id;

```
sqlite> select e.employee_id, e.last_name,m.employee_id as manager_id,m.last_name as
   ...> manager_name from employees e join employees m on e.manager_id = m.manager_id;
```

employee_id	last_name	manager_id	manager_name
401	Rawat	401	Rawat
402	Gosami	402	Gosami
403	Patil	403	Patil
404	Jackes	404	Jackes
405	Patel	405	Patel
406	Oja	406	Oja
407	Rao	407	Rao
408	Chauhan	408	Chauhan
409	Patel	409	Patel
410	Patil	410	Patil

- Query 8 : select e.job_id , avg(e.salary) as average_salary from employees e group by e.job_id;

```
sqlite> select e.job_id , avg(e.salary) as average_salary from employees e group by e.job_id;
```

job_id	average_salary
1	56000.0
2	89000.0
3	68000.0
4	98000.0
5	56000.0
6	39000.0
7	35000.0
8	45000.0
9	57500.0
10	67750.0

- Query 9 : select l.location_id ,l.street_address ,l.city,l.state_province ,r.country_name from departments d join locations l on d.location_id = l.location_id join countries r on l.country_id = r.region_id;

```
sqlite> select l.location_id ,l.street_address ,l.city,l.state_province ,r.country_name from
   ...> departments d join locations l on d.location_id = l.location_id join countries r on
   ...> l.country_id = r.region_id;
```

location_id	street_address	city	state_province	country_name
101	135 main street	New York	NY	Brazil
102	321 Broadway	New York	NY	Brazil
106	5th Rajmarg st	Surat	ST	China
106	5th Rajmarg st	Surat	ST	India
106	5th Rajmarg st	Surat	ST	Japan
107	Vinod Sohjab st	Delhi	DL	China
107	Vinod Sohjab st	Delhi	DL	India
107	Vinod Sohjab st	Delhi	DL	Japan
108	Yonaka St	Tokoyo	TO	Canada
108	Yonaka St	Tokoyo	TO	Mexico
108	Yonaka St	Tokoyo	TO	U.S.A
109	910 king St	Vancover	BC	France
109	910 king St	Vancover	BC	Germany
109	910 king St	Vancover	BC	U.K.
110	11111st Ave	Seattle	WA	Brazil

Question 2

Write a command to Dump entire database with proper file name and tables structure into a file named as your rollno.

Answer

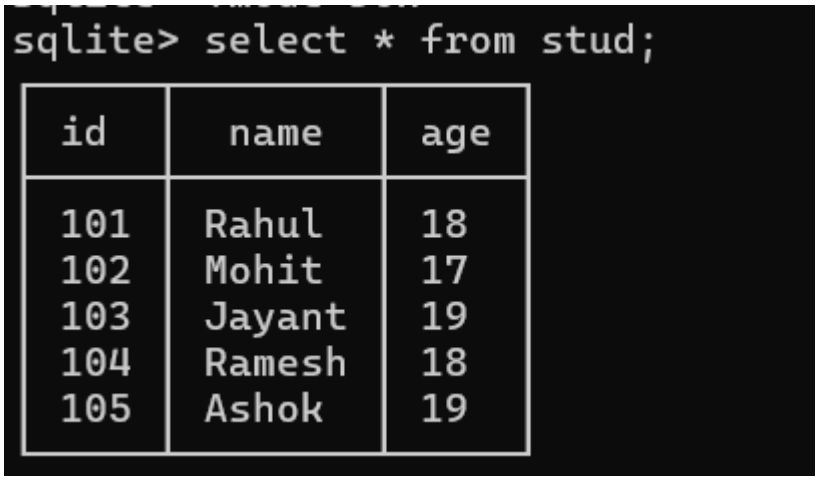
- Create Query :

```
CREATE TABLE stud (id number primary key,name varchar(10) not null,age number);
```

- Insert Query :

```
INSERT INTO stud VALUES(101,'Rahul',18);
INSERT INTO stud VALUES(102,'Mohit',17);
INSERT INTO stud VALUES(103,'Jayant',19);
INSERT INTO stud VALUES(104,'Ramesh',18);
INSERT INTO stud VALUES(105,'Ashok',19);
```

- Table View :



- Query :

```
sqlite> .output 2452001.sql
sqlite> .dump
sqlite> .exit
```

- Output :

2452001.sql

File Edit View

```
PRAGMA foreign_keys=OFF;
BEGIN TRANSACTION;
CREATE TABLE stud (id number primary key,name varchar(10) not null,age number);
INSERT INTO stud VALUES(101,'Rahul',18);
INSERT INTO stud VALUES(102,'Mohit',17);
INSERT INTO stud VALUES(103,'Jayant',19);
INSERT INTO stud VALUES(104,'Ramesh',18);
INSERT INTO stud VALUES(105,'Ashok',19);
COMMIT;
```

Question 3

Write a trigger called AGECHECK on table employees that dont allow the 3 insertion or update of any record that has an age less than 18.

Answer

- Queries :

```
create table employees(id number primary key,name varchar(10),age number);

create trigger agecheck before insert on employees for each row
begin
select case
when new.age < 18 then raise(abort,'Age Must Be 18 Or Older')
end;
end;

insert into employees values(101,'Mohit',21);
insert into employees values(102,'Mahesh',25);
insert into employees values(103,'Mohan',23);
```

- Trigger Action:

```
sqlite> insert into employees values(104,'John',17);
Runtime error: Age Must Be 18 Or Older (19)
sqlite> insert into employees values(104,'John',10);
Runtime error: Age Must Be 18 Or Older (19)
sqlite>
```

```
sqlite> select * from employees;
```

id	name	age
101	Mohit	21
102	Mahesh	25
103	Mohan	23

Question 4

Write a python program to find mean, median, mode from set of numbers in a

Answer

- Code :

```
import statistics

n = [12,25,35,20,22,25,15,18,30,32]

mean=statistics.mean(n)
print("Mean : ",mean)

median=statistics.median(n)
print("Median : ",median)

mode=statistics.mode(n)
print("Mode : ",mode)
```

- Output :

```
Mean :  23.4
Median :  23.5
Mode :  25
```

Question 5

Write a python program to retrieve all rows from employee table and display the column values in tabular format.

Answer

- Code :

```
import sqlite3
from tabulate import tabulate

conn = sqlite3.connect('C:\sqlite\q5.db')
cursor = conn.cursor()

cursor.execute("select * from employee")
rows = cursor.fetchall()

column_names = [desc[0] for desc in cursor.description]

conn.close()

print(tabulate(rows,headers = column_names,tablefmt='grid'))
```

- Output :

```
+------+--------+-------+--------------+----------+
|   id | name   |   age | department   |   salary |
+======+========+=======+==============+==========+
|  101 | Mohan  |    25 | IT           |    25000 |
+------+--------+-------+--------------+----------+
|  102 | Maulik |    23 | Sale         |    15000 |
+------+--------+-------+--------------+----------+
|  103 | Rishi  |    27 | Marketing    |    22000 |
+------+--------+-------+--------------+----------+
|  104 | Roshan |    22 | Development  |    19000 |
+------+--------+-------+--------------+----------+
|  105 | Nikunj |    29 | HR           |    29000 |
+------+--------+-------+--------------+----------+
```

Question 6

Write a python program to read CSV file and upload data into table.

Answer

- Code :

```
import csv
import sqlite3

csvp = 'C:\sqlite\q6.csv'
table_name = 'emp01'

conn = sqlite3.connect('C:\sqlite\q5.db')
cursor = conn.cursor()

cursor.execute(f'''
    create table if not exists {table_name}(
            id number primary key,
            name varchar(20),
            age number,
            mobile number,
            department varchar(10)
    )
''')

with open(csvp,'r') as csvfile:
    reader = csv.reader(csvfile)
    next(reader)
    for row in reader :
        cursor.execute(f'''
                insert into {table_name} (id,name,age,mobile,department)
                values(?,?,?,?,?)
        ''',row)

conn.commit()
conn.close()
```

- Output :

```
sqlite> select * from emp01;
```

id	name	age	mobile	department
Id	Name	Age	Mobile No.	City
101	Rajesh	25	9864751256	Surat
102	Mohit	27	7859614580	Ahemdabad
103	Mahesh	26	8596743257	Vapi
104	Ramesh	24	9698748532	Valsad
105	Jayesh	23	8745329810	Vadorda
106	Atul	28	9578624130	Bharuch
107	Ujjval	29	6855744982	Ankleswer
108	Neel	28	9865748981	Surat
109	Sami	21	7845296815	Valsad
110	Maulik	22	8967541230	Navasri

Question 7

Write a python program to retrieve all rows from employee table and dump into 'employee details.csv' CSV file.

Answer

- Code :

```
import sqlite3
import csv

conn = sqlite3.connect('C:\sqlite\q5.db')
cursor = conn.cursor()

cursor.execute("SELECT * FROM employee")
rows = cursor.fetchall()

column_names = [desc[0] for desc in cursor.description]

conn.close()

with open('C:\sqlite\details.csv', 'w', newline='') as csvfile:
    writer = csv.writer(csvfile)

    writer.writerow(column_names)

    writer.writerows(rows)

print("Data dumped into employee details.csv")
```

- Output :

id	name	age	department	salary
101	Mohan	25	IT	25000
102	Maulik	23	Sale	15000
103	Rishi	27	Marketing	22000
104	Roshan	22	Development	19000
105	Nikunj	29	HR	29000

Question 8

Write a program to implement DML operations using sqlite3.

Answer

- Code :

```
import sqlite3

conn = sqlite3.connect('C:\sqlite\qu8.db')
cursor = conn.cursor()

cursor.execute('''
     create table if not exists employee(
            id number primary key,
            name varchar(20),
            age number,
            department varchar(10),
            salary number
    )
''')

cursor.execute("""
    insert into employee (id, name, age, department, salary)
    VALUES (?, ?, ?, ?, ?)
""", (6, "David", 32, "Finance", 85000))
```

```
cursor.execute("""
    UPDATE employee
    SET salary = ?
    WHERE id = ?
""", (90000, 4))

cursor.execute("""
    DELETE FROM employee
    WHERE id = ?
""", (5,))

conn.commit()
conn.close()

print("DML operations performed successfully")
```

- Output :

```
sqlite> select  * from employee;
```

id	name	age	department	salary
6	David	32	Finance	85000

Question 9

Get total salary from employees table and show line plot with the following Style properties

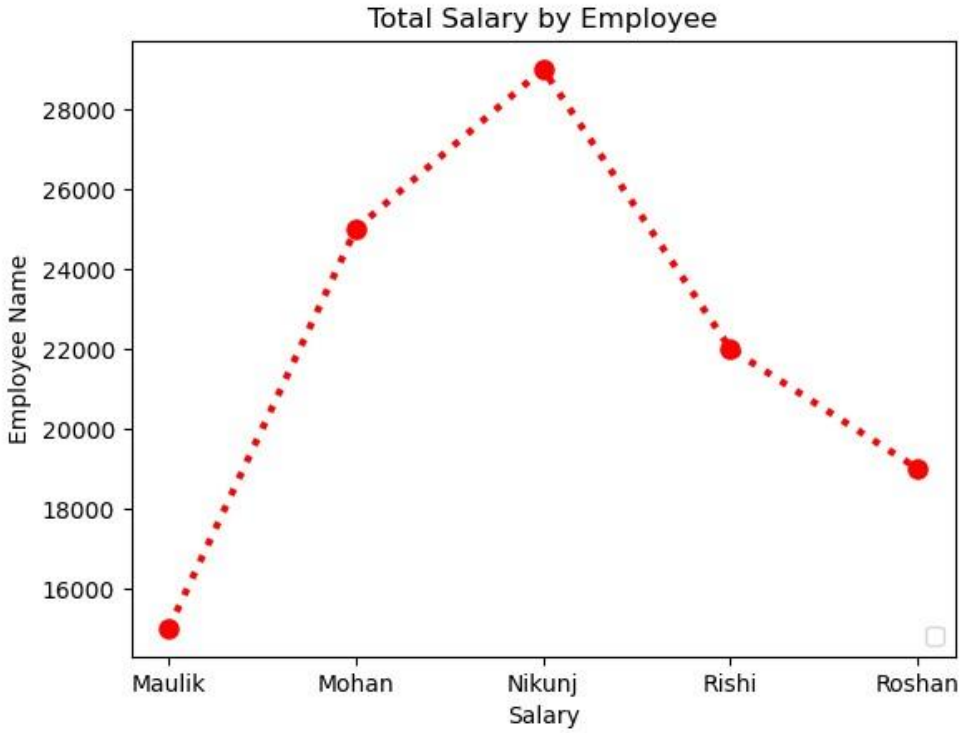
Generated line plot must include following Style properties: -
- Line Style dotted and Line-color should be red
- Show legend at the lower right location.
- X label name salary
- Y label name =Employee name
- Add a circle marker.
- Line marker color as read
- Line width should be 3

Answer

- Code :

```
import sqlite3
import matplotlib.pyplot as plt

conn = sqlite3.connect('C:\sqlite\q5.db')
cursor = conn.cursor()

cursor.execute("""
    SELECT name, SUM(salary) AS total_salary
    FROM employee
    GROUP BY name
""")
rows = cursor.fetchall()

conn.close()

employee_names = [row[0] for row in rows]
total_salaries = [row[1] for row in rows]

plt.plot(employee_names, total_salaries,
         linestyle=':', linewidth=3, color='red', marker='o', markersize=8, markerfacecolor='red')

plt.xlabel('Salary')
plt.ylabel('Employee Name')

plt.title('Total Salary by Employee')

plt.legend(loc='lower right')

plt.show()
```

- Output :


Total Salary by Employee
28000
26000
24000
22000
20000
18000
16000
Employee Name
Maulik
Mohan
Nikunj
Rishi
Roshan
Salary

Question 10

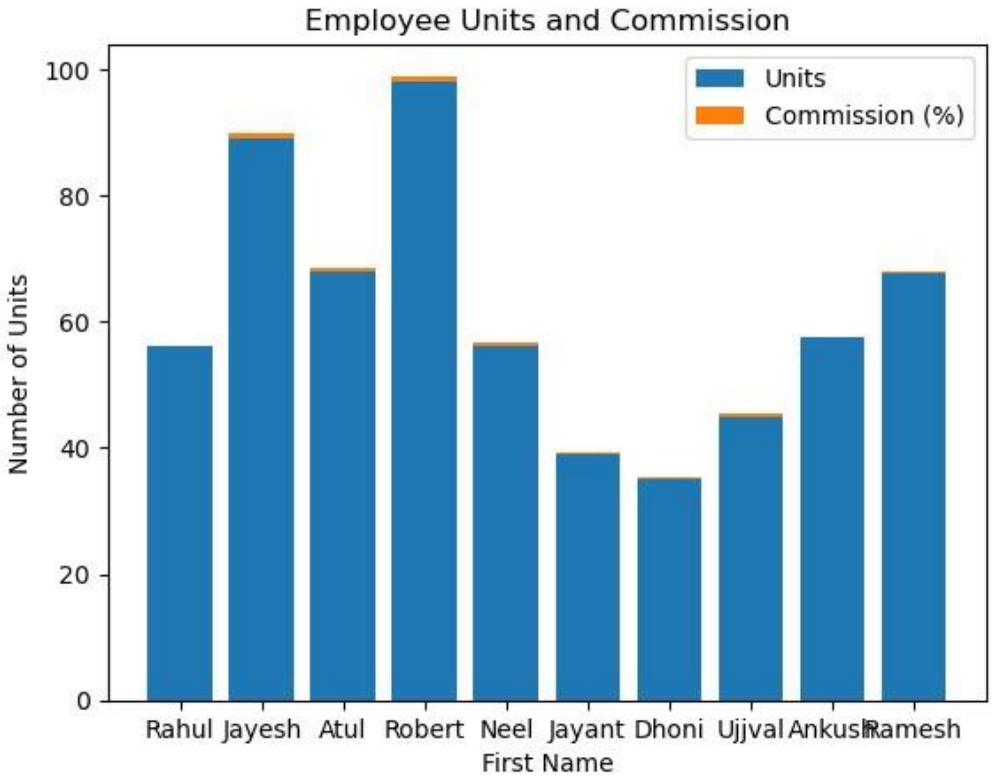
Use employee details.csv file and read salary and commission pct data and show it using the bar chart The bar chart should display the number of units for each employee. Add a separate bar for each first name in the same chart.

Answer

- Code :

```
import pandas as pd
import matplotlib.pyplot as plt

df = pd.read_csv('C:\sqlite\employee.csv')

first_names = df['first_name']
salaries = df['salary']
commissions = df['commission_pct']

units = salaries / 1000

plt.bar(first_names, units)
plt.bar(first_names, commissions, bottom=units)


plt.xlabel('First Name')
plt.ylabel('Number of Units')

plt.title('Employee Units and Commission')

plt.legend(['Units', 'Commission (%)'])

plt.show()
```

- Output :


Employee Units and Commission
Units
Commission (%)
Number of Units
0
20
40
60
80
100
Rahul
Jayesh
Atul
Robert
Neel
Jayant
Dhoni
Ujjval
Ankush
Ramesh
First Name