2MCA 7: DATABASE MANAGEMENT SYSTEMS LAB

PART _ A

l) Draw E-R diagram and convert entities and relationships to relation table for a given scenario'

a. Two assignments shall be carried out i.e. consider two different scenarios (e.g. bank, college)

COLLEGE DATABASE

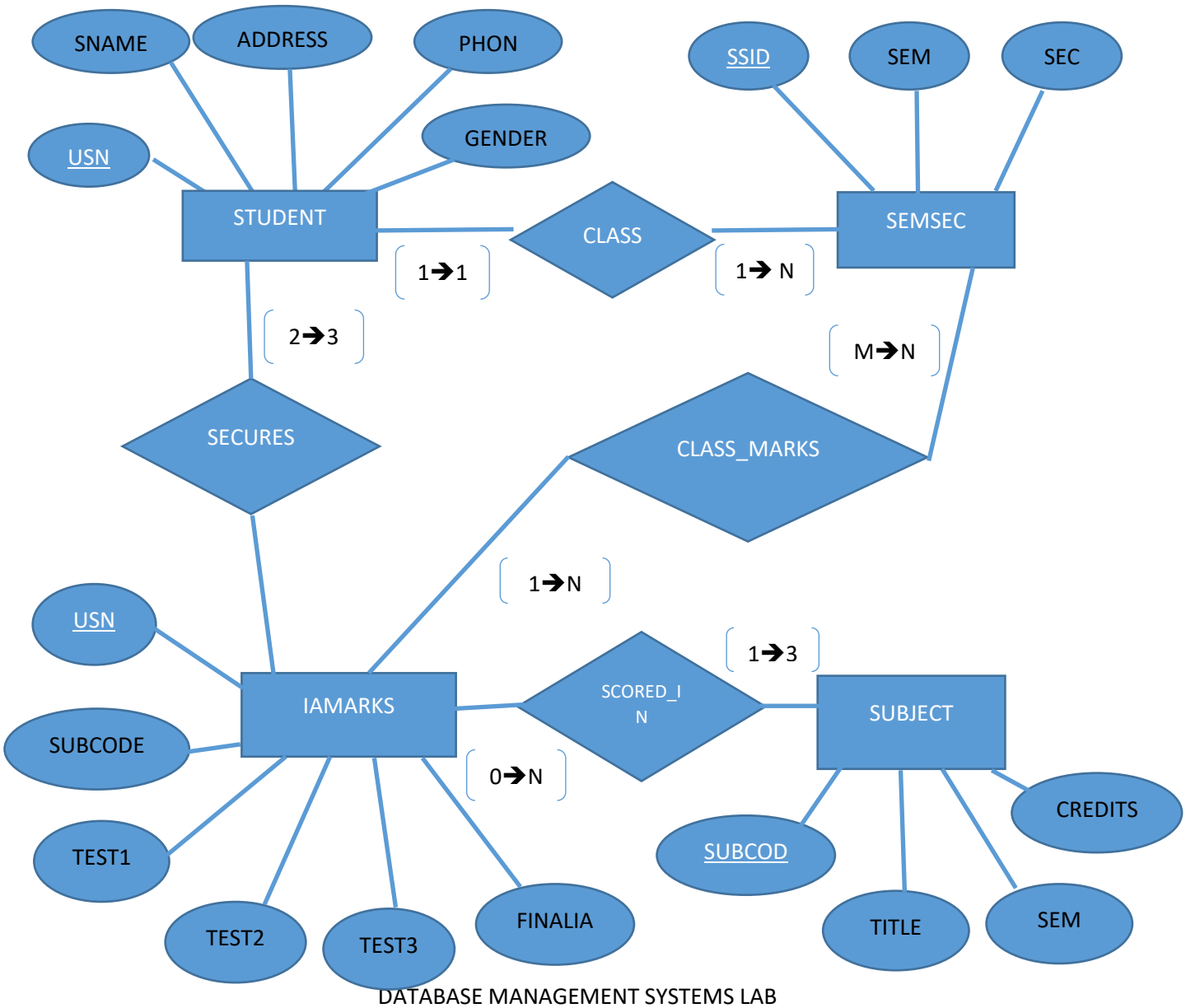
STUDENT (USN, SNAME, ADDRESS, PHONE, GENDER)

SEMSEC (SSID, SEM, SEC)

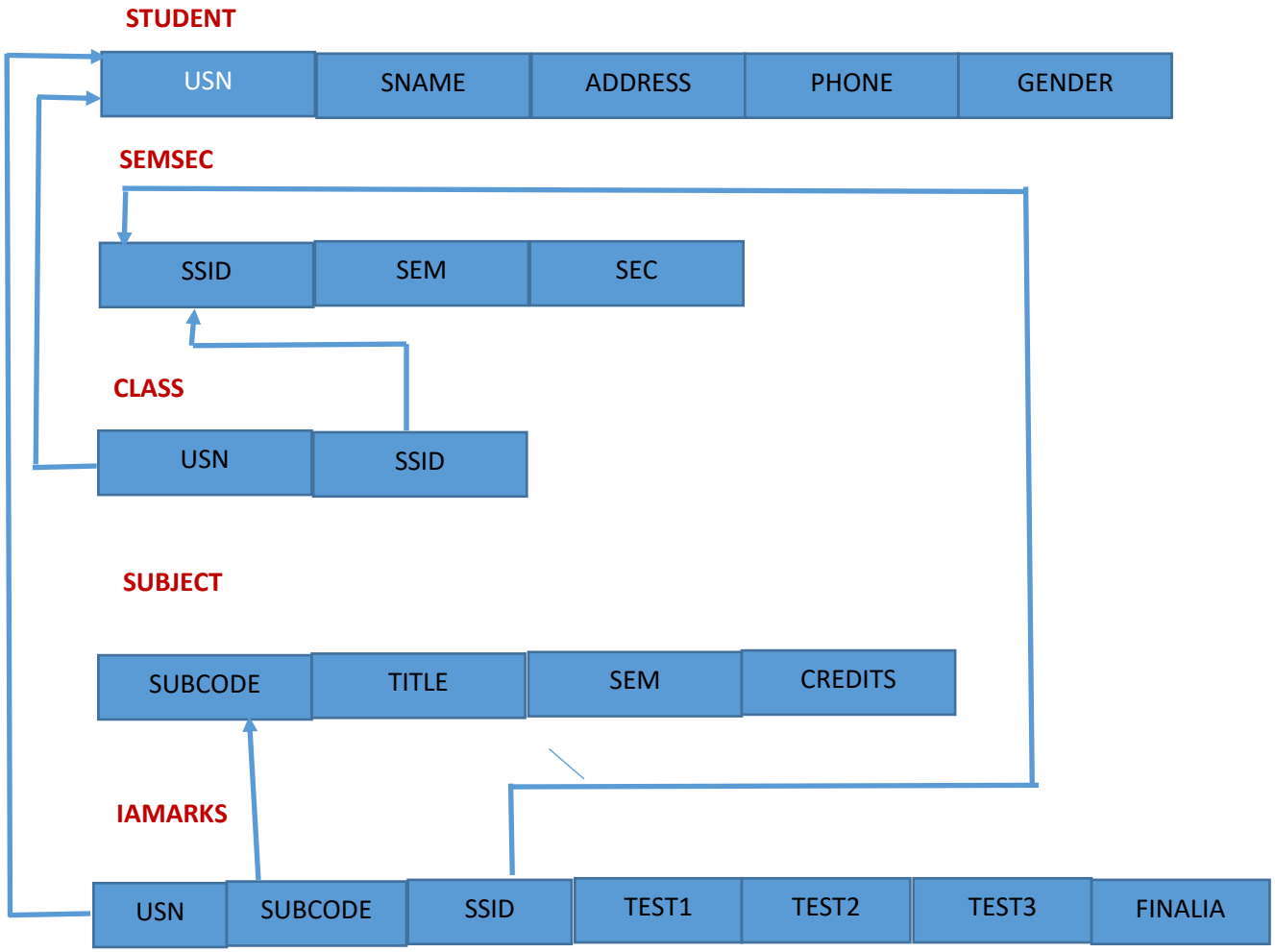
CLASS (SUBCODE, TITLE, SEM, CREDITS)

IAMARKS (USN, SUBCODE, SSID, TEST1, TEST2, TEST3, FINALIA)

COLLEGE DATABASE: E-R DIAGRAM



Mapping entities and relationships to relational table (College Schema Diagram)



COMPANY DATABASE

EMPLOYEE (SSN, NAME, ADDRESS, SEX, SALARY, SUPERSSN, DNO)

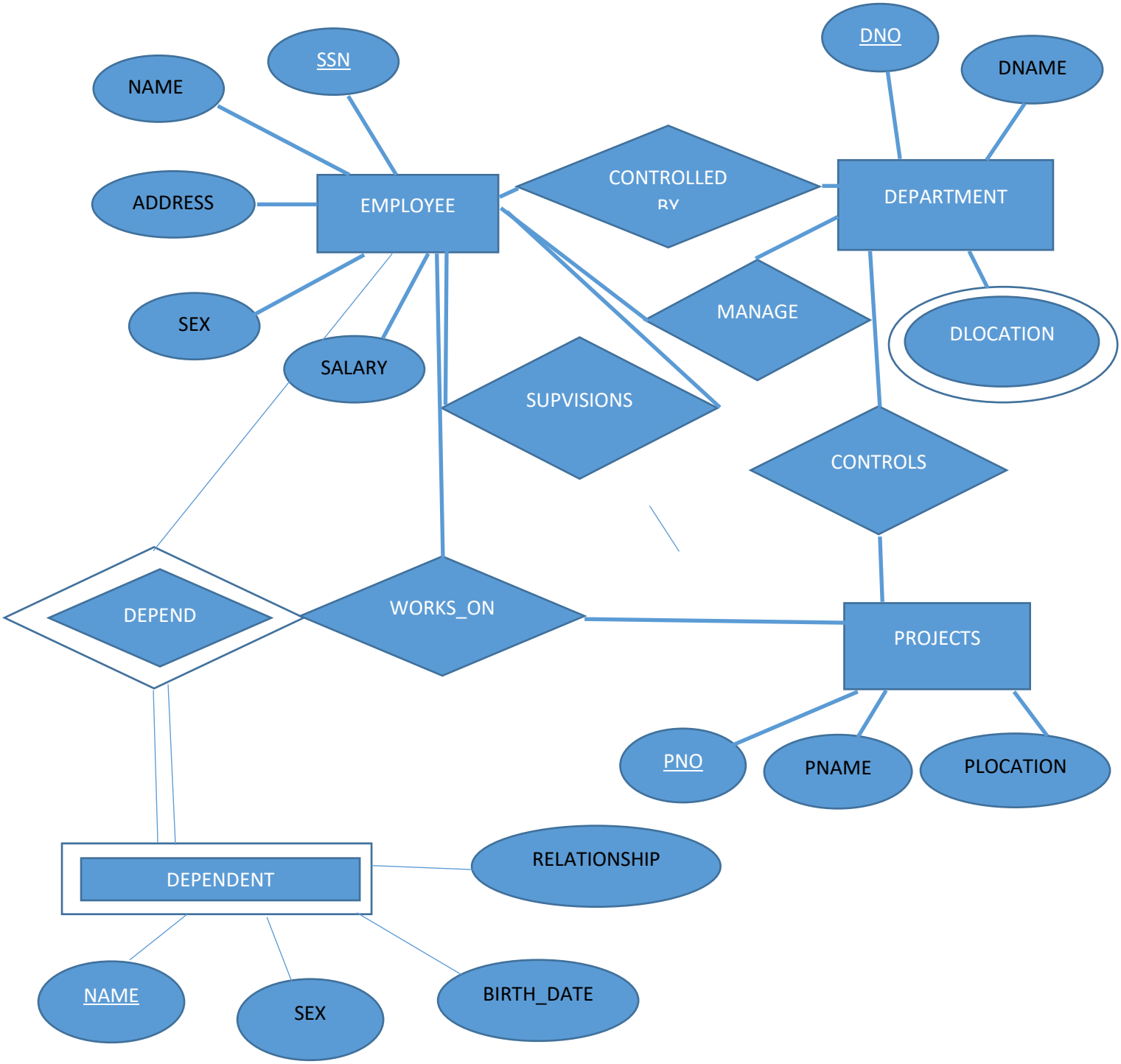
DEPARTMENT (DNO, DNAME, MGRSSN, MGRSTARTDATE)

DLOCATION (DNO, DLOC)

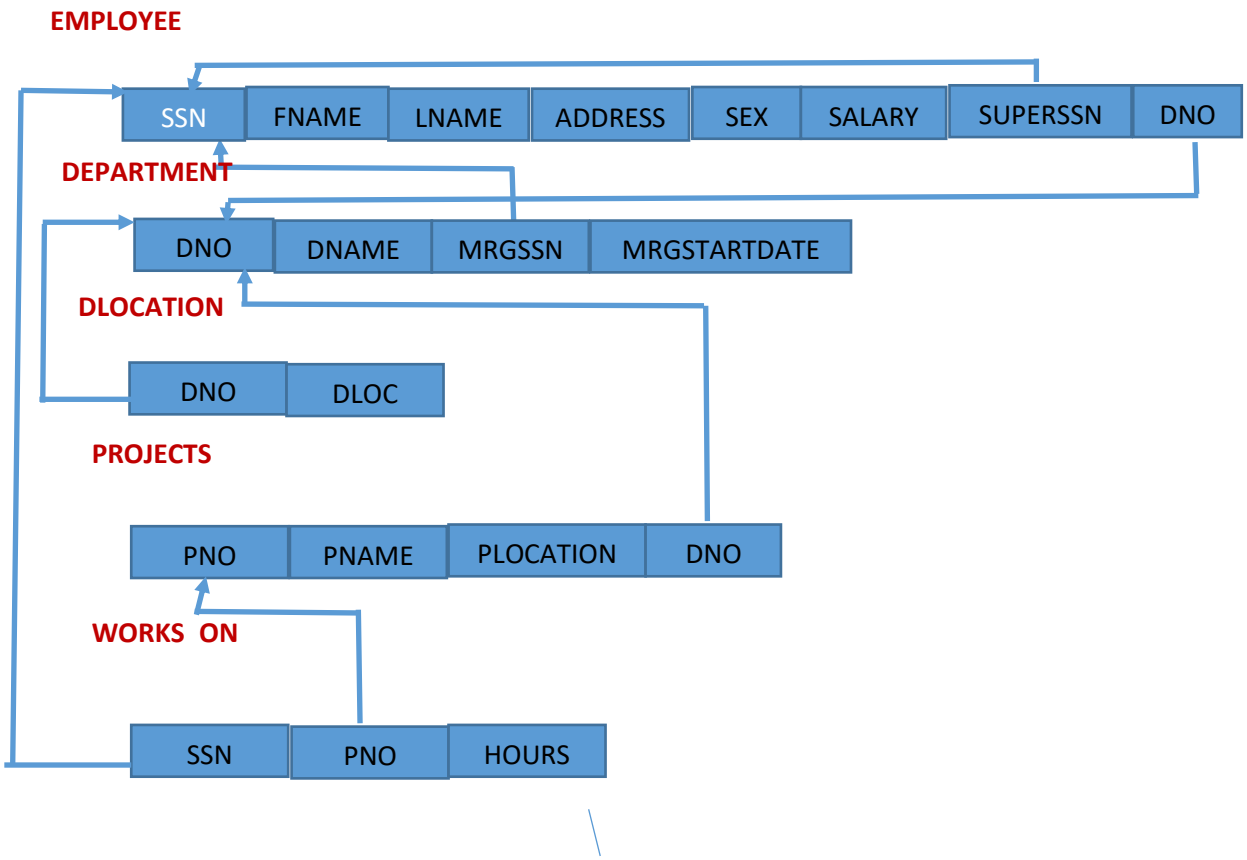
PROJECT (PNO, PNAME, PLOCATION, DNO)

WORKS_ON (SSN, PNO, HOURS)

COMPANY DATABASE: E-R DIAGRAM



Mapping entities and relationships to relational table (Company Schema Diagram)



Consider the Company database with following Schema

EMPLOYEE (FNAME String, MINIT String, LNAME String, SSN String, BDATE Date, ADDRESS Text, SEX Text, SALARY Number, SUPER_SSN Number, DNO Number)

```
CREATE TABLE EMPLOYEE
(FNAME        VARCHAR (15)        NOT NULL,
MINT          CHAR,
LNAME         VARCHAR (15)        NOT NULL,
SSN           CHAR (9)            NOT NULL,
BDATE         DATE,
ADDRESS       VARCHAR (30),
SEX           CHAR,
SALARY        DECIMAL (10, 2),
SUPER_SSN     CHAR (9),
DNO           INTEGER             NOT NULL,
PRIMARY KEY (SSN),
FOREIGN KEY (SUPER_SSN) REFERENCES EMPLOYEE (SSN),
FOREIGN KEY (DNO) REGERENCES DEPARTMENT (DNMUMBER));
```

DEPARTMENT (DNAME String, DNUMBER Number, MGR_SSN String, MSR_START_DATE Date)

```
CREATE TABLE DEPARTMENT
(DNAME              VARCHAR (15)        NOT NULL,
DNUMBER             INTEGER             NOT NULL,
MGR_SSN             CHAR (9)            NOT NULL,
MGR_START_DATE      DATE,
PRIMARY KEY (DNUMBER),
UNIQUE (DNAME),
FOREIGN KEY (MGR_SSN) REFERENCE EMPLOYEE (SSN));
```

DEPT_LOCATIONS (DNUMBER Number, DLOCATION String)

```
CREATE TABLE DEPT_LOCATIONS
(DNUMBER            INTEGER             NOT NULL,
DLOCATION           VARCHAR (15)        NOT NULL,
PRIMARY KEY (DNUMBER, DLOCATION),
FOREIGN KEY (DNUMBER) REFERENCES DEPARTMENT (DNUMBER));
```

PROJECT (PNAME String, PNUMBER Number, PLOCATION String, DNUM Number)

```
CREATE TABLE PROJECT
(PNAME              VARCHAR (15)        NOT NULL,
PNUMBER             INTEGER             NOT NULL,
PLOCATION           VARCHAR (15),
DNUM                INTEGER             NOT NULL,
PRIMARY KEY (PNUMBER),
UNIQUE (PNAME),
FOREIGN KEY (DNUM) REFERENCES DEPARTMENT (DNUMBER));
```

WORKS_ON (ESSN Number, PNO Number, HOURS Number)

```
CREATE TABLE WORKS_ON
(ESSN            CHAR (9)       NOT NULL,
PNO              INTEGER        NOT NULL,
HOURS            DECIMAL (3, 1) NOT NULL,
PRIMARY KEY (ESSN, PNO),
FOREIGN KEY (ESSN) REFERENCES EMPLOYEE (SSN),
FOREIGN KEY (PNO) REFERENCES PROJECT (PNUMBER));
```

DEPENDENT (ESSN Number, DEPENDENT_NAME String, SEX String, BDATE Date, RELATIONSHIP String)

```
CREATE TABLE DEPENDENT
(ESSN            CHAR (9)       NOT NULL,
DEPENDENT_NAME   VARCHAR (15)   NOT NULL,
SEX              CHAR,
BDATE            DATE,
RELATIONSHIP     VARCHAR (8),
PRIMARY KEY (ESSN, DEPENDENT_NAME),
FOREIGN KEY (ESSN) REFERENCES EMPLOYEE (SSN));
```

EMPLOYEE TABLE VALUES

FNAME	MINT	LNAME	SSN	BDATE	ADDRESS	SEX	SALARY	SUPER_SSN	DNO
John	B	Smith	123456789	1965-01-09	731 Fondren, Houston, TX	M	30000	333445555	5
Franklin	T	Wong	333445555	1955-12-08	638 Voss, Houston, TX	M	40000	888665555	5
Alicia	J	Zelaya	999887777	1968-01-19	3321 Castle, Spring, TX	F	25000	987654321	4
Jennifer	S	Wallace	987654321	1941-06-20	291 Berry, Bellaire, TX	F	43000	888665555	4
Ramesh	K	Narayan	666884444	1962-09-15	975 Fire Oak, Humble, TX	M	38000	333445555	5
Joyce	A	English	453453453	1972-07-31	5631 Rice, Houston, TX	F	25000	333445555	5
Ahmad	V	Jabbar	987987987	1969-03-29	980 Dallas, Houston, TX	M	25000	987654321	4
James	E	Borg	888665555	1937-11-10	450 Stone, Houston, TX	M	55000	NULL	1

DEPARTMENT TABLE VALUES

DNAME	DNUMBER	MGR_SSN	MGR_START_DATE
Research	5	333445555	1988-05-22
Administration	4	987654321	1995-01-01
Headquarters	1	888665555	1981-06-19

DEPT_LOCATIONS TABLE VALUES

DNUMBER	DLOCATION
1	Houston
4	Stafford
5	Bellaire
5	Sugarland
5	Houston

PROJECT TABLE VALUES

PNAME	PNUMBER	PLOCATION	DNUM
ProductX	1	Bellaire	5
ProductY	2	Sugarland	5
ProductZ	3	Houston	5
Computerization	10	Stafford	4
Reorganization	20	Houston	1
Newbenefits	30	Stafford	4

WORKS_ON TABLE VALUES

ESSN	PNO	HOURS
123456789	1	32.5
123456789	2	7.5
666884444	3	40.0
453453453	1	20.0
453453453	2	20.0
333445555	2	10.0
333445555	3	10.0
333445555	10	10.0
333445555	20	10.0
999887777	30	30.0
999887777	10	10.0
987987987	10	35.0
987987987	30	5.0
987654321	30	20.0
987654321	20	20.0
888665555	20	NULL

DEPENDENT TABLE VALUES

ESSN	DEPENDENT_NAME	SEX	BDATE	RELATIONSHIP
333445555	Alice	F	1986-04-05	Daughter
333445555	Theodore	M	1983-10-25	Son
333445555	Joy	F	1958-06-03	Spouse
987654321	Abner	M	1942-02-28	Spouse
123456789	Michael	M	1988-01-04	Son
123456789	Alice	F	1988-12-30	Daughter
123456789	Elizabeth	F	1967-05-05	Spouse

2. Perform the following:

1. **Perform the following:**
   a. **Viewing all databases**

      Show Databases;

   b. **Creating a Database**

      Create Database Databasename.

      Example:
      Create Database rajeshDB;

   c. **Viewing all Tables in a Database**

      Show tables;

   d. **Creating Tables (with and Without Constraints)**

      Create table tablename (attributes type (size)…..);

      Example
      Create table student (sno integer, sname char (20), dbirth date);

   e. **Inserting the records**

      Insert into tablename values (values…..);

      Example
      Insert into student values (101,'rajesh','1969-03-06');

   f. **Updating the records**
      Update tablename set attributename="value";

      Example
      Update student set sname="rajeshrao' where sid=10;

   g. **Deleting the records**
      Delete student where sno='101';

   h. **Saving (Commit)**
      Commit;

   i. **Undoing (Rollback)**
      Rollback;

3. **Perform the following:**

a. **Altering a Table**

Syntax

Alter table tablename modify attributename type (size);

Example:

Alter table student modify sname varchar (30);

Syntax

Alter table tablename add attributename type (size);

Example:

Alter table student add phone char (10);

b. **Renaming a Table**

Syntax

Rename table oldname to newname;

Example:

Rename table student to stud;

c. **Truncating a Table**

Syntax

Truncate table tablename;

Example:

Truncate table stud;

d. **Dropping a Table**

Syntax

Drop table tablename;

Example:

Drop table stud;

e. **Backing up a Database**

Syntax

Sudo mysqldump –u[user] –p[database1] [database2] > [filename].sql;

Sudo mysqldump –root –p[rajeshdb] > raj.sql;

f. **Restoring a Database.**

Syntax

Mysql –u[user] –p[rajeshdb] < [filename].sql;

4. For a given set of relation schemes, create tables and perform the following Simple Queries, Simple queries with Aggregate functions, Queries with Aggregate functions (group by and having clause).

Simple Queries:

The SELECT-FROM-WHERE Structure of Basic SQL Queries

SELECT <attribute list>

FROM <table list>

WHERE <Condition>

Example:

Retrieve all the attribute values of any EMPLOYEE who works in DEPARTMENT number 5
SELECT * FROM EMPLOYEE WHERE Dno=5;

Bdate	address
1965-01-09	731 Fondren, Houston, TX

1. Retrieve the name and address of all employees who work for the 'Research' department.

SELECT Fname, Lname, Address
FROM EMPLOYEE, DEPARTMENT
WHERE Dname='Research' AND Dnumber= Dno;

fname	lname	Address
John	Smith	731 Fondren, Houston, TX
Franklin	Wong	638 Voss, Houston, TX
Joyce	English	5631 Rice, Houston, TX
Ramesh	Narayan	975 Fire Oak, Humble, TX

2. For every project located in 'Stafford', list the project number controlling department number and the department manager's last name, address and birth date.
SELECT Pnumber, Dnum, Lname, Address, Bdate
FROM PROJECT, DEPARTMENT, EMPLOYEE
WHERE Dnum = Dnumber AND Mgr_ssn = ssn AND Plocation='Stafford';

Pnumber	Dnum	Lname	Address	bdate
30	4	Wallace	291 Berry, Bellaire, TX	1941-06-20

3. For each employee, retrieve the employee's first and last name and the first and last name of his or her immediate supervisor.

SELECT E.Fname, E.Lname, S.Fname, S.Lname
FROM EMPLOYEE AS E, EMPLOYEE AS S
WHERE E.Super_ssn=S.Ssn;

Fname	Lname	Fname	Lname
John	Smith	Franklin	Wong
Franklin	Wong	James	Bong
Joyce	English	Franklin	Wong
Ramesh	Narayan	Franklin	Wong
Jennifer	Wallace	James	Bong
Ahmad	Jabbar	Jennifer	Wallace
Alicia	Zelaya	Jennifer	Wallace

4. Retrieve all the attributes of an EMPLOYEE and the attributes of the DEPARTMENT IN which her or she works for every employee of the 'Research' department

SELECT * FROM EMPLOYEE, DEPARTMENT WHERE Dname='Research' AND Dno=Dnumber;

Fname	Min t	Lname	Ssn	Bdate	Address	S ex	Salary
John	B	Smith	123456789	1965-01-09	731 Fondren, Houston, TX	M	30000
Franklin	T	Wong	333445555	1955-12-08	638 Voss, Houston, TX	M	40000
Joyce	A	English	453453453	1972-07-31	5631, Rice, Houston, TX	F	25000
Ramesh	K	Narayan	666884444	1962-08-15	975 Fire Oak, Humble, TX	M	38000

Super_ssn	Dno	Dname	Dnumber	Mgr-ssn	Mgr_start_date
333445555	5	Research	5	333445555	1988-05-22
888665555	5	Research	5	333445555	1988-05-22
333445555	5	Research	5	333445555	1988-05-22
333445555	5	Research	5	333445555	1988-05-22

5. Retrieve the salary of every employee.

SELECT ALL Salary FROM EMPLOYEE;

Salary
30000
40000
25000
38000
55000
43000
25000
25000

6. Retrieve all distinct salary values.

SELECT DISTINCT Salary FROM EMPLOYEE;

Salary
30000
40000
25000
38000
55000
43000

7. Retrieve all employee whose address is in Houston, TeXas.

SELECT Fname, Lname
FROM EMPLOYEE
WHERE Address LIKE '%Houston, TX%";

fname	lname
John	Smith
Franklin	Wong
Joyce	English
James	Bong
Ahmad	Jabbar

8. Find all employees who were born during the 1950;

SELECT Fname, Lname FROM EMPLOYEE WHERE Bdate LIKE '1950%';

Empty sets

9. Retrieve all employees in department 5 whose salary is between 30,000 and 40,000

SELECT * FROM EMPLOYEE WHERE (Salary BETWEEN 30000 AND 40000) AND Dno=5;

Fname	Mint	Lname	Ssn	Bdate	Address	Sex	Salary	Super_ssn	Dno
John	B	Smith	123456789	1965-01-09	731, Fondren, Houston, TX	M	30000	333445555	5
Franklin	T	Wong	333445555	1955-12-88	638 Voss, Houston,TX	M	40000	888665555	5
Ramesh	K	Narayan	666884444	1962-09-15	975 Fire Oak, Humble,TX	M	38000	333445555	5

3 rows in set (0.13 sec)

10. **Show the resulting salaries if every employee working on the ProductX project is given a 10% raise.**

SELECT E.Fname, E.LNAME, 1.1 * E.Salary AS Increased_sal FROM EMPLOYEE AS E, WORKS_ON AS W, PROJECT AS P WHERE E.SSN=W.ESSN AND W.Pno=P.Pnumber AND P.Pname='ProductX';

FNAME	LNAME	INCREASED_SAL
JOHN	SMITH	33000.00
JOYCE	ENGLISH	27500.00

5. Execute the fallowing queries

a. How the resulting salaries if every employee working on the 'Research' Departments is given a 10 percentage raise.

SELECT E.ENO, E.ENAME, D.DNAME, 1.1 * E.SALARY AS "INC SALARY" FROM EMPLOYEE AS E, DEPARTMENT AS D WHERE E.DNO=D.DNUMBER AND D.DNAME="RESEARCH";

SSN	FNAME	DNAME	INC SALARY
123456789	John	Research	33000.00
333445555	Franklin	Research	44000.00
453453453	Joyce	Research	27500.00
666884444	Ramesh	Research	41800.00

b. Find the sum of the salaries of all employees of the 'Accounts' department, as well as the maximum salary, the minimum salary, and the average salary in this department

SELECT MAX (E.SALARY), MIN (E.SALARY), SUM (E.SALARY), AVG (E.SALARY) FROM EMPLOYEE E, DEPARTMENT D WHERE E.DNO=D.DNUMBER AND D.DNAME = "ACCOUNTS";

MAX(E.SALARY)	MIN(E.SALARY)	SUM(E.SALARY)	AVG(E.SALARY)
NULL	NULL	NULL	NULL

6. Execute the fallowing queries

a. Retrieve the name of each employee Controlled by department number 5 (use EXISTS operator).

SELECT E.ENAME FROM EMPLOYEE E WHERE EXISTS (SELECT D.DNUMBER FROM DEPARTMENT D WHERE E.DNO=D.DNUMBER AND E.DNO=5);

FNAME
John
Franklin
Joyce
Ramesh

b. Retrieve the name of each dept. and number of employees working in each department which has at least 2 employees

SELECT D.DNAME, COUNT (*) FROM EMPLOYEE E, DEPARTMENT D WHERE E.DNO=D.DNUMBER GROUP BY D.DNAME HAVING COUNT (*) > 2;

DNAME	COUNT(*)
Administration	3
Research	4

7. Execute the fallowing queries

a. For each project, retrieve the project number, the project name, and the number of employee who work on that project. (Use GROUP BY)

SELECT P.PNUMBER, P.PNAME, COUNT (*) AS "NO_OF_EMP" FROM PROJECT P, WORKS_ON W WHERE P.PNUMBER=W.PNO GROUP BY P.PNUMBER, P.PNAME;

PNUMBER	PNAME	NO OF EMPLOYEES
1	ProductX	2
2	ProductY	3
3	ProductZ	2
10	Computerization	3
20	Reorganization	3
30	Newbenefits	3

b. Retrieve the name of employees who born in the year 1990'.

SELECT FNAME, BDATE FROM EMPLOYEE WHERE BDATE LIKE "1990%";

Empty set

8. For each department that has more than five employees, retrieve the department number and number of employees who are making salary more than 40000'

SELECT D.DNAME, D.DNUMBER, COUNT (*) AS "NO_OF_EMP" FROM EMPLOYEE E, DEPARTMENT D WHERE E.DNO=D.DUMBER AND E.SALARY > 40000 AND D.DNUMBER IN (SELECT DNO FROM EMPLOYEE GROUP BY DNO HAVING COUNT (*) > = 5) GROUP BY D.DNO, D.DNAME;

Empty set

9. For each project on which more than two employees work, retrieve the project number, project name and the number of employees who work on that project'

SELECT P.PNUMBER, P.PNAME, COUNT (*) AS "NO_OF_EMPLOYEES" FROM PROJECT P, WORKS_ON W WHERE P.PNUMBER = W.PNO GROUP BY P.PNUMBER, P.PNAME HAVING COUNT (*) > 2;

PNUMBER	PNAME	NO OF EMPLOYEES
2	ProductY	3
10	Computerization	3
20	Reorganization	3
30	Newbenefits	3c

10. For a given set of relation tables perform the following a. Creating Views (with and without check option), Dropping views, Selecting from a view

a. Create a view

CREATE VIEW EMP_DEPT AS (SELECT E.SSN, E.FNAME, E.SALARY, E.DEPTNO, D.DNAME FROM EMPLOYEE E, DEPARTMENT D WHERE E.DEPTNO= D.DNO);

Query Ok.

b. Display all the rows of a view

SELECT * FROM EMP_DEPT;

SSN	FNAME	SALARY	DNO	DNAME
123456789	John	30000.00	5	Research
333445555	Franklin	40000.00	5	Research
453453453	Joyce	25000.00	5	Research
666884444	Ramesh	38000.00	5	Research
888665555	James	55000.00	1	Headquarters
987654321	Jennifer	43000.00	4	Administrator
987654321	Ahmad	25000.00	4	Administrator
999887777	Alicia	25000.00	4	Administrator

c. Insert records into a view

INSERT INTO EMP_DEPT (SSN, FNAME, SALARY, DEPTNO) VALUES (10000009,'RAJESH', 90000, 5,'Research');

Error table employeedb.emp_dept does not exsit

d. Display all the rows of a view

SELECT * FORM EMP_DEPT;

SSN	FNAME	SALARY	DNO	DNAME
123456789	John	30000.00	5	Research
333445555	Franklin	40000.00	5	Research
453453453	Joyce	25000.00	5	Research
666884444	Ramesh	38000.00	5	Research
888665555	James	55000.00	1	Headquarters
987654321	Jennifer	43000.00	4	Administrator
987654321	Ahmad	25000.00	4	Administrator
999887777	Alicia	25000.00	4	Administrator

e. Drop view

DROP VIEW EMP_DEPT;

Query OK.

f. WITH CHECK OPTION

1. Let us create sample view on EMPLOYEE table with check option of salary less than 50000 in where condition

CREAT VIEW EMP_VIEW AS (SELECT SSN, FNAME, SALARY FROM EMPLOYEE WHERE SALARY <= 50000) WITH CHECK OPTION;

2. Display all the rows of a view.

SELECT * FROM EMP_VIEW;

SSN	FNAME	SALARY
123456789	John	30000.00
333445555	Franklin	40000.00
453453453	Joyce	25000.00
666884444	Ramesh	38000.00
987654321	Jennifer	43000.00
987987987	Ahmad	25000.00
999887777	Alicia	25000.00

3. Insert a row where employee salary is less than 500000

INSERT INTO EMP EMP_VIEW (SSN, FNAME, SALARY) VALUES (101155555,'Ravi', 39000);

4. Display all the rows of views

SELECT * FROM EMP_VIEW;

SSN	FNAME	SALARY
123456789	John	30000.00
333445555	Franklin	40000.00
453453453	Joyce	25000.00
666884444	Ramesh	38000.00
987654321	Jennifer	43000.00
987987987	Ahmad	25000.00
999887777	Alicia	25000.00
101155555	Ravi	39000.00

5. Insert a row where employee salary is greater than 50000.

INSERT INTO EMP_VIEW (SSN, FNAME, SALARY) VALUES (1012,"RAMU", 90999);

ORA-01402: VIEW WITH CHECK OPTION WHERE CLAUSE VIOLANCES.

6. Drop view

DROP VIEW EMP_VIEW;