GAIN MORE KNOWLEDGE
REACH GREATER HEIGHTS

PRESIDENCY COLLEGE

(AUTONOMOUS)

AFFILIATED TO BENGALURU CITY UNIVERSITY, APPROVED BY AICTE, DELHI & RECOGNISED BY THE GOVT. OF KARNATAKA
RE-ACCREDITED BY NAAC WITH 'A+' GRADE

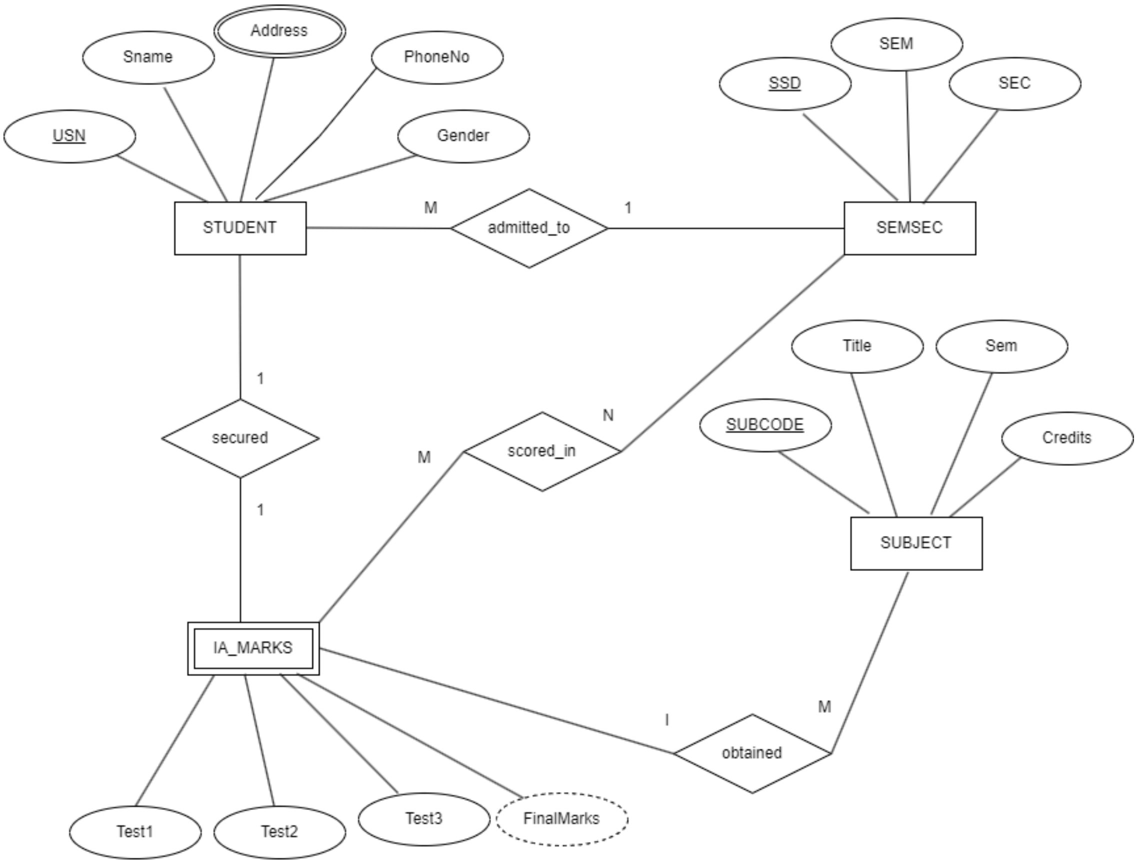
BCA
I SEMESTER
DATABASE MANAGEMENT SYSTEM LAB

Total Hours: 20 per batch **Hours/Week: 2**

Max Marks: 50 **Credits: 2**

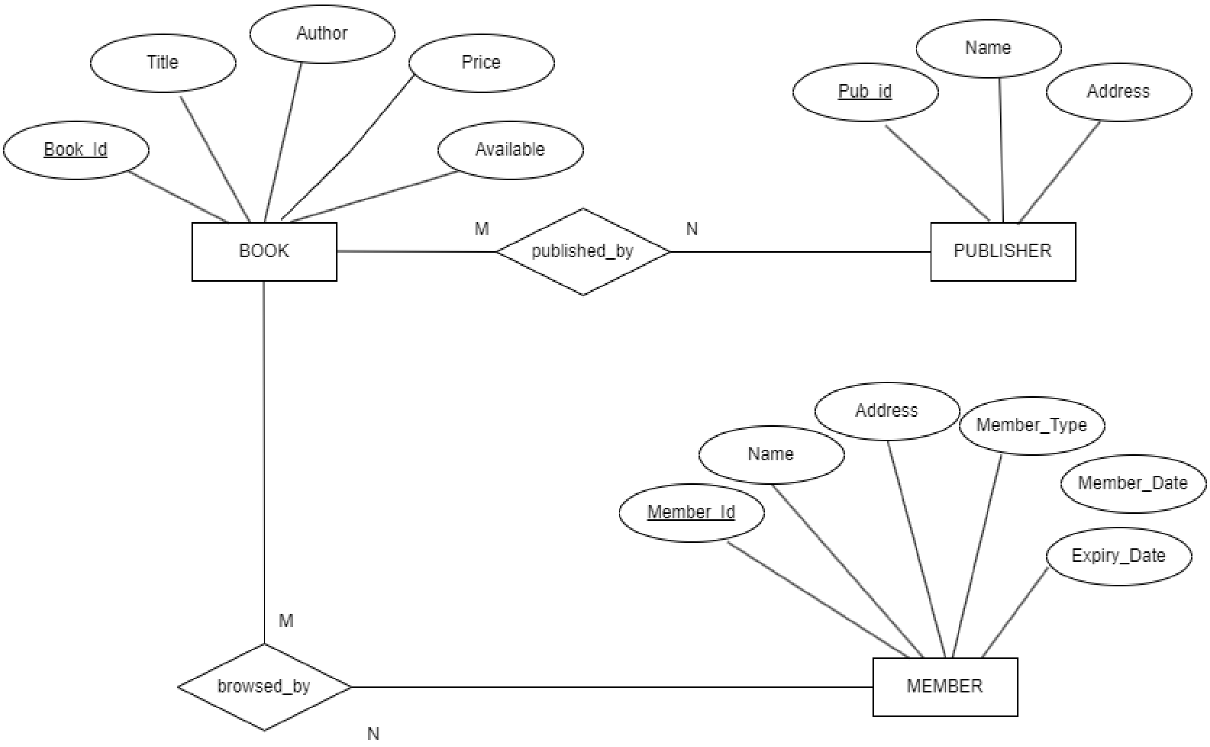
Program 1	Draw E-R diagram for a given scenario. **COLLEGE DATABASE:** STUDENT (USN, SName, Address, Phone, Gender) SEM_SEC (SSID, Sem, Sec) SUBJECT (Subcode, Title, Sem, Credits) IA_MARKS (USN, Subcode, SSID, Test1, Test2, Test3, FinalIA)

Solution:



Program 2	Draw E-R diagram for a given scenario. **LIBRARY DATABASE:** BOOKS (Book_Id, Author, Title, Price, Available) PUBLISHER**(**Pub_Id, Address ,Name) MEMBER(Member_Id,Name, Address, Member_Type, Member_date, Expiry_Date)

Solution:



Program 3	**The EMPLOYEE detail database has a table with the following attributes.** **EMPLOYEE** (Empno: int, Name: string, DOB: date, Phone_no: int) a. Create the above table. b. Display table Structure. c. Enter five tuples into the table. d. Display all the tuples in EMPLOYEE table.

Solution:

a) Create the EMPLOYEE table.

```
SQL> CREATE TABLE EMPLOYEE(
                    Empno int,
                    Name varchar(15),
                    DOB date,
                    Phone_no number(12));
```

b) Display table Structure.

```
SQL> DESC EMPLOYEE;
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 EMPNO                                               NUMBER(38)
 NAME                                               VARCHAR2(15)
 DOB                                                 DATE
 PHONE_NO                                           NUMBER(12)
```

c) Enter five tuples into the table.

```
SQL> insert into EMPLOYEE
          values(1001,'Evelyn','02-aug-1993',8764563728);
1 row created.
SQL> insert into EMPLOYEE
          values(1002,'Heather','24-sep-1996',9874563728);
1 row created.
SQL> insert into EMPLOYEE
          values(1003,'Gregory','12-oct-1983',9994563728);
1 row created.
SQL> insert into EMPLOYEE
          values(1004, 'Anthony','08-jun-1990',8974563728);
1 row created.
```

```
SQL> insert into EMPLOYEE
          values(1005, 'Lindsey','17-jul-1979',7894563728);
1 row created.
```

c) Display all the tuples in EMPLOYEE table.

```
SQL> select * from EMPLOYEE;

EMPNO NAME          DOB        PHONE_NO
---------- --------------- --------- ----------
 1001 Evelyn       02-AUG-93     8764563728
 1002 Heather      24-SEP-96    9874563728
 1003 Gregory       12-OCT-83    9994563728
 1004 Anthony       08-JUN-90    8974563728
 1005 Lindsey       17-JUL-79    7894563728
```

Program 4	Consider **EMPLOYEE** (Empno: int, Name: string, DOB: date, Phone_no: int) Perform the following: a. Rename the table EMPLOYEE as EMP b. Add a new column ‘Salary’ with not null constraint to the existing table EMP c. Rename the column name ‘Name’ to ‘Emp_name’ in EMP table d. Delete the column ‘Salary’ from EMP table. e. Truncate table to delete records. f. Drop table

Creating EMPLOYEE table with primary key Empno:

```
SQL> create table EMPLOYEE(
          Empno int,
          Name varchar(15),
          DOB date,
          Phone_no number(12),
          primary key(Empno));
```

a. Rename the table EMPLOYEE as EMP

```
SQL> alter table EMPLOYEE rename to EMP;
Table altered.
```

b. Add a new column ‘Salary’ with not null constraint to the existing table EMP

```
SQL> ALTER TABLE EMP ADD Salary DECIMAL(10, 2);
Table altered.
```

c. Rename the column name ‘Name’ to ‘Emp_name’ in EMP table

```
SQL> ALTER TABLE EMP RENAME COLUMN Name TO Emp_name;
Table altered.

SQL> DESC EMP;
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 EMPNO                                              NUMBER(38)
 EMP_NAME                                           VARCHAR2(15)
 DOB                                                DATE
 PHONE_NO                                           NUMBER(12)
 SALARY                                             NUMBER(10,2)
```

d. Delete the column 'Salary' from EMP table.

```
SQL> ALTER TABLE Emp1 DROP COLUMN Salary;
Table altered.

SQL> DESC Emp;
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 EMPNO                                              NUMBER(38)
 EMP_NAME                                           VARCHAR2(15)
 DOB                                                DATE
 PHONE_NO                                           NUMBER(12)
```

e. Truncate table to delete records.

```
SQL> TRUNCATE TABLE Emp;
Table truncated.

SQL> SELECT * FROM Emp;
no rows selected
```

f. Drop table

```
SQL> DROP TABLE Emp;
Table dropped.
```

For Verification:

```
SQL> DESC Emp;
ERROR:
ORA-04043: object EMP does not exist
```

Program 5	Perform the following: Viewing all Tables in a Database, Creating Tables (With and Without Constraints). Consider the following tables: **COMPANY**(Emp_id: integer, Emp_name: string, Gender: character) **DEPT**(Dept_id: integer, Dept_name: string) **SALARY**(Emp_id: integer, Dept_id: integer, Salary: integer) Perform the following: a. Creating Tables (specifying the primary keys and the foreign keys) b. Enter 5 tuples in each table c. Saving (Commit) and Undoing (rollback) d. Viewing all Tables in a Database

a. Creating Tables (specifying the primary keys and the foreign keys)

COMPANY table:

```
SQL> CREATE TABLE COMPANY (
        Emp_id INT PRIMARY KEY,
        Emp_name VARCHAR(255) NOT NULL,
        Gender CHAR(1) NOT NULL
        );
Table created

SQL> DESC COMPANY;
 Name                              Null?    Type
 ----------------------------------------- -------- ----------------------------
 EMP_ID                              NOT NULL NUMBER(38)
 EMP_NAME                            NOT NULL VARCHAR2(255)
 GENDER                              NOT NULL CHAR(1)
```

DEPT Table:

```
SQL> CREATE TABLE DEPT (
         Dept_id INT PRIMARY KEY,
        Dept_name VARCHAR(255) NOT NULL
        );
Table created.
```

```
SQL> DESC DEPT;
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 DEPT_ID                                   NOT NULL NUMBER(38)
 DEPT_NAME                                 NOT NULL VARCHAR2(255)
```

SALARY Table:

```
CREATE TABLE SALARY (
        Emp_id INT NOT NULL,
        Dept_id INT NOT NULL,
        Salary INT NOT NULL,
        FOREIGN KEY (Emp_id) REFERENCES COMPANY(Emp_id),
        FOREIGN KEY (Dept_id) REFERENCES DEPT(Dept_id)
        );
```

```
SQL> DESC SALARY;
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 EMP_ID                                    NOT NULL NUMBER(38)
 DEPT_ID                                   NOT NULL NUMBER(38)
 SALARY                                    NOT NULL NUMBER(38)
```

b. Enter 5 tuples in each table

Inserting records into COMPANY table:

```
SQL>INSERT INTO COMPANY
        VALUES (1, 'Alice Johnson', 'F');
1 row created.
SQL>INSERT INTO COMPANY
        VALUES (2, 'Bob Smith', 'M');
1 row created.
SQL>INSERT INTO COMPANY
        VALUES (3, 'Catherine Zeta', 'F');
1 row created.
SQL>INSERT INTO COMPANY
        VALUES (4, 'David Brown', 'M');
1 row created.
SQL>INSERT INTO COMPANY
        VALUES (5, 'Eva Green', 'F');
```

```
1 row created.
```

Inserting records into DEPT Table:

```
SQL> INSERT INTO DEPT
        VALUES (101, 'Human Resources');
1 row created.
SQL> INSERT INTO DEPT
        VALUES (102, 'Finance');
1 row created.
SQL> INSERT INTO DEPT
        VALUES (103, 'Engineering');
1 row created.
SQL> INSERT INTO DEPT
        VALUES (104, 'Marketing');
1 row created.
SQL> INSERT INTO DEPT
        VALUES (105, 'Sales');
1 row created.
```

Inserting records into SALARY Table:

```
SQL> INSERT INTO SALARY
        VALUES (1, 101, 60000);
1 row created.
SQL> INSERT INTO SALARY
        VALUES (2, 102, 55000);
1 row created.
SQL> INSERT INTO SALARY
        VALUES (3, 103, 75000);
1 row created.
```

Saving (Commit) and Undoing (rollback)

```
SQL> SAVEPOINT a;
Savepoint created.

SQL> INSERT INTO SALARY VALUES (4, 104, 50000);
1 row created.

SQL> SAVEPOINT b;
Savepoint created.
```

```
SQL> INSERT INTO SALARY VALUES (5, 105, 65000);
1 row created.

SQL> SELECT * FROM SALARY;

    EMP_ID    DEPT_ID     SALARY
      ----------    ----------     ----------
         1        101       60000
         2        102       55000
         3        103       75000
         4        104       50000
         5        105       65000
```

SQL> ROLLBACK TO a;

```
Rollback complete.

SQL> SELECT * FROM SALARY;

    EMP_ID    DEPT_ID     SALARY
      ---------- ---------- ----------
         1        101       60000
         2        102       55000
         3        103       75000
```

Program 6

For a given data set perform the following Aggregate functions.

EmployeeName	Gender	Salary	DeptName	DeptHead	DeptLocation
Sam	Male	4500	IT	John	London
Pam	Female	2300	HR	Mike	Sydney
Simon	Male	1345	IT	John	London
Mary	Female	2567	HR	Mike	Sydney
Todd	Male	6890	IT	John	London

a. Create table EMPLOYEE
b. Insert above tuples.
c. Retrieve number of employees
d. Retrieve distinct Department name.

Solution:

a. Create table EMPLOYEE

```
SQL>  CREATE TABLE Employee(
       EmployeeName VARCHAR(255) NOT NULL,
      Gender CHAR(1) NOT NULL,
      Salary DECIMAL(8,2) NOT NULL,
      DeptName VARCHAR(255) NOT NULL,
      DeptHead VARCHAR(255) NOT NULL,
      DeptLocation VARCHAR(255) NOT NULL );
```

b. Insert sample tuples

```
SQL>INSERT INTO Employee VALUES ('Sam', 'Male', 4500, 'IT', 'John', 'London');
1 row created
SQL>INSERT INTO Employee VALUES ('Pam', 'Female', 2300, 'HR', 'Mike', 'Sydney');
1 row created
SQL>INSERT INTO Employee VALUES ('Simon', 'Male', 1345, 'IT', 'John', 'London');
1 row created
SQL>INSERT INTO Employee VALUES ('Mary', 'Female', 2567, 'HR', 'Mike', 'Sydney');
```

```
1 row created
SQL>INSERT INTO Employee VALUES  ('Todd', 'Male', 6890, 'IT', 'John', 'London');
```

c. Retrieve number of employees

```
SQL>SELECT COUNT(*) AS number_of_employees FROM Employee;
```

d. Retrieve distinct department names

```
SQL>SELECT DISTINCT DeptName FROM Employee;
```

Program 7

Consider the Employee database with following Schema

EmployeeName	**Gender**	**Salary**	**DeptName**	**DeptHead**	**DeptLocation**
Sam	Male	4500	IT	John	London
Pam	Female	2300	HR	Mike	Sydney
Simon	Male	1345	IT	John	London
Mary	Female	2567	HR	Mike	Sydney
Todd	Male	6890	IT	John	London

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

Solution:

(Note: Program 6 Table need to be created)

```
SQL> SELECT SUM(salary) AS total_salary,
          MAX(salary) AS max_salary,
          MIN(salary) AS min_salary,
          AVG(salary) AS average_salary FROM Employee WHERE department = 'IT';
```

Program 8	Consider the Company database with following Schema **EMP** (Eno : Number; Ename : String; Ebdate : Date; Address : Text; Gender : Text; Salary : Number; Deptno :Number) **DEPT** (Dno :Number; Dname :String; Dlocation: String) **PROJECT** (Pno : Number; Pname : String ; Dnum : Number) **WORKS_ON** (Eno : Number; Pnum; Number; Hours : Number) Execute the Following 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) b. Retrieve the name of employees who born in the year 1990's

Solution:

Create EMP table:

```
SQL> CREATE TABLE EMP ( Eno NUMBER PRIMARY KEY,

        Ename VARCHAR(255) NOT NULL,

        Ebdate DATE,

        Address varchar(50),

        Gender varchar(3),

        Salary NUMBER,

         Deptno NUMBER );

Table created.
```

Create DEPT table:

```
SQL> CREATE TABLE DEPT ( Dno NUMBER PRIMARY KEY,

                        Dname VARCHAR(255) NOT NULL,

                   Dlocation VARCHAR(255) NOT NULL );

Table created.
```

Create Project table:

```
SQL> CREATE TABLE PROJECT (

                    Pno NUMBER PRIMARY KEY,
                    Pname VARCHAR(255) NOT NULL,
                    Dnum NUMBER,
                    FOREIGN KEY (Dnum) REFERENCES DEPT(Dno));
Table created
```

Create works_on table:

```
SQL> CREATE TABLE WORKS_ON (
                    Eno NUMBER,
                    Pno NUMBER,
                    Hours NUMBER,
                    PRIMARY KEY (Eno, Pno), -- Composite Primary Key
                    FOREIGN KEY (Eno) REFERENCES EMP(Eno),
                    FOREIGN KEY (Pno) REFERENCES PROJECT(Pno));
Table created
```

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

```
SQL> SELECT P.Pno, P.Pname, COUNT(DISTINCT W.Eno) AS num_employees FROM
PROJECT P INNER JOIN WORKS_ON W ON P.Pno = W.Pno GROUP BY P.Pno, P.Pname;
```

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

```
SQL>SELECT Ename
          FROM EMP
          WHERE
          EXTRACT(YEAR FROM Ebdate) BETWEEN 1990 AND 1999;
```

(Note: EXTRACT function to extract the year from the Ebdate column.)

Program 9	Consider the Company database with following Schema **EMP** (Eno : Number; Ename : String; Ebdate : Date; Address : Text; Gender : Text; Salary : Number; Deptno :Number) **DEPT** (Dno :Number; Dname :String; Dlocation: String) **PROJECT** (Pno : Number; Pname : String ; Dnum : Number) **WORKS_ON** (Eno : Number; Pnum; Number; Hours : Number) Execute the Following Queries a. For each Department that has more than five employees retrieve the department number and number of employees who are making salary more than 40000. b. For each Department that has more than two employees retrieve the department number and number of employees who are making salary more than 40000.

(NOTE: TO ENTER MINIMUM 6 TUPLES IN THE EMPLOYEE TABLE)

CREATE TABLE EMP

```
SQL>CREATE TABLE EMP
                    ( Eno Number,
                     Ename VARCHAR(20),
                     Ebdate DATE,
                     Address varchar(100),
                     Gender VARCHAR(10),
                      Salary DECIMAL(10, 2),
                      Deptno NUMBER);
```

Table created.

INSERT IN EMP TABLE

```
SQL>INSERT INTO
             EMP (Eno, Ename, Ebdate, Address, Gender, Salary, Deptno)
             VALUES (1, 'John Doe','15-MAY-1990', '123 Main St, Anytown, USA', 'Male',
             50000.00, 101);
             1 row created.

SQL>INSERT INTO
             EMP (Eno, Ename, Ebdate, Address, Gender, Salary, Deptno)
             VALUES (2, 'Jane Smith', '20-AUG-2001', '456 Oak Ave, Somewhere, USA',
             'Female', 60000.00, 102);
```

```
SQL>INSERT INTO
        EMP (Eno, Ename, Ebdate, Address, Gender, Salary, Deptno)
         VALUES (3, 'Michael Johnson', '10-MAR-1993', '789 Elm Rd, Nowhere, USA',
        'Male', 55000.00, 101);
        1 row created.
```

DEPT TABLE CREATION

```
SQL>CREATE TABLE DEPT (
            Dno NUMBER,
            Dname VARCHAR(20),
            Dlocation VARCHAR(20));

            Table created.
```

INSERT VALUES IN DEPT TABLE

```
SQL>INSERT INTO DEPT (Dno, Dname, Dlocation)
      VALUES (101, 'HR Department', 'New York');
      1 row created.

SQL>INSERT INTO DEPT (Dno, Dname, Dlocation)
      VALUES (102, 'IT Department', 'San Francisco');
      1 row created.

SQL>INSERT INTO DEPT (Dno, Dname, Dlocation)
      VALUES  (103, 'Sales Department', 'Chicago');
      1 row created.
```

CREATE TABLE PROJECT:

```
SQL>CREATE TABLE PROJECT (
       PNO NUMBER,
       Pname VARCHAR(20),
       Dnum NUMBER);
Table created.
```

INSERT IN TABLE PROJECT:

```
SQL>INSERT INTO PROJECT (Pno, Pname, Dnum)
        VALUES (1, 'Project A', 101);
        1 row created.

SQL>INSERT INTO PROJECT (Pno, Pname, Dnum)
        VALUES (2, 'Project B', 102);
        1 row created.

SQL>INSERT INTO PROJECT (Pno, Pname, Dnum)
        VALUES (3, 'Project C', 103);
        1 row created.
```

CREATE A TABLE WORKS_ON

```
SQL>CREATE TABLE WORKS_ON
        (Eno NUMBER,
        Pnum NUMBER,
        Hours DECIMAL(5, 2));
Table created.
```

INSERT IN WORKS_ON TABLE

```
SQL>INSERT INTO WORKS_ON (Eno, Pnum, Hours)
        VALUES (1, 1, 40.5);
        1 row created.

SQL>INSERT INTO WORKS_ON (Eno, Pnum, Hours)
        VALUES (1, 2, 30);
        1 row created.

SQL>INSERT INTO WORKS_ON (Eno, Pnum, Hours)
        VALUES (2, 1, 25.75);
        1 row created.

 SQL>INSERT INTO WORKS_ON (Eno, Pnum, Hours)
        VALUES (3, 3, 35);
        1 row created.
```

For each Department that has more than ONE employees retrieve the department number and number of employees who are making salary more than 40000.

```
SQL>SELECT Deptno, COUNT(*) AS NumEmployeesOver40k
        FROM EMP
        WHERE Salary > 40000
        GROUP BY Deptno
        HAVING COUNT(*) > 5;
```

For each Department that has more than two employees retrieve the department number and number of employees who are making salary more than 40000.

```
SQL>SELECT Deptno, COUNT(*) AS NumEmployeesOver40k
        FROM EMP
        WHERE Salary > 40000
        GROUP BY Deptno
        HAVING COUNT(*) > 2;
```

Program 10	Consider the following schema: **STUDENT** (USN, Name, DOB, Branch, Mark1, Mark2, Mark3, Total, GPA) Execute the following queries a. Creating Tables (With and Without Constraints), Inserting/Updating/Deleting Records in a Table, Saving (Commit) and Undoing (rollback) b. List the students who are studying in a particular branch of study. c. Find the maximum GPA score of the student branch-wise.

A. Create Table STUDENT

```
SQL>CREATE TABLE STUDENT(
            USN VARCHAR(15),
            Name VARCHAR(15),
            DOB DATE,
            Branch CHAR(5),
            Mark1 NUMBER(3),
            Mark2 NUMBER(3),
            Mark3 NUMBER(3),
            Total NUMBER(5),
            GPA DECIMAL(4,2),
            PRIMARY KEY (USN));

    Table created.
```

B. Insert into STUDENT Table

```
SQL>INSERT INTO STUDENT VALUES
        ('BCA001','AISHU','28-DEC-1989','CS',70,60,65,195,7.5);
        1 row Created.

SQL>INSERT INTO STUDENT VALUES
        ('BCA002','SNEHA','7-JAN-2000','ARTS',71,62,50,183,7.1);
        1 row Created.


SQL>INSERT INTO STUDENT VALUES
        ('BCA003','RAM','25-NOV-2001','COM',80,70,50,200,7.7);
        1 row Created.
```

```
SQL>INSERT INTO STUDENT VALUES
            ('BCA004','RAJ','5-FEB-2000','B.E',60,60,61,181,7.1);
            1 row Created.


SQL>INSERT INTO STUDENT VALUES
            ('BCA005','KHAN','23-JUN-2002','B.A',70,75,55,200,7.7);
            1 row created.


SQL>INSERT INTO STUDENT VALUES
            ('BCA008','RAJAT','23-JUN-2002','CS',70,75,55,200,6.6);
            1 row created.
```

C. Display the Table Content

```
SQL>SELECT * FROM STUDENT;

            (NOTE: use command  SET PAGESIZE 20;
                                SET LINESIZE 120;)
```

D. Update the Table Content

```
SQL>UPDATE STUDENT
            SET NAME='SNEHA PANDIT'
            WHERE USN='BCA002';
            1 row updated.

SQL>SELECT * FROM STUDENT;
```

E. DELETE the table Content

```
SQL>DELETE FROM STUDENT
            WHERE USN='BCA005';
            1 row deleted.

SQL>SELECT * FROM STUDENT;
```

F. Commit(SAVE THE DATA)

```
COMMIT complete.

SQL>DELETE FROM STUDENT WHERE USN='BCA004';
        1 row deleted.
SQL>SELECT * FROM STUDENT;
```

G. ROLLBACK(UNDO THE CHANGES)

```
SQL>ROLLBACK;
        Rollback complete.

SQL> SELECT * FROM STUDENT;
```

H. List the students who are studying in a particular branch of study

```
SQL>SELECT * FROM STUDENT
        WHERE Branch='CS';
```

I. Find the maximum GPA score of the student branch-wise.

```
SQL>SELECT Branch, MAX(GPA) AS MaxGPA
        FROM STUDENT
        GROUP BY Branch;
```

Program 11	Consider the following schema: **STUDENT (USN, Name, DOB, Branch, Mark1, Mark2, Mark3, Total, GPA)** Execute the following queries: a. Find the GPA score of all the students. b. Find the students who born on a particular year of birth from the ‘DOB’ column.

(NOTE: From Program 10, Queries a,b,c to be executed for the further operations)

a. Find the GPA score of all the students

```
SQL>SELECT GPA
      FROM STUDENT;
```

b. Find the students who born on a particular year of birth from the ‘DOB’ column

```
SQL>SELECT * FROM STUDENT
      WHERE DOB between '01-Jan-2000' and '31-Dec-2000';
```

Program 12	Create the following tables with properly specifying Primary keys, foreign keys andsolve the following queries. **BRANCH** (Branch_id, Branchname, HOD) **STUDENT** (USN, Name, Address, Branch_id, Sem)dd **BOOK** (Book_id, Bookname, Author_id, Publisher, Branch_id) **AUTHOR** (Author_id, Authorname, Country, Age) **BORROW** (USN, Book_id, Borrowed_Date) Execute the following queries a. Display the Book names in descending order of their names. b. Display the number of books written by each Author. c. List the details of Students who are all studying in 2nd sem BCA. d. List the students who are not borrowed any books. e. Display the student details who borrowed more than two books.

To Create Tables:

BRANCH table

```
SQL>CREATE TABLE BRANCH(
         Branch_id Number PRIMARY KEY,
        Branchname VARCHAR(20),
        HOD VARCHAR(20) );
```

STUDENT table

```
SQL>CREATE TABLE STUDENT1 (
        USN VARCHAR(10) PRIMARY KEY,
        Name VARCHAR(20),
        Address VARCHAR(20),
        Branch_id Number,
        Sem Number,
        FOREIGN KEY (Branch_id) REFERENCES BRANCH(Branch_id));
```

AUTHOR table

```
SQL>CREATE TABLE AUTHOR (
                Author_id Number PRIMARY KEY,
                Authorname VARCHAR(20),
                Country VARCHAR(20),
                Age Number
                );
```

BORROW table

```
SQL>CREATE TABLE BORROW (
                USN VARCHAR(20),
                Book_id Number,
                Borrowed_Date DATE,
                PRIMARY KEY (USN, Book_id),
                FOREIGN KEY (USN) REFERENCES STUDENT(USN),
                FOREIGN KEY (Book_id) REFERENCES BOOK(Book_id) );
```

Insert Values in the Branch Table:

```
SQL>INSERT INTO BRANCH (Branch_id, Branchname, HOD)
                VALUES (1, 'Computer Science', 'John Doe');
                1 row created.

SQL>INSERT INTO BRANCH (Branch_id, Branchname, HOD)
                VALUES (2, 'Electrical Engineering', 'Jane Smith');
                1 row created.


SQL>INSERT INTO BRANCH (Branch_id, Branchname, HOD)
                VALUES (3, 'Mechanical Engineering', 'Mike Johnson');
                1 row created.
```

Insert Values in the STUDENT Table

```
SQL>INSERT INTO STUDENT1 (USN, Name, Address, Branch_id, Sem)
                VALUES ('1MS17CS001', 'Alice', '123 Main St', 1, 3);
```

```
                    1 row created.

                    INSERT INTO STUDENT1 (USN, Name, Address, Branch_id, Sem)
                    VALUES ('1MS17ME003', 'Charlie', '789 Oak St', 3, 4);
                    1 row created.
```

Insert Values in the AUTHOR Table

```
SQL>INSERT INTO AUTHOR (Author_id, Authorname, Country, Age)
                    VALUES (1, 'J.K. Rowling', 'UK', 56);
                    1 row created.


SQL>INSERT INTO AUTHOR (Author_id, Authorname, Country, Age)
                    VALUES (2, 'Stephen King', 'USA', 75);
                    1 row created.

SQL>INSERT INTO AUTHOR (Author_id, Authorname, Country, Age)
                    VALUES (3, 'Haruki Murakami', 'Japan', 73);
                    1 row created.
```

Insert Values in the BORROW Table

```
SQL>INSERT INTO BORROW (USN, Book_id, Borrowed_Date)
                     2  VALUES ('1MS17CS001', 101, '28-dec-2000');
                    1 row created.


SQL>INSERT INTO BORROW (USN, Book_id, Borrowed_Date)
                    2  VALUES ('1MS17ME003', 103, '20-jun-2001');
                    1 row created.
```

Display the Book names in descending order of their names.

```
SQL>SELECT Bookname
                     FROM BOOK
                     ORDER BY Bookname DESC;
```

Display the number of books written by each Author.

```
SQL>SELECT Author_id, COUNT(*) AS Num_of_Books
                FROM BOOK
                GROUP BY Author_id;
```

List the details of Students who are all studying in 3rd sem Computer Science

```
SQL>SELECT *
               FROM STUDENT1
               WHERE Sem = 3 AND Branch_id = (SELECT Branch_id FROM BRANCH
               WHERE Branchname = 'Computer Science');
```

List the students who are not borrowed any books.

```
SQL>SELECT * FROM STUDENT1
               WHERE USN
               NOT IN (SELECT DISTINCT USN FROM BORROW);
```

Display the student details who borrowed more than two books

```
SQL>SELECT s.*
               FROM STUDENT1 s
               WHERE s.USN IN (
               SELECT b.USN
               FROM (
               SELECT USN, COUNT(*) AS Num_of_Borrowings
               FROM BORROW
               GROUP BY USN
               ) b
               WHERE b.Num_of_Borrowings > 2
               );
```

Program 13	Write a PLSQL program to perform Arithmetic operations

```
SQL> SET SERVEROUTPUT ON;
SQL> DECLARE
        a int;
        b int;
        c int;
        d int;
        e int;
        f int;
        BEGIN
        a := &a;
        b := &b;
        c := a+b;
        d := a-b;
        e := a*b;
        f := a/b;
        dbms_output.put_line('Addition of two numbers:' ||c);
        dbms_output.put_line('Subtraction of two numbers:' ||d);
        dbms_output.put_line('Multiplication of two numbers:' ||e);
        dbms_output.put_line('Division of two numbers :' ||f);
        END;
```

Program 14	Write a PLSQL program to find out to check whether a year is leap year or not.

```
SQL> SET SERVEROUTPUT ON;
SQL> DECLARE
        Year NUMBER;
        BEGIN
        Year:=2022;
        IF MOD(Year,4)=0 AND MOD(Year,100)!=0 OR MOD(Year,400)=0 THEN
        DBMS_OUTPUT.PUT_LINE(Year ||' IS A LEAP YEAR');
        ELSE
        DBMS_OUTPUT.PUT_LINE(Year ||' IS NOT A LEAP YEAR');
        END IF;
        END;
 /
```

Program 15	Write a PLSQL program to find largest of two numbers.

```
SQL> SET SERVEROUTPUT ON;
SQL>DECLARE
  num1 number;
  num2 number;
  greatest number;
BEGIN
            num1 := &num1;
            num2 := &num2;
    IF num1 > num2 THEN
    greatest := num1;
  ELSE
    greatest := num2;
  END IF;
    DBMS_OUTPUT.PUT_LINE('The greatest number is: ' || greatest);
END;
/
```