

SRI CHANDRASEKHARENDRA SARASWATHI VISWA MAHAVIDYALAYA

(UNIVERSITY ESTABLISHED UNDER SECTION 3 OF UGC ACT 1956)
ENATHUR,KANCHIPURAM – 631561

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING



DATABASE MANAGEMENT SYSTEM LAB RECORD

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Class : 3rd year
Course : BE-CSE
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BONAFIDE CERTIFICATE

This is to certify that this is the bonafide record of work done by Mr/Mrs. S.B.V.Anjaneya with Reg.no 11239A079 of III-B.E-CSE in the DATABASE MANAGEMENT SYSTEM LAB during the academic year 2025-2026

Station: **Enathur**

Date :

Staff-in-charge

Head of the department

**Submitted for the practical examination held
on _____**

Examiner-1

Examiner-2

Experiment 1 : Create Table with Constraints

A. NOT NULL

Ensures a column cannot have NULL (empty) values.

B. UNIQUE

Ensures all values in a column are different.

C. PRIMARY KEY

Uniquely identifies each record in a table (NOT NULL + UNIQUE)

D. FOREIGN KEY

Links one table to another using a referenced key.

E. CHECK

Ensures that all values in a column satisfy a specific condition.

F. DEFAULT

Assigns a default value to a column if no value is provided.

G. CREATE INDEX

Improves the speed of data retrieval from a table.

Experiments:

A. NOT NULL

Code:

```
create table student(id int not null,name varchar2(50) not null);
```

```
SQL> create table student(id int not null,name varchar2(50) not null);
Table created.
```

Output:

```
SQL> desc student
 Name          Null?    Type
 ----          -----   -----
 ID           NOT NULL NUMBER(38)
 NAME         NOT NULL VARCHAR2(50)
```

B. UNIQUE

Code:

```
create table student_uni(roll_no int unique,email varchar2(100) unique);
```

```
SQL> create table student_uni(roll_no int unique,email varchar2(100) unique);
Table created.
```

Output:

```
SQL> desc student_uni
Name Null? Type
ROLL_NO NUMBER(38)
EMAIL VARCHAR2(100)

SQL> create table student_pri(roll_no int primary key,name varchar2(100));
```

C. PRIMARY KEY

Code:

```
create table student_pri(roll_no int primary key,name varchar2(100));
```

```
SQL> create table student_pri(roll_no int primary key,name varchar2(100));
Table created.
```

Output:

```
SQL> desc student_pri
Name Null? Type
ROLL_NO NOT NULL NUMBER(38)
NAME VARCHAR2(100)
```

D. FOREIGN KEY

Code:

```
create table dept(dept_id int primary key,dept_name varchar2(100));
create table student_fore(roll_no int primary key,dept_id int,foreign key (dept_id)
references dept(dept_id));
```

```
SQL> create table dept(dept_id int primary key,dept_name varchar2(100));
Table created.

SQL> create table student_fore(roll_no int primary key,dept_id int,foreign key (dept_id) references dept(dept_id));
Table created.
```

Output:

```
SQL> desc student_fore
Name Null? Type
ROLL_NO NOT NULL NUMBER(38)
DEPT_ID NUMBER(38)
```

E. CHECK

Code:

```
create table student_check(id int primary key,age int check(age>=18));
```

```
SQL> create table student_check(id int primary key,age int check(age>=18));
Table created.
```

Output:

```
SQL> desc student_check
Name          Null?    Type
-----  -----
ID           NOT NULL NUMBER(38)
AGE          NUMBER(38)
```

F. DEFAULT**Code:**

```
create table student_default(id int primary key,city varchar2(50) default 'kadiri');
SQL> create table student_default(id int primary key,city varchar2(50) default 'kadiri');
Table created.
```

Output:

```
SQL> desc student_default
Name          Null?    Type
-----  -----
ID           NOT NULL NUMBER(38)
CITY         VARCHAR2(50)
```

G. CREATE INDEX**Code:**

```
create index idx_name on student_pri(name);
```

```
SQL> create index idx_name on student_pri(name);
Index created.
```

Output:

```
SQL> select index_name,table_name,column_name
  2  from user_ind_columns
  3  where table_name='STUDENT_PRI';
```

```
INDEX_NAME
```

```
TABLE_NAME
```

```
COLUMN_NAME
```

```
SYS_C008359
STUDENT_PRI
ROLL_NO
```

```
IDX_NAME
STUDENT_PRI
NAME
```

```
INDEX_NAME
```

```
TABLE_NAME
```

```
COLUMN_NAME
```

Experiment 2 : INSERT Command

- 1. Insert values with single entry**
- 2. Insert values with multiple entries**
- 3. ALTER Table Structure**
- 4. VIEW Table structure**
- 5. UPDATE table**
- 6. DELETE Rows in table**

Source Code:

```
-- =====
-- EXPERIMENT 2: INSERT COMMAND
-- =====

-- Step 1: Create and use database
CREATE DATABASE IF NOT EXISTS DBMS_Experiments;
USE DBMS_Experiments;

-- Step 2: Create necessary tables (so INSERT has targets)
CREATE TABLE IF NOT EXISTS Students (
    StudentID INT PRIMARY KEY,
    FirstName VARCHAR(50) NOT NULL,
    LastName VARCHAR(50),
    Email VARCHAR(100) UNIQUE,
    Age INT CHECK (Age >= 18),
    City VARCHAR(50) DEFAULT 'Unknown'
);

CREATE TABLE IF NOT EXISTS Courses (
    CourseID INT PRIMARY KEY,
    CourseName VARCHAR(100) NOT NULL
);

CREATE TABLE IF NOT EXISTS Enrollments (
    EnrollmentID INT PRIMARY KEY,
    StudentID INT,
    CourseID INT,
    FOREIGN KEY (StudentID) REFERENCES Students(StudentID),
    FOREIGN KEY (CourseID) REFERENCES Courses(CourseID)
);

-- =====
```

```
-- INSERT COMMANDS
```

```
-- 1 Insert values with single entry
```

```
INSERT INTO Students (StudentID, FirstName, LastName, Email, Age, City)  
VALUES (1, 'John', 'Doe', 'john.doe@example.com', 20, 'New York');
```

```
-- 2 Insert values with multiple entries
```

```
INSERT INTO Students (StudentID, FirstName, LastName, Email, Age, City)  
VALUES  
(2, 'Alice', 'Smith', 'alice.smith@example.com', 22, 'Boston'),  
(3, 'Bob', 'Brown', 'bob.brown@example.com', 21, 'Chicago'),  
(4, 'Mary', 'Johnson', 'mary.johnson@example.com', 19, DEFAULT);
```

```
-- 3 Insert into Courses table
```

```
INSERT INTO Courses (CourseID, CourseName)  
VALUES  
(101, 'Database Systems'),  
(102, 'Operating Systems'),  
(103, 'Computer Networks');
```

```
-- 4 Insert into Enrollments table
```

```
INSERT INTO Enrollments (EnrollmentID, StudentID, CourseID)  
VALUES  
(1, 1, 101),  
(2, 2, 102),  
(3, 3, 103),  
(4, 4, 101);
```

```
-- =====
```

```
-- VIEW INSERTED DATA
```

```
-- =====
```

```
SELECT * FROM Students;  
SELECT * FROM Courses;  
SELECT * FROM Enrollments;
```

Program:

```
-- Step 1: Create and use database
CREATE DATABASE IF NOT EXISTS DBMS_Experiments;
USE DBMS_Experiments;

-- Step 2: Create necessary tables (so INSERT has targets)
CREATE TABLE IF NOT EXISTS Students (
    StudentID INT PRIMARY KEY,
    FirstName VARCHAR(50) NOT NULL,
    LastName VARCHAR(50),
    Email VARCHAR(100) UNIQUE,
    Age INT CHECK (Age >= 18),
    City VARCHAR(50) DEFAULT 'Unknown'
);

CREATE TABLE IF NOT EXISTS Courses (
    CourseID INT PRIMARY KEY,
    CourseName VARCHAR(100) NOT NULL
);

CREATE TABLE IF NOT EXISTS Enrollments (
    EnrollmentID INT PRIMARY KEY,
    StudentID INT,
    CourseID INT,
    FOREIGN KEY (StudentID) REFERENCES Students(StudentID),
    FOREIGN KEY (CourseID) REFERENCES Courses(CourseID)
);

-- =====
-- INSERT COMMANDS
-- =====

-- 1 Insert values with single entry
INSERT INTO Students (StudentID, FirstName, LastName, Email, Age, City)
VALUES (1, 'John', 'Doe', 'john.doe@example.com', 20, 'New York');

-- 2 Insert values with multiple entries
INSERT INTO Students (StudentID, FirstName, LastName, Email, Age, City)
VALUES
(2, 'Alice', 'Smith', 'alice.smith@example.com', 22, 'Boston'),
(3, 'Bob', 'Brown', 'bob.brown@example.com', 21, 'Chicago'),
(4, 'Mary', 'Johnson', 'mary.johnson@example.com', 19, DEFAULT);
```

```

-- 3 Insert into Courses table
INSERT INTO Courses (CourseID, CourseName)
VALUES
(101, 'Database Systems'),
(102, 'Operating Systems'),
(103, 'Computer Networks');

-- 4 Insert into Enrollments table
INSERT INTO Enrollments (EnrollmentID, StudentID, CourseID)
VALUES
(1, 1, 101),
(2, 2, 102),
(3, 3, 103),
(4, 4, 101);

-- =====

-- VIEW INSERTED DATA
-- =====

SELECT * FROM Students;
SELECT * FROM Courses;
SELECT * FROM Enrollments;

```

Output:

	StudentID	FirstName	LastName	Email	Age	City
▶	1	John	Doe	john.doe@example.com	20	New York
	2	Alice	Smith	alice.smith@example.com	22	Boston
	3	Bob	Brown	bob.brown@example.com	21	Chicago
*	4	Mary	Johnson	mary.johnson@example.com	19	Unknown
*	NUL	NUL	NUL	NUL	NUL	NUL

	CourseID	CourseName
▶	101	Database Systems
	102	Operating Systems
	103	Computer Networks
*	NUL	NUL

	EnrollmentID	StudentID	CourseID
▶	1	1	101
	2	2	102
	3	3	103
	4	4	101
*	NUL	NUL	NUL

Experiment 3 :Aggregate Functions

Source Code:

```
DROP DATABASE IF EXISTS college;  
CREATE DATABASE college;  
USE college;
```

```
-- Create table  
CREATE TABLE marks (  
    student_name VARCHAR(50),  
    subject VARCHAR(50),  
    score INT  
)
```

```
-- Insert sample data  
INSERT INTO marks VALUES  
(‘Manasa’, ‘DBMS’, 90),  
(‘Ravi’, ‘DBMS’, 80),  
(‘Priya’, ‘Math’, 95),  
(‘Kiran’, ‘Math’, 65),  
(‘Meena’, ‘Math’, 60);
```

```
-- Display all records  
SELECT * FROM marks;
```

```
-- Aggregate functions demonstration  
SELECT  
    MIN(score) AS min_score,  
    MAX(score) AS max_score,  
    COUNT(*) AS total_students,  
    SUM(score) AS total_score,  
    AVG(score) AS avg_score  
FROM marks;
```

Program:

```
DROP DATABASE IF EXISTS college;
CREATE DATABASE college;
USE college;
-- Create table
CREATE TABLE marks (
    student_name VARCHAR(50),
    subject VARCHAR(50),
    score INT
);
-- Insert sample data
INSERT INTO marks VALUES
('Manasa', 'DBMS', 90),
('Ravi', 'DBMS', 80),
('Priya', 'Math', 95),
('Kiran', 'Math', 65),
('Meena', 'Math', 60);
-- Display all records
SELECT * FROM marks;
-- Aggregate functions demonstration
SELECT
    MIN(score) AS min_score,
    MAX(score) AS max_score,
    COUNT(*) AS total_students,
    SUM(score) AS total_score,
    AVG(score) AS avg_score
FROM marks;
```

Output:

	student_name	subject	score
▶	Manasa	DBMS	90
	Ravi	DBMS	80
	Priya	Math	95
	Kiran	Math	65
	Meena	Math	60

	min_score	max_score	total_students	total_score	avg_score
▶	60	95	5	390	78.0000

Experiment 4 :Group By and Order By

Source Code:

```
DROP DATABASE IF EXISTS college;
CREATE DATABASE college;
USE college;
CREATE TABLE marks (
    student_name VARCHAR(50),
    subject VARCHAR(50),
    score INT
);
INSERT INTO marks VALUES
('Manasa', 'DBMS', 90),
('Ravi', 'DBMS', 80),
('Priya', 'Math', 95),
('Kiran', 'Math', 65),
('Meena', 'Math', 60);
-- Average score per subject
SELECT subject, AVG(score) AS avg_score
FROM marks
GROUP BY subject;
-- Order students by score descending
SELECT student_name, score
FROM marks
ORDER BY score DESC;
```

Program:

```
DROP DATABASE IF EXISTS college;
CREATE DATABASE college;
USE college;
CREATE TABLE marks (
    student_name VARCHAR(50),
    subject VARCHAR(50),
    score INT
);
INSERT INTO marks VALUES
('Manasa', 'DBMS', 90),
('Ravi', 'DBMS', 80),
('Priya', 'Math', 95),
('Kiran', 'Math', 65),
('Meena', 'Math', 60);
-- Average score per subject
SELECT subject, AVG(score) AS avg_score
FROM marks
GROUP BY subject;
-- Order students by score descending
SELECT student_name, score
FROM marks
ORDER BY score DESC;
```

Output:

Result Grid		
	student_name	score
▶	Priya	95
	Manasa	90
	Ravi	80
	Kiran	65
	Meena	60

Result Grid		
	subject	avg_score
▶	DBMS	85.0000
	Math	73.3333

Experiment 5 : Ascending, Descending

Source Code:

```
-- Create database
CREATE DATABASE IF NOT EXISTS college;
USE college;

-- Create table
DROP TABLE IF EXISTS student;
CREATE TABLE student (
    id INT PRIMARY KEY,
    name VARCHAR(30),
    age INT,
    branch VARCHAR(10)
);

-- Insert sample data
INSERT INTO student VALUES
(1, 'Manasa', 20, 'CSE'),
(2, 'Ravi', 22, 'ECE'),
(3, 'Kiran', 21, 'CSE'),
(4, 'Priya', 19, 'EEE'),
(5, 'Arjun', 23, 'MECH');

-- View all records
SELECT * FROM student;

-- Ascending order by name
SELECT * FROM student
ORDER BY name ASC;

-- Descending order by age
SELECT * FROM student
ORDER BY age DESC;
```

Program:

```

-- Create database
CREATE DATABASE IF NOT EXISTS college;
USE college;
-- Create table
DROP TABLE IF EXISTS student;
CREATE TABLE student (
    id INT PRIMARY KEY,
    name VARCHAR(30),
    age INT,
    branch VARCHAR(10)
);
-- Insert sample data
INSERT INTO student VALUES
(1, 'Manasa', 20, 'CSE'),
(2, 'Ravi', 22, 'ECE'),
(3, 'Kiran', 21, 'CSE'),
(4, 'Priya', 19, 'EEE'),
(5, 'Arjun', 23, 'MECH');
-- View all records
SELECT * FROM student;
-- Ascending order by name
SELECT * FROM student
ORDER BY name ASC;
-- Descending order by age
SELECT * FROM student
ORDER BY age DESC;

```

Output:

	id	name	age	branch
▶	1	Manasa	20	CSE
	2	Ravi	22	ECE
	3	Kiran	21	CSE
	4	Priya	19	EEE
*	5	Arjun	23	MECH
	NULL	NULL	NULL	NULL

	id	name	age	branch
▶	5	Arjun	23	MECH
	3	Kiran	21	CSE
	1	Manasa	20	CSE
	4	Priya	19	EEE
	2	Ravi	22	ECE
*	NULL	NULL	NULL	NULL

	id	name	age	branch
▶	5	Arjun	23	MECH
	2	Ravi	22	ECE
	3	Kiran	21	CSE
	1	Manasa	20	CSE
	4	Priya	19	EEE
*	NULL	NULL	NULL	NULL

Experiment 6 :SQL Operators

1. Like operator (%,-)

2. Between & or

Source Code:

```
DROP DATABASE IF EXISTS college;
CREATE DATABASE college;
USE college;
CREATE TABLE student (
    student_id INT PRIMARY KEY,
    name VARCHAR(50),
    age INT,
    dept_id INT
);
INSERT INTO student VALUES
(101, 'Manasa', 20, 1),
(102, 'Ravi', 21, 2),
(103, 'Priya', 19, 1),
(104, 'Kiran', 22, 1),
(105, 'Meena', 20, 3);
-- LIKE operator
SELECT * FROM student WHERE name LIKE 'M%';
SELECT * FROM student WHERE name LIKE '%an%';
-- BETWEEN operator
SELECT * FROM student WHERE age BETWEEN 19 AND 21;
-- IN operator
SELECT * FROM student WHERE dept_id IN (1, 3);
```

Program:

```

DROP DATABASE IF EXISTS college;
CREATE DATABASE college;
USE college;
CREATE TABLE student (
    student_id INT PRIMARY KEY,
    name VARCHAR(50),
    age INT,
    dept_id INT
);
INSERT INTO student VALUES
(101, 'Manasa', 20, 1),
(102, 'Ravi', 21, 2),
(103, 'Priya', 19, 1),
(104, 'Kiran', 22, 1),
(105, 'Meena', 20, 3);
-- LIKE operator
SELECT * FROM student WHERE name LIKE 'M%';
SELECT * FROM student WHERE name LIKE '%an%';
-- BETWEEN operator
SELECT * FROM student WHERE age BETWEEN 19 AND 21;
-- IN operator
SELECT * FROM student WHERE dept_id IN (1, 3);

```

Output:

	student_id	name	age	dept_id
▶	101	Manasa	20	1
▶	105	Meena	20	3
*	NULL	NULL	NULL	NULL

	student_id	name	age	dept_id
▶	101	Manasa	20	1
▶	104	Kiran	22	1
*	NULL	NULL	NULL	NULL

	student_id	name	age	dept_id
▶	101	Manasa	20	1
▶	102	Ravi	21	2
▶	103	Priya	19	1
▶	105	Meena	20	3
*	NULL	NULL	NULL	NULL

	student_id	name	age	dept_id
▶	101	Manasa	20	1
▶	103	Priya	19	1
▶	104	Kiran	22	1
▶	105	Meena	20	3
*	NULL	NULL	NULL	NULL

Experiment 7 : SQL Joins

- 1. Inner Join**
- 2. Left Join**
- 3. Right Join**
- 4. Outer Join**
- 5. Left Join exclude Inner Join**
- 6. Right Join exclude Inner Join**
- 7. Outer Join exclude Inner Join**

Source Code:

```
-- Create tables
DROP TABLE IF EXISTS Students;
DROP TABLE IF EXISTS Courses;
CREATE TABLE Students (
    StudentID INT,
    Name VARCHAR(50),
    CourseID INT
);

CREATE TABLE Courses (
    CourseID INT,
    CourseName VARCHAR(50)
);

-- Insert data
INSERT INTO Students VALUES
(1, 'John', 101),
(2, 'Emma', 102),
(3, 'Raj', 103),
(4, 'Sara', NULL);

INSERT INTO Courses VALUES
(101, 'Math'),
(102, 'Science'),
(104, 'History');

-- 1. INNER JOIN
SELECT s.Name, c.CourseName
FROM Students s
INNER JOIN Courses c ON s.CourseID = c.CourseID;
```

-- 2. LEFT JOIN

```
SELECT s.Name, c.CourseName  
FROM Students s  
LEFT JOIN Courses c ON s.CourseID = c.CourseID;
```

-- 3. RIGHT JOIN

```
SELECT s.Name, c.CourseName  
FROM Students s  
RIGHT JOIN Courses c ON s.CourseID = c.CourseID;
```

-- 4. FULL OUTER JOIN (some databases: use UNION of LEFT + RIGHT)

```
SELECT s.Name, c.CourseName  
FROM Students s  
LEFT JOIN Courses c ON s.CourseID = c.CourseID  
UNION  
SELECT s.Name, c.CourseName  
FROM Students s  
RIGHT JOIN Courses c ON s.CourseID = c.CourseID;
```

-- 5. LEFT JOIN EXCLUDING INNER JOIN

```
SELECT s.Name, c.CourseName  
FROM Students s  
LEFT JOIN Courses c ON s.CourseID = c.CourseID  
WHERE c.CourseID IS NULL;
```

-- 6. RIGHT JOIN EXCLUDING INNER JOIN

```
SELECT s.Name, c.CourseName  
FROM Students s  
RIGHT JOIN Courses c ON s.CourseID = c.CourseID  
WHERE s.CourseID IS NULL;
```

Program:

```

-- Create tables
DROP TABLE IF EXISTS Students;
DROP TABLE IF EXISTS Courses;
CREATE TABLE Students (
    StudentID INT,
    Name VARCHAR(50),
    CourseID INT
);
CREATE TABLE Courses (
    CourseID INT,
    CourseName VARCHAR(50)
);
-- Insert data
INSERT INTO Students VALUES
(1, 'John', 101),
(2, 'Emma', 102),
(3, 'Raj', 103),
(4, 'Sara', NULL);
INSERT INTO Courses VALUES
(101, 'Math'),
(102, 'Science'),
(104, 'History');

-- 1. INNER JOIN
SELECT s.Name, c.CourseName
FROM Students s
INNER JOIN Courses c ON s.CourseID = c.CourseID;

-- 2. LEFT JOIN
SELECT s.Name, c.CourseName
FROM Students s
LEFT JOIN Courses c ON s.CourseID = c.CourseID;

-- 3. RIGHT JOIN
SELECT s.Name, c.CourseName
FROM Students s
RIGHT JOIN Courses c ON s.CourseID = c.CourseID;

-- 4. FULL OUTER JOIN (some databases: use UNION of LEFT + RIGHT)
SELECT s.Name, c.CourseName
FROM Students s
LEFT JOIN Courses c ON s.CourseID = c.CourseID
UNION
SELECT s.Name, c.CourseName
FROM Students s
RIGHT JOIN Courses c ON s.CourseID = c.CourseID;

-- 5. LEFT JOIN EXCLUDING INNER JOIN
SELECT s.Name, c.CourseName
FROM Students s
LEFT JOIN Courses c ON s.CourseID = c.CourseID
WHERE c.CourseID IS NULL;

-- 6. RIGHT JOIN EXCLUDING INNER JOIN
SELECT s.Name, c.CourseName
FROM Students s
RIGHT JOIN Courses c ON s.CourseID = c.CourseID
WHERE s.CourseID IS NULL;

```

Output:

Result Grid | Filter Rows:

	Name	CourseName
▶	John	Math
	Emma	Science

Result Grid | Filter Rows:

	Name	CourseName
▶	John	Math
	Emma	Science
	Raj	NULL
	Sara	NULL

Result Grid | Filter Row:

	Name	CourseName
▶	John	Math
	Emma	Science
	NULL	History

Result Grid | Filter Rows: [

	Name	CourseName
▶	John	Math
	Emma	Science
	Raj	NULL
	Sara	NULL
	NULL	History

Result Grid | Filter Rows:

	Name	CourseName
▶	Raj	NULL
	Sara	NULL

Result Grid | Filter Rows:

	Name	CourseName
▶	NULL	History

Experiment 8 : Normal Forms

1. INF

Source Code:

```
DROP DATABASE IF EXISTS normalforms;  
CREATE DATABASE normalforms;  
USE normalforms;
```

```
CREATE TABLE orders_1nf (  
    order_id INT,  
    customer_name VARCHAR(30),  
    product VARCHAR(30),  
    quantity INT  
);
```

```
INSERT INTO orders_1nf VALUES  
(1, 'Manasa', 'Pen', 10),  
(1, 'Manasa', 'Book', 2),  
(2, 'Ravi', 'Pencil', 5);  
SELECT * FROM orders_1nf;
```

Program:

```

DROP DATABASE IF EXISTS normalforms;
CREATE DATABASE normalforms;
USE normalforms;

CREATE TABLE orders_1nf (
    order_id INT,
    customer_name VARCHAR(30),
    product VARCHAR(30),
    quantity INT
);

INSERT INTO orders_1nf VALUES
(1, 'Manasa', 'Pen', 10),
(1, 'Manasa', 'Book', 2),
(2, 'Ravi', 'Pencil', 5);
SELECT * FROM orders_1nf;

```

Output:

	order_id	customer_name	product	quantity
▶	1	Manasa	Pen	10
	1	Manasa	Book	2
	2	Ravi	Pencil	5

2. 2NF

Source Code:

-- Clean safely (drop children first)

DROP TABLE IF EXISTS items;

DROP TABLE IF EXISTS orders_2nf;

DROP TABLE IF EXISTS customer;

-- Recreate tables

CREATE TABLE customer (

cust_id INT PRIMARY KEY,

cust_name VARCHAR(30)

);

```

CREATE TABLE orders_2nf (
    order_id INT PRIMARY KEY,
    cust_id INT,
    FOREIGN KEY (cust_id) REFERENCES customer(cust_id)
);

CREATE TABLE items (
    item_id INT PRIMARY KEY,
    order_id INT,
    product VARCHAR(30),
    quantity INT,
    FOREIGN KEY (order_id) REFERENCES orders_2nf(order_id)
);

-- Insert data

INSERT INTO customer VALUES (1, 'Manasa'), (2, 'Ravi');

INSERT INTO orders_2nf VALUES (101, 1), (102, 2);

INSERT INTO items VALUES
(1, 101, 'Pen', 10),
(2, 101, 'Book', 2),
(3, 102, 'Pencil', 5);

-- Verify

SELECT o.order_id, c.cust_name, i.product, i.quantity
FROM orders_2nf o
JOIN customer c ON o.cust_id = c.cust_id
JOIN items i ON o.order_id = i.order_id;

```

Program:

```

-- Clean safely (drop children first)
DROP TABLE IF EXISTS items;
DROP TABLE IF EXISTS orders_2nf;
DROP TABLE IF EXISTS customer;
-- Recreate tables
CREATE TABLE customer (
    cust_id INT PRIMARY KEY,
    cust_name VARCHAR(30)
);
CREATE TABLE orders_2nf (
    order_id INT PRIMARY KEY,
    cust_id INT,
    FOREIGN KEY (cust_id) REFERENCES customer(cust_id)
);
CREATE TABLE items (
    item_id INT PRIMARY KEY,
    order_id INT,
    product VARCHAR(30),
    quantity INT,
    FOREIGN KEY (order_id) REFERENCES orders_2nf(order_id)
);
-- Insert data
INSERT INTO customer VALUES (1, 'Manasa'), (2, 'Ravi');
INSERT INTO orders_2nf VALUES (101, 1), (102, 2);
INSERT INTO items VALUES
(1, 101, 'Pen', 10),
(2, 101, 'Book', 2),
(3, 102, 'Pencil', 5);
-- Verify
SELECT o.order_id, c.cust_name, i.product, i.quantity
FROM orders_2nf o
JOIN customer c ON o.cust_id = c.cust_id
JOIN items i ON o.order_id = i.order_id;

```

Output:

Result Grid				
	order_id	cust_name	product	quantity
▶	101	Manasa	Pen	10
	101	Manasa	Book	2
	102	Ravi	Pencil	5

3. 3NF

Source Code:

```

-- Create database
CREATE DATABASE normalforms3;
USE normalforms3;
-- Tables for 3NF
CREATE TABLE city (
    city_name VARCHAR(30) PRIMARY KEY,
    state VARCHAR(30)

```

```

);
CREATE TABLE customer (
    cust_id INT PRIMARY KEY,
    cust_name VARCHAR(30),
    city_name VARCHAR(30),
    FOREIGN KEY (city_name) REFERENCES city(city_name)
);
CREATE TABLE orders (
    order_id INT PRIMARY KEY,
    cust_id INT,
    product VARCHAR(30),
    quantity INT,
    FOREIGN KEY (cust_id) REFERENCES customer(cust_id)
);
-- Insert data
INSERT INTO city VALUES
('Vijayawada', 'Andhra Pradesh'),
('Hyderabad', 'Telangana');
INSERT INTO customer VALUES
(1, 'Manasa', 'Vijayawada'),
(2, 'Ravi', 'Hyderabad');
INSERT INTO orders VALUES
(101, 1, 'Pen', 10),
(102, 1, 'Book', 5),
(103, 2, 'Pencil', 6);
-- Display result
SELECT o.order_id, c.cust_name, c.city_name, ci.state, o.product, o.quantity
FROM orders o
JOIN customer c ON o.cust_id = c.cust_id
JOIN city ci ON c.city_name = ci.city_name;

```

Program:

```

-- Create database
CREATE DATABASE normalforms3;
USE normalforms3;
-- Tables for 3NF
CREATE TABLE city (
    city_name VARCHAR(30) PRIMARY KEY,
    state VARCHAR(30)
);
CREATE TABLE customer (
    cust_id INT PRIMARY KEY,
    cust_name VARCHAR(30),
    city_name VARCHAR(30),
    FOREIGN KEY (city_name) REFERENCES city(city_name)
);
CREATE TABLE orders (
    order_id INT PRIMARY KEY,
    cust_id INT,
    product VARCHAR(30),
    quantity INT,
    FOREIGN KEY (cust_id) REFERENCES customer(cust_id)
);

```

```
-- Insert data
INSERT INTO city VALUES
('Vijayawada', 'Andhra Pradesh'),
('Hyderabad', 'Telangana');
INSERT INTO customer VALUES
(1, 'Manasa', 'Vijayawada'),
(2, 'Ravi', 'Hyderabad');
INSERT INTO orders VALUES
(101, 1, 'Pen', 10),
(102, 1, 'Book', 5),
(103, 2, 'Pencil', 6);
-- Display result
SELECT o.order_id, c.cust_name, c.city_name, ci.state, o.product, o.quantity
FROM orders o
JOIN customer c ON o.cust_id = c.cust_id
JOIN city ci ON c.city_name = ci.city_name;
```

Output:

	order_id	cust_name	city_name	state	product	quantity
▶	103	Ravi	Hyderabad	Telangana	Pencil	6
	101	Manasa	Vijayawada	Andhra Pradesh	Pen	10
	102	Manasa	Vijayawada	Andhra Pradesh	Book	5

Experiment 9 :Nested Queries Using select across two tables

Source Code:

```
CREATE TABLE department (
dept_id INT PRIMARY KEY,
dept_name VARCHAR(20)
);
CREATE TABLE student (
stu_id INT PRIMARY KEY,
stu_name VARCHAR(20),
dept_id INT,
FOREIGN KEY (dept_id) REFERENCES department(dept_id)
);
INSERT INTO department VALUES (1, 'CSE'), (2, 'ECE');
INSERT INTO student VALUES
(101, 'Manasa', 1),
```

```

(102, 'Ravi', 2),
(103, 'Priya', 1);
SELECT stu_name
FROM student
WHERE dept_id = (SELECT dept_id FROM department WHERE dept_name = 'CSE');

```

Program:

```

CREATE TABLE department (
    dept_id INT PRIMARY KEY,
    dept_name VARCHAR(20)
);
CREATE TABLE student (
    stu_id INT PRIMARY KEY,
    stu_name VARCHAR(20),
    dept_id INT,
    FOREIGN KEY (dept_id) REFERENCES department(dept_id)
);
INSERT INTO department VALUES (1, 'CSE'), (2, 'ECE');
INSERT INTO student VALUES
(101, 'Manasa', 1),
(102, 'Ravi', 2),
(103, 'Priya', 1);
SELECT stu_name
FROM student
WHERE dept_id = (SELECT dept_id FROM department WHERE dept_name = 'CSE');

```

Output:

Result Grid	
	stu_name
▶	Manasa
	Priya

Experiment 10 :SQL wild card characters

Source Code:

```

DROP TABLE IF EXISTS student;

CREATE TABLE student (
    id INT,
    name VARCHAR(30)
);

INSERT INTO student (id, name) VALUES
(1, 'Manasa'),

```

```
(2, 'Ravi'),  
(3, 'Manoj'),  
(4, 'Priya'),  
(5, 'Kiran');
```

-- Names starting with 'Ma'

```
SELECT name
```

```
FROM student
```

```
WHERE name LIKE 'Ma%';
```

-- Names containing 'ri' (case-insensitive)

```
SELECT name
```

```
FROM student
```

```
WHERE LOWER(name) LIKE '%ri%';
```

Program:

```
DROP TABLE IF EXISTS student;  
CREATE TABLE student (  
    id INT,  
    name VARCHAR(30)  
);  
INSERT INTO student (id, name) VALUES  
(1, 'Manasa'),  
(2, 'Ravi'),  
(3, 'Manoj'),  
(4, 'Priya'),  
(5, 'Kiran');  
-- Names starting with 'Ma'  
SELECT name  
FROM student  
WHERE name LIKE 'Ma%';  
-- Names containing 'ri' (case-insensitive)  
SELECT name  
FROM student  
WHERE LOWER(name) LIKE '%ri%';
```

Output:

Result Grid |

	name
▶	Manasa
	Manoj

Result Grid |

	name
▶	Priya

Experiment 11 :Retrieve Database using SELECT with Comparison operator (= , > . < . >= , <=)

Source Code:

```
DROP TABLE IF EXISTS student;
```

```
CREATE TABLE student (
```

```
    id INT,
```

```
    name VARCHAR(30),
```

```
    marks INT
```

```
);
```

```
INSERT INTO student (id, name, marks) VALUES  
(1, 'Manasa', 85),  
(2, 'Ravi', 72),  
(3, 'Manoj', 90),  
(4, 'Priya', 78),  
(5, 'Kiran', 60);
```

```
-- Single query showing all comparison operators
```

```
SELECT
```

```
    name,
```

```
    marks,
```

```
CASE
```

```
    WHEN marks = 78 THEN 'Equal to 78'
```

```
    WHEN marks > 80 THEN 'Greater than 80'
```

```
    WHEN marks < 75 THEN 'Less than 75'
```

```
    WHEN marks >= 78 THEN 'Greater than or equal to 78'
```

```
    WHEN marks <= 72 THEN 'Less than or equal to 72'
```

```
    ELSE 'Other'
```

```
END AS `Condition`
```

```
FROM student;
```

Program:

```

DROP TABLE IF EXISTS student;
CREATE TABLE student (
    id INT,
    name VARCHAR(30),
    marks INT
);
INSERT INTO student (id, name, marks) VALUES
(1, 'Manasa', 85),
(2, 'Ravi', 72),
(3, 'Manoj', 90),
(4, 'Priya', 78),
(5, 'Kiran', 60);
-- Single query showing all comparison operators
SELECT
    name,
    marks,
    CASE
        WHEN marks = 78 THEN 'Equal to 78'
        WHEN marks > 80 THEN 'Greater than 80'
        WHEN marks < 75 THEN 'Less than 75'
        WHEN marks >= 78 THEN 'Greater than or equal to 78'
        WHEN marks <= 72 THEN 'Less than or equal to 72'
        ELSE 'Other'
    END AS `Condition`
FROM student;

```

Output:

	name	marks	Condition
▶	Manasa	85	Greater than 80
	Ravi	72	Less than 75
	Manoj	90	Greater than 80
	Priya	78	Equal to 78
	Kiran	60	Less than 75

Experiment 12 : Working on Local Host XAMPP Server

1. Exploring Server Variables.(Servername, User, pwd, DBname)

Source Code:

```
-- Get the current MySQL user
```

```
SELECT USER();
```

```
-- Get the current selected database
```

```
SELECT DATABASE();
```

```
-- Get the hostname (server name)
```

```
SHOW VARIABLES LIKE 'hostname';
```

```
-- Get the MySQL version
```

```
SELECT VERSION();
```

Program:

```
-- Get the current MySQL user
SELECT USER();

-- Get the current selected database
SELECT DATABASE();
|
-- Get the hostname (server name)
SHOW VARIABLES LIKE 'hostname';

-- Get the MySQL version
SELECT VERSION();
```

Output:

Result Grid	
	USER()
▶	root@localhost

Result Grid	
	DATABASE()
▶	testdb

Result Grid	
Filter Rows:	
Variable_name	Value
▶ hostname	DESKTOP-1FJ85TS

Result Grid	
	VERSION()
▶	8.0.44

2. Exploring Create hierarchical user access with privileges

Source Code:

```
-- Check if the database exists and then drop it
DROP DATABASE IF EXISTS testdb;

CREATE DATABASE testdb;

USE testdb;

CREATE TABLE students (id INT PRIMARY KEY, name VARCHAR(50), age INT);
```

Program:

```
-- Check if the database exists and then drop it
DROP DATABASE IF EXISTS testdb;
CREATE DATABASE testdb;
USE testdb;
CREATE TABLE students (id INT PRIMARY KEY, name VARCHAR(50), age INT);
-- Experiment: Create Users and Grant Privileges in MySQL

-- Step 1: Drop database if it already exists and create a new one
DROP DATABASE IF EXISTS companydb;
CREATE DATABASE companydb;
USE companydb;
|
-- Step 2: Create users (admin and staff)
CREATE USER IF NOT EXISTS 'admin'@'localhost' IDENTIFIED BY 'admin123';
CREATE USER IF NOT EXISTS 'staff'@'localhost' IDENTIFIED BY 'staff123';

-- Step 3: Grant privileges
-- Admin has full access to companydb
GRANT ALL PRIVILEGES ON companydb.* TO 'admin'@'localhost';

-- Staff has limited access (can only SELECT and INSERT)
GRANT SELECT, INSERT ON companydb.* TO 'staff'@'localhost';
```

```
-- Step 4: Apply privilege changes  
FLUSH PRIVILEGES;  
  
-- Step 5: Verify the privileges for each user  
SHOW GRANTS FOR 'admin'@'localhost';  
SHOW GRANTS FOR 'staff'@'localhost';
```

Output:

Result Grid		Filter Rows:	Export:
	Grants for admin@localhost		
▶	GRANT SELECT, INSERT, UPDATE, DELETE, CR... GRANT APPLICATION_PASSWORD_ADMIN,AU... GRANT ALL PRIVILEGES ON `companydb`.* TO...		

Result Grid		Filter Rows:	Exp
	Grants for staff@localhost		
▶	GRANT USAGE ON *.* TO 'staff' @'localhost' GRANT SELECT, INSERT ON `companydb`.* T... GRANT SELECT, INSERT, UPDATE ON `testdb`		



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on the 7th of November, 2025

saraswathi M
Oracle Academy Instructor

