
📘 DBMS PRACTICAL – PART B (DML OPERATIONS)

Title: *DML Commands – Insert, Update, Delete, Select, Sorting, Pattern Matching & Aggregations*

🎯 AIM

To perform various **DML (Data Manipulation Language)** operations on the student table such as:

- Inserting records
- Updating existing records
- Deleting specific records
- Retrieving all and selective records
- Applying pattern matching
- Using range conditions
- Sorting data
- Using aggregate functions
- Grouping data using GROUP BY

🧠 THEORY (LONG, FULL-PAGE, EXAM-READY)

⭐ 1. Introduction to DML

Data Manipulation Language (DML) is a subset of SQL used to **manipulate the data stored inside tables**.
While DDL defines structure, DML deals with **data retrieval and modification**.
DML commands do not change the structure of tables; instead, they insert, modify, delete, or fetch data from existing tables.

⭐ 2. INSERT Command

The **INSERT** statement is used to add new rows (records) into a table.
We can insert all columns or specific columns.

In this practical, rno is AUTO_INCREMENT, so it is not inserted manually.
Example:

INSERT INTO stud(name, age, marks, city, email_id) VALUES (...);

⭐ 3. UPDATE Command

The **UPDATE** statement is used to modify existing records.
Very important:

- Always use **WHERE** to avoid updating all rows.
  Example:

UPDATE stud SET city='Delhi' WHERE name='Priya';

⭐ 4. DELETE Command

The **DELETE** statement is used to delete specific rows.
Again, WHERE is mandatory to avoid deleting the entire table.
Example:

DELETE FROM stud WHERE rno = 3;

⭐ 5. SELECT Command

SELECT retrieves data from tables.
Examples:

- SELECT * FROM stud; (all records)
- SELECT name FROM stud; (specific column)

SELECT is the most used command in SQL.

⭐ 6. Pattern Matching (LIKE)

LIKE is used for string pattern matching:

- 'S%' → starts with S
- '%i' → ends with i
  LIKE is used along with wildcard characters.

⭐ 7. Range Selection (BETWEEN)

BETWEEN is used to select values in a given range.
Example:

WHERE rno BETWEEN 2 AND 7;

⭐ 8. Sorting (ORDER BY)

ORDER BY arranges the result in ascending or descending order.
Example:

- ORDER BY name
- ORDER BY marks DESC

⭐ 9. Aggregate Functions

Aggregate functions perform calculations on a group of values:

- MAX
- MIN
- SUM
- AVG
- COUNT

Example:

SELECT MAX(marks) FROM stud;

⭐ 10. GROUP BY

GROUP BY groups rows that have the same value in a column.
Mostly used with aggregate functions.
Example:
Counting students age-wise.

This practical shows how DML commands help in managing and analyzing the data stored in a database.

🧪 PART B – COMPLETE DML CODE

```
INSERT INTO stud (name, age, marks, city, email_id) VALUES
('Sahil', 20, 78, 'Nashik', 'sahil@gmail.com'),
('Priya', 21, 88, 'Pune', 'priya@gmail.com'),
('Rohan', 22, 65, 'Mumbai', 'rohan@gmail.com'),
('Sneha', 19, 90, 'Nashik', 'sneha@gmail.com'),
('Vikas', 20, 72, 'Pune', 'vikas@gmail.com'),
('Aditi', 23, 85, 'Nagpur', 'aditi@gmail.com'),
('Saurabh', 21, 67, 'Nashik', 'saurabh@gmail.com'),
('Isha', 20, 92, 'Pune', 'isha@gmail.com'),
('Neha', 22, 76, 'Mumbai', 'neha@gmail.com'),
('Sanjay', 19, 81, 'Nashik', 'sanjay@gmail.com');

UPDATE stud SET city = 'Delhi' WHERE name = 'Priya';

DELETE FROM stud WHERE rno = 3;

SELECT * FROM stud;

SELECT * FROM stud WHERE name LIKE 'S%';

SELECT * FROM stud WHERE name LIKE '%i';

SELECT * FROM stud WHERE rno BETWEEN 2 AND 7;

SELECT * FROM stud ORDER BY name;
```

```
SELECT * FROM stud ORDER BY marks DESC;


SELECT
   MAX(marks),
   MIN(marks),
   SUM(marks),
   AVG(marks),
   COUNT(*)
FROM stud;


SELECT age, COUNT(*) AS total_students, MAX(marks) AS highest_marks
FROM stud
GROUP BY age;
```

🔍 **STEP-BY-STEP EXPLANATION (LINE BY LINE)**

⭐ **1. INSERT RECORDS**

INSERT INTO stud (name, age, marks, city, email_id) VALUES (...);

- Adds new rows to the table.
- rno is auto-generated, so we don't insert it.

⭐ **2. UPDATE RECORD**

UPDATE stud SET city='Delhi' WHERE name='Priya';

- Changes only Priya's city.
- WHERE ensures only one row is updated.

⭐ **3. DELETE A RECORD**

DELETE FROM stud WHERE rno = 3;

- Deletes the row with roll number 3.
- Without WHERE, all rows would be deleted.

⭐ 4. SELECT ALL RECORDS

SELECT * FROM stud;

- Displays every row and column in the table.

⭐ 5. NAMES STARTING WITH 'S'

SELECT * FROM stud WHERE name LIKE 'S%';

- S% → Pattern for names beginning with S.

⭐ 6. NAMES ENDING WITH 'i'

SELECT * FROM stud WHERE name LIKE '%i';

- %i → Pattern for names ending with "i".

⭐ 7. RANGE OF ROLL NUMBERS

SELECT * FROM stud WHERE rno BETWEEN 2 AND 7;

- Displays records with roll numbers from 2 to 7.

⭐ 8. SORTING

SELECT * FROM stud ORDER BY name;

- Sorts names alphabetically.

SELECT * FROM stud ORDER BY marks DESC;

- Sorts marks from highest to lowest.

⭐ 9. AGGREGATE FUNCTIONS

SELECT MAX(marks), MIN(marks), SUM(marks), AVG(marks), COUNT(*) FROM stud;

- MAX → highest marks
- MIN → lowest
- SUM → total of all marks
- AVG → average
- COUNT → number of students

⭐ 10. GROUP BY

SELECT age, COUNT(*), MAX(marks) FROM stud GROUP BY age;

- Groups by age
- Shows number of students per age
- Shows highest marks per age

🗣️ HOW TO EXPLAIN THIS PRACTICAL TO EXTERNAL (20 SECONDS PERFECT ANSWER)

“Sir, in the DML part I inserted 10 records into the stud table.
Then I updated Priya’s city using UPDATE and deleted roll number 3 using DELETE.
Using SELECT, I displayed all records, selected students using LIKE patterns, used BETWEEN for range selection, and ORDER BY for sorting.
I applied aggregate functions like MAX, MIN, AVG, COUNT, and finally used GROUP BY to analyze students age-wise.”

🎤 VIVA QUESTIONS & ANSWERS (AT THE END ONLY)

1. What is DML?

DML stands for Data Manipulation Language used to modify and retrieve data.

2. Name DML commands.

INSERT, UPDATE, DELETE, SELECT.

3. Difference between DELETE and DROP.

DELETE removes specific rows; DROP removes the entire table.

4. Why do we use WHERE?

To filter rows and avoid affecting all records.

5. What is LIKE used for?

For pattern matching using wildcards.

6. What is ORDER BY?

Used to sort data in ascending or descending order.

7. What are aggregate functions?

Functions like MAX, MIN, AVG, SUM, COUNT that perform calculations.

8. What is GROUP BY?

Used to group rows that have the same value in a column.
