Pranjal Save(SY-COMPS)

Data Base Management System (22319)

UNIT II-Relational Data Model.

(Weightage -18marks)

Q1.Define Table and Field.(2marks)

Tables-

- Collection of related data entries and it consist of Column and rows.
- A table is a collection of related data held in table format. It is a set of data elements using a model of vertical columns and horizontal rows.

Fields-

- Smallest unit of data and has a meaning to the user eg name ,address.
- Each table contains field which is a data structure, used to hold the data. It can also be termed as attribute.

Q2.List any four Data types in SQL.(2marks)

SQL Datatype is used to define the values that a column can contain.

Every column is required to have a name and data type in the database table.

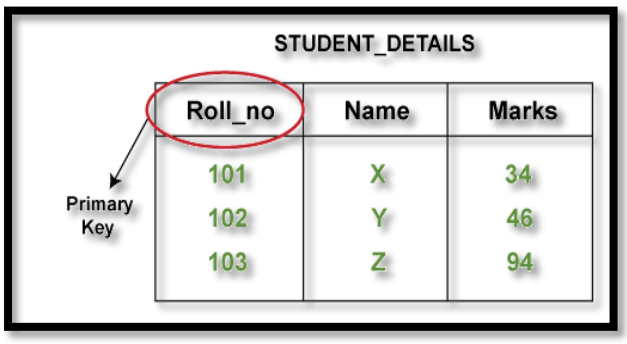
- 1)Char(n): Fixed-length character data (string),n characters long.Maximum size-255 2)varchar2(n):variable length character string,Maximum size-2000
- 3)date:date date type for storing date and time. The default format for the date is dd-mm-yy
- 4)long:-character data up to a length of 2 gb.only one long column is allowed per table
- 5)number(o,d):-number data type for integer and real o=overall no of digits , d=number of digits to the right of the decimal point max value o=38, d=-84 to +127 Eg number (5,2)=999.99

Q3.Define following terms.(2marks/4marks)

i)Primary key **ii)Candidate Key** **iii)Foreign Key**

Ans-Primary key

PRIMARY KEY in DBMS is a column or group of columns in a table that uniquely identify every row in that table. The Primary Key can't be a duplicate meaning the same value can't appear more than once in the table. A table cannot have more than one primary key.



Primary key is an attribute or set of attributes used to identify an entity from an entity set. All the values of a primary key should be unique and null values are not allowed.

Example, RollNo attribute is a primary key for Relation Student

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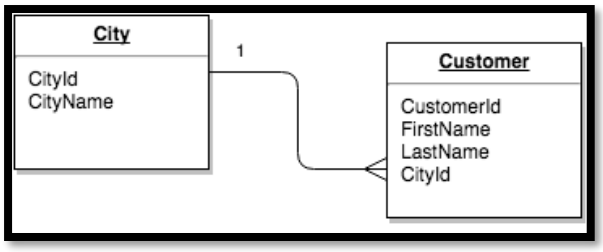
Foreign Key

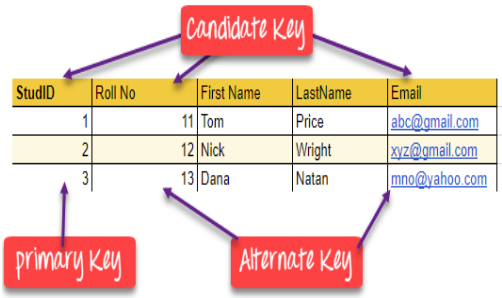
FOREIGN KEY is a column that creates a relationship between two tables. The purpose of Foreign keys is to maintain data integrity and allow navigation between two different instances of an entity. It acts as a cross-reference between two tables as it references the primary key of another table. This concept is also known as Referential Integrity



Foreign key is an attribute of an entity which is the primary key of another entity. It is used to show relation between entities. The table containing foreign key is called the child table.

Candidate Key

CANDIDATE KEY in SQL is a set of attributes that uniquely identify tuples in a table. Candidate Key is a super key with no repeated attributes. The Primary key should be selected from the candidate keys. Every table must have at least a single candidate key. A table can have multiple candidate keys but only a single primary key.



Candidate key Example: In the given table Stud ID, Roll No, and email are candidate keys which help us to uniquely identify the student record in the table.

In a relation, there may be a primary key or may not, but there may be a key or combination of keys which uniquely identify the record. Such a key is called as Candidate key. OR A candidate key is a column, or set of columns, in a table that can uniquely identify any database record without referring to any other data. The candidate key can be simple (having only one attribute) or composite as well. For Example, {STUD_NO, COURSE_NO} is a composite candidate key for relation STUDENT_COURSE.

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Q4.State E.F Codd's Rules (2marks)

Rule 0:Foundation Rule	**Rule 7:High-level Insert , Update and Delete Rule**
Rule 1:Information Representation	**Rule 8:Physical data independence**
Rule 2:Systematic treatment of null values	**Rule 9:Logical data independence**
Rule 3:The guaranteed access Rule	**Rule 10:Integrity independence**
Rule 4:Active online catalog	**Rule 11:Distribution independence**
Rule 5:The comprehensive data sub language Rule	**Rule 12:The non-subversion rule**
Rule 6:View updating Rule	

State and Explain E.F codd rules any four.(4marks)

1.Foundation rule- The DB must be structured in a relational manner so that the system's relational capabilities can manage the DB.

2.Information Rule-The data stored in a database, may it be user data or metadata, must be a value of some table cell. Everything in a database must be stored in a table format.

3. Guaranteed Access Rule-Every single data element (value) is guaranteed to be accessible logically with a combination of table-name, primary-key (row value), and attribute-name (column value)

A relational DB's primary key value, column name, and table name can be used to conceptually retrieve any single or precise data (the atomic value).

4. Systematic Treatment of NULL Values-The NULL values in a database must be given a systematic and uniform treatment. This is a very important rule because a NULL can be interpreted as one the following – data is missing, data is not known, or data is not applicable.Primary key must not be null.For Eg:- Landline No.

5. Active Online Catalog-The structure description of the entire database must be stored in an online catalog, known as data dictionary, which can be accessed by authorized users. Users can use the same query language to access the catalog which they use to access the database itself. A DB dictionary is a logical representation of the whole logical structure of a descriptive DB that needs to be stored online. It grants users access to the DB and uses a query language that is comparable to that of the DB.

6. Rule of Comprehensive Data Sub-language -A single robust language should be able to define integrity constraints, views, data manipulations, transactions and authorizations. If the database allows access to the aforementioned ones, it is violating this rule.

7. View Updating Rule-All the views of a database, which can theoretically be updated, must also be updatable by the system. Views help in data abstraction.

8. High Level Insert, Update, and Delete Rule - A database must support high-level insertion, updation, and deletion. This must not be limited to a single row, that is, it must also support union, intersection and minus operations to yield sets of data records.

9. Physical Data Independence- All stored data in a database or an application must be physically independent to access the database. Each data should not depend on other data or an application. If data is updated or the physical structure of the database is changed, it will not show any effect on external applications that are accessing the data from the database.

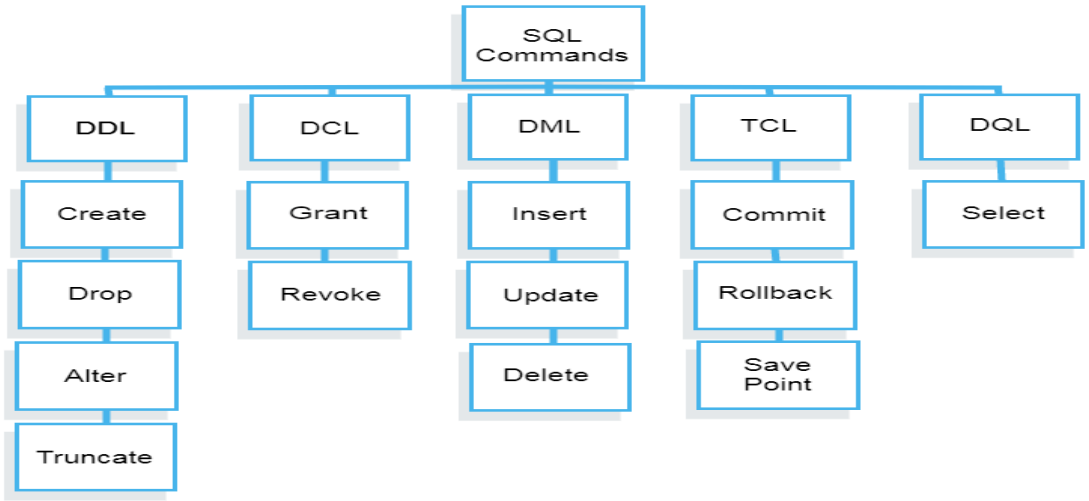
10. Logical Data Independence-It is similar to physical data independence. It means, if any changes occurred to the logical level (table structures), it should not affect the user's view (application). For example, suppose a table either split into two tables, or two table joins to create a single table, these changes should not be impacted on the user view application.

11. Integrity Independence A database must be independent of the application that uses it. All its integrity constraints can be independently modified without the need of any change in the application. This rule makes a database independent of the front-end application and its interface

12 .Rule of Distribution Independence -The Data Manipulation Language of the relational system should not be concerned about the physical data storage and no alterations should be required if the physical data is centralized or distributed.

13. Rule of Non Subversion -Any row should obey the security and integrity constraints imposed. No special privileges are applicable.

Q5.Enlist SQL Types . or Classify SQL (2marks)



Q6. List four DDL commands with syntax.(2marks)

Or Describe create & alter command with syntax & example.(4marks)

OR Explain any two DDL commands along with example.(4marks)

Or Write syntax for creating and Renaming a table.(2marks)

ANSWER-

Data Definition Language (DDL)

- DDL changes the structure of the table like creating a table, deleting a table, altering a table, etc.
- All the command of DDL are auto-committed that means it permanently save all the changes in the database.

Here are some commands that come under DDL:

● CREATE ● ALTER ● DROP ● TRUNCATE ● Rename ● DESC

1.CREATE

The SQL CREATE TABLE statement is used to create a new table.

Syntax The basic syntax of the CREATE TABLE statement is as follows –

CREATE TABLE table_name

(column1 datatype (size), column2 datatype(size), column3 datatype(size), ...);

Example: CREATE TABLE Persons (PersonIDnumber(10), LastNamevarchar2(20), FirstNamevarchar2(20), Address varchar2(20), City varchar2(20));

2.ALTER

The ALTER TABLE statement is used to add, delete, or modify columns in an existing table. The ALTER TABLE statement is also used to add and drop various constraints on an existing table. It is used to alter the structure of the database. This change could be either to modify the characteristics of an existing attribute or probably to add a new attribute.

Syntax ALTER TABLE table_name ADD/MODIFY column_name COLUMN data types;

Example

ALTER TABLE STU_DETAILS ADD(ADDRESS VARCHAR2(20));

ALTER TABLE STU_DETAILS MODIFY (NAME VARCHAR2(20));

3.TRUNCATE

It is used to delete all the rows from the table and free the space containing the table.

Syntax - TRUNCATE TABLE table_name; **Example-** TRUNCATE TABLE EMPLOYEE;

4.Drop

It is used to delete both the structure and record stored in the table.

Syntax DROP TABLE table_name;

Example DROP TABLE EMPLOYEE;

5.Rename

Rename table command is used to rename the old table name to new table name.

Syntax:- rename table old_tablename to new_tablename;

Example- Rename emp to emp1

6.Desc

The table structure can be described by using describe command.

Syntax- Desc table_name

Q7. Enlist & Explain DML commands.(2marks)./(4marks)

Data Manipulation Language

● DML commands are used to modify the database. It is responsible for all form of changes in the database.

● The command of DML is not auto-committed that means it can't permanently save all the changes in the database. They can be rollback.

Here are some commands that come under DML: ● INSERT ● UPDATE ● DELETE

INSERT: The INSERT statement is a SQL query. It is used to insert data into the row of a table.

Syntax:-INSERT INTO TABLE_NAME VALUES (value1, value2, value3, ... valueN);
Example_- INSERT INTO javatpoint (Author, Subject) VALUES ("Sonoo", "DBMS");

INSERT INTO javatpoint values (“Sonoo”,”DBMS”);

UPDATE: This command is used to update or modify the value of a column in the table.
Syntax:- UPDATE table_name SET column_name=new_value WHERE column_name=some_value;

Example - UPDATE students SET User_Name = 'Sonoo' WHERE Student_Id = '3' c

.

DELETE: It is used to remove one or more row from a table.

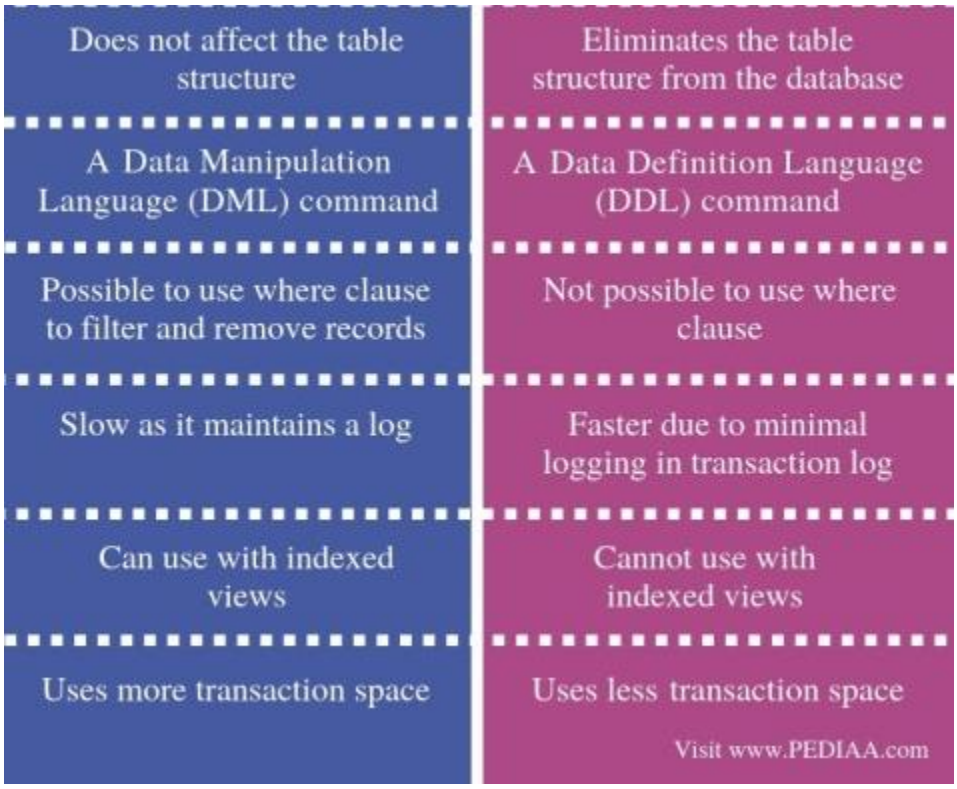
DELETE FROM table_name [WHERE condition];

DELETE FROM javatpoint WHERE Author="Sonoo";

Delete * from table_name; //full table record

Q8. Explain difference between delete and truncate command with example.(4marks)

DELETE	TRUNCATE
It is a DML command.	It is a DDL command
Used to remove specific rows or all the rows depending upon our requirement.	Can only be used to remove all the rows from a table.
It can use the WHERE clause.	It can't use the WHERE clause.
It is comparatively slower.	It is faster.
It records the deleted rows in the transactions log.	Since it removes the page where our table's data is stored, it stores the page in the transactional log.



Q9. List DCL commands.(2marks)

Or Explain Grant and Revoke Command with example(4marks)

Data Control Language

DCL commands are used to grant and take back authority from any database user.

DCL commands are related to the security of the database.

Here are some commands that come under DCL: ● Grant ● Revoke

a. Grant:The objects created by one user are not accessible by another user unless the owner of those object gives such permission to the other user.It is used to give user access privileges to a database. List of object are ALTER, DELETE, INSERT, SELECT,UPDATE with GRANT OPTION

Syntax: Grant {object privileges} ON object name TO user name [with GRANT OPTION]

Syntax:-GRANT SELECT, UPDATE ON MY_TABLE TO SOME_USER;

GRANT ALL ON student TO Sachin;

b. Revoke: The revoke statement is used to deny the grant given on an object. It is used to take back permissions from the user. Syntax:- REVOKE {object privileges} ON object name FROM user_name; Syntax:-REVOKE SELECT, UPDATE ON MY_TABLE FROM USER1, USER2;

REVOKE DELETE ON student From sachin;

Q10.Explain savepoint and Rollback command with suitable example.(4marks)

Or Describe commit and rollback with syntax and example.(4marks)

TCL commands can only use with DML commands like INSERT, DELETE and UPDATE only.

These operations are automatically committed in the database that's why they cannot be used while creating tables or dropping them.

Here are some commands that come under TCL: ● COMMIT ● ROLLBACK ● SAVEPOINT

a. Commit: Commit command is used to save all the transactions to the database.

Syntax: SQL>DELETE FROM CUSTOMERS WHERE AGE = 25;

SQL>COMMIT;

b. Rollback: Rollback command is used to undo transactions that have not already been saved to the database.

Syntax -DELETE FROM CUSTOMERS WHERE AGE = 25;

ROLLBACK;

c. SAVEPOINT: It is used to roll the transaction back to a certain point without rolling back the entire transaction.

Synatax-SAVEPOINT SAVEPOINT_NAME;

Example : savepoint sp1; SQL>>Delete from customers where ID=3; SQL>>Rollback sp2]

Or answer can be according to msbte-

Commit: The COMMIT command saves all transactions to the database since the last COMMIT or ROLLBACK command

The syntax: SQL> COMMIT; Or COMMIT WORK;

Example : SQL>Commit;

Rollback: The ROLLBACK command is used to undo transactions that have not already been saved to the database. The ROLLBACK command can only be used to undo transactions since the last COMMIT or ROLLBACK command was issued.

The syntax for ROLLBACK is: ROLLBACK TO SAVEPOINT_NAME; OR ROLLBACK; OR ROLLBACK WORK;
Example: SQL>ROLLBACK;

Q11. Explain Primary and Unique key constraint with syntax.

Explain Not null constraint

Primary Key Constraint/ Not NULL Constraint

- A primary key is a constraint that enforces the uniqueness of values in one or more columns of a table.
- It also ensures that the specified column(s) do not contain NULL values because a primary key must uniquely identify each row, and NULL values do not provide unique identification.
- Each table can have only one primary key, and it's typically used to uniquely identify each row in the table.
- The entity integrity constraint states that primary key value can't be null.
- This is because the primary key value is used to identify individual rows in relation and if the primary key has a null value, then we can't identify those rows.
- A table can contain a null value other than the primary key field

They are also known to be Entity integrity constraints.

EMPLOYEE

EMP_ID	EMP_NAME	SALARY
123	Jack	30000
142	Harry	60000
164	John	20000
	Jackson	27000

Not allowed as primary key can't contain a NULL value

Syntax

```
CREATE TABLE table_name
(
column1 datatype PRIMARY KEY not null,
column2 datatype,
...
);
```

Example

```
CREATE TABLE Customers
(
CustomerID INT PRIMARY KEY not null,
FirstName VARCHAR(50),
LastName VARCHAR(50),
...
);
```

Unique Key Constraint:

- A unique key constraint is similar to a primary key in that it enforces the uniqueness of values in one or more columns of a table.
- Unlike the primary key, a unique key allows NULL values in the specified column(s), meaning it can enforce uniqueness but still allow at most one row with a NULL value in that column.
- A table can have multiple unique key constraints.

Syntax :CREATE TABLE table_name (

column1 datatype UNIQUE,

column2 datatype,

...

);

Example : CREATE TABLE Employees (

EmployeeID INT UNIQUE,

FirstName VARCHAR(50),

LastName VARCHAR(50),

...

);

4. Key constraints

- Keys are the entity set that is used to identify an entity within its entity set uniquely.
- An entity set can have multiple keys, but out of which one key will be the primary key. A primary key can contain a unique and null value in the relational table.

ID	NAME	SEMENSTER	AGE
1000	Tom	1st	17
1001	Johnson	2nd	24
1002	Leonardo	5th	21
1003	Kate	3rd	19
1002	Morgan	8th	22

Not allowed. Because all row must be unique

Q12. Enlist arithmetic and logical SQL operators.(2marks)

SQL Arithmetic Operators: Addition Operator (+) Subtraction Operator (-) Multiplication Operator (+) Division Operator (-) Modulus Operator

SQL Logical Operators: ALL operator AND operator OR operator BETWEEN operator IN operator NOT operator ANY operator LIKE operator

Q13.List the SQL operations and explain range searching operation 'between' and pattern matching operator 'like' with example.(4marks)

Range Searching Operators

Between and Not Between Operator:-The between and not between operator select a range of data between two values and not between the two values.These values can be number, text or dates.

The between operator is used to search for value that are within that a set of values, given the minimum value and the maximum value.

Syntax:-select column_name from table_name WHERE column_name between value1 and value2;

Syntax:-select column_name from table_name WHERE column_name not between value1 and value2;

LastName	FirstName	Address	City
sharma	Arun	Camp 23	Mumbai
Gupta	Vijay	GM Road18	Pune
Mane	Pooja	Decaan 19	Mumbai

Example :- To display the persons alphabetically **between** (and including) "sharma" and exclusive "johnson" use the following sql

Select * from persons where LastName Between ' Sharma' and 'Mane';

Example :- To display the persons outside the range used the not operator:

Select * from persons where LastName Not Between ' Sharma' and 'Mane';

Pattern Matching in SQL

- LIKE clause is used to perform the pattern matching task in SQL.
- A WHERE clause is generally preceded by a LIKE clause in an SQL query.
- LIKE clause searches for a match between the patterns in a query with the pattern in the values present in an SQL table. If the match is successful, then that particular value will be retrieved from the SQL table.
- LIKE clause can work with strings and numbers.

The LIKE clause uses the following symbols known as wildcard operators in SQL to perform this pattern-matching task in SQL.

1. To represent zero, one or more than one character, % (percentage) is used.
2. To represent a single character _ (underscore) is used

ID	Name	City	Salary	Age
1	Priyanka Bagul	Nasik	26000	20
2	Riya Sharma	Mumbai	72000	28
3	Neha Verma	Varanasi	37000	19
4	Neeta Desai	Nasik	39500	21
5	Priya Wagh	Udaipur	60000	32

A) Using LIKE clause with % (percentage) (Draw Table)

Example 1: Write a query to display employee details in which name starts with 'Pr

SELECT * FROM employee_details **WHERE Name** LIKE 'Pr%'; '

Example 2: Write a query to display employee details in which 'ya' is a substring in a name.

SELECT * FROM employee_details **WHERE Name** LIKE '%ya%';

Write a query to display employee details in which city name ends with 'i'.;

(B) Using LIKE clause with _ (underscore)

Example 1:

Write a query to display employee details in which city name starts with 'Na', ends with 'ik', and contains any single character between 'Na' and 'ik'.

Query:

mysql> **SELECT * FROM** employee_details **WHERE** City LIKE 'Na_ik';

Example 2:

Write a query to display employee details in which salary contains a number starting with '3' succeeding any two digits and finally ends with '00'.

SELECT * FROM employee_details **WHERE** Salary LIKE '3__00';

Q14 .Explain any four set operators in SQL with example.(4marks)

SET Operators in SQL

There are certain rules which must be followed to perform operations using SET operators in SQL. Rules are as follows:

1. **The number and order of columns must be the same.**
2. **Data types must be compatible.**

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1. UNION:

● UNION will be used to combine the result of two select statements.

● Duplicate rows will be eliminated from the results obtained after performing the UNION operation.

● The UNION operator is used to combine the result-set of two or more SELECT statements.

● Every SELECT statement within UNION must have the same number of columns

● The columns must also have similar data types

● The columns in every SELECT statement must also be in the same order

ID	Name	Department	Salary	Year_of_Experience
1	Aakash Singh	Development	72000	2
2	Abhishek Pawar	Production	45000	1
3	Pranav Deshmukh	HR	59900	3
4	Shubham Mahale	Accounts	57000	2
5	Sunil Kulkarni	Development	87000	3
6	Bhushan Wagh	R&D	75000	2
7	Paras Jaiswal	Marketing	32000	1

ID	Name	Department	Salary	Year_of_Experience
1	Prashant Wagh	R&D	49000	1
2	Abhishek Pawar	Production	45000	1
3	Gautam Jain	Development	56000	4
4	Shubham Mahale	Accounts	57000	2
5	Rahul Thakur	Production	76000	4
6	Bhushan Wagh	R&D	75000	2
7	Anand Singh	Marketing	28000	1

SQL Statement>>SELECT * FROM t_employees UNION SELECT *FROM t2_employees;

2. UNION ALL:

● This operator combines all the records from both the queries.

● Duplicate rows will be not be eliminated from the results obtained after performing the UNION ALL operation.

Example 1: Write a query to perform union all operation between the table t_employees and the table t2_employees.

Query: 1. mysql> SELECT *FROM t_employees UNION ALL SELECT *FROM t2_employees;

3. INTERSECT:

● It is used to combine two SELECT statements, but it only returns the records which are common from both SELECT statements.

Example 1: Write a query to perform intersect operation between the table t_employees and the table t2_employees.

Query: 1. mysql> SELECT * FROM t_employees INTERSECT SELECT * FROM t2_employees;

4. MINUS

● It displays the rows which are present in the first query but absent in the second query with no duplicates.

Example 1: Write a query to perform a minus operation between the table t_employees and the table t2_employees.

Query: 1. mysql> SELECT * FROM t_employees MINUS SELECT * FROM t2_employees;

ID	Name	Department	Salary	Year_of_Experience
1	Aakash Singh	Development	72000	2
3	Pranav Deshmukh	HR	59900	3
5	Sunil Kulkarni	Development	87000	3
7	Paras Jaiswal	Marketing	32000	1

Since we have performed Minus operation between both the tables, so only the unmatched records from both the tables are displayed.