

SQL Assignment - Introduction to SQL and Advanced Functions

Assignment Code: DA-AG-014

Question 1

Explain the fundamental differences between DDL, DML, and DQL commands in SQL. Provide one example for each.

Answer:

SQL commands are categorized based on the type of operation they perform on a database.

1. DDL (Data Definition Language)

DDL commands are used to **define, modify, or delete database structures** such as tables, schemas, and indexes. These commands affect the structure, not the data itself.

Example:

```
CREATE TABLE Employees (  
    EmpID INT PRIMARY KEY,  
    EmpName VARCHAR(50)  
);
```

2. DML (Data Manipulation Language)

DML commands are used to **insert, update, or delete data** stored in database tables.

Example:

```
INSERT INTO Employees VALUES (1, 'Alice');
```

3. DQL (Data Query Language)

DQL commands are used to **retrieve data** from the database.

Example:

```
SELECT * FROM Employees;
```

Question 2

What is the purpose of SQL constraints? Name and describe three common types with scenarios.

Answer:

SQL constraints are rules applied to table columns to **maintain data integrity and accuracy**. They prevent invalid data from being inserted into the database.

1. PRIMARY KEY

-

Ensures each record is unique and not NULL.

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Scenario: Employee ID must uniquely identify each employee.

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```
EmpID INT PRIMARY KEY
```

2. NOT NULL

-

Ensures a column cannot contain NULL values.

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Scenario: Customer name must always be provided.

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```
CustomerName VARCHAR(100) NOT NULL
```

3. UNIQUE

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Ensures all values in a column are different.

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Scenario: Email addresses must be unique.

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Email VARCHAR(100) UNIQUE

Question 3

Difference between LIMIT and OFFSET. Retrieve the 3rd page (10 records per page).

Answer:

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LIMIT specifies how many rows to return.

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OFFSET specifies how many rows to skip.

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For page 3 with 10 records per page:

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Skip first 20 records

-

-

Fetch next 10 records

-

```
SELECT *FROM Products  
LIMIT 10 OFFSET 20;
```

Question 4

What is a Common Table Expression (CTE)? Benefits and example.

Answer:

A **Common Table Expression (CTE)** is a temporary result set defined using the `WITH` clause. It improves **readability, modularity, and maintainability** of complex queries.

Benefits:

- Simplifies complex queries
- Improves readability
- Allows recursive queries
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Example:

```
WITH ExpensiveProducts AS (  
    SELECT ProductName, Price  
    FROM Products  
    WHERE Price > 100  
)SELECT * FROM ExpensiveProducts;
```

Question 5

Explain SQL Normalization and its goals. Explain 1NF, 2NF, 3NF.

Answer:

Normalization is the process of organizing data to **reduce redundancy and improve data integrity**.

Goals of Normalization

- Eliminate duplicate data
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-

Ensure logical data storage

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-

Improve data consistency

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First Normal Form (1NF)

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No repeating groups

-
-

Atomic values

-

Second Normal Form (2NF)

-

Must be in 1NF

-
-

No partial dependency on composite key

-

Third Normal Form (3NF)

-

Must be in 2NF

-
-

No transitive dependency