**Q-1 What is SQL, and why is it essential in database management?**

**Ans:-**

SQL (Structured Query Language) is a standard programming language used to manage and manipulate relational databases (RDBMS) like MySQL, PostgreSQL, Oracle, SQL Server, etc.

It provides a way to:

* Create databases and tables
* Insert new data
* Retrieve (query) data
* Update existing data
* Delete data
* Control user access and security

**Q-2-Describe the role of SQL in managing relational databases.**

**Ans:-**

Role of SQL in Managing Relational Databases

1. Data Definition (DDL) – SQL creates and modifies database structures (tables, schemas) using commands like CREATE, ALTER, DROP.
2. Data Manipulation (DML) – SQL inserts, updates, deletes, and retrieves data from tables using INSERT, UPDATE, DELETE, SELECT.
3. Data Control (DCL) – SQL manages access rights and permissions with commands like GRANT and REVOKE.
4. Transaction Control (TCL) – SQL ensures data consistency and reliability using COMMIT, ROLLBACK, SAVEPOINT.
5. Data Integrity & Relationships – SQL enforces rules like PRIMARY KEY, FOREIGN KEY, and UNIQUE to maintain accuracy and consistency.

**Q-3-What are the key features of SQL?**

**Ans:-**

Key Features of SQL

1.Data definition (CREATE, ALTER, DROP).

2.Data manipulation (INSERT, UPDATE, DELETE, SELECT).

3.Data control (GRANT, REVOKE).

4.Transaction control (COMMIT, ROLLBACK).

5.Powerful data retrieval with queries.

6.Integrity constraints for accuracy.

7.Standard and portable across databases.

**Q-4-What are the basic components of SQL syntax?**

**Ans:-**

1.Keywords – Reserved words like SELECT, INSERT, UPDATE, DELETE.

2. Clauses – Parts of a query such as WHERE, ORDER BY, GROUP BY.

3.Expressions – Produce values (e.g., age + 1, salary \* 2).

4Predicates – Conditions that return TRUE/FALSE (e.g., age > 18).

5.Statements – Complete commands (e.g., SELECT \* FROM students;).

6.Identifiers – Names of databases, tables, columns.

7.Operators – Symbols like =, <, >, AND, OR.

**Q-5-What are constraints in SQL? List and explain the different types of constraints.**

**Ans:-**

Constraints in SQL

Constraints are rules on table columns that ensure valid and consistent data.

Types of Constraints:

1. PRIMARY KEY – Uniquely identifies each row, no NULL.
2. FOREIGN KEY – Links two tables, maintains relationship.
3. UNIQUE – All values must be different (duplicates not allowed).
4. NOT NULL – Column cannot have NULL value.
5. CHECK – Ensures values meet a condition (e.g., age > 18).
6. DEFAULT – Sets a default value if no value is given.

**Q-6-What is the role of NOT NULL and UNIQUE constraints?**

**Ans:-**

1.NOT NULL Constraint:  
It makes sure that a column must always contain a value. This means you cannot insert or update a record with a NULL value in that column. It ensures that important fields like student\_name or email are never left empty.

2.UNIQUE Constraint:  
It ensures that all values in a column are distinct. No two rows can have the same value in that column. This is useful for columns like email, username, or roll\_no where duplication is not allowed.

**Q-7-What is the use of the ALTER command in SQL?**

**Ans:-**

ALTER is a DDL command.

The ALTER command is used to add, delete, or modify columns and constraints in an existing table, making it flexible to update the database schema as requirements change.

With ALTER, we can:

* Add a new column.
* Change a column’s datatype or size.
* Rename a column or table.
* Remove (drop) a column.
* Add or drop constraints.

**Q-8-What is the function of the DROP command in SQL?**

**Ans:-**

* DROP is a DDL (Data Definition Language) command.
* Its function is to delete database objects permanently (like tables, views, indexes, databases).
* Once an object is dropped, all its data and structure are lost and cannot be recovered (unless backup exists).
* It also removes all dependencies (like constraints, relationships) linked with that object.

**Q-9-What is the importance of the WHERE clause in UPDATE and DELETE operations?**

**Ans:-**

Importance of WHERE Clause in UPDATE and DELETE

* The WHERE clause is used to specify which rows should be updated or deleted.
* Without WHERE, the command will affect all rows in the table.
* It helps to control changes and prevent accidental data loss.

**Q-10 What is the SELECT statement, and how is it used to query data?**

**Ans:-**

Definition

The SELECT statement in SQL is used to fetch data from a database table. It allows you to choose specific columns, filter rows using conditions, and sort or group the results as needed.

**Q-11 Explain the use of the ORDER BY and WHERE clauses in SQL queries**

**Ans:-**

1. WHERE Clause

The WHERE clause in SQL is used to filter records in a table based on specific conditions. Only rows that satisfy the condition are returned.

2. ORDER BY Clause

The ORDER BY clause is used to sort the result set in ascending (ASC) or descending (DESC) order based on one or more columns.

**Q-12 What is the purpose of GRANT and REVOKE in SQL?**

**Ans:-**

Definition & Purpose:

* GRANT:  
  Used to give (grant) specific privileges/permissions to users on database objects such as tables, views, or procedures.  
  Example permissions: SELECT, INSERT, UPDATE, DELETE.
* REVOKE:  
  Used to remove (revoke) previously given privileges from users, so they can no longer perform those operations.

**Q-13 What is the purpose of the COMMIT and ROLLBACK commands in SQL?**

**Ans:-**

Definition & Purpose:

* COMMIT
  + Used to save all changes permanently in the database after executing DML commands like INSERT, UPDATE, or DELETE.
  + Once committed, the changes cannot be undone.
* ROLLBACK
  + Used to undo changes made by DML commands before they are committed.
  + It restores the database to the last saved (committed) state.

**Q-14 How are joins used to combine data from multiple tables?**

**Ans:-**

Definition

A JOIN in SQL is used to combine rows from two or more tables based on a related column (usually a primary key in one table and a foreign key in another).

* It helps retrieve meaningful combined data that is stored across different tables.

**Q-15 What is the GROUP BY clause in SQL? How is it used with aggregate functions?**

**Ans:-**

The GROUP BY clause in SQL is used to arrange identical data into groups. It is mostly used with aggregate functions like COUNT(), SUM(), AVG(), MAX(), and MIN() to perform calculations on each group of data rather than on the whole table.

🔹 Purpose:

* To divide rows into groups based on one or more columns.
* To apply aggregate functions on each group.

**Q-16 What is a trigger in SQL? Describe its types and when they are used.**

**Ans:-**

A trigger is a special stored procedure that runs automatically when an event (INSERT, UPDATE, DELETE) occurs on a table or view.

🔹 Types of Triggers

1. BEFORE Trigger – Runs before the operation → used for validation.
2. AFTER Trigger – Runs after the operation → used for logging, auditing, cascading updates.
3. INSTEAD OF Trigger – Replaces the operation → mostly used on views to control inserts/updates.

🔹 Uses

* Enforce business rules
* Maintain data integrity
* Audit or log changes
* Validate data automatically

**Q-17 What is PL/SQL, and how does it extend SQL's capabilities?**

**Ans:-**

PL/SQL is Oracle’s extension of SQL that adds programming features like variables, loops, conditions, and error handling.

🔹 How it extends SQL

* Supports procedural logic (IF, LOOP)
* Allows procedures, functions, triggers (modularity)
* Provides exception handling
* Improves performance by reducing network calls
* Enhances security by storing business logic in DB

**Q-18 Explain the concept of SAVEPOINT in transaction management. How do ROLLBACK and COMMIT interact with savepoints?**

**Ans:-**

A SAVEPOINT is a marker inside a transaction that allows you to roll back (undo) part of the transaction up to that point, instead of rolling back the whole transaction.

* ROLLBACK TO SAVEPOINT → undo only the changes after that savepoint.
* COMMIT → makes all changes permanent and clears all savepoints.