**🔹 BASICS OF SQL (Q1–Q10)**

**1. What is SQL?**

**Structured Query Language** is used to communicate with relational databases—used for storing, manipulating, and retrieving data.

**2. What are the different types of SQL commands?**

* **DDL** – Data Definition Language (CREATE, ALTER, DROP)
* **DML** – Data Manipulation Language (INSERT, UPDATE, DELETE)
* **DQL** – Data Query Language (SELECT)
* **TCL** – Transaction Control Language (COMMIT, ROLLBACK, SAVEPOINT)
* **DCL** – Data Control Language (GRANT, REVOKE)

**3. What is a database?**

A **database** is an organized collection of structured data stored electronically.

**4. What is a table?**

A **table** is a collection of rows and columns to store data in relational databases.

**5. What is a primary key?**

A **primary key** uniquely identifies each record. It cannot have nulls or duplicates.

**6. What is a foreign key?**

A **foreign key** is a field in one table that references the **primary key** in another table.

**7. What is a candidate key?**

A **candidate key** is a set of attributes that can uniquely identify a row. One of them becomes the **primary key**.

**8. What is a composite key?**

A **composite key** uses **more than one column** to uniquely identify a row.

**9. What is a unique key?**

Ensures all values in a column are unique, but unlike primary key, it **can have one NULL**.

**10. What is the difference between primary key and unique key?**

| **Primary Key** | **Unique Key** |
| --- | --- |
| No nulls allowed | One null allowed |
| One per table | Multiple allowed |

**🔹 QUERYING & DATA OPERATIONS (Q11–Q20)**

**11. What is the SELECT statement?**

Used to fetch data from a table.

**12. What is the WHERE clause?**

Used to **filter** records based on a condition.

**13. What is the ORDER BY clause?**

Used to **sort** records in ascending or descending order.

**14. What is the GROUP BY clause?**

Used to **group rows** with the same values in a column.

**15. What is the HAVING clause?**

Used to **filter groups** created by GROUP BY, similar to WHERE but works on aggregated data.

**16. What is the difference between WHERE and HAVING?**

| **WHERE** | **HAVING** |
| --- | --- |
| Works on rows | Works on groups |
| Used before GROUP BY | Used after GROUP BY |

**17. What is the difference between DELETE and TRUNCATE?**

| **DELETE** | **TRUNCATE** |
| --- | --- |
| Can use WHERE | Removes all rows |
| Slower | Faster |
| Logs individual rows | Minimal logging |

**18. What is the INSERT statement?**

Used to add a **new row** into a table.

**19. What is the UPDATE statement?**

Used to **modify existing records** in a table.

**20. What is the difference between UPDATE and ALTER?**

* UPDATE: Changes **data**
* ALTER: Changes **structure** (e.g., add column)

**🔹 JOINS & RELATIONSHIPS (Q21–Q30)**

**21. What is a JOIN in SQL?**

A JOIN is used to combine rows from **two or more tables** based on related columns.

**22. Types of JOINS?**

* **INNER JOIN** – Matching rows only
* **LEFT JOIN** – All rows from left, matching from right
* **RIGHT JOIN** – All rows from right, matching from left
* **FULL JOIN** – All rows from both sides
* **CROSS JOIN** – Cartesian product

**23. What is an INNER JOIN?**

Returns records with **matching values** in both tables.

**24. What is a LEFT JOIN?**

Returns **all records from the left** table and the matching ones from the right.

**25. What is a SELF JOIN?**

Joining a table with **itself**.

**26. What is a CROSS JOIN?**

Returns the **Cartesian product** of both tables.

**27. What is a SUBQUERY?**

A query inside another query, enclosed in ().

**28. What is a correlated subquery?**

A subquery that **depends on the outer query** for its value.

**29. What is a view?**

A **virtual table** based on a query. Doesn't store data physically.

**30. What is a materialized view?**

Stores the **actual data**, unlike a regular view.

**🔹 CONSTRAINTS & DATA TYPES (Q31–Q40)**

**31. What is a constraint in SQL?**

Used to **limit** the type of data that can go into a column (e.g., NOT NULL, CHECK, UNIQUE).

**32. What is NOT NULL constraint?**

Ensures a column **cannot have NULL** values.

**33. What is a DEFAULT constraint?**

Provides a **default value** if no value is supplied.

**34. What is a CHECK constraint?**

Validates that the values in a column satisfy a specific condition.

**35. What is the difference between CHAR and VARCHAR?**

| **CHAR** | **VARCHAR** |
| --- | --- |
| Fixed length | Variable length |
| Pads with spaces | Saves space |

**36. What is a NULL value in SQL?**

A NULL represents a **missing or unknown value**.

**37. Is NULL = NULL true?**

No. In SQL, NULL is not equal to anything, even itself. Use IS NULL.

**38. What is the use of IS NULL and IS NOT NULL?**

Used to check for NULL values in a column.

**39. What is the difference between DROP, DELETE, and TRUNCATE?**

* **DROP** – Deletes table structure
* **DELETE** – Deletes rows
* **TRUNCATE** – Deletes all rows, keeps structure

**40. What is AUTO\_INCREMENT (MySQL) or SEQUENCE (Oracle)?**

Used to **auto-generate unique values**, usually for primary keys.

**🔹 ADVANCED CONCEPTS & TRANSACTIONS (Q41–Q50)**

**41. What is normalization?**

Process of organizing data to **reduce redundancy**.

**42. What are the normal forms?**

* **1NF** – Atomic values
* **2NF** – No partial dependency
* **3NF** – No transitive dependency
* **BCNF** – Advanced 3NF

**43. What is denormalization?**

Introducing **redundancy** to improve performance of read-heavy systems.

**44. What is indexing?**

Used to speed up retrieval of data. Works like a **table of contents**.

**45. What is a clustered index?**

Alters the **physical order** of data in a table. Only one per table.

**46. What is a non-clustered index?**

Creates a **separate structure** from the data. Multiple allowed per table.

**47. What is a transaction?**

A sequence of operations performed as a **single unit of work**.

**48. What are the properties of transactions (ACID)?**

* **Atomicity**
* **Consistency**
* **Isolation**
* **Durability**

**49. What is ROLLBACK and COMMIT?**

* **COMMIT** – Saves changes
* **ROLLBACK** – Undoes changes

**50. What is a stored procedure?**

A **precompiled group of SQL statements** stored in the database and executed as a program.