Here are some common **SQL interview questions** along with their answers:

Basic SQL Questions

1. What is SQL?

SQL (Structured Query Language) is a programming language used to manage and manipulate relational databases. It is used for querying, inserting, updating, and deleting data from databases.

2. What are the different types of SQL commands?

SQL commands are categorized as follows:

- **DDL (Data Definition Language)**: CREATE, ALTER, DROP, TRUNCATE
- **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 the difference between DELETE, TRUNCATE, and DROP?

Command	Description
DELETE	Removes specific rows based on a condition, can be rolled back.
TRUNCATE	Deletes all rows from a table without logging, cannot be rolled back.
DROP	Deletes the table structure and data permanently.

4. What are Primary Key and Foreign Key?

- **Primary Key**: A column (or set of columns) that uniquely identifies each row in a table. It **cannot have NULL values**.
- **Foreign Key**: A column in one table that references the **Primary Key** in another table to enforce referential integrity.

5. What is the difference between HAVING and WHERE?

- WHERE is used **before** grouping (GROUP BY) to filter individual rows.
- HAVING is used **after** GROUP BY to filter groups based on aggregate functions.

Example:

sql

CopyEdit

```
SELECT department, COUNT(*)
FROM employees
WHERE salary > 50000
GROUP BY department
HAVING COUNT(*) > 5;
```

Intermediate SQL Questions

6. What is an Index?

An **index** is a database structure that improves the speed of data retrieval operations.

Types of indexes:

- **Clustered Index**: Sorts and stores data physically in the order of the index. Only **one per table**.
- **Non-Clustered Index**: Stores pointers to actual data, multiple can exist.

7. What is the difference between JOIN types?

JOIN Type	Description
INNER JOIN	Returns matching rows from both tables.
LEFT JOIN	Returns all rows from the left table and matching rows from the right.
RIGHT JOIN	Returns all rows from the right table and matching rows from the left.
FULL JOIN	Returns all rows from both tables with NULLs for non-matching rows.

Example:

sql

CopyEdit

```
SELECT e.name, d.department_name
FROM employees e
INNER JOIN departments d
ON e.department_id = d.department_id;
```

8. What is Normalization?

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

- **1NF (First Normal Form)**: No duplicate rows, atomic values only.

- **2NF (Second Normal Form)**: 1NF + No partial dependencies.
- **3NF (Third Normal Form)**: 2NF + No transitive dependencies.

9. What is a View?

A **View** is a virtual table based on an SQL query. It does not store data but simplifies complex queries.

Example:

sql

CopyEdit

CREATE VIEW HighSalaryEmployees AS

SELECT name, salary FROM employees WHERE salary > 80000;

Advanced SQL Questions

10. What is the difference between RANK(), DENSE_RANK(), and ROW_NUMBER()?

Function	Description
RANK()	Assigns a unique rank, but **skips ranks** after duplicates.
DENSE_RANK()	Assigns a rank but **does not skip** ranks.
ROW_NUMBER()	Assigns a unique row number to each row.

Example:

sql

CopyEdit

SELECT name, department, salary,

RANK() OVER (PARTITION BY department ORDER BY salary DESC) AS Rank

FROM employees;

11. What is a CTE (Common Table Expression)?

A **CTE** is a temporary result set used within an SQL query.

Example:

sql

CopyEdit

WITH HighSalaries AS (

```
  SELECT name, salary FROM employees WHERE salary > 80000
)
SELECT * FROM HighSalaries;
```

12. What is the difference between UNION and UNION ALL?

- **UNION** removes duplicates.
- **UNION ALL** keeps duplicates.

Example:

sql

CopyEdit

```
SELECT name FROM employees
UNION
SELECT name FROM managers;
```

13. What are Stored Procedures?

A **Stored Procedure** is a reusable SQL code block stored in the database.

Example:

sql

CopyEdit

```
CREATE PROCEDURE GetEmployees()
AS
BEGIN
  SELECT * FROM employees;
END;
```

14. What is the difference between EXISTS and IN?

- **EXISTS** checks for row existence and stops searching after finding the first match (better performance).
- **IN** retrieves all matching values in the subquery.

Example:

sql

CopyEdit

SELECT name FROM employees

WHERE department_id **EXISTS** (SELECT department_id FROM departments WHERE location = 'NY');

15. What is ACID in SQL?

ACID properties ensure **reliable transactions**:

- **Atomicity**: Transaction is **all or nothing**.
- **Consistency**: Database remains valid.
- **Isolation**: Transactions do not interfere.
- **Durability**: Changes persist after system failures.

Scenario-Based Questions

16. Find the second highest salary in a table.

sql

CopyEdit

SELECT MAX(salary) FROM employees

WHERE salary < (SELECT MAX(salary) FROM employees);

17. Find duplicate records in a table.

sql

CopyEdit

SELECT name, COUNT(*)

FROM employees

GROUP BY name

HAVING COUNT(*) > 1;

18. Find employees with the highest salary per department.

sql

CopyEdit

SELECT name, department, salary

FROM (

  SELECT name, department, salary,

  RANK() OVER (PARTITION BY department ORDER BY salary DESC) AS rnk

```
    FROM employees
) t
WHERE rnk = 1;
```

Would you like more **practical SQL exercises** to practice? 🚀

4o