Basic SQL Questions

1. What is SQL? Differentiate between SQL, MySQL, and PostgreSQL.
2. What are the different types of SQL commands (DDL, DML, DCL, TCL)? Give examples.
3. What is the difference between `CHAR` and `VARCHAR` data types?
4. Explain `PRIMARY KEY`, `UNIQUE`, and `FOREIGN KEY`.
5. What is the difference between `WHERE` and `HAVING` clauses?
6. What is the difference between `DELETE`, `TRUNCATE`, and `DROP`?
7. How does `NULL` behave in SQL? How do you handle it in conditions?
8. Explain the difference between `INNER JOIN`, `LEFT JOIN`, `RIGHT JOIN`, and `FULL JOIN`.
9. What is the difference between `UNION` and `UNION ALL`?
10. Write a query to fetch the **second highest salary** from an `employees` table.

Intermediate SQL Questions

11. What are `GROUP BY` and aggregate functions? Give an example.
12. Explain the concept of **indexes** in SQL. What are clustered vs non-clustered indexes?
13. What are **window functions** in SQL? Explain with an example (`ROW_NUMBER`, `RANK`, `DENSE_RANK`).
14. What is a **Common Table Expression (CTE)**? How is it different from a subquery?
15. Write a query to find employees who earn **more than the average salary**.
16. What is the difference between `IN` and `EXISTS`?
17. What is normalization? Explain **1NF, 2NF, 3NF, and BCNF**.
18. What is denormalization? When would you use it?
19. Explain `CASE WHEN` in SQL with an example.
20. Write a query to find duplicate rows in a table.

Advanced SQL Questions

21. Explain the difference between **OLTP and OLAP** systems in terms of SQL usage.
22. What are **stored procedures**, **functions**, and **triggers**? How are they different?
23. Explain **ACID properties** in databases.
24. What is a **materialized view**? How is it different from a normal view?
25. Write a query to get a **running total** using window functions.
26. Explain the concept of **partitioning** in SQL.

27. What are **transactions** in SQL? Explain COMMIT, ROLLBACK, and SAVEPOINT.
28. What is a **deadlock** in SQL? How can it be prevented?
29. Explain the difference between **horizontal scaling and vertical scaling** in databases.
30. Write a SQL query to **pivot** and **unpivot** a table.