SQL & MySQL Interview Questions and Answers (Batch 1: 1–50)

Basics of SQL

1. What is SQL?
SQL (Structured Query Language) is a standard language used to manage and manipulate relational databases. It allows users to insert, query, update, and delete data.

2. What are the different types of SQL commands?

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

3. What is a primary key?
A primary key uniquely identifies each row in a table. It cannot contain NULL values and must be unique.

4. What is a foreign key?
A foreign key links two tables and establishes a relationship. It points to the primary key in another table.

5. Difference between `WHERE` and `HAVING` ?

- `WHERE` : filters rows before grouping.
- `HAVING` : filters groups after grouping.

6. What is a JOIN in SQL?
JOIN is used to combine rows from two or more tables based on a related column.

7. Types of JOINs?

- INNER JOIN
- LEFT JOIN (or LEFT OUTER JOIN)
- RIGHT JOIN (or RIGHT OUTER JOIN)
- FULL OUTER JOIN
- CROSS JOIN

8. What is normalization?
Normalization organizes data to reduce redundancy and improve data integrity by dividing tables into

smaller ones.

9. What is denormalization?
Denormalization is the process of combining tables to optimize read performance, often at the expense of redundancy.

10. What is a subquery?
A subquery is a query within another SQL query. It can be used in SELECT, INSERT, UPDATE, or DELETE statements.

Intermediate SQL

11. Difference between `UNION` and `UNION ALL`?

- `UNION` : removes duplicates.
- `UNION ALL` : includes duplicates.

12. What is a view?
A view is a virtual table based on the result-set of an SQL statement. It doesn't store data physically.

13. Can a view be updated?
Yes, but with restrictions. The view must be based on one table without aggregate functions.

14. What is an index?
Indexes improve query performance by allowing faster data retrieval.

15. Types of indexes in SQL?

- Clustered Index
- Non-clustered Index
- Composite Index
- Unique Index
- Full-text Index (MySQL)

16. What is the difference between clustered and non-clustered index?

- Clustered index sorts and stores data rows in the table.
- Non-clustered index has a separate structure and points to the data.

17. How is `NULL` treated in SQL?
`NULL` represents missing or unknown data. `NULL <> NULL` and comparison with `NULL` requires `IS NULL`.

18. What is the difference between `DELETE`, `TRUNCATE`, and `DROP`?

- `DELETE` : removes specific rows, can be rolled back.
- `TRUNCATE` : removes all rows, can't be rolled back (in most DBMS).
- `DROP` : removes the table structure and data.

19. How do you fetch unique records?

Using `SELECT DISTINCT column_name FROM table_name;`

20. What is a constraint?

Constraints enforce rules on data in tables like `NOT NULL` , `UNIQUE` , `CHECK` , `DEFAULT` , etc.

MySQL-Specific

21. Difference between MySQL and SQL?

- SQL is a language.
- MySQL is a database system that uses SQL.

22. What is `AUTO_INCREMENT` in MySQL?

It automatically increments numeric fields, typically used for primary keys.

23. What storage engines are used in MySQL?

- InnoDB (default, supports transactions, foreign keys)
- MyISAM (fast, no transactions support)

24. How do you create a user in MySQL?

```
CREATE USER 'username'@'localhost' IDENTIFIED BY 'password';
```

25. How to grant privileges in MySQL?

```
GRANT ALL PRIVILEGES ON dbname.* TO 'username'@'localhost';
```

26. How to show tables in a MySQL database?

```
SHOW TABLES;
```

27. How to switch databases in MySQL?

```
USE database_name;
```

28. Difference between `CHAR` and `VARCHAR` ?

- `CHAR` : fixed length
- `VARCHAR` : variable length

29. How to list all databases in MySQL?

```
SHOW DATABASES;
```

30. How to check MySQL version?

```
SELECT VERSION();
```

Advanced Concepts

31. What is ACID in databases?

- **Atomicity**, **Consistency**, **Isolation**, **Durability** – principles to ensure reliable transactions.

32. What are transactions?

A transaction is a unit of work performed within a database. Use `BEGIN` , `COMMIT` , and `ROLLBACK` .

33. What is a trigger?

A trigger is a stored procedure that runs automatically when certain events occur (e.g., INSERT, UPDATE).

34. What is a stored procedure?

A set of SQL statements with a name that can be called repeatedly.

35. What is the difference between a function and a stored procedure?

- Functions return a value.
- Stored procedures may or may not return values.

36. What is a cursor in SQL?

A cursor is used to retrieve, manipulate, and navigate row-by-row results from a query.

37. What is a composite key?

A primary key made up of two or more columns.

38. What is a unique constraint?

Ensures all values in a column or group of columns are unique.

39. What is an alias in SQL?

Used to give a table or column a temporary name:

```
SELECT first_name AS Name FROM users;
```

40. How to fetch current date and time in SQL?

```
SELECT NOW();
```

Scenario-Based Questions

41. Write a query to find the second highest salary.

```
SELECT MAX(salary) FROM employees WHERE salary < (SELECT MAX(salary) FRO
```

42. How to find duplicate records?

```
SELECT column_name, COUNT(*) FROM table_name GROUP BY column_name HAVING
```

43. How do you handle NULLs in aggregate functions?

Most aggregate functions ignore NULLs. Use `COALESCE()` to handle them explicitly.

44. How to rename a column in SQL?

```
ALTER TABLE table_name RENAME COLUMN old_name TO new_name;
```

45. How do you get the count of records in a table?

```
SELECT COUNT(*) FROM table_name;
```

46. What is the use of the `IFNULL()` function?

Returns the specified value if the expression is NULL.

```
SELECT IFNULL(column, 'Default') FROM table;
```

47. How do you find the number of rows affected by a query?

Use `ROW_COUNT()` in MySQL or check affected rows in your DB tool.

48. What is the difference between `BETWEEN` and `IN`?

- `BETWEEN` : for a range of values
- `IN` : for a list of discrete values

49. Write a query to fetch employees who joined in the last 30 days.

```sql
SELECT * FROM employees WHERE join_date >= CURDATE() - INTERVAL 30 DAY;
```

50. How to change the datatype of a column?

```sql
ALTER TABLE table_name MODIFY column_name NEW_DATATYPE;
```

Here is the second batch: **51 to 100 most asked MySQL/SQL interview questions with answers**, continuing from where we left off. This batch focuses on **advanced SQL**, **performance**, **real-world use cases**, and **best practices**.

SQL & MySQL Interview Questions and Answers (Batch 2: 51–100)

Advanced SQL & Performance

51. What is a correlated subquery?

A subquery that references columns from the outer query.

```sql
SELECT e1.name FROM employees e1 WHERE salary > (SELECT AVG(salary) FROM
```

52. What is the difference between `EXISTS` and `IN`?

- `IN` : checks for a value in a list or result set.
- `EXISTS` : returns true if a subquery returns any rows (faster for correlated queries).

53. What is a window function?

Performs calculations across a set of rows related to the current row.

```sql
SELECT name, salary, RANK() OVER (ORDER BY salary DESC) FROM employees;
```

54. What is the use of `RANK()`, `DENSE_RANK()`, and `ROW_NUMBER()`?

Used in window functions to assign a unique rank or number to rows.

55. How to optimize a slow SQL query?

- Use indexes
- Avoid `SELECT *`
- Use `WHERE` clauses
- Avoid unnecessary joins
- Analyze query plans

56. What is `EXPLAIN` in SQL?

It shows the execution plan for a query. Helps identify performance issues.

57. How do indexes affect performance?

Indexes speed up `SELECT` queries but slow down `INSERT`, `UPDATE`, `DELETE`.

58. What is a covering index?

An index that includes all columns needed by a query, avoiding table lookup.

59. How to prevent SQL injection?

- Use parameterized queries
- Avoid string concatenation
- Sanitize inputs

60. Difference between `CHAR_LENGTH()` and `LENGTH()`?

- `CHAR_LENGTH()` : character count
- `LENGTH()` : byte count (differs with multibyte characters)

Real-World Scenarios

61. How to find employees who don't have a manager?

```
SELECT * FROM employees WHERE manager_id IS NULL;
```

62. How do you update data from one table to another?

```
UPDATE t1 JOIN t2 ON t1.id = t2.id SET t1.name = t2.name;
```

63. How to insert data from one table to another?

```
INSERT INTO new_table (col1, col2) SELECT col1, col2 FROM old_table;
```

64. How to get top N records?

```
SELECT * FROM table ORDER BY salary DESC LIMIT 5;
```

65. How to find nth highest salary using `LIMIT` ?

```
SELECT DISTINCT salary FROM employees ORDER BY salary DESC LIMIT 1 OFFSET
```

66. How to find employees with duplicate names?

```
SELECT name, COUNT(*) FROM employees GROUP BY name HAVING COUNT(*) > 1;
```

67. How to delete duplicate records?

Use `ROW_NUMBER()` or `GROUP BY` with `MIN(id)` to preserve one record.

68. How to write a recursive query?

Use `WITH RECURSIVE` for hierarchical data:

```
WITH RECURSIVE cte AS (
  SELECT id, name, manager_id FROM employees WHERE manager_id IS NULL
  UNION ALL
  SELECT e.id, e.name, e.manager_id FROM employees e
  INNER JOIN cte ON e.manager_id = cte.id
)
SELECT * FROM cte;
```

69. What is the difference between `DELETE` and `DROP` ?

- `DELETE` : removes data
- `DROP` : removes table structure and data

70. How do you find the most common value in a column?

```
SELECT column, COUNT(*) AS freq FROM table GROUP BY column ORDER BY freq
```

Functions & Expressions

71. What is `COALESCE()` in SQL?

Returns the first non-null value in a list.

```
SELECT COALESCE(middle_name, 'N/A');
```

72. What is `CASE` statement in SQL?

Used for conditional logic:

```
SELECT name, salary,
  CASE WHEN salary > 50000 THEN 'High' ELSE 'Low' END AS status
FROM employees;
```

73. What is the difference between `IS NULL` and `= NULL`?

`= NULL` does not work. Use `IS NULL` or `IS NOT NULL`.

74. How to concatenate two columns?

```
SELECT CONCAT(first_name, ' ', last_name) AS full_name FROM users;
```

75. How to calculate age from DOB in SQL?

```
SELECT name, TIMESTAMPDIFF(YEAR, dob, CURDATE()) AS age FROM users;
```

76. How to round decimal values?

```
SELECT ROUND(salary, 2) FROM employees;
```

77. What is the use of `GROUP_CONCAT()` in MySQL?

Combines values from multiple rows into a single string.

```
SELECT department, GROUP_CONCAT(name) FROM employees GROUP BY department;
```

78. What does `FIND_IN_SET()` do in MySQL?

Finds the position of a string in a comma-separated string.

```
SELECT FIND_IN_SET('a', 'a,b,c'); -- returns 1
```

79. What is the use of `DATE_FORMAT()` ?

Formats date values:

```
SELECT DATE_FORMAT(NOW(), '%d-%m-%Y');
```

80. How do you check if a column exists in a table?

```
SHOW COLUMNS FROM table_name LIKE 'column_name';
```

Miscellaneous + Best Practices

81. How do you back up a MySQL database?

Using `mysqldump` :

```
mysqldump -u root -p dbname > backup.sql
```

82. What is the difference between logical and physical data independence?

- Logical: change schema without changing applications
- Physical: change storage without affecting schema

83. What are temp tables in SQL?

Temporary tables that exist during the session.

```
CREATE TEMPORARY TABLE temp_name (...);
```

84. What are derived tables?

Subqueries used as temporary tables in the `FROM` clause.

85. What is the use of `LIMIT` with `OFFSET` ?

Used for pagination:

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

86. What are wildcards in SQL?

Used with `LIKE` : `%` (any characters), `_` (single character).

87. What is a schema in SQL?

A logical container for database objects like tables, views, procedures.

88. What is a surrogate key?

An artificially created key (like an auto-increment ID).

89. How to count rows by group?

```
SELECT department, COUNT(*) FROM employees GROUP BY department;
```

90. How to rename a table in SQL?

```
RENAME TABLE old_name TO new_name;
```

Real-time Case-Based Questions

91. Write a query to find departments with more than 5 employees.

```
SELECT department_id, COUNT(*) FROM employees GROUP BY department_id HAVI
```

92. How to perform an INNER JOIN between 3 tables?

```
SELECT * FROM A
JOIN B ON A.id = B.a_id
JOIN C ON B.id = C.b_id;
```

93. How to copy table structure without data?

```
CREATE TABLE new_table LIKE old_table;
```

94. How to get only even IDs from a table?

```
SELECT * FROM table WHERE MOD(id, 2) = 0;
```

95. How to find the difference between two dates in days?

```
SELECT DATEDIFF(date1, date2);
```

96. How to get a list of all indexes on a table in MySQL?

```
SHOW INDEXES FROM table_name;
```

97. Write a query to retrieve employees who earn above average salary.

```
SELECT * FROM employees WHERE salary > (SELECT AVG(salary) FROM employees
```

98. What is JSON datatype in MySQL?

Stores JSON-formatted data and allows querying using `JSON_EXTRACT` , etc.

99. How to extract values from JSON fields in MySQL?

```
SELECT JSON_EXTRACT(json_column, '$.name') FROM table;
```

100. How to find last record inserted into a table?

Assuming `id` is `AUTO_INCREMENT` :

```
SELECT * FROM table ORDER BY id DESC LIMIT 1;
```

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