1. What is SQL, and why is it essential for data professionals?
SQL (Structured Query Language) is used to interact with databases. It is essential because it helps data professionals retrieve, update, and manage data efficiently.

2. Explain the difference between SQL and NoSQL databases.
SQL databases are structured and use tables (relational), while NoSQL databases handle unstructured/semi-structured data and are more flexible (non-relational).

3. What are the primary SQL commands for data retrieval?
The SELECT command is primarily used for data retrieval.

4. What are the main SQL data types?
Common types are INT, VARCHAR, DATE, FLOAT, and BOOLEAN.

5. What is a primary key, and why is it important?
A primary key uniquely identifies each record in a table and prevents duplicates.

6. What is a foreign key, and how is it used in SQL?
A foreign key links one table to another and maintains referential integrity.

7. How do you retrieve all records from a table?
By using: SELECT * FROM table_name;

8. Explain the WHERE clause and its use in SQL queries.
The WHERE clause filters records based on specific conditions.

9. What is the purpose of the ORDER BY clause?
It is used to sort the results in ascending (ASC) or descending (DESC) order.

10. How do you filter results based on multiple conditions using the AND and OR operators?
Use AND for combining multiple conditions that must all be true, and OR for conditions where at least one must be true.

11. What is the LIMIT clause, and when is it used?
LIMIT restricts the number of rows returned by a query.

12. Explain the GROUP BY clause and its role in aggregation.
GROUP BY groups rows with the same values, often used with aggregate functions like COUNT or SUM.

13. What is the HAVING clause, and how does it differ from the WHERE clause?
HAVING filters groups after aggregation, while WHERE filters rows before aggregation.

14. What is a SQL subquery, and how is it used?
A subquery is a query inside another query, used to get intermediate results.

15. How do you use the DISTINCT keyword in SQL?
DISTINCT removes duplicate rows in the result set.

16. What is the purpose of the CONCAT() function?
It joins two or more strings together.

17. What is an INNER JOIN, and how does it work?
It returns rows that have matching values in both tables.

18. Explain LEFT JOIN and RIGHT JOIN with examples.

LEFT JOIN returns all rows from the left table and matching rows from the right. RIGHT JOIN does the opposite.

19. What is a self-join, and why would you use it?
A self-join is when a table is joined with itself, useful for hierarchical data.

20. Describe the differences between primary keys and unique constraints.
Primary keys uniquely identify records and cannot be NULL. Unique constraints ensure uniqueness but allow one NULL.

21. How do you establish a many-to-many relationship in SQL?
By using a junction table with foreign keys referencing both related tables.

22. Explain the INSERT statement and how it is used.
INSERT adds new rows into a table.

23. What is an SQL transaction, and why is it important?
A transaction is a sequence of queries executed as a single unit to ensure data consistency.

24. How can you update data in a table using SQL?
By using the UPDATE statement with a WHERE clause.

25. What is the purpose of the DELETE statement?
DELETE removes specific rows from a table.

26. Describe the differences between DELETE and TRUNCATE.
DELETE removes selected rows, TRUNCATE removes all rows quickly and resets identity.

27. Explain the concept of indexing in databases.
Indexing speeds up data retrieval using pointers but may slow down write operations.

28. What is normalization, and why is it important?
Normalization organizes data to reduce redundancy and improve consistency.

29. How can you create and manage views in SQL?
Views are virtual tables created with SELECT statements, managed with CREATE VIEW and DROP VIEW.

30. What are stored procedures, and when are they useful?
Stored procedures are saved SQL code that can be reused for tasks like automation and security.

31. Explain SQL injection and methods to prevent it.
SQL injection is inserting malicious SQL into queries. Prevent it using parameterized queries and validation.

32. How do you optimize SQL queries for performance?
By using indexes, avoiding SELECT *, and optimizing joins.

33. What is a unique key in SQL?
A unique key ensures all values in a column are different.

34. What is the difference between UNION and UNION ALL?
UNION removes duplicates, UNION ALL keeps them.

35. What is the difference between a table and a view?
A table stores actual data, a view is a virtual table showing data from queries.

36. What SQL operator is used for pattern matching?
The LIKE operator.

37. What's a SQL aggregate function and how is it used?
Aggregate functions like COUNT, SUM, AVG operate on groups of rows.

38. What DDL and DML?
DDL (Data Definition Language) defines structures like CREATE, ALTER. DML (Data Manipulation Language) works with data like SELECT, INSERT, UPDATE.

39. Give me a brief of DBMS, RDBMS and eventually MYSQL ?
DBMS manages databases, RDBMS is a DBMS with relational tables, MySQL is a popular RDBMS.

40. Explain database relationships and mention their various types
Relationships: One-to-One, One-to-Many, Many-to-Many.

41. Define constraints and give five examples of them.
Constraints ensure rules: CHECK, DEFAULT, UNIQUE, PRIMARY KEY, FOREIGN KEY.

42. Mention a major distinction among the Non-Cluster Index and Cluster Index?
Clustered index arranges data physically, non-clustered stores a pointer to data.

43. What do you understand about user-defined functions?
Functions created by users to perform specific tasks in queries.

44. What is Cross-Join?
It returns the Cartesian product of two tables.

45. What is a Data Warehouse?
A data warehouse stores large amounts of historical data for analysis.

46. What are scalar and aggregate functions?
Scalar returns single value (e.g., UPPER()), aggregate works on groups (e.g., SUM).

47. What is ETL in SQL ?
ETL means Extract, Transform, Load – moving and preparing data for analysis.

48. What are Nested Triggers?
Triggers that fire other triggers when executed.

49. What will be the SQL query to get the employee full names and replace the space with '-'.
SELECT REPLACE(full_name, ' ', '-') FROM employees;

50. Explain the main features of a relational database
Features: tables, keys, relationships, integrity, SQL support.

51. What is an ACID property in SQL?
ACID = Atomicity, Consistency, Isolation, Durability – ensures reliable transactions.

52. What is the difference between SQL and MySQL?
SQL is a query language, MySQL is a database system that uses SQL.

53. What are SQL comments?
SQL comments explain code. Single-line uses --, multi-line uses /* */.