1. what is database?

is a organised collection of structured data that can be easily accessed, managed, and update.

2. Different types of databases.

- Relational Database (rows and column)
- Non-Relational Database (key-value)
- object oriented database (oops concepts
- Distributed Database (distributed across while appearing in local single database)
- Cloud database (db hosted on cloud platform) eg Amazon
- Graph Database (used to store & query data structed as nodes and edges (eg Amazon Neptune

3. what is relational Database? How it is different from non-relational database?

Relational Database use tables with rows and columns.

Table we can linked via keys (primary, foregin)

Follows ACID properties

Difference from Non-Relational.

Non-relational stores data in JSON like documents, key-value pairs, or graphs

Relational requires fixed schemas, while non-relational allows flexible schema

4. What is SQL? Its major components?

Structured Query Language is used to communicate with and manage relational database.

DDL (Data Definition Language)
Create/alter structures (tables, database)

DML (Data Manipulation Language)
Insert, update, delete data

DCL (Data Control Language) Control access
(Grant, Revoke)

TCL (Transaction Control Language) Manage transactions (Commit, Rollback)

5. What is the role of SQL in a DBMS?

Defining database structures
Inserting, updating and retrieving data
Controlling user access and managing transactions
Its acts as the interfaces between the user/application and the DBMS.

6. How to install and set SQL

Download SQL from website

Run the Installer and followup Instructions

Select Server type

configure user name and root Password

start the MySQL Server

Access via...

MySQL Command Line (mysql -u root -p)

MySQL workbench GUI for basic management

7. Syntax to create a database and tables

```
CREATE DATABASE database_name;
USE database_name;

CREATE TABLE Students ( student_id INT
    PRIMARY KEY, NAME VARCHAR (50)
    Age INT, Grade VARCHAR (10));
```

8. Insert a records:

```
INSERT INTO Students (student_id, Name,
age, grade) values (', 'Ali', 14, '8th');

INSERT INTO Students (student_id, Name, age, Grade)
Values ( 2, 'Bob', 15, '9th'),
    (3, 'chan', 16, '10th');
```

9. Difflorent btwoon
DDL DML DCL , TCL

| | | |
|---|---|---|
| DDL | Define DB structure | Create, Alter, Drop |
| DML | manage Data | Insert, updat, Delete |
| DCL | Manage permission | grant, Revoke |
| TCL | Manage Transaction | Commit, rollback,<br>Savepoint |

10. Common SQL datatypes:
INT, FLOAT, DECIMAL – Numeric
VARCHAR (n), CHAR (n) – strings
DATE, TIME, DATETIME – date / time
BOOLEAN – true / false
TEXT, BLOB – long text / binary

11. purpose of SELECT
retrive one or more tables in the database

12. Retrive specific columns.
select Name, Age from Students;

13. DISTINCT keyword (remove duplicate rows)
SELECT DISTINCT grade drom Studentes

14. Filter using WHERE (filters records based on condition)
SELECT * from Students WHERE ag > 14;

15. Comparison operators:

= (equal), != or <> (not equal)
> (greater than)
< (less than)
>= (greater than or equal)
<= (less than or equal).

Select * FROM students WHERE grade = '8th'.

16. Logical operators.

AND : All conditions must be true.
OR : At least one condition must be true.
NOT : Negates a condition.

Select * From Students where age > 13 AND Grade = '8th';

17. LIKE operator.

used for pattern match.
% -> Zero or more characters.
_ -> Single Character

Select * from Students where name like 'A%';

18. Between and IN

Between : checks if a value is within a range
IN : checks if a value matches any value in a List

19. Differente between ISNULL vs = NULL

use ISNULL to check for Null Values

= Null does not work in SQL

20. Sorting with order BY

used to sort query results

Ascending (ASC) by default.

Descending (DEC) if specified

Can sort by multiple Columns.

21. what are aggregate functions in SQL? List and explain five.

Aggregate function perform calculation on a set of values, returning a single value.

Count the number of rows

Select COUNT (*) from Employees.

Sum ()

select Sum (Salary) from Employees

Avg ().

Select Avg (salary) From Employees.

Max ()

SELECT MAX (salary) from Employees

MIN()

SeLECT MIN (Salary) FROM Employees

22. How does the count () function behave with NULL Values?

Count (*) count all rows include NULLS
Count (column_name) ignores NULL Values.

23. Different between SUM() and COUNT ()

Sum () -> adds up numeric Values in a Column
Count() -> count the number of Non_null rows in a column

24. How to group data using GROUP BY.

Group BY clause groups rows with the same values in specifed columns for aggregation.

25. Purpose of HAVING and its different from WHERE

Where filters rows before grouping
Having filtes groups after aggregation.

26. Can you use aggregate function in the where clause?

No aggregate functions cannot be used in WHERE since where filters before aggregation

27. Query find department With more than 5 employeer.

```
SELECT Department, Count (*) AS
EmployeeCount FROM Employees
GROUP BY Department
HAVING Count (*) > 5;
```

28. Find maximum and Minimum Salary

```
Select max (Salary) as maxSalary, Min (Salary
as minisalary from employees;
```

29. Calculate avarage Salary by department

```
Select department, avg (Salary) as avgSalary
from employees groupby department;
```

30. what happens if you use group by without aggregate functions?

It groups the data and returns unique Combinations of the grouped columns

31. what are Joins in SQL? why are they used?

joins combines rows from two or more tables based on related columns to retrive meaningful related data

32. Different between Inner Join and Left join
Inner join -> return matching rows from both tables

Left join -> Returns all rows from the left table and matching raw from the right table. NULL where no match.

33. Explain right Join and use Case:
Right Join: returns all rows from the right table and matching rows from the left. NULL where no match
Use when You want all data from the right table, even if no match exists in the left

34. What is a Full outer JOIN? Is it supported in mySQL?
Combines results of LEFT JOIN and RIGHT JOIN
Returns all rows from both tables with NULL where no match.
Not natively Supported in MySQL, but can be Simulated using UNION of LEFT JOIN and RIGHT JOIN.

45. Combining JOIN, GROUP BY and HAVING

```
Select d.departmentName, AVG (e.Salary)
As Avgsalary From employees e
JOIN Departments d ON e.DeptID = d.DeptID
Group BY d.department Name
HAVING AVG (e.salary) > 800000;
```

46. What is a CASE WHEN statement?

Used for conditional logic in SQL

47. Retrieve employees who joined in the last 6 months

```
Select * From Employees
WHERE JoinDate >= DATE_SUB (CURDATE(),
                     INTERVAL 6 MONTH);
```

48. Purpose and syntax of INSERT, UPDATE, DELETE

To add data

```
INSERT INTO TABLNAME (Name, Salary) VALUES
('Alice', 50000).
```

Update : Modify data

```
UPDATE employee SET Salary = 60000 Where
Name = 'Alice';
```

Delete : Remove data

```
Delete From employee Where Name = "Alice";
```

49. Types of Constraints in SQL

PRIMARY KEY - uniquely identifies each rou

FOREIUN KEY - maintain referential integrity.

UNIQUE : Ensures unique Values

Not Null : prevent NULL Values

Check : Ensures Specific Conditions

Default : sets default Value fron Columns.

50. what are transactions in SQL?

Is a group of SQL operations executed as a single unit, ensuring data integrity

Transaction commands.

COMMIT

ROLLBACK

SAVEPOINT