………………………………………… Interview Questions-1 ……………………………………………………………

1. What are the different types of databases, and how do they differ from each other?

ANS) Types of Databases and Their Differences:-

- **Relational Databases**: Organize data into tables with rows and columns (e.g., MySQL, PostgreSQL). They use SQL for queries.
- **NoSQL Databases**: Store unstructured or semi-structured data (e.g., MongoDB, Cassandra). They don't rely on fixed schemas.
- **Hierarchical Databases**: Data is structured in a tree-like format (e.g., IBM IMS).
- **Network Databases**: Similar to hierarchical but allow many-to-many relationships (e.g., Integrated Data Store).
- **Object-Oriented Databases**: Store data in the form of objects (e.g., ObjectDB).
- **Key-Value Databases**: Store data as key-value pairs (e.g., Redis).
- **Columnar Databases**: Optimize for analytical queries by storing data by columns (e.g., Apache Cassandra).
- **Graph Databases**: Use nodes and edges to represent relationships (e.g., Neo4j).
  Differences: These databases vary in structure, scalability, and use cases. For instance, relational databases are best for structured data, while NoSQL databases excel with unstructured or large-scale distributed systems.

2. What are SQL clauses, and can you provide examples of commonly used clauses?

Ans) SQL Clauses and Examples:-

SQL clauses are commands used to filter, group, or sort data. Examples include:

- **WHERE**: Filters rows (SELECT * FROM students WHERE age > 18;).
- **GROUP BY**: Groups data based on a column (SELECT department, COUNT(*) FROM employees GROUP BY department;).
- **HAVING**: Filters grouped data (SELECT department, COUNT(*) FROM employees GROUP BY department HAVING COUNT(*) > 5;).
- **ORDER BY**: Sorts data (SELECT * FROM students ORDER BY marks DESC;).

3. What is the difference between SQL commands and SQL clauses?

Ans) Difference Between SQL Commands and SQL Clauses:-

- **SQL Commands**: Instructions to perform database operations like creating tables, inserting, or modifying data. Categories include:
  - **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.

- **SQL Clauses**: Subparts of SQL queries that refine operations (e.g., WHERE, GROUP BY, ORDER BY). Clauses enhance how commands operate.

4. Can you explain the different types of SQL operators and provide examples?

Ans) Types of SQL Operators:-

SQL operators are symbols or keywords used in queries. Types include:

- **Arithmetic Operators**: +, -, *, / (e.g., SELECT salary * 1.1 FROM employees;).
- **Comparison Operators**: =, >, <, != (e.g., SELECT * FROM products WHERE price > 100;).
- **Logical Operators**: AND, OR, NOT (e.g., SELECT * FROM students WHERE age > 18 AND marks > 75;).
- **LIKE Operator**: Matches patterns (e.g., SELECT * FROM customers WHERE name LIKE 'A%';).
- **IN Operator**: Checks within a list (e.g., SELECT * FROM products WHERE category IN ('Electronics', 'Books');).

5. What are aggregate functions in SQL, and can you provide examples?

Ans):- Aggregate Functions in SQL

Aggregate functions perform calculations on a set of values:

- **COUNT**: Counts rows (SELECT COUNT(*) FROM orders;).
- **SUM**: Sums values (SELECT SUM(salary) FROM employees;).
- **AVG**: Calculates average (SELECT AVG(age) FROM students;).
- **MAX/MIN**: Finds maximum/minimum (SELECT MAX(price) FROM products;).

6. What is normalization, and why is it important in database design?

Ans) Normalization:-

Normalization is the process of structuring database tables to reduce redundancy and improve data integrity. **Benefits**:

- Reduces duplication.
- Improves query performance.
- Enhances data consistency.
- Ensures scalability.

Types:

- **1NF**: Eliminate duplicate columns and ensure atomic data.
- **2NF**: Ensure no partial dependency on composite keys.
- **3NF**: Remove transitive dependencies.

7. What are the different types of joins in SQL, and how do they differ?

Ans):- Types of Joins in SQL

Joins combine data from multiple tables:

- **INNER JOIN**: Returns matching rows (SELECT * FROM A INNER JOIN B ON A.id = B.id;).
- **LEFT JOIN**: All rows from the left table, matching rows from the right.
- **RIGHT JOIN**: All rows from the right table, matching rows from the left.
- **FULL OUTER JOIN**: All rows from both tables, matching or not.
- **CROSS JOIN**: Cartesian product of two tables.

8. What is the purpose of the GROUP BY clause in SQL?

Ans) Purpose of GROUP BY Clause:-

The GROUP BY clause aggregates rows with the same values in specified columns.

Example:

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

Purpose:

- Summarize data.
- Combine with aggregate functions (e.g., COUNT, SUM).

9. Can you explain the difference between primary key and foreign key?

Ans) Difference Between Primary Key and Foreign Key:-

- **Primary Key**: Uniquely identifies a row in a table. Cannot be NULL or duplicate.
- **Foreign Key**: Establishes a relationship between two tables by referencing a primary key in another table.

Example:

```
        CREATE TABLE orders (
  order_id INT PRIMARY KEY,
  customer_id INT,
  FOREIGN KEY (customer_id) REFERENCES customers(id)
);
```

10. What are some common commands used in MySQL?

Ans) Common Commands in MySQL:-

- **CREATE DATABASE**: Creates a new database.
- **USE DATABASE**: Selects a database for operations.
- **CREATE TABLE**: Creates a table.
- **INSERT INTO**: Inserts data (INSERT INTO users (name, age) VALUES ('John', 25);).
- **SELECT**: Fetches data (SELECT * FROM employees;).
- **UPDATE**: Modifies data (UPDATE users SET age = 30 WHERE name = 'John';).
- **DELETE**: Removes data (DELETE FROM users WHERE age < 18;).