Database Interview Questions & Answers

1. What is normalization?

Normalization is the process of organizing data to reduce redundancy and improve data integrity. It involves dividing a database into two or more tables and defining relationships between them.

Example: Instead of storing student and course info in one table, split into Students and Courses tables.

2. Explain primary vs foreign key.

Primary Key: Uniquely identifies each record in a table.

Foreign Key: References a primary key in another table.

Example:

Students(student_id PRIMARY KEY)

Marks(student_id FOREIGN KEY REFERENCES Students(student_id))

3. What are constraints?

Constraints are rules enforced on data columns to maintain data integrity.

Types: PRIMARY KEY, FOREIGN KEY, NOT NULL, UNIQUE, CHECK.

Example:

```
CREATE TABLE Employees (
 emp_id INT PRIMARY KEY,
 age INT CHECK (age > 18),
 email VARCHAR(100) UNIQUE NOT NULL);
```

4. What is a surrogate key?

A surrogate key is an artificially generated unique identifier, like AUTO_INCREMENT.

Example: employee_id INT PRIMARY KEY AUTO_INCREMENT

5. How do you avoid data redundancy?

By normalizing tables, using foreign keys, and referencing data instead of repeating it.

Example: Use a Departments table instead of storing department name in every Employee record.

6. What is an ER diagram?

ER (Entity-Relationship) diagram visually shows entities, attributes, and relationships in a schema.

Example: [Book]---(written by)---[Author]

7. What are the types of relationships in DBMS?

One-to-One: e.g., Person <-> Passport

One-to-Many: e.g., Author -> Books

Many-to-Many: e.g., Students <-> Courses (through Enrollments table)

8. Explain the purpose of AUTO_INCREMENT.

AUTO_INCREMENT auto-generates unique numeric IDs for new rows.

Example:

CREATE TABLE Users (user_id INT AUTO_INCREMENT PRIMARY KEY, username VARCHAR(50));

9. What is the default storage engine in MySQL?

The default storage engine is InnoDB.

It supports transactions, foreign keys, and row-level locking.

10. What is a composite key?

A composite key is a primary key made up of two or more columns.

Example:

```
CREATE TABLE Enrollments (
 student_id INT,
 course_id INT,
 PRIMARY KEY (student_id, course_id));
```