Normalization is the process of organizing data in a database to reduce redundancy and improve data integrity.
It divides large tables into smaller ones and links them using relationships.
It ensures:

- No repeating groups (1NF)
- No partial dependencies (2NF)
- No transitive dependencies (3NF).

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2. Primary Key vs Foreign Key

Primary Key	**Foreign Key**
Uniquely identifies each row	Refers to the primary key in another table
Cannot have NULL values	Can have NULLs (unless restricted)
Only one per table (usually)	Can be multiple
Enforces entity integrity	Enforces referential integrity

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3. What are Constraints?

Constraints are rules applied to columns in a table to ensure valid data.
Common constraints:

- PRIMARY KEY: Ensures uniqueness
- FOREIGN KEY: Enforces link between tables
- UNIQUE: No duplicate values
- NOT NULL: Value must be provided
- CHECK: Restricts values based on condition
- DEFAULT: Sets a default value

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4. What is a Surrogate Key?

A **surrogate key** is an artificially created unique identifier for a table.
➡️ It has no business meaning (e.g., auto-incrementing ID).

Example:

5. How do you avoid data redundancy?

By using:

- **Normalization** to break data into related tables.
- **Foreign keys** to link tables instead of duplicating data.
- **Efficient database design** to avoid repeating values.

6. What is an ER Diagram?

An **Entity-Relationship (ER) Diagram** is a visual representation of database structure.
It shows:

- **Entities** (tables)
- **Attributes** (columns)
- **Relationships** (how tables are related)

Used during database design to plan and organize data structure.

7. Types of Relationships in DBMS

Relationship Type	Description	Example
One-to-One (1:1)	One record in A relates to one in B	Person ↔ Passport
One-to-Many (1:N)	One record in A relates to many in B	Teacher → Students
Many-to-Many (M:N)	Many in A relate to many in B	Students ↔ Courses

8. Purpose of AUTO_INCREMENT

AUTO_INCREMENT is used to automatically generate unique values (usually for primary keys) in MySQL.

Example:

9. Default Storage Engine in MySQL

The default storage engine in MySQL is **InnoDB**.

✅ It supports:

- Transactions
- Foreign keys
- Row-level locking

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10. What is a Composite Key?

A **composite key** is a combination of two or more columns used together as a primary key.

Used when:

- No single column uniquely identifies a row.

Example: