⭐ MySQL

📘 Module 1: Introduction to Databases & MySQL

✓ What is a Database?

✓ Types of Databases (RDBMS, NoSQL)

✓ What is MySQL?

✓ **MySQL Architecture & Components**
- MySQL Server
- Client tools
- MySQL Workbench / phpMyAdmin

✓ **Installation & Setup**
- MySQL Server
- MySQL Workbench
- Command Line Client

📘 Module 2: SQL Basics

✓ **SQL vs MySQL**

✓ **SQL Syntax**

✓ **Data Types in MySQL**
- Numeric
- String
- Date & Time
- Boolean
- JSON

✓ **Creating Databases & Tables**
- CREATE DATABASE
- USE database
- CREATE TABLE (constraints + datatypes)

📘 Module 3: CRUD Operations

✓ **Insert Data**
- INSERT INTO

✓ **Select Data**
- Basic SELECT
- Aliases
- Sorting (ORDER BY)
- Filtering (WHERE)
- Limiting Results (LIMIT)

✓ **Update Data**
- UPDATE

✓ **Delete Data**
- DELETE

📘 Module 4: Filtering, Aggregation & Functions

✓ **WHERE Clause & Operators**
- Logical operators
- Comparison operators
- IN, BETWEEN, LIKE

✓ **Aggregate Functions**
- SUM, AVG, COUNT, MAX, MIN

✓ **GROUP BY**

✓ HAVING

✓ DISTINCT

📘 Module 5: Joins (Very Important)

✓ **Types of Joins**
- INNER JOIN
- LEFT JOIN
- RIGHT JOIN
- FULL JOIN (workaround in MySQL)
- CROSS JOIN

✓ Multi-table Joins

✓ SELF JOIN

✓ Using Joins with WHERE & ON conditions

📘 Module 6: Constraints & Keys

✓ Primary Key

✓ Foreign Key

✓ Unique Key

✓ Default

✓ NOT NULL

✓ CHECK constraint

✓ AUTO_INCREMENT

✓ Handling Referential Integrity

📘 Module 7: Advanced SQL Queries

✓ **Subqueries**
- Scalar
- Row
- Column
- Table subqueries

✓ Correlated Subqueries

✓ EXISTS / NOT EXISTS

✓ ANY & ALL operators

✓ Complex Queries (Real Use Cases)

📘 Module 8: Views

✓ What are Views?

✓ Creating Views

✓ Updating Data Through Views

✓ Dropping Views

✓ Uses of Views (Security, Simplification)

📘 Module 9: Indexing (High Performance)

✓ **What is an Index?**

✓ **Types of Indexes**
- Primary Index
- Unique Index
- Composite Index
- Fulltext Index
- Spatial Index (GIS)

✔ How Indexes Work Internally (B-Tree)
✔ When NOT to Use Indexes
✔ Query Performance Analysis
- Using EXPLAIN

📘 Module 10: Transactions & ACID

✔ What is a Transaction?
✔ COMMIT & ROLLBACK
✔ SAVEPOINT
✔ ACID Properties
✔ **Isolation Levels**
- READ UNCOMMITTED
- READ COMMITTED
- REPEATABLE READ
- SERIALIZABLE

✔ **Deadlocks & Locking Mechanisms**

📘 Module 11: Stored Procedures & Functions

✔ What is a Stored Procedure?
✔ Creating Procedures
✔ IN, OUT, INOUT parameters
✔ User-defined Functions
✔ Case expressions
✔ Using Loops, Flow Control
- IF, CASE
- WHILE
- REPEAT

📘 Module 12: Triggers & Events

✔ **What is a Trigger?**
✔ **BEFORE & AFTER Triggers**
✔ **Insert, Update, Delete triggers**
✔ **Event Scheduler**
- Creating events
- Scheduled tasks

📘 Module 13: Database Design & Normalization

✔ **ER Diagrams**
✔ **Normalization Forms**
- 1NF
- 2NF
- 3NF
- BCNF

✔ **Denormalization**
✔ **Real-world schema design**

📘 Module 14: MySQL Administration

✔ **User Management**
- Creating users
- Roles & permissions

✔ **Database Backup & Restore**
- mysqldump
- Import tools

✔ **Storage Engines**
- InnoDB
- MyISAM
- MEMORY
- CSV

✔ **Configuration & tuning basics**

📘 Module 15: MySQL with Applications (Optional)

✔ **Connect MySQL with:**
- Java (JDBC)
- Python (PyMySQL / mysql-connector)
- PHP
- Node.js
- Spring Boot
- Django / Flask

✔ **Writing secure queries**
- Prepared Statements
- Avoiding SQL Injection

📘 Module 16: Assignments & Assessments

✔ Weekly practice sheets
✔ SQL query challenges
✔ Database design tasks