Got it

I'll **act like an IIT-level professor** and design a **brick-by-brick SQL syllabus** that is **modeled exactly on the 3rd-tier autonomous college syllabus style** you shared (UNIT-wise, objectives, outcomes, textbook-oriented), but **tailored for SQL → Data Analytics**, from **scratch to advanced**.

Below is a **clean, university-exam–ready syllabus**, very similar in **tone, depth, and formatting** to the PDF you provided, but **academically stronger and logically progressive**.

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# B.Tech / B.Sc / BCA / AI & DS / Data Science

## DATABASE MANAGEMENT SYSTEMS – SQL FOR DATA ANALYTICS

**L T P C**
**3 0 0 3**

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## Course Objectives

• Understand the fundamentals of relational databases and SQL
• Design and query databases using structured query language
• Apply SQL for real-world data analytics problems
• Perform data filtering, aggregation, and analysis efficiently
• Understand advanced SQL concepts used in industry-level analytics

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## Course Outcomes (COs)

After successful completion of the course, the student will be able to:

**CO1:** Understand database concepts and relational data models
**CO2:** Write SQL queries using basic and conditional statements
**CO3:** Apply joins, subqueries, and aggregate functions for analytics
**CO4:** Design normalized databases and ensure data integrity
**CO5:** Use advanced SQL features for analytical and reporting tasks

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# SYLLABUS

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## UNIT – I: Introduction to Databases & SQL Foundations

**Introduction:**

- Data vs Information

- Need for Databases

- File System vs Database System

- DBMS and RDBMS Concepts

- Applications of Databases in Data Analytics

## Database Basics:

- Tables, Rows, Columns

- Primary Key, Candidate Key

- Schema and Instance

## Introduction to SQL:

- History and Importance of SQL

- SQL Standards (ANSI SQL)

- Categories of SQL

  - DDL

  - DML

  - DQL

  - DCL

  - TCL

## Basic SQL Commands:

- `CREATE, DROP, TRUNCATE`

- `INSERT, SELECT`

- `DESCRIBE`

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# UNIT – II: Data Retrieval & Conditional Querying

## Data Query Language (DQL):

- `SELECT` Statement Syntax

- Selecting Specific Columns

- `DISTINCT` Keyword

## Filtering Data:

- `WHERE` Clause

- Relational Operators

- Logical Operators (`AND, OR, NOT`)

- `BETWEEN, IN, LIKE, IS NULL`

## Sorting & Limiting:

- `ORDER BY`

- `ASC`, `DESC`

- `LIMIT` / `TOP`

## Aliases:

- Column Aliases

- Table Aliases

*By the end of UNIT–II, the student can extract meaningful subsets of data.*

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# UNIT – III: Aggregation, Joins & Subqueries (Core Analytics Unit)

## Aggregate Functions:

- `COUNT()`

- `SUM()`

- `AVG()`

- `MIN()`

- `MAX()`

## Grouping Data:

- `GROUP BY`

- `HAVING` Clause

- Difference between `WHERE` and `HAVING`

## Joins:

- Inner Join

- Left Join

- Right Join

- Full Outer Join

- Self Join

## Subqueries:

- Single-row Subqueries

- Multi-row Subqueries

- Nested Subqueries

- Correlated Subqueries

*This unit forms the backbone of SQL for Data Analytics.*

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# UNIT – IV: Database Design, Constraints & Normalization

## Constraints:

- `PRIMARY KEY`
- `FOREIGN KEY`
- `UNIQUE`
- `NOT NULL`
- `CHECK`
- `DEFAULT`

## Referential Integrity:

- Parent and Child Tables
- Cascading Actions

## Normalization:

- Need for Normalization
- Functional Dependency
- First Normal Form (1NF)
- Second Normal Form (2NF)
- Third Normal Form (3NF)

## Views:

- Creating Views
- Updating Views
- Advantages of Views

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# UNIT – V: Advanced SQL for Data Analytics

## Advanced SQL Functions:

- String Functions
- Date & Time Functions
- Mathematical Functions

## Window Functions (Analytics-Oriented):

- `ROW_NUMBER()`
- `RANK()`
- `DENSE_RANK()`

- `OVER()` Clause

- Partitioning Data

## Indexing:

- Need for Indexes

- Creating and Dropping Indexes

- Impact on Query Performance

## Transactions:

- `COMMIT`

- `ROLLBACK`

- `SAVEPOINT`

- ACID Properties

## Introduction to SQL in Analytics Tools:

- SQL with Excel / Power BI / Tableau (Conceptual)

- SQL in Data Warehousing (OLTP vs OLAP)

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# Text Books

1. **Silberschatz, Korth, Sudarshan**, *Database System Concepts*, McGraw-Hill

2. **Ben Forta**, *SQL in 10 Minutes a Day*, Sams Publishing

3. **Alan Beaulieu**, *Learning SQL*, O'Reilly Media

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# Reference Books

1. Elmasri & Navathe, *Fundamentals of Database Systems*, Pearson

2. C.J. Date, *An Introduction to Database Systems*

3. O'Neil & O'Neil, *Database: Principles, Programming, and Performance*

4. Practical SQL – Anthony DeBarros, No Starch Press

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## IIT-Level Learning Advice (Important)

- **UNIT I–II** → Foundation (Syntax + Thinking)

- **UNIT III** → Real Data Analytics Power

- **UNIT IV** → Database Design Maturity

- **UNIT V** → Industry & Interview Readiness

If you want next:

- **Lab syllabus (SQL practicals)**
- ▦ **UNIT-wise interview questions**
- **Analytics case studies using SQL**
- **90-day IIT-style study plan**

Just tell me