DATABASE MANAGEMENT SYSTEM

Course code : 22AI33 **Credits : 04**

L: P: T: S 3:0:0:0 **CIE Marks: 50**

Exam Hours: 03 **SEE Marks: 50**

Total Hours: 40

Course Objectives:

1. Understand the basic concepts and the applications of database systems.
2. Master the basics of SQL and construct queries using SQL.
3. Understand the relational database design principles.
4. To understand the concepts of normalization.
5. Design and build simple database applications.
6. Familiar with the basic issues of transaction processing and concurrency control.

Course Outcomes: At the end of the course, student will be able to:

CO1	Understand the basics of databases and database management systems
CO2	Apply DBMS concepts to design and create databases that address specific real-world scenerios
CO3	Analyse a given scenario and use suitable database technique
CO4	Demonstrate the various SQL & Relational algebra query processing
CO5	Ability to conduct experiments as individual or team to using modern tools like Mysql and MongoDB
CO6	Write clear and concise experiment reports that detail the methods, results, and conclusions of DBMS experiment

Module	Contents of the Module	Hours	COs
1	**Introduction to Databases:** Introduction, An Example, Characteristics of Database approach, Advantages of using DBMS approach, Wen not to use a DBMS Database System **Concepts and Architecture**: Data models, Schemas and instances, Three schema architecture and data independence Database languages and interfaces, The database system environment. **SQL:** SQL Data Definition and Data Types specifying basic constraints in SQL, Basic retrieval queries in SQL, Insert, Delete and Update statements in SQL, Additional features of SQL, More complex SQL Queries, Specifying Constraints as Assertions and Triggers, Views (Virtual Tables) in SQL, Schema Change Statement in SQL.	08	CO1
2	**Data Modelling using the Entity-Relationship(ER) model:** Using High-Level Conceptual Data Models for Database Design, A sample Database Application, Entity types, Entity Sets, Attributes, and Keys, Relationship Types, Relationship Sets, Roles and Structural Constraints, Weak Entity types, Refining the ER Design, ER Diagrams, Naming Conventions and Design Issues, Relationship Types of Degree Higher than two, Relational Database Design using ER-to-Relational Mapping	08	C02 & CO4
3	**Relational Data Model and Relational Database Constraints:** Relational Model Concepts, Relational Model Constraints and Relational Database Schemas, Update Operations, Transactions and Dealing with Constraint Violations. Relational Algebra: Unary Relational Operations, SELECT, and PROJECT, Relational Algebra Operations from Set Theory Binary Relational Operations: JOIN and DIVISION, Additional Relational Operations, Examples of Queries in Relational Algebra.	08	CO3& CO4

4	**Database Design Theory and Normalization:** Informal Design Guidelines for Relation Schemas, Functional Dependencies, Normal Forms Based on Primary Keys, General Definitions of Second and Third Normal Forms, Boyce-Codd Normal Form, Fourth Normal Form, Fifth Normal Form.	08	CO2& CO5
5	**Transaction Processing, Concurrency Control, and Recovery:** Introduction to Transaction Processing, Transaction and System Concepts, Desirable Properties of Transactions, Two-Phase Locking Techniques for Concurrency Control, Recovery Concepts, NO-UNDO/REDO Recovery Techniques based on Deferred Update, Recovery Techniques Based on Immediate Update, Shadow Paging, The ARIES Recovery Algorithm. Mongo DB: CRUD & nesting, Indexing, Aggregation, Map reduce, Replica set, Sharding, Geospatial and GridFS	08	

Text Books:

"Fundamental of Database Systems", Ramez Elmasri and Shamkant B Navathe ,Sixth Edition, Pearson, 2019

2. "Database Management Systems", Ramakrishnan and Gehrke , Third Edition, McGraw Hill, 2016

3. "Seven Databases in Seven Weeks ",Luc Perkins with Eric Redmond and Jim R. Wilson, Second edition, 2018

Reference Books:

1. "An Introduction to Database Systems", C.J.Date, A.Kannan, S.Swamynathan,8th Edition ,Pearson Education,2017

2. "Database Systems: The Complete Book ", Hector Garcia Molina, Jeffrey D. Ullman, Jennifer Widom ,Second Edition, Pearson Education, 2018

3. "Database System Concepts". Abraham Silberschatz, Henry F. Korth, S. Sudarsha , Sixth Edition ,Tata McGraw-Hill, 2017.