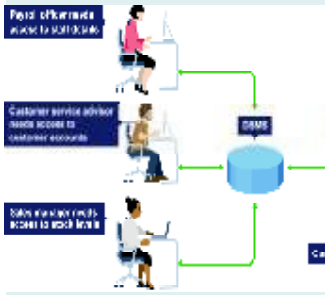
16CS201 DATABASE MANAGEMENT SYSTEMS



Hours Per Week :

L	T	P	C
3	1	2	5

Total Hours :

L	T	P
45	15	30

CS	WA/RA	SSH	SA	S	BS
5	5	40	8	5	2

Course Description and Objectives:

This course presents an introduction to database management systems with an emphasis on how to organize, maintain and retrieve data efficiently and effectively from a database. It concentrates on requirements gathering and conceptual, logical, physical database design. The objective of the course is to make the student to understand database management concepts such as database design, transaction processing and query optimization.

Course Outcomes:

The student will be able to:

- understand the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL.
- design Entity Relationship(ER) models to represent simple database application scenarios.
- convert the ER-model to relational tables, populate relational database and formulate SQL queries.
- construct simple and complex queries using Structured Query Language (SQL).
- improve the database design by normalization.
- familiarise with basic database storage structures and access techniques.

SKILLS :

- ü *Design a conceptual database using ER-Model.*
- ü *Convert ER- Model to RDBMS.*
- ü *Formulate database queries using* Structured Query Language (SQL).
- ü *Build and run DDL and DML commands.*
- ü Design and implement normalized databases.
- ü Construct B+ Trees.

ACTIVITIES:

- *Design of ER diagram for the development of web applications.*
- *Transformation of ER diagram into a relational schema.*
- *Creation of relations with entity and referential integrity constraints for a given relational schema*
- *Representation of queries using Relational Algebra.*
- *Formulation of queries using SQL.*
- *Design of relational database using normalization techniques.*
- *Development of relational schema for enterprise level web applications.*

UNIT - 1 **L-09,T-03**

INTRODUCTION TO DATABASES: Characteristics of the Database Approach, People who work with databases, Advantages of using the DBMS approach, Data Models, Schemas and Instances, Three-Schema Architecture and Data Independence, Database Languages and Interfaces, The Database System Environment, Centralized and Client/Server Architectures for DBMSs.

UNIT - 2 **L-09,T-03**

CONCEPTUAL DESIGN AND DATABASE DESIGN: 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 for the Company Database, ER Diagrams, Naming Conventions and Design Issues, Subclasses, Super classes and Inheritance, Specialization and Generalization, Constraints and Characteristics of Specialization and Generalization Hierarchies, Modeling of UNION Types Using Categories.

UNIT - 3 **L-09,T-03**

RELATIONAL DATA MODEL AND SQL: Relational Database Design Using ER-to-Relational Mapping, Mapping EER Model Constructs to Relations, Relational Model Concepts, Relational Model Constraints and Relational Database Schemas, Update Operations, Transactions and Dealing with Constraint Violations, SQL Data Definition and Data Types, Specifying Constraints in SQL, Basic Retrieval Queries in SQL, INSERT, DELETE and UPDATE Statements in SQL, Complex SQL Retrieval Queries, Specifying Constraints as Assertions and Actions as Triggers, Views (Virtual Tables) in SQL, Relational Algebra.

UNIT - 4 **L-09,T-03**

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, Multivalued Dependency and Fourth Normal Form, Join Dependencies and Fifth Normal Form, Properties of Relational Decompositions.

UNIT - 5 **L-09,T-03**

TRANSACTION PROCESSING, CONCURRENCY CONTROL AND RECOVERY: Transaction and System Concepts, Desirable Properties of Transactions, Two-Phase Locking Techniques, Timestamp Ordering, Recovery Concepts, The ARIES Recovery Algorithm, Recovery in Multi-database Systems, Primary File Organizations, Single level and Multilevel indexes, Dynamic Multilevel Indexes Using B+ Trees.

LABORATORY EXPERIMENTS

Course Outcomes:

The student will be able to:

- ü understand, analyze, and apply common SQL Statements including DDL, DML and DCL statements to perform different operations.
- ü apply PL/SQL blocks using Cursors and Triggers.
- ü design and implement a database for a given problem.

List of experiments Total Hours 30

1. ER Design tool (ex. TOAD)
2. MYSQL RDBMS

3. Table Creation, Constraints, Insert, Select Commands, Update and Delete Commands.
4. Nested Queries and Join Queries.
5. Views.
6. Design and development of database using MYSQL.
7. High level programming language extensions (Control structures, Procedures and Functions).
8. Front end Tools.
9. Forms.
10. Triggers.
11. Menu Design.
12. Reports.

TEXT BOOK:

1. Ramez Elmasri and Shamkant B Navathe, "Fundamentals of Data base Systems", 6th edition, Pearson Education, 2010.

REFERENCE BOOKS :

1. Raghu Rama Krishnan and Johannes Gehrke, "Database Management Systems", 3rd edition, Tata McGraw Hill, 2013.
2. Abraham Silberschatz, Henry F.Korth and S.Sudarshan, "Database System Concepts", 6th edition, Tata McGraw Hill, 2010.
3. Peter Rob and Carlos Coronel, "Database System Design, Implementation and Management", 7th edition, Cengage Learning, 2007.