Program: Second Year B. Tech.	Semester: IV	L	P	C
Database Management System	Course Code: ADCR0403	3	0	3
Database Management System Lab	Lab Code: ADLR0403	0	2	1
		3	2	4

Course Objectives:	
1	To develop entity relationship data model and its mapping to relational model
2	To learn relational algebra and Formulate SQL queries
3	To apply normalization techniques to normalize the database
4	To understand concept of transaction, concurrency control and recovery techniques.

Course Outcomes:	
After successful completion of this course, the students should be able to	
CO 1:	Recognize the need of database management system & Design ER and EER diagram and convert to relational model for real life applications.
CO 2:	Construct relational model and write relational algebra queries by Applying the concept of normalization, DDL, DML, DCL and TCL commands to relational database design.
CO 3:	Formulate and write simple and complex queries and Use Pl / SQL Constructs.
CO 4:	Describe and demonstrate the concept of concurrent transactions execution, concurrency and recovery also Demonstrate the fronted-back-end connectivity.

Pre-requisite courses: C Programming, Data Structures

Course Assessment Methods:

DIRECT
1. Continuous Internal Assessment (Theory component)   2. Assignments/Tutorials/Power-point-presentation/Group-discussion/Quiz/seminar/Case studies/Design Thinking/Innovation/Creativity (Blog writing/Vlogging, etc)   3. Pre/Post - Experiment Test/Viva; Experimental Write-Up for each Experiment, Day to Day Experiments /Assignments/Tutorials/Power-point-presentation/Group-discussion/Quiz/seminar/Case studies/Design Thinking/Innovation/Creativity (Blog writing/Vlogging, etc) (Lab Component)   4. End Semester Examination (Theory component)
INDIRECT
1.   Course-end survey   2.   Activity based survey (if any)

DETAILED SYLLABUS

Module-1: Introduction Database Concepts & Entity–Relationship Data Model	9 Hours

1.1 Database Concepts: Introduction, Characteristics of databases, File system v/s Database system, Data abstraction and data Independence, DBMS system architecture, Database Administrator.

1.2 Entity–Relationship Data Model: The Entity-Relationship (ER) Model: Entity types: Weak and strong entity sets, Entity sets, Types of Attributes, Keys, Relationship constraints: Cardinality and Participation, Extended Entity- Relationship (EER) Model: Generalization, Specialization and Aggregation

Module-2: Relational Model, Algebra & Database Design	10 Hours

2.1 Relational Model: Introduction to the Relational Model, relational schema and concept of keys. Mapping the ER and EER Model to the Relational Model.

2.2 Algebra: Relational Algebra-operators, Relational Algebra Queries.

2.3 Database Design: Pitfalls in Relational-Database designs, Concept of normalization, Function Dependencies, First Normal Form, 2NF, 3NF, BCNF.

Module-3: Structured Query Language (SQL)	10 Hours

3.1 Overview of SQL, Data Definition Commands, Integrity constraints: key constraints, Domain Constraints, Referential integrity, check constraints, Data Manipulation commands, Data Control Commands, Set and string operations, aggregate function-group by having, Views in SQL, joins, Nestedand complex queries, Triggers.

Module-4: Transactions Management and Concurrency and Recovery	10 Hours

4.1 Transaction concept, Transaction states, ACID properties, Transaction Control Commands, Concurrent Executions, Serializability-Conflict and View, Concurrency Control: Lock-based, Timestamp-based protocols, Recovery System: Log based recovery, Deadlock handling.

Lecture:3 hrs/week   **Total Hours :39 Hrs**

LAB COMPONENT CONTENTS:
  Suggested Topic/List of Experiments (Minimum 8 Experiments)

1. Identify the case study and detail statement of problem. Design an Entity Relationship (ER) / Extended Entity- Relationship (EER) Model.
2. Mapping ER/EER to Relational schema mode.
3. Create a database using Data Definition Language (DDL) and apply integrity constraints for the specified System
4. Apply DML Commands for the specified system
5. Perform DCL and TCL commands.
6. Implement various Join operations.
7. Perform Simple queries, string manipulation operations and aggregate functions.
8. Perform Nested and Complex queries.
9. Implement procedure and functions.
10. Implementation of Views and Triggers.
11. Demonstrate Database connectivity.
12. Implementation and demonstration of Transaction and Concurrency control techniques using locks.

One beyond curriculum experiment may be conducted (To be decided by the Subject Teacher)

Practical: 2 hrs/week	**Total Hours :26 Hrs**

Textbooks:
1. Database System Concepts/Korth, Slberchatz, Sudarshan/6thEdition/McGraw Hill
2. Fundamentals of Database Systems/Elmasri and Navathe/5thEdition, Pearson Education
3. Database Management Systems/Raghu Ramkrishnan and Johannes Gehrke/TMH

Reference Books:
1. Peter Rob and Carlos Coronal, Database Systems Design, Implementation and Management, Thomson Learning, 5th Edition.
2. Dr. P.S. Deshpande, SQL and PL/SQL for Oracle 10g, Black Book, Dreamtech Press.
3. G. K. Gupta, Database Management Systems, McGraw Hill, 2012.