DATABASE MANAGEMENT SYSTEMS
(Common to CSE&IT)

II B. Tech. - II Semester	L	T	P	C
Course Code: A3CS14	4	1	-	4

COURSE OVERVIEW:

This course introduces the core principles and techniques required in the design and implementation of database systems. This introductory application-oriented course covers the relational database systems RDBMS - the predominant system for business, scientific and engineering applications at present. It includes Entity-Relational model, Normalization, Relational model, Relational algebra, and data access queries as well as an introduction to SQL. It also covers essential DBMS concepts such as: Transaction Processing, Concurrency Control and Recovery. It also provides students with theoretical knowledge and practical skills in the use of databases and database management systems in information technology applications.

COURSE OBJECTIVES:

1. **To Teach** the basic database concepts, applications, data models, schemas andinstances.
2. **To familiarize** Entity Relationship model for a database.
3. **To Demonstrate** the use of constraints and relational algebra operations.
4. **To Describe** the basics of SQL and construct queries using SQL.
5. **To Emphasize** the importance of normalization in databases.
6. **To Demonstrate** the basic concepts of transaction processing and concurrency control.
7. **To familiarize** the concepts of database storage structures and identify the access techniques.

COURSE OUTCOMES:

At the end of the course the students are able to:

1. Use the basic concepts of Database Systems in Database design
2. Apply SQL queries to interact with Database
3. Design a Database using ER Modelling
4. Apply normalization on database design to eliminate anomalies
5. Analyze database transactions and can control them by applying ACID properties.

SYLLABUS

UNIT - I

INTRODUCTION: Introduction and applications of DBMS, Purpose of data base, Data, Independence, Database System architecture- Levels, Mappings, Database, users and DBA

DATABASE DESIGN: Database Design Process, ER Diagrams - Entities, Attributes, Relationships, Constraints, keys, extended ER features, Generalization, Specialization, Aggregation, Conceptual design with the E-Rmodel.

UNIT - II

THE RELATIONAL MODEL: Introduction to the relational model, Integrity constraints over relations, Enforcing integrity constraints, Querying relational data, Logical database design: E-R to relational, Introduction to views, Destroying/altering tables and views.

RELATIONAL ALGEBRA AND CALCULUS: Preliminaries, relational algebra operators, relational calculus - Tuple and domain relational calculus, expressive power of algebra and calculus.

UNIT - III

SQL: Basics of SQL, DDL, DML,DCL, structure – creation, alteration, defining constraints – Primary key, foreign key, unique, not null, check, IN operator, Functions - aggregate functions, Built-in functions – numeric, date, string functions, set operations, sub-queries, correlated sub-queries, Use of group by, having, order by, join and its types, Exist, Any, All , view and its types. transaction control commands – Commit, Rollback, Save point, cursors, stored procedures,Triggers

UNIT - IV

SCHEMA REFINEMENT AND NORMAL FORMS: Introduction to schema refinement, functional dependencies, reasoning about FDs. Normal forms: 1NF, 2NF, 3NF, BCNF, properties of decompositions, normalization, schema refinement in database design, case studies.

UNIT – V

TRANSACTIONS MANAGEMENT: Transaction concept, transaction state, implementation of atomicity and durability, concurrent executions, Serializability, recoverability, implementation of isolation, transaction definition in SQL, testing for Serializability.

CONCURRENCY CONTROL AND RECOVERY SYSTEM: Concurrency control, lock based protocols, time-stamp based protocols, validation based protocols, multiple granularity. Recovery system - failure classification, storage structure, recovery and atomicity, log- based recovery, shadow paging, buffer management, failure with loss of non-volatile storage, advanced recovery techniques, remote backup systems.

OVERVIEW OF STORAGE AND INDEXING: Tree structured indexing - intuition for tree indexes, indexed sequential access method (ISAM), B+ Trees - a dynamic tree structure.

TEXT BOOKS:

1. Raghurama Krishnan, Johannes Gehrke , Database Management Systems, 3rd edition, Tata McGraw Hill, New Delhi,India.
2. Elmasri Navate, Fundamentals of Database Systems, Pearson Education,India.

REFERENCE BOOKS:

1. Abraham Silberschatz, Henry F. Korth, S. Sudarshan (2005), Database System Concepts, 5th edition, McGraw-Hill, New Delhi,India.
2. Peter Rob, Carlos Coronel (2009), Database Systems Design, Implementation and Management, 7thedition.