BCSC0003: DATABASE MANAGEMENT SYSTEM

Objective: *The objective of the course is to enable students to understand and use a relational database& NoSQL system. Students learn how to design and create a good database.*

Credits: 03 **L-T-P-J: 3-0-0-0**

Module No.	Content	Teaching Hours
I	Introduction**:** An Overview of Database Management System, Database System Vs File System, Database System Concept and Architecture, Data Model Schema and Instances, Data Independence, Database Language and Interfaces (DDL, DML, DCL), Database Development Life Cycle (DDLC) with Case Studies. Data Modeling Using the Entity-Relationship Model**:** ER Model Concepts, Notation for ER Diagram, Mapping Constraints, Keys, Specialization, Generalization, Aggregation, Reduction of an ER Diagram to Tables, Extended ER Model. Relational Data Model and Language**:** Relational Data Model Concepts, Integrity Constraints, Entity Integrity, Referential Integrity, Keys Constraints, Domain Constraints, Relational Algebra	20
II	**Database Design & Normalization I:** Functional Dependencies, Primary Key, Foreign Key, Candidate Key, Super Key, Normal Forms, First, Second, Third Normal Forms, BCNF, Non-Redundant Cover, Canonical Cover **Database Design & Normalization II:** 4th Normal Form, 5th Normal Form, Lossless Join Decompositions, MVD and JDs, Inclusion Dependence. **File Organization:** Indexing, Structure of Index files and Types, Dense and Sparse Indexing **Transaction Processing Concept:** Transaction System, Testing of Serializability, Serializability of Schedules, Conflict & View Serializable Schedule, Recoverability, Recovery from Transaction Failures, Log Based Recovery, Deadlock Handling. **Concurrency Control Techniques:** Concurrency Control, Locking Techniques for Concurrency Control, 2PL, Time Stamping Protocols for Concurrency Control, Validation Based Protocol. **Distributed Database:** Introduction of Distributed Database, Data Fragmentation and Replication.	20

Text Books:

- Elmasri and Navathe, "Fundamentals of Database Systems", 6th Edition, Addison Wesley,2010.
- Sadalage, P. &Fowler, "NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence", Pearson Education,2012.

References Books:

- Date C J," An Introduction to Database Systems", 8th Edition, Addison Wesley.
- Korth, Silbertz and Sudarshan, "Database Concepts", 5th Edition, TMH,1998.
- Redmond, E. & Wilson, "Seven Databases in Seven Weeks: A Guide to Modern Databases and the NoSQL Movement", 1st Edition.

Outcome: After the completion of the course, the student will:

- CO1: Understand the concept of database management systems and Relational database.
- CO2: Identify the various data model used in database design.
- CO3: Design conceptual models of a database using ER modeling for real life applications and construct queries in Relational Algebra.
- CO4: Create and populate a RDBMS for a real life application, with constraints and keys using SQL.
- CO5: Select the information from a database by formulating complex queries in SQL.
- CO6: Analyze the existing design of a database schema and apply concepts of normalization to design an optimal database.
- CO7: Discuss indexing mechanisms for efficient retrieval of information from a database.
- CO8: Discuss recovery system and be familiar with introduction to web database, distributed databases.