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 **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	20
II	**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 (2010), "*Fundamentals of Database Systems*", 6th Edition, Addison Wesley.
- Sadalage, P. & Fowler (2012), "NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence", Pearson Education

References Books:

- Date C J," *An Introduction to Database Systems*", 8th Edition, Addison Wesley.
- Korth, Silbertz and Sudarshan (1998), "*Database Concepts*", 5th Edition, TMH.
- 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:

- Master the basic concepts and appreciate the applications of database systems.
- Be familiar with the relational database theory, and be able to write relational algebra expressions for queries and design principles for the logical design of databases, including the E-R method and normalization approach.
- Be familiar with the basic issues of transaction processing and concurrency control.
- Be familiar with the various NoSQL database system.

BCSC0802: DATABASE MANAGEMENT SYSTEM LAB

Objective: *The lab aims to develop an understanding of different applications and constructs of SQL, PL/SQL.*

Credits:01 **L-T-P-J:0-0-2-0**

Module No.	Content	Teaching Hours
I, II and III	• Write the SQL queries for data definition and data manipulation language. • To implement various operations on a table. • To implement various functions in SQL. • To implement restrictions on the table. • To implement the concept of the grouping of Data. • To implement the concept of Joins in SQL. • To implement the concept of sub-queries. • To implement the concept of views, sequence. • To implement the concept of PL/SQL using a cursor. • To implement the concept of Procedure function and Triggers.	24

References Books:

- Date C J," *An Introduction to Database Systems*", 8th Edition, Addison Wesley.
- Korth, Silbertz and Sudarshan (1998), *"Database Concepts"*, 5th Edition, TMH.
- Majumdar& Bhattacharya, *"Database Management System"*, TMH

Outcome: After the completion of the course, the student will be able to:

- Ability to create database tables
- Ability to formulate SQL queries based on the problems given
- Ability to apply PL/SQL.
- Ability to create NoSQL databases.
- Ability to connect database using Python program.