DATABASE MANAGEMENT SYSTEMS (DBMS)

Course Code: BECSE2C022 / BECCS2C022
Course Title: DATABASE MANAGEMENT SYSTEMS
Semester: IV
Credits: 04

Rationale

The study of DBMS is essential for acquiring the skills needed to manage data effectively, support organizational processes, and contribute to informed decision-making in the digital age. The role of DBMS in also seen in supporting and streamlining various business processes by providing a centralized and structured data repository.

Course Outline

Contents	No. of Lectures
Unit - I **Introduction to Database:** Definition, Terminology of database, Need for Databases, Traditional File Systems Vs Database, DBMS architecture, Data Abstraction, Data Independence, Mapping between layers. Data Models- Network model, Hierarchical model, Relational and Object-Oriented Data models. Database users, Data dictionary.	**10**
Unit - II **Relational Model:** Introduction and definition of relation, entities, attributes, keys, relationships, relational model integrity rules. **Entity Relationship Model**: E-R Diagrams, Constraints Entity Types, Entity Sets, Attributes, Relationships, Relationships Types, Design of an E-R Database Schema, Reduction of an E-R schema to relational schemas and vice-versa. Integrity constraints over Relations, Aggregation, Generalization and Specialization.	**10**
Unit - III **Relational query languages:** Relational algebra and evaluation of relational algebra expressions, Relational Calculus: Tuple and domain relational calculus. **Database Implementation:** Introduction to software-RDBMS, Basic structure, Database Structure, SQL- DDL, DML, and DCL, views, Queries in SQL, Specifying Constraints in SQL.	**10**
Unit - IV **Relational Database Design:** Normalization- 1NF, 2NF, 3NF, BCNF, 4NF and 5NF. Concept of De-normalization and practical problems based on these forms.	**10**
Unit - V **Transaction Management and Concurrency control:** Concept of Transaction, States of Transaction and its properties, Need of Concurrency control, concept of Lock, Two phase locking protocol. **Recovery Management:** Need of Recovery Management, Concept of Stable Storage, Log Based Recovery Mechanism, Checkpoint.	**10**

Laboratory work:

Students will perform SQL commands to demonstrate the usage of DDL, DML and DCL, joining of tables, grouping of data and will implement PL/SQL constructs.

COURSE OUTCOMES

Upon successful completion of the course the student will be able to:

1. Understanding and implement the fundamental database design, including data models, schemas, and relationships.
2. Analyze and design database using E-R data model by identifying entities, attributes and relationships.
3. Illustrate their technical skills on Structured Query Language (SQL) so as to effectively retrieve, manipulate, and manage data within a relational database.
4. Acquire knowledge of mechanisms to ensure data integrity, normalization, accuracy, including constraints and access control.
5. Critically comprehend the concepts of transaction management, concurrence control, recovery management and security within a database.

Text Books:

1. Silverschatz A., Korth F. H. and Sudarshan S., Database System Concepts, Tata McGraw Hill (2019) 7th Edition.
2. Elmasri R. and Navathe B. S., “Fundamentals of Database Systems”, Pearson (2016) 7th ed.

Reference Books:

1. C.J Date, "An Introduction to Database Systems" , Addison-Wesley(2018), 8th Edition.
2. Hector Garcia-Molina, Jeff Ullman, and Jennifer Widom, “Database Systems: The Complete Book” , Pearson Prentice Hall(2008), 2nd Edition
3. Raghu Ramakrishnan and Johannes Gehrke "Database Management Systems",McGraw-Hill Education (2002), 3rd Edition