TCS 503

DATABASE MANAGEMENT SYSTEM

Unit 1:

Introduction:

- An overview of DBMS
- Advantages of using DBMS approach
- Database systems vs File Systems
- Database system concepts and architecture
- Data models, schemas, and instances
- Three-schema architecture and data independence
- Database languages and interfaces
- The database system environment
- Centralized and client-server architectures
- Classification of Database Management systems

Unit 2:

Entity-Relationship Model:

- Using High-Level Conceptual Data Models for Database Design
- An Example Database Application
- Entity Types, Entity Sets, Attributes and Keys
- Relationship types, Relationship Sets Roles and Structural Constraints
- Weak Entity Types
- Refining the ER Design
- ER Diagrams, Naming Conventions and Design Issues
- Relationship types of degree higher than two

Unit 3:

Relational Model and Relational Algebra:

- Relational Model Concepts
- Relational Model Constraints and Relational Database Schemas
- Update Operations, Transactions and dealing with constraint violations
- Unary Relational Operations: SELECT and PROJECT
- Relational Algebra and Calculus Operations from Set Theory
- Binary Relational Operations: JOIN and DIVISION
- Additional Relational Operations
- Examples of Queries in Relational Algebra
- Relational Database Design Using ER- to-Relational Mapping

SQL – 1:

- SQL Data Definition and Data Types
- Specifying basic constraints in SQL
- Schema change statements in SQL
- Basic queries in SQL
- More complex SQL Queries
- Insert, Delete and Update statements in SQL
- Specifying constraints as Assertion and Trigger
- Views (Virtual Tables) in SQL
- Additional features of SQL
- Database programming issues and techniques
- Embedded SQL, Dynamic SQL
- Database stored procedures.

Unit 4:

Database Design – 1:

- Informal Design Guidelines for Relation Schemas
- Functional Dependencies
- Normal Forms Based on Primary Keys
- General Definitions of Second and Third Normal Forms
- Boyce-Codd Normal Form
- Properties of Relational Decompositions
- Algorithms for Relational Database Schema Design
- Multivalued Dependencies and Fourth Normal Form
- Join Dependencies and Fifth Normal Form
- Inclusion Dependencies
- Other Dependencies and Normal Forms

Unit 5:

Transaction Management:

- The ACID Properties
- Transactions and Schedules
- Concurrent Execution of Transactions
- Lock- Based Concurrency Control
- Performance of locking
- Transaction support in SQL
- Introduction to crash recovery
- 2PL, Serializability and Recoverability
- Lock Management
- Log Files
- Checkpointing
- Recovering from a System Crash
- Media Recovery