SEMESTER V

SUBJECT CODE	SUBJECT TITLE	CORE/ ELECTIVE	CREDITS			
			L	T	P	C
CSE 304 (ES)	Database Management Systems	C	3	0	2	4

Course Objectives:

Students will understand

1. To store data using fixed and variable length records in the file
2. To implement index structures in the file
3. To implement query parsing and execution
4. Concurrency control protocols used for transaction processing
5. Recovery techniques for recovering from transaction failures

Course Outcomes:

Students will be able to:

1. Store data in the files and to implement indexing schemes for the fast retrieval of data
2. Implement query complier, planner and executor
3. Implement concurrency control protocols for transaction processing system

UNIT I: Introduction to DBMS and Relational model

File Processing System, Advantages of DBMS over File Processing System, Database System Applications. DBMS Architecture: The three schema architecture, Data Independence : Logical and Physical, Data Models: Hierarchical, network and relation models, Introduction to relational model, concepts of domain, attribute, tuple, relation, importance of null values, Database constraints (Domain, Key constraints, integrity constraints) and their importance.

UNIT II : Query processing

Relational Algebra, Relational Calculus, Introduction to SQL: Database Objects- DDL Schema definitions, DML- Insert, select, update, delete, Views, exercise on SQL queries, Transaction support in SQL, Aggregate Functions, Null Values, Views, Complex Integrity Constraints in SQL, Assertions, Triggers

UNIT III : Conceptual model and database design

Entity Relationship model Entity types, Entity Sets, Attributes, and Keys Relationships, Relationship types and constraints, Weak Entity types, Enhanced ER (EER) Modeling : Super/Sub Classes Specialization and Generalization. Constraints and characteristics of Specialization and Generalization , Basics of Normalization, Normal Forms: First Normal Form (1NF), Second Normal Form (2NF), Third Normal Form (3NF), BCNF

UNIT IV: Transaction Processing, Concurrency Control and Recovery
Introduction of transaction processing, advantages and disadvantages of transaction processing system, Serializability and Recoverability of transaction, Concurrency Control, Lock based Protocols, Timestamp Based Protocols – Validation based Protocols - Multiple Granularity Locking, Recovery techniques

UNIT V: Overview of Storage and Indexing
Data on External Storage, File Organization and Indexing - Clustered Indexes, Primary and Secondary Indexes, Indexed Sequential Access Methods(ISAM) B+ Trees: Tree Structure, Search, Insert, Delete, Hash Based Indexing: Static Hashing, Extendable hashing, Linear Hashing, Extendible vs. Linear Hashing.

Books of Study:

1. Database System Implementation, Hector Garcia Molina, Jeffrey D. Ullman, Jennifer Widom, Person publications, First Edition, 2002

Books of References:

1. Database system the complete book: Hector Garcia Molina, Jeffrey D. Ullman, Jennifer Widom, Person New International Edition, Second Edition, 2013
2. Navathe, Shamkant B., and Ramez A. Elmasri. *Fundamentals of Database Systems with Cdrom and Book.* Addison-Wesley Longman Publishing Co., Inc., 2001.
3. Silberschatz, Abraham, Henry F. Korth, and Shashank Sudarshan. *Database system concepts*. Vol. 5. New York: McGraw-Hill, 1997.
4. Date, Christopher John. *An introduction to database systems*. Pearson Education India, 2004.
5. Heller stein, Joseph, and Michael Stonebreaker. Readings in Database Systems (The RedBook). 4th ed. MIT Press, 2005. ISBN:9780262693141.