

COURSE CODE	COURSE TITLE	L T P C
UCS1404	DATABASE MANAGEMENT SYSTEMS	3 0 0 3

OBJECTIVES

- To introduce the fundamentals of database systems and conceptual modeling
- To learn SQL and relational model
- To learn database programming and relational database design
- To explore the fundamental concepts of transaction processing, concurrency control and recovery techniques
- To understand NOSQL databases.

UNIT I DATABASE SYSTEM CONCEPTS AND CONCEPTUAL MODELING 8

Characteristics of database -- Database users -- Data models, Schemas – Three-schema architecture -- Database system environment -- Centralized and client/server DBMS architectures -- Data modeling using ER model -- Enhanced-ER model.

UNIT II RELATIONAL MODEL AND SQL 11

Relational Model: Concepts -- Constraints -- Update operations -- Constraint violations; Relational Algebra; Basic SQL: Data Definition -- SQL constraints -- Basic retrieval queries -- Insert, delete and update commands -- Schema modification; More SQL: dealing NULL -- Tuples, Set/Multiset comparisons -- Correlated nested -- EXISTS function -- SQL Renaming -- JOIN and Outer JOINS -- Aggregate functions -- Grouping.

UNIT III DATABASE PROGRAMMING AND DESIGN 10

Triggers -- Views; Database Programming Techniques: Overview and Issues -- Embedded SQL -- JDBC -- Database Stored Procedures and SQL/PSM; Design guidelines – Functional dependencies -- First, second and third Normal Forms -- Boyce-Codd Normal Forms; FD: Inference rules -- Minimal cover; ER-to-relational mapping.

UNIT IV TRANSACTION, CONCURRENCY AND RECOVERY 8

Transaction Processing: Concepts -- ACID properties -- schedules -- serializability; Concurrency control: Two-phase locking technique -- Timestamp Ordering; Recovery: Concepts – Deferred update -- Immediate update -- Multidatabase system recovery.

Introduction to NOSQL Systems -- The CAP Theorem -- Document-Based NOSQL Systems and MongoDB -- NOSQL Key -- Value Stores -- Column-Based or Wide Column NOSQL Systems -- NOSQL Graph Databases and Neo4j.

TOTAL PERIODS: 45

OUTCOMES

- On successful completion of this course, the student will be able to:
- Understand the database concepts and apply ER models to any real-world application (K3)
- Apply data definition and complex SQL queries (K3)
- Design databases systematically and develop database software for various real-time applications (K3)
- Apply transaction processing, concurrency control and recovery mechanisms for practical problems (K3)
- Understand the concepts of NOSQL databases (K2)

TEXTBOOKS

1. Ramez Elmasri, Shamkant B Navathe, "Fundamentals of Database Systems", 7th Edition, Pearson, 2016.
2. Abraham Silberschatz, Henry F Korth, S Sudharshan, "Database System Concepts", 6th Edition, Tata Mc Graw Hill, 2011.

REFERENCE BOOKS:

1. Jeffrey D Ullman, Jennifer Widom, "A First Course in Database Systems", 3rd Edition, Pearson Education, 2014.
2. S Sumathi, S Esakkirajan, "Fundamentals of Relational Database Management Systems", (Studies in Computational Intelligence), Springer-Verlag, 2007.
3. Raghu Ramakrishnan, "Database Management Systems", 4th Edition, Tata Mc Graw Hill, 2010.
4. C J Date, A Kannan, S Swamynathan, "An Introduction to Database Systems", 8th Edition, Pearson Education, 2006.
5. Hector Garcia-Molina, Jeffrey D Ullman, Jennifer Widom, "Database Systems: The Complete Book", 2e, Pearson