

Course Code- **MC1103**Course Title- **Database Management System**

Teaching Scheme				Examination Scheme			
Lectures	Tutorials	Practicals	Credits	CT	TA	ESE	Total
3	1	-	4	20	20	60	100

Course Objectives

- 1 To understand the fundamental concepts of database management. These concepts include aspects of database design, database languages, and database-system implementation.
- 2 To provide a strong formal foundation in database concepts, technology and practice
- 3 To be familiar with the basic issues of transaction processing and concurrency control.

Course Outcomes- After studying this course, students will be able to:

- CO 1 To analyze database models & entity relationship models
- CO 2 To design and implement a database schema for a given problem-domain.
- CO 3 Assess data and information requirements
- CO 4 To populate and query a database using SQL DML/DDL commands.
- CO 5 To Evaluate the normality of a logical data model, and correct any anomalies

Course Contents

Unit No	Detailed Contents	Contact Hours
1	<p>Introduction to Databases: Introduction, Characteristics of database approach, Advantages of using the DBMS approach, History of database applications.</p> <p>Overview of Database Languages and Architectures: Data Models, Schemas, and Instances. Three schema architecture and data independence, database languages, and interfaces, The Database System environment. Conceptual Data</p> <p>Modelling using Entities and Relationships: Entity types, Entity sets, attributes, roles, and structural constraints, Weak entity types, ER diagrams examples, Specialization and Generalization.</p>	6
2	<p>Relational Model: Relational Model Concepts, Relational Model Constraints and relational database schemas, Keys, referential integrity and foreign keys. Relational Algebra: Unary and Binary relational operations, additional relational operations (aggregate, grouping, etc.) Examples of Queries in relational algebra. Mapping Conceptual Design into a Logical Design: Relational Database Design using ER-to-Relational mapping. SQL: SQL data definition and data types, specifying constraints in SQL, retrieval queries in SQL, INSERT, DELETE, and UPDATE statements in SQL, Nested queries - correlated and uncorrelated, Notion of aggregation, Aggregation functions group by and having clauses, Embedded SQL</p>	6
3	<p>Normalization: Database Design Theory – Introduction to Normalization using Functional and Multivalued Dependencies: Informal design guidelines for relation schema, Functional Dependencies, Normal Forms based on Primary Keys, Second and Third Normal Forms, Boyce-Codd Normal Form, Multivalued Dependency and Fourth Normal Form, Join Dependencies and</p>	6

Fifth Normal Form. **Normalization Algorithms:** Inference Rules, Equivalence, and Minimal Cover, Properties of Relational Decompositions

- 4 **Disk Storage, Basic File Structures, and Hashing:** Secondary Storage Devices, Buffering of Blocks, Placing File Records on Disk, Operations on Files, Hashing Techniques, Indexing Structures for Files, Single-Level Ordered Indexes, Multilevel Indexes, Dynamic Multilevel Indexes Using B-Trees and B+-Trees 6
- 5 **Transaction Processing:** Introduction to Transaction Processing, Transaction and System concepts, Desirable properties of Transactions, Characterizing schedules based on recoverability, Characterizing schedules based on Serializability, Transaction support in SQL. 6
Concurrency Control in Databases: Two-phase locking techniques for Concurrency control, Concurrency control based on Timestamp ordering, Multiversion Concurrency control techniques, Validation Concurrency control techniques, Granularity of Data items and Multiple Granularity Locking.
Introduction to Database Recovery Protocols: Recovery Concepts, NO-UNDO/REDO recovery based on Deferred update, Recovery techniques based on immediate update, Shadow paging,

Text Books

- 1 R. Elmasri and S. Navathe, Fundamentals of Database Systems, Addison-Wesley.
- 2 Silberschatz A., Korth H., Sudarshan S, Database System Concepts, McGraw Hill Publication, Sixth Edition

Reference Books

- 1 S. K. Singh, Database Systems: Concepts, Design and Application, Pearson Publication,
- 2 An Introduction to Database System : Bipin Desai West Publications
- 3 R Ramakrishnan, J Gehrke, Database Management Systems, 3rd Ed., McGraw-Hill,
- 4 Thomas M. Connolly, Carolyn E. Begg, "Database Systems: A Practical Approach to Design, Implementation and Management", Addison Wesley, fifth Edition

E Books/ Online learning material

- 1 <https://nptel.ac.in/courses/106/105/106105175/>
- 2 <http://www.nptelvideos.in/2012/11/database-management-system.html>
- 3 <https://freevideolectures.com/course/2668/database-management-system>

Assessment Table:

Assessment Tool	Course Outcomes				
	CO1	CO2	CO3	CO4	CO5
Evaluation I (Class Test) 20 Marks	10	10			
Teachers Assessment 20 Marks	5	5		5	5
ESE Assessment 60 Marks	20	20		10	10