

**M.Tech(IT) : First Semester**  
**Paper Code : MT14**  
**Paper Name : Advanced DBMS**

**Syllabus**

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**1. INTRODUCTION**

Basics of database systems, Traditional file oriented approach, Motivation for database approach, Evolution of database systems, Database basics, Views of data, Three level architecture of DBMS, Relational database systems, Data models, Database languages, Client-server and multi-tier architectures, Multimedia data, Information integration, Data-definition language commands, Overview of query processing, Storage and buffer management, Transaction processing, The query processor. The Entity-Relationship

**2. DATA MODELS**

Data Model, Introduction of entity Relationship model, Elements of the E/R Model Requirement, Relationship, Entity-Relationship Diagrams, Multiplicity of Binary E/R Relationships, Design Principles, Avoiding Redundancy, Simplicity Counts, Extended ER Models

**3. REPRESENTING DATA ELEMENTS**

Data Elements and Fields, Representing Relational Database Elements, Records, Representing Block and Record Addresses, Client-Server Systems, Logical and Structured Addresses, Record Modifications, Index Structures, Indexes on Sequential Files, Secondary Indexes, B-Trees, Hash Tables.

**4. RELATIONAL ALGEBRA**

Relational Algebra: Basics of Relational Algebra, Set Operations on Relations, Extended Operators of Relational Algebra, Constraints on Relations, Modification of the Database, Views Relational Calculus, Tuple Relational Calculus, Domain Relational Calculus.

**5. RELETIONAL MODEL**

The Relational Data Model: Basics of the Relational Model, Relation Instances, Functional Dependencies, Rules about Functional Dependencies, Design of Relational Database Schemas

**6. NORMALIZATION**

Normalization, First Normal form, Second Normal Form, Third Normal Form, Boyce-Codd Normal Form, Multi-valued dependency, Fifth Normal Form

**7. SQL**

Use Of SQL, DDL Statements, DML Statements, View Definitions, Constraints and Triggers Keys and Foreign Keys, Constraints on Attributes and Tuples, Modification of Constraints Cursors, Dynamic SQL.

**8. QUERY EXECUTION**

Introduction to Physical-Query-Plan Operators, One-Pass Algorithms for Database Operations, Nested-Loop Joins, Two-Pass Algorithms Based on Sorting, Two-Pass

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Algorithms Based on Hashing, Index-Based Algorithms, Buffer Management, Parallel Algorithms for Relational Operations, Using Heuristics in Query Optimization, Basic Algorithms for Executing Query Operations.

**9. QUERY COMPLIER**

Parsing, Algebraic Laws for Improving Query Plans, From Parse Trees to Logical Query Plans, Estimating the Cost of Operations, Introduction to Cost-Based Plan Selection, Completing the Physical-Query-Plan, Coping With System Failures, Issues and Models for Resilient Operation, Redo Logging, Undo/Redo Logging, Protecting Against Media Failures

**10. CONCURRENCY CONTROL**

Serialisability, Enforcing Serializability by Locks, Locking Systems With Several Lock Modes, Architecture for a Locking Scheduler Managing Hierarchies of Database Elements, Concurrency Control by Timestamps, Concurrency Control by Validation.

**11. TRANSACTION MANAGEMENT**

Introduction of Transaction management, Serializability and Recoverability, View Serializability, Resolving Deadlocks, Distributed Databases, Distributed Commit, Distributed Locking

**12. DATABASE SYSTEM ARCHITECTURE**

Centralized and Client-Server Architectures, Server System Architectures, Parallel Systems, Distributed Systems, Network Types.

**13. DISTRIBUTED DATABASE**

Homogeneous And Heterogeneous Database, Distributed Data Storage, Distributed Transaction, Commit Protocols, Concurrency Control In Distributed Databases, Availability, Heterogeneous.

Reference Books:-

- 1) Raghu Ramakrishnan/Johannes Gehrke, "Database Management Systems", Tata Mc Graw Hill.
- 2) Silber Schatz. Korth, "Database System Concepts", Tata Mc Graw Hill.
- 3) ShamKanth B. Navathe, "Fundamental of DataBase System", Pearson Education.