# DATABASE MANAGEMENT SYSTEMS - SYLLABUS

## DATABASE MANAGEMENT SYSTEMS - SYLLABUS

Lecture : 3 Year : III

Tutorial : 1 Part : II

Practical : 3

Course Objectives:

The course objective is to provide fundamental concept, theory and practices in design and implementation of Database Management System.

1. Introduction [3 hours]

1.1. Concepts and Applications
1.2. Objective and Evolution
1.3. Data Abstraction and Data Independence
1.4. Schema and Instances
1.5. Concepts of DDL, DML and DCL

2. Data Models [7 hours]

2.1. Logical, Physical and Conceptual
2.2. E-R Model
2.3. Entities and Entities sets
2.4. Relationship and Relationship sets
2.5. Strong and Weak Entity Sets
2.6. Attributes and Keys
2.7. E-R Diagram
2.8. Alternate Data Model (hierarchical, network, graph)

3. Relational Languages and Relational Model [7 hours]

3.1. Introduction to SQL
3.2. Features of SQL

3.3. Queries and Sub-Queries
3.4. Set Operations
3.5. Relations (Joined, Derived)
3.6. Queries under DDL and DML Commands
3.7. Embedded SQL
3.8. Views
3.9. Relational Algebra
3.10. Database Modification
3.11. QBE and domain relational calculus

4. Database Constraints and Normalization [6 hours]

4.1. Integrity Constraints and Domain Constraints
4.2. Assertions and Triggering
4.3. Functional Dependencies
4.4. Multi-valued and Joined Dependencies
4.5. Different Normal Forms (1st, 2nd, 3rd, BCNF, DKNF)

5. Query Processing and Optimization [4 hours]

5.1. Query Cost Estimation
5.2. Query Operations
5.3. Evaluation of Expressions
5.4. Query Optimization
5.5. Query Decomposition
5.6. Performance Tuning

6. File Structure and Hashing [4 hours]

6.1. Records Organizations
6.2. Disks and Storage
6.3. Remote Backup System
6.4. Hashing Concepts, Static and Dynamic Hashing

6.5. Order Indices
6.6. B+ tree index

7. Transactions processing and Concurrency Control [6 hours]

7.1. ACID properties
7.2. Concurrent Executions
7.3. Serializability Concept
7.4. Lock based Protocols
7.5. Deadlock handling and Prevention

8. Crash Recovery [4 hours]

8.1. Failure Classification
8.2. Recovery and Atomicity
8.3. Log-based Recovery
8.4. Shadow paging
8.5. Advanced Recovery Techniques

9. Advanced database Concepts [4 hours]

9.1. Concept of Objet-Oriented and Distributed Database Model
9.2. Properties of Parallel and Distributed Databases
9.3. Concept of Data warehouse Database
9.4. Concept of Spatial Database

Practical:

1: Introduction and operations of MS-Access or MySQL or any suitable DBMS
2: Database Server Installation and Configuration (MS-SQLServer, Oracle)
3: DB Client Installation and Connection to DB Server. Introduction and practice with SELECT Command with the existing DB.
4, 5: Further Practice with DML Commands
6, 7: Practice with DDL Commands. (Create Database and Tables).

8: Practice of Procedure/Trigger and DB Administration & other DBs (MySQL, PG-SQL, DB2.)
9, 10, 11: Group Project Development.
12: Project Presentation and Viva

References

1. H. F. Korth and A. Silberschatz, " Database system concepts", McGraw Hill, 2010.
2. A. K. Majumdar and P. Bhattacharaya, "Database Management Systems", Tata McGraw Hill, India, 2004.

Evaluation Scheme:

The question will cover all the chapters of the syllabus. The evaluation scheme will be as indicated in the table below:

| Unit | Hour | Marks Distribution* |
|---|---|---|
| 1 | 3 | 4 |
| 2 | 7 | 12 |
| 3 | 7 | 12 |
| 4 | 6 | 12 |
| 5 | 4 | 8 |
| 6 | 4 | 8 |
| 7 | 6 | 12 |
| 8 | 4 | 6 |
| 9 | 4 | 6 |
| Total | 45 | 80 |

*There can be minor deviations in the numbers