

Database Management System (3-1-3)

Evaluation:

	Theory	Practical	Total
Sessional	30	20	50
Final	50	-	50
Total	80	20	100

Objectives:

The objective of this course is to provide fundamental concept, theory and practices in design and implementation of DBMS.

Course Contents:

1. Introduction

(4 hrs)

- 1.1 Concept and applications
- 1.2 Objectives and Evolution
- 1.3 Needs of DBMS
- 1.4 Data abstraction
- 1.5 Data independence
- 1.6 Schema and Instances
- 1.7 Concept of DDL, DML and DCL
- 1.8 Database Manager and users

2. Data Models

(4hrs)

- 2.1 Logical, Physical and Conceptual Model
- 2.2 E-R Model
- 2.3 Relation with UML class diagrams
- 2.4 Alternate data models (Network Data Model, hierarchical Data Model)

3. Relational Model

(4 hrs)

- 3.1 Definitions and terminology
- 3.2 Structure of relational databases
- 3.3 The relational algebra
- 3.4 Schema and Views
- 3.5 Data dictionary

4. Relational Database Query languages

(8 hrs)

- 4.1 SQL – features of SQL, queries and sub-queries, Join operations, set operations and other SQL constructs
- 4.2 DDL and DML queries in SQL
- 4.3 Stored procedures
- 4.4 QBE

5. Database Constraints and Relational Database Design

(8 hrs)

- 5.1 Introduction
- 5.2 Integrity constraints
- 5.3 Referential Integrity
- 5.4 Assertions and Triggers



- 5.5 Functional dependencies
- 5.6 Normalization and Normal Forms (1NF, 2NF, 3NF, BCNF, 4NF)
- 5.7 Multivalued Dependencies
- 5.8 Decomposition of relation schemes

6. Security

(3 hrs)

- 6.1 Needs of security
- 6.2 Security and integrity violations
- 6.3 Access control
- 6.4 Authorization
- 6.5 Security and Views
- 6.6 Encryption and decryption

7. Query Processing

(3 hrs)

- 7.1 Introduction to query processing
- 7.2 Equivalence of expressions
- 7.3 Query cost estimation
- 7.4 Query Optimization

8. File organization and indexing

(4 hrs)

- 8.1 Disks and storage
- 8.2 Organization of records into blocks
- 8.3 File organizations - The sequential and the indexed sequential file organizations
- 8.4 B+ Tree index
- 8.5 Hash index

9. Crash Recovery

(3 hrs)

- 9.1 Failure classification
- 9.2 Concept of log-based recovery and shadow paging
- 9.3 Data Backup/Recovery
- 9.4 Remote backup system

10. Transaction Processing and Concurrency Control

(4 hrs)

- 10.1 Introduction to Transactions
- 10.2 ACID properties of transaction
- 10.3 Schedules and Serializability
- 10.4 Concepts of locking for concurrency control

11. Advanced Database concepts

(3 hrs)

- 11.1 Object-Oriented Model
- 11.2 Object-Relational Model (ORM)
- 11.3 Distributed databases
- 11.4 Concepts of Data Warehouses

Laboratory:

There shall be enough laboratory exercises based on some RDBMS (like ORACLE, MS-SQL server, MySQL, etc) to complement theoretical part studied. An individual project should be given to each student. 10% of sessional marks should be allocated for evaluation for lab works and project.



Text Book:

H. F. Korth and A. Silberschatz, *Database System Concepts*, McGraw Hill.

Reference Books:

1. K. Majumdar and P. Bhattacharaya, *Database Management Systems*, Tata McGraw Hill, India.
2. R. E. Mani and S. C. Nevathe, *Fundamentals of Database Systems*, Benjamin/Cummings Publishing Co. Inc.
3. G.C Everest, *Database Management*, McGraw Hill.

