Code No.: **MDS 505**
Course Title:**Data Base Management Systems**   Full Marks: 75
Nature: Theory +Practical (Elective)   Credit: 3

Course Description:

The course covers on the fundamentals of knowledgebase and relational database management systems, and the current developments in database theory and their practice.

Course Objectives:
After the completion of this course, the students should be able to

- Familiarize the students to the fundamentals of Database Management Systems.
- Understand the relational model, ER diagrams and SQL.
- Understand the fundamentals of Transaction Processing and Query Processing.
- Familiarize the different types of database.
- Understand the Security Issues in Databases.

Course Content:

Unit 1: Fundamental Concept of DBMS   [6 Hrs.]
Database and database management system, Data Abstraction and Data Independence,Schema and Instances, Concepts of DDL, DML and DCL, Purpose of Database System, Database System Terminologies, Database characteristics, Data models , Types of data models , Components of DBMS, Relational Algebra. Relational DBMS – Codd's Rule – Entity- Relationship model,

Unit 2: Relational Languages and Relational Model   [7Hrs.]
Introduction to SQL, Features of SQL, Queries and Sub-Queries,Set Operations, Relations (Joined, Derived), Queries under DDL and DML Commands, Embedded SQL,Views, Relational Algebra, Database Modification, QBE and domain relational calculus

Unit 3: Database Constraints and Normalization   [6 Hrs.]
Integrity Constraints and Domain Constraints, Assertions and Triggering, Functional Dependencies, Different Normal Forms (1st, 2nd, 3rd, BCNF, DKNF)

Unit 4: SQL & Query Optimization   [6 Hrs.]
SQL Standards ,Data types , Database Objects- DDL-DML-DCL-TCL, Embedded SQL, Static Vs Dynamic SQL, QUERY OPTIMIZATION: Query Processing and Optimization , Heuristics and Cost Estimates in Query Optimization.

Unit 5: Transaction Processing and Concurrency Control   [6 Hrs.]
Properties of Transaction, Serializability, Concurrency Control, Locking Mechanisms, Two Phase Commit Protocol, Deadlock handling and Prevention

Unit 6: Trends in Database Technology   [9Hrs.]
Overview of Physical Storage Media ,RAID , Tertiary storage , File Organization, Organization of Records in Files ,Indexing and Hashing ,Ordered Indices , B+ tree Index Files , B tree Index Files , Static Hashing ,Dynamic Hashing , Introduction to Distributed Databases, Client server technology, Multidimensional and Parallel databases, Spatial and multimedia databases, Mobile and web databases, Data Warehouse, data Mining, Data marts.

Unit 7: Advanced Topic   [8Hrs.]

Concept of Object-Oriented and Distributed Database Model, Properties of Parallel and

Distributed Databases, Threats and risks ,Database access Control, Types of Privileges ,Cryptography, Statistical Databases, Distributed Databases Architecture, Transaction

Processing, Data Warehousing and Mining, Classification, Association rules-Clustering, Information Retrieval, Relevance ranking, Crawling and Indexing the Web, Object Oriented Databases,XML Databases.

Practical Works:

- Fundamental concept of MS-Access or MySQL or any suitable DBMS
- Database Server Installation and Configuration (MS-SQLServer, Oracle)
- DB Client Installation and Connection to DB Server
- Practice with DDL Commands. (Create Database and Tables)
- Practice of Procedure/Trigger and DB Administration & other DBs (MySQL, PG-SQL, DB2.)
- Group Project Development

References:

1. RamezElmasri&Shamkant B. Navathe (2015).*Fundamentals of Database Systems*, Seventh Edition, Pearson Education.
2. Korth, H. F. &Silberschatz, A. (2010).*Database system concepts*, McGraw Hill.
3. Majumdar, K.&Bhattacharaya, P. (2004).*Database Management Systems*, Tata McGraw Hill, India.
4. Abraham Silberschatz, Henry F. Korth& S. Sudharshan (2011).*Database System Concepts*, Sixth Edition, Tata McGraw Hill.
5. Date, C.J., Kannan, A.&Swamynathan, S. (2006).*An Introduction to Database Systems*, Eighth Edition, Pearson Education.
6. AtulKahate (2006) .*Introduction to Database Management Systems*, Pearson Education, New Delhi.
7. Alexis Leon & Mathews Leon(2003).*Database Management Systems*, Vikas Publishing House Private Limited, New Delhi.
8. Raghu Ramakrishnan (2010).*Database Management Systems*, Fourth Edition, Tata McGraw Hill.
9. Gupta, G.K.(2011).*Database Management Systems*, Tata McGraw Hill.

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