CS010 503: Database Management Systems

(Common with IT010 506)

Teaching scheme **Credits:**

2 hours lecture and 2 hours tutorial per week

Objectives

- *To impart an introduction to the theory and practice of database systems.*
- *To develop basic knowledge on data modelling and design of efficient relations.*
- *To provide exposure to oracle database programming.*

Module I (10 hours)

Basic Concepts - Purpose of Database Systems- 3 Schema Architecture and Data Independence- Components of DBMS –Data Models, Schemas and Instances-Data Modeling using the Entity Relationship Model-Entity types, Relationship Types, Weak Entity Types .

Module II (14 hours)

Relational Model Concepts –Constraints – Entity Integrity and Referential Integrity, Relational Algebra -Select, Project, Operations from Set Theory, Join, OuterJoin and Division - Tuple Relational Calculus.

SQL- Data Definition with SQL - Insert, Delete and Update Statements in SQL, Defining Domains, Schemas and Constraints, Constraint Violations - Basic Queries in SQL - Select Statement, Use of Aggregate functions and Group Retrieval, Nested Queries, Correlated Queries – Views.

Module III (12 hours)

Oracle Case Study : The Basic Structure of the Oracle System – Database Structure and its Manipulation in Oracle- Storage Organization in Oracle.- Programming in PL/SQL- Cursor in PL/SQL - Assertions – Triggers.

Indexing and Hashing Concepts -: Ordered Indices, Hash Indices, Dense and Sparse Indices, Multi Level Indices, Cluster Index, Dynamic Hashing.

Module IV (11 hours)

Database Design– Design Guidelines– Relational Database Design – Functional Dependency- Determination of Candidate Keys, Super Key, Foreign Key, Normalization using Functional Dependencies, Normal Forms based on Primary keys- General Definitions of First, Second and Third Normal Forms. Boyce Codd Normal Form– Multi-valued Dependencies and Forth Normal Form – Join Dependencies and Fifth Normal Form – Pitfalls in Relational Database Design.

Module V (13 hours)

Introduction to Transaction Processing- Transactions- ACID Properties of Transactions- Schedules- Serializability of Schedules- Precedence Graph- Concurrency Control – Locks and Timestamps-Database Recovery

Query processing and Optimization- Translating SQL Queries into a Relational Algebra Computing Select, Project and Join

Object Relational Databases-Distributed Databases-Different Types-Fragmentation and Replication Techniques-Functions of DDBMS.

Reference Books

1. Elmsari and Navathe, *Fundamentals of Database System*, Pearson Education Asia, 5th Edition, New Delhi, 2008.
2. Henry F Korth, Abraham Silbershatz , *Database System Concepts*, Mc Graw Hill 6td Edition, Singapore, 2011.
3. Elmsari and Navathe, *Fundamentals of Database System*, Pearson Education Asia, 3rd Edition, New Delhi,2005, for oracle
4. Alexis Leon and Mathews Leon, *Database Management Systems*, Leon Vikas Publishers, New Delhi.
5. Narayanan S, Umanath and Richard W.Scamell, *Data Modelling and Database Design*, Cengage Learning, New Delhi, 2009.
6. S.K Singh, *Database Systems Concepts, Design and Application*, Pearson Education Asia, New Delhi, 2006.
7. Pranab Kumar Das Gupta, *Datbase management System Oracle SQL And PL/SQL*, Easter Economy Edition, New Delhi, 2009
8. C.J.Date , *An Introduction to Database Systems*, Pearson Education Asia, 7th Edition, New Delhi.
9. Rajesh Narang, *Database Management Systems*, Atsha K ghosh , PHI Learning, New Delhi, 2009.
10. Ramakrishnan and Gehrke, *Database Management Systems*, Mc Graw Hill, 3rd Edition , 2003.
11. Peter Rob and Carlos Coronel, *Database Systems*, Thomson Course Technology, 7th Edition, 2007.
12. Satinder Bal Guptha and Adithya Mittal, *Introduction to Database Management System*, University Science Publishers, New Delhi, 2010.
13. Patrick O'Neil and Elizabeth O'Neil, *Database Principles, Programming and Performance*, Morgan Kaufmann, 2nd Edition, New Delhi,2010 .
14. Ramon A Mata-Toledo and Pauline K Cushman, Schaum's OUTlines *Database Management Systems*, Tata Mc Graw Hill , New Delhi, 2007.
15. Michel Kifer, Philip M. Lewis, Prabin K .Panigrahi and Arthur Bernstein, *Database Systems An Application Oriented Approach*, Pearson Education Asia, 2nd Edition, New Delhi, 2008.