Course code	Database Management System	L	T	P	J	C
CSE2004		2	0	2	4	4
Pre-requisite	-	Syllabus version				
		v. xx.xx				

Course Objectives:

This course imparts the students with background to understand, design, implement, and use database management systems. The course will highlight the significant functions of database management system. This course is devised to learn and explore.

- Advantages of using a DBMS rather than a file system.
- Designing an Entity-Relationship model for a real life application.
- Mapping a database schema from ER model.
- Evaluating relational schemas for design qualities
- Optimize a query.
- Basic concepts on transaction processing, concurrency control and recovery.
- Fundamental view on unstructured data and its management.
- Storage of databases and techniques to access them using various algorithms.

Expected Outcome :

At the completion of this course, students should be able to do the following:

- **CO1:** Comprehend the role of a database management system in an organization.
- **CO2:** Design the structure and operation of the relational data model.
- **CO3:** Develop a database project depending on the business requirements, considering various design issues.
- **CO4:** Explain the concept of a database transaction processing
- **CO5:** Comprehend the concept of database facilities including concurrency control, backup and recovery.
- **CO6:** List the concepts of indexing and accessing methods
- **CO7:** Review the fundamental view on unstructured data and its management

Student Learning Outcomes (SLO):	1,5,7

Module:1	DATABASE SYSTEMS CONCEPTS AND ARCHITECTURE	5 hours	SLO: 5

History and motivation for database systems –characteristics of database approach – Actors on the scene – Workers behind the scene – Advantages of using DBMS approach, Data Models, Schemas, and Instances, Three-Schema Architecture and Data Independence, The Database System Environment, Centralized and Client/Server Architectures for DBMSs, Classification of database management systems.

Module:2	DATA MODELING	4 hours	SLO: 5

Entity Relationship Model : Types of Attributes, Relationship, Structural Constraints – Relational Model ,Relational model Constraints – Mapping ER model to a relational schema – Integrity constraints

Module:3	SCHEMA REFINEMENT	6 hours	SLO: 5,7

Guidelines for Relational Schema - Functional dependency; Normalization, Boyce Codd Normal Form, Multi-valued dependency and Fourth Normal form; Join dependency and Fifth Normal form.

Module:4	QUERY PROCESSING AND TRANSACTION PROCESSING	5 hours	SLO: 1,7

Translating SQL Queries into Relational Algebra – heuristic query optimization – Introduction to Transaction Processing – Transaction and System concepts - Desirable properties of Transactions – Characterizing schedules based on recoverability – Characterizing schedules based on serializability

Module:5	CONCURRENCY CONTROL AND RECOVERY TECHNIQUES	4 hours	SLO: 5,7

Two-Phase Locking Techniques for Concurrency Control based on time stamp – Recovery concepts – Recovery based on deferred update – Recovery techniques based on immediate update – Shadow paging.			
Module:6	**PHYSICAL DATABASE DESIGN**	**3 hours**	**SLO: 1**
Indexing: Single level indexing, multi-level indexing, dynamic multilevel indexing.			
Module:7	**RECENT TRENDS - NOSQL DATABASE MANAGEMENT**	**3 hours**	**SLO: 5**
Introduction, Need of NoSQL, CAP Theorem, different NoSQL data models: Key-value stores, Column families, Document databases, Graph databases.			
	Total Lecture hours:	**30 hours**	

Text Book(s)

1. R. Elmasri & S. B. Navathe, Fundamentals of Database Systems, Addison Wesley, 7th Edition, 2015
2. Raghu Ramakrishnan,Database Management Systems,Mcgraw-Hill,4th edition,2015

Reference Books

3. A. Silberschatz, H. F. Korth & S. Sudershan, Database System Concepts, McGraw Hill, 6th Edition 2010
4. Thomas Connolly, Carolyn Begg,l Database Systems : A Practical Approach to Design, Implementation and Managementl,6th Edition,2012
5. Pramod J. Sadalage and Marin Fowler, NoSQL Distilled: A brief guide to merging world of Polyglot persistence, Addison Wesley, 2012.
6. Shashank Tiwari ,—Professional NoSqll,Wiley ,2011