Course Code	Course Title	L	T	P	C
PMDS506L	Database Management Systems	3	0	0	3
Pre-requisite	Nil	Syllabus version			
		1.0			

Course Objectives

1. To understand the basic concepts of database, ER Modelling, normalization and query optimization.
2. To comprehend the concepts concurrency control, recovery and indexing.
3. To explore the concepts of NoSQL and main types of NoSQL databases.

Course Outcomes

At the end of the course, students will be able to:

1. Describe the concepts of database, construct entity-relationship (ER) model for the real world problems and transfer data model into database designs.
2. Analyze the fundamental concepts of normalization, transaction, concurrency control and recovery mechanisms.
3. Demonstrate the basic database storage structure and indexing techniques.
4. Organize the detailed architecture and primary benefits using NoSQL Databases.
5. Analyze the major types of NoSQL databases.

Module:1	DATABASE SYSTEMS CONCEPTS AND DATA MODELING	7 hours

Basic concepts of database systems- Entity Relationship Model - Structural Constraints- Relational Model- Relational Model Constraints- Mapping ER model to a Relational Schema and database integrity.

Module:2	DATABASE DESIGN AND QUERY PROCESSING	7 hours

Guidelines for Relational Schema- Functional Dependency- Normalization- Translating SQL Queries into Relational Algebra- Heuristic Query Optimization.

Module:3	TRANSACTION PROCESSING CONCEPTS	6 hours

Introduction to transaction processing- Transaction and system concepts -Desirable properties of transactions- Characterizing schedules based on recoverability- Characterizing schedules based on serializability- Test for serializability.

Module:4	CONCURRENCY CONTROL AND PHYSICAL DATABASE DESIGN	6 hours

Lock-based protocols- Techniques for concurrency control- Recovery concepts- File organization- and Indexing.

Module:5	NOSQL	6 hours

Database revolutions: First generation, second generation, third generation- Managing transactions and data integrity- ACID and BASE for reliable database transactions- Speeding performance by strategic use of RAM, SSD, and disk, Brewer's CAP theorem.

Module:6	KEY VALUE DATA STORES	6 hours

Essential features of key value databases- Key-Value architecture- Designing structured values- Limitations of key-value databases - Design patterns for key-value databases and Case study for Key-Value databases.

Module:7	NOSQL DATA MODEL	5 hours

Aggregate models- Document data model- Key- value data model- Columnar data model and Graph based data model.

Module:8	Contemporary Issues	2 hours

		Total Lecture hours	**45 hours**

Text Book(s)

1	Raghu Ramakrishnan, Johannes Gehrke, Database Management Systems, 2015, 4th Edition, Tata McGraw Hill.

Reference Book(s)

1	Henry F Korth, Abraham Silberschatz, S. Sudharshan, Database System Concepts, 2006, 5th Edition, McGraw Hill.
2	R. Elmasri and S. B. Navathe, Fundamentals of Database Systems, 2016, 7th Edition, Addison Wesley.
3	Guy Harrison, Next Generation database: NoSQL New SQL and Big Data, 2015, 1st Edition, Apress.
4	Daniel G. McCreary and Ann M. Kelly, Making Sense of NoSQL, 2013, Manning publisher.

Mode of Evaluation: CAT, Assignment, Quiz and FAT

Recommended by Board of Studies	15-02-2024		
Approved by Academic Council	No. 73	Date	14-03-2024