

Course Code	Course Title	L	T	P	C
PMCA503L	Database Systems	3	0	0	3
Pre-requisite	NIL	Syllabus version			
		1.0			
Course Objectives:					
1. To understand, analyze and design databases.					
2. To emphasize on the understanding of data models, architecture and administration.					
3. To appreciate the internal functioning of database management systems.					
Course Outcomes:					
1. Identify the basic concepts of database and various data models used in DB design					
2. Design conceptual models to represent simple database application scenarios					
3. Convert high-level conceptual model to relational data model and to improve a database design by normalization					
4. Populate and query a database using SQL and PL/SQL. Also apply Query processing and indexing techniques to optimize the database system performance					
5. Apply and relate the concept of transaction, concurrency control and recovery on data					
Module:1	Fundamentals of DBMS	6 hours			
Introduction to Databases - Database Environment - Database Architectures - Data Models, Entity - Relationship Modeling, Enhanced Entity-Relationship Modeling					
Module:2	Relational Model	6 hours			
The Relational Model - Terminology, Integrity Constraints, Logical Database Design, ER and EER to Relational Mapping, Relational Algebra - Binary, Unary Operators, Aggregate and GROUP BY					
Module:3	Design using Normalization Theory	6 hours			
Data Redundancy and Update Anomalies, Functional Dependencies, Process of Normalization - 1NF - 2NF - 3NF - Functional Dependencies - Inference Rules, Minimal sets of Functional Dependencies - BCNF - 4NF - 5NF, Lossless-Join algorithms of Normal Forms					
Module:4	SQL and PL/SQL	7 hours			
SQL - Data Definition, Views, Data Manipulation and Transaction Control Languages, Advanced SQL - Declarations, Control Statements, Exception, Cursor, Subprograms, Triggers and ADT					
Module:5	Query processing and Physical database design	6 hours			
Query processing - Query Decomposition, Heuristical Approach to Query Optimization, Indexing - Sparse and Dense, BTree Vs Hash, Tuning Physical Design - Index and Query Rewriting					
Module:6	Transaction Management	6 hours			

Properties of Transaction, Concurrency Control - The Need for Concurrency Control, Serializability and Recoverability, Locking and Timestamp Methods, Multiversion Techniques, Recovery - Need, Techniques			
Module:7	Advanced Database Models		6 hours
Temporal Database Concepts - Spatial Database Concepts - Distributed Database Concepts - NoSQL Databases - Introduction to MongoDB - Datamodels, CRUD Operations and Sharding.			
Module:8	Contemporary Issues		2 hours
Guest Lecture from Industry and R & D Organizations			
	Total Lecture hours:		45 hours
Text Book(s)			
1.	RamezElmasri and Shamkant B. Navathe, "Fundamentals of Database Systems", 2016, 7 <sup>th</sup> Edition, Pearson Education, Delhi.		
2.	Thomas Connolly, Carolyn Begg, "Database Systems: A Practical Approach to Design, Implementation, and Management", 2015, 6 <sup>th</sup> Edition, Pearson Education, USA.		
Reference Books			
1.	Abraham Silberschatz, Henry F. Korth and S. Sudarshan, "Database System Concepts", 2020, 7 <sup>th</sup> Edition, McGraw Hill, Delhi.		
2.	Raghu Ramakrishnan and Johannes Gehrke, "Database Management Systems", 2007, 3 <sup>rd</sup> Edition, McGraw Hill, Delhi.		
3.	Shannon Bradshaw, Eoin Brazil, Kristina Chodorow, "MongoDB: The Definitive Guide: Powerful and Scalable Data Storage", 2019, 3 <sup>rd</sup> Edition, O'Reilly.		
Mode of Evaluation: CAT, Written Assignment, Quiz, FAT and Seminar			
Recommended by Board of Studies		04-05-2023	
Approved by Academic Council		No. 70	Date 24-06-2023