

## 23AD22T1 - DATABASE MANAGEMENT SYSTEMS

(Common to CSE, CSE(DS), CSE (AI&ML), and IT)

<b>Course Category:</b>	Professional Core	<b>Credits:</b>	3
<b>Course Type:</b>	Theory	<b>Lecture-Tutorial-Practical:</b>	3-0-0
<b>Prerequisite:</b>	<ul style="list-style-type: none"> <li>Relational Algebra and Calculus</li> <li>Data Structures and Algorithms</li> </ul>	<b>Sessional Evaluation:</b> 30 <b>Univ. Exam Evaluation:</b> 70 <b>Total Marks:</b> 100	
<b>Objectives:</b>	<b>Students undergoing this course are expected:</b> <ul style="list-style-type: none"> <li>Introduce database management systems and give a good formal foundation on the relational model of data and usage of Relational Algebra</li> <li>Introduce the concepts of basic SQL as a universal Database language</li> <li>Demonstrate the principles behind systematic database design approaches by covering conceptual design, logical design through normalization</li> <li>Provide an overview of the physical design of a database system, by discussing Database indexing techniques and storage techniques</li> </ul>		

<b>Course Outcomes</b>	<b>Upon successful completion of the course, the students will be able to:</b>	
	CO1	Understand the basic concepts of database management systems (L2)
	CO2	Analyze a given database application scenario to use Relational model for conceptual design of the database (L4)
	CO3	Utilize SQL proficiently to address diverse query challenges (L3).
	CO4	Employ normalization methods to enhance database structure (L3)
	CO5	Assess and implement transaction processing, concurrency control and database recovery protocols in databases. (L4)
<b>Course Content</b>	<p style="text-align: center;"><b><u>UNIT-I</u></b></p> <p><b>Introduction:</b> Database system, Characteristics (Database Vs File System), Database Users, Advantages of Database systems, Database applications. Brief introduction of different Data Models; Concepts of Schema, Instance, and data independence; Three-tier schema architecture for data independence; Database system structure, environment, Centralized and Client-Server architecture for the database.</p> <p><b>Entity Relationship Model:</b> Introduction, Representation of entities, attributes, entity set, relationship, relationship set, constraints, sub-classes, super class, inheritance, specialization, generalization using ER Diagrams.</p> <p style="text-align: center;"><b><u>UNIT-II</u></b></p> <p><b>Relational Model:</b> Introduction to relational model, concepts of domain, attribute, tuple, relation, importance of null values, constraints (Domain, Key constraints, integrity constraints) and their importance, Relational Algebra, Relational Calculus.</p> <p><b>BASIC SQL:</b> Simple Database schema, data types, table definitions (create, alter),</p>	

	<p>different DML operations (insert, delete, update).</p> <p style="text-align: center;"><b><u>UNIT-III</u></b></p> <p><b>SQL:</b> Basic SQL querying (select and project) using where clause, arithmetic &amp; logical operations, SQL functions(Date and Time, Numeric, String conversion).Creating tables with relationship, implementation of key and integrity constraints, nested queries, sub queries, grouping, aggregation, ordering, implementation of different types of joins, view(updatable and non-updatable), relational set operations.</p> <p style="text-align: center;"><b><u>UNIT-IV</u></b></p> <p><b>Schema Refinement (Normalization):</b> Purpose of Normalization or schema refinement, concept of functional dependency, normal forms based on functional dependency Lossless join and dependency preserving decomposition, (1NF, 2NF and 3 NF), concept of surrogate key, Boyce-Codd normal form(BCNF), MVD, Fourth normal form(4NF), Fifth Normal Form (5NF).</p> <p style="text-align: center;"><b><u>UNIT-V</u></b></p> <p><b>Transaction Concept:</b> Transaction State, ACID properties, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for Serializability, lock based, time stamp based, optimistic, concurrency protocols, Deadlocks, Failure Classification, Storage, Recovery and Atomicity, Recovery algorithm.</p> <p><b>Introduction to Indexing Techniques:</b> B+ Trees, operations on B+Trees, Hash Based Indexing</p>
<b>Text Books &amp; References Books</b>	<p><b>TEXTBOOKS:</b></p> <ol style="list-style-type: none"> <li>1. Database Management Systems, 3rd edition, Raghurama Krishnan, Johannes Gehrke, TMH (For Chapters 2, 3, 4)</li> <li>2. Database System Concepts, 5th edition, Silberschatz, Korth, Sudarsan, TMH (For Chapter 1 and Chapter 5)</li> </ol> <p><b>REFERENCE BOOKS:</b></p> <ol style="list-style-type: none"> <li>1. Introduction to Database Systems, 8th edition, C J Date, Pearson.</li> <li>2. Database Management System, 6th edition, Ramez Elmasri, Shamkant B. Navathe, Pearson</li> <li>3. Database Principles Fundamentals of Design Implementation and Management, Carlos Coronel, Steven Morris, Peter Robb, Cengage Learning.</li> </ol>
<b>E-Resources</b>	<ol style="list-style-type: none"> <li>1. <a href="https://nptel.ac.in/courses/106/105/106105175/">https://nptel.ac.in/courses/106/105/106105175/</a></li> <li>2. <a href="https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01275806667282022456_shared/overview">https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01275806667282022456_shared/overview</a></li> </ol>