

Subject Code	Subject Name	Credits
26CS115	DATABASE MANAGEMENT SYSTEM	4

**Course Objectives:**

1. To learn data models, conceptualize and depict a database system using ER diagrams
2. To understand the internal storage structures in a physical DB design
3. To know the fundamental concepts of transaction processing techniques
4. To understand the concept of Database Design in Normalization techniques
5. To know the manipulation of SQL Queries

**Learning Objectives:**

On successful completion of the course, students will be able to:

1. Demonstrate the basic elements of a relational database management system.
2. Identify the data models for relevant problems.
3. Design entity relationship and convert entity relationship diagrams into RDBMS and formulate SQL queries on the respect data into RDBMS and formulate SQL queries on the data.
4. Demonstrate their understanding of key notions of query evaluation and optimization techniques.
5. Extend normalization for the development of application software's.

**UNIT I: Introduction to Database Systems and Data Modeling (12 Hrs.)**

Introduction and Need for Database Systems – Advantages of DBMS, Database Vs. File systems – Database – DBMS distinction – Three levels of Database Architecture –Client/Server Architectures for DBMS-Data Modeling – Entity-Relationship Model – Weak Entity Sets – Mapping ER Model to Relational Model.

**UNIT II: Relational Model, Normalization, and Database Design (12 Hrs.)**

Relational Database Schemas, Concept of Relations – Schema-Instance distinction, Update Operations and Dealing with Constraint Violations; Relational Algebra and Relational Calculus; Functional Dependencies – Normalization – Decomposition – Armstrong 's Axioms – First, Second, Third Normal Forms – Dependency Preservation – Boyce/Codd Normal Form.

**UNIT III: Structured Query Language (SQL) (12 Hrs.)**

Characteristics of SQL, advantage of SQL. SQL data type and literals. Types of SQL commands, Basic Structure of SQL Queries, Set Operations, Aggregate Functions – GROUPBY – HAVING, Nested Sub queries, Views.

**UNIT IV: File Organization and Indexing Techniques (12 Hrs.)**

File Organisation Techniques - Primary and Secondary Index Structure – Dense and Sparse indexes – Multi-level Indexing - Hash-based Indexing – Dynamic Hashing Techniques – B Trees – B+ Trees.

**UNIT V: Transaction Management and Concurrency Control**

Transaction Concepts, ACID properties, Serializability and Concurrency Control, Lock-based Concurrency Control (Two Phase Locking – 2PL, Deadlocks), Database Recovery Management.

**Reference Books:**

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, “Database System Concepts”, Fifth Edition, Tata McGraw Hill, 2006.
2. Ramez Elmasri, Shamkant B. Navathe, “Fundamentals of Database Systems”, Fourth Edition, Pearson / Addison Wesley, 2007.
3. Raghu Ramakrishnan, “Database Management Systems”, Third Edition, Tata McGraw Hill, 2003.
4. S.K.Singh, “Database Systems Concepts, Design and Applications”, First Edition, Pearson Education, 2006.
5. C.J.Date, A.Kannan, S.Swamynathan, “An Introduction to Database Systems”, Eighth Edition, Pearson Education, 2006.

COs and Bloom's Taxonomy Mapping – 26CS115		
Course Outcomes	On completing U.G. program the students will be able to	BTL
CO1	Explain the fundamentals of database systems, DBMS architecture, data models, ER model, weak entities, and mapping ER to relational model.	K1,K2

<b>CO2</b>	Apply relational model concepts, relational algebra, relational calculus, and normalization techniques for designing efficient database schemas.	K3
<b>CO3</b>	Construct SQL queries using DDL, DML, DCL commands, joins, aggregate functions, GROUP BY, HAVING, subqueries, and views.	K3
<b>CO4</b>	Analyze file organization and indexing techniques such as dense, sparse, multi-level indexing, hashing, B-trees, and B+ trees.	K4
<b>CO5</b>	Evaluate transaction processing concepts including ACID properties, concurrency control (2PL), deadlocks, and recovery techniques.	K4,K5

BTL K1 and K2 – remembering and understanding, K3- Applying, K4 – Analyse, K5- Evaluate and K6- Create

<b>Relationship Matrix – 26CS115</b>													
<b>Course Outcomes</b>	<b>Programme Outcomes (POs)</b>							<b>Programme Specific Outcomes (PSOs)</b>					<b>Mean Score of CO's</b>
	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>	
<b>CO1</b>	2	1	1	1	2	1	1	2	1	1	1	1	1.25
<b>CO2</b>	2	2	2	1	2	2	1	2	2	2	1	1	1.83
<b>CO3</b>	2	3	3	1	2	3	1	2	3	2	2	1	2.16
<b>CO4</b>	2	3	3	1	2	3	2	2	3	3	2	1	2.33
<b>CO5</b>	2	3	2	2	3	2	2	2	2	3	3	2	2.33
<b>Total</b>													1.98

Mean Score: 3- High, 2- Medium, 1- Low

