

CSEN2061	DATABASE MANAGEMENT SYSTEMS	L	T	P	S	J	C
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Pre-requisite	None						
Co-requisite	None						
Preferable exposure	MATH1041:Discrete Mathematics						

Course Description:

This course provides fundamental and practical knowledge on database concepts by means of organizing the information, storing and retrieve the information in an efficient and a flexible way from a well-structured relational model. This course ensures that every student will gain experience in creating data models and database design

Course Educational Objectives:

- Focus the role of a database management system in an organization and construct ER Diagram
- Demonstrate basic database concepts, including the structure and operation of the relational data model and basic database queries using SQL
- Applying advanced database queries using Structured Query Language (SQL)
- Evaluating logical database design principles and database normalization
- Demonstrate the concept of a database transaction, concurrency control, and data object locking and protocols

UNIT 1 Introduction to DBMS and Database Design 9 hours, P - 6 hours

Introduction to DBMS: File system vs DBMS, advantages of DBMS, storage data, queries, DBMS structure, Types of Databases – Hierarchical, Network, Relational, Key-Value, Object Oriented, XML DB

Overview of File Structures in database

Data base Design: data models, the importance of data models.

E-R model: Entities, attributes and entity sets, relationship and relationship set, mapping cardinalities, keys, features of ER model, conceptual database design with ER model.

UNIT 2 Relational Model and Basic SQL 9 hours, P - 6 hours

Relational model: Integrity constraints over relations and enforcement, querying relation data, logical database design, views, destroying/altering tables and views.

Basic SQL: Introduction to SQL, Basic SQL Queries: DML, DDL, DCL, TCL

UNIT 3

Advances SQL and PL/SQL

**9 hours, P - 6
hours**

Structured Query Language (SQL): Select Commands, Union, Intersection, Except, Nested Queries, Aggregate Operators, Null values, Relational set operators, SQL join operators

Relational Algebra(RA): Selection, Projection, Set operations, Joins

Relational Calculus (TRC, DRC): Tuple Relational Calculus, Domain Relational Calculus

PL/SQL, Assertions, Triggers

UNIT 4

Schema Refinement and Normal Forms

**9 hours, P - 6
hours**

Schema Refinement and Normal Forms: Introduction to Schema Refinement, Functional Dependencies, Reasoning about Functional Dependencies. Normal Forms, Properties of Decomposition, Normalization, different types of dependencies.

UNIT 5

**Introduction to Transaction Management,
Concurrency Control and Crash Recovery**

**9 hours, P - 6
hours**

Introduction to Transaction Management: ACID properties, Transactions and Schedules, Concurrent Execution of Transactions, Lock-Based Concurrency Control.

Concurrency Control: 2PL, Serializability and Recoverability, Introduction to Lock Management, Lock Conversions, Dealing with Deadlocks, Concurrency control without locking. Crash Recovery: Aries, Recovering from a System Crash.

DBMS LAB

1. Developing a sample ER model for the specified database.
2. Create a database and learn to set various constraints (can use Sailors example from textbook1, University example from textbook2)
3. Familiarization of SQL DDL commands-create, alter, drop, rename and truncate
4. Use of DML commands-select, insert, update and delete
5. Use of different of operators for nested sub-queries.
6. Use of Joins
7. Use of grouping functions
8. Creating Views
9. PL/SQL programming environment
10. Declaring triggers and use of cursors.

Lab infrastructure

1. Oracle Server and Client System
2. SQL Server
3. MS Access

Textbooks:

1. Raghu Ramakrishnan and Johannes Gehrke, Database Management Systems, McGraw-Hill, 3e, 2014
Note: File Structure refer Chapter 8
2. H.F.Korth and A.silberschatz, Database System Concepts, McGraw-Hill, 6e, 2011.

References:

1. D. Ullman, Principles of Database and Knowledge – Base Systems, Vol 1,1/e, Computer Science Press,1990.
2. RamezElmasri, Shamkant B. Navathe, Fundamentals of Database Systems, Pearson Education, 7e, 2016.

Course Outcomes:

After successful completion of the course the student will be able to:

1. Understand database design principles
2. Apply data Modelling using E-R diagrams
3. Create refined data models using normalization
4. Build database queries using Structured Query Language
5. Understand the transaction management and concurrency control

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3					1							2		
CO2			3	2					2					2	
CO3		2	2												1
CO4		3											2		
CO5			3		2							2		2	

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:

BOS : 06-09-2021

ACADEMIC COUNCIL: 01-04-2022

SDG No. & Statement:

SDG Justification: