Kadi Sarva Vishwavidyalaya

Faculty of Engineering & Technology

Second Year Bachelor of Engineering (CE/IT) – Semester III

(With effect from: Academic Year 2018-19)

Subject Code: CT306-N	**Subject Title:** Database Management Systems
Pre-requisite	

Teaching Scheme (Credits and Hours)

Teaching scheme				**Total Credit**	**Evaluation Scheme**					
L	**T**	**P**	**Total**		**Theory**		**Mid Sem Exam**	**CIA**	**Pract.**	**Total**
Hrs	**Hrs**	**Hrs**	**Hrs**		**Hours**	**Marks**	**Marks**	**Marks**	**Marks**	**Marks**
04	00	04	08	06	03	70	30	20	30	150

Course Objective:

- To understand the different issues involved in the design and implementation of a database system.
- To study the physical and logical database designs, database modeling, relational, hierarchical, and network models
- To understand and use data manipulation language to query, update, and manage a Database.
- To develop an understanding of essential DBMS concepts such as: database security, integrity, concurrency, distributed database, and intelligent database, Client/Server (Database Server), Data Warehousing.
- To design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS.

Outline of the Course:

Sr. No	**Title of the Unit**	**Minimum Hours**
1	Database system architecture	06
2	Data models	07
3	Relational query languages	10
4	Relational database design	08
5	Query processing and optimization	06
6	Storage strategies	07
7	Transaction processing	12
8	Database Security	04
9	Advanced topics	04
	Total	**64**

Total hours (Theory): 64
Total hours (Lab): 64
Total hours: 128

Detailed Syllabus

Sr. No	Topic	Lecture Hours	Weightage(%)
1	**Database system architecture**: Data Abstraction, Data Independence, Data Definition Language (DDL), Data Manipulation Language (DML), Applications of Database Systems, Database Users.	06	09
2	**Data models**: Entity-relationship model, relational and object oriented data models, integrity constraints, data manipulation operations.	07	11
3	**Relational query languages:** Relational algebra. **SQL**: DDL(Data Definition Language), Data Dictionary, DML(Data Manipulation Language), DRL(Data Retrieval Language), DCL(Data Control Language), TCL(Transaction Control Language), SQL Functions and Aggregate Functions, Join Operations, Views.	10	16
4	**Relational database design:** Basic System Development Life Cycle, Armstrong's axioms, Functional dependencies, Normalization, Normal forms based on keys (1NF, 2NF, 3NF, BCNF, 4NF, 5NF), Loss less joins and dependency preserving decomposition.	08	13
5	**Query processing and optimization:** Steps in query processing, evaluation of relational algebra expressions, Query evaluation plans: Cost based and rule (heuristic) based.	06	09
6	**Storage strategies:** Overview of Physical media, Indices: Types, B-trees: Structure, Hashing: Organization, Hash Functions.	07	11
7	**Transaction processing:** Introduction and Properties of Transaction, Concurrency control, ACID property, Serializability of scheduling, Locking and timestamp based schedulers, Database recovery, Log Based Recovery.	12	19
8	**Database Security:** Authentication, Authorization and access control, SQL injection.	04	06
9	**Advanced topics:** Web databases, Distributed databases, Data warehousing and data mining, NoSQL.	04	06
	Total	64	100

Instructional Method and Pedagogy:

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lecture and laboratory which carries 10 marks in overall evaluation.
- One internal exam will be conducted as a part of internal theory evaluation.
- Assignments based on the course content will be given to the students for each unit and will be evaluated at regular interval evaluation.
- Surprise tests/Quizzes/Seminar/tutorial will be conducted having a share of five marks in the overall internal evaluation.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
- Experiments shall be performed in the laboratory related to course contents.

Learning Outcome:

On successful completion of this course, the student should be able to:

- For a given query write relational algebra expressions for that query and optimize the developed expressions
- For a given specification of the requirement design the databases using E_R method and normalization.
- For a given specification construct the SQL queries for Open source and Commercial DBMS -MYSQL, ORACLE, and DB2.
- For a given query optimize its execution using Query optimization algorithms
- For a given transaction-processing system, determine the transaction atomicity, consistency, isolation,
- durability.
- Implement the isolation property, including locking, time stamping based on concurrency control and Serializability of scheduling.

E-Resources:

- NPTEL: Database Management System - https://onlinecourses.nptel.ac.in/noc18_cs15/unit?unit=5&lesson=18
- edX: Database Systems Concepts and Design - https://www.edx.org/course/database-systems-concepts-design-gtx-cs6400x-1
- Coursera: Database Management Essentials - https://www.coursera.org/learn/database-management
- Udacity: Database Systems Concepts & Design - https://in.udacity.com/course/database-systems-concepts-design--ud150

Reference Books:

1. “Database System Concepts”, 6th Edition by Abraham Silberschatz, Henry F. Korth, S. Sudarshan, McGraw-Hill.
2. 1 “Principles of Database and Knowledge – Base Systems”, Vol 1 by J. D. Ullman, Computer Science Press.
3. “Fundamentals of Database Systems”, 5th Edition by R. Elmasri and S. Navathe, Pearson Education
4. “Foundations of Databases”, Reprint by Serge Abiteboul, Richard Hull, Victor Vianu, Addison-Wesley

List of experiments

Sr.No	Name of Experiment
1	Creating and Manipulating Database objects and Applying Constraints (DDL)
2	Manipulating Data with Database Objects (DML)
3	Retrieving, Restricting and Sorting Data (DRL)
4	SQL Single Row Functions
5	SQL Multiple Row Functions (Aggregate Function)
6	Displaying Data from Multiple Tables (Join)
7	Using Commit and Rollback show Transaction ACID Property.
8	Securing data using Views and Controlling User Access (DCL)
9	Database SET Operations
10	Write a join query based on two tables and analyze the query using action plan
11	PL/SQL Block Syntax and DML Operation through PL/SQL Block
12	Control Structures in PL/SQL
13	Working with Cursor
14	Creating Procedures and Functions in PL/SQL
15	Creating Database Triggers
	As part of experimentation, a small project / model / seminar / poster / other should be prepared / presented by student(s) based on the practical knowledge gained by this course at the end of the curriculum. The concerned laboratory faculty (in consultation with course coordinator) is empowered to design/decide the type/execution of this experiment. The student(s) are expected to present the same before their batch-mates.