

## V Semester

DATABASE MANAGEMENT SYSTEMS			
Course Code	21CS53	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
<b>Course Learning Objectives</b> CLO 1. Provide a strong foundation in database concepts, technology, and practice. CLO 2. Practice SQL programming through a variety of database problems. CLO 3. Demonstrate the use of concurrency and transactions in database CLO 4. Design and build database applications for real world problems.			
<b>Teaching-Learning Process (General Instructions)</b>  These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes. <ol style="list-style-type: none"><li>1. Lecturer method (L) need not to be only a traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.</li><li>2. Use of Video/Animation to explain functioning of various concepts.</li><li>3. Encourage collaborative (Group Learning) Learning in the class.</li><li>4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.</li><li>5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.</li><li>6. Introduce Topics in manifold representations.</li><li>7. Show the different ways to solve the same problem with different circuits/logic and encourage the students to come up with their own creative ways to solve them.</li><li>8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.</li></ol>			
<b>Module-1</b>			
<b>Introduction to Databases:</b> Introduction, Characteristics of database approach, Advantages of using the DBMS approach, History of database applications.			
<b>Overview of Database Languages and Architectures:</b> Data Models, Schemas, and Instances. Three schema architecture and data independence, database languages, and interfaces, The Database System environment.			
<b>Conceptual Data Modelling using Entities and Relationships:</b> Entity types, Entity sets, attributes, roles, and structural constraints, Weak entity types, ER diagrams, Examples			
<b>Textbook 1: Ch 1.1 to 1.8, 2.1 to 2.6, 3.1 to 3.7</b>			
<b>Teaching-Learning Process</b>	Chalk and board, Active Learning, Problem based learning		
<b>Module-2</b>			
<b>Relational Model:</b> Relational Model Concepts, Relational Model Constraints and relational database schemas, Update operations, transactions, and dealing with constraint violations.			
<b>Relational Algebra:</b> Unary and Binary relational operations, additional relational operations (aggregate, grouping, etc.) Examples of Queries in relational algebra.			
<b>Mapping Conceptual Design into a Logical Design:</b> Relational Database Design using ER-to-Relational			

mapping.

**Textbook 1:, Ch 5.1 to 5.3, 8.1 to 8.5, 9.1;**

<b>Teaching-Learning Process</b>	Chalk and board, Active Learning, Demonstration
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#### Module-3

**SQL:** SQL data definition and data types, specifying constraints in SQL, retrieval queries in SQL, INSERT, DELETE, and UPDATE statements in SQL, Additional features of SQL.

**Advances Queries:** More complex SQL retrieval queries, Specifying constraints as assertions and action triggers, Views in SQL, Schema change statements in SQL.  
Database

**Application Development:** Accessing databases from applications, An introduction to JDBC, JDBC classes and interfaces, SQLJ, Stored procedures, Case study: The internet Bookshop.

**Textbook 1: Ch 6.1 to 6.5, 7.1 to 7.4; Textbook 2: 6.1 to 6.6;**

<b>Teaching-Learning Process</b>	Chalk and board, Problem based learning, Demonstration
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#### Module-4

**Normalization: Database Design Theory** – Introduction to Normalization using Functional and Multivalued Dependencies: Informal design guidelines for relation schema, Functional Dependencies, Normal Forms based on Primary Keys, Second and Third Normal Forms, Boyce-Codd Normal Form, Multivalued Dependency and Fourth Normal Form, Join Dependencies and Fifth Normal Form. Examples on normal forms.

**Normalization Algorithms:** Inference Rules, Equivalence, and Minimal Cover, Properties of Relational Decompositions, Algorithms for Relational Database Schema Design, Nulls, Dangling tuples, and alternate Relational Designs, Further discussion of Multivalued dependencies and 4NF, Other dependencies and Normal Forms

**Textbook 1: Ch 14.1 to -14.7, 15.1 to 15.6**

<b>Teaching-Learning Process</b>	Chalk& board, Problem based learning
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#### Module-5

**Transaction Processing:** Introduction to Transaction Processing, Transaction and System concepts, Desirable properties of Transactions, Characterizing schedules based on recoverability, Characterizing schedules based on Serializability, Transaction support in SQL.

**Concurrency Control in Databases:** Two-phase locking techniques for Concurrency control, Concurrency control based on Timestamp ordering, Multiversion Concurrency control techniques, Validation Concurrency control techniques, Granularity of Data items and Multiple Granularity Locking.

**Textbook 1: Ch 20.1 to 20.6, 21.1 to 21.7;**

<b>Teaching-Learning Process</b>	Chalk and board, MOOC
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#### Course Outcomes

At the end of the course the student will be able to:

- CO 1. Identify, analyze and define database objects, enforce integrity constraints on a database using RDBMS
- CO 2. Use Structured Query Language (SQL) for database manipulation and also demonstrate the basic of query evaluation.
- CO 3. Design and build simple database systems and *relate* the concept of transaction, concurrency control and recovery in database
- CO 4. Develop application to interact with databases, relational algebra expression.
- CO 5. Develop applications using tuple and domain relation expression from queries.

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

**Continuous Internal Evaluation:**

Three Unit Tests each of **20 Marks (duration 01 hour)**

1. First test at the end of 5<sup>th</sup> week of the semester
2. Second test at the end of the 10<sup>th</sup> week of the semester
3. Third test at the end of the 15<sup>th</sup> week of the semester

Two assignments each of **10 Marks**

4. First assignment at the end of 4<sup>th</sup> week of the semester
5. Second assignment at the end of 9<sup>th</sup> week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for **20 Marks (duration 01 hours)**

6. At the end of the 13<sup>th</sup> week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

**CIE methods /question paper has to be designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.**

**Semester End Examination:**

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored shall be proportionally reduced to 50 marks

**Suggested Learning Resources:****Textbooks**

1. Fundamentals of Database Systems, Ramez Elmasri and Shamkant B. Navathe, 7th Edition, 2017, Pearson.
2. Database management systems, Ramakrishnan, and Gehrke, 3rd Edition, 2014, McGraw Hill

**Reference Books:**

1. Abraham Silberschatz, Henry F. Korth and S. Sudarshan's Database System Concepts 6th Edition Tata Mcgraw Hill Education Private Limited

**Weblinks and Video Lectures (e-Resources):**

1. <https://www.youtube.com/watch?v=3EJlovevfcA>
2. <https://www.youtube.com/watch?v=9TwMRs3qTcU>
3. <https://www.youtube.com/watch?v=ZWl0Xow304I>
4. <https://www.youtube.com/watch?v=4YilEjkNPrQ>
5. <https://www.youtube.com/watch?v=CZTkgMoqVss>
6. <https://www.youtube.com/watch?v=Hl4NZB1XR9c>
7. [https://www.youtube.com/watch?v=EGEwkad\\_lIA](https://www.youtube.com/watch?v=EGEwkad_lIA)
8. <https://www.youtube.com/watch?v=t5hsV9lC1rU>

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

**Demonstration of real time Database projects** - E-commerce Platform, Inventory Management, Railway System, College Data Management, Library Data Management, Solution for Saving Student Records, Hospital Data Management, Blood Donation Management.