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| **DATABASE MANAGEMENT SYSTEM**  **(Effective from the academic year 2018 -2019) SEMESTER – V** | | | | |
| **Course Code** | **18CS53** | **CIE Marks** | 40 | |
| **Number of Contact Hours/Week** | 3:2:0 | **SEE Marks** | 60 | |
| **Total Number of Contact Hours** | 50 | **Exam Hours** | 03 | |
| **CREDITS –4** | | | | |
| **Course Learning Objectives:** This course (18CS53) will enable students to: | | | | |
| * Provide a strong foundation in database concepts, technology, and practice. * Practice SQL programming through a variety of database problems. * Demonstrate the use of concurrency and transactions in database * Design and build database applications for real world problems. | | | | |
| **Module 1** | | | | **Contact Hours** |
| **Introduction to Databases:** Introduction, Characteristics of database approach, Advantages of using the DBMS approach, History of database applications. **Overview of Database Languages and Architectures:** Data Models, Schemas, and Instances. Three schema architecture and data independence, database languages, and interfaces, The Database System environment. **Conceptual Data Modelling using Entities and Relationships:** Entity types, Entity sets, attributes, roles, and structural constraints, Weak entity types, ER diagrams, examples, Specialization and Generalization.  **Textbook 1:Ch 1.1 to 1.8, 2.1 to 2.6, 3.1 to 3.10 RBT: L1, L2, L3** | | | | 10 |
| **Module 2** | | | |  |
| **Relational Model**: Relational Model Concepts, Relational Model Constraints and relational database schemas, Update operations, transactions, and dealing with constraint violations. **Relational Algebra:** Unary and Binary relational operations, additional relational operations (aggregate, grouping, etc.) Examples of Queries in relational algebra. **Mapping Conceptual Design into a Logical Design:** Relational Database Design using ER-to-Relational mapping. **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. **Textbook 1: Ch4.1 to 4.5, 5.1 to 5.3, 6.1 to 6.5, 8.1; Textbook 2: 3.5**  **RBT: L1, L2, L3** | | | | 10 |
| **Module 3** | | | |  |
| **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. **Internet Applications:** The three-Tier application architecture, The presentation layer, The Middle Tier  **Textbook 1: Ch7.1 to 7.4; Textbook 2: 6.1 to 6.6, 7.5 to 7.7. RBT: L1, L2, L3** | | | | 10 |
| **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. **Normalization Algorithms:** Inference Rules,  Equivalence, and Minimal Cover, Properties of Relational Decompositions, Algorithms for Relational Database Schema Design, Nulls, Dangling tuples, and alternate Relational | | | | 10 |

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| Designs, Further discussion of Multivalued dependencies and 4NF, Other dependencies and Normal Forms  **Textbook 1: Ch14.1 to 14.7, 15.1 to 15.6 RBT: L1, L2, L3** |  |
| **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. **Introduction to Database Recovery Protocols:** Recovery Concepts, NO-UNDO/REDO recovery based on Deferred update, Recovery techniques based on immediate update, Shadow paging, Database backup and recovery from catastrophic failures  **Textbook 1: 20.1 to 20.6, 21.1 to 21.7, 22.1 to 22.4, 22.7. RBT: L1, L2, L3** | 10 |
| **Course Outcomes:** The student will be able to : | |
| * Identify, analyze and define database objects, enforce integrity constraints on a database using RDBMS. * Use Structured Query Language (SQL) for database manipulation. * Design and build simple database systems * Develop application to interact with databases. | |
| **Question Paper Pattern:** | |
| * The question paper will have ten questions. * Each full Question consisting of 20 marks * There will be 2 full questions (with a maximum of four sub questions) from each module. * Each full question will have sub questions covering all the topics under a module. * The students will have to answer 5 full questions, selecting one full question from each module. | |
| **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. Silberschatz Korth and Sudharshan, Database System Concepts, 6th Edition, Mc-GrawHill, 2013. 2. Coronel, Morris, and Rob, Database Principles Fundamentals of Design, Implementation and Management, Cengage Learning 2012. | |