**Amrita VishwaVidyaPeetham**

**Amrita School of Engineering**

**Department of Computer Science and Engineering**

**Course Plan**

**Class: III Year B.Tech (CSE) Subject Code: 15CSE302**

**Batch: 2018 Semester: 5 Subject Name: Database Management Systems**

**Available Theory Hours: 30 & Available Lab Sessions: 15**

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| **S.No** | **Lecture Hours** | **No of Hour** | **Topic** | **SubTopics** | **Objective** | **Remarks**  **(Book Details)** |
| **1** | **1 to 2** | **2** | **Introduction:**  Overview of DBMS, File Vs DBMS, Elements of DBMS. | 1. Database System Applications 2. Purpose of Database Systems 3. View of Data   3.1) Data Abstraction3.2) Instances and Schemas  3.3) Data Models   1. Database Languages   4.1) Data Manipulation Language  4.2) Data Definition Language   1. Overview of Relational Databases,   Database Design & Transactions   1. Database Architecture 2. Database User and Administrators | To provide the students with a general overview of the nature and purpose of database systems. | T1 : Chapter 1  pp. 1-30. |
| **2** | **3 to 5** | **3** | Relational Databases –Structure of relational databases – fundamental relational algebra operations – additional relational algebra operations. | 1. Structure of Relational Databases 2. Database Schema Keys 3. Schema Diagrams Relational Query Languages 4. Relational Operations | To introduce the relational model of database. | T1: Chapter 2  pp. 39-52. |
| **3** | **6 to 9** | **4** | **Database Design:**  E-R Model, Notations, Constraints, Cardinality and participation constraints, Week and strong entity sets. | 1. Overview of the design process   1.1) Design phases1.2) Design Alternatives   1. The E-R Models   2.1) Entity Sets2.2) Relationship Sets2.3) Attributes   1. Constraints   3.1) Mapping Cardinalities  3.2) Participation Constraints3.3) Keys   1. Removing Redundant Attributes in Entity Sets 2. E-R Diagrams   5.1) Basic Structure5.2) Mapping Cardinalities  5.3) Complex Attributes5.4) Roles  5.5) Non-binary Relationship Sets 5.6) Weak Entity Sets  5.7) E-R diagram for University Enterprise. | To focus on how to design a database. | T1: Chapter 7.  pp. 259 - 283 |
| **4** | **10 to 13** | **4** | **Database Design:**  Reduction of ER model to relational model, ER design issues, Extended ER features. | 1) Reduction to Relational Schemas  1.1) Representation of Strong Entity Sets with Simple Attributes.  1.2) Representation of Strong Entity Sets with Complex Attributes.  1.3) Representation of Weak Entity Sets.  1.4) Representation of Relationship Sets.  2) Entity Relationship Design Issues  2.1) Use of Entity Sets versus Attributes.  2.2) Use of Entity Sets versus Relationship Sets.  2.3) Binary versus n-ary Relationship Sets.  2.4) Placement of Relationship Attributes.  3) Extended E-R Features  3.1) Specialization 3.2) Generalization  3.3) Attribute Inheritance  3.4) Constraints on Generalization  3.5) Aggregation  3.6) Reduction to Relational Schema  3.6.1) Representation of Generalization  3.6.2) Representation of Aggregation | To learn E-R model. | T1: Chapter 7.  pp. 283 - 304 |
| **5** | **14 to 20** | **7** | **Relational Database Design:** Functional dependency  **Normalization:** 1NF, 2NF, 3NF, BCNF, Relational synthesis algorithm, Lossless join testing algorithm, Functional-Dependency theory, | Relational Database Design   1. Features of Good Relational Designs   1.1)Design Alternative : Larger Schemas  1.2) Design Alternative : Smaller Schemas   1. Atomic Domains and 1NF 2. Decomposition using Functional Dependencies   3.1) Keys and Functional Dependencies  3.2) BCNF  3.3) BCNF and Dependency Preservation  3.4) 3NF3.5) Higher Normal Forms   1. Functional Dependency Theory   4.1) Closure of a Set of Functional Dependencies  4.2) Closure of Attribute Sets  4.3) Canonical Cover  4.4) Lossless Decomposition  4.5) Dependency Preservation | To introduce a formal approach to relational database design based on the notion of functional dependencies. | T1: Chapter 8.  pp. 323-348. |
| **6** | **21 to 23** | **3** | Decomposition using Functional dependencies, | 1. Algorithm for Decomposition using Functional Dependencies    1. BCNF Decomposition    2. 3NF Decomposition 2. Overview of Multivalued Dependencies and Higher normal forms. | To discuss algorithm for the generation of the design. And to discuss about multivalued dependencies. | T1: Chapter 8.  pp. 348- 355  and  Overview of 355-361 |
| **7** | **24 to 26** | **3** | **Transactions:** Transaction concept, Transaction model, storage structure, Transaction atomicity and durability, Transaction isolation, Serializability. | 1. Transaction Concept 2. A Simple Transaction Model 3. Storage Structure 4. Transaction Atomicity and Durability 5. Transaction Isolation 6. Serializability | To Describe the concept of transaction in detail, including the properties of atomicity, durability, isolation and other properties | T1: Chapter14.  pp. 627- 646. |
| **8** | **27 to 30** | **4** | **Concurrency control:** Lock-based protocols – Locks, granting of locks, The two-phase locking protocol, implementation of locking, Graph-based protocols.  **Deadlock handling:** Deadlock prevention, Deadlock detection and recovery. | 1. Lock-Based Protocols    1. Locks    2. Granting of Locks    3. The Two-Phase Locking Protocol    4. Implementation of Locking    5. Graph-Based Protocols 2. Deadlock Handling   2.1) Deadlock Prevention  2.2) Deadlock Detection and Recovery  15.2.2.1) Deadlock Detection  15.2.2.2 Recovery from Deadlock |  | T1: Chapter 15.  pp. 661-679. |
|  |  |  |  | **Lab Portion** |  |  |
| **Sno** | **No of Sessions** | **Sessions** | **Topics** | **SubTopic** | **Objective** | **Book** |
| **1** | **1 to 5** | **5** | Introduction to SQL –  SQL – background – SQL data types and schemas – integrity constraints – data definition – basic structure of SQL queries – set operations – aggregate functions – null values. | 1. Overview of the SQL Query Language 2. SQL Data Definition   2.1) Basic Types  2.2) Basic Schema Definition   1. Basic Structure of SQL Queries   3.1) Queries on a Single Relation  3.2) Queries on Multiple Relations  3.3) The Natural Join   1. Additional Basic Operations   4.1) The Rename Operation  4.2) String Operations  4.3)Attribute Specification in Select Clause  4.4) Ordering the Display of Tubles.  4.5) Where Clause Predicates   1. Set Operations   5.1) The Union Operation  5.2) The Intersect Operation  5.3) The Except Operation   1. Null Values 2. Aggregate Functions   7.1) Basic Aggregation  7.2) Aggregation with Grouping  7.3) The Having Clause  7.4) Aggregation With Null and Boolean Values | To focus on the most influential of the user-oriented relational language: SQL  Presenting SQL’s fundamental constructs and concepts. | T1: Chapter 3  pp. 57-90. |
| **2** | **5 to 7** | **2** | SQL and advanced SQL – nested sub-queries | 1. Nested Subqueries   1.1) Set Membership 1.2) Set Comparison  1.3) Test for Empty Relations  1.4) Test for the Absence of Duplicate Tuples  1.5) Subqueries in the From Clause  1.6) The with Clause 1.7) Scalar Subqueries   1. Modification of the Databases   2.1) Deletion 2.2) Insertion 2.3) Updates | To discuss SQL nested subqueries and queries to modify the database. | T1: Chapter 3  pp. 90-104. |
| **3** | **8 to 10** | **3** | SQL and advanced SQL –views – join relations – authorization – functions and procedural constructs. | 1. Join Expressions   1.1) Join Conditions 1.2) Outer Joins  1.3) Join Types and Conditions   1. Views   2.1) View Definition 2.2) Using Views in SQL Queries 2.3) Materialized Views 2.4) Update of a View   1. Transactions 2. Overview of Integrity Constraints 3. Overview of Additional SQL and user defined data types   6) Authorization  6.1) Granting and Revoking of Privileges6.2) Roles  6.3) Authorization on Views6.4) Authorization on Schema6.5) Transfer of Privileges  6.6) Revoking of Privileges | To continue studying SQL with more complex form of SQL queries. | T1: Chapter 4  pp. 113-150. |
| **4** | **11 to 15** | **5** | SQL and advanced SQL –functions and procedural constructs | Advanced SQL   1. Overview of accessing SQL from a Programming Language 2. Functions and Procedures   2.1) Declaring and invoking SQL functions and  procedures.  2.2) Language Constructs for Procedures and  Functions  2.3) External Language Routines   1. Cursors, Exceptions and Triggers. | To cover some more advanced features of SQL. | T1: Chapter 5  pp. 157-180 |

**Text Book:**

1. Silberschatz A Korth H F and SudharshanS , “Database System Concepts”, 6th Edition, TMH publishing company limited, 2011.

**References:**

1. Hector Garcia-Molina, Jeffrey D Ullman, JennierWidom, ‘Database System ; The complete book”, 2nd Edition, 2011.
2. Elmasri R and Navathe S B, “Fundamentals of Database Systems”, 5th Edition, Addison Wesley, 2006.
3. Ramakrishnan R and Gehrke J, “Database Management Systems”, 3rd Edition, TMH, 2003

**Evaluation Pattern:**

**Total Marks: 100**

* **Continuous Assessment 70 Marks** 
  + - **Quiz 20 marks**
    - **Lab Evaluation 20 marks**
    - **Project Reviews 30 marks**

* **End semester 30 Marks**

**Online Exam 15 marks**

**Viva 15 marks**