# 20CS2102 - DATABASE MANAGEMENT SYSTEMS

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| Course Category: | Program Core | Credits: | 3 |
| Course Type: | Theory | Lecture-Tutorial-Practical: | 3-0-0 |
| Prerequisite: | Basic foundations in mathematics and preliminary fundamentals of data sets | Sessional Evaluation:Univ. Exam Evaluation:Total Marks: | 4060100 |
| Objectives: | * Understand the areas of databases and composition of queries using Structured Query Language and PL/SQL
* To study various database design models for building applications
* Evaluate a business situation while designing a database system
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| Course Outcomes | Upon successful completion of the course, the students will be able to: |
| CO1 | Master the basic concepts and explore the applications of database systems. |
| CO2 | Understand Data Modelling and the Relational model. |
| CO3 | Learn Relational Algebra operations and basic SQL primitives. |
| CO4 | Familiar with PL/SQL Query Processing Techniques and Normal forms. |
| CO5 | Identify the basic issues of transaction processing, concurrency control and methods for recovery. |
| CO6 | Expose in Advanced Data Models and Security issues. |
| Course Content | UNIT-I**Introduction to Databases**: Characteristics of a Database, Advantages, A brief history of database applications, when not to use DBMS.**Overview of Database languages and architectures**: Data models, Schemas and Instances, Three-schema architecture and Data independence, Centralized and Client/Server Architecture for DBMS, Classification of DBMS**.**UNIT-II**Data Modelling Using (ER) Model**: High level conceptual data models, Entity types, Entity sets, Attributes, Keys, Relationship types, Relationship sets, Roles and Structural Constraints, Weak entity types.**Basic Relational Model**: Relational model concepts, Constraints and Relational Database Schemas, Update Operations and Dealing with Constraint Violations.UNIT-III**Formal Relational Languages:** Unary relational operations, relational algebra operations, binary relational operations. **Basic SQL:** Data definition and types, Specifying constraints, Basic Retrieval Queries, Clauses, Conversion functions and aggregate functions.UNIT-IV**PL/SQL:** Introduction to PL/SQL, Variables and Program Data, Conditional and Sequential Control, Loops.**Functional Dependencies and Normalization**: Design Guidelines for Relation Schemas, Functional dependencies, First,2nd and 3rd normal forms, Boyce-Codd normal form, Multivalued dependencies and 4th normal form, Join dependencies and 5th normal form.UNIT-V**Introduction to Transaction:** Transaction Processing**,** Transaction and System Concepts, Desirable Properties of Transactions, Characterizing Schedules Based on Recoverability and Serializability.**Concurrency Control**: Two phase locking techniques, Time stamp ordering, Multi version concurrency control techniques, Validation concurrency control.UNIT-VI**Database Recovery Protocols**: Recovery Concepts, Undo/Redo Recovery based on deferred Update, Recovery Techniques based on Immediate Update, Shadow paging.**Database Security:** Security Issues, Discretionary Access Control based on Granting and Revoking Privileges, Mandatory Access Control and Role Based Access Control for Multilevel Security. |
| Text Books &ReferencesBooks | **TEXT BOOKS:**1. RamezElmasri, and Shamkant B Navathe, Database Systems, 6th edition, Pearson Education
2. Steven Feuerstein & Bill Pribyl, Oracle PL/SQL Programming, 2nd Edition

**REFERENCE BOOKS:**1. Silberschatz A, Korth H F, and Sudarshan S, Database System Concepts, 5th edition, McGraw-Hill, 2006.
2. Ramakrishnan R, and Gehrke J, Database Management Systems, 3rd edition, McGraw-Hill, 2003.
3. Date C J, An Introduction to Database Systems, 7th edition, Pearson Education, 2000.Rob P, Database Systems – Design, Implementation, and Management, 7th edition, Thomson, 2007.
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| E-Resources | 1. <https://nptel.ac.in/courses>
2. <https://freevideolectures.com/university/iitm>
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