17CS2201 - DATABASE MANAGEMENT SYSTEMS

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| **Course Category:** | Core | **Credits:** | 3 |
| **Course Type:** | Theory | **Lecture – Tutorial – Practical:** | 2-2-0 |
| **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
* 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 Relational Model and the Relational Algebraic operations. |
| CO3 | Learn OODB Concepts and basic SQL primitives. |
| CO4 | Familiar with 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, Data independence, Centralized and Client/Server Architecture for DBMS, Classification of DBMS**.****Conceptual Data Models using Entities and Relationships**: High level conceptual data models, Entity types, Entity sets, Attributes, Keys, Relationship types, Weak entity types, ER diagrams, Naming conventions and Design Issues.UNIT – II**Basic Relational Model**: Relational model concepts, Constraints and Relational Database Schemas, Update Operations, Transactions and Dealing with Constraint Violations.**Formal Relational Languages:** Unary relational operations, relational algebra operations, binary relational operations, Tuple relational calculus, Domain relational calculus. UNIT – III**Object Relational Databases:** Object Database Concepts, Object Database Extension to SQL, The ODMG object Model and the Object Definition Language, Object Database Conceptual Design.**SQL :** Data definition and types, constraints, Basic Retrieval Queries, complex SQL Queries, INSERT,UPDATE, DELTE, Assertions, Triggers and Views.UNIT – IV**Introduction to Query Processing and Query Optimization Techniques**: Translating SQL Queries into Relational Algebra, Algorithms for SELECT, JOIN, PROJECT and Set Operations.**Functional Dependencies and Normalization**: Functional dependencies, First,2nd and 3rd normal forms, Boyce-Codd normal form, Multivalued dependencies, 4th normal form, Join dependencies, 5th normal form.UNIT – V**Concurrency Control**: Two phase locking techniques, Time stamp ordering, Multi version concurrency control techniques, Validation concurrency control.**Database Recovery Protocols**: Recovery Concepts, No Undo/Redo Recovery based on deffered Update, Recovery Techniques based on Immediate Update, Shadow paging.UNIT – VI**Advanced Database Models:** Temporal, Spatial and Multimedia Database Concepts.**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 and References:** | **Text Books:**1. Ramez Elmasri, and Shamkant B Navathe, Database Systems, 6th edition, Pearson Education

**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**](https://nptel.ac.in/courses)
2. [**https://freevideolectures.com/university/iitm**](https://freevideolectures.com/university/iitm)
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