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| Hours / Week | : | 4 | |  | Sessional Marks | : | 40 |
| Credits | : | 4 | |  | End Examination Marks | : | 60 |

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| **UNIT - I** |
| **Database System Concepts:** Data Models, Schemas and Instances, Three-Schema Architecture, Database Languages and Interfaces, The Database System Environment, Centralized and Client/Server Architectures for DBMSs, Classification of DBMS.  **Data Modeling Using ER Model:** ER Diagrams, Naming Conventions, and Design Issues.  **EER Model:** Subclasses, Super Classes, and Inheritance, Data Abstraction, Knowledge Representation and Ontology Concepts. |
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| **UNIT – II** |
| **Database Design:** Functional Dependencies, Normal forms Based on Primary Keys, Second Normal Forms, Third Normal Forms, Multivalued Dependencies and Fourth Normal Form, Join Dependencies and Fifth Normal Form.  **Query Processing and Optimization:** Algorithms for External Sorting, SELECT and JOIN Operations, PROJECT and SET Operations, Aggregate Operations and OUTER JOINS, Using Heuristics in Query Optimization, Using Selectivity and Cost Estimates in Query Optimization. |
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| **UNIT – III** |
| **Object and Object-Relational Databases:** Object-Oriented Concepts, Object Model of ODMG, Object Definition Language, Object Query Language, Object Database Conceptual Design, Overview of SQL and Its Object-Relational Features, Evolution of Data Models and Current Trends of Database Technology, Object Relational Features of oracle 8. |
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| **UNIT – IV** |
| **Security and Advanced Modeling:** Database Security Issues, Discretionary Access Control Based on Granting and Revoking Privileges, Mandatory Access Control and Role-Based Access Control for Multilevel Security, Statistical Database Security, Privacy Issues and Preservation, Challenges of Database Security.  **Enhanced Data Models for Advanced Applications:** Active Database Concepts and Triggers, temporal Database Concepts, Spatial and Multimedia Databases, Deductive Databases. |
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| **UNIT – V** |
| **Emerging Database Technologies and Applications:**  **Mobile Databases:** Architecture, Characteristics, Data management Issues.  **Multimedia Databases:** Multimedia Data, Data management Issues, Open Research Problems, Applications.  **Geographic Information Systems (GIS):** Components of GIS Systems, Characteristics, Data models for GIS, GIS Applications and software, Future work in GIS.  **Genome Data Management:** Characteristics, The Human Genome Project and existing Biological Databases. |
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| TEXT BOOKS |
| 1. Ramez Elmasri & Shamkant B. Navethe, Fundamentals of Database Systems, fourth Edition, Pearson Education, 2004. 2. Abraham Silberchatz, Henry F. Korth, S.Sudarsan, Database System Concepts, Fifth Edition, McGraw-Hill, 2006. 3. Stefano Ceri, Giuseppe Pelagatti, Distributed Databases Principles and Systems, McGraw-Hill International Editions, 1985. |
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| REFERENCE BOOKS |
| 1. Thomas M. Connolly, Carolyn E. Begg, Database Systems – A Practical Approach to Design, Implementation and Management, Third edition, Pearson Education, 2003. 2. Jefrey D. Ullman, Jenifer Widom, A First Course in Database Systems, Pearson Education Asia, 2001. 3. Stefano Ceri, Giuseppe Pelagatti, Distributed Databases Principles and Systems, McGraw-Hill International Editions, 1985. 4. Rajesh Narang, Object Oriented Interfaces and Databases, Prentice Hall of India, 2002. |