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

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| **UNIT – I** |
| **Databases And Database Users**: Database approach, its characteristics, and advantages, A brief history of database applications, When not to use a DBMS.  **Database System Concepts And Architecture**: Data models, Schemas, and Instances, Three-schema architecture, Data independence, Database languages  **Data Modeling Using Entity-Relationship (ER) Model**: High level conceptual data models, Entity types, Entity sets, Attributes, Keys, Relationship types, Weak entity types, ER diagrams, Naming conventions, Design issues, |
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| **UNIT – II** |
| **The Relational Data Model And Relational Database Constraints**: Relational model concepts, Constraints, Schemas, Update operations, Transactions, Dealing with Constraint violations.  **The Relational Algebra And Relational Calculus**: Relational operations, Queries in relational algebra, Tuple relational calculus, Domain relational calculus.  SQL-99: Schema definition, Constraints, Queries, and Views |
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| **UNIT – III** |
| **Functional Dependencies And Normalization For Relational Databases**: Informal design guidelines for relation schemas, Functional dependencies, Normal forms, 2nd and 3rd normal forms, Boyce-Codd normal form.  **Relational Database Design Algorithms And Further Dependencies**: Properties of relational decompositions, Multivalued dependencies, 4th normal form, Join dependencies, 5th normal form. |
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| **UNIT – IV** |
| **Concurrency Control Techniques**: Two phase locking techniques for concurrency control, Concurrency control based on time stamp ordering, Multi version concurrency control techniques, Validation concurrency control, Granularity of data items and multiple granularity locking. |
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| **UNIT – V** |
| **Database Recovery Techniques**: Recovery concepts, Recovery techniques based on deferred update, and immediate update, Shadow paging, ARIES recovery algorithm, Database backup, recovery from catastrophic failures. |
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| TEXT BOOKS |
| 1. Elmasri R, and Navathe S B, Fundamentals of Database Systems, 5th edition, Pearson Education, 2008. |
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| 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. 4. Rob P, Database Systems – Design, Implementation, and Management, 7th edition, Thomson, 2007. |