AIL303- Database Engineering

Teaching Scheme	
Lectures	3 Hrs. /Week
Tutorials	**-**
Total Credits	3

Evaluation Scheme	
SE-I	25
SE-II	25
SEE	50
Total	100

Prerequisite
Object Oriented Concepts, Fundamentals of Data Structures

Course Objectives	
1	To develop conceptual understanding of fundamentals of database management systems.
2	To get familiar with different data models.
3	To apply functional dependency and normalization.
4	To model the database by query writing.
5	To expose students to indexing, transaction processing and concurrency control mechanisms.

Course Outcomes	
At the end of the course students will be able to -	
1	Explain the fundamentals of database management systems.
2	Design database using E-R features.
3	Write SQL queries

--

Contents		
Unit 1	**Introduction to DBMS: –**Introduction, Traditional file system v/s DBMS, views of data, instance and schema, Data Models – Relational and ER model, Keys, Database design process, Schema diagram, Extended E-R Features-Specialization, Generalization and Aggregation, Database system structure, Database users. Relational algebra, Tuple relational calculus, Domain relational calculus.	**8 Hrs**
Unit 2	**Structured Query Language (SQL) :–** Introduction to SQL, data types. DDL Statements – Create, Alter, Drop, Rename, Truncate. DML Statements- Select, Insert, Update, Delete. DCL Statements – Commit, Rollback. Aggregate functions, Group by clause, having clause, order by clause, set operations, Joins, Nested Queries, Views PL/SQL- Functions, Procedures, Triggers, Cursors	**8 Hrs**
Unit 3	**Functional Dependency and Normalization: –** Integrity constraints – domain	**7 Hrs**

D. K .T. E. Society's Textile and Engineering Institute, Ichalkaranji
(An Autonomous Institute)
Department of Computer Science and Engineering

	constraints, referential integrity, Pitfalls in Relational-Database Design, Functional dependency, types of functional dependency, closure of set of functional dependency, Closure of Attribute Sets, canonical cover. Normalization – Purpose of normalization, First Normal Form (1NF), Second Normal Form (2NF), Third Normal Form (3NF), Boyce-Codd Normal Form (BCNF), Fourth Normal Form (4NF), Fifth Normal Form (5NF),	
Unit 4	**Data Storage and Indexing: –** File organization, Organization of records in file, Buffer Management. Indexing – Ordered indices – primary indices, secondary indices, dense and sparse indices, multilevel indexing, B tree indexing, B+ tree indexing and multiple key access. Hashing – static hashing – open hashing, closed hashing, dynamic hashing. Bitmap indices.	5 Hrs
Unit 5	**Transaction Processing and Concurrency Control: –**Transaction Processing – Concept, ACID properties, Transaction model, Schedule, Serializability – conflict and view Serializability, Recoverable schedule. Concurrency Control Mechanisms – Lock based protocols, Multiple Granularity, Timestamp based protocols, Thomas's Write Rule, Validation based protocols	7 Hrs
Unit 6	**Deadlock Handling and Data Recovery: –** Deadlock Handling – Deadlock prevention, deadlock detection and deadlock recovery. Data Recovery – Failure Classification, Storage, Log based recovery, checkpoints, Recovery Algorithm, Buffer Management, Failure with loss of non- volatile Storage	5 Hrs

Text Books	
1	"Database System Concepts", Abraham Silberschatz, Henry F. Korth, S. Sudarshan, 6th edition, McGraw- Hill.
2	"Database Systems - A Practical Approach to Design, Implementation and Management", Thomas Connolly, Carolyn Begg, 4th Edition, Addison Wesley.
3	"MySQL Cookbook", Paul DuBois, 3rd edition, O'REILLY.

Reference Books	
1	"Fundamentals of Database Systems", Ramez, Elmasri, Shamkant B. Navathe, 6th Edition, Addison Wesley.
2	"Database Systems – Design, Implementation and Management", Rob & Coronel, 5th Edition, Thomson Course Technology.