Introduction to Database Systems	L	T	P	-
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Course Objective: To provide knowledge about the principles, concepts and applications of Database Systems.

S. NO	Course Outcomes (CO)
CO1	Understand the architecture, data models, and fundamental concepts of database systems, including data independence and database languages and design ER diagrams
CO2	Apply relational data model principles, including integrity constraints, relational algebra, and SQL, to design and manipulate relational databases.
CO3	Implement database normalization techniques using functional dependencies and various normal forms to achieve an optimized database design.
CO4	Analyze and implement various file organization, indexing, and hashing techniques for efficient data retrieval and storage.
CO5	Understand and manage transaction processing, including serializability, recoverability, and handling of transaction failures and deadlocks.
CO6	Apply concurrency control mechanisms, including locking techniques and time-stamping protocols, to ensure consistency in distributed database systems.

S. NO	Contents	Contact Hours
UNIT 1	**Introduction**: Data base system concepts and its architecture, Data models schema and instances, Data independence and data base language and interface, Data definition languages, DML. Overall database structure. **Data modeling using Entity Relationship Model**: E.R. model concept, notation for ER diagrams mapping constraints, Keys, Concept of super key, candidate key, primary key generalizations, Aggregation, reducing ER diagrams to tables, extended ER model.	7
UNIT 2	**Relational Data Model and Language:** Relational data model concepts, integrity constraints, Keys domain constraints, referential integrity, assertions, triggers, foreign key relational algebra, relational calculus, domain and tuple calculus, SQL data definition queries and updates in SQL.	7
UNIT 3	**Data Base Design:** Functional dependencies, normal forms, 1NF, 2NF, 3NF and BCNF, multi-valued dependencies fourth normal forms, join dependencies and fifth normal forms. Inclusion dependencies, loss less join decompositions, normalization using FD, MVD and JDs, alternatives approaches to database design.	6

UNIT 4	**File Organization, Indexing and Hashing:** Overview of file organization techniques, Indexing and Hashing Basic concepts, Static Hashing, Dynamic Hashing, Ordered indices, Multi-level indexes, B-Tree index files, B+- Tree index files, Buffer management.	**10**
UNIT 5	**Transaction processing concepts:** Transaction processing system, schedule and recoverability, Testing of serializability, Serializability of schedules, conflict & view serializable schedule, recovery from transaction failures, deadlock handling.	**6**
UNIT 6	**Concurrency Control Techniques:** Locking Techniques for concurrency control, time stamping protocols for concurrency control, concurrency control in distributed systems. multiple granularities and multi-version schemes.	**6**
	TOTAL	**42**

REFERENCES

S.No.	Name of Books/Authors/Publishers	Year of Publication / Reprint
1	Elmasri, Navathe,"Fundamentals of Database systems", Addision Wesley	2016
2	Korth, Silberchatz, Sudarshan,"Data base concepts", McGraw-Hill.	2010
3	Ramakrishna, Gehkre, "Database Management System", McGraw-Hill	2014
4	Date C.J.,"An Introduction to Database systems"	2006

B.Tech. Information Technology

Course code:	Course Structure	Pre-Requisite