Semester: III	
Programme : B.Sc. Computer Science (Hons)	
Course : DATABASE MANAGEMENT SYSTEM	
Paper code: B2CS230312T & B2CS230312P	**Credits: 4**
Hours/week : Theory: 3 / Practical 2	
Category: Core/MDC/SEC/VAC : Core	
Theory / Practical / Composite : Composite	**Composite**
No of Modules : 1	

Course Overview: Database Management System is a 4-credit composite course designed for B.Sc. Computer Science (Hons) students to develop comprehensive understanding of database concepts, design methodologies, and implementation techniques. The curriculum progresses from foundational DBMS architecture and data abstraction to conceptual modeling using Entity-Relationship diagrams, logical design via the relational model, normalization theory, file organization strategies, and transaction processing principles. Through integrated theory and practical sessions, students gain proficiency in designing robust database schemas, writing SQL queries, applying normalization rules, and ensuring data integrity—essential skills for developing reliable data-driven applications in modern computing environments.

Course Outcome:

1. **Recall and explain** fundamental DBMS concepts including architecture, data abstraction levels (physical, conceptual, external), data models, database languages, and roles of DBA and database manager.
2. **Apply** Entity-Relationship modeling techniques to design conceptual schemas using entity sets, relationship sets, mapping constraints, keys, and extended features (specialization/generalization, aggregation).
3. **Analyze** relational database structures and formulate queries using relational algebra operations (fundamental and extended) and Structured Query Language (SQL).
4. **Evaluate** database schemas using functional dependencies and normalization theory to transform relations into optimal normal forms (1NF, 2NF, 3NF, BCNF) while preserving integrity constraints.
5. **Design** complete database solutions by integrating conceptual ER modeling, logical relational design, normalization, and SQL implementation for real-world application scenarios.
6. **Assess** transaction processing mechanisms with emphasis on ACID properties and concurrency control strategies to ensure database reliability and consistency.

Prerequisites:

SYLLABUS

UNIT/Module	CONTENT	HOURS	CO Mapping	COGNITIVE LEVEL
I.	Fundamental concepts of DBMS; Purpose of Database Systems; Data Abstraction (Physical, Conceptual, External Levels); Data Models; Database Languages; Database Users; Database Manager; Database Administrator; DBMS Structure	8	CO1	K1, K2 (Remember/Understand)
II.	Entity Relationship Model: Entity Sets; Relationship Sets; Mapping Constraints; Keys; ER	8	CO2	K3 (Apply)

	Diagrams; Strong and Weak Entity Sets; Extended ER Features (Specialization/Generalization, Aggregation)			
III.	Relational Model: Structure of Relational Databases; Database Schema; Query Languages—Relational Algebra (Fundamental and Additional Operations); Structured Query Language (SQL)	9	CO3	K4 (Analyse)
IV.	Database Design: Constraints (Domain, Referential Integrity); Functional Dependencies; Normalization (1NF, 2NF, 3NF, BCNF)	8	CO4	K5 (Evaluate)
V.	File Organization: Operations on Files; Records (Fixed Length, Variable Length); Sequential File Organization	6	CO1, CO6	K2-K3 (Understand/Apply)
VI.	Introduction to Transaction Processing: ACID Properties; Concurrency Control Mechanisms	6	CO6	K5 (Evaluate)
Practical Integration	ER diagram design, SQL query formulation, normalization exercises, and mini-project implementation	-	CO2, CO3, CO4, CO5	K3-K6 (Apply/Create)

Text Books

1. Elmasri, S.B. Navathe, Fundamentals of Database Systems 6th Edition, Pearson Education, 2010.
2. A. Silberschatz, H.F. Korth, S. Sudarshan, Database System Concepts 6th Edition, McGraw Hill, 2010.
3. R. Ramakrishanan, J. Gehrke, Database Management Systems 3rd Edition, McGraw-Hill, 2002.

Suggested readings

C. J. Date, An Introduction to Database Systems, 8th Edition, Pearson India

Web Resources

https://nptel.ac.in/courses/106105175

Evaluation	Theory CIA: 12 Attendance: 3 Semester Exam: 45	Practical CA: 38 Attendance: 2

Paper Structure for Theory Semester Exam Module : Answer 3 out of 5 of 15 marks each

Course outcomes (COs) and Cognitive Level Mapping

COs	CO Description	Cognitive levels
CO1	Recall and explain fundamental DBMS concepts including architecture, data abstraction levels (physical, conceptual, external), data models, database languages, and roles of DBA and database manager.	K1-K2 (Remember/Understand)
CO2	Apply Entity-Relationship modeling techniques to design conceptual schemas using entity sets, relationship sets, mapping constraints, keys, and extended features (specialization/generalization, aggregation).	K3 (Apply)
CO3	Analyze relational database structures and formulate queries using relational algebra operations (fundamental and extended) and Structured Query Language (SQL).	K4 (Analyse)
CO4	Evaluate database schemas using functional dependencies and normalization theory to transform relations into optimal normal forms (1NF, 2NF, 3NF, BCNF) while preserving integrity constraints.	K5 (Evaluate)
CO5	Design complete database solutions by integrating conceptual ER modeling, logical relational design, normalization, and SQL implementation for real-world application scenarios.	K6 (Create)
CO6	Assess transaction processing mechanisms with emphasis on ACID properties and concurrency control strategies to ensure database reliability and consistency.	K5 (Evaluate)