Semester: VI	
Programme : B.Sc. Computer Science (Hons)	
Course : ADVANCED DATABASE MANAGEMENT SYSTEM AND DATA WAREHOUSING	
Paper code: C3CS230642T / C3CS230642P	**Credits: 4**
Hours/week : Theory: 3 / Practical 2	
Category: Core/MDC/SEC/VAC : Core	
Theory / Practical / Composite : Composite	
No of Modules : 1	

Course Overview: This course advances students' knowledge of database systems by exploring transaction management, concurrency control, and recovery mechanisms to ensure data integrity and consistency. It covers query processing and optimization techniques to enhance system performance, alongside principles of distributed databases including fragmentation and transparency. The curriculum further delves into data warehousing architectures, schema design (Star, Snowflake), and Data Marts, culminating in On-Line Analytical Processing (OLAP) concepts and multi-dimensional data models. Through theoretical study and analytical exercises, students gain the expertise needed to design robust, scalable database solutions and analytical systems for complex organizational needs.

Course Outcome:

1. **Recall and explain** transaction management concepts including states, ACID properties, consistency models, and schedules.
2. **Apply** concurrency control protocols (Locking, Timestamp) and analyze schedules for serializability and deadlock handling.
3. **Analyze** recovery techniques and failure classifications to ensure database consistency and durability using log-based methods.
4. **Evaluate** query processing steps, optimization strategies, and distributed database principles (fragmentation, replication).
5. **Design** data warehouse architectures and schemas (Star, Snowflake, Fact Constellation) to meet organizational analytical requirements.
6. **Create** OLAP solutions using multi-dimensional data models and operations to support decision-making processes.

SYLLABUS

UNIT/Module	CONTENT	HOURS	CO Mapping	COGNITIVE LEVEL
I.	Transaction Management: States of Transaction, ACID properties, consistency model, storage model.	4	CO1	K1, K2 (Remember/Understand)
II.	Concurrency: Schedules, testing for serializability, Lock-based protocols- Two-phase locking protocol, Timestamp based protocol, deadlock handling.	6	CO2	K3, K4 (Apply/Analyse)

III.	Recovery: Failure classification, storage hierarchy, log-based recovery, shadow paging.	5	CO3	K4 (Analyse)
IV.	Query processing and optimization: Steps of query processing, query interpretation, equivalence of expression, estimation of cost, join strategies.	6	CO4	K4, K5 (Analyse/Evaluate)
V.	Distributed Database: Principles of distributed database, levels of distribution transparency, data fragmentation, replication and allocation techniques.	6	CO4	K5 (Evaluate)
VI.	Data warehousing: Basic Concepts, OLTP, Advantages and Drawbacks, Architecture. Data Warehouse Schema: Star, Snowflake, Fact Constellation. Data Marts: Basic concepts, Components.	6	CO5	K6 (Create)
VII.	Data Warehouse Design: Different views of designs, processes of design. On-line Analytical Processing: Concepts of OLAP, Multi-dimensional Data Model; OLAP Operations.	6	CO6	K6 (Create)

Text Books

1. Elmasri Navathe, Fundamentals of Database System, 3/e, Pearson Education.
2. Korth, Silberschatz: Database System Concepts, McGraw Hill
3. Data Mining: Concepts and Techniques, J Han and M Kamber, Third Edition, Elsivier.

Suggested readings

1. Ceri and Pelagatti, Distributed Databases: Principles and System: McGraw Hill

Web Resources

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 transaction management concepts including states, ACID properties, consistency models, and schedules.	K1-K2 (Remember/Understand)
CO2	Apply concurrency control protocols (Locking, Timestamp) and analyze schedules for serializability and deadlock handling.	K3-K4 (Apply/Analyse)
CO3	Analyze recovery techniques and failure classifications to ensure database consistency and durability using log-based methods.	K4 (Analyse)
CO4	Evaluate query processing steps, optimization strategies, and distributed database principles (fragmentation, replication).	K5 (Evaluate)
CO5	Design data warehouse architectures and schemas (Star, Snowflake, Fact Constellation) to meet organizational analytical requirements.	K6 (Create)
CO6	Create OLAP solutions using multi-dimensional data models and operations to support decision-making processes.	K6 (Create)