

Semester: I				
Programme: M.Sc. Data Science				
Course: Database Management Systems				
Paper code: MDTS4114			Credits: 6	
Hours/week: 7 (4Th + 3Pr)				
Category: Core/MDC/SEC/VAC : Core				
Theory / Practical / Composite: Composite				
No of Modules: 1				
Course Overview:				
Course Outcome:				
1. Remember fundamental DBMS concepts, including levels of data abstraction, various data models (Entity Relationship and Relational), and standard database languages				
2. Understand the principles of transaction management, concurrency control, and recovery techniques, such as ACID properties, lock-based protocols, and deadlock handling.				
3. Apply Structured Query Language (SQL) and NoSQL tools like MongoDB to perform data operations and establish database connectivity using Python				
4. Analyse database designs by applying functional dependencies and normalization rules to ensure referential integrity and minimize data redundancy.				
5. Evaluate the performance and suitability of different query processing methods and data warehouse architectures, including OLTP and OLAP configurations.				
6. Create comprehensive database and data warehouse structures by synthesizing design elements like constraints, indexing, hashing, and multidimensional schemas				
SYLLABUS				
UNIT/Module	CONTENT	HOURS or NUMBER OF CLASSES	CO Mapping	COGNITIVE LEVEL
I.	Recap of DBMS concepts: Data Abstraction; Data Models (Entity Relationship Model, Relational Model) Database Languages.	4	CO1	KO1
II.	Database design: Constraints; Referential Integrity; Functional Dependencies; Normalization. Indexing and Hashing.	12	CO4, CO6	KO4, KO6
III.	Transaction Management, Concurrency Control & Recovery: ACID properties; rollback; recoverable schedules; lock-based protocols; deadlock handling; failure; recovery techniques.	18	CO2	KO2
IV.	Query processing.	6	CO5	KO5
V.	Data warehousing: Basic Concepts, OLTP, Data Warehouse Architecture; Schemas; Data Marts; Data Warehouse Design; On-line Analytical Processing (OLAP).	12	CO5, CO6	KO5, KO6
VI.	Suggested packages and tools for Practical using the Structured Query Language (SQL), NoSQL, MongoDB, Python DB connectivity.	39	CO3	KO3

Text Books				
1. Silberschatz, A., Korth, H. F., & Sudarshan, S. (2021). <i>Database System Concepts</i> . McGraw-Hill Education.				
2. Ramakrishnan, R., & Gehrke, J. (2018). <i>Database Management Systems</i> . McGraw-Hill Education.				
3. Elmasri, R., & Navathe, S. B. (2017). <i>Fundamentals of Database Systems</i> (7th ed.). Pearson India.				
4. Han, J., Kamber, M., and Pei, J. (2012). <i>Data Mining: Concepts and Techniques</i> (3rd ed.). Morgan Kaufmann (Elsevier).				
5. Inmon, W. H. (2005). <i>Building the Data Warehouse</i> (4th ed.). John Wiley & Sons.				
6. Kimball, R., & Ross, M. (2013). <i>The Data Warehouse Toolkit</i>				
Evaluation				
Paper Structure for Theory Semester Exam Module:				
Marks	Theory CIA: 10 End Sem Exam: 50 Total: 60		Practical Continuous Assessment: 40	
Paper Structure for Theory Semester Exam	Short questions: 5 marks each 2 out of 4		Long Questions: 10 Marks each 4 out of 6	

Course outcomes (COs) and Cognitive Level Mapping

COs	CO Description	Cognitive levels
CO1	Remember fundamental DBMS concepts, including levels of data abstraction, various data models (Entity Relationship and Relational), and standard database languages	KO1
CO2	Understand the principles of transaction management, concurrency control, and recovery techniques, such as ACID properties, lock-based protocols, and deadlock handling.	KO2
CO3	Apply Structured Query Language (SQL) and NoSQL tools like MongoDB to perform data operations and establish database connectivity using Python	KO3
CO4	Analyze database designs by applying functional dependencies and normalization rules to ensure referential integrity and minimize data redundancy.	KO4
CO5	Evaluate the performance and suitability of different query processing methods and data warehouse architectures, including OLTP and OLAP configurations.	KO5
CO6	Create comprehensive database and data warehouse structures by synthesizing design elements like constraints, indexing, hashing, and multidimensional schemas	KO6