

TE Sem VI EXT C-scheme May'2026
Date: 20/05/2026

Duration: 3hrs [Max Marks: 80]

- N.B. : (1) Question No 1 is Compulsory.
(2) Attempt any three questions out of the remaining five.
(3) All questions carry equal marks.
(4) Assume suitable data, if required and state it clearly.

- 1 Attempt any FOUR [20]
 - a Explain the concept of a Database Management System (DBMS). Discuss its components and functions in detail. 5
 - b Describe the Three-Tier Database Architecture with a neat diagram. Explain the role of each tier. 5
 - c Explain the importance of data models in database design. How do data models help in representing real-world scenarios? 5
 - d Explain the ER Model with its components. Discuss various constraints in ER modeling with suitable examples. 5
 - e Explain Relational Algebra and its fundamental operations. Describe Selection (σ) and Projection (π) with suitable examples. 5
- 2 a Explain the Entity-Relationship (ER) Model and the Object-Oriented Data Model. Compare both models in terms of structure and usage. [10]
b Discuss the basic building blocks of a data model. Explain concepts such as entities, attributes, relationships, and constraints. [10]
- 3 a Draw and explain an ER Diagram (ERD) for a college management system. Also discuss common ERD issues faced during database design. [10]
b State and explain Codd's Rules. How do these rules define a true Relational Database Management System (RDBMS)? [10]
- 4 a Explain the syntax and semantics of Relational Algebra queries. How do grouping and ungrouping operations work? [10]
b Describe Tuple Relational Calculus (TRC) and Domain Relational Calculus (DRC). Compare Relational Algebra and Relational Calculus in terms of approach and computational capability. [10]
- 5 a Explain SQL Data Definition Language (DDL) commands with syntax and examples. Discuss how constraints are applied using DDL. [10]
b Explain Nested Subqueries and Joined Relations in SQL with suitable examples. Differentiate between different types of joins. [10]
- 6 a What is a transaction in DBMS? Explain the ACID properties (Atomicity, Consistency, Isolation, Durability) with suitable examples. [10]
b Discuss database recovery management. Explain techniques such as log-based recovery, checkpoints, and shadow paging. [10]
