K. K. Wagh Institute of Engineering Education & Research, Nashik

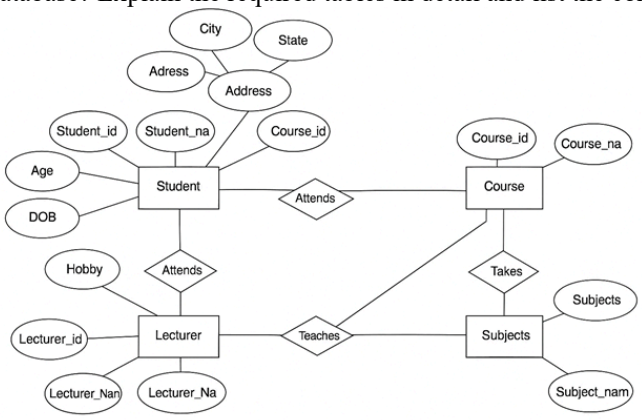
(An Autonomous Institute From A.Y. 2022-23)

WINTER-2025	
Exam Seat No.:	
Academic Year:2025-2026	Semester:IV
Class:SY	Program:B.Tech
Branch Code:ADS	Pattern:2023
Name of Course:Database Management System	Course Code:2311212
Max. Marks:60	Duration:2.30 Hrs.

Instructions: Candidates should read carefully the instructions printed on the Question Paper and on the cover page of the Answer Book, which is provided for their use.

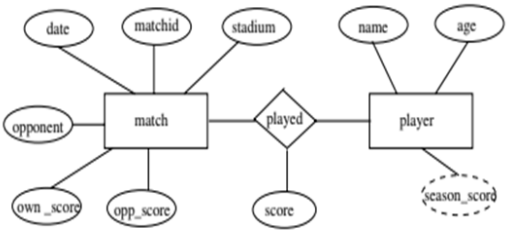
1. This question paper contains 2 pages.
2. Answer to each new question is to be started on a new page.
3. Assume suitable data wherever required, but justify it.
4. Draw the neat labelled diagrams, wherever necessary.
5. The last columns indicates the Course Outcome and level of Blooms Taxonomy of the Question/sub-question.

		Marks	**CO**
Question No. 1			
1a)	List any three real-world applications where Database Management Systems (DBMS) are commonly used.	(6)	CO1
Question No. 2			
2a)	Explain SQL views within a database system and demonstrate their functionality by providing an appropriate example.	(6)	CO2
Question No. 3			
3a)	How many tables are needed to represent a given Entity Set and its Relationship Set in a relational database? Explain the required tables in detail and list the complete schema for each table.	(8)	CO3



OR

3b)	Differentiate between weak and strong entities. Convert the following ER diagram into tables.	(8)	CO3



3c) Given the relational schema: (8) CO3

employee(emp_no, emp_name, address, Dept_no, dept_name, dept_manager),

Analyze whether this schema suffers from update, insert, or delete anomalies.

Provide justification for each anomaly identified.

Also, explain the concepts of Second Normal Form (2NF) and Third Normal Form (3NF) along with suitable examples.

Demonstrate how the above schema can be decomposed into 2NF and 3NF to eliminate the anomalies.

OR

3d) Given the schema Students_Details(Stud_id, stud_name, zip, city), Evaluate whether the relation is in Third Normal Form (3NF). If it violates 3NF, justify the violation and transform the schema into a proper 3NF design. (8) CO3

Question No. 4

4a) Differentiate between centralized database architecture and client–server architecture, highlighting their key features, advantages, and disadvantages. Classify data into structured, semi-structured, and unstructured categories, and explain each type with suitable real-world examples. (8) CO4

OR

4b) Explain the different levels of abstraction in a database system—physical level, logical level, and view level. Discuss how each level helps in data independence (8) CO4

4c) Explain the CRUD (Create, Read, Update, Delete) operations in database systems along with their general syntax. Describe the structure of a MongoDB document and analyze how it differs from a traditional row in a relational database. (8) CO4

OR

4d) Describe the different types of NoSQL databases—key-value stores, document stores, column-family stores, and graph databases—along with suitable examples. Highlight CAP theorem and the BASE properties in the context of NoSQL systems. (8) CO4

Question No. 5

5a) Define a transaction in a database system and describe the various states a transaction passes through during its execution. Compare conflict serializability and view serializability. (8) CO5

OR

5b) Explain the shadow paging recovery technique used in database . Explain ACID Properties. (8) CO5

5c) Explain the Two-Phase Locking (2PL) protocol and describe how it ensures serializability in concurrent transaction processing. Define a recoverable schedule and discuss why recoverability is essential for maintaining the correctness and consistency of transactions in a database system. (8) CO5

OR

5d) Explain the Checkpoint-based Recovery Mechanism in DBMS. Describe how checkpoints help reduce recovery time after a system crash. (8) CO5

····· End of question paper·····