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:II
Class:PG-I	Program:MCA
Branch Code:M.C.A.	Pattern:2022
Name of Course:Database Management System	Course Code:MCA222002
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___page(s).
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)	Construct ER Diagram for Library Management System: A college library maintains records of books, members, issue/return transactions, and fines. Each book has a title, ISBN, author, and category. Members can borrow multiple books, and fines apply for late returns.	(6)	CO1
Question No. 2			
2a)	Consider the following database schema: STUDENT(StudentID, StudentName, Program, City) ENROLLMENT(EnrollID, StudentID, CourseID, Semester) COURSE(CourseID, CourseName, Credits) Write SQL queries to perform the following: a) Display the names of students enrolled in the “Database Systems” course. b) Retrieve the list of distinct cities from which students belong. c) Display students who are enrolled in more than 3 courses	(6)	CO4
Question No. 3			
3a)	Given a relation that violates 1NF, explain how you would reorganize the structure to enforce atomicity and 1NF. Demonstrate your explanation using your own simple example.	(8)	CO3
	OR		
3b)	Differentiate between BCNF and 3NF	(8)	CO3
3c)	Given the relation: R2(ProjectID, EmployeeID, EmpName, ProjectName, HoursWorked) Functional Dependencies: • ProjectID, EmployeeID → HoursWorked • EmployeeID → EmpName • ProjectID → ProjectName Candidate Key: (ProjectID, EmployeeID)	(8)	CO3

Determine the highest normal form of relation R2.

OR

3d)	Demonstrate Domain, Referential Integrities and Enterprise Constraints with suitable example.	(8)	CO3

Question No. 4

4a)	Describe the ACID properties of a transaction. How does each property contribute to maintaining database consistency and reliability?	(8)	CO2

OR

4b)	Explain the concept of lock-based concurrency control. Why are locks required to manage concurrent transactions in a database system?	(8)	CO2
4c)	Explain what is meant by a transaction schedule. Differentiate between serial and non-serial schedules with suitable explanation.	(8)	CO2

OR

4d)	Explain what a deadlock is in a database system. How does deadlock handling ensure smooth execution of transactions?	(8)	CO2

Question No. 5

5a)	Analyze the differences between centralized database architecture and client–server database architecture in terms of data access, performance, scalability, and fault tolerance.	(8)	CO5

OR

5b)	Analyze the need for parallel databases. How does parallel database architecture improve query performance and throughput compared to traditional database systems?	(8)	CO5
5c)	Analyze the need for distributed databases over centralized database systems. How do distributed databases address data availability and performance requirements?	(8)	CO5

OR

5d)	Analyze the top-down and bottom-up distributed database design processes. How does each approach affect data fragmentation, allocation, and system scalability?	(8)	CO5

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