



**K. K. Wagh Institute of Engineering Education & Research, Nashik**  
(An Autonomous Institute From A.Y. 2022-23)

	SUMMER-2023		
	Exam Seat No.:		
	Academic Year:2022-2023	Semester:II	
	Name of Programme:MCA	Pattern:2022	
	Name of Course:Database Management System	Course Code:MCA222002	
	Max. Marks:60	Duration:2.30	

**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 3 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

**Question No. 1 Attempt following Question**

- 1a) Demonstrate the terms entity, attribute, relationship, constraint, and key in the context of the ER model with suitable example (6) CO1

**Question No. 2 Attempt following Question**

- 2a) Write a PL/SQL block to calculate and display gross salary on basis of basic salary. If DA is 30% of basic, HRA is 10% of basic and PF deduction is 8% of basic salary. Accept basic salary from user Gross salary=Basic Salary+DA+HRA-PF (6) CO4

**Question No. 3 Attempt following Question**

- 3a) Illustrate advantages of implementing Codd's rule in a relational database management system (6) CO3

**OR**

- 3b) Show why normalization is important in relational database design (6) CO3
- 3c) Compare the different types of decomposition techniques in the context of functional dependencies (6) CO3

**OR**

- 3d) Illustrate referential integrity constraints, integrity constraints and domain constraints (6) CO3
- 3e) Explain the features of good relational design (4) CO3

**OR**

- 3f) Evaluate a given set of functional dependencies and determine if the relation is in Boyce-Codd Normal Form (BCNF). Consider a relation R with attributes (student, subject, teacher).

F: { (student, teacher)  $\rightarrow$  subject, (student, subject)  $\rightarrow$  teacher  
teacher  $\rightarrow$  subject }  
Candidate keys are (student, teacher) and (student, subject).

student	teacher	subject
Jhansi	P.Naresh	Databas
Jhansi	K.Das	C
subbu	P.Naresh	Databas
subbu	R.Prasad	C

(4) CO3

**Question No. 4 Attempt following Question**

- 4a) Describe the concept of timestamp-based protocols in concurrency control (8) CO2

**OR**

- 4b) Illustrate the concept of a transaction in the context of database management systems. Discuss the properties of transaction (8) CO2
- 4c) Describe the elements and structure of a schedule, and explain the importance of serial and concurrent schedules. Differentiate between recoverable schedules and non-recoverable schedules in database transactions (8) CO2

**OR**

- 4d) Examine the stages involved in query processing and query optimization in database systems (8) CO2

**Question No. 5 Attempt following Question**

- 5a) Differentiate between i) 2-tier and 3-tier architecture  
ii) parallel databases and distributed databases (8) CO5

**OR**

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| 5b) | Explain the BASE properties and components of the CAP theorem and their implications on distributed database systems     | (8) | CO5 |
| 5c) | Describe the characteristics and use cases of key-value stores, column family store, document stores and graph databases | (8) | CO5 |

**OR**

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|-----|---|-----|-----|
| 5d) | Discuss the advantages and disadvantages of using NoSQL databases compared to traditional SQL databases | (8) | CO5 |
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