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B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

June 2025 Semester End Main Examinations

Programme: B.E. **Semester: III**

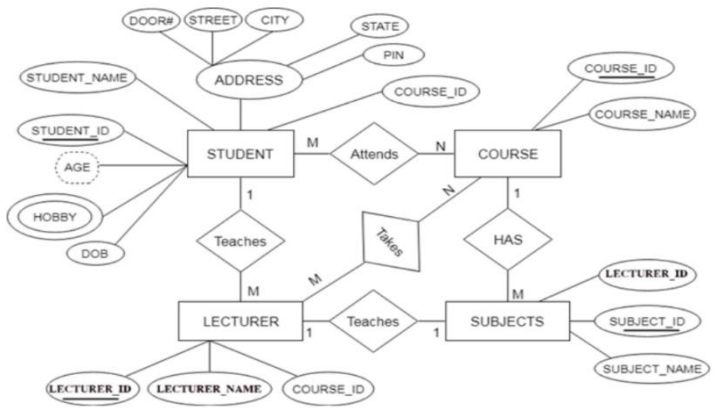
Branch: Artificial Intelligence and Machine Learning **Duration: 3 hrs.**

Course Code: 23AM3PCDBM **Max Marks: 100**

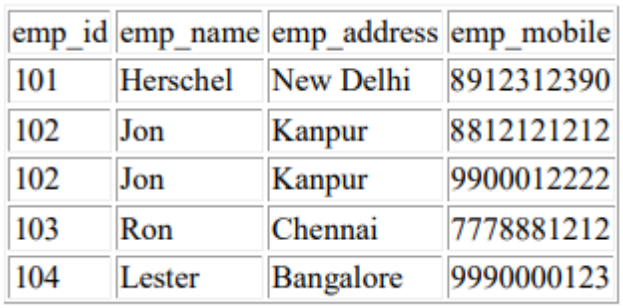
Course: Database Management Systems

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

			UNIT - I	*CO*	*PO*	Marks
1	a)		Make use of the Three Schema Architecture to emphasize how Data Independence is achieved in a DBMS, with a neat diagram.	CO1	PO1	**7**
	b)		Elaborate the Centralized Architecture in DBMS by identifying the pros and cons.	CO1	PO1	**6**
	c)		List and explain the data models in DBMS.	CO1	PO1	**7**
			OR			
2	a)		Elaborate the Client-Server Architecture in DBMS by identifying the pros and cons.	CO1	PO1	**7**
	b)		Identify the characteristics of database approach in DBMS.	CO1	PO1	**6**
	c)		Distinguish between physical and logical data independence in DBMS.	CO1	PO1	**7**
			UNIT - II			
3	a)		Identify the various cardinality ratio and participation constraints applied in constructing an ER diagram.	CO1	PO1	**8**
	b)		Convert the given ER diagram into relational schemas. Provide justification for each step. 	CO3	PO3	**12**

			OR			
	4	a)	Design an ER diagram for the Library management system with the following requirements: i. Each book has a unique ISBN, a title, a publication year, and belongs to a specific genre. ii. Each book is written by one or more authors. An author can write multiple books. Authors are identified by their unique ID and have a name. iii. Each book is published by exactly one publisher. Publishers are identified by their unique name and have a contact address. iv. The library allows borrowers to borrow books. Borrowers are identified by a unique borrower ID and have a name. A borrower can borrow multiple books, and a book can be borrowed by multiple borrowers. The system needs to track the borrowing date and return date for each transaction.	CO3	PO3	**12**
		b)	Explain the following with suitable example: i. Entity ii. Cardinality ratio iii. Primary key iv. Weak entity	CO2	PO1	**8**
			UNIT - III			
	5	a)	Consider the relation schema R (A, B, C, D, E, F) and the functional dependency set FD = {A->B, C->DF, AC->E, D->F}. Find the primary key of the relation R.	CO3	PO3	**10**
		b)	Consider 2 sets of functional dependencies. Examine whether they are equivalent. i. F= {A→C, AC → D, E → AD, E → H} AND G= {A → CD, E→AH}. ii. X= {AB→CD, B→C, C→D}, AND Y= {AB→C, AB→D, C→D}	CO3	PO3	**10**
			OR			
	6	a)	Analyze the need for normalization in DBMS. Outline 2NF and 3NF with examples.	CO3	PO3	**10**
		b)	Inspect whether the given decompositions are lossless or lossy by Considering the given relations and their decompositions. i. R = {A, B, C, D, E} which is decomposed into R1 = {A, B, C}, R2 = {C, D, E} with FD = {A → BC, CD → E, B → D, E → A}. ii. R = {V, W, X, Y, Z} which is decomposed into R1= {V, W, X}, R2= {X, Y, Z} With FD= {Z→Y, Y→Z, X→YV, VW→X}	CO3	PO3	**10**

			UNIT - IV			
	7	a)	Analyze which of the following schedules are conflict serializable and which are not with help of precedence graphs. i. R1(x) ; R3(x) ; W1(x) ; R2(x) ; W3(x) ii. R3(x) ; R2(x) ; W3(x) ; R1(x) ; W1(x) iii. R2(x) ; R1(x) ; W1(x) ; R1(y) ; W1(y) ; W2(x)	CO2	PO3	**12**
		b)	Elaborate indexing concepts in database systems to demonstrate the faster data access.	CO1	PO1	**8**
			OR			
	8	a)	For the given relation below, identify 5 trivial and 5 non trivial functional dependencies. Provide justification for your answers. 	CO2	PO3	**12**
		b)	Apply the concept of B-Tree to fasten the process of database operations.	CO1	PO1	**8**
			UNIT - V			
	9	a)	Compare SQL Vs NOSQL.	CO1	PO1	**6**
		b)	Elaborate MongoDB – Database, Collection, and Document.	CO1	PO1	**7**
		c)	Explain the different data types in MongoDB with examples.	CO1	PO1	**7**
			OR			
	10	a)	Identify the types of NoSQL Databases and illustrate in detail.	CO1	PO1	**10**
		b)	Illustrate CAP theorem Key Principles and Tradeoffs.	CO1	PO1	**10**

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