U.S.N.										

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

Autonomous Institute Affiliated to VTU

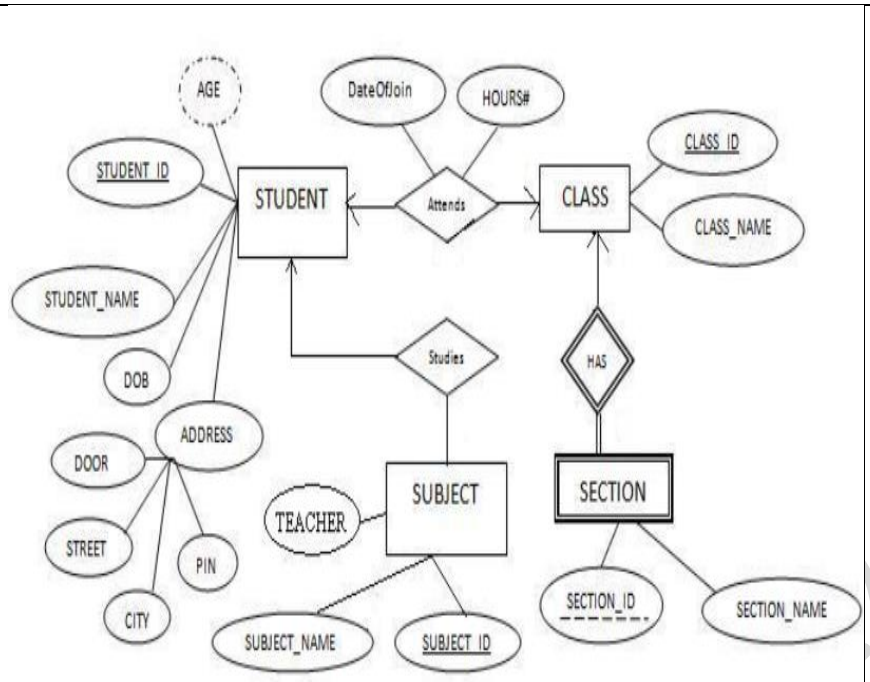
September / October 2023 Semester End Main Examinations

Programme: B.E. **Semester: IV**
Branch: Information Science and Engineering **Duration: 3 hrs.**
Course Code: 22IS4PCDBM **Max Marks: 100**
Course: Database Management System

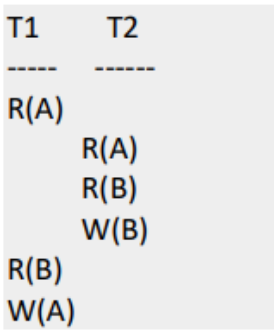
Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

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)	With a neat diagram, explain the component modules of Database Management System and their interactions.		*CO1*		**10**
	b)	Design a schema diagram for a company database application with atleast four schemas and identify the metadata for the same.		*CO2*	*PO1*	**06**
	c)	Discuss with an example, any two characteristics of the database approach.		*CO1*		**04**
		UNIT - II				
2	a)	Consider a MAIL_ORDER database in which employees take orders for parts from customers. The data requirements are summarized as follows: • The mail order company has employees, each identified by a unique employee number, first and last name, and Zip Code. • Each customer of the company is identified by a unique customer number, first and last name, and Zip Code. • Each part sold by the company is identified by a unique part number, a part name, price, and quantity in stock. • Each order placed by a customer is taken by an employee and is given a unique order number. Each order contains specified quantities of one or more parts. • Each order has a date of receipt as well as an expected ship date. The actual ship date is also recorded. Design an Entity–Relationship Diagram for the mail order database. Also explain the different types of attributes in an ER diagram with an example.		*CO2*	*PO1*	**10**
	b)	Identify the number of tables required to convert the ER diagram to a Relational Database. Justify your answer by mentioning the rules for conversion.		*CO2*	*PO1*	**10**

						
			UNIT - III			
3	a)	Given the schema: **Salesman**(salesman_id, name, city, commission) **Customer**(customer_id, customer_name, city, grade, salesman_id) **Order**(order_no, purch_amt, order_date, customer_id, salesman_id) **Write SQL queries for the given below questions:** a) Display only those customers whose grade are, in fact, higher than every customer in New York. b) Find all the salesmen who worked for only one customer. c) Extract the data from the orders table for the salesman who earned the maximum commission d) Display all the orders issued by the salesman 'Paul Adam' from the orders e) Find the names of all customers along with the salesmen who works for them	*CO3*	*PO4*	**10**
	b)	Consider the following relations for a database that keeps track of business trips of salespersons in a sales office: **SALESPERSON**(Ssn, Name, Start_year, Dept_no) **TRIP**(Ssn, From_city, To_city, Departure_date, Return_date, Trip_id) **EXPENSE**(Trip_id, AccountId, Amount) A trip can be charged to one or more accounts. Create the above tables by specify the primary and foreign keys. Explain the use of both the keys.	*CO2*	*PO1*	**06**
	c)	Identify the need for virtual tables in SQL with an example.	*CO2*	*PO2*	**04**

			UNIT - IV			
	4	a)	**Movies**(title, director, myear, rating) **Actors**(actor, ayear) **Acts**(actor, title) **Directors**(director,dyear) Write Relational Algebra Queries for the following: a) Find movies made after 1997 b) Find movies made by Hanson after 1997 c) Find all the movies and their ratings d) Find all the actors and directors e) Find Coen's movies with actor McDormand	*CO3*	*PO4*	**05**
		b)	Given the relations R and S **R** A | B a1 | b1 a2 | b2 **S** B | C b2 | c2 b3 | c3 Find Natural Join, Left Outer Join, Right Outer Join and Full Outer Join.	*CO2*	*PO1*	**08**
		c)	Identify the need for normalization and infer with example Second and Third Normal Forms.	*CO2*	*PO2*	**07**
			OR			
	5	a)	Given the following relation A | B | C | TUPLE# 10 | b1 | c1 | 1 10 | b2 | c2 | 2 11 | b4 | c1 | 3 12 | b3 | c4 | 4 13 | b1 | c1 | 5 14 | b3 | c4 | 6 Which of the following dependencies may hold in the above relation? If the dependency cannot hold, explain why by specifying the tuples that cause the violation. i. A ->B, ii. B -> C, iii. C -> B, iv. B -> A, v. C -> A	*CO2*	*PO2*	**05**
		b)	Identify and discuss the anomalies the given table can cause. Provide a solution to avoid anomalies. **Sid | Sname | Credits | Dept | Building | Room No** **1 | Ram | 15 | ISE | B1 | 101** **2 | Raj | 15 | ISE | B1 | 101** **3 | Rahul | 15 | CSE | B2 | 201** **4 | Rohan | 15 | CSE | B2 | 201** **5 | Rohit | 20 | ME | B3 | 301**	*CO2*	*PO2*	**07**

		c)	Given a relation R(X, Y, Z, W, P) and Functional Dependency set FD = { X → Y, Y → P, and Z → W}, Determine whether the given relation is in 3NF. If not, convert it into 3 NF.	*CO2*	*PO2*	**08**
			UNIT - V			
	6	a)	Draw a state transition diagram illustrating the states for transaction execution.	*CO1*		**07**
		b)	Given the Schedule with two interleaving transactions, is it possible to convert to a serial schedule. Justify your answer.  	*CO2*	*PO2*	**05**
		c)	Identify the locking scheme which uses the three operations read_lock(X), write_lock(X) and unlock(X) and explain the same.	*CO2*	*PO2*	**08**
			OR			
	7	a)	Analyze, if the given schedules are Conflict Serializable using Precedence Graph and Justify your answer. (a) r1 (X); r3 (X); w1(X); r2(X); w3(X) (b) r3 (X); r2 (X); w3(X); r1(X); w1(X)	*CO2*	*PO2*	**10**
		b)	Perform the following operations using MongoDB i) Create a collection that contains details of library books. ii) Insert three documents in the collection, each document contains fields B_ID, B_Name, B_Author, B_Amount. iii) Display all the information in the collection. iv) Display the documents where the author name is "GKS" and cost of the book is greater than Rs. 500. v) Update the document which contains B_ID=10.	*CO3*	*PO4*	**05**
		c)	Differentiate between **Lost Update** Problem and **Dirty Read** Problem with an example.	*CO2*	*PO2*	**05**

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