U.S.N.										

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

Autonomous Institute Affiliated to VTU

June / July 2024 Semester End Make-Up Examinations

Programme: B.E. **Semester: III**
Branch: Computer Science and Engineering **Duration: 3 hrs.**
Course Code: 23CS3PCDBM / 19CS4PCDBM **Max Marks: 100**
Course: Database Management Systems

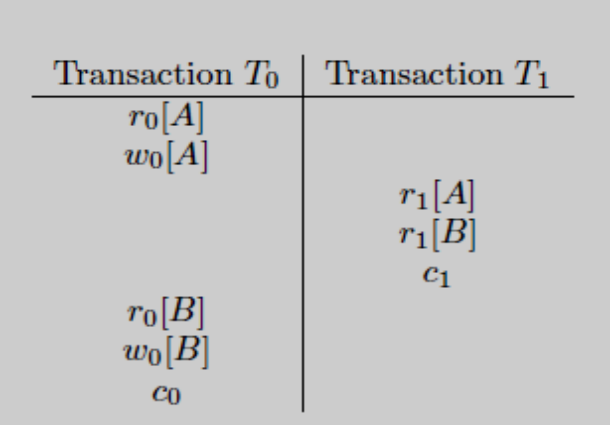
Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

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)	Consider below schema for a social media platform, create a view "ActiveUserPostCount" that displays the usernames of active users along with the count of posts made by each user. IsActive Column is Boolean. Users (**UserID**, UserName , JoinDate, IsActive) Posts (**PostID**, UserID, PostContent ,PostDate, UserID)	CO2	PO2	**05**
	b)	Explain referential integrity with primary key and foreign key with an example.	CO1	PO1	**05**
	c)	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) Expenses (Trip_ID, Account No, Amount) Write SQL query to retrieve the following details from the database. i. Retrieve all information about salespersons who started in or after the year 2010. ii. Show the trip details (From_city, To_city, Departure_date, Return_date) along with the corresponding salesperson's name for a specific trip ID. iii. Show trip details for trips where the total expenses exceed $1000. iv. Retrieve the names of salespersons along with the total amount they have spent on all their trips. v. Find the trip details along with the total expenses for each trip.	CO2	PO2	**10**
		OR			

	2	a)	Discuss three schema architecture with a neat diagram	*CO1*	*PO1*	**05**
		b)	A company is developing a database to manage its inventory, it has a table to maintain product details (Productid, Price). Each product must have a unique ID, and its price cannot be negative. Additionally, certain products are categorized as "high value" and must have a price greater than $1000. How would you implement these constraints while implementing the table “Products”?	*CO2*	*PO2*	**05**
		c)	Authors (**author_id**, name, country, birth_year) Books (title, author_id, Publication_year) Nobel_Winners (author_id, award_year) Write SQL query to retrieve the following details from the database. i. Retrieve the names of authors who won the Nobel Prize ii. Retrieve the authors and the number of books they have written iii. Retrieve the authors who were born after 1979 and have won the Nobel Prize iv. Retrieve the titles of books written by authors from Japan v. Retrieve the count of Nobel Prize winners per country	*CO2*	*PO2*	**10**
			UNIT 2			
	3	a)	Design an ER diagram for the following requirements A recording studio needs help designing its database of musicians, albums and other entities. Each musician who records at the studio has an identification number and a name and no two musicians have same identifications number. Musicians form bands. A band is described by a unique name and has at least two musicians and members. Bands record albums, which have a title, a genre, and a year of production. Each album is recorded by at least one band, and no two albums have the same combination of title and production year. Some musicians produce albums. Each album is produced by at least one musician. Albums are made up of songs. Each song is assigned a title and a sequence number. Each song belongs to exactly one album, and all songs on the same album have different sequence numbers	*CO3*	*PO3*	**10**
		b)	Explain the difference between a Entity and Weak entity set with an example	*CO1*	*PO1*	**05**
		c)	Suppose you have a database schema for a library management system with the following tables and Write Relational Algebra query for the following Books (BookID, Title, Author, Genre, Availability) Members (MemberID, FirstName, LastName) Loans (LoanID, BookID, MemberID, LoanDate, ReturnDate) i. Retrieve the titles of all books that are currently available in the library. ii. Find the names of all members who currently have loan on books.	*CO2*	*PO2*	**05**

			iii. Retrieve the titles of all books that are currently on loan along with the corresponding member names.			
			(OR)			
	4	a)	Consider the following Relational Schema: Customer(cid: integer, cname: string, rating: integer, salary: real) Item(iid: integer, iname: string, type: string) Order(cid: integer, iid: integer, day:date, qty:real) Write Relational Algebra query for the following i. Find the names of customers who have placed orders ii. Retrieve the names of items that have been ordered iii. Retrieve the names of customers who have ordered items of type 'Clothing' iv. Find the names of customers who have not placed any orders v. Find the names of customers who have ordered every type of item available	*CO2*	*PO2*	**10**
		b)	i. Explain the concept of cardinality in the context of ER modeling. Consider a bookstore database, how would you represent the fact that "each book can have multiple authors and each author can write multiple books"? ii. Describe the difference between Total and Partial participation in an ER model.	*CO1*	*PO1*	**10**
			UNIT III			
	5	a)	Consider the relation R = {A, B, C, D, E, F, G, H, I, J} and the set of functional dependencies F = {{A, B} → {C}, {B, D} → {E, F}, {A, D} → {G, H}, {A} → {I}, {H} → {J}}. i. Identify the candidate key(s) for R. ii. Identify the highest normal form that R satisfies (1NF, 2NF, 3NF). iii. If R is not in 3NF, decompose it into a set of 3NF relations	*CO2*	*PO2*	**10**
		b)	Explain full functional dependency and describe how this type of dependency relates to 2NF. Provide an example to illustrate your answer	*CO1*	*PO1*	**05**
		c)	Consider a relation R (A, B, C, D, E) with the following instance A B C D E a1 b1 c1 d1 e1 a2 b2 c2 d2 e2 a1 b3 c1 d1 e3 a2 b2 c3 d3 e4 a3 b3 c4 d4 e5 a2 b2 c5 d3 e6 Identify which of the following functional dependencies are satisfied by this relation. i. A → B ii. C → A iii. E → D iv. B → C v. D → A	*CO2*	*PO2*	**05**

			UNIT - IV			
	6	a)	Describe the desirable properties of the transaction and discuss the States of the transaction with a neat sketch.	*CO1*	*PO1*	**10**
		b)	Consider the following two transactions and schedule. Draw the dependency graph for the schedule and explain why or why not a conflict serializable  	*CO1*	*PO1*	**05**
		c)	Is the following schedule is recoverable or non-recoverable schedule? Explain your answer. i. r1(x) , w1(x) , r2(x) , r1(y) , w2(x) , Commit2, Abort1 ii. r1(x) , w1(x) , r2(x) , w2(x) , Abort1	*CO2*	*PO2*	**05**
			UNIT - V			
	7	a)	Consider a MongoDB database containing a collection named users. Each document in the users collection represents a user profile and contains fields such as name, age, email, and city. Write a MongoDB query for the following i. To insert the following user profile into the user's collection. Name: John Doe Age: 30 Email: john.doe@example.com City: New York ii. To retrieve all user profiles in the users collection iii. To find users with ages between 25 and 35 years old. iv. Update the email address of a user with the name "Alice" to "alice.smith@example.com" v. To count the total number of users in the users collection. vi. To find users whose email addresses contain the domain "example.com" vii. To retrieve user profiles sorted by age in ascending order viii. To delete a user profile with the email "john.doe@example.com". ix. To find users who live in either "New York" or "Los Angeles". x. To find the oldest user in the users collection.	*CO2*	*PO2*	**10**
		b)	List different storage types in NoSQL database and Discuss how does the storage model of a key-value store differ from that of a column-oriented store?	*CO1*	*PO1*	**10**

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