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

Autonomous Institute Affiliated to VTU

April 2024 Semester End Main Examinations

Programme: B.E.   **Semester: III**
Branch: CSE(DS)/ CSE(ICB) / AI & DS   **Duration: 3 hrs.**
Course Code: 23DC3PCDBM   **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.

			UNIT - I	*CO*	*PO*	**Marks**
1	a)		Discuss the main characteristics of the database approach. How does it differ from the traditional approach of programming with files.	*CO1*	*PO1*	**07**
	b)		Consider the following relations for an Order Processing database application in a company. CUSTOMER (cust_no, cname, city) ORDER (order_no, odate, cust_no, ord-Amt) ITEM (item_no, unit-price) ORDER-ITEM (order_no, item_no, qty) WAREHOUSE (warehouse_no, city) SHIPMENT (order_no, warehouse_no, ship-date). Write SQL for the following quires. i. Produce a listing cname, Number of orders, Avg_Order_Amt, where the middle column is the total numbers of orders by the customer and the last column is the average order amount for that customer. ii. List the order_no for orders that were shipped from all warehouses that the company has in a specific city. iii. Demonstrate how you delete item_no 10 from the ITEM table and make that field null in the ORDER_ITEM table.	*CO3*	*PO3*	**06**
	c)		With neat diagram explain Three Schema Architecture.	*CO1*	*PO1*	**07**
			UNIT - II			
2	a)		Illustrate with an example to show the violation of the constraint in each of the three types of update operations and explain how it can be overcome.	*CO1*	*PO1*	**06**

		b)	Design the ER diagram for the following requirements (capture all the relationship constraints in the diagram): Consider order database in which employees take orders for product from customers. The requirements are: a) Each Employee is identified by EMP_ID, EMP_Name & Address (Street num, area name, city). b) Each Customer is identified by CUST_ID, CUST_Name, Mobile Number(multiple values). c) Each Product is identified by Product_ID, Product_name, Price and Quantity. d) Each Employee can take order from more than one Customer. e) Each Customer can place request for more than one Product. f) Each Employee can deliver more than one Product.d	*CO2*	*PO2*	**07**
		c)	Summarize the steps involved in converting the given ER diagram to relational mapping. Design relational schema diagram for the following ER-Diagram. Appropriately label the primary key and corresponding foreign key references. 	*CO3*	*PO3*	**07**
			OR			
	3	a)	Define Entity, Relationship, Attributes, and Entity Types With diagrammatic representations. Explain the different types of attributes that occur in an ER diagram with examples.	*CO1*	*PO1*	**07**
		b)	Design the ER model for the given case study: A General Hospital consists of a number of specialized wards (such as Radiology, Oncology, etc). Information about ward includes unique name, total numbers of current patients. Each ward hosts a number of patients, who were admitted by a consultant (doctors) employed by the Hospital. On admission, the date and time are kept. The personal details of every patient includes patient id , name, set of phone and one address (city, street, code). A separate register is to be held to store the information of the tests undertaken. Each test has unique test number, category and the result of test. Number of tests may be conducted for each patient. Doctors are specialists in a specific ward and may be leading consultants for a number of patients. Each patient is assigned to one leading consultant but may be examined by other doctors, if required.	*CO3*	*PO3*	**07**
		c)	Summarize the steps involved in converting the given ER diagram to relational mapping. Design relational schema diagram for the following ER-Diagram. Appropriately label the primary	*CO2*	*PO2*	**06**

key and corresponding foreign key references.

			UNIT - III			
4	a)		For the following schema specify the following queries in relational algebra. Student(snum:int, sname:string, major:string, level:string, age: int) Course(name: string, meets_at: time, room: string, fid: int) Enrolled(snum: int, cname: string) Faculty(fid: int, fname,: string, deptid: int) i. Find the names of faculty members for whom the enrollment of the courses that they teach is less than 5. ii. Find the number of students enrolled for each course. iii. Find the names of faculty members who teach courses in the "Computer Science" department. iv. Find the names of students who are enrolled in a course taught by a faculty member named "John". v. Find the names of students who are enrolled in more than one course.	*CO3*	*PO3*	**10**
	b)		Consider the relation R = {A, B, C, D, E, F, G, H, I, J} and the set of functional dependencies F = {{A, B} $\rightarrow$ {C}, {B, D} $\rightarrow$ {E, F}, {A, D} $\rightarrow$ {G, H}, {A} $\rightarrow$ {I}, {H} $\rightarrow$ {J}}. i. What are the keys of R? ii. Decompose R in 2NF iii. Decompose further into 3NF	*CO3*	*PO3*	**10**
			OR			
5	a)		Explain relational algebra DIVISION operation. Find the quotient for the following: A/B1, A/B2 and A/B3; where A, B1, B2 and B3 are 	*CO2*	*PO2*	**06**

		b)	Consider the following relations for a BOOK CLUB. Write relational algebraic query for the following. Members (Member_id, Name, Designation, Age) Books (Bid, Btitle, Bauthor, Bpublisher, Bprice) Reserves (Member_id, Bid, Date) Where Bid is book identification, Btitle is book title, Bpublisher is book publisher, and Bprice is book price, i. Find the names of members who are professors older than 45 years. ii. List the titles of books reserved by professor. iii. Find IDs of members who have not reserved books that cost more than Rs.800. iv. Find the names of members who have reserved all books. v. Find the author and title of books reserved on 23-April-2019.	*CO3*	*PO3*	**10**
		c)	Explain the informal design guidelines for relational schema.	*CO1*	*PO1*	**04**
			UNIT - IV			
6		a)	With neat diagram, explain state transition diagram illustrating the states for transaction execution.	*CO1*	*PO1*	**06**
		b)	Explain conditions for two operations to be conflicting pair with example. I. w3(A); r1(A); w1(B); r2(B); w2(C); r3(C); II. W1(A), R2(A), W1(B), W3(C), R2(C), R4(B), W2(D), W4(E), R5(D), W5(E) III. r1(A); r2(A); r1(B); r2(B); r3(A); r4(B); wl(A); w2(B); IV. r3(x);r2(x);w3(x);r1(x);w1(x); For each of the above given schedule answer the following questions: (i) What is the precedence graph for the schedule? (ii) Is the schedule conflict-serializable?	*CO3*	*PO3*	**08**
		c)	Write a short note on system log in transaction and importance of it.	*CO1*	*PO1*	**06**
			UNIT - V			
7		a)	Explain with neat diagram storage hierarchy and compare each storage according to their cost, speed and access time.	*CO1*	*PO1*	**06**
		b)	Give a brief explanation on Magnetic hard disk mechanism with neat labelled diagram	*CO1*	*PO1*	**07**
		c)	What are different ways of catastrophic failure. Explain Measures taken to overcome such failures	*CO1*	*PO1*	**07**

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