



VIT

Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

REG.NO.:

NAME OF THE SCHOOL
CONTINUOUS ASSESSMENT TEST - II
FALL SEMESTER 2024-2025

SLOT: A2

Programme Name & Branch : MCA
Course Code and Course Name : PMCA503L- Database Systems
Faculty Name(s) : Prof. Ranichandra C, Prof. Senthil Kumar N, Prof. Parimala M
Class Number(s) : VL2024250103140, VL2024250103199, VL2024250103244
Date of Examination : 13-10-2024
Exam Duration : 90 minutes Maximum Marks: 50

General instruction(s):

- Answer All Questions
- M - Max mark; CO – Course Outcome; BL – Blooms Taxonomy Level (1 – Remember, 2 – Understand, 3 – Apply, 4 – Analyse, 5 – Evaluate, 6 – Create)
- Course Outcomes
 3. Convert high-level conceptual model to relational data model and to improve a database design by normalization
 4. Populate and query a database using SQL and PL/SQL. Also apply query processing and indexing techniques to optimize the database system performance
 5. Apply and relate the concept of transaction, concurrency control and recovery on data

Q. No	Question	M	CO	BL
1.	Consider the attribute set $R = ABCDEGH$ and the FD set $F = \{AB \rightarrow C, AC \rightarrow D, AD \rightarrow E, B \rightarrow D, BC \rightarrow A, E \rightarrow G\}$. a. Find the primary key for the above relation? Explain your answer. b. Normalize the table up to 3NF. State the reasons behind each decomposition.	10	3	3
2.	Consider the universal relation $R = \{A, B, C, D, E, F, G, H, I, J\}$ and the set of functional dependencies $F = \{\{A, B\} \rightarrow \{C\}, \{A\} \rightarrow \{D, E\}, \{B\} \rightarrow \{F\}, \{F\} \rightarrow \{G, H\}, \{D\} \rightarrow \{I, J\}\}$. $R1 = \{A, B, C\}, R2 = \{A, D, E\}, R3 = \{B, F\}, R4 = \{F, G, H\}, R5 = \{D, I, J\}$ Determine whether the decomposed relation satisfies dependency preservation or lossless join property.	10	3	3
3.	Assume a sales company "X" has its headquarters located in Mumbai and also distributed geographically in locations Chennai, Bangalore and Kerala. Database related to Salesperson of the company is distributed in various sites. Fragment and replicate the salesperson schema across various sites. Write the relevant relational algebraic expressions or SQL statements executed in each site to create the fragments specified. Also identify the type of fragmentation. $(5 \times 2.5 = 10)$ Salesperson (SSN, Name, product_name, quantity_sold, location) (i) Site 1: Mumbai – All the informations are stored. (ii) Site 2: Chennai – Store the name and product_name of all the salesperson.	10	4	5



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	<p>(iii) Site 3: Bangalore- Store the name of the salesperson who resides in 'Bangalore'.</p> <p>(iv) Site 4: Kerala- Store only the product_name and quantity_sold of employees who are located in "Kerala". Also the database has a replica that resides in "Chennai".</p>			
4.	<p>Assume that a Mongo Database called "Profile" is created which has a collection "Student_Profile". Following are the two documents inserted in the collection.</p> <p>{AccNo: 101, Acc_type: "Savings", Acc_bal=2000, branch:[{id:"B01", Loc:"Chennai"}], Cust_name: ["XY","UV"]}</p> <p>{AccNo: 102, Acc_type: "Current", Acc_bal=9000, branch:[{id:"B02", Loc:"Bangalore"}], Cust_name: "PQ"}</p> <p>Write the MongoDB query for the following requirements, (2*5=10)</p> <p>(i) Display the details of customer whose name is "PQ".</p> <p>(ii) Display the customer details who has either Account Number 102 or branch id is 'B01' .</p> <p>(iii) List the customer information who have balance less than 2000.</p> <p>(iv) Update the balance of AccNo: 102 to 15000.</p> <p>(v) Find the number of customers branch wise.</p>	10	4	5
5.	<p>SELECT S.sname, P.pname FROM Suppliers S, Parts P, Supply Y WHERE S.sid = Y.sid AND Y.pid = P.pid AND S.city = 'Madison' AND P.price ≤ 1,000 Draw an optimized tree using heuristic approach.</p>	10	6	4
