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Vellore Institute of Technology

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Reg. No. : 24MCA1034

Final Assessment Test(FAT) - Nov/Dec 2024

Programme	M.C.A.	Semester	Fall Semester 2024-25
Course Code	PMCA503L	Faculty Name	Prof. Sandhya M
Course Title	Database Systems	Slot	D1+TD1
		Class Nbr	CH2024250103011
Time	3 hours	Max. Marks	100

General Instructions

- Write only Register Number in the Question Paper where space is provided (right-side at the top) & do not write any other details.

Course Outcomes

CO1 -Identify the basic concepts of database and various data models used in DB design

CO2.-Design conceptual models to represent simple database application scenarios

CO3- Convert high-level conceptual model to relational data model and to improve a database design by normalization

CO4- Populate and query a database using SQL and PL/SQL. Also apply Query processing and indexing techniques to optimize the database system performance

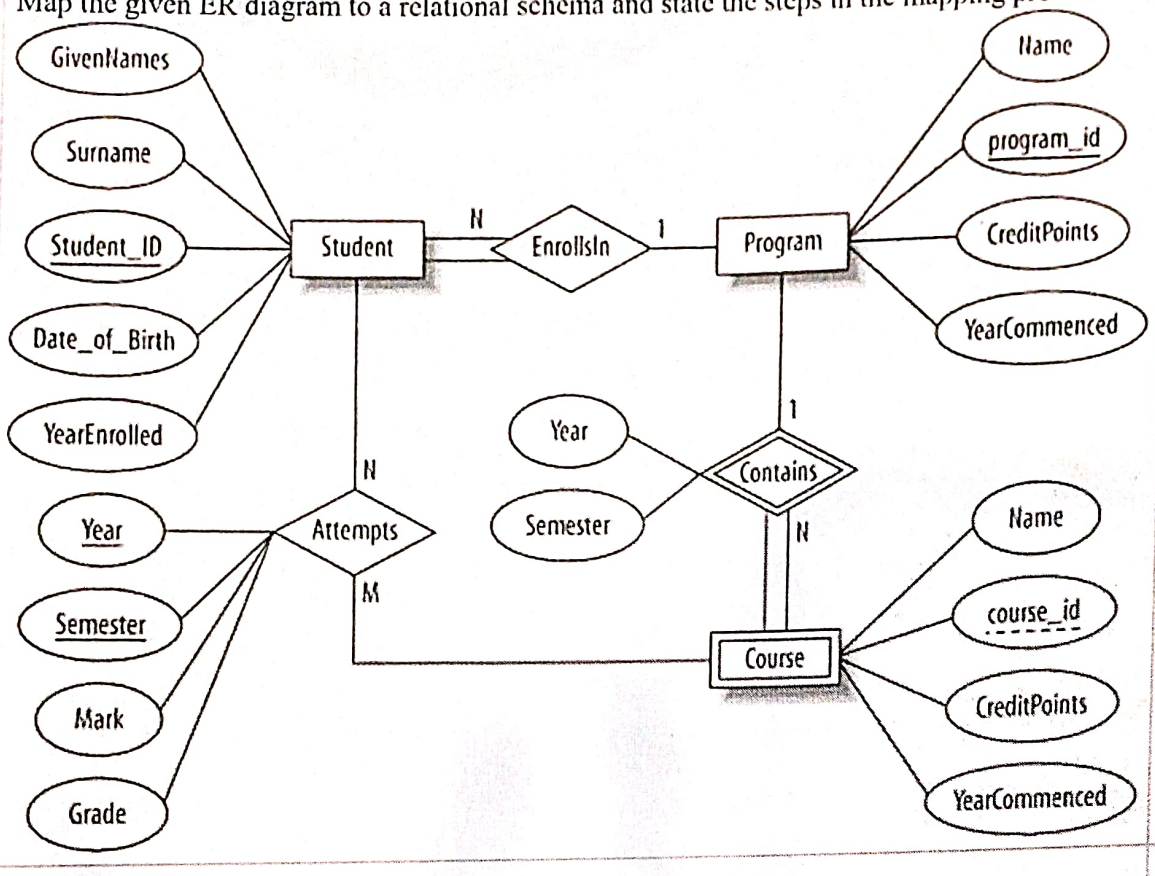
CO5- Apply and relate the concept of transaction, concurrency control and recovery on data

Section - I

Answer all Questions (10 × 10 Marks) *M - Marks

Q.No	Question	*M	CO	BL
01.	Lot of security lapses are occurring all over the world and it has become one of the main issues in software development. Operating systems usually offer only two types of authorization control for data files: read access and write access. Why do database systems offer so many kinds of authorization for security concerns? List out the commands that can be used for authorization.	10	2	3
02.	Draw E-R diagram for the "Menu ordering system" that will facilitate the food items ordering and services with in a hotel. The entire scenario is detailed as follows. Nowadays the customer is able to view the food items menu, call the waiter, place orders and obtain the final bill through the computer kept in their table. The waiters through their wireless tablet PC are able to initialize a table for customer, control the table functions to assist customers, orders, send orders to food preparation staff(chef) and finalize the customer's bill. The chef with their touch-display interfaces to the system are able to view orders sent to the kitchen by waiters. During preparation, they are able to let the waiter know the status of each item and can send notifications when items are completed. The system should have full accountability and logging facilities.	10	3	4

03.	Map the given ER diagram to a relational schema and state the steps in the mapping process.	10	4	3



04.	Normalize the following schema with given constraints to BCNF. books(accessionno, isbn, title, author, publisher) users(userid, name, deptid, deptname) accessionno → isbn isbn → title isbn → publisher isbn →→ author userid → name userid → deptid deptid → deptname	10	5	5

05.	Consider the instance of the Sailors relation shown below:	10	6	6

sid	sname	rating	age
18	Jones	3	30.0
41	John	6	56.0
22	Abraham	7	44.0
63	Miller	null	15.0

(i) Write SQL queries to compute the average rating, using AVG; the sum of the ratings, using SUM; and the number of ratings, using COUNT. (5 marks)

(ii) Consider the following query:

Find the names of sailors with a higher rating than all sailors with age < 21.

The following two SQL queries attempt to obtain the answer to this question. Do they both compute the result? If not, explain why. Under what conditions would they compute the same result? (5 marks)

06.	Construct a B+ tree to insert the following key elements. Order of the tree is 3. (24,22,87,54,48,56,55,98,32,79,22,30). After final construction of the tree delete the element 87 and 98.	10	3	3
07.	(a) If deadlock is avoided by deadlock-avoidance schemes, is starvation still possible? Explain your answer with suitable examples. (5 marks) (b) When a transaction is rolled-back under timestamp ordering, it is assigned a new timestamp. Why can it not simply keep its old timestamp? (5 marks)	10	5	4
08.	Which of the following schedules is (conflict) serializable? For each serializable schedule, determine the equivalent serial schedules. a. $r1(X)$; $r3(X)$; $w1(X)$; $r2(X)$; $w3(X)$; b. $r1(X)$; $r3(X)$; $w3(X)$; $w1(X)$; $r2(X)$; c. $r3(X)$; $r2(X)$; $w3(X)$; $r1(X)$; $w1(X)$; d. $r3(X)$; $r2(X)$; $r1(X)$; $w3(X)$; $w1(X)$;	10	6	5
09.	Consider the given SQL query: Select P.Pnumber, P.Dnum ,E.Lname,E.Address,E.Bdate From Project as P Department as D Employee as E Where P.Dnum=D.Dnumber And D.Mgr_ssn=E.ssn And P.Plocation='chennai' (a) Convert the SQL query to a relational algebraic expression (5 marks) (b) Draw the tree for the converted relational expression (5 marks)	10	4	4
10.	Internet applications are mainly using the concept of distributed databases. List out the main challenges that are faced by traditional DBMS. Whether Cloud computing helps to find a solution to the challenges that arise because of distributed databases. Discuss.	10	5	6

BL-Bloom's Taxonomy Levels - (1.Remembering, 2.Understanding, 3.Applying, 4.Analysing, 5.Evaluating, 6.Creating)

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