

H

Roll No.

TMC-201

M. C. A. (SECOND SEMESTER)

MID SEMESTER

EXAMINATION, March, 2024

**ADVANCED DATABASE MANAGEMENT
SYSTEMS**

Time : 1½ Hours

Maximum Marks : 50

Note : (i) Answer all the questions by choosing
any *one* of the sub-questions.

(ii) Each sub-question carries 10 marks.

1. (a) Explain three schema architecture of DBMS with the help of a diagram. How Data independence can be explained using the three schema architecture ? (CO1)

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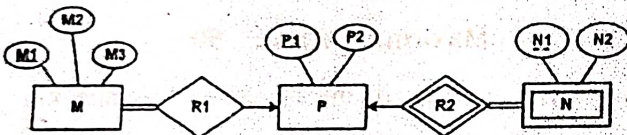
OR

(b) Explain the following : (CO1)

- (i) 1-tier Architecture
- (ii) 2-tier Architecture
- (iii) 3-tier Architecture

Database architecture with example and diagram.

2. (a) Convert given E-R diagram to tables. Find the number of tables required for the following E-R diagram in relational model. Show the table with attribute. Also minimize the number of tables required if possible : (CO1)



OR

- (b) What are the different symbols used in the design of E-R diagram ? Design ERD for the following description :

We store each employee's name (first, last), Aadhar Number (AN), street address

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(SA), salary (S), sex (gender), and birth date. (CO1)

An employee is assigned to one department, but may work on several projects, which are not necessarily controlled by the same department.

We keep track of the current number of hours per week that an employee works on each project.

We also keep track of the direct supervisor of each employee (who is another employee). (CO1)

3. (a) Explain the role of the following : (CO2)

- (i) Generalization
- (ii) Specialization
- (iii) Aggregation

In case of enhanced E-R diagram design and explain above points with suitable example and diagram.

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OR

- (b) Explain different fundamental operators present in relational algebra. Consider the following table of Students having different optional subjects in their course :
(CO2)

FRENCH	
Student_Name	Roll_Number
Ram	1
Mohan	2
Vivek	13
Geeta	17

GERMAN	
Student_Name	Roll_Number
Vivek	13
Geeta	17
Shyam	21
Rohan	25

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Write resulted table after performing below Relational Algebra Query.

 $\pi(\text{Student_Name}) \text{ FRENCH}$
 $\cup \pi(\text{Student_Name}) \text{ GERMAN}$

4. (a) Suppose there is a banking database which comprises the following tables : (CO2)
- Customer (Cust_name, Cust_street, Cust_city)
- Branch (Branch_name, Branch_city, Assets)
- Account (Branch_name, Account_number, Balance)
- Loan (Branch_name, Loan_number, Amount)
- Depositor (Cust_name, Account_number)
- Borrower (Cust_name, Loan_number)
- Answer the following queries based on the schema given using relational algebra :
- (i) Find the names of all the customers who have taken a loan from the bank and have an account at the bank.

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(ii) List down all the customer's name with their account number.

(iii) List down customer name who have taken loan amount greater than 20 K (assume amount stored in thousands).

(iv) List down customer name who have taken loan from Delhi branch.

OR

(b) Explain Query Processing and Optimization with the help of a diagram. Explain Heuristics rules for Query Optimizations. Discuss different steps present in the Heuristics Query Optimization. (CO2)

5. (a) What do you understand by Physical Database Design ? Also explain the different factors influencing physical database design and steps involved. (CO2)

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OR

(b) What are functional dependencies ? Explain the condition for all the normal form (1NF, 2NF, 3NF, BCNF). Given a relation $R(A, B, C, D)$ and Functional Dependency set $FD = \{AB \rightarrow CD, B \rightarrow C\}$, determine whether the given R is in 2NF ? If not, convert it into 2NF. (CO2)

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