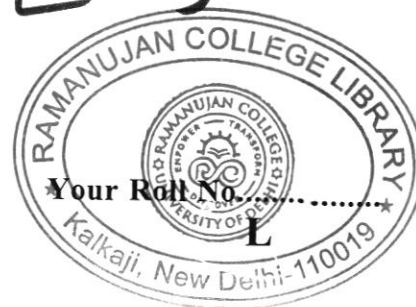


31/5/26 [Eve]



[This question paper contains 4 printed pages.]

Sr. No. of Question Paper : 13782
Unique Paper Code : 32345202
Name of the Paper : Database Management Systems
Name of the Course : Generic Elective (GE)
Semester : II
Duration : 3 Hours

Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **all** questions from **Section-A**.
3. Attempt any **five** questions from **Section-B**.
4. Attempt **all** parts of a question together.

Section A

- 1 a) Explain the difference between a single-valued attribute and a multi-valued attribute. 2
- b) What is the difference between a database schema and a database state? 2
- c) Consider a relation $R(W, X, Y, Z)$ with the following dependencies: 2
 $X \rightarrow W, WZ \rightarrow XY, Y \rightarrow WXZ$
List any one key for the relation R . Justify your answer
- d) State whether the following are DDL or DML commands: 3
(i) UPDATE
(ii) INSERT
(iii) ALTER TABLE
- e) Give the notation used in ER model for the following: 3
(i) Multivalued attribute
(ii) Identifying relationship
(iii) Derived attribute
- f) List three advantages of using DBMS approach. 3
- g) Give the differences between sophisticated end users and standalone users. 3
- h) Consider an existing relation PROJECT (projID, name, location). Write SQL command to delete location column from the PROJECT table. 3

P.T.O.

- i) Consider the following relation in a database:

4

EmpID	Name	Department	Address
E1	Saloni	Finance	Delhi
E2	Neha	IT	Pune
E3	Priyanka	Finance	Delhi
E4	Kashish	Marketing	Kanpur
E4	Rohit	IT	Delhi

- (i) Identify the cardinality of the given relation
- (ii) Give an SQL command to change the address to "Pune" for the employee whose employee ID is "E3"
- (iii) Identify the problem that may occur when employee with name "Rohit" is inserted in the given relation

Section B

- 2 Consider a Company Management System that stores the following:

10

- Each employee has employee ID, name, address, and the address is a composite attribute.
- An employee is assigned to one department but may work in several teams.
- Each department has a department ID and name. A department can own several teams.
- Each team has a team ID and name. A team can be owned by different departments

- (i) Draw the entity relationship diagram representing the given system, showing the entities, attributes and relationships amongst entities. Mention the primary keys for each entity.
- (ii) Specify the cardinality ratios and participation constraints between the entities.

- 3 a) Explain three-schema architecture with the help of a diagram. How is logical data independence different from physical data independence.

6

- b) Consider the following relation:

4

STUDENT (Roll Number, Name, Subject, Marks, Dno)

Dno is a foreign key in the STUDENT relation.

Does the given relation STUDENT suffer from any of the following anomalies? Justify your answers using appropriate examples.

- (i) Insertion
- (ii) Deletion
- (iii) Modification

- 4 a) Consider the following relation:

4

ORDER(invoiceNumber, productID, Quantity, Amount, discountPercent)

Write an SQL query to display the maximum amount and the average quantity for every product ordered by the customer.

- b) Consider the following relation:

6

CAR (Engine_serial_number: Char(5), Make: Varchar, Model: Varchar, Price: INT)

Identify which relational model constraint is violated when the following records are inserted:

- (i) ("1202522", "Maruti", "WagonR", 500000)
- (ii) ("12125", "Audi", "A3", 1530000) followed by ("12125", "BMW", "X5", 1630000)

Justify your answer

- 5 Consider the following database:

10

PRODUCT (prodID, name, category)
SALE (invoiceNum, prodID, custID, empID, quantity, totalAmount)
CUSTOMER (custID, name, address)
EMPLOYEE (empID, name, salary, departmentNum)

Answer the following queries in SQL:

- (i) Display the product details with "Cleaning Products" as the category.
- (ii) For each department, display the average salary of employees working in that department.
- (iii) Display the invoice number and product ID where quantity sold is between 100 and 250.
- (iv) Display the details of all products that are not sold.

- 6 a) List two scenarios where NULL values may be used in a relation. Give suitable examples.

4

- b) Consider the relation $R(A, B, C, D, E)$ with the following functional dependencies: 2+4=6
 $A \rightarrow B, BC \rightarrow E, ED \rightarrow A$
- (i) Determine the candidate key(s) of R.
 - (ii) Normalize the relation to Third Normal Form (3NF), showing all steps.
- 7 a) Specify the cardinality ratio (1:1 / 1:N / M:N) for the following binary relationships based on the meaning of the given entity types: 4
- (i) Department and Manager
 - (ii) Student and Course
 - (iii) Project and Worker
 - (iv) Supplier and Parts
- b) Classify the following attributes as simple, composite and multivalued. 6
- (i) Address(House_no, Street, City, State, Zip)
 - (ii) {Name(First, Middle, Last)}
 - (iii) Age
 - (iv) Contact{Phone, Email}
- 8 a) Differentiate between the following: 5
- (i) Strong entity and weak entity
 - (ii) Alter table and Update table SQL commands
- b) Consider the following relational database state: 5

STUDENT

RollNo	Name	Department	Course
101	Rohit	Commerce	C01
102	Neha	Computer Science	C03
103	Priyanka	Computer Science	C04
104	Ravinder	Hindi	C02

COURSE

CourseID	Name
C01	B.Com (H)
C02	Hindi (H)
C03	BSc (H) CS
C04	BSc (P) CS

- (i) Identify Primary key and Foreign key(s) for STUDENT and COURSE relations.
- (ii) State whether the functional dependency $\text{Department} \rightarrow \text{Course}$ holds for the STUDENT relation. Justify your answer.