

- N. B.: (1) All questions are **compulsory**.
(2) All questions carry **equal** marks.
(3) Draw **neat, labeled diagrams** wherever necessary.

Q1. Attempt any three.**(15M)**

- Write a short note on relational model.
- Explain the various functions of database administrator.
- Explain the following with example:
 - Super key
 - Candidate key
 - Alternate key
 - Primary key
 - Foreign key
- Write a short note on storage manager component of database system.
- Explain the following relational algebra with example:
 - Projection
 - Outer join
 - Minus
- Explain 2-tier database architecture.

Q2. Attempt any three.**(15M)**

- Define the following with respect to ER model:
 - Entity
 - Attributes
 - Relationship
 - Entity type
 - Role name
- Explain various types of attributes with suitable example.
- Explain the concept of Generalization with example.
- State and explain Codd's 12 rules.
- Explain various types of cardinalities with proper example.
- A college database needs to store information about students (identified by stud_id, with stud_nm, stud_add and phone as attributes), instructors (identified by inst_id, with inst_nm and dept as attributes), and course (identified by course_id, with course_nm and credits as attributes). Students enrolls for the course; an instructor manages each student; each instructor is the member of the course. Draw an ER diagram, make proper assumptions wherever required also assign proper cardinalities.

Q3. Attempt any three.**(15M)**

- Explain lossless join dependency.
- What is normalization? Explain 1NF.
- What is the need for normalization?
- Explain lossy join dependency.
- Explain functional dependency in normalization.
- The company has several regular customers. Company makes some products. Customer places order for the products and the particular order is fulfilled by the company. Consider the un-normalized data given in the table, normalize the data using 1NF and explain the same.

cust_no	cust_nm	cust_add	description	order_no	o_date
C001	Raj	Delhi	Pen, pencil, Eraser	O003	16-12-2021
C002	Riya	Mumbai	Notebook, Brown Cover	O001	10-02-2022
C003	Dhvani	Hyderabad	Stickers	O002	05-04-2022

Q4. Attempt any three.**(15M)**

- a. Solve the queries based on following table:

Customer (custid varchar (5), Fname varchar (10), Lname varchar (10), City varchar (20), phoneno integer)

- Create table Customer with proper constraints.
 - Display details of customers living in city Mumbai, Hyderabad or Jaipur.
 - Find out total number of customers in each city.
 - Display customer whose name has 'e' as second letter.
 - Add a new column 'Salary' of type integer to customer table.
- b. Explain various datatypes used in SQL.
- c. What is trigger? Create a trigger on Customer table, when an update is made on Salary of customers living in Assam and Delhi.
- d. Solve the queries based on following tables :
- Book** (bookid varchar (5), title varchar (20), authorid varchar (5), publisherid varchar (5), quantity integer, price integer, year integer)
- Author** (authorid varchar (5), authornm varchar (20), city varchar (10), country varchar (15))
- Publisher** (publisherid varchar (5), publishernm varchar (20), city varchar (10), country varchar (15))
- Create table Book with proper constraints.
 - Create check constraint on Book table where price should not be below 250.
 - Find out the book written by 'James Groff' and published by 'Microsoft Press'.
 - List the average price of all books published by 'Himalaya'.
 - Delete all records of author.
- e. Write a short note on Views.
- f. What is indexing? Explain its types. Explain creating and removing indexing.

Q5. Attempt any three.**(15M)**

- What is transaction? Explain ACID properties of transaction.
- Explain the concept of conflict serializability.
- Explain states of transaction.
- What is deadlock? Explain deadlock recovery.
- Explain shadow copy technique.
- Explain the Write-Ahead Log Protocol.