THE NATIONAL INSTITUTE OF ENGINEERING

Department of Computer Science and Engineering

Model Question Paper

Subject: **Database Management Systems** Subject code: **BCS403** Semester: **IV**
Time: **3 hrs** Max. Marks**: 100**

Note: Answer all the questions

Q. No.	Cognitive Level	COs	Questions	Marks
1a	L2	CO1	Describe the database design process along with diagram.	10
1b	L3	CO1	Write an Entity-Relationship diagram for a university database system that needs to manage information about students, courses, and instructors.	10
2a	L2	CO2	Describe along with examples how relational model handle violation of different constraints.	10
2b	L3	CO2	Consider a database for an online bookstore with the following relations: Book (BookID, Title, AuthorID, PublisherID, Price) Author (AuthorID, Name) Publisher (PublisherID, Name) Customer (CustomerID, Name, Email) Order (OrderID, CustomerID, Date) OrderDetails (OrderID, BookID, Quantity) Write relational algebra expressions for the following: i) Find the titles of books written by 'J.K. Rowling'. ii) Get the titles of books ordered by a customer named 'Alice'. iii) Find the names of authors whose books are published by 'Penguin Books'. iv) Get the names of customers who have placed orders in the month of January 2024. v) List the titles of books along with the quantity ordered in each order.	10
3a	L3	CO2	Given the following relation R with attributes and functional dependencies, convert it to Third Normal Form. R $\{A,B,C,D,E,F\}$ Functional Dependencies: $A \rightarrow B$ $A \rightarrow C$ $C \rightarrow D$ $D \rightarrow E$ $B,E \rightarrow F$	10

3b	L3	CO3	Consider the relational schema given in Question 2b and write SQL queries for the following. i) List the names of publishers who have published books priced over 500. ii) Get the titles of books ordered by a customer named 'Alice'. iii) List the titles of books that have never been ordered. iv) Retrieve the names of customers who have ordered a book titled '1984'. v) List the titles of books along with the quantity ordered in each order.	10
OR				
3c	L3	CO2	Consider the following relation for a library system and check if they are in 3NF: LibraryBooks Attributes: (BookID, Title, AuthorID, AuthorName, PublisherID, PublisherName, Genre, ISBN, ShelfNumber) Functional Dependencies: BookID → Title, AuthorID, PublisherID, Genre, ISBN, ShelfNumber AuthorID → AuthorName PublisherID → PublisherName	10
3d	L3	CO3	Consider the relational schema given in Question 2b and write SQL queries for the following. i) Find the total number of books in the store ii) List all books along with their authors and publishers iii) Retrieve the top 5 bestselling books (based on the total quantity ordered) iv) List all customers who have ordered books more than once v) Find the average price of books in each genre	10
4a	L3	CO4	Consider a database managing customer information with two tables: 'Customer' and 'CustomerUpdateLog'. Customer (CustomerID, Name, Email, Phone) CustomerUpdateLog (LogID, CustomerID, LogMessage, LogDate) Write SQL queries for the following: i) To create the mentioned tables along with suitable datatypes and constraints. ii) Create a trigger in SQL that automatically logs an entry in the CustomerUpdateLog table whenever a customer's information is updated in the Customer table.	10
4b	L2	CO4	Describe the desirable properties of transaction along with an example.	10
OR				

4c	L3	CO4	With respect to views, answer the following: i) Differentiate between the two implementations of views. ii) Write the syntax for creating a view. iii) Refer the schema given in Question 2b and write a SQL query to create a view named 'BookDetails' that combines information from the 'Book', 'Author', and 'Publisher' tables:	10
4d.	L2	CO4	Describe the different issues that arise due to concurrent execution of transaction. Explain how to set the transaction isolation level.	10
5a	L2	CO4	Explain two-phase locking, its issues and its variants.	10
5b	L2	CO4	Describe the MongoDB CRUD operations along with an example.	10