Jan-Feb 2025 (B. Tech.)
Program: Information Technology   Scheme: III
Supplementary Regular Examination: SY   Semester: III
Course Code: ITC303 and Course Name: Database Management System
Duration: 02.5 Hours   Max. Marks: 60
Date of Exam: 29-01-'25

Instructions:
(1) All questions are compulsory.
(2) Draw neat diagrams wherever applicable.
(3) Assume suitable data, if necessary.

Q. No.	Question	Max. Marks	CO	BT level
Q 1	Solve any **two** questions out of three: (05 marks each)			
a)	Discuss four significant differences between a file-processing system and a DBMS.	10	CO1	U
b)	Sketch notations used in ER and EER diagram and their meaning with suitable example.		CO2	A
c)	Explain any four constraints on relational database with suitable example.		CO3	U
Q 2	Solve any **two** questions out of three: (05 marks each)			
a)	List and determine two reasons why null values might be introduced into the database.		CO4	A
b)	Consider the following relation for published books: BOOK (Book_title, Author_name, Book_type, List_price, Author_affil, Publisher) Author_affil refers to the affiliation of author. Suppose the following dependencies exist: Book_title → Publisher, Book_type Book_type → List_price Author_name → Author_affil Evaluate normal form of this relation. Explain your answer.	10	CO5	E
c)	Explain a state diagram and discuss the typical states that a transaction goes through during execution.		CO6	U
Q.3	Solve any **two** questions out of three. (10 marks each)			
a)	List four significant differences between a file-processing systems and a DBMS. Also explain the concept of data abstraction with the help of suitable diagram.	20	CO1	U
b)	Design a database for a world-wide package delivery company (e.g., DHL or FedEX). The database must be able to keep track of customers (who ship items) and customers (who receive items); some customers may do both. Each package must be identifiable and trackable, so the database must be able to store the location of the package and its history of locations. Locations include trucks, planes, airports, and warehouses. Your design should include an E-R diagram, a set of relational schemas, and a list of constraints, including primary-key and foreign-key constraints.		CO2	C

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			CO3	C
c)	Consider the relational database of Figure 1. Design an ER diagram for the database in figure 1. Also give an expression in the relational algebra to express each of the following queries: i. Find the names of all employees who live in city "Mumbai". ii. Find the names of all employees whose salary is greater than Rs. 100,000. iii. Find the names of all employees who live in "Mumbai" and whose salary is greater than Rs. 100,000. employee (person name, street, city) works (person name, company name, salary) company (company name, city) Figure 1. Relational database			
Q.4	Solve any **two** questions out of three. (10 marks each)			
			CO4	A
a)	Consider the library database of Figure 2. Solve the following queries in SQL. i. Print the names of members who have borrowed any book published by "McGraw-Hill". ii. Print the names of members who have borrowed all book published by "McGraw-Hill". iii. For each publisher, print the names of members who have borrowed more than five books of that publisher. iv. Print the average number of books borrowed per member. Take into account that if a member does not borrow any books, then that member does not appear in the borrowed relation at all. member(memb_no, name, age) book(isbn, title, authors, publisher) borrowed(memb_no, isbn, date) Figure 2. Library database	20		
			CO5	A
b)	Normalize the following schema, with given constraints, to 4NF. 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			
			CO6	U
c)	Explain which of the following schedules is (conflict) serializable. For each serializable schedule, determine the equivalent serial schedules. i. $r1(X); r3(X); w1(X); r2(X); w3(X);$ ii. $r1(X); r3(X); w3(X); w1(X); r2(X);$ iii. $r3(X); r2(X); w3(X); r1(X); w1(X);$ iv. $r3(X); r2(X); r1(X); w3(X); w1(X);$			