JK Lakshmipat University Jaipur
INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination, December 2024
B. Tech. (CSE), Semester III, 2023-2024

Roll No.....66.....

CS1133: Database Management Systems Time: 3 hours Max. Marks: 30

Instructions to students:
1. Do not write anything other than your roll number on question paper.
2. Mention all the assumptions for your answers clearly.

Q. 1.1	Consider the following GRADEBOOK relational schema describing the data for a grade book of a particular instructor. (Note :- The attributes A,B,C, D of COURSES store grade cutoffs.) CATALOG(Cno, Ctitle) STUDENTS(Sid, Fname, Lname, Minit) COURSES(Term,Sec_no, Cno, A,B,C,D) ENROLLS(Sid,Term, Sec_no) Specify and execute the following queries in mentioned Query Language - a. Retrieve the names of students enrolled in Automata class during the fall 1996 term. (Domain Relational Calculus) b. Retrieve the name of students who have not enrolled in any class. (Relational Algebra) c. Retrieve the name of students who have enrolled in all courses in the CATALOG table. (SQL) d. Retrieve the Sid values of students who have enrolled in CS226 and CS227 course. (Tuple Relational Calculus) e. Delete all tuples from enrolls table.	5.0 *(LO3,4)*
Q. 1.2	Consider the following relations for a database that keeps track of student enrollment in courses and the books adopted for each course: STUDENT(Ssn, Name, Major, Bdate) COURSE(Course#,Cname,Dept) ENROLL(Ssn, Course#, Quarter, Grade) BOOK_ADOPTION(Course#, Quarter, Book_isbn) TEXT(Book_isbn, Book_title, Publisher, Author) Specify the foreign keys for this schema, stating any assumptions you make.	2.0 *(LO2,3)*
Q. 1.3	Consider the ER diagram shown below for part of a BANK database. Each bank can have multiple branches, and each branch can have multiple accounts and loans. a) List the strong (nonweak) entity types in the ER diagram. b) Is there a weak entity type? If so, give its name, partial key, and identifying relationship.	3.0 *(LO2,3)*

c) What constraints do the partial key and the identifying relationship of the weak entity type specify in this diagram?

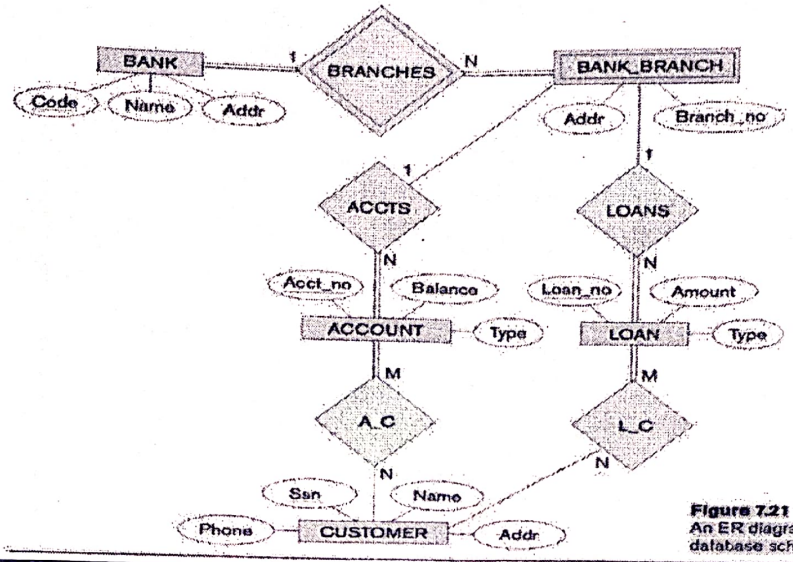


Figure 7.21
An ER diagram for a BANK database schema.

Q. 2.1	Why should NULLs in a relation be avoided as far as possible? Discuss the problem of spurious tuples and how we prevent it.	2.0 *(LO2,3)*
Q. 2.2	Given a relation R={A,B,C,D,E,H} and having the following FDs A→BC, CD→E, E→C, D→AEH, ABH→BD, DH→BCW. Find the key for the relation R with given FDs.	3.0 *(LO2,3)*
Q. 2.3	Examine the table shown below.	1+3+1 *(LO2,3)*

branchNo	*branchAddress*	*telNo*	*mgrStaffNo*	*name*
B001	8 Jefferson Way, Portland, OR 97201	503-555-3618	S1500	Tom Daniels
B002	City Center Plaza, Seattle, WA 98122	206-555-6756	S0010	Mary Martinez
B003	14 – 8th Avenue, New York, NY 10012	212-371-3000	S0145	Art Peters
B004	16 – 14th Avenue, Seattle, WA 98128	206-555-3131	S2250	Sally Stern

(a) Why is this table not in 3NF?
(b) Describe and illustrate the process of normalizing the data shown in this table to third normal form (3NF).
(c) Identify the primary, (alternate) and foreign keys in your 3NF relations.

Q. 3.1	List the different deadlock prevention schemes and comment on how younger transactions are handled in either scheme.	2.0 *(LO5,6)*
Q. 3.2	Apply the timestamp ordering algorithm to the schedule mentioned below and determine whether the algorithm will allow the execution of the schedule.	3.0 *(LO5,6)*

Transaction T_1	Transaction T_2	Transaction T_3
	read(Z) read(Y) write(Y)	
		read(Y) read(Z)
read(X) write(X)		
		write(Y) write(Z)
	read(X)	
read(Y) write(Y)		
	write(X)	

Q. 3.3 Consider the three transactions T1, T2, T3 and the schedules S1 and S2 given below. Draw the serializability(precedence) graphs for S1 and S2, and state whether each schedule is serializable or not. If schedule is serializable, write down the equivalent serial schedule(s). **3.0 (LO5, 6)**

T_1: $r_1(X); r_1(Z); w_1(X);$

T_2: $r_2(Z); r_2(Y); w_2(Z); w_2(Y);$

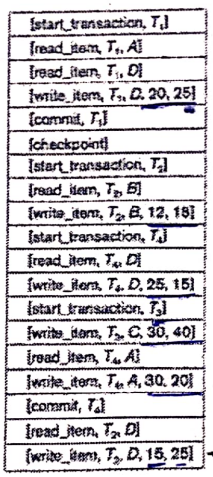
T_3: $r_3(X); r_3(Y); w_3(Y);$

S_1 : $r_1(X); r_2(Z); r_1(Z); r_3(X); r_3(Y); w_1(X); w_3(Y); r_2(Y); w_2(Z); w_2(Y);$

S_2 : $r_1(X); r_2(Z); r_3(X); r_1(Z); r_2(Y); r_3(Y); w_1(X); w_2(Z); w_3(Y); w_2(Y);$

($r_{1,2,3}$, $w_{1,2,3}$ are symbols for read and write operations respectively)

Q. 3.4 Refer to the figure below explain the deferred update protocol for the same and justify the usage of Redo/Undo operation. **2.0 (LO5, 6)**



all the best!