Roll Number:_____	
Thapar Institute of Engineering and Technology Patiala	
Computer Science and Engineering Department	
MakeUp Test	
BE Second Year (4th Semester) 18 April, 2023	**UCS310: Database Management System**
Time: 2 Hours, Max Marks:30	**Instructor: Dr Geeta Kasana**

Note: Attempt all questions. All parts of a question must be answered in order. Assume any missing data.

Q1 — 2+3

a) Compare File processing system and DBMS on following characteristics:

i) Durability ii) Isolation

b) Explain the three-tier architecture of DBMS with diagram.

Q 2 — 2+3

a) Consider the following **employee** table to write the following queries in SQL.

EMPNO	EMP_NAME	DEPT_NAME	SALARY	DOJ	Branch
1	Amit	Production	45000	12-Mar-00	Bangalore
2	Amit	HR	70000	03-Jul-02	Bangalore
3	Sunita	Management	120000	11-Jan-01	Mysore

i. Find the total salary received by the Bangalore branch.
ii. Find the count of employees with salary more than 45000.

b) Differentiate between following with help of suitable example/SQL syntax:
i) Left outer join and Right outer join
ii) Strong and Weak Entity
iii) Co-related queries and Sub-Queries

Q 3 — 5

Design an ER-diagram for the following description; **Make sure cardinalities, primary keys and association in the diagram should be clear.**
A publishing company produces books on various subjects. The books are written by authors who specialize in one particular subject. The company employs editors who., not necessarily being specialist in a particular area, each take sole responsibility for editing one or more book publications. Each book requires some items for publication. These items supplied by suppliers. One supplier can supply many items. Shop owner buys books from the publisher. Shop owner can buy many books but one book can be bought by one shop owner only. Books are identified by book id.

Q4 — 5

Given a relational Schema R(W, X, Y, Z) and set of Function Dependencies.

FD = { W → X, Y → X, Z → WXY, WY → Z }. Find the canonical cover?

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End Sem Test

BE Second Year (4th Semester) 13th May, 2023	UCS310: Database Management System
Time: 3 Hours, Max Marks:40	Coordinators: Dr Geeta Kasana, Dr. Ranjeet Kumar Ranjan
Instructors: Geeta Kasana, Ranjeet Kumar Ranjan, Deepak Kumar Dewangan, Sumit Sharma, Manisha Kaushal, Rakesh Kumar Yadav, Sanjeev Rao	

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Q1 (6+2)

a) Consider a relation R (A, B, C, D, E) with FDs:

$$AB \rightarrow C,$$
$$AC \rightarrow B,$$
$$BC \rightarrow A, \text{ and}$$
$$D \rightarrow E.$$

i. Determine all the candidate keys of relation R.
ii. Is relation R (A, B, C, D, E) in 2NF? If not, justify your answer and convert into 2NF.
iii. Is relation R (A, B, C, D, E) in 3NF? If not, justify your answer and convert into 3NF.
iv. Is relation R (A, B, C, D, E) in BCNF or not? Justify your answer

b) Differentiate between lossy and lossless decomposition used in Normalization with a suitable example.

Q2 (2+2+4)

a) Consider the following four schedules using read and write operation on a data item **X**, denoted by r(x) and w(x) respectively. Find the following schedules are conflict serializable or not, with explanation.

S1: $r_1(X); r_2(X); w_1(X); r_3(X); w_2(X)$
S2: $r_2(X); r_1(X); w_2(X); r_3(X); w_1(X);$
S3: $r_3(X); r_2(X); r_1(X); w_2(X); w_1(X);$
S4: $r_2(X); w_2(X); r_3(X); r_1(X); w_1(X);$

b) Consider the following schedule S of transactions T1, T2, T3, T4:

T1	T2	T3	T4
	Read(X)		
		Read(Z)	
		Write(X)	
		Commit	
Read(Z)			
Write(X)			
Commit			
	Write(Y)		
	Read(Z)		
	Commit		
			Read(X)
			Read(Y)
			Commit

Using precedence graph, describe whether the above Schedule is conflict serializable, view serializable or both.

c) Explain Cascadeless Recoverable schedule. Find out whether the given schedule S is Cascadeless schedule or not. Justify your answer.

S: $R_1(A)$ $R_2(C)$ $R_3(A)$ $R_1(C)$ $R_2(B)$ $R_3(B)$ $W_1(A)$ C_1 $W_2(C)$ $W_3(B)$ $W_2(B)$ C_3 C_2.

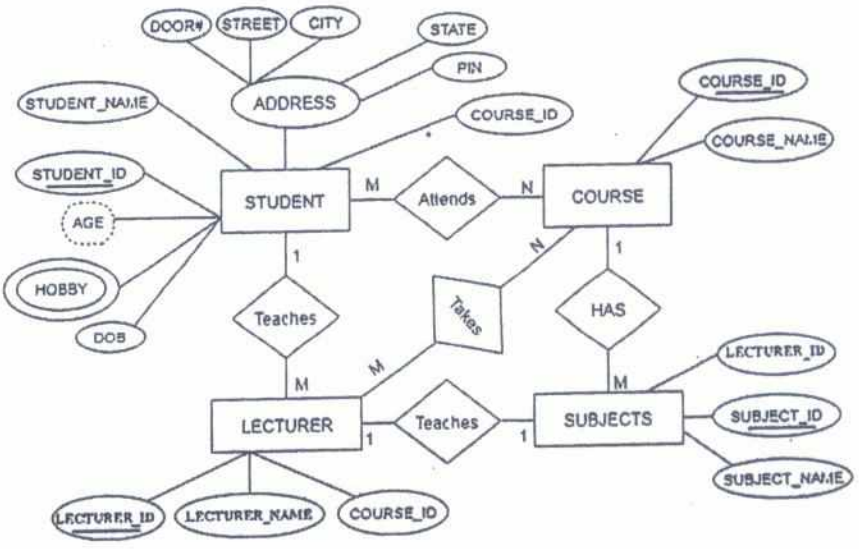
Where, $R_i(X)$ and $W_i(X)$ represent read and write operations on data item X by transaction T_i respectively and C_i is commit of transaction T_i.

Q3	a) Explain Strict Two-Phase Locking (Strict 2PL) protocol and its advantages with respect to basic 2PL. For the given schedule below, explain whether Basic 2PL and Strict 2PL can be applicable or not.	5+3

T1	T2
Read(A)	
Write(A)	
Read(B)	
	Read(A)
	Read(C)
Write(B)	

b) Consider a database with objects *X* and *Y* and assume that there are two transactions *T1* and *T2*. Transaction *T1* reads objects *X* and *Y* and then writes object *X*. Transaction *T2* reads objects *X* and *Y* and then writes objects *X* and *Y*. Using the given operations of transactions T1 and T2, construct the schedules which show the following conflicts. Also justify how conflicts occur.

(i) write-read conflict
(ii) read-write conflict
(iii) write-write conflict

Q4	a) Consider the table **Emp** (empno, ename, deptno, salary) to write a PL/SQL program to increase the salary of an employee according to the following rule: • Salary of the department number 10 employees increased by 1000. • Salary of the department number 20 employees increased by 500. • Salary of the department number 30 employees increased by 500. • Store the employee number, old salary and new salary in another table named temp having three columns empno, old_ salary, new_ salary. b) Write the PL/SQL program to define and raise a user defined exception named ***invalid_id.*** for above table **Emp**, if [***empno*** <= 0].	6+2
Q5	a) Convert the following E-R diagram to Tables. Explicitly mention primary and foreign keys for each of the table.  b) List any six responsibilities performed by Database Administrator (DBA).	5+3

**********ALL THE BEST**********

Q5	Write a PL/SQL stored function to find the factorial of a number. Call the stored function in a separate PL/SQL program through which user will enter the number.	5
Q 6	The following table is in 1NF. List out various functional dependencies exist in this table and convert the following table into next higher normal forms based on the data given on the table.(Consider highest Normal Form upto 3 NF)	5

Cust_id	Course_NO	Enrollment_Date	Fees	Residence
C01	M01	01-01-2000	50000	Mohali
C02	M01	01-03-2000	50000	Mohali
C01	M02	01-01-2000	40000	Surat
C04	M02	01-07-2000	40000	Surat

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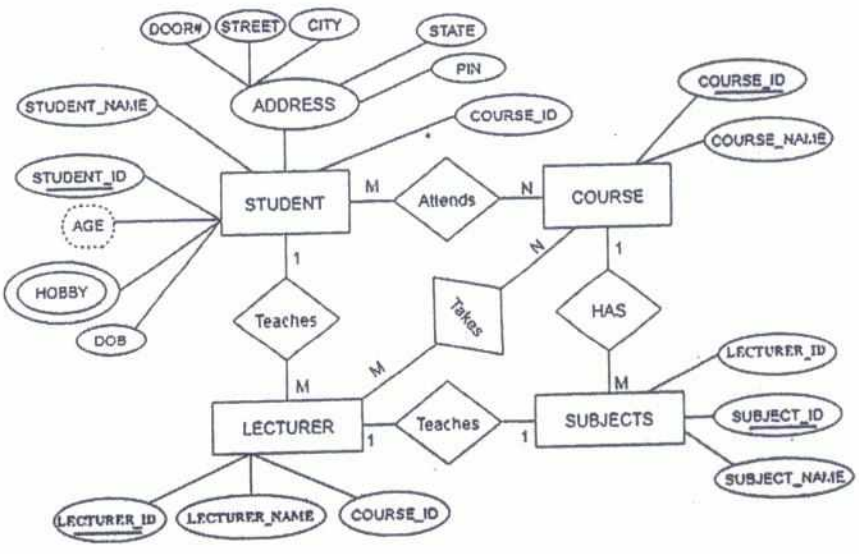
Q5	a) Convert the following E-R diagram to Tables. Explicitly mention primary and foreign keys for each of the table.  b) List any six responsibilities performed by Database Administrator (DBA).	5+3

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