

Note: (a) All questions are compulsory.

(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

(c) Use of calculator is not allowed

Q.No	Question	CO	Marks														
Q1	Explain the following operations in Relational Algebra: 1. Selection 2. Projection 3. Set Difference 4. Union 5. Division	2	5														
Q2	Consider the relations Employee(EId,Name,Dept,Salary) Depositor(Name, AccNo) Borrower(Name, LoanNo) . Write the relational algebra queries for the following: 1. Find the Name, EId of employees earning >60000. 2. Find names of all the customers who have deposited money and also availed loan. 3. Find names of employees in the IT department and earning >75000 4. Find employees not in the IT department. 5. List all the customers names associated with the bank either as an account holder or a Loan Borrower.	2	10														
Q3	Consider the Schedule S of transactions T1 and T2. Find the Conflict Equivalent Schedule for the same. <table><tr><th colspan="2">S</th></tr><tr><th>T1</th><th>T2</th></tr><tr><td>R(A)</td><td></td></tr><tr><td>W(A)</td><td></td></tr><tr><td></td><td>R(A)</td></tr><tr><td></td><td>W(A)</td></tr><tr><td>R(B)</td><td></td></tr></table>	S		T1	T2	R(A)		W(A)			R(A)		W(A)	R(B)		4	5
S																	
T1	T2																
R(A)																	
W(A)																	
	R(A)																
	W(A)																
R(B)																	

Q4	What is a transaction? Discuss the ACID properties in a transaction.	4	5																
Q5	Consider the schedule S of transactions T1 and T2 : <table><tr><th colspan="2">S</th></tr><tr><th>T1</th><th>T2</th></tr><tr><td>Lock S(A)</td><td></td></tr><tr><td>Lock S(B)</td><td>Lock S(A)</td></tr><tr><td>Unlock (A)</td><td></td></tr><tr><td>Unlock (B)</td><td>Lock X(D)</td></tr><tr><td></td><td>Unlock (A)</td></tr><tr><td></td><td>Unlock (D)</td></tr></table> Apply the two phase locking protocol(2PL) and show the resultant schedule S₁. Also find the serial schedule corresponding to S₁.	S		T1	T2	Lock S(A)		Lock S(B)	Lock S(A)	Unlock (A)		Unlock (B)	Lock X(D)		Unlock (A)		Unlock (D)	4	5
S																			
T1	T2																		
Lock S(A)																			
Lock S(B)	Lock S(A)																		
Unlock (A)																			
Unlock (B)	Lock X(D)																		
	Unlock (A)																		
	Unlock (D)																		
Q6	Explain with example the following problems related to concurrency schedule: 1. Lost Update 2. Dirty Read	4	5																