Final Assessment Test - November 2016

Course: **CSE2004 - Database Management Systems**

Class NBR(s): **1319 / 1326 / 1328 / 1333 / 1338 / 1340 / 1344 / 1346** Slot: **D1**

Time: **Three Hours** Max. Marks: **100**

PART – A (8 X 5 = 40 Marks)
Answer ALL Questions

1. When do you think traditional file processing will be more desirable than a database approach? Give examples of such systems.

2. Using Alter table commands enforce the given integrity constraints on the Student schema.

Column	Data Type	Constraint	
Student Name	Varchar2(20)	Not Null	**[1]**
Gender	Varchar2(1)	Check for the following values (M,m,F,f)	**[2]**
Location	Varchar2(10)	Location name must start with only C or V	**[2]**

3. Prove the following Armstrong's Axioms

   IR1 (reflexive rule): If $X \supseteq Y$, then $X \rightarrow Y$. **[1]**

   IR2 (augmentation rule): $\{X \rightarrow Y\} \models XZ \rightarrow YZ$. **[2]**

   IR3 (transitive rule): $\{X \rightarrow Y, Y \rightarrow Z\} \models X \rightarrow Z$. **[2]**

4. For a Relation R(PQRST) with the set of functional dependencies F={PQ→R,R→Q,R→S,S→T}

   Is PQS the Super Key? Justify. **[2]**

   Is PQR the Primary Key? Justify. **[2]**

   List out any candidate keys in the relation. **[1]**

5. Construct queries in Relational Algebra for the given scenarios using the following relational schema.

   Employee

Ssn	Name	Gender	Salary

   Car

Car Id	Car Name	Model	Price

   Owns

SSn	Car Id

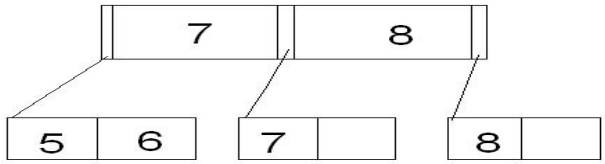
   - Display the names of employees who don't own a car. **[1]**
   - Display Ssn of employees who own a car and are male and also employees who are female with salary greater than 10000 Rupees. **[2]**
   - Display names of Employees who own every car model present in the Car relation. **[2]**

6. Consider the following two transactions:

Timestamp	T31	T32
t1	R(A)	R(B)
t2	R(B)	R(A)
t3	If(A=0) then B:=B+1;	If(B=0) then A:=A+1;

   Add lock and unlock instructions to transactions T31 and T32, so that they observe the two-phase locking protocol. Can the execution of these transactions result in a deadlock?

7. Reconstruct the given B+ tree [with n=2] by inserting value 4.



8. List five differences between SQL and NO SQL Databases. Give Examples.

PART – B (6 X 10 = 60 Marks)
Answer any SIX Questions

9. a) Identify the components that manage the given functionalities inside a database management system. **[5]**
   - The list of indexes created is maintained in _____
   - The component that interacts with the operating system for retrieval of contents from the hard disk is _____
   - DML commands from an application program is extracted by the _____
   - The canned transactions with run time parameters is executed by the _____
   - Use of correct algorithms, indexes and elimination of redundancies is the work of _____

   b) Compare 2 Tier Client Server Architecture with 3 Tier Client Server Architecture. Give examples for both the architectures. **[5]**

10. Construct an ER diagram and identify all the relational schemas that satisfy 3rd Normal form for the scenario given below.
Vendors sell different products. Customers can order different products from several vendors in a single order. Each customer is given an invoice containing the details of the order. Each order is shipped by 1 to many shippers based on the products ordered. Customers can track the shipment of their packages. A package can take any one of the statuses [shipment in progress, shipped, delivered or returned].

11. For a relation R (PQRST) the set of Functional Dependencies are F = {P→S, QR→PS, R→Q, T→P, T→S} Apply the relational synthesis algorithm and decompose the relation in to 3NF that satisfies dependency preservation and lossless decomposition.

12. The table lists agents, the companies they work for and the policies they sell for those companies. Is it possible to remove the redundancy of data in the given table by decomposition? Justify your answer. If yes, list the decompositions and identify the normal form of the decomposed relations.

Agent	Company	Policies
Jeff	USAA	Policy1
Jeff	USAA	Policy2
Jeff	AXA	Policy3
Chris	USAA	Policy3

13. Elucidate conflict equivalence and view equivalence of schedules. Check if the given schedules are conflict serializable and view serializable?

Schedule S1.

T1	T2
R(x)	
X:=X-10;	
W(X)	

	R(Q)
	Q:=Q-20;
	W(Q)
R(Z)	R(L)
Z:=Z-10;	L:=L+10;
W(Z)	W(L)
R(J)	
J=J+10;	
W(J)	

Schedule S2

T1	T2
R(x)	
X:=X-10;	
W(X)	
	R(Q)
	Q:=Q-20;
	W(Q)
R(Q)	R(X)
Q:=Q+10;	X:=X+5;
W(Q)	W(X)
R(X)	
X:=X+2;	
W(X)	

14. Construct a B+ tree for the values (1,4, 7, 10, 17, 21, 31, 25, 19, 20, 28, 42) with n=4.
15. List and elaborate on the different NoSQL data models.

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