



DOF  
19-4-16

4th Sem (Regular & Back)  
DBMS CS-2004  
(CSE, IT)

## SPRING END SEMESTER EXAMINATION-2016

4<sup>th</sup> Semester B.Tech & B.Tech Dual Degree

### DATABASE MANAGEMENT SYSTEMS

#### CS-2004

(Regular-2014 & Back of Previous Admitted Batches)

**Time: 3 Hours**

**Full Marks: 60**

*Answer any SIX questions including Question No.1 which is compulsory.*

*The figures in the margin indicate full marks.*

*Candidates are required to give their answers in their own words as far as practicable and all parts of a question should be answered at one place only.*

1. a) Dependency is always preserved if relations are decomposed [ $2 \times 10$  using 2NF/3NF - justify your answer
- b) Discuss the importance of NULL value with suitable example.
- c) Differentiate between database analyst and database administrator.
- d) What problems a relation can have with redundancy in tuples and with having more number of NULL values in many tuples.
- e) Every candidate key is a super key; but all super keys are not candidate keys - justify your answer.
- f) Consider the relation R (A, B, C, D, E, F) and the set F = { $A \rightarrow BC$ ,  $E \rightarrow CF$ ,  $B \rightarrow E$ ,  $CD \rightarrow EF$ }. Find the closure of {A,B}.
- g) Consider the join of a relation A with a relation B. If A has m tuples and B has n tuples, then find out the maximum and minimum sizes of the join.

(1)

- h) From the partial committed state, always a transaction moves to committed state - justify your answer.
- i) What is a multi-valued attribute? Draw an entity set having one multi-valued attribute and then translate the entity set into relations.
- j) Differentiate between serial schedule and concurrent schedule with suitable example.

2. a) Find a 3NF decomposition of the following relation scheme [4]  
(Faculty, Dean, Department, Chairperson, Professor, Rank, Student). The relation satisfies the following functional dependencies:

Faculty  $\rightarrow$  Dean,  
 Dean  $\rightarrow$  Faculty,  
 Department  $\rightarrow$  Chairperson,  
 Professor  $\rightarrow$  Rank, Chairperson,  
 Department  $\rightarrow$  Faculty,  
 Student  $\rightarrow$  Department, Faculty, Dean,  
 Professor, Rank  $\rightarrow$  Department, Faculty

- b) Discuss the difference between a composite key and a composite attribute. How would each of the above and a multivalued attribute be indicated in an ER- diagram? Illustrate with example. [4]

3. There are different organizations available for which we are interested to store the unique orgid along with orgname and domain. Each organization is conducting one annual fest (unique festid, festname, budget and theme) in each session. Many people are coming to the annual fest. Each person has unique prid along with prname, age and contact(s). The people can be categorized as either Employee (with [5+3]

salary) or Student (with cgpa) or Staff (with working\_hours). Employees are managing Students. Similarly, Staffs are managing Students. Each annual fest contains many events (identified by unique evid along with evname and category). The students are participating in one or more events. Similarly, many students are participating in an event. There are different students treated as event managers for different events. Each event contains different rewards. Each reward has a rewardname and prize. Each reward can be identified by rewardname once the event is known.

- i) Draw the entity-relationship diagram for the above system. Make necessary assumption.
- ii) Convert the above ER diagram into relational schemas.

4. a) Find the canonical cover of the set of functional dependencies  $\{A \rightarrow BC, AB \rightarrow D, A \rightarrow D, B \rightarrow CE, C \rightarrow E, B \rightarrow C, A \rightarrow DE\}$ . [4]

b) Given a relation  $R(X, Y, W, Z, P, Q)$  and the set  $F = \{XY \rightarrow W, XW \rightarrow P, PQ \rightarrow Z, XY \rightarrow Q\}$ . Consider the decomposition  $R_1(Z, P, Q)$  and  $R_2(X, Y, W, P, Q)$ . Check whether this decomposition is lossless or lossy decomposition. [4]

5. Consider the following relational schema
- Employee (empno, name, office, age)
- Books (isbn, title, authors, publisher)
- Loan (empno, isbn, date)

Write the following queries in relational algebra, tuple relational calculus, domain relational calculus and SQL:

- a) Display the book title of the books written by 'Korth' and borrowed on '01-APR-2016'. [4]



- b) Find the names of employees who have borrowed a 'Database' book published by 'TMH'. [4]
6. a) Construct a B-Tree of order 5 for the data items: 15, 27, 56, 35, 45, 87, 76, 7, 22, 72, 20. Redraw the tree after deleting 76 from the original B - Tree. [4]
- b) Explain the difference between primary index, clustering index and secondary index. Provide suitable example. [4]
7. a) Discuss the rules of conflict serializability. Let T1 and T2 be two transactions. Check whether the given schedule is conflict serializable or not. [4]

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

- b) Explain the difference between immediate database modification and deferred database modification recovery systems with suitable examples. [4]
8. Write Short Notes (Any Two) [4 × 2]
- Timestamp Based Protocol
  - Inner Join vs. Outer Join
  - 3 Level Data Abstraction

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