

BENGAL ENGINEERING AND SCIENCE UNIVERSITY, SHIBPUR
M. E. (ICE) 1st Semester Examination, 2013

Design of Database Systems (ICE-903)

Time: 3Hours

Full Marks: 70

Answer any FIVE questions

1. What is the difference between database schema and database state? Represent the following relational model into network model. Also write the advantages of relational model over network model.

Employee

name	sal	age
Ram	1000	30
Sam	1500	30
Rabi	2000	40

Project

pno	pname	ploc
P1	X	Kol
P2	Y	Del
P3	Z	Kol

Workson

Name	pno	hour
Ram	P1	4
Ram	P2	6
Ram	P3	8
Sam	P1	6
Sam	P3	4

What is relation in RDBMS? Describe the properties of relation.

3+6+5

2. Why should NULL values in a relation be avoided as far as possible? Explain clearly why the lossless-join property is a necessary condition for decomposition while dependency preservation is only a desirable condition. Consider the relation R(A,B,C,D,E,F) and the set of functional dependency G= { A→B, C →{D,E}, {A,C} →F}. Determine whether the following decomposition has lossless join property with respect to G.

R1= (A,B) R2=(C,D,E) R3=(A,C,F)

“If a relation is in BCNF then it is also in 3NF, but the reverse is not true” explain the statement.

3+3+4+4

3. Explain the role of recovery manager to ensure atomicity and durability of transaction? Why a serializable schedule is considered correct? Why cascadeless schedule is required? Prove that wait-die and wound-wait techniques avoid deadlock. Why must lock and unlock be atomic operations?

4+2+2+4+2

4. What are the reasons for having variable length records? Explain how insert and delete operation in a file with sparse index is done. Consider a disk with block size 512 bytes. A record pointer is 7 bytes long. A file has 20000 EMPLOYEE records of fixed size and length of each record is 100 bytes. Suppose the file is ordered by the key field eno and we have constructed a primary index on eno. If file is not ordered by the key field eno and we have constructed a secondary index on eno, then compare the performance of primary and secondary index to search a record using the index.

Explain the use of partitioned hashing for indexing on multiple keys.

3+3+5+3

5. Consider the following schedule and apply multiversion timestamp ordering algorithm to the schedule to determine whether the algorithm will allow the execution of the schedule.

	Transaction T1	Transaction T2	Transaction T3
Time ↓	read(X) write(X)	read(Z) read(Y) write(Y)	read(Y) read(Z)
	read(Y) write(Y)	read(X)	write(Y) write(Y)
		write(X)	

What is phantom problem in database? What are checkpoints and why are they important? Explain immediate update recovery technique.

5+3+3+3

6. Discuss the different security problem related to database. What is meant by 'granting a privilege? What are the different methods to implement conjunctive selection? Consider the join operation: $EMP *_{dno=dnum} DEPT$. EMP file has 10000 records stored in 2000 blocks. DEPT file consists of 125 records stored in 13 blocks. Primary key of DEPT is dnum. If blocking factor of resulting file is 4 records per block, then which file is considered as outer loop for nested-loop join operation.

5+2+3+4

7. What is the difference between distributed database and distributed processing? What is the significance of distribution transparency in the context of distributed database? Describe the architecture of distributed database system. Explain the correctness property of data fragmentation. Consider the following operations of distributed DB at two site :

Site1: $r_i(x), w_i(x), r_j(x), w_j(x)$

Site2: $r_j(y), w_j(y), r_i(y), w_i(y)$

Is there any schedule of the distributed DB which is serializable? If not, then what is the reason?

2+2+5+3+2

8. Write short notes on the following:

a) Shadow paging b) Transaction management in distributed DB c) join dependency

5+4+5