Name : ....

Roll No. : ....

Invigilator's Signature : ....

CS/B.TECH (CSE)/SEM-7/CS-704A/2010-11

2010-11
DISTRIBUTED DATABASE

Time Allotted : 3 Hours   Full Marks : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words
as far as practicable.

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following :   10 × 1 = 10

    i)   In a heterogeneous distributed DBMS

        a)   Two different sites can use two different DBMS products, but data model must be the same.

        b)   Two different sites can use two different data model, but DBMS product must be the same.

        c)   Two different sites can both different DBMS products and data models.

        d)   Two different sites can use both different DBMS products, but database languages must be the same.

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ii) Preservation of functional dependency is ensured by which of the correctness rule of the fragmentation ?

    a) Disjointness

    b) Reconstruction

    c) Completeness

    d) All of these.

iii) Which of the following statement is true ?

    a) Horizontal fragmentation is subset of tuples.

    b) Vertical fragmentation is subset of attributes.

    c) Mixed fragmentation is subset of a combination of tuples and attributes.

    d) All of these.

    e) None of these.

iv) If a distributed system has n sites, the total number of message transfer in distributed 2PL is

    a) $2n + 3$ b) $5n$

    c) $n * n$ d) $n * (n + 1)/2$.

v) A global (distributed) schedule of a DDBMS is serializable if

   a) it is the union of local schedules

   b) the execution order at each site is serializable

   c) the execution order at each site is serializable and local serialization orders are identical.

   d) none of these.

vi) Replication of attributes violates which of the following conditions of fragmentation ?

   a) completeness

   b) reconstruction

   c) disjointness

   d) both (b) and (c).

vii) Two-phase commitment protocol is used for

   a) concurrency control

   b) integrity control

   c) recovery

   d) redundancy.

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    viii) Transaction restart overhead is removed in

        a)   Basic TO algorithm

        b)   Conservative TO algorithm

        c)   Both (a) and (b)

        d)   None of these.

    ix) Changes made in a database are called

        a)   Transaction

        b)   Commit

        c)   Replication

        d)   Fragmentation

    x)   Shared memory is

        a)   Loosely coupled architecture

        b)   Tightly coupled architecture

        c)   Both (a) and (b)

        d)   None of these.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following.   3 × 5 = 15

2.   What are the advantages and disadvantages of database replication ? What is false deadlock ?   3 + 2

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3. What is primary copy and majority locking protocal ?   3 + 2

4. Give an example to prove that Distributed 2PL is more restrictive compared to distributed serializability.   5

5. Explain with example, the difference between semijoin and natural join operation. What are the rules which must be followed when defining fragmentation ?   2 + 3

6. In which situation derived horizontal fragmentation of a global relation is needed and how is it defined ? Explain your answer.   5

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following.   3 × 15 = 45

7. Discuss horizontal, vertical and mixed fragmentations with examples.   15

8. Write down the 2-phase commitment protocol with diagram. Discuss the behavior of the 2-phase commitment protocol in presence of different kinds of failures.   8 + 7

9. a) Explain how the reliability of a distributed database is maintained both from the angles of data redundancy and data transmission.   8

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b) What is false deadlock ? How is it overcome ? 1 + 2

c) Differentiate between distributed database and parallel database. 4

10. a) Consider the following Global schema, Fragmentation schema, Allocation schema :

Global schema :

Guest (G_ID, name, block_ID, room_no) 5

Fragmentation schema :

F1 : $\sigma_{block\_id = "North"}$ (Guest) F2 : $\sigma_{block\_id = "South"}$ (Guest)

Allocation schema : F1 at site 2 and F2 at site 1

Write a query that accepts G_ID from user and output the name at level 1, 2 and 3 of transparency.

b) Explain distributed deadlock detection. What is the difference between centralized and distributed deadlock detection ? 5 + 2

c) What is hierarchical deadlock detector ? 3

11. a) Write down the algorithm for basic timestamp method. 5

b) Consider the following schemas : 10

BRANCH (Branch No., Street, Postcode)

PROPERTY (PNO., Rent Amount, Owner No, Type, Branch No.)

Consider the following fragments :

P1 : $\sigma_{Branch\_no="B003" \wedge type = "House"}$ (PROPERTY)

P2 : $\sigma_{Branch\_no="B003" \wedge type = "Flat"}$ (PROPERTY)

P3 : $\sigma_{Branch\_no!="B003"}$ (PROPERTY)

B1 : $\sigma_{Branch\_no="B003"}$ (BRANCH)

B2 : $\sigma_{Branch\_no!="B003"}$ (BRANCH)

Optimize the following query.

SELECT *

FROM BRANCH b, PROPERTY p

WHERE b.Branch No. = p.Branch No.

AND p.type = "Flat";