Name : ……………………………………………………………

Roll No. : …………………………………………………………

Invigilator's Signature : ………………………………………

CS/B.TECH(CSE)/SEM-7/CS-704A/2011-12

2011

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 any *ten* of the following :

$$10 \times 1 = 10$$

i)   Autonomy refers to the distribution of

   a)   data   b)   control

   c)   function   d)   none of these.

ii)   The simplest way to reconstruct a global consistent state in a distributed database is to use

   a)   local dumps   b)   local logs

   c)   global checkpoints   d)   all of these.

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iii) Vertical Fragmentation is a set of sub-relations each of which have a subset of

    a) attributes   b) tuples

    c) both (a) and (b)   d) none of these.

iv) Total isolation refers to

    a) fully autonomous facility

    b) partially autonomous facility

    c) both (a) and (b)

    d) none of these.

v) Commit starts

    a) when coordinator requests all subordinates to "get ready"

    b) when coordinator acknowledges that they are all agreed

    c) both (a) and (b)

    d) none of these.

CS/B.TECH(CSE)/SEM-7/CS-704A/2011-12

vi) All the data of the Global relation must be mapped into the fragments imply

    a) completeness condition

    b) reconstruction condition

    c) disjoint-ness condition

    d) all of these.

vii) Let a Global relation be SUPPLIER (SNUM, NAME, CITY), then

$SUPPLIER_1 = SL_{CITY = KOL}$ SUPPLIER, $SUPPLIER_2 = SL_{CITY = HOW}$ SUPPLIER $SUPPLIER_3 = SL_{SNUM.NAME}$ = SUPPLIER implies

    a) Horizontal fragmentation

    b) Vertical fragmentation

    c) Derived Horizontal fragmentation

    d) Mixed fragmentation.

viii) Processing locality conflicts with

    a) availability and reliability of distributed data

    b) workload distribution

    c) storage cost availability

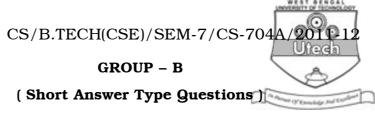   d) none of these.

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ix) Join graph is used in

    a)   primary horizontal fragmentation

    b)   vertical fragmentation

    c)   derived fragmentation

    d)   all of these.

x) Which one of the following is not a part of buffer replacement strategy ?

    a)   Stable blocks   b)   Pinned blocks

    c)   Output blocks   d)   Force output of block.

xi) Which of the following is increased with redundant data in distributed database system ?

    a)   Reliability   b)   Availability

    c)   Inconsistency   d)   All of these.

xii) Which one holds the fully distribution feature ?

    a)   Client-Server   b)   Peer-to-Peer

    c)   Multi-DBMS   d)   None of these.

CS/B.TECH(CSE)/SEM-7/CS-704A/2011-12

GROUP – B

(Short Answer Type Questions)

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

2. What is the difference between

    a)   parallel database and distributed database

    b)   homogeneous and heterogeneous distributed database ?

    $2\frac{1}{2} + 2\frac{1}{2}$

3. How does a central name server can help in ensuring unique name for data items ? Mention the disadvantages of such a scheme. $2\frac{1}{2} + 2\frac{1}{2}$

4. In two phase commit protocol, what happens when the network becomes partitioned ?

5. Discuss the additional functions of distributed database in comparison to a centralized database.

6. What is the principle of single lock manager approach for concurrency control ? Mention its disadvantages.   2 + 3

GROUP – C

(Long Answer Type Questions)

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

7. a)   Describe semijoin strategy and mention its advantage. 5

    b)   Consider the Global Relation

    PATIENT (NUMBER, NAME, SSN, AMOUNT-DUE, DEPT, DOCTOR, MED-TREATMENT) DEPARTMENT (DEPT, LOCATION, DIRECTOR) STAFF (STAFFNUM, DIRECTOR, TASK)

CS/B.TECH(CSE)/SEM-7/CS-704A/2011-12

Define their fragmentation as follows :

i)   DEPARTMENT has a Horizontal fragmentation by LOCATION, with two locations; each department is conducted by one DIRECTOR.

ii) There are several staff members for each department, led by the Department's Director. STAFF has a Horizontal fragmentation derived from that of DEPARTMENT and a semi-join on the DIRECTOR attribute.

iii) PATIENT has a Mixed fragmentation; attributes NUMBER, NAME, SSN and AMOUT-DUE constitute a Vertical fragment used for accounting purposes; attributes NUMBER, NAME, DEPT, DOCTOR and MED-TREATMENT constitute a Vertical fragment used for describing cares. This last fragment has a Horizontal fragmentation derived from that of DEPARTMENT and a semi-join on the DEPT attribute.

Give also the reconstruction of Global relations from fragments.   2 + 2 + (2 + 2 + 2)

8. a) In the context of distributed transaction, what are transaction manager and transaction co-ordinator, Specify their responsibilities.   3 + 4

    b) Why is it necessary to have a commit protocol ? Explain how does two phase commit protocol respond to failure of a participating site.   2 + 6

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9. a) What are the drawbacks of majority protocol ? 3

   b) Describe Quorum consensus protocol and mention its benefit. 4

   c) What is global wait-for graph ? When is it reconstructed or updated ? Under what circumstances, global wait-for graph based deadlock handling leads to unnecessary rollback ? 2 + 3 + 3

10. a) What is a catalog ? 2

    b) What are the uses of catalog in DDMBS ? 3

    c) What are the contents of a catalog ? 5

    d) What are the different alternatives of catalog management ? 5

11. Write short notes on the following : 6 + 4 + 5

    a) Checkpoint and cold restart

    b) ODBC

    c) Federated database system.

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