

Name :

Roll No. :

Invigilator's Signature :

CS/B.TECH (CSE)/SEM-7/CS-704A/2012-13

2012

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 :

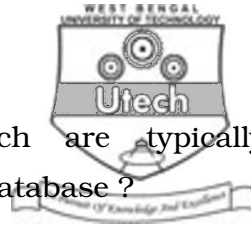
10 × 1 = 10

- i) Distributed Database is basically a placement of
 - a) Data and Function b) Data and Program
 - c) Data and Control d) Program and control.
- ii) The Query optimizer acts as
 - a) access path selector
 - b) to manage local DBMS remains constant
 - c) interpret user command
 - d) all of these.

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- iii) Which software components which are typically necessary for building a distributed database ?
- a) The data communication component (DC)
 - b) The data dictionary (DD)
 - c) The database management component (DB) and distributed database component (DDB)
 - d) All of these.
- iv) During growing phase of Two Phase Locking the 'locks' are
- a) released
 - b) acquired
 - c) both (a) and (b)
 - d) none of these.
- v) The type of mapping defined in the allocation schema (whether the Distributed DBMS is redundant or non-redundant) is
- a) One-to-many
 - b) One-to-one
 - c) Many-to-many
 - d) Many-to-one.
- 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.

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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) When the distributed database developed as a aggregation of existing databases what will be easier approach ?
- a) Bottom-Up
 - b) Top-Down
 - c) Both of these
 - d) None of these.
- ix) Cold Restart is required after some catastrophic failure which has
- a) caused the los of log information on stable storage
 - b) due to frequent access the machine is very hot
 - c) caused low access speed
 - d) none of these.
- x) To construct common data model in Heterogeneous distributed DBMS, which type of conflicts may arise ?
- a) Name conflicts
 - b) Scale conflicts
 - c) Structural conflicts
 - d) All of these.

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**GROUP – B****(Short Answer Type Questions)**Answer any *three* of the following. $3 \times 5 = 15$

2. What do you mean by Node & Link failure in DDBMS ? How can you recover these problems ? $2 + 3$
3. Why we need Checkpoints and Cold Restart ? Explain with diagram.
4. Compare the features of Distributed Database versus Centralized Database.
5. Draw and explain the state diagrams of 2-Phase Commitment Protocol for non-Blocking.
6. Define equivalence transformation. Explain Commutativity, Associativity of binary operations. $2 + 3$

GROUP – C**(Long Answer Type Questions)**Answer any *three* of the following. $3 \times 15 = 45$

7. What is Distributed Database System ? Explain with diagram reference architecture of a DDBMs. Write down the Date's 12 rule for DDBMS. What is site autonomy ? $2 + 5 + 6 + 2$
8. What is serializability in distributed database. Write down the algorithms both Coordinator and Participants of 2PC protocol in distributed environment. Explain with diagram communication structure for different 2PC protocol.

 $2 + 7 + 6$

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9. a) Consider the following schemas :

EMP = (ENO, ENAME, TITLE)

ASG = (ENO, PNO, RESP, DUR)

PROJ = (PNO, PNAME, LOC)

Consider the following query :

SELECT ENAME

FROM EMP, ASG, PROJ

WHERE EMP.ENO = ASG.ENO

AND PROJ.PNO = ASG.PNO

AND TITLE = 'ELECT ENGG.'

AND DUR = 12

Draw the canonical tree and then transform it into optimized tree. 8

- b) Simplify the following query using idempotency rules :

SELECT ENO

FROM EMP

WHERE (NOT (TITLE="PROGRAMMER"))

AND (TITLE="PROGRAMMER" OR TITLE="ELECT ENGG.")

AND NOT (TITLE="ELECT ENGG."))

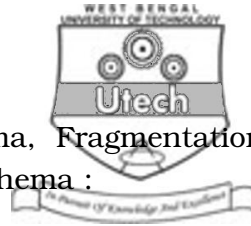
OR ENAME="TOM" ;

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- c) Write short notes on Distributed 2PL protocol.

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

Guest (G_ID, name, block_ID, room_no)

Fragmentation schema :

F1 : $\sigma_{\text{block_id}=\text{"North"}}(\text{Guest})$

F2 : $\sigma_{\text{block_id}=\text{"South"}}(\text{Guest})$

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. 5

- 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 conservative 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 : $\sigma_{\text{Branch_no}=\text{"B003"}} \wedge \text{type}=\text{"House"}}(\text{PROPERTY})$

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

P3 : $\sigma_{\text{Branch_no} \neq \text{"B003"}}(\text{PROPERTY})$

B1 : $\sigma_{\text{Branch_no}=\text{"B003"}}(\text{BRANCH})$

B2 : $\sigma_{\text{Branch_no} \neq \text{"B003"}}(\text{BRANCH})$

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Optimize the following query :

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SELECT S  
FROM BRANCH b, PROPERTY p  
WHERE b.Branch No.= p.Branch No.  
AND p.type = "Flat" ;
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