CS/MCA (SUPPLE)/SEM-5/MCAE-501A/09
DISTRIBUTED DATABASE MANAGEMENT SYSTEM (SEMESTER - 5)

1. .....
Signature of Invigilator

2. .....
Signature of the Officer-in-Charge

Reg. No. | | | | | | | | | | | | | | |

Roll No. of the Candidate | | | | | | | | | | | | | | |

CS/MCA (SUPPLE)/SEM-5/MCAE-501A/09
ENGINEERING & MANAGEMENT EXAMINATIONS, AUGUST – 2009
DISTRIBUTED DATABASE MANAGEMENT SYSTEM (SEMESTER - 5)

Time : 3 Hours] [Full Marks : 70

INSTRUCTIONS TO THE CANDIDATES :

1. This Booklet is a Question-cum-Answer Booklet. The Booklet consists of **32 pages**. The questions of this concerned subject commence from Page No. 3.
2. a) In **Group – A**, Questions are of Multiple Choice type. You have to write the correct choice in the box provided **against each question**.
   b) For **Groups – B** & **C** you have to answer the questions in the space provided marked 'Answer Sheet'. Questions of **Group – B** are Short answer type. Questions of **Group – C** are Long answer type. Write on both sides of the paper.
3. **Fill in your Roll No. in the box** provided as in your Admit Card before answering the questions.
4. Read the instructions given inside carefully before answering.
5. You should not forget to write the corresponding question numbers while answering.
6. Do not write your name or put any special mark in the booklet that may disclose your identity, which will render you liable to disqualification. Any candidate found copying will be subject to Disciplinary Action under the relevant rules.
7. **Use of Mobile Phone and Programmable Calculator is totally prohibited in the examination hall.**
8. You should return the booklet to the invigilator at the end of the examination and should not take any page of this booklet with you outside the examination hall, **which will lead to disqualification**.
9. Rough work, if necessary is to be done in this booklet only and cross it through.

No additional sheets are to be used and no loose paper will be provided

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FOR OFFICE USE / EVALUATION ONLY

Marks Obtained

	Group – A										Group – B			Group – C				
Question Number																	***Total Marks***	***Examiner's Signature***
Marks Obtained																		

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Head-Examiner/Co-Ordinator/Scrutineer

S-54049 (20/08)

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GROUP – A

(Multiple Choice Type Questions)

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

i) Data replication is a

a) technique of breaking up the database into logical units, which may be assigned for storage at the various sites

b) process of deciding about locating data to several sites

c) technique that permits storage of certain data in more than one sites

d) none of these. ☐

ii) A horizontal fragmentation is produced by specifying a

a) predicate operation of relational algebra

b) projection operation of relational algebra

c) selection and predicate operations of relational algebra

d) none of these. ☐

iii) In a DDBMS, the deadlock prevention method by aborting the transaction can be used such as

a) time stamping b) wait-die

c) wound-wait d) none of these. ☐

iv) A DDBMS allows application to access data from

a) local database b) remote database

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

v) Which of the following architectures is used by DDBS ?

a) Client/server architecture b) Mainframe architecture

c) Personal architecure d) None of these. ☐

vi) In DDBS the lock manager function is

a) distributed over several sites b) centralized at one site

c) no lock manager is used d) none of these. ☐

vii) Which of the following is the function of a DDBMS ?

a) Distributed data recovery b) Distributed query processing

c) Replicated data management d) All of these. ☐

viii) 3PC protocol avoids the limitation of 2PC protocol by

a) the blocking problem b) the non-blocking problem

c) the locking problem d) none of these. ☐

ix) Which of the following is a benefit of a parallel database system ?

a) Improved performance b) Greater flexibility

c) Better availability d) All of these. ☐

x) A global locking system is required in

a) shared-disk architecture b) shared-nothing architecture

c) shared-memory architecture d) none of these. ☐

GROUP – B

(Short Answer Type Questions)

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

2. What is distributed database ? What is DDBMS ? What are the features of DDBMS ?

3. What is the difference between reliability and availability ? What is nested transaction ?

4. Explain the different types of failures in DDBMS.

5. What is the difference between tightly coupled and loosely coupled architecture ?

6. Explain the cold starts and warm starts.

GROUP – C

(Long Answer Type Questions)

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

7. Consider the global relations :

   PATIENT (NUMBER, NAME, SSN, AMOUNT-DUE, DEPT, DOCTOR, MED-TREATMENT)

   DEPARTMENT (DEPT, LOCATION, DIRECTOR)

   STAFF (STAFFNUM, DIRECTOR, TASK)

   Define their fragmentation as follows :

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

   b) There are staff members for each department, led by the department's director. STAFF has a horizontal fragmentation derived from that of DEPARTMENT and semi-join on the DIRECTOR attribute. Which assumption is required in order to to assure completeness and disjointness ?

   c) Write down the rules for fragmentation in detail.

   d) Briefly describe the reference architecture of a distributed database.

   3 + 4 + 3 + 5

8. Consider the following *two* allocations of fragments :

a) R_1 at site 1 ; R_2 at site 2 ; R_3 at site 3

b) R_1 and R_2 at site 1 ; R_2 and R_3 at site 3.

With the following applications (all with same activation frequency)

A1, issued at site 1 reads 5 records of R_1 and 5 records of R_2

A2, issued at site 3 reads 5 records of R_3 and 5 records of R_2

A3, issued at site 2 reads 10 records of R_2 .

a) if we take locality of reference as objective, which solution is best ?

b) if we take complete locality of application as objective, which solution is the best ?

c) assume now that A3 updates 10 records of R_2 . Taking the locality of reference as objective, which one is the best ?

d) what do you mean by distribution transparency ? Discuss different levels of distribution transparency. 2 + 4 + 3 + 6

9. a) What is serializability in a distributed database ?

b) Discuss about 2-phase locking as a distributed concurrency control method.

c) Let two objects x, y be stored at site S1 and z and w be stored at site S2. Determine for each of the following executions, whether the execution is serializable or not. If yes, determine all possible total orders of transactions. If not, then prove that there is no total order possible.

Execution 1 :

S1 : R1 (x) R2 (x) W2 (x) W1 (x)

S2 : R2 (w) R2 (z) W2 (w) W1 (w)

Execution 2 :

S1 : R (x) ~ (x) W2 (y) W1 (y)

S2 : W1 (z)

Execution 3 :

S1 : R (x) R2 (x) W1 (x) W2 (y)

S2 : R (z) ~ (z) W2 (z) W1 (w)

Execution 4 :

S1 : R (y) R2 (x) W2 (x)

S2 : W1 (z) R1 (w) R2 (w) W1 (w). 2 + 6 + 7

10. a) Why are distributed deadlocks occurred ?

b) What are distributed wait-for graph and local wait-for graph ? How does wait-for graph help in deadlock detection ?

c) What is false deadlock ?

d) Consider the following wat-for graph.

Site 1 Site 2

r2 – – ~ T2 – – –→ T3i

J, T1 – – – 1 T1 < T31

Where Tj's are the transactions and – – –~ waiting for the case of different transactions – – –→ waiting in the case of same transactions.

Detect the deadlock occurred here. 2 + 6 + 2 + 5

11. a) Consider the following SQL query :

```
SELECT ENAME, RESP
FROM EMP, ASG, PROJ
WHERE EMP.ENO = ASG.ENO
AND PNAME = "CAD/CAM"
AND DUR ~ 36
AND TITLE = "Programmer"
```

Draw its Query Graph.

b) Given a Relation EMP (ENO, ENAME, TITLE) and its three horizontal fragments defined as follows :

EMP } = *a ENO ~ "E3"(EMP)*

EMP 2 = *0"'/:"3" < ENO ~ "E6" (EMP)*

EMP3 = cr > *"E6" (EMP*)

ENO

Now, consider the following example query :

```
SELECT *
FROM EMP
WHERE ENO = "E5"
```

Draw the Operator Tree for the Generic Query and also for the Reduced Query.

7 + 8

12. a) Why do we need reliability in distributed database ?

b) Differentiate between blocking and non-blocking commitment protocols in distributed database.

c) State the protocols which can deal with partitions.

d) Write notes on any *two* of the following :

i) Weighted majority locking

ii) Primary copy locking

iii) Write-locks-all. 2 + 3 + 2 + 8

END