PName : .....

Roll No. : .....

Invigilator's Signature : .....

CS/M.Tech (CSE)/SEM-2/MCSE-203/2013

2013

ADVANCED DATABASE MANAGEMENT SYSTEMS

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) Which database level is the one closest to the physical storage ?

a) Internal b) External

c) Conceptual d) None of these.

ii) Which of the following is a deadlock avoidance technique ?

a) Wound-wait b) Wait-die

c) All of these d) None of these.

iii) A cycle in a GWFG not involving an external node indicates

a) there is the possibility of local deadlock

b) there is the possibility of Global deadlock

c) a deadlock has occurred locally

d) a deadlock has occurred globally.

iv) Two-phase commitment protocol is used for

a) concurrency control

b) integrity control

c) recovery

d) redundancy.

v) 2PC is a

a) blocking protocol

b) non blocking protocol

c) both of these

d) none of these.

vi) Which of the following techniques is used when the information on a stable storage is lost ?

a) Shadow paging b) Check pointing

c) Cold restart d) None of these.

vii) Which of the following is not a recovery technique ?

a) Deferred update b) Immediate update

c) Shadow paging d) Write-ahead logging.

viii) 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) $n*(n+1)/2$

ix) Distributed transactions are classified based on

a) life time of transaction

b) read and write operations within transactions

c) structure of transactions

d) all of these.

x) Dirty data refers to the state in which data has been updated by a transaction and

a) the transaction has committed

b) the transaction has aborted

c) the transaction has restarted

d) the transaction has not yet committed.

xi) If you have a column with low cardinality and often count queries are run against the same which index will be appropriate

a) Bitmap index b) Hash based index

c) *B* tree index d) *B* + Tree index.

xii) If you have more range queries than point queries, which index you will prefer

a) value order based index

b) hash based primary index

c) hash based secondary index

d) bitmap index.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. Discuss horizontal, vertical and mixed fragmentation with example.

3. Discuss briefly about the Majority Locking protocol.

4. Differentiate between top down and bottom up approaches.

5. Describe the need of maintaining slowly changing dimension. What are the 3 strategies of handling slowly changing dimension, explain with example. 2 + 3

6. What are the different levels of independence, explain with example. What are different types of anomalies, explain with example. 2 + 3

GROUP – C

(Long Answer Type Questions)

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

7. a) Briefly explain the centralized deadlock detection approach.

   b) Explain checkpoint and cold restart of a distributed database system.

   c) What are False and Phantom deadlock ? 5 + 5 + 5

8. a) Write down the 3-phase commitment protocol with diagram.

   b) What are the communication schemes used for 2PC ?

   c) What are the alternative strategies of Data allocation ?

   5 + 5 + 5

9. Differentiate an OLTP system with an OLAP system. Explain how database system resolves the issue of concurrency, reliability, security issues faced by a file system. Describe a star schema consisting of fact and dimensional table with example. What is the difference between a star schema and snowflake schema ? What is a surrogate key ? Describe at least 3 scenarios when a surrogate key is useful.

3 + 3 + 4 + 1 + 1 + 3

10. Explain working of a multi level index with example. What are sparse and dense index respectively ? What are the overheads of indexes, if any ? We have the below table, compute the bit map strings for both gender and income level.

Customer Name	Gender	Income Level
Bikash	M	L1
Nilima	F	L2
Purabi	F	L2
Sourav	M	L1
Akshay	M	L3

Compare a hash based index with a value order based index. What are the two different types of hash indices ?

11. Write short notes on any *three* of the following : $3 \times 5 = 15$

    a) Homogeneous Vs Heterogeneous database

    b) Data Distribution Transparency

    c) Reference Architecture of Distributed DBMS

    d) State Transition diagram for 2PC.