



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

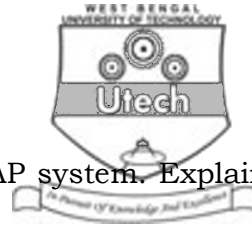
**GROUP – C**

**( 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



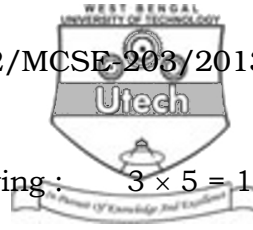
9. Differentiate an OLTP system with an OLAP system. Explain how database system resolves the issue of concurrency, reliability, security issues faced by a file system. Describe a star schema consisting of fact and dimensional table with example. What is the difference between a star schema and snowflake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

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