



Name :

Roll No. :

Invigilator's Signature :

**CS / M.Tech(CSE) / SEM-2 / MCSE-203 / 2010
2010**

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 the following : $10 \times 1 = 10$
 - i) Which one of the following is a trivial dependency ?
 - a) $AB \not\subset A$
 - b) $A \not\subset A$
 - c) Both (a) and (b)
 - d) None of these.
 - ii) A table can be logically connected to another table by defining a
 - a) hyperlink
 - b) common field
 - c) primary key
 - d) foreign key.
 - iii) F covers E implies
 - a) every FD in E also in F+
 - b) every FD of F also in E+
 - c) both (a) and (b)
 - d) none of these.



- iv) The relation $R = (ABC)$ and set of functional dependencies $F = \{A \rightarrow B, B \rightarrow C\}$. R is decomposed in two different ways $R_1 = (AB)$, $R_2 = (BC)$. This is
- a) loss-less join decomposition
 - b) dependency preserving
 - c) both (a) and (b)
 - d) none of these.
- v) The steps of ARIES recovery algorithm are
- a) analysis
 - b) redo
 - c) undo
 - d) all of these.
- vi) Autonomy refers to the distribution of
- a) data
 - b) control
 - c) function
 - d) none of these.
- vii) The condition which must be followed while defining horizontal fragmentation is
- a) completeness
 - b) reconstruction
 - c) disjointness
 - d) all of these.
- viii) Join graph is used in
- a) primary horizontal fragmentation
 - b) vertical fragmentation
 - c) derived fragmentation
 - d) all of these.



- ix) The query optimizer acts as
- access path selector
 - to manage local database remains constant
 - interpret user command
 - all of these.
- x) Distributed database is basically placement of
- data and function
 - data and program
 - program and control
 - data and control.

GROUP – B

(Short Answer Type Questions)

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

- Draw an extended ER diagram of your own college.
- Why is normalization needed ?
 - What are the anomalies of a relation ?
- Consider the following schema :

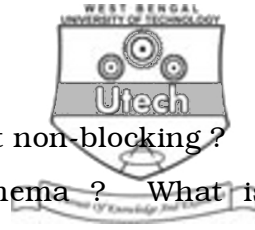
Suppliers (sid,sname,addres)

Parts (pid,pname,color)

Catalog (sid,pid,cost)

State what the following queries compute :

- a) π sname (π sid (σ color=red Parts) \bowtie $(\sigma$ cost<100Catalog) \bowtie Suppliers)
- b) π sname (π sid ((σ color=red Parts) \bowtie $(\sigma$ cost<100 Catalog) \bowtie Suppliers))



5. Explain 3-phase commit protocol. Why is it non-blocking?
6. What are local, global and external schema? What is multidatabase system?

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

7. a) Consider a relation R (A B C D E F G H I J) and the FDs are given as

$$F = \{ AB \twoheadrightarrow C, A \twoheadrightarrow DE, B \twoheadrightarrow F, F \twoheadrightarrow GH, D \twoheadrightarrow IJ \}$$

Find out the candidate key and also the super key set.

- b) Write down the general algorithm for finding out the candidate key.

Consider Student (USN, Name) with FDs $F = \{ USN \twoheadrightarrow Name, Name \twoheadrightarrow USN \}$. Find out the candidate key.

- c) Who are the users of DBMS ? $7 + 7 + 1$

8. a) Suppose that we decompose the schema

$R = (A, B, C, D, E)$ into

$(A B C)$

$(A D E)$.

Show that the decomposition is lossless decomposition if the following set F of functional dependencies holds :

$A \twoheadrightarrow BC$

$CD \twoheadrightarrow E$

$B \twoheadrightarrow D$

$E \twoheadrightarrow A$

- b) Find out the canonical cover of the following relation $R (A B C)$ with FDs

$A \twoheadrightarrow BC$

$B \twoheadrightarrow C$



$A \cap B$

$AB \cap C$

c) Why is relational algebra needed ? 7 + 7 + 1

9. a) What is view serializability ? Consider the schedule. Test whether they are conflict serializable schedule or not

T1	T2
Read(A)	
Write(A)	
	Read(A)
	Write(A)
Read(B)	
Write(B)	
	Read(B)
	Write(B)

b) What are immediate and deferred updates in a log based recovery ? Explain with diagram.

c) Draw the state transaction diagram and explain.

5 + 5 + 5

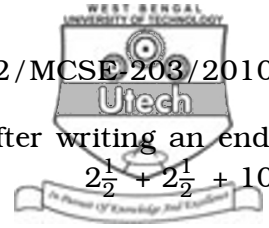
10. a) What are the methods to prevent unauthorized access in distributed database ?

b) Explain the concurrency control mechanisms.

c) Suppose that 2 PC with presumed is used as commit protocol. Explain how the system recovers from failure and deals with a particular transaction T in each of the following cases :



- i) A subordinate site for T fails before receiving a prepare T message.
- ii) A subordinate site for T fails after receiving a prepare message but before making a decision.
- iii) A subordinate site for T fails after receiving a prepare message and force writing an abort log record but before responding to the prepare message.
- iv) A subordinate site for T fails after receiving a prepare message and force writing a prepare log record but before responding to the prepare message.
- v) A subordinate site for T fails after receiving a prepare message and force writing an abort log record and sending a no vote.
- vi) The coordinator of site T fails before sending a prepare message.
- vii) The coordinator of site T fails after sending a prepare message but before collecting all votes.
- viii) The coordinator of site T fails after writing an abort log record but before sending any further message to its subordinates.
- ix) The coordinator of site T fails after writing a commit log record but before sending any further message to its subordinates.



- x) The coordinator of site T fails after writing an end log record.

$$2\frac{1}{2} + 2\frac{1}{2} + 10$$

11. a) What do you mean by local mapping transparency and replication transparency ?
- b) Consider the following global fragmentation and allocation schemata :

Global Schema : STUDENT (ROLL, NAME, DEPT)

Fragmentation Schema : STUDENT₁ = SL_{DEPT = "IT"}

STUDENT

STUDENT₂ = SL_{DEPT = "CS"}

STUDENT

Allocation Schema : STUDENT₁ at sites 1, 2

STUDENT₂ at sites 3, 4

(Assume that "IT" and "CS" are the only possible values for DEPT attribute)

- i) Write an application that requires the roll number of student from terminal and outputs the name and department, at levels 1, 2 and 3 of transparency.
- ii) Write an application that moves the student having roll number 432 from department "IT" to department "CS", at levels 1, 2 and 3 of transparency.

$$5 + (5 + 5)$$