http://www.makaut.com

Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/M.Tech(CSE)/SEM-2/MCSE-203/2011

2011

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 × 1 = 10

   i) The main objective of serializability is to search

      a) serial schedule b) nonserial schedule

      c) parallel schedule d) none of these.

   ii) Logical unit of work that must be either completed or aborted are called

      a) concurrent schedule b) serializable schedule

      c) transaction d) all of these.

   iii) If a relation does not have a join dependency, it is in

      a) 3NF b) 4NF

      c) BCNF d) 5NF.

iv) If every determinant in the table is a candidte key, then it is in

a) 3NF b) 4NF

c) 5NF d) BCNF.

v) ..... file organization rewrites the file to be rewritten when new records are added.

a) Sequential b) Direct

c) Indexed d) Hashed.

vi) Which of the following is an aggregate function ?

a) PLUS b) ABS

c) Minimum d) Count.

vii) How many rules are there in E F Codd's Rule ?

a) 10 b) 12

c) 8 d) 9.

viii) Distributed database system is the union of two technologies

a) database and artificial intelligence

b) database and networking

c) database and soft computing

d) database and parallel programming.

ix) A distributed database is

a) a collection of multiple, logically interrelated databases

b) distributed over computer network

c) parallel database system

d) both (a) and (b).

x) Which of the following statements is not true for DDBMS ?

a) DDBMS delivers data distribution transparency ability

b) DDBMS delivers easier system expansion ability

c) DDBMS delivers improved query processing ability

d) DDBMS delivers less reliability over centralized system.

GROUP – B

(Short Answer Type Questions)

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

2. a) Explain the difference between serial schedule and serializable schedule.

b) Describe one method of testing serializability. 2 + 3

3. What is Hashing ? State the various steps to find out the address of any data.

4. Describe the physical significance of closure of a set of attributes and closure of a set of FD.

5. Describe the set operations of relational algebra, including union ($\cup$) intersection ($\cap$) set difference (–) and cross product (∞). For each, what can you say about the cardinality of their input and output tables ?

6. Discuss on various levels of transparencies delivered by DDBMS.

7. Discuss on Lock based concurrency control strategies for DDBMS.

GROUP – C
(Long Answer Type Questions)

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

8. a) Consider the following two sets of FDs :

$F = \{ A \varnothing C, AC \varnothing D, E \varnothing AD, E \varnothing H \}$

$G = \{ A \varnothing CD, E \varnothing AH \}$

Check whether they are equivalent.

b) If $R = \{ A B C D E G H I \}$ and FDS

$F = \{ A \varnothing BD, C \varnothing D, AD \varnothing CE, OG \varnothing H \}$

List all candidate keys.

c) Compute F_c for FD set F given in question 8b.

5 + 5 + 5

9. a) Check whether the following schedule is conflict serializable. (Don't use precedence graph)

$T1$	$T2$
$R(A)$	
$W(A)$	
	$R(A)$
$R(B)$	
	$W(A)$
$W(B)$	
	$R(B)$
	$W(B)$

b) Draw the precedence graph of the following schedule :

$T1$	$T2$	$T3$
$R1(A)$		
		$R3(A)$
$W1(A)$		
	$W2(A)$	
		$W3(A)$

c) List all MVD satisfied by the following relation :

A	*B*	*C*
1	2	3
1	2	4
5	2	3
5	2	6

d) If $R = \{ A, B, C, D \}$ and the FDs are $\{ A \varnothing C, D \varnothing B \}$, why R is in 3NF but not in BCNF ? 5 + 4 + 3 + 3

10. a) What do you mean by Dense and Sparse index ? State with examples for each.

b) Insert the elements in a B tree with order 5 :

55,4,67,90,12,34,5,68,44,1,99,100,46,78,3,61,21,29

c) Consider the schema of a company :

employee(EID,Name,Bdate,Address,Salary,DeptId)

department(DeptID, Dname, Office, Mng-EID)

project(Pcode,Name,Budget,DeptId)

join(EID,PCode,Startdate)

emp-dependent(EID,Dependent-Name,Bdate,Relationship)

i) Find the name, relationship of all the dependents of employees who works for Department Human Resource.

ii) Find the name of employees who works for both project number1 & project number2.

$5 + 5 + 2 \infty 2\frac{1}{2}$

11. What are the advantages of DDBMS over centralized DBMS ? Explain with an example to illustrate the usefulness of semijoin strategy facilitating improved distributed query processing. Consider the following data allocation schemata and discuss on the query decomposition as well as execution strategies at site 2 to retrieve the name and hours for each employee who works on some project controlled by the department 5. Please note that an employee working on a project may not belong to the department controlling the project.

a) EMPLOYEE (name*[Emp-name]*, **ssn** *[EMP-ID]*,
dno *[dept number to which an employee belongs]*)

b) PROJECT (pname*[Project name]*, **pnum** *[Project-ID]*,
ploc *[Project-location]*, dnum *[project-controller dept]*)

c) WORKS_ON (**essn***[Emp-ID]*, **pno** *[Project-ID]*,
hours *[hours spent on the project]*)

- At site-1 : All *i.e.* entire database is present at site-1 without fragmentation
- At site-2 :
  - EMPLOYEE :
    - Attribute List : * (*i.e.* all)
    - Guard Condition : dno = 5
  - PROJECT :
    - Attribute List : * (*i.e.* all)
    - Guard Condition : dnum = 5
  - WORKS_ON :
    - Attribute List : * (*i.e.* all)
    - Guard Condition : "essn" in ∏ssn (EMPLOYEE at Site 2) Or "pno" in ∏pnum(PROJECT at Site 2)

4 + 5 + 6

12. Discuss on various deadlock management strategies in DDBMS. Why is recovery in a DDBMS more complicated than a centralized system ? Describe distributed Two-Phase commit protocol. How does Three-Phase commit protocol prevent the well-known blocking issue of Two-Phase commit protocol ? 6 + 1 + 5 + 3