Name : .....

Roll No. : .....

Invigilator's Signature : .....

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

2013

ADV. DBMS

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.

Answer Question No. **1** and any *two* from each Group.

1. Answer any *five* of the following : 5 × 2 = 10

a) Explain the distinction between the term serial schedule and serializable schedule.

b) Show with the help of a diagram the different steps in query processing.

c) What is heterogeneous database ?

d) Explain the working principle of 2PL.

e) Explain the importance of 'log base recovery' method in DBMS.

f) What do you mean by 'Object oriented database' ?

GROUP – A

Answer any *two* of the following. 2 × 15 = 30

2. a) Let the relations $r1$ (A, B, C) and $r2$ (C, D, E) have the following properties. $r1$ has 20000 tuples, $r2$ has 45000 tuples, 25 tuples of $r1$ fit on one block, and 30 tuples of $r2$ fit on one block. Estimate the number of block access required the Nested-loop join strategy for $r1$ and $r2$. 5

b) What is a recoverable schedule ? Why is recoverability of schedules desirable ? Explain your answer. 5

c) What is a cascades schedule ? Why is cascadelesness of schedules desirable ? Explain your answer. 5

3. a) Consider the following two transactions :

$T1$: Read (A);

Read (B);

If A = 0 then B : = B + 1;

Write (B);

$T2$: Read (B);

Read (A);

If B=0 then A : = A + 1;

Write (A);

Add lock and unlock instructions to transactions $T1$ and $T2$, so they observe the two-phase locking protocol. Can the execution of these transactions result in a deadlock ? 7

b) Explain with the help of an example the phantom phenomenon. Why may this phenomenon lead to an incorrect concurrency execution despite the use of the two-phase locking protocol ? 8

4. a) Explain why log records for transactions on the undo-list must be processed in the reverse order, whereas redo is performed in a forward direction and undo is performed before performing redo. Explain the recovery algorithm in the situation where redo is performed before undo. 10

b) Explain the purpose of the checkpoint mechanism. How often should checkpoints be performed ? 5

GROUP – B

Answer any *two* of the following.

5. a) What is the difference between a primary index and a secondary index ? What is multilevel index ? 5

b) Let the following relation schemas be given : $2\frac{1}{2} + 2\frac{1}{2}$

$R = (A, B, C)$

$S = (D, E, F)$

Let relation r (R) and s (S) be given. Give an expression in the tuple relational calculus that is equivalent to each of the following :

i) $\sigma_{B = 17}(r)$

ii) $\prod_{A, F}\left(\sigma_{C = D}(r \times s)\right)$.

c) Explain right outer join and theta join with proper examples and diagram. 5

6. Discuss the relative advantages of centralized and distributed database. What is horizontal and vertical fragmentation ? What do you understand by local and global transaction in distributed database ? What is the role of transaction manager ? Why is it useful to have replication or fragmentation of data ? Explain your answer.

4 + 3 + 2 + 2 + 4

7. Explain RAID level hierarchy. Explain the concept of view and conflict serializability with proper examples. Write short note on Data Warehousing. 5 + 5 + 5