Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/M.Tech(MSS)/SEM-2/MMS-203/2012

2012

TOPICS ON 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 any *five* of the following. 5 × 14 = 70

1. a) Comment on the following with proper justification.

   i) *AB*+ tree index structure is efficient both for sequential access and for random access.

   ii) Dynamic hashing maintains the memory requirement in an effective way.

   b) Find out the cost of indexed nested loop join algorithm. (5 + 6) + 3

2. a) Write an algorithm for shared and exclusive locking. How does granularity affect this algorithm ? Discuss about the intention of lock up-gradation and lock down-gradation mechanism through an example.

   b) "Most of the DBMS implement strict or rigorous two-phase locking" — critically comment on the statement. (4 + 4 + 3) + 3

3. a) Consider the following database :

employees(e_no,e_name,address,salary),
projects(p_no,p_name,p_job),work_on(emp_no,p_no)

Optimize the following SQL query through heuristic based optimization :

```
SELECT e_name
WHERE  e_no IN
       (SELECT e_no
       FROM work_on
       WHERE p_no=
       (SELECT p_no
       FROM projects
       WHERE p_name="DBMS")
       ORDER by e_name
```

b) Discuss the timestamp ordering protocol for concurrency control. What is Thomas write rule and how does it affect the above-said protocol ?

6 + (6 + 2)

4. a) What do you mean by the term Reliability of Distributed Database in the context of application-dependent and application-independent specifications ? Explain in brief the relation of reliability with availability.

b) Explain how 2-Phase-Locking can be used as a method for Distributed Concurrency Control. 5 + 4 + 5

5. a) "The sequence of Select-Project-Join has been considered as an effective method of query optimization in a centralized database" — explain. Do you consider the same method be enough for distributed database also ?

   b) Explain in brief the potential problems, if any, in updating of database in distributed environment.

(4 + 6) + 4

6. Explain the structure and operation of a quad-tree. How do you store an area feature in a quad-tree structure ? What are the limitations of quad tree while used for GIS applications ? 2 + 4 + 5 + 3

7. Explain why conventional database systems cannot handle spatial data efficiently ? Design a monolithic data organization to handle both spatial and non-spatial query related to GIS applications. 4 + 10

8. Write short notes on any *two* of the following : 7 + 7

   a) Security issues in Statistical Database

   b) XML databases

   c) Temporal databases

   d) Multimedia databases.