[This question paper contains 3 printed pages]

6260-A   *Your Roll No*

M.Sc. COMPUTER SCIENCE/II Sem.   **J**

MCS 203 – DATABASE SYSTEMS AND IMPLEMENTATION

(OC)

Time   2 hours   *Maximum Marks   40*

*(Write your Roll No on the top immediately
on receipt of this question paper)*

Attempt **all** *questions*
Use of calculator is allowed
Parts of a question should be answered together

1   (a) What are the advantages of RAID level 5 over RAID level 4 ? Explain with the help of an example   (3)

   (b) Consider a disk with block size 512 bytes A block pointer is 6 bytes long, and a record pointer is 7 bytes long A file has 30,000 EMPLOYEE fixed length records of 115 bytes each SSN is one of the fields in a record and occupies 9 bytes Suppose the file is ordered by the key field SSN and we want to construct a primary index on SSN Calculate

                                              P T O

(i) the index blocking factor bfr_i (1)

(ii) the number of first-level index entries and the number of first-level index blocks Assume that there is one index record for every block in the data file   (2)

(iii) the number of levels needed if we make it into a multi-level index   (2)

(c) Consider a disk with the following characteristics block size B = 512 bytes, interblock gap size = 128 bytes, number of blocks per track = 20, number of tracks per surface = 400 A disk pack consists of 15 double-sided disks What is the total capacity of a cylinder and what is its useful capacity (excluding interblock gaps) ?   (2)

2   (a) What is a collision in hashing ? Explain any two methods of collision resolution   (3)

(b) Differentiate between the following

(i) clustering and non-clustering indexes

(ii) nested and block nested loop join   (5)

(c) What is an equivalence rule ? Where is it used ?   (2)

3 (a) Consider the following relational schema

Employee (personName, street, city)

Works(personName, companyName, salary)

Company(companyName, location)

Given the following relational algebra expression

$\Pi_{Employee\ personName\ \ Works\ companyName\ \ location}\ (\sigma_{location\ =\ city\ \wedge\ salary\ \ 100000}\ (Employee \bowtie Works \bowtie Company)$

Construct a relational algebra tree and a relational algebra expression that reflects the order of operations a query optimizer would choose for the given expression (5)

(b) What is a transaction ? With the help of a diagram, explain the various states a transaction goes through (5)

4 (a) What do you understand by serializability ? Briefly explain various types of serializability (5)

(b) What are locking protocols ? How is strict two-phase locking protocol different from rigorous two-phase locking protocol ? (5)

(100)**