MCA (III Year)

Term-End Examination

June, 2008

CS-15 : RELATIONAL DATABASE MANAGEMENT SYSTEM

Time : 3 hours   Maximum Marks : 75

Note :   Question number 1 is **compulsory**. Answer any **three** questions from the rest.

1. (i)   Consider the following relations :

hotel (hotelno, hotelname, city)

room (roomno, hotelno, type, price)

booking (hotelno, guestno, datefrom
              dateto, roomno)

guest (guestno, gname, gaddress)

Write appropriate queries in SQL as well as relational algebra for the following : $4 \times 2\frac{1}{2} = 10$

(a)   Find the average price of a room.

(b)   List the names and addresses of all guests with bookings for a hotel in London, alphabetically ordered by name.

(c)   Find the total income from all the rooms of the hotels in New York.

(d)   List the name(s) of guest(s) at the Grosvenor Hotel who are paying highest price for a room.

(ii) What is a checkpoint ? How is the checkpoint information used in recovery operation following a system crash ?   *4*

(iii) Define BCNF. How does it differ from 3NF ? Why is it considered a stronger form of 3NF ?   *6*

(iv) Mention at least four instances where creating a database is not necessary.   *4*

(v) How is a union different from category in ER-Diagrams ? Give an example of your own to differentiate between the two.   *6*

2. (i) Consider the following transactions (Trn)

$$Trn1 : Fac\_salary_i = 1 \cdot 1 \cdot Fac\_salary_i + 1025$$

$$Trn2 : Avg\_Fac\_Salary_i = \sum_{i=1}^{n} Fac\_salary_i / N$$

What problem(s) could arise if these were to run concurrently ? How would you solve the problem(s) ?   *10*

(ii) Compare binary locks with Read/Write locks.   *5*

3. (i) Each semester, each student must be assigned an advisor who counsels students about degree requirements and helps students register for a class. Students must register for the classes with the help of an advisor, but if their assigned advisor is not available they must register with any advisor. The system must keep the track of students, their assigned advisors and the classes for which they have registered. Represent the above with ER diagram. Identify all primary keys, candidate keys as well as foreign keys in the above.   *8*

(ii) Prove or disprove the following inference axioms :

    (a) $\{w \rightarrow y, x \rightarrow z\} \models \{wx \rightarrow y\}$ 2

    (b) $\{w \rightarrow y\}$ and $y \supseteq z \models \{x \rightarrow z\}$ 2

    (c) $\{xy \rightarrow z, y \rightarrow w\} \models \{xw \rightarrow z\}$ 3

4. (i) Why is data replication useful in DDBMSs ? What typical units of data are replicated ?   6

    (ii) What is the difference between persistent and transient objects ? How is persistence handled in typical OO database systems ?   9

5. (i) What is multivalued dependency ? What type of constraint does it specify ? When does it arise ?   6

    (ii) Why can we have at most one primary or clustering index on a file but several secondary indexes ? How does multi level indexing improve the efficiency of searching an index file ?   9