S.E. Sem 4 Comp.
P4/RT-Ex-08-290

Database systems

02/12/08

Con. 5264–08.

RC–6107

(3 Hours) **[Total Marks : 100**

N.B. : (1) Question No. **1** is **compulsory**.
    (2) Attempt any **four** questions out of remaining **six** questions.
    (3) Make **suitable** assumptions if **needed**.

1. (a) Describe following terms :–   **12**
        (i) Natural Join and Equi Join.
        (ii) 3 layer data obstruction
        (iii) Different types of DBMS users.

  (b) State whether following statements are **true** or **false** –   **8**
        (i) ISAM Index is dense Index
        (ii) The outcome of database design is only set of table schemas
        (iii) Relational model better supports physical data independence than logical data independence
        (iv) No further FDs can be generated once initial analysis lists given set of FDs from mini world description
        (v) Heap based storage needs more disk space than that required for hashing based storage organization
        (vi) Tree based locking protocol prevents deadlock
        (vii) Shadow paging requires no redo and undo operation overheads
        (viii) View can provide dynamic security control.

2. (a) Describe 2 NF, 3 NF and BCNF with examples.   **8**
        Decompose 2 NF table into 3 NF tables with example
        Decompose 3NF table into BCNF tables with example.

  (b) Consider following employee database.
        emp (empid, empname, bdate, address, sex, salary, mgrid, dno)
        dept (dno, dname, dmgrid, appointedate)
        project (pno, pname, plocation, dno)
        dept location (dno, dlocation)
        works on (empid, pno, Hours)
    Most attributes are self explanatory 'bdate' is birthdate and address stores full address in string format 'mgrid' is the manager / supervisor of the employee working in dept 'dno', 'dmgrid' is the manager of the department and is appointed on 'appointedate'. Department may be located at multiple locations. Every project is managed by a department – 'dno'. Write SQL queries –
        (i) List the department names which are located at multiple locations.   **2**
        (ii) List department, its manager and number of employees in the dept.   **2**
        (iii) List the employees who do not have any supervisors.   **2**
        (iv) List the employees working on project 'myERP' with their present salary and salary after 10% raise.   **3**
        (v) List the projects whose location is same as location of their controlling department.   **3**

[TURN OVER

3. (a) Library needs to be computerised. The main functions to be supported are to query existing titles based on either author / title or key strings. Users are registered to borrow the books. All transactions, i.e. to issue and return are stored. Users can put the claim. Write any assumption you make.

    (i) Draw E-R diagram for above requirements. Show relationship types and primary key of entities.   8

    (ii) Convert E-R diagram into set of relation schema.   4

  (b) Describe database design process. What are ideal characteristic of database design output ?   8

4. (a) Draw state diagram for transaction and describe concept of transaction in DBMS.   6

  (b) Explain shadow paging technique for recovery.   7

  (c) Explain 'Undo' and 'Redo' operations for log based recovery. How they are used during recovery ?   7

5. (a) Explain time stamp based concurrency control.   8

  (b) Describe different methods of recovery from deadlock.   6

  (c) Describe one protocol that prevents deadlock.   6

6. (a) Describe hashed based storage organization.   4

  (b) Compare ISAM index vs B-tree index.   4

  (c) Consider a disk with blocksize = 2048 bytes. A block pointer = 6 bytes. Employee table schema is as follows —

    employee (name char (20),

             id   char (9),

             dept   char (9),

             address char (36),

             phone   char (9),

             bdate   date,

             sex   char (1),

             Johcode char (4),

             Salary   Number,

    Where 'date' type needs 8 bytes and 'number' type needs 4 bytes of storage. Calculate if there are 30,000 employees —

    (i) Record size in bytes   3

    (ii) Number of records per disk block   3

    (iii) Number of Block to store employee table on the disk   3

    (iv) Number of Blocks to store ISAM index on 'id' on the disk.   3

7. Write short notes (any **four**) :-   20

    (a) Check pointing in crash recovery

    (b) 'View' in SQL

    (c) Foreign key and referential integrity

    (d) Procedural vs non procedural query languages

    (e) Conflict serializability.