53 (EC 813) DBMS

2019

DBMS

Paper : EC 813

Full Marks : 100

Time : Three hours

***The figures in the margin indicate
full marks for the questions.***

*Answer **any five** questions.*

1. *(a)* Define first, second and third normal forms. Differentiate between 3NF and BCNF. Why BCNF is considered as a stronger form of 3NF ? 10

   (b) Discuss various types of locks used in concurrency control. 10

2. *(a)* What do you mean by database schema ? Draw a schema diagram of a BANK database. 2+6=8

(b) What are the advantages of DBMS approach over traditional file system? Explain. 8

(c) What is a two-phase locking protocol? 4

3. (a) Explain deadlock and starvation. Write about *any one* deadlock prevention as well as detection schema. 4+3+3=10

(b) Discuss the optimistic concurrency control technique. How is minimum overhead achieved? 10

4. (a) Consider the following relation :

R (doctor_id, patient_id, date, diagnosis, treat_code, charge).

Here, a tuple describes a visit of a patient to a doctor along with a treatment code and daily charge. Assume that diagnosis is determined uniquely for each patient by a doctor. Assume that each treatment code has a fixed charge regardless of patient. Normalize the relation. 8

(b) Discuss the cardinality ratios for binary relationships, giving proper example. Explain tertiary relationship type. 8+4=12

5. (a) Consider the following relations for an order-processing database applications.

customer (cust#, cname, qty)

order (order#, Odate, cust#, Oamt)

order-item (order#, item#, qty)

item (item#, unit-price)

shipment (order#, warehouse#, ship-date)

warehouse (warehouse#, city)

Here, Oamt → order amount, Odate → order date

ship_date → shipping date.

Assume that an order can be shipped from several warehouses. Specify the foreign keys for this schema, stating any assumption you make and find other constraints, if any. 10

(b) What is a transaction ? What are the problems associated with concurrent transaction processing ? 2+8=10

6. (a) Consider the following relation schema :

employee (emp_id, name, age, salary, dept_no)

department (dept_no, d_name, d_location, mgr_id)

2×6=12

project (proj_no, proj_name, dept_no, p_location)

works-on (emp_no, proj_no, hours)

Write SQLs for the following:

(i) Retrieve name and address of all employees who work in 'HR' department.

(ii) For every project located in 'New Jersey', list the project number, the project name, the department and the department manager's name. 10

(iii) For each project, retrieve the project number, the project name, and the no. of employees who work on that project.

(iv) For each department, retrieve the department number, the no. of employees in the department and their average salary.

(v) Increase the salary of each employee by 10% for 'Research' department.

(vi) Find the employee who works for maximum no. of hours (per week) and the project-no.

(b) Discuss entity integrity, referential integrity and foreign keys. 8

7. Write short notes on: 5×4=20

(i) Primary key and Super key

(ii) ACID properties of a transaction

(iii) Transaction State Diagram

(iv) Serializability and Schedule.