Total number of printed pages–6

53 (EC 813) DBMS

2018

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)* Consider the following COMPANY relational database schema.

employee → { ssn, name, addr, age, salary, d_no, super_ssn, gender}

dept → {d_no, dname, dlocation, mgr_ssn}

project → { p_no, pname, plocation, dnum}

works_on → {essn, pno, hours}

Contd.

Write the following queries in relational algebra : 2×5=10

(i) Retrieve the names of all employees in department 4 who work more than 10 hours per week on the product X project.

(ii) Find the names of all employees who are directly supervised by "Smith".

(iii) Retrieve the names of all employees who work on every project.

(iv) Retrieve the average salary of all female employees.

(v) For each project, list the project name and the total hours per week by all employees spent on that project.

(b) Discuss the problems, giving example, faced when concurrent transactions are executed in an uncontrolled manner. 10

2. *(a)* What is a lock? Describe the types of locks used in concurrency control. 2+6=8

(b) Discuss the problems of deadlock and starvation and different approaches to deal with these problems. 5+7=12

3. (a) Discuss the optimistic concurrency control technique. Name its phases. How is minimum overhead reached? 10

(b) Draw an ER diagram of your institute, taking a mini-world situation of your interest. Take assumptions if needed. 10

4. (a) Define first, second and third normal forms. Give appropriate example for each. 6

(b) How does BCNF differ from 3NF? Why is it considered a stronger form of 3NF? 5

(c) Consider the following database relations : $1 \cdot 5 \times 6 = 9$

suppliers (s-no, s_name, status, city)

parts (p_no, p_name, color, weight, city)

projects (proj_no, proj_name, city)

shipment (s_no, p_no, proj_no, quantity)

Write SQL statements for the following queries :

(i) Get the part numbers and the weight for each part with weight more than 10,000.

(ii) For each supplier, get the supplier numbers and the total no. of parts supplied.

(iii) Get the maximum and minimum quantity for part P2.

(iv) Set the shipment quantity to five for all suppliers in Bombay.

(v) Delete all shipments with quantity greater than 300.

(vi) Get the total quantity of part P2 supplied.

5. (a) Draw a transaction state diagram and discuss the typical states that a transaction goes through during execution. 8

(b) Consider the following relation : 8

car_sale (car #, date_sold, salesperson #, commission%, discount_amt)

Assume that a car may be sold by multiple salespeople. Additional dependencies are :

date_sold → discount_amt;

salesperson # → commission %.

Based on the given primary key, is this relation in 1NF, 2NF or 3NF ? Why or why not ? How would you successfully normalize it completely. 8

(c) Draw a binary relationship diagram of the database relation given in Q. no. 4. *(c)*. 4

6. *(a)* Discuss the cardinality ratios for binary relationships, giving proper example. 6

(b) Discuss the various characteristics of database approach. 7

(c) What is a transaction ? What are its desirable properties ? 2+5=7

7. Write short notes on : 5×4=20

(i) Serializability and schedule

(ii) Referential integrity constraints and foreign key

(iii) Two-phase locking protocol

(iv) Types of attributes.

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