[Total No. of Questions - 9] [Total No. of Printed Pages - 4]
(2068)

18060(M)

B. Tech 4th Semester Examination

Database Management System (CBS)

CS-401

Time : 3 Hours **Max. Marks : 60**

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Candidates are required to attempt five questions in all selecting one question form each of the sections A, B, C and D. Section E with all its subparts is compulsory.

SECTION - A

1. (a) What are the disadvantages of conventional file processing system that has led to the emergence of Database Management System? (6)

   (b) Explain component modules of a complete Database Management System and their interaction with the overall architecture. (6)

2. (a) Draw and explain complete ER diagram of a banking system with all components. (6)

   (b) What is a data model? Name three basic data models and explain in detail network model. (6)

SECTION - B

3. (a) Explain the basic Relational Algebra operations. Differentiate between Cartesian product and natural join operations used in relational algebra. (6)

   (b) Explain Tuple Relational Calculus and Domain Relational Calculus. Give example of each. (6)

4. (a) Explain the mechanism of maintaining referential integrity based on foreign keys (foreign key rules), considering that null values are not allowed. (6)

   (b) Consider the following employee database, where the primary keys are underlined.

   Employee (employee-name, street, city)

   Works (employee-name, company-name, salary)

   Company (company-name, city)

   Managers (employee-name, manager-name)

   Give an expression in SQL for each of the following queries.

   (i) Find the names of all employees who work for State Bank of India and live in Delhi.

   (ii) Find the names, street addresses and cities of residences of all employees who work for first Bank Corporation and earn more than Rs. 10000.

   (iii) Find all employees who do not work for State Bank of India.

   (iv) Find the company that has the smallest payroll.

   (v) Find all employees in the database who do not live in the same cities and on the same streets as do their managers. (6)

SECTION - C

5. (a) What is functional dependency? How it affects the design of a good database schema? With suitable example give various functional dependencies and their possible remedies. (6)

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(b) What is query optimization? Explain cost statistics and cost based optimization. (6)

6. (a) If we have 3NF, why do we need BCNF? Take an example that shows that BCNF is required and thus differentiate between BCNF and 3NF. (6)

(b) Explain two-phase lock protocol in detail. How it helps in maintaining concurrency? (6)

SECTION - D

7. (a) What are different methods of concurrency control in parallel transactions? What is serial equivalent interleaving of transactions? (6)

(b) Explain Timestamp based concurrency control method. (6)

8. (a) How does a transaction differ from normal operation? What are software locks and with example explain how they are helpful in concurrency control? (6)

(b) What are ACID properties of transactions? What do you understand by durability? (6)

SECTION - E

9. (a) What is the role of Database Administrator?

(b) What is a weak entity set? How to convert it into strong entity set?

(c) What is Data Independence? Is it a desired or undesired property?

(d) What is the difference between Procedural DML and Non-Procedural DML?

(e) What is a multi valued attribute? Give examples.

(f) What is DDL and DML?

(g) Define foreign key. How does it play a role in the join operation?

(h) Explain Triggers and its types with examples.

(i) What is Lossless join property?

(j) What is loss-less decomposition?

(k) What is lost update problem in transaction processing?

(l) Differentiate between join and natural join operations. (1×12=12)