53 (CS 401) DBMS

2017

DATABASE MANAGEMENT SYSTEMS

Paper : CS 401

Full Marks : 100

Time : Three hours

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

*Answer **any five** questions.*

1. *(A)* Explain the following terms briefly :

Simple Attribute and Composite attribute, Domain, Mapping cardinality, Participation constraints, Weak entity set, Aggregation, Strong entity set. 10

(B) A university database contains information about professors (identified by social security number or SSN and courses identified by course id). Professors teach courses. Assume that professors can teach the same course in several semesters and each offering must be recorded. Draw an E-R diagram that describes above situation. 10

2. *(A)* What is a Locking Protocol? Describe about strict Two-Phase Locking protocol. 5

(B) Describe ACID Properties of Transactions. 5

(C) Explain about query processing and query optimization. 10

3. *(A)* What is multiple-granularity? What is the difference between Implicit and Explicit Locking? 5

(B) Define Deadlock. Explain about deadlock prevention schemes. 5

(C) Explain about Recoverable schedule and Cascadeless schedule with the help of example. 10

4. *(A)* Consider a relation R with five attributes ABCDE. You are given the following dependencies :

$A \rightarrow B$, $BC \rightarrow E$ and $ED \rightarrow A$

(i) List all candidate keys for R.

(ii) Is R is in 3NF?

(iii) Is R is in BCNF?

if R is not in BCNF, then decompose it to get schemes which will satisfy BCNF condition. 10

(B) Define 2NF and 4NF. 5

(C) Explain about Functional dependencies and Multi-valued dependencies. 5

5. Consider the employee database of Figure-1, where the primary keys are underlined. Given an expression in SQL for each of the following queries.

Employee (employee-name, street, city)

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

Company (company-name, city)

Manager (employee-name, manager-name)

20

Figure-1

(i) Find the names and cities of residence of all employees who works for "State Bank of India".

(ii) Find all employees in the database who do not work for "State Bank of India".

(iii) Find the name of the employee who earn highest salary.

(iv) Find all employees in the database who earn more than each employee of "Small Bank Corporation".

(v) Find the names, street address, and cities of residence of all employees who work for "First Bank Corporation" and earn more than Rs. 50,000.

6. *(A)* Let consider the following relation schemes be given : 3+3+4=10

$R = (A, B, C)$

$S = (D, E, F)$

Let relations r (R) and s (S) be given. Give an expression in the tuple relational calculus that is equivalent to each of the following :

(i) $\pi_A (r)$

(ii) $\sigma_{B=17} (r)$

(iii) $\pi_{A, F} (\sigma_{C=D} (r \times s))$

(B) Explain the following relational algebra operation with the help of example.

(i) Select *(ii)* Project

(iii) Union *(iv)* Set difference

(v) Rename 10

7. *(A)* Explain about Two-tier architecture and Three-tier architecture. 5

(B) Differentiate between Data Manipulation Language (DML) and Data Definition Language (DDL). 5

(C) Explain the functions of Database Administrator (DBA). 10
