Hajee Mohammad Danesh Science and Technology University, Dinajpur

Department of Computer Science and Engineering

B. Sc. (Engg) in Electronics and Communication Engineering

Special Repeat Examination - 2018

Level: 3 Semester: I Credit Hours: 3.0 Course Code: CSE 315

Course Title: Database Management System

Time: 3 Hours **Total Marks: 90**

[NB: The figure in the right margin indicates the marks for the respective question. Split answer of any question is unacceptable]

Section-A

Answer any 3 (three) questions from the following

1. a) What are the responsibilities of a *DBMS*? Describe in brief. 5

   b) Describe five main functions of a database administration. 5

   c) What is a data model? List a few data models that you know. 2+3

2. a) Define *schema* and *instance* of a *DB*. How does a weak entity set of *ER diagram* is represented in *schema diagram*? 2+3

   b) What are *candidate key* and *super key*? If *primary key* is enough to identify each record than, why do we need all these keys? Explain your opinion. 2+2

   c) (2, 23, 5, 7, 31, 17, 19, 3, 29, 11, 10, 40) 3+3
   Construct a *B+ tree* from the key values given above. Consider that the number of keys that will fit in one node (order of the tree) is as follows:
   i) Three
   ii) Four

3. a) Consider the following *schema* and write the expression in *relational algebra* for the questions bellow: 3*2
   employee (person_name, street, city)
   works (person_name, company_name, salary)
   company (company_name, city)
   manages (person_name, manager)
   i) Find the names of all employees who works in his own city.
   ii) Find the names of all employees in this database who do not work for "Eastern Bank".
   iii) Find the names of all employees who earn more than every employee of "Western Bank".

   b) Briefly describe the phases of database design a designer should go through to create an optimally functional database. 4

   c) How would you use the feature of nested queries in SQL to develop complex queries? Give examples. 5

4. Consider the schema in *Question 3. a).* Now write the *SQL* for each of the following queries. 1.5*10
   a. Find the names and cities of residence of all employees who work for First Bank Corporation.
   b. Find the names, street addresses, and cities of residence of all employees who work for First Bank Corporation and earn more than $10,000.
   c. Find all employees in the database who live in the same cities and on the same streets as do their managers.
   d. Find all employees in the database who do not work for First Bank Corporation.

e. Find all employees in the database who earn more than each employee of Small Bank Corporation.
f. Assume that the companies may be located in several cities. Find all companies located in every city in which Small Bank Corporation is located.
g. Find all employees who earn more than the average salary of all employees of their company.
h. Find the company that has the most employees.
i. Find the company that has the smallest payroll.
j. Find those companies whose employees earn a higher salary on average than the average salary at First Bank Corporation.

Section-B

Answer any 3 (three) questions from the following

1. a) Describe the tree schema architecture for database management systems and explain how it supports different forms of data independence. 5

   b) Define ACID properties of a DBMS and how those properties remain unchanged after recovery procedure of any database failure? 2+3

   c) Define *foreign key*. How can one ensure *referential integrity constraint* in a *database*? Explain in brief. 2+3

2. a) Write functionalities of query engine in short. 4

   b) Explain the third normal form and boycee codd normal form with examples. 3+3

   c) Explain, how do the *selection* and *projection* operation work in the *relational algebra*? 5

3. a) Define *RAID*. Describe the different *RAID* levels with example. 1+4

   b) What problems may arise if sufficient care is not taken for concurrent execution of multiple transactions? Describe in brief. 5

   c) Define Generalization and specialization. Describe various types of constraints on generalization. 2+3

4. a) Describe simple locking protocol. What problems may arise while using simple locking? 2+3

   b) Define *deadlock*. Describe the reasons those may lead the concurrent of transactions to fall in *deadlock* condition. 1+4

   c) Write the main properties by which performance of any storage disk can be measured. Give detail explanation of each of them. 5