

# INTERNATIONAL CENTRE FOR APPLIED SCIENCES (Manipal University) IV SEMESTER B.S. DEGREE EXAMINATION – NOV. / DEC.2016 SUBJECT: DATABASE MANAGEMENT SYSTEMS (CS 246)

Reg No.

### (BRANCH: CS)

#### Thursday, 01 December 2016

#### **Time: 3 Hours**

Max. Marks: 100

- ✓ Answer any FIVE FULL Questions.
- ✓ Missing data, if any, may be suitably assumed.
- 1A. What is DBMS? What are the disadvantages of File Oriented System?
- 1B. Using the relational schema given below ,write the queries using relational algebra. Customer= (customer-name, customer-street, customer-city) Borrower = (customer-name, loan-number) Account = (account-number, branch-name, balance) Depositor= (customer-name, account-number) Branch-schema = (branch-name, branch-city, assets)
  - a. Delete all of Smith's account records.
  - b. Find the names of all branches with customers who have an account in the bank and who live in Harrison..
  - c. Find all customers of the bank who have an account but not a loan.
  - d. Find all customers who have an account at all the branches located in Brookly
  - e. Find the names of all customers who live on the same street and in the same city as Smith.
- 2A. List and explain the Entity –Relationship design issues.
- 2B. Give an algorithm to compute attribute closure. Using the same find (AB)+ for a give R(A, B, C, D, E, F), and F = {A B → C, B C → A D, D → E, C F → B} and check (AB)+ is a super key or not.
- 2C. Write a procedure for computing join for the select \* from instructor (id, name, salary), department (building, budget), and explain MRU and toss-immediate buffer management strategy. (8+6+6)
- 3A. Consider the employee database as given Give 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)

manages (employee-name, manager-name)

- a. Find the names and cities of residence of all employees who work for First Bank Corporation.
- b. Find all employees in the database who do not work for First Bank Corporation where an employee may have jobs with more than one company
- c. Find all employees in the database who earn more than every employee of Small Bank Corporation
- d. Assume that the companies may be located in several cities. Find all companies located in every city in which Small Bank Corporation is located.
- e. Give all managers of First Bank Corporation a 10-percent raise unless the salary becomes greater than \$100,000; in such cases, give only a 3-percent raise(Use case update)

(10+10)

- 3B. How are inner joins are different from outer joins operator in SQL, explain with example(s)
- 3C. List and explain extended relational algebra operations.
- 4A. A university Registrar's office maintains data about the following entities:
  - (a) courses, including number, title, credits, syllabus, and prerequisites;
  - (b) course offerings, including course number, year, semester, section number, instructor(s), timings, and classroom;
  - (c) students, including student-id, name, and program; and
  - (d) instructors, including identification number, name, department, and title. Further, the enrollment of students in courses and grades awarded to students in each course they are enrolled for must be appropriately modeled.

Construct an E-R diagram for the registrar's office. Document all assumptions that you make about the mapping constraints.

- 4B. How do you check where a relation is in 3NF or not? Check where the given schema R=(ABCDEF) and set of functional dependencies as F={  $A \rightarrow BC, C \rightarrow AD, E \rightarrow ABC, F \rightarrow CD, CD \rightarrow BEF, AB \rightarrow D$ } is in 3NF or not? If not decompose it into 3NF.
- 4C. Give the algorithm for 4NF decomposition.
- <sup>5A.</sup> Consider two accounts A and B with the balance as Rs1000 and Rs 2000 respectively, where a transaction T1 transfers Rs 100 from A to B and transaction T2 transfers 10% of amount from A to B.
  - a. Construct Serial Schedule (S1) in the order of T1 followed by T2.
  - b. Construct Concurrent Schedule (S2) so that total balance of A and B remains consistent.
  - c. When do you say two instructions conflict each other?
  - d. Check where the schedule S created by you has conflict equivalent serial schedule or not by swapping non conflict instructions.
- 5B. Suppose that we are using extendable hashing on file that contains records with following Search key values :1,4,5,7,8,2,20.Show the extendable structure for this with  $h(x) = x \mod 8$  as hash function with bucket size 2 records each. (10 + 10)
- <sup>6A.</sup> Define Shared and Exclusive lock modes. With the help of a matrix explain how it is used in the compatibility function. When can dead lock can occur in these case? Explain with example.
- 6B. Construct a B+-tree for the following set of values (2, 3, 5, 7, 11, 17, 19, 23, 29, 31) Assume that the tree is initially empty and values are inserted in ascending order with the number m of pointers that will fit a node is 4. Show the tree after each operation
  - a. Insert 9
  - b. Insert 10
  - c. Insert 8
- 7A. With appropriate example explain the constraints on generalization.
- 7B. Define a view in SQL. Write its syntax. With the help of an example explain how to create a view in SQL
- 7C. Explain the two major pitfalls that are to be avoided while designing the Database Schema.
- 7D. Consider the relational schema R=(A B C) and F={  $AB \rightarrow C, C \rightarrow A$ }. Show that the schema R is in 3NF but not in BCNF. (6+4+6+4)
- <sup>8A.</sup> What is a schema diagram? Draw a schema diagram for the database given in 1B including Loan=(loan-number,branch-name,amount) schema with it.
- 8B. List and explain the data structured used in disk drives.
- 8C. When do you say a schedule is recoverable and cascadless. Explain with example for each. (7+8+5)

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(10+10)

(11+6+3)

(6+10+4)