Mid Semester Examination – 2020

School of Computer Engineering

Kalinga Institute of Industrial Technology (KIIT) Deemed to be University

Subject: Database Management System

Time: 1.5 Hrs   Full Marks: 20

(Answer any Four Questions including Question No. 1)

1. Answer the following questions briefly.   [1 X 5]

   a.   Distinguish between Disjoint and Overlapping constraints?
   b.   Differentiate between Theta join and Equi join.
   c.   Primary key is not same as unique key -Justify your answer.
   d.   Consider the below two tables for the given question :
        Write a SQL query to fetch employee names having a salary greater than or
        equal to 5000 and less than or equal 10000.

   Table 1: EmployeeDetails   Table-2 EmployeeSalary

EmpId	FullName	ManagerId	DateOfJoining
121	John Snow	321	01/31/2014
321	Walter White	986	01/30/2015
421	Kuldeep Rana	876	27/11/2016

EmpId	Project	Salary
121	P1	8000
321	P2	1000
421	P1	12000

   e.   Given the relations
        Employee (eid, name, salary, deptno) and
        Department (deptno, deptname, address)
        Which of the following queries cannot be expressed using the basic
        relational algebra operations (U, -, x, π, σ, ρ)?
        (a) Department address of every employee
        (b) Employees whose name is the same as their department name
        (c) The sum of all employees' salaries
        (d) All employees of a given department.

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2.   Describe the three-schema architecture. Why do we need mappings between   [5]
     schema levels? Also, differentiate between logical data independence and
     physical data independence.

3.(a)   What are advantages of DBMS over traditional file based systems?   [3]
  (b)   Discuss the roles of Data Analyst and Application Programmer.   [2]

4.   Consider the following schema to write queries in relational Algebra: [5]
        Sailor(sid, sname, age, rating)
        Boats(bid, bname, bcolor)
        Reserves(sid,bid,day)

     a.   Find id of the boats reserved by sailor with id 567.
     b.   Find the names of the sailors who reserved 'red' boats.
     c.   Find the boats which have at least two reservations by different
          sailors.
     d.   Find the sailors name who have ratings of 5 and their name
          started with 'P'.
     e.   Find the name of Sailors who have reserved boat id 100 on
          Monday.

5. A University wants to maintain a database to store the information about their students, courses, lecturers, cabins, and subjects. The university hired a leading consultancy firm for the project. After a detailed analysis, the development team came up with the following design:

I. For students, the database stores the details like name, roll, dob, age, hobby, and address. The address consists of door_no, street_name, city, state, and pin. A student can register for many courses where each course has a course_id, and course_name. Similarly, a course can be taken by many students.

II. Each lecturer, with a lect_id, lect_name, email, and contact_no, is assigned with a cabin, with cabin_no, floor. However, a cabin can be allotted to 2 lecturers on sharing basis.

III. A lecturer can teach only one subject, where the subject has a subject_id, subject_name, and duration. However, a subject can be taught by many lecturers.

IV. Each lecturer has a salary history which contains amt_credited, credit_date, and deductions.
V. Each Course consists of many subjects , however one subject can belongs to multiple courses.
VI. The Lecturers are managing the students.
    A. Draw ER diagram for the above scenario.
    B. Convert the ER diagram into relational schema

6. Consider a schema with two relations, R(A, B) and S(B, C), where all values [5] are integers. Make no assumptions about keys. Consider the following three relational algebra expressions:

a. $\pi_{A,C}(R \bowtie \sigma_{B=1} S)$

b. $\pi_A(\sigma_{B=1} R) \times \pi_C(\sigma_{B=1} S)$

c. $\pi_{A,C}(\pi_A R \times \sigma_{B=1} S)$

Two of the three expressions are equivalent (i.e., produce the same answer on all databases), while one of them can produce a different answer. Which query can produce a different answer? Give the simplest database instance you can think of where a different answer is produced.

~~~~ ALL THE BEST ~~~~