**Database Management Systems [CSE2007 - 134]**

**Marks: 50** **Duration: 90 mins.**

**Part-A**

**Answer all the questions.**

1) (10)

1. Consider the following relation schema:

student (rollNo, name, degree, year, sex, deptNo, advisorId)
department (deptId, name, hod, phone)
professor (empId, name, sex, startYear, deptNo, phone)
course (courseId, cname, credits, deptNo)
(rollNo, courseId, sem, year, grade)
(empId, courseId, sem, year, classRoom)
(preCourseId, courseId)

Write the following queries in SQL:

a. Retrieve the rollNo, name of all women students in the dept no. 5.
b. Retrieve the employee Id, name and phone number of professors in the CSE department who have joined after 1999.
c. Retrieve the rollNo, name of students in the CSE department along with their advisor's name and phone number.
d. List the department numbers which have no Girl students.
e. List the rollNo,name ,sem of the students enrolled in 'DBMS' course.

2) (10)

2. Consider the following relation schema:

student (rollNo, name, degree, year, sex, deptNo, advisorId)
department (deptId, name, hod, phone)
professor (empId, name, sex, startYear, deptNo, phone)
course (courseId, cname, credits, deptNo)
enrollment (rollNo, courseId, sem, year, grade)
teaching (empId, courseId, sem, year, classRoom)
preReq(preCourseId, courseId)

a. Retrieve the rollNo, name of students who have a lady professor as their advisor.
b. Find the empId, name of the senior-most Professor(s).
c. Find the employee Id and name of professors who advise at least one women student.
d. List the department Id and name of departments whose courses are all 3-credit courses.

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3) (10)

3.a). Consider a relation R=(A,B,C,D,E,F) that satisfies the following four FDs:{ AB -> C, BC -> AD, D-> E, CF->B} Does AB -> D hold? If so, show a formal proof; otherwise, give a counterexample.

b). Given a relation R (A,B,C,D,E,G) with the following eight functional dependencies

F={AB → C, D → EG, C → A ,BE → C, BC → D,CG → BD,ACD → B ,CE → AG}

For the following statements, decide whether they are true or false. For false statements, explain why you think that they are wrong.

1 The closure of BC is {A,D,E,G}
2 All attributes of R are in the closure of BC.
3 The closure of AC is {A,C}
4 ABC is a super key of R
5 BC is the only candidate key of R.

4) (10)

4. Consider the universal relation R = {A, B, C, D, E, F, G, H, I, J} and the set of functional dependencies G = {{A, B} ->{C}, {B, D} ->{E, F}, {A, D} ->{G, H}, {A} ->{I}, {H} ->{J}}

5) (10)

5. Consider the following schema:

Instructor(EmpId, name, deptName, salary)
Teaches(EmpNo, course_id ,sec_id, semester, year)
Course(course_no, title, dep_name, credits)

Write a SQL query to find the names of all instructors in the Music department who have taught a course in 2009, along with the titles of the courses that they taught.

Translate it to Relational Algebra and draw the initial query tree for this query and show how the query tree is optimized by heuristic optimization algorithm by drawing suitable query tree for each step.

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