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05SCS/SCE13

First Semester M.Tech. Degree Examination, Dec.08 / Jan.09

Database Management System

Time: 3 hrs. Max. Marks:100

Note : ***Answer any FIVE full questions.***

1 a. Draw a clear and complete ER diagram with min, max to capture the database requirements for the following: The database has data about employees, departments and phones. An employee has a SSN, a Name and a Salary. An employee has one, two or three phone numbers in the database-one for work, one for home and one for the closest fax machine. An employee belongs to one and only one department. A department must have at least 10 employees for it to exist. Every department has a Dept#, MgrSSN, Depname. A department must have one and may have up to three phone numbers and may have no fax or upto two fax numbers. **(10 Marks)**

b. Give the ER-to-Relational mapping algorithm, which converts ER schema into corresponding relational database schema. **(10 Marks)**

2 a. Will any relation with only two attributes which present in the first normal form is also in BCNF? Justify your answer. **(08 Marks)**

b. Explain fourth normal form and fifth normal form. Give examples. **(12 Marks)**

3 a. Let the relation Refrig (Model #, Year, Price, Manuf-plant, Color), which is abbreviated as Refrig (M,Y, P, MP, C) and the following set F of FD.

$F = \{M \rightarrow MP, \{M,Y\} \rightarrow P, MP \rightarrow C\}$

i) Evaluate each of the following as a candidate key for Refrig, give reasons why it can or cannot be the key?
$\{M\}$, $\{M, Y\}$, $\{M, C\}$

ii) Based on the above key determinations, state whether the relation Refrig is in 3NF and is BCNF, giving proper reasons.

iii) Consider the decomposition of Refrig into $D = \{R_1(M,Y,P), R_2(M,MP,C)\}$. Is the decomposition lossless? Show why? **(14 Marks)**

b. Explain template dependencies with examples. **(06 Marks)**

4 a. What is query execution plan? **(05 Marks)**

b. Given the SQL query

```
SELECT PNUMBER, DNUM, LNAME, ADDR, BDATE
FROM PROJECT, DEPT, EMP
WHERE DNUM = DNUMBER AND
MGRSSN = SSN AND PLOCATION = "STANFORD"
```

i) Give the equivalent relational algebra expression.

ii) Apply heuristic optimization and obtain optimized query free. **(15 Marks)**

5 a. Discuss the object relational features of ORACLE in detail. **(12 Marks)**

b. What are the desirable properties of transactions? Explain each. **(08 Marks)**

6 a. Explain in detail how SQL supports transaction. **(10 Marks)**

b. Explain concurrency control based on timestamp ordering with an algorithm. **(10 Marks)**

7 a. What do you understand by spatial database? Discuss different types of spatial queries. **(10 Marks)**

b. Write a note on multimedia and temporal databases. **(10 Marks)**

8 Write short notes on:

a. Internet database.

b. Architecture of distributed database.

c. Database recovery.

d. Serealizability of schedules. **(20 Marks)**