T-E-(I-T-) Sem VI (R)

Con. 2861–09. (REVISED COURSE) VR–5427

(3 Hours) [Total Marks : 100

Database Systems 23-05-09

3 p.m to 6 p.m

N.B. : (1) Question No. **1** is **compulsory**.

(2) Attempt any **four** questions out of remaining **six** questions.

(3) Assume any **suitable** data wherever required but justify the **same**.

1. Consider the following information about a university database.
   (a) Professors have an SSN, a name, an age, a rank and a research speciality.
   (b) Projects have a project number, a sponsor name, a starting date, an ending date and a budget.
   (c) Graduate students have an SSN, a name, an age and a degree program.
   (d) Each project is managed by one professor (known as the projects principal investigator).
   (e) Each project is worked on by one or more professors (known as the projects co-investigators)
   (f) Professors can manage and/or work on multiple projects.
   (g) Each project is worked on by one or more graduate students (known as the projects research assistants).
   (h) When graduate students work on a project, a professor must supervise their work on the project ? Graduate students can work on multiple projects, in which case they will have a (potentially different) supervisor for each one.
   (i) Departments have a department number, a department name and a main office.
   (j) Departments have a professor (known as the Chairman) who runs the department.
   (k) Professors work in one or more departments and for each department that they work in a time percentage is associated with their job.
   (l) Graduate students have one major department in which they are working on thier degree.
   (m) Each graduate student has another, more senior graduate student (known as a student advisor) who dvises him or her on what courses to take.
      (i) Design and draw an ER diagram that captures the information about the university. **10**
      (ii) Consider the university database and the ER diagram you designed. Write SQL statements to create the corresponding relations and capture as many of the constrainsts as possible. If you cannot capture some constraints, explain why ? **10**

2. (a) List the responsibilities of database manager for each responsibility explain the problems that would arise if the responsibility were not discharged. **10**
   (b) What do you mean by serializability schedule ? How would you test whether given schedule S is conflict serializable ? **10**

3. (a) What is difference between Persistent and Transient objects ? How is Persistence handled in typical object oriented system ? **10**
   (b) Explain 3NF and 4NF with suitable example. **10**

4. (a) What is a deadlock ? How it can be prevented ? How it is detected ? **12**
   (b) Explain concept of referential integrity with example. **8**

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5. (a) Consider the following relational database. 10

EMPLOYEE (FNAME, INITIAL, LNAME, ENO, BDATE, ADDRESS, SEX, SALARY, SUPERENO, DNO)
DEPT — LOCATIONS (DNUMBER, DLOCATION)
DEPARTMENT (DNAME, DNUMBER, MGRENO, MGRSTARTDATE)
WORKS—ON (EENO, PNO, HOURS)
PROJECT (PNAME, PNUMBER, PLOCATION, DNUM)
DEPENDENT (EENO, DEPENDENT-NAME, SEX, BDATE, RELATIONSHIP)

Give a relational-algebra expression for each of the following queries.

(i) Retrieve the name and address of all employees who work for the 'Research' department.

(ii) For every project located in 'Chennai'. List the project number, the controlling department number, and the department manager's last name, address and date of birth.

(iii) Find the names of employees who work on all the project controlled by department number 5.

(iv) Make a list of project numbers for projects that involve an employee whose last name is 'KUMAR', either as a worker or as a manager of the department that controls the projects.

(v) List the name of managers who have at least one dependent.

(b) Explain Triggers and Stored Procedure. 10

6. (a) Explain Shadow-paging method. 8

(b) Explain concurrency control in database system with the help of any two protocols. 12

7. Write short notes on any **four** :— 20

(a) Comparision of RDBMS, OODBMS, ORDBMS
(b) OQL
(c) Assertion
(d) View
(e) Security and Authorization.