(Pages : 4) **A – 4200**

Reg. No. : .....

Name : .....

Fourth Semester B.Tech. Degree Examination, June 2016
(2013 Scheme)
13.405 : DATABASE DESIGN (FR)

Time : 3 Hours Max. Marks : 100

PART – A

Answer **all** questions. **Each** carries **4** marks.

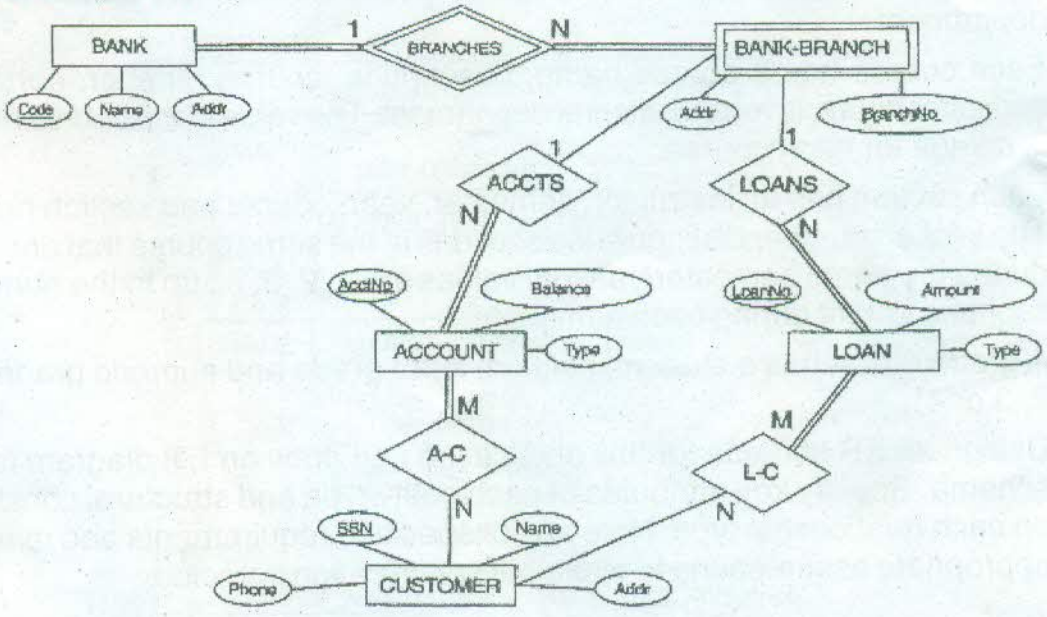
1. Why do we need mappings between schema levels ? How do different schema definition languages support this architecture ?
2. How does tuple relational calculus differ from domain relational calculus ?
3. How does Boyce-Codd normal form differ from 3NF ? Why is it considered a stronger form of 3NF ?
4. What is difference between Conflict and View Serializability ?
5. Why is two-phase locking not used as a concurrency control method for indexes such as trees ?

PART – B

Answer **any one** question from **each** Module.

Module – I

6. a) Consider the ER diagram shown in figure below for part of a BANK database. Each bank can have multiple branches and each branch can have multiple accounts and loans.



P.T.O.

i) List the (nonweak) entity types in the ER diagram.

ii) Is there a weak entity type ? If so, give its name, partial key and identifying relationship.

iii) What constraints do the partial key and the identifying relationship of the weak entity type specify in this diagram ?

iv) List the names of all relationship types and specify the (min, max) constraint on each participation of an entity type in a relationship type. Justify your choices.

v) Suppose that every customer must have at least one account but is restricted to at most two loans at a time and that a bank branch cannot have more than 1000 loans. How does this show up on the (min, max) constraints ? 15

b) What is an entity type ? What is an entity set ? Explain the differences among an entity, an entity type and an entity set. 5

OR

7. Consider the following set of requirements for a university database that is used to keep track of student's transcripts.

i) The university keeps track of each student's name, student number, social security number, current address and phone, permanent address and phone, DOB, sex, class (First Year, Second Year, ..., graduate), major department, minor department (if any), and degree program (B.A., B.S., ..., Ph.D.). Some user applications need to refer to the city, state and zip code of the student's permanent address and to the student's last name. Both social security number and student number have unique values for each student.

ii) Each department is described by a name, department code, office number, office phone and college. Both name and code have unique values for each department.

iii) Each course has a course name, description, course number, number of semester hours, level and offering department. The value of the course number is unique for each course.

iv) Each section has an instructor, semester, year, course and section number. The section number distinguishes sections of the same course that are taught during the same semester/year; its values are 1, 2, 3, ..., up to the number of sections taught during each semester.

v) A grade report has a student, section, letter grade and numeric grade (0, 1, 2, 3 or 4).

Design an ER schema for this application and draw an ER diagram for that schema. Specify key attributes of each entity type and structural constraints on each relationship type. Note any unspecified requirements and make appropriate assumptions to make the specification complete. 20

Module – II

8. a) Construct the following SQL queries for given insurance relational database.

Person (driverid, name, address, phone no, email-id)

Car (license, model, year)

Accident (reportno, date, location)

Owns (driver-id, license)

Participated (driverid, car, reportno, damage-amount)

i) Find the total number of people who owned cars that were involved in accidents in 1989.

ii) Find the number of accidents in which the cars belonging to "john" were involved.

iii) Add a new accident to the database, assume any values for required attribute.

iv) Delete the ford belonging to "james".

v) Update the damage amount for the car with licence number "ab10" in accident with reportno "AR17" to rs.50000. 15

b) Why do the UNION, INTERSECTION, and DIFFERENCE operations require that the relations on which they are applied be union compatible ? 5

OR

9. Specify the following queries on the database schema shown in given figure, using the relational operators.

EMPLOYEE

FNAME	MINIT	LNAME	SSN	BDATE	ADDRESS	SEX	SALARY	SUPERSSN	DNO

DEPARTMENT

DNAME	DNUMBER	MGRSSN	MGRSTARTDATE

DEPT_LOCATIONS

DNUMBER	DLOCATION

PROJECT

PNAME	PNUMBER	PLOCATION	DNUM

WORKS_ON

ESSN	PNO	HOURS

DEPENDENT

ESSN	DEPENDENT_NAME	SEX	BDATE	RELATIONSHIP

i) Retrieve the names of all employees in department 5 who work more than 10 hours per week on the 'Product _X' project.

ii) List the names of all employees who have a dependent with the same first name as themselves.

iii) Find the names of all employees who are directly supervised by 'Franklin Wong'.

iv) For each project, list the project name and the total hours per week (by all employees) spent on that project.

v) For each department, retrieve the department name and the average salary of all employees working in that department.

vi) Retrieve the average salary of all female employees.

vii) Find the names and addresses of all employees who work on at least one project located in Houston but whose department has no location in Houston.

viii) List the last names of all department managers who have no dependents. **20**

Module – III

10. a) What does the term unnormalized relation refer to ? How did the normal forms develop historically from first normal form up to Boyce-Codd normal form ? **16**

b) What types of constraints is inclusion dependencies meant to represent ? **4**

OR

11. a) Discuss about lossless and dependency preservation decomposition in normalizations. **12**

b) Differentiate between BCNF and 4NF. **8**

Module – IV

12. a) Develop cost functions for an algorithm that consists of two SELECTs, a JOIN and a final PROJECT, in terms of the cost functions for the individual operations. **12**

b) What is the difference between the UNDO/REDO and the UNDO/NO-REDO algorithms for recovery with immediate update ? **8**

OR

13. a) Discuss the decisions made during physical database design. **12**

b) Discuss the problems of deadlock and starvation and the different approaches to dealing with these problems. **8**
