EASTERN UNIVERSITY, SRILANKA

DEPARTMENT OF MATHEMATICS

EXAMINATION IN SCIENCE –2009/2010

SECOND SEMESTER (April /May, 2012)

CS 203 – DATABASE DESIGN

(PROPER & REPEAT)

Answer all questions **Time allowed: 02 hours**

Q1

a) List any two significant differences between a file processing system and a DBMS.

b) What is a database? Describe the advantages and disadvantages of using DBMS.

c) Explain five duties of Database Administrator.

d) Draw and explain the three level architecture of the database system.

e) Briefly describe the *Database Life Cycle*.

Q2

a) Explain Candidate Key, Alternate Key and Foreign Key in a Database.

b) What are the various symbols used to draw an ER diagram? Explain with the help of an example how weak entity sets represented in an ER diagram.

c) Define the following terms:
   i.   Primary key.
   ii. Multivalued attributes
   iii. Cardinality ratio

d) What is an ER model? Draw an ER Diagram for the company database with the following descriptions:
   i.   The company is organized into departments. Each department has a unique name and a unique number with several locations.
   ii. A department controls a number of projects, each of which has a unique name, unique number and a single location.

iii. We store each employees name, social security number, address, and salary. An employee is assigned to one department but may work on several projects, which are not necessarily controlled by the same department.

iv. We want to keep track of the dependent of each employee for insurance purposes. We keep each dependent's name, age and relationship to the employee

e) Information about a bank is about customers and their account. Customer has a name, address which consists of the house number, area and city, and one or more phone numbers. Account has number, type and balance. We need to record customers who own an account. Account can be held individually or jointly. An account cannot exist without a customer. Arrive at an ER diagram. Clearly indicate attributes, key and cardinality ratios.

Q3

a) What is *Data Definition Language (DDL)* and *Data Manipulation Language (DML)*? Write five DDL commands and five DML commands.

b) Explain the three data models namely relational, network and hierarchical.

c) Show how each E-R model construct can be mapped to the relational model.

d) In an organization several projects are undertaken. Each project can employ one or more employees. Each employee can work on one or more projects. Each project is undertaken on the request of clients. A client can request for several projects. Each project has only one client. A project can use a number of items and a item may be used by several projects. Draw an ER diagram and convert it to a relational schema.

Q4

a. Define the five basic operators of relational algebra with an example for each.

b. Consider the following relational schema:
       PERSON (SS#, NAME, ADDRESS)
       CAR (REGISTRATION_NUMBER, YEAR, MODEL)
       ACCIDENT (DATE, DRIVER, CAR_REG_NO)
       OWNS (SS#, LICENSE)
   Construct the following relational algebra queries:
   i. Find the names of persons who are involved in an accident.
   ii. Find the registration number of cars which were not involved in any accident.

c. Consider the following relations

       PHYSICIAN (regno, name, telno, city)
       PATIENT (pname, street, city)
       VISIT (pname, regno, date_of_visit, fee)
Where the regno and pname respectively identify the physician and the patient uniquely.

d. Express queries (i) to (iii) in SQL.
    i.   Get the name and regno of physicians who are in Batticaloa.
    ii. Find the name and city of patient(s) who visited a physician on 31 August 2004.
    iii. Give the name of the physician and the total number of patients who have visited her.

e. What does the following SQL query answer:

        SELECT DISTINCT name
            FROM PHYSICIAN P
        WHERE NOT EXISTS
            (SELECT *
                FROM VISIT
            WHERE regno = p.regno).