THE OPEN UNIVERSITY OF SRI LANKA
FACULTY OF ENGINEERING TECHNOLOGY
BACHELOR OF SOFTWARE ENGINEERING- LEVEL 4
FINAL EXAMINATION – ACADEMIC YEAR 2013/2014
ECI4166– DATA MODELING AND DATABASE SYSTEMS

DATE:03rd of September 2014 **TIME:1330–1630hrs**

INSTRUCTIONS

- *This paper consists of 6 questions.*
- *Answer any five(5) questions.*
- *Each question carries 20 marks.*
- *This is a **close book** examination.*

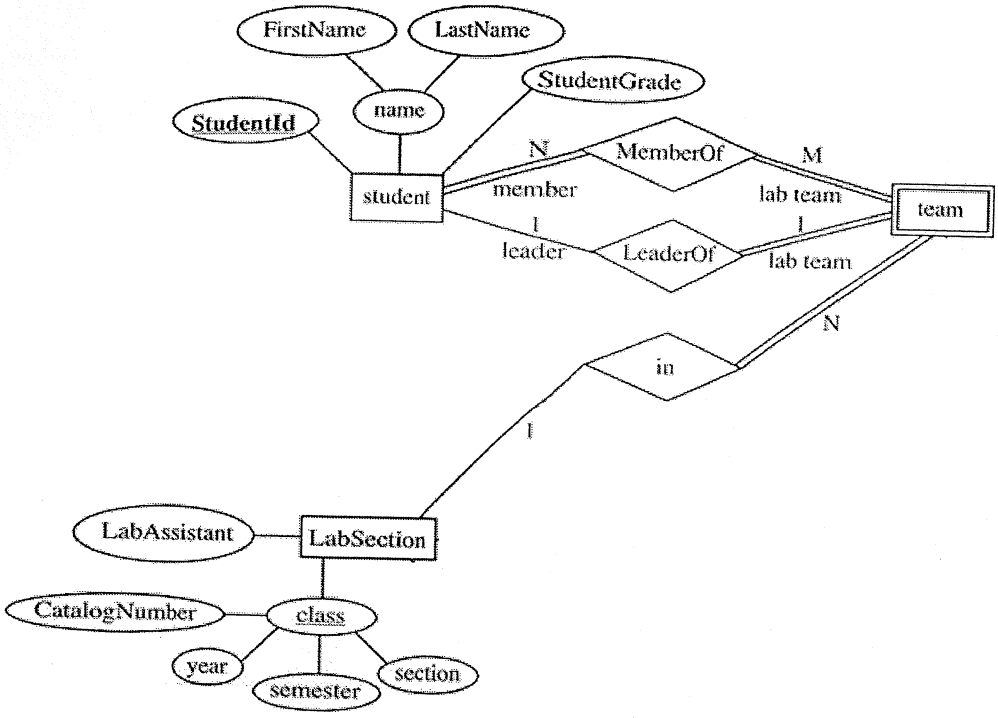
Question 1 (20 marks)

'Modern Technologies' is an electronic item shop which seeks your help to design a database for the following scenario. Draw an ER diagram mentioning the notation you are going to use for the diagram.

- Manufacturerhas a name, which you may assume to be unique, an address, and a phone number. Products have a model number and a type.
- Each product is madeby one manufacturer, and different manufacturers may have different products withthe same model number. However, you may assume that no manufacturer would havetwo products with the same model number.
- Customers are identified by their unique national identity number.
- Customers have emailaddresses, and home addresses.
- Several customers may have the same home address, but you may assume that no two customers have the same email address.
- An order has a unique order number and a date. An order is placed by one customer.
- For each order, there can be one or more products.
- For each product on the order quantity should be mentioned.

Question 2 (20 marks)

Convert the following ER diagram to the relational model. You do not need to specify the domains of attributes.



Question 3 (20 marks)

Consider the following relational schema.

Branch *(branchName:varchar(15), branchManager:varchar(10))*
Account *(branchName:varchar(15), accNo:char(7), balance:float(10,2))*
Depositor *(customerName:varchar(20), accNo:char(7),homeAddress:varchar(25))*

(a.) Create the above relational schema using SQL statements. Make sure to add all primary key, foreign key constraints and the following check constraints.
- *accNo* attribute of Account and Depositorrelations should start with 'AC'.
- *balance*attribute of the Account relation should not be less thanor equal to zero.

(b.) Write a SQL statement to add the account typeof the Account as *accType:varchar(15)*to the relation Account.

(c.) Write SQL statement(s) to insert the following information about a Depositor to the schema above. Assume that Branch relation and Account relation contains all relevant information.

Customer Name	AccNo	HomeAddress
Amila	AC1050	SinaWatta, Matara

(d.) Assume that there are 1000Account holder detailsavailable in the schema. Write a SQL statement to delete allDepositor details of Depositors whohas *balance* less than Rs.1000.00.

Question 4 (20 marks)

Consider the following relational schema.

Branch (branchName:varchar(15),branchManager:varchar(10))
Account (branchName:varchar(15), accNo:char(7), balance:float(10,2))
Depositor (customerName:varchar(20), accNo:char(7),homeAddress:varchar(25))

Write SQL statements for the following:

(a) Display the Branch Manager name of the 'Galle City' branch.

(b) Display the list of customers whohas accounts at 'Colombo 1' branch.

(c) Display all customer who have accounts in 'Colombo 1'branch and balance is greater than 100,000.

(d) Display all branch names with their maximum balance.

(e) Display branchName of the branches with their total balance. You are supposed to give an alias for the total balance as *"total account balance"*.

Question 5 (20 marks)

A construction consultancy firmnamed 'ABC Consultancy Firm', supplies staff to other companies in the construction sector to work on their projects for certain amount of time. Consider the following relation which needs to be normalized.

employee(eNo, eName, eAddress, contractNo, companyID,companyLoc, hours)

eNo denotes the employee number, eName denotes the employee name, contractNo denotes the contract number of the contract between the ABC and the company, companyID denotes the unique company ID, compnayLoc denotes the Location of the company and the hours denotes the number of hours a certain employee for a certain contract.

Assume that the following functional dependencies exist on the relation *employee*.

eNo→eName, eAddress
eNo, contractNo→hours
contractNo→companyID, companyLoc
companyID→companyLoc

{ eNo, contractNo} is the primary key of the given relation.

(a.) Is the relation in 2nd Normal Form? Give reasons for your answer.
(b.) Are there any transitive dependencies available on the relation *employee*? If so what are they?
(c.) Normalize the above relation step by step removing functional dependencies.

Question 6 (20 marks)

PART A [12 Marks]

Consider the following XML document, loans.xml:-

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<?xml-stylesheethref="mystylesheet.xsl" type="text/xsl"?>
<microloans>
        <loaner>
                <name>
                        <first>Daya</first>
                        <last>Appuhamy</last>
                </name>
                <address>No.12, AppuhamyMawatha, Colombo 02</address>
                <loan>
                        <amount>50000</amount>
                        <payout-date>2000-03-03</payout-date>
                        <repayment amount="25000" date="2001-03-03"/>
                        <repayment amount="25000" date="2002-03-03"/>
                </loan>
                <loan>
                        <amount>100000</amount>
                        <payout-date>2006-03-13</payout-date>
                        <repayment amount="100000" date="2007-03-13"/>
                </loan>
        </loaner>
```

```
<loaner>
    <name>
        <first>Prema</first>
        <last>Kirihami</last>
    </name>
    <address>No 3K, Kirihami Road, Kirinda</address>
    <loan>
        <amount>110000</amount>
        <payout-date>2006-03-13</payout-date>
        <repayment amount="110000" date="2007-03-13"/>
    </loan>
</loaner>
</microloans>
```

at are

(a.) Write an FLWOR expression that returns the *name* (name elements) in loaners.xml. Write the expected output of the FLWOR expression you wrote.
[4 Marks]

(b.) Write an FLWOR expression that returns the *name,payout-date* and *amount* where the *amount* is greater than 95000. Write the expected output of the FLWOR expression you wrote.
[4 Marks]

(c.) If loanerID (an identity to identify the loaner) is needed to be added to the xml document how are you going to change the above xml document.
[4 Marks]

PART B [8 Marks]

(a.) Discuss any two file organizations. (Eg:- Sequential, Sequential File Organization etc…)

(b.) Briefly describe the following.

a. Data definition language
b. Application Programming Interface

END