THE OPEN UNIVERSITY OF SRI LANKA
FACULTY OF ENGINEERING TECHNOLOGY
BACHELOR OF SOFTWARE ENGINEERING - LEVEL 4
FINAL EXAMINATION – ACADEMIC YEAR 2012/2013
ECI4166– DATA MODELING AND DATABASE SYSTEMS

DATE:21st August 2013 **TIME:0930–1230hrs**

INSTRUCTIONS

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

Question 1 (20 marks)

Magic Transporters has decided to store information about their drivers, items which are transported by its company and other relevant data on a database. Draw an ER diagram for the given requirements. Clearly indicate all the keys, cardinality constraints and any assumptions that you make.

- Drivers who make deliveries are identified by a **driver_no**. Each driver has a **name, address,** and **dob (date of birth).**

- Each vehicle is identified by a **reg_no** where each vehicle is being manufactured for a particular **make** with the **year of manufacturing.**

- It is possible for a vehicle to be taken out of the vehicle depot whenever available and kept out for any length of **time.** It is possible for a vehicle to be taken out of the vehicle depot more than once on a given day by different drivers.

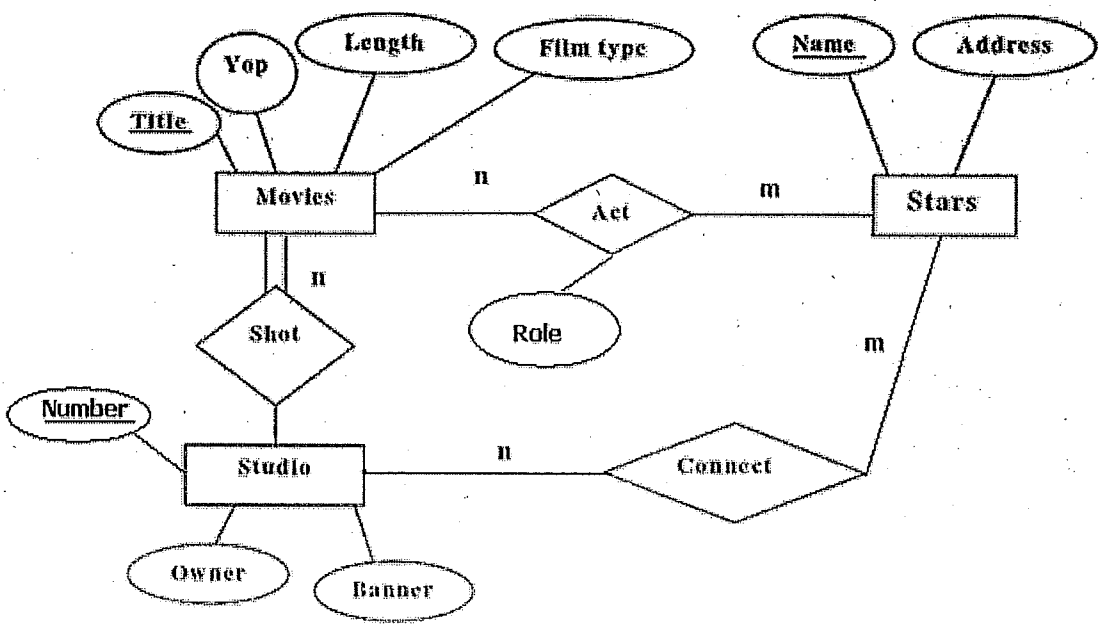
- When a vehicle goes out, the load is made up of any **qty** of any number of item types identified by its **item_no**, each with **colour**, **weight**, and **description**.

- Every time a vehicle is taken out, the driver can incur expenses of certain types (meals, overnight stay, etc.). Each expense type has a **type_no,** the **amount** and **receipt_no** which are recorded for each expense incurred. One or more expenses of the same type may be incurred during the same trip.

- Any number of stops can be made during the trip. An **address** of the stop is recorded for each stop, together with the **qty_left** of each item type at the stop. A driver can stop only once at an address during a particular trip, but can stop at the same address on different trips.

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.

Train (trainNo:char(3), trainName:varchar(10), start:varchar(15), desti:varchar(15))

Ticket(passNo:char(5), trainNo:char(3), ticStart:varchar(15), ticDesti:varchar(15), fare:float)

Passenger (passNo:char(5),passName:varchar(15), address:varchar(15))

(a.) Create the above relational schema using SQL statements. Make sure to add all primary key, foreign key constraints and the following check constraints.

- *passNo* attribute of Ticket and Passenger relations should start with 'PS'.
- *Fare* attribute of the Ticket relation should not be less than or equal to zero.

(b.) Write a SQL statement to add the start Time of the train as *startTime:time* to the relation Ticket.

(c.) Write SQL statement(s) to insert the following information about a passenger to the schema above. Assume that Train relation contains all relevant information about Trains.

Passenger No	Passenger Name	Address
PS101	Hinahamy	SinaWatta, Matara

(d.) Assume that there are 100 Passenger details available in the schema. Write a SQL statement to delete all passenger details of passengers who booked their ticket to "Trincomalie".

(e.) Write a SQL statement to increase the *fare* of the ticket where *start* is *"Colombo" and destination* is *"Kandy"* by 5% of the existing fare.

Question 4 (20 marks)

Consider the following database which records information about the train booking system given in Question3.

Train (trainNo:char(3), trainName:varchar(10), start:varchar(15), desti:varchar(15))

Ticket(passNo:char(5), trainNo:char(3), ticStart:varchar(15), ticDesti:varchar(15), fare:float)

Passenger (passNo:char(5),passName:varchar(15), address:varchar(15))

Write SQL statements for the following:

(a.) Display *all the details* of trains starting their trip from "Colombo".

(b.) Display *trainNo, trainName, passNo, passName* of passengers who travel in the train '200'.

(c.) Display the *trainNo, start and destination* of trains which has more than 30 passengers.

(d.) Display *passNo, passName* and *Address* of passengers who has bought tickets to go to *Kandy* from *Matara.*

(e.) Display *trainNo* and the *total fare* earned from the train "Mahaweli". You are supposed to give an alias for the total earnings as *"total fare"*.

Question 5 (20 marks)

Consider the following relation on books,
Book(Book_Title, Author, Book_Type, Price, Postal_Address, Publisher)

Assume that the following functional dependencies exist on the relation Book.
Book_Title→ Publisher, Book_Type
Book_Type→ Price
Author →Postal_Address

Assume that an Author may write many books and hence { Author, Book_Title} is the primary key of the given relation.

(a.) Is the relation in 2nd Normal Form? Give reasons for your answer.
(b.) Normalize the above relation step by step removing functional dependencies.

Question 6 (20 marks)

PART A [12 Marks]
Consider the following XML document, stores.xml:-

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<?xml-stylesheethref="mystylesheet.xsl" type="text/xsl"?>
<stores>
        <item ID = "001">
                <name>Maldive Fish </name>
                <supplier>
                        <name>Kirihami</name>
                        <address>No.04, KirihamiWatta, Galle</address>
                        <price>200.00</price>
                </supplier>
                <supplier>
                        <name>Titus and Sons</name>
                        <address>No.98, Titus Villa, Jaffna</address>
                        <price>250.00</price>
                </supplier>
        </item>
        <item ID = "002">
                <name> Garlic</name>
                <supplier>
                        <name>Kirihami</name>
                        <address>No.04, KirihamiWatta, Galle</address>
                        <price>100.00</price>
                </supplier>
                <supplier>
                        <name>Jaya Suppliers</name>
                        <address>No.1, Jaya Mawatha, Colombo 10</address>
                        <price>128.00</price>
                </supplier>
        </item>
</stores>
```

(a.) Write a FLWOR expression that returns the *items* in the stores (item elements) in stores.xml.
Write the expected output of the FLWOR expression you wrote.

(b.) Write a FLWOR expression that returns the *Supplier name,address* and *price* of Suppliers of Maldive Fish.
Write the expected output of the FLWOR expression you wrote.

(c.) What are the two ways that you can add a SupplierID to this *xml* document?

(d.) Write a FLWOR expression that returns the *Supplier name, address* and *price* of Suppliers of Garlic whose price is greater than Rs 100.00.
Write the expected output of the FLWOR expression you wrote.

PART B [8 Marks]

(a.) Discuss advantages and disadvantages of **hashing.**

(b.) Briefly describe five(5) responsibilities of a **Database Administrator**.

END