THE OPEN UNIVERSITY OF SRI LANKA
FACULTY OF ENGINEERING TECHNOLOGY
BACHELOR OF SOFTWARE ENGINEERING - LEVEL 4
FINAL EXAMINATION – ACADEMIC YEAR 2014/2015
ECI4166 – DATA MODELING AND DATABASE SYSTEMS

DATE: 16th of September 2015 **TIME:0930–1230hrs**

INSTRUCTIONS

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

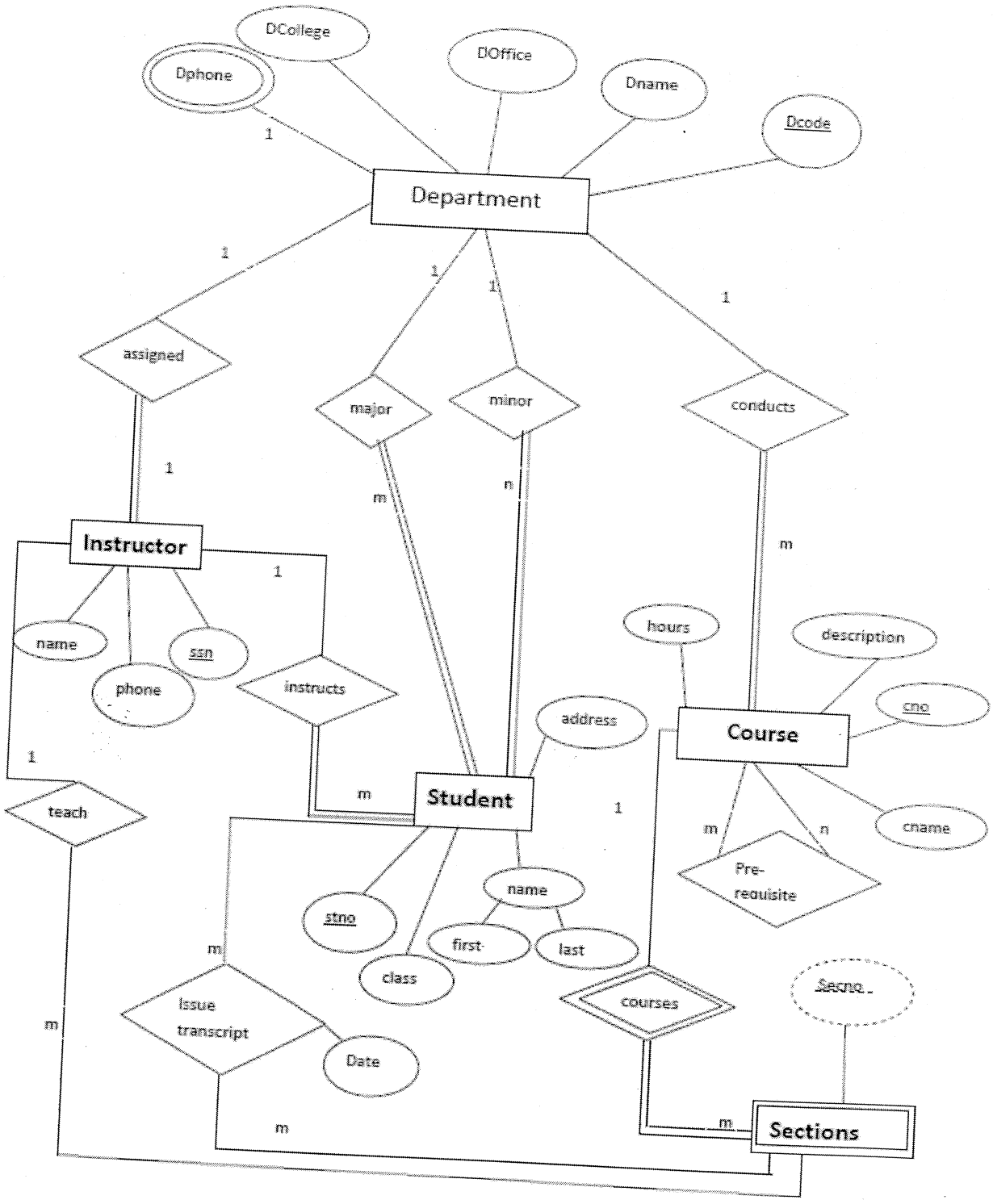
Question 1 (20 marks)

XYZ company requires an information system to facilitate the requirements given below. Draw an ER diagram mentioning the notation you will be using for the diagram.

- Each item is at one LOCATION, of one TYPE, and has a DESCRIPTION.
- Each item is build using many parts. One part is used only for one item.
- Each part is identified by a PART_ID, has a given WEIGHT and a MAX_DIMENSION and can have any number of COLOURS.
- Each person is identified by a PERSON_ID, NAME and any number of QUALIFICATIONS.
- The NAME of a person has FIRST_NAME and MIDDLE_NAME and SURNAME.
- Faults on the equipment are identified by a unique FAULT_ID and are reported at a TIME_REPORTED.
- Any number of persons may be assigned to a fault but at a time a person will be assigned to many faults.
- TIME_SPENT by each person on a particular fault need to be recorded.
- Any number of parts may be used to fix a fault. One part may be used for many faults.
- The QTY_USED of each part for a fault need to be recorded.

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 relations Fan(*id,name,memberSince,playerID*) and Player(*playerID,name,country*) which contains data on members of a fan club, and their favorite players to answer the given questions.
Fan(*id:char(5),name:varchar(15),memberSince:int(4),playerID:char(3)*)
Player(*playerID:char(3),playerName:varchar(15),country: 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.
- *playerID* attribute of Fan and Player relations should start with 'P'.
- *memberSince* attribute of the Fan relation should not be less than 2000.
- *country* attribute of the Player relation should not be NULL
- *playerName* should be a UNIQUE value

(b.) Write a SQL statement to add the *Gender* of the Fan as gender:*varchar(6)* to the relation Fan. Add the check constraint so that *Gender* attribute should contain only two values, either MALE or FEMALE.

(c.) Write SQL statement(s) to insert the following information about a Player to the schema above.

playerID	playerName	country
P95	Jaya Sathuta	Sri Lanka

(d.) Write a SQL statement to delete the attribute Gender from the Fan relation.

Question 4 (20 marks)

Consider the relations Fan(*id,name,memberSince,playerID*) and Player(*playerID,name,country*) which contains data on members of a fan club, and their favorite players to answer the given questions.
Fan(*id:char(5),name:varchar(15),memberSince:int(4),playerID:char(3)*)
Player(*playerID:char(3),playerName:varchar(15),country: varchar(15)*)

Write SQL statements for the following:

(a) Display all details of members of the fan club who has the membership since 2005.

(b) Display the *playerID* and *playerName* of players whose *playerName* contains 'Jaya'.

(c) Display the number of members who has joined the fan club in each year.

(d) Display the details of members of the fan club who have favourite players from the country "Sri Lanka".

(e) Display the name of members of the fan club who has the membership since 2005 and the favourite playerName as "Preethi".

Question 5 (20 marks)

Consider the following relation *Order* which needs to be normalized.

Order (OrderNo, OrderDate, CustomerNo, CustomerName, ItemNo, ItemQty, ItemPrice)

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

OrderNo → *OrderDate*, *CustomerNo*, *CustomerName*
OrderNo → *ItemNo*, *ItemQty*, *ItemPrice*
CustomerNo → *CustomerName*
ItemNo → *ItemPrice*

{ *OrderNo*, *CustomerNo* } 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. Give reasons for your answer.

Question 6 (20 marks)

PART A [12 Marks]

Consider the following XML document, menu.xml:-

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<?xml-stylesheet href="mystylesheet.xsl" type="text/xsl"?>

<breakfast_menu>
    <food>
        <name>Milk Rice</name>
        <price>150.00</price>
        <description>Milk rice with sambol</description>
    </food>
    <food>
        <name>String Hoppers</name>
        <price>200.00</price>
        <description>String Hoppers with Potato curry and sambol</description>
    </food>
    <food>
        <name>Rice</name>
        <price>250.00</price>
        <description>Rice with 3 vegetables and Fish</description>
        </food>
<breakfast_menu>
```

(a.) Write a FLWOR expression that returns the food *name* (name elements) in menu.xml. Write the expected output of the FLWOR expression you wrote.

[4 Marks]

(b.) Write a FLWOR expression that returns the *name,* price and *description* where the *price* is greater than 200.00. Write the expected output of the FLWOR expression you wrote.

[4 Marks]

(c.) Write a FLWOR expression that returns the *name in the order of name,* price and *description* where the *price* is greater than 150.00. Write the expected output of the FLWOR expression you wrote.

[4 Marks]

PART B [8 Marks]

(a.) Discuss advantages and disadvantages of hashing used in Direct file organization.

(b.) Briefly describe the following.

a. Role of a Database administrator
b. Application Programming Interface

END