**DUBLIN INSTITUTE OF TECHNOLOGY**

# DT8266 Masters Qualifier for MSc in Computing

## SUMMER EXAMINATIONS 2017/2018

### INFORMATION SYSTEMS [CMPU4061]

MS. CINDY LIU

TUESDAY 15$^{\text{TH}}$ MAY

TWO HOURS

INSTRUCTIONS TO CANDIDATES

ANSWER **TWO** QUESTIONS OUT OF **THREE**.

ALL QUESTIONS CARRY EQUAL MARK

1. (a) A local community library keeps records of current loans of books to borrowers. Each borrower is identified by a borrowerid and each book by an bookid. The name and address of each borrower is held so that communications, such as overdue loan reminders, can be sent when necessary. The information held about books is the title, author's name, year published, publisher's name, purchase price, and number of pages. The library regards a book as only being written by one author, and being published by a single publisher. A book will cover a number of different subjects that the library wishes to record so that borrowers can use an on-line catalogue system to select texts by subject as well as title and author's name. There is a restriction on the number of books a borrower may have on loan at any one time and the loan period. When a book is borrowed, the return date is automatically recorded given the current date. Books out on loan may be reserved by other borrowers pending their return. A special borrower's status flag is maintained – borrowers who hold overdue books or who have reached their loan limit, are flagged to prevent further borrowings.

Using the details given in the above statement:

    i.   Create an Entity – Relationship (ER) diagram (Diamond notation) to represent the company data requirements described above. State any assumptions you made when creating the ER diagram. Be sure to include attributes as part of your ER design.

**(15 Marks)**

    ii.   Convert your Diamond notation diagram into a Crows feet notation diagram.

**(15 Marks)**

    iii.   Write SQL statements to create the tables for each entity

**(10 Marks)**

(b) *Entity Relational Diagrams* (ERDs) and *Database Normalisation* are two distinct approaches to database design. How in your opinion are they similar and how do they differ?

**(10 Marks)**

2. (a) Suppose we have a database structure which consists of the following relations:

ORDER (OrderNumber, OrderDate, CustomerCode)
PRODUCT (ProductNumber, Description, UnitPrice)
ORDERLINE (OrderNumber, ProductNumber, QuantityOrdered)

Write SQL queries corresponding to the following user requirements:

I.    Provide a list of product descriptions for those products on OrderNumber 3.

(5 marks)

II.    For the customer with CustomerCode 4, list all the orders for that customer along with all the product details.

(5 marks)

III.    Assuming it is possible for us to have an order in the system for no products, list the OrdernNmbers for those orders in the system which are for no products.

(5 marks)

IV.    List the products that have not been ordered at all.

(5 marks)

V.    For all orders, display the OrderNumber and the Total Quantity of all products on the order.

(5 marks)

(b) Explain the three phases involved in the development of the "Lifecycle of an Information System". Illustrate your answer with appropriate diagrams.

(15 Marks)

(c) How do *views* differ from *base tables* in a relational database? Under what circumstances are views useful?

(10 Marks)

3. (a) Discuss the typical management structure for a computing department within a company.

**(20 Marks)**

(b) A medium-size company with small branches in Dublin and New York is determining the best way to manage its customer and sales data requirements. Both sites have local customers with whom they will be generating sales. The Chief Technology Officer (CTO) for the organisation is assessing the following options:

     (i)     Local file storage of customer and sales data at each site.
     (ii)    Local database of customer and sales data at each site.
     (iii)   Central database of customer and sales data at one of the sites, holding data from both sites.
     (iv)   Outsourcing of data management to the cloud (i.e. a third party)

Discuss the points that the CTO may raise both for and against each of the above choices.

**(20 Marks)**

(c) One of the most important functions of a database is to ensure and preserve *Data Integrity*. Consider any two general database topics discussed in class which you feel have relevance to integrity preservation and illustrate how they achieve that goal.

**(10 Marks)**