

W265/104C, W265B/104C, W8900/104C



DUBLIN INSTITUTE OF TECHNOLOGY

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**DT265 Higher Diploma in Computing  
DT8900 International Pre-Masters for  
MSc in Computing**

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**WINTER EXAMINATIONS 2014/2015**

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**INFORMATION SYSTEMS [CMPU4061]  
[DT265, DT265B, DT8900-CF]**

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TUESDAY 6<sup>TH</sup> JANUARY                      1.00 P.M. – 3.00 P.M.

TWO HOURS

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

ALL QUESTIONS CARRY EQUAL MARKS.

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 a 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:

Create an Entity – Relationship (ER) diagram (Diamond notation) to represent the library 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)**

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

**(15 Marks)**

Write SQL statements to create the tables for each entity

**(10 Marks)**

- (b) Define the *entity integrity* and *referential integrity* constraints. Why is each of these considered important?

**(10 Marks)**

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

**ORDERS** (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 2.  
(5 marks)

(ii) For the customer with CustomerCode 2, 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 OrderNumbers for those orders in the system which is for no products.  
(5 marks)

(iv) List the products that have been ordered before.  
(5 marks)

(v) For all orders, display the OrderNumber and the Total Quantity of all products on the order.  
(5 marks)

(Total 25 Marks)

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

(15 Marks)

(c) List the classes of DB users, and give a simple explanation of their roles.

(10 Marks)

- 3 (a) *Data*, *Information* and *Knowledge* are frequently used terms in relation to databases. Define each term and identify the relationships of these three terms. Provide two examples of each of the terms.

How do databases add "semantic richness" to data?

(20 Marks)

- (b) Discuss the strengths and limitations of the *relational data model*

(20 Marks)

- (c) Describe the relevant factors needed to be examined when choosing a DBMS.

(10 Marks)