



DUBLIN INSTITUTE OF TECHNOLOGY

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**DT265C/1 Masters Qualifier for MSc in Computing**

**DT8265/1 Higher Diploma in Computing**

**DT8266/1 Masters Qualifier for MSc in Computing**

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**SUMMER EXAMINATIONS 2015/2016**

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**INFORMATION SYSTEMS [CMPU4061]**

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MONDAY 23<sup>RD</sup> MAY                      9.30 A.M. – 11.30 A.M.

TWO HOURS

INSTRUCTIONS TO CANDIDATES

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

ALL QUESTIONS CARRY EQUAL MARK

1. The requirements collection and analysis phase of a database design process has provided the following data requirements for a company called Cars for Hire, which rents out vehicles (cars and vans). The Company has various outlets (garage/offices) throughout the city. Each outlet has a number, address, phone number and fax number.

Each site is allocated a stock of vehicles for hire; however, individual vehicles may be moved between outlets, as required. Only the current location for each vehicle is stored. The registration number uniquely identifies each vehicle for hire and is used when hiring a vehicle to a client. Each individual hire agreement between a client and the Company is uniquely identified using a hire number. Information stored on the vehicles for hire includes: the vehicle registration number, model, engine size, capacity, current mileage, daily hire rate, and the current location (outlet) of each vehicle.

The data stored on a hire agreement includes the hire number, the client's number, name, address and phone number, date the client started the hire period, date the client wishes to terminate the hire period, the vehicle registration number, model and make, the mileage before and after the hire period. After each hire a member of staff checks the vehicle and notes any fault(s).

The data stored on clients includes the client number, name (first and last of the person), address, phone number, date of birth and driving licence number. The client number uniquely identifies each client and the information stored relates to all clients who have hired in the past and those currently hiring a vehicle.

Information that is stored on the staff based at various outlets includes: staff number, name (first and last name), home address, date of birth (DOB), sex, PPS number, job title and salary. Each staff member is associated with a single outlet but may be moved to an alternative outlet as required, although only the current location for each member of staff is stored.

Using the details given in the above statement:

- (a). Create an Entity – Relationship (ER) diagram (Diamond notation) to represent the vehicle hire 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.

**(20 Marks)**

- (b). Convert your Diamond notation diagram into a Crows feet notation diagram.

**(20 Marks)**

- (c). Write SQL statements to create the tables for each entity

**(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 5.  
(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 have 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)

(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 between these three terms. Provide two examples for each of the terms.

How do databases add "semantic richness" to data?

(20 Marks)

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

(20 Marks)

- (c) *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)