

OLLSCOIL NA hÉIREANN  
THE NATIONAL UNIVERSITY OF IRELAND

NATIONAL UNIVERSITY OF IRELAND, GALWAY

SEMESTER 1 EXAMINATIONS 2000/2001

HIGHER DIPLOMA IN APPLIED SCIENCE  
(SOFTWARE DESIGN & DEVELOPMENT)

DATABASE DEVELOPMENT (CT857)

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Time allowed: Two hours

Candidates are required to answer Question One in SECTION A and two other questions from SECTION B

- Q1.** The following is a relational schema (keys bolded) representing a section of a companies database. The database has three entities (Salesperson, Order and Customer).

SALESPERSON: (**Name**, Age, Salary)  
ORDER: (**Number**, Custname, SalespersonName, OrderDate, Amount)  
CUSTOMER: (**Name**, City, Email, IndustryType)

**Required:**

To provide the SQL commands to execute the transactions (a) to (t) below.

- (a) Show the ages and salaries of all salespersons.
- (b) Show the customer name and email who placed order number 100.
- (c) List the customers who do not have an email.
- (d) List the customer name, address and email of customers who have placed an order in Nov 2000.
- (e) How many orders were received in 1999 from customers based in Dublin, Cork or Galway.
- (f) How many customers have hotmail.com e-mail addresses.
- (g) Assume orders are without VAT. If Vat was payable at 21% what is the total amount payable for order number 120.
- (h) What is the customer's name who placed the largest order?
- (i) For each city we have customers, list the city and the number of customers who live there, and sort the list in descending order of the number of customers
- (j) How many different cities do we serve?

- (k) What is the average age of salespersons whose names begin with T?
- (l) Compute the number of orders for each salesperson considering orders for an amount exceeding 500.
- (m) Show the names of salespeople who have two or more orders.
- (n) List the name of all customers who do not currently have orders on file.
- (o) Insert a new customer Jack Donald in the electrical industry, from Dublin into the customers' table. As of yet he does not have an email address.
- (p) Write the SQL commands to create the Salesperson table, assuming that the Create Table statement supports both entity and referential integrity.
- (q) Customer Karen Jones has gone bankrupt. It has been decided to write them off as a bad debt. Make the necessary changes.
- (r) The data administrator has received a request to add a mobile phone column (max of 29 characters) to the Customers table. Facilitate this request.
- (s) There is a shortage of petrol in London. As a result it has been decided to increase the price of orders in that area. Make the necessary changes.
- (t) User Barnes must be allowed update the salaries of the salesreps. The database should reflect this.

**(30 Marks)**

## **SECTION B**

- Q2.** [i] There is an increasing need nowadays to create web sites which connect to databases and, either retrieve information from the database and display it, or collect information from the user and store this information back into the database.

Discuss this trend, paying particular attention to how a site interacts with a database, the steps involved to create this connection and the technologies used.

**(35 Marks)**

- Q3.** [i] Discuss the need for transaction processing in:
- (a) single user environment
  - (b) multi-user environment
- (ii) Explain how transaction processing is handled in both cases in (i) above.
- Explain how users may experience delays in accessing the database if transaction processing is being properly adhered to.
- (iii) Explain what you understand by deadlocks. How are deadlocks overcome.

**(35 Marks)**

**Q4.** [i]

Consider the relation shown in figure 1, which represents information on the products of a electrical appliance manufacturing firm. The following are given: the type of component of a product (attribute type), the quantity of the component necessary for a certain product (attribute Qty), the unit price of the component of a certain product (attribute PriceOfC), the supplier of the component (attribute Supplier) and the total price of the single product (attribute PriceOfP).

Product	Component	Type	Qty	PriceOfC	Supplier	PriceOfP
Toaster	Element	4 Bar	1	3	James	25
Toaster	Screws	SR 14	16	.20	Clearys	25
Toaster	Springs	SP 45	6	.17	Mcfaddens	25
Kettle	Element	4 Bar	1	3	James	32
Kettle	Screws	SR 11	14	.18	Clearys	32
Kettle	Handle	H478	1	2	Smiths	32
Lamp	Screws	SR 14	16	.26	O Connors	50
Lamp	Screws	SR 12	8	.15	Clearys	50
Lamp	Bulb	60 watt	3	.40	Sloweys	50

**Figure 1**

With references to the relation in figure 1 consider the following update operations:

- Insertion of a new product
- Deletion of a product
- Addition of a component in a product
- Modification of the price of a product

Discuss the types of anomaly that can be caused by these operations.

[ii]

With respect to the design of relational databases, discuss the following issues (giving examples where appropriate):

- One-to-One relationships
- Many-to-Many relationships
- Selection of Indexes
- Selection of primary Keys

**(35 Marks)**