

**OLLSCOIL NA hÉIREANN**  
The National University Of Ireland

NATIONAL UNIVERSITY OF IRELAND, GALWAY

**SUMMER EXAMINATIONS 1999**

**SECOND YEAR BA EXAMINATION**

**INFORMATION SYSTEMS**

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Time allowed: **THREE** hours

Q1 and Q4 are compulsory  
Answer **TWO** questions from each section

Use separate answer books for each section

**SECTION A**

- Q.1.** (a) Explain the main components of the relational model. Your answer should include data structures used, relational operators and integrity constraints.
- (b) Given the following relational schema and interpretation:

SLSREP:	<u>Rep_No</u> , Rep_Name, Addr, Status
CUSTOMER:	<u>Cust_No</u> , Cust_Name, Addr, Balance, Rep_No
ORDER_INX:	<u>Ord_No</u> , <u>Cust_No</u> , Date
ORDER_LINE:	<u>Ord_No</u> , <u>Item_No</u> , Ord_Price, Quantity
ITEM:	<u>Item_No</u> , Item_Desc, Item_Price

(Keys are underlined)

The SLSREP relation stores information regarding the sales representatives - unique number, name, address and status. The CUSTOMER relation is used to maintain information on customers. The attribute Rep\_No in CUSTOMER acts as a foreign key to the SLSREP relation. ORDER\_INX stores information on orders placed by customers. The ORDER\_LINE relation is used to maintain information on orders - the items, the price and quantity. The final relation, ITEM, stores information on items - number, description and price.

- (i) Develop an operator sequence (using the relational algebra) to return all items, with item price greater than 14, ordered by customer named "John Smith".
- (ii) Develop SQL queries to satisfy the following information needs:
  - i) List the name and address of all customers with a sales representative with status greater than 10.
  - ii) List the name and address of all customers who have Tom Smith as a sales representative or who have placed an order with a price greater than 100.
  - iii) List the name and address of the sales representative of the customer with the lowest status.
  - iv) List, in alphabetical order the customers who have placed an order comprising more than 3 parts (excluding parts with item price less than 10).
  - v) List all customers with a balance less than that of customer "John Smith" who have also placed an order on the same day as "John Smith"

- Q.2.**
- (a). With respect to file organisations, outline the differences between ordered and unordered files.
  - (b) What is meant by a hashed file organisation. Explain the importance of having a collision resolution policy. Present pseudo-code for a simple algorithm to deal with collisions occurring in a hash file.
  - (c) Explain the limitations of a file system approach to data management. Explain how a DBMS overcomes these limitations.
  - (d) Write a note on techniques used for retrieval of information from collections of text-based documents.

- Q.3.** (a) A video store owner wishes to maintain a database to aid in the running of the store. Model the owner's requirements using an ER model given that:

Information on customers is to be stored - name, address, id\_no and a record of money owing.

Information on stock is also to be stored. For videos, the name, year of release, rating, director, number of copies, a unique identifier and cost is to be stored.

All rental information is to be stored - customer and video involved and date of rental.

Employee information is also to be stored - name, rsi number, salary and address. Information concerning which employee approved which rental is also to be stored. Employees are supervised by other employees.

- (b) Outline a procedure that may be taken to map an ER diagram to a relational schema and illustrate this procedure using the ER model created in (a).
- (c) Explain, and illustrate, the need for normalisation. Define first, second, third and Boyce-Codd normal forms.

## SECTION B

- Q. 4.** (a) What is TCP/IP? Explain your answer giving appropriate examples.
- (b) In relation to the Internet, discuss the problems associated with each of the following:
- Information Overload
  - Security and Control
- (c) Explain, with example code where necessary, the different ways you can include an image map on a web site. Give the advantages and disadvantages of each approach.
- (d) Describe in detail the different scripting languages available. Give example code with each language listed.

**Q. 5.** Write notes on three of the following:

- Data Warehousing
- Decision support systems
- Graphic formats on the internet
- Uniform Resource locator

- Q. 6.** (a) Outline the different information system security issues that arise in organisations.
- (b) What impact does the introduction of the data protection act have on information systems design, administration, hardware and software.
- (c) In relation to information systems security, explain what is meant by the terms: Virus, Worm and Trojan horse.
- (d) What is meant by the term "Biometric technology"? Explain with examples.