

**Ollscoil na hÉireann, Gaillimh**  
**National University of Ireland, Galway**

**Semester II Examinations, 2003/2004**

Exam Code(s)	2BS 2CS 2EL
Exam(s)	2 <sup>nd</sup> Year Examination in Computing Studies
Module Code(s)	CT233
Module(s)	INFORMATION SYSTEMS
Repeat Paper	
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Internal Examiner(s)	Professor G. Lyons Ms. J. Griffith

**Instructions:**

Answer **THREE** questions.  
 All questions carry equal marks.

Duration	<u>2hrs.</u>
No. of Pages	<u>4</u>
Department(s)	<u>Information Technology</u>

- Q. 1.** (i) Describe what is meant by each of the following:  
(a) Primary storage and secondary storage. (5)  
(b) File blocks and blocking factor. (5)
- (ii) With the aid of a diagram describe the main components of a magnetic disk. (5)  
Describe the stages involved in accessing a disk block on a magnetic disk, given the block address. (5)
- (iii) What is meant by *hashed file organisation*? (4)  
With the aid of an example, describe the division method hash function. (3)  
Explain why a collision resolution technique is required when using a hashed file organisation. (3)
- Q. 2.** (i) Distinguish between the traditional file processing approach and the database approach, describing the advantages and disadvantages of each approach. (10)
- (ii) Define the relational model, describing the concepts of *relation*, *attribute*, *tuple* and *domain* in your answer. (5)  
Discuss the integrity constraints that are considered part of the relational model and give examples of cases where the DBMS must check to ensure that such integrity constraints are not violated by update operations. (5)
- (iii) With the aid of examples, describe the following:  
(a) composite and derived attributes. (5)  
(b) single-valued and multi-valued attributes. (5)

Q. 3.

Given the following relational schema and interpretation (with keys underlined):

```
customers(CNo, CName, street, city, county, discount)
sales_reps(SNo, SName, city, salary)
products(PNo, PName, price)
orders(CNo, PNo, SNo, order_date, quantity)
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A company employs a number of sales representatives to sell products in different cities. Associated with each sales\_rep is a unique number (SNo), name (SName), city in which the sales\_rep is based and salary. The company has a number of products identified by a unique product number (PNo), name (PName) and price. Details held on customers are: a unique customer number (CNo), name (CName), address (street, city, county) and an associated discount (percentage value). Customers place orders with sales\_reps; each order has the customer number, sales\_rep number, product number and the quantity of the product ordered and the date the order was placed.

- (i) With the aid of examples based on the relational schema given:
  - (a) Describe the concept of a *foreign* key. (5)
  - (b) Explain the role of foreign keys in representing relationships between relations. (5)
- (ii) Develop SQL queries to satisfy the following information needs:
  - (a) Retrieve the customer name and customer number of all customers who have a discount greater than 10. (4)
  - (b) List the names of customers whose discount is less than the average discount of customers based in Galway city. (4)
  - (c) List the customer names and product names of all products supplied in quantity less than 10 to customers based in county Donegal. (4)
  - (d) List the name of sales\_reps based in Dublin who have taken orders for a product with PNo = 'p10' (4)
  - (e) List the customer names, and the cities in which they live, of customers who have ordered a product with PNo = 'p01' in quantity greater than 100, from a sales\_rep based in Kerry or Cork. (4)

- Q. 4. (i) What is meant by a view? (5)  
Discuss the advantages and disadvantages of using views. (5)
- (ii) What is meant by query processing? (4)  
With the aid of a diagram, describe the main steps involved in processing a query. (6)
- (iii) Evaluation of an SQL SELECT statement often requires the implementation of a search method to search for records that satisfy some selection condition. Outline the steps involved in both a linear search and a binary search approach. (10)

- Q. 5. (i) HTML is an example of a mark-up language. Explain what is meant by a *mark-up* language, giving some examples of the language (HTML) to support your answer. (10)
- (ii) With respect to the principles of user interface design, discuss the desirable HCI (Human Computer Interaction) requirements of a web site. Use examples from web interfaces with which you are familiar to support your answer. (10)
- (iii) With the aid of a diagram describe the main components of an Information Retrieval system. (6)  
Describe what is meant by the techniques *stemming* and *stop word removal*. (4)