

**OLLSCOIL NA hÉIREANN**  
**THE NATIONAL UNIVERSITY OF IRELAND, GALWAY**

SUMMER EXAMINATIONS 1999

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**FIRST YEAR BSc. INFORMATION TECHNOLOGY**  
**FIRST YEAR BSc. BIOMEDICAL SCIENCE**

***CT101 COMPUTING SYSTEMS***

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Time allowed: THREE hours

Answer 5 questions

At least two questions must be answered from each section

Please use separate answer books for each section

**SECTION A**

1. (a) Describe the main functions of an operating system.
- (b) What is a wildcard character? Write the wildcard pattern if you want to find:
  - all files with extension *exe* with filenames four characters long and beginning with the letter *p*
  - all files with filenames 7 characters long, beginning with *wi* and with *w* as the fourth character.
- (c) Distinguish between:
  - command line interface and graphical interfaceand between:
  - multi-user operating system and single-user operating system
2. (a) With respect to records of a file explain what is meant by the term *blocking factor*.
- (b) With the aid of examples, distinguish between sequential, indexed and hashed file organisation.
- (c) Outline the steps required in an algorithm which merges two sorted files into another file, maintaining the sorted order.

3. (a) What is the difference between data and information? What is meant by the term *information overload*?
- (b) Describe how a DBMS overcomes problems associated with a file system approach.
- (c) The main criterion used to classify DBMSs is the data model. What is meant by the term *data model*? Describe the relational data model.
4. (a) Why is a natural language, such as English, not suited to the description of algorithms?
- (b) What are the desirable features of quality software?
- (c) Outline the main stages in the Software Development Lifecycle (SDLC) waterfall model. Compare this with the SDLC spiral model.

### SECTION B

5. (a) Perform the following binary and hexadecimal calculations:  
 $101011_2 + 110110_2$  ;  $101011_2 - 110110_2$  ;  $D5F_{16} + 4AC_{16}$ ;
- (b) Draw logic diagrams and truth tables to represent the following Boolean relationships:  

$$\frac{\overline{A.B.C} (A + \overline{B.C})}{X.Y + \overline{X.Z} + Y.\overline{Z}}$$
- (c) Draw diagrams and truth tables to show the derivation of NAND and NOR gates. What are the advantages of these in integrated circuit design?
6. What methods of data input, output and storage might be used by a large retail business to manage their customer transactions? Justify your answers.
7. (a) Describe the main steps carried out in the CPU during the fetch-execute cycle.
- (b) Explain the actions of the control unit when data is being transferred from the ALU to an output device, illustrating your answer with a diagram.
8. (a) Explain the following terms when used in data communications:  
asynchronous ; protocol ; frequency modulation ; EDI
- (b) Describe the LAN topologies of ring, bus and star, explaining the advantages and disadvantages of each to a small business office.