

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

GX 1514

**Semester II Examinations, 2003/2004**

Exam Code(s) 1EM1, 2BS1, 2EL1, 2ER1

Exam(s) \_\_\_\_\_  
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Module Code(s) CT251

Module(s) Introduction to Computer Systems  
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Paper No. 1

Repeat Paper \_\_\_\_\_

External Examiner(s) Professor D. Bell

Internal Examiner(s) Professor G. Lyons

Mr. P. Bigioi

Mr. J. Byrne

**Instructions:**

**Answer any 3 questions.**

All questions will be marked equally.

Duration 2 hrs

No. of Answer Books 2 1

No. of Pages 3

Department(s) Information Technology

**CT251: Introduction to Computer Systems**

**Answer any 3 questions**

**Time allowed: 2 hours**

**Question 1**

- a) Explain why digital signals are better than analog signals for data representation and transmission. Why is binary representation preferred (as opposed to octal, decimal, hexadecimal, or other)?  
10 MARKS
- b) What is text compression and why is it used?  
Using the asterisk (\*) as a flag character, compress the following line of characters using run-length encoding:  
*nnnnnnxxxxxxxxxxxxHelloWorldkkkkkkkkkeeee*  
Also, calculate the compression ratio in this example.  
15 MARKS
- c) Convert the decimal number 28 into binary.  
Also, convert the fraction  $0.796875_{10}$  into binary.  
10 MARKS

**Question 2**

- a) Describe briefly RAM and ROM memory. Name one type of RAM memory and three types of ROM.  
10 MARKS
- b) Explain what an address bus and a data bus are.  
A memory chip of size 512 X 8 has 512 memory locations, each of which has 8 bits.  
How wide (in bits) must the address bus be?  
How wide must the data bus be in order to access a memory location's contents in a single burst?  
10 MARKS
- c) Explain what is meant by each of the following terms:  
• Volatile memory  
• Cache miss  
• Instruction register  
• ALU  
• Program counter  
15 MARKS

**Question 3**

- a) Describe both SCSI and IDE disk storage.  
10 MARKS
- b) Name and describe three types of RAID systems.  
15 MARKS
- c) Explain how data is stored on a CD-ROM using optical disk technology. Also explain how data is read from a CD-ROM.  
10 MARKS

**Question 4**

- a) Describe the role and operation of a keyboard encoder.

10 MARKS

- b) Explain how both impact and non-impact printers work, giving an example of each.

Describe how a laser printer works.

15 MARKS

- c) Describe the components of a mouse and explain how movement of the mouse is translated into binary data that the computer can understand.

10 MARKS

**Question 5**

- a) Describe each of the following terms:

- Simplex channel
- Half duplex channel
- Full duplex channel
- Parallel transmission
- Serial transmission

10 MARKS

- b) Describe synchronous and asynchronous serial transmission.

10 MARKS

- c) Describe the three main network topologies – the bus, the star, and the ring – giving one advantage and one disadvantage in each case.

15 MARKS