Ollscoil na hÉireann, Gaillimh
National University of Ireland, Galway

GX 1615

Semester II Examinations, 2002/2003

Exam Code(s)	1EM1, 2BS1, 2EL1, 2ER1
Exam(s)	
Module Code(s)	CT251
Module(s)	Introduction to Computer Systems
Paper No.	1
Repeat Paper	
External Examiner(s)	Professor D. Bell
Internal Examiner(s)	Professor G. Lyons
	Mr. P. Bigioi
Instructions:	Answer any 3 questions. All questions will be marked equally.
Duration	3 hrs
No. of Answer Books	2
No. of Pages	3
Department(s)	Information Technology

Question 1

a) Explain why digital signals are better than analog signals for data representation and transmission. Why binary representation is preferred (as suppose to octal, decimal or hexadecimal)?

10 MARKS

b) What is test compression and why is used? Describe briefly at least two text compression methods you know.

10 MARKS

c) Perform the following operations:
- Convert the decimal number 28 into binary.
- Perform the following binary calculation: $000101_2 + 100111_2$
- Convert the binary number 11110101_2 in octal and hexadecimal form.

15 MARKS

Question 2

a) What is the main difference between ROM and RAM memory? Describe briefly the main types of ROM memory and RAM memory.

10 MARKS

b) Describe (draw) the typical computer organization. Describe briefly each of the sub-systems (buses, central processing unit, memory and I/O sub-system). How is the CPU accessing a given memory location?

15 MARKS

c) In the context of CPU organization, describe the role of the program counter (or instruction pointer) and instruction register. What is the role of ALU (Arithmetic Logic Unit)?

10 MARKS

Question 3

a) In the context of disk storage technology, describe the terms "***track***" and "***sector***".

10 MARKS

b) Name and explain briefly at least three types of RAID (Redundant Arrays of Inexpensive Disks) systems.

15 MARKS

c) Explain the optical disk technology and principle of operation for optical disks.

10 MARKS

Question 4

a) How is a mouse transforming the movement on X and Y axis into electrical signals? Explain briefly the components of a mouse.

10 MARKS

b) What are the main types of non-impact printers? Describe briefly the functionality of the laser printer.

15 MARKS

c) In the context of display technology, explain the principle of operation for a CRT (Cathode Ray Tube) Monitor. What is "***refresh rate***" functional parameter?

10 MARKS

Question 5

a) In the context of data communication, explain the following terms: "***channel***", "***baud rate***" and "***bandwidth***".

10 MARKS

b) Consider the parallel interface in Figure 1. Consider that the "Data Ready" signal is used by the sender to indicate that it placed valid data on the data bus and the "Read Complete" signal is used by the receiver to indicate that the data has been read from the bus. Draw the timing diagram for a two bytes data transfer from the sender to the receiver.

15 MARKS

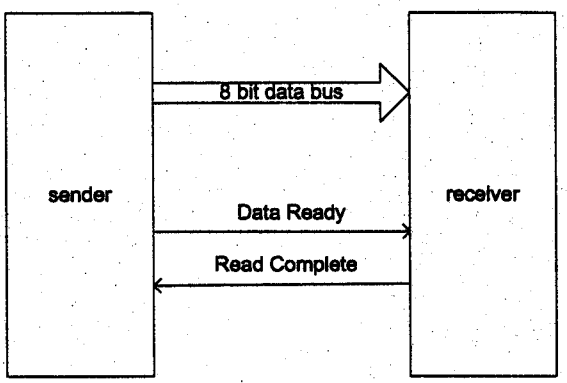

Figure 1: Parallel Interface

c) Describe at least two modulation techniques, giving practical examples of how byte 00110110 is modulated.

10 MARKS

Question 6

a) Describe asynchronous serial transmission.

10 MARKS

b) Describe the star network topology and highlight a few of its advantages over other topologies.

10 MARKS

c) Describe briefly the CSMA/CD (Carrier Sense Multiple Access / Collision Detection) network protocol.

15 MARKS