UNIVERSITY OF LONDON

GOLDSMITHS COLLEGE

B. Sc. Examination 2004

COMPUTING AND INFORMATION SYSTEMS

IS51009A (CIS110)
Introduction to Computing and the Internet

Duration: 3 hours

Date and time:

This paper is in two parts, Part A and Part B. There are a total of three questions in each part. ***You should answer <u>two</u> questions from Part A and <u>two</u> questions from Part B.*** *Your answers to Part A and Part B should be written in separate answer books.*

Full marks will be awarded for complete answers to a total of four questions, two from Part A and two from Part B. Each question carries 25 marks. The marks for each part of a question are indicated at the end of the part in [.] brackets.

There are 100 marks available on this paper.

Electronic calculators must not be programmed prior to the examination. Calculators which display graphics, text or algebraic equations are not allowed.

Part A: answer TWO questions from this Part

Question 1

(a) (i) Calculate the decimal value of the following binary numbers in two's complement notation:

1) 10000011
2) 00001111 [6]

(ii) State the advantages of two's complement notation. [2]

(b) A 9-bit processor has instructions that consist of 3-bit op-codes with a 6-bit operand, as described in the following table. (The operand "dddddd" stands for any sequence of 6-bits which is to be interpreted as data. The operand "aaaaaa" stands for any sequence of 6-bits which is to be interpreted as an address.)

Opcode	Operand	Description
0 0 1	d d d d d d	Load the accumulator with the data 000dddddd
0 1 0	a a a a a a	Add to the accumulator the data at the address aaaaaa
1 0 0	a a a a a a	Write the content of the accumulator to the address aaaaaa
1 1 0	a a a a a a	Jump to the address aaaaaa
1 1 1	a a a a a a	Halt

Given the following program which starts at address 000000, describe what the program does, step by step.

Address	Instruction
000000	001 010000
000001	010 100000
000010	100 100001
000011	111 001000
:	:
:	:
100000	000 00001
100001	000 11111

[10]

(c) The following bit pattern represents a single precision floating-point number with an 8-bit exponent (with a bias of 127) and a normalised 23 bit significand conforming to IEEE 754.

Sign	Exponent	Significand
1	1000 0000	0000 0000 0000 0000 0000 000

Showing all your working, calculate which number this represents in base 10. [7]

Question 2

(a) (i) How does a cell in Main Memory store information? [3]
(ii) How is information read from a cell in Main Memory? [3]

(b) Suppose that a computer has 600 cells. How many address lines does this computer need? Explain your answer. [6]

(c) (i) Explain the concept of 'fetch-execute cycle'. [4]
(ii) Explain the role that the *program counter* (PC) plays in such cycles. [3]

(d) Draw a diagram to illustrate the connection between the Central Processing Unit, the Main Memory, and the Input/Output Devices. [4]

(e) What is a 'bus' in computing? [2]

Question 3

(a) What is an operating system? [4]

(b) Suppose that the CPU is executing a process when an interrupt occurs. How does the operating system deals with this interrupt? [8]

(c) (i) What is fixed-sized partitioning? [3]
(ii) Use an example to explain the problems of fixed-sized partitioning. [4]

(d) What is 'pipelining'? Describe its disadvantages. [6]