UNIVERSITY OF LONDON

GOLDSMITHS COLLEGE

B. Sc. Examination 2003

COMPUTING AND INFORMATION SYSTEMS

IS51006A (CIS106) Introduction to Computing

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) 10001001
2) 00110010 [6]

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

(b) An 8-bit processor has instructions that consist of 3-bit op-codes with a 5-bit operand, as described in the following table. (The operand "ddddd" stands for any sequence of 5-bits which is to be interpreted as data. The operand "aaaaa" stands for any sequence of 5-bits which is to be interpreted as an address.)

Opcode	Operand	Description
0 0 1	d d d d d	Load the accumulator with the data 111ddddd
0 1 0	a a a a a	Add to the accumulator the data at the address aaaaa
1 0 0	a a a a a	Write the content of the accumulator to the address aaaaa
1 1 0	a a a a a	Make the content of the cell aaaaa to be 111 11111
1 1 1	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
00000	001 00011
00001	010 10000
00010	100 10001
00011	110 10010
00100	111 00100
:	:
:	:
10000	000 00001
10001	000 11111
10010	000 10000

[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
0	0111 1111	1100 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 floppy disc store information? [4]
(ii) How is information read from a floppy disc? [4]

(b) (i) What is 'random access'? [3]
(ii) Which of the following two types of devices are random access devices: compact disks and main memory? Explain your answer. [6]

(c) Explain how the central process unit runs a program stored in the main memory. [4]

(d) How does cache memory work? [4]

Question 3

(a) Explain why operating systems are needed. [4]

(b) What is 'programmed I/O'? [3]

(c) Explain the concept of 'Direct Memory Access'. [4]

(d) Distinguish between 'long term scheduler', 'medium term scheduler' and 'short term scheduler'. [8]

(e) What is 'demand paging'? Why it is useful? [6]