UNIVERSITY OF LONDON

291 0110E

FOR EXTERNAL STUDENTS

B. Sc. and Diploma Examination 2006

COMPUTING AND INFORMATION SYSTEMS

CIS110 (Eastern) Introduction to Computing and the Internet

Duration: 3 hours

Date and time: Friday 19 May 2006: 10.00 - 1.00pm

This paper is in two parts, Part A and Part B. There are a total of three questions in each part. ***You should answer two questions from Part A and two 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 may be used. The make and model should be specified on the script. The calculator must not be programmed prior to the examination. Calculators which display graphics, text or algebraic equations are not allowed.

THIS EXAMINATION PAPER MUST NOT BE REMOVED FROM THE EXAMINATION ROOM

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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]

PART B: answer TWO questions from this section.

Question 4

(a) Explain the concept of *layering* in networked computing. Describe how *headers* are used to implement layering in the TCP/IP model.

[8]

(b) What is meant by *flow control* in the context of networked computing, and which protocol layer is primarily responsible? Explain in general terms how this is implemented under the TCP/IP model, with reference to relevant header fields.

[7]

(c) In the TCP/IP model, which layer is responsible for resolving domain names to logical addresses? Say as much as you can about how the following sequences identify a particular network, host computer and application, assuming the classfull addressing system:

- 24.0.29.3:21
- 206.154.13.85:80
- 158.223.1.23:110

[10]

Question 5

(a) What are the advantages of *separation of content and presentation* in web authoring? Briefly describe some technologies that support this division.

[7]

(b) Describe in general terms the sequence of actions carried out by web applications to service a user request for a web document. Your answer should make reference to both client-side and server-side applications, and to both static and dynamic web pages.

[8]

(c) What HTML syntax errors does the following document contain? How will these errors affect the way the page is displayed by a standard web browser? What additional changes need to be made for the document to conform to XHTML standards?

```
<Html>
<Head><Title>Some Famous Jazz Musicians</Title></Head>
<Body BGcolor = ffffcc>
<head><title>Some famous jazz musicians</title></head>
<h1>Some famous jazz musicians</h2>
<P>Albums recorded by <b><i>Miles Davis</b></i>
<ol>
<li>Kind of Blue
<li>Sketches of Spain
<li>The Complete Birth of the Cool</ol>
<BR>Albums recorded by <i><b>John Coltrane</i></b>
<ul>
<li>A Love Supreme
<li>Giant Steps
<li>The Village Vanguard Sessions
</html>
```

[10]

Question 6

(a) Explain the following terms in the context of network security: *trojan horse, denial of service, macro virus, buffer overflow.*

[9]

(b) (i) State the names of the two most important pieces of UK legislation relating to issues of computer security.

(ii) What are the principle implications of these acts for system administrators and end-users, in relation to computer security?

[6]

(c) Discuss the view that "ethical" or "white hat" hackers provide a useful service in highlighting security weaknesses in computer systems, as compared with "malicious" or "black hat" hackers. Give arguments for and against the proposition.

[10]

CIS110 (Eastern) 2006 END OF EXAMINATION