THIS PAPER IS NOT TO BE REMOVED FROM THE EXAMINATION HALLS

UNIVERSITY OF LONDON **291 0110 ZA**

BSc/Diploma Examination
for External Students

COMPUTING AND INFORMATION SYSTEMS AND CREATIVE COMPUTING

Introduction to Computing and the Internet

Dateline: Tuesday 19 May 2009 : 10.00 – 1.00 pm

Duration: 3 hours

This paper is in two parts, **Part A** and **Part B**. There are a total of three questions in each part. Candidates should answer **TWO** questions from **Part A** and **TWO** 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 the total of four questions, two from Part A and two from Part B. There are 100 marks available on this paper.

A hand held calculator may be used when answering questions on this paper but it must not be pre-programmed or able to display graphics, texts or algebraic equations. The make and type of machine must be stated clearly on the front cover of the answer book.

PART A: Answer TWO questions from this section

QUESTION 1

(a) Compare the following different types of memory in terms of speed, cost and size: CPU registers, cache memory, main memory, magnetic discs, optical discs and magnetic tapes.

[4 Marks]

(b) Explain how data is transferred from a magnetic disc (i.e. floppy disc) to the main memory.

[7 Marks]

(c) (i) What is the difference between CAV and CLV?

(ii) Which one of the above is related to a magnetic disc?

(iii) Explain why the access time in an optical drive is slower than that of a magnetic drive.

[9 Marks]

(d) Suppose a computer memory is linked to a decoder with 5 address lines.

(i) Can 1000 memory cells be used?

(ii) What is the maximum number of addresses generated if multiplexed addresses are used?

[5 Marks]

QUESTION 2

(a) How is integer subtraction performed on a binary two's complement computer?

[3 Marks]

(b) Consider the following two's complement negative 8-bits binary integer 11101011_2

(i) Express its corresponding positive number, assuming a two's complement representation (same number of bits).

(ii) Evaluate $10111011_2 - 11101011_2$ in two's complement.

(iii) What is an overflow? Does the operation above contain an overflow?

[8 Marks]

(c) Suppose that in a computer the fetch-execute cycle is further decomposed into 5 stages.

(i) How many time units will 12 instructions take if pipelining is used? Explain your answer.

(ii) Briefly describe two problems that might occur when using pipelining.

[8 Marks]

(d) We assume the standard representation of single-precision floating point numbers with 1 sign bit, 8 bits for the exponent and 23 bits for the fractional value. This means the bias is $2^7 - 1 = 127$.

Using this representation, calculate the decimal value represented by the following binary pattern. Your answer should show all of your workings.

1 | 1000 0110 | 1001 0000 0000 0000 0000 000

[6 Marks]

QUESTION 3

(a) List four responsibilities of an Operating System as resource manager

[4 Marks]

(b) (i) Briefly describe and contrast the following mechanisms of implementing input/output:

- Programmed I/O
- Interrupt-driven I/O
- Direct memory access (DMA)

(ii) Which I/O method is better suited to deal with a DVD drive?

[8 Marks]

(c) What are the roles of long-term scheduler, short-term scheduler, and medium-term scheduler?

[5 Marks]

(d) An 8-bit processor has instructions that consists of a 3-bit op-code 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
001	ddddd	Load the accumulator with the data 000ddddd
010	aaaaa	Add to the accumulator the data at the address aaaaa
100	aaaaa	Write the content of the accumulator to the address aaaaa
110	aaaaa	Make the content of the cell aaaaa to 00000000
111	aaaaa	Halt.

Write a program in machine code which adds up the numbers stored in the cells 10000, 10001, and stores the sum in cell 10010. The program should start at the address 00000.

[8 Marks]

PART B: Answer TWO questions from this section

QUESTION 4

(a) Explain the differences between the following topologies:

- bus
- ring
- star

[6 Marks]

(b) (i) Explain how the following addresses identify a particular network, host computer and application.

- 204.187.159.152 : 23
- 129.234.0.20 : 25

(ii) Explain what is subnetting in networked computing.

[10 Marks]

(c) (i) Briefly describe and discuss the differences between TCP and UDP protocols.

(ii) Suppose a TCP sender receives many successive (i.e., in a row) duplicate acknowledgements for segment x. What should the TCP sender infer has happened? Why?

[9 Marks]

QUESTION 5

(a) (i) What is the difference between HTML and DHTML?

(ii) What are the shortcomings of using HTML as a web language?

(iii) Explain how XHTML addresses the problems of HTML.

[11 Marks]

(b) Describe two advantages of using an external CSS style sheet over embedding formatting information in an XHTML document.

[4 Marks]

(c) List five rules XHTML documents must conform to.

[5 Marks]

(d) Explain the differences between well-formed XML and valid XML

[5 Marks]

QUESTION 6

(a) Describe three ways viruses can enter a networked computer system and three techniques that can be used to prevent systems from virus attacks.

[6 Marks]

(b) Describe three ways an intruder could gain access to a password-protected system.

[6 Marks]

(c) In the context of computer security, explain the difference between a Trojan horse virus and a buffer overflow attack.

[6 Marks]

(d) Discuss the difference between white hat hackers and black hat hackers. Give an example where hackers provide a useful service to the community.

[7 Marks]