UNIVERSITY OF LONDON

GOLDSMITHS COLLEGE

B. Sc. Examination 2011

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. 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 a 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, text or algebraic equations. The make and type of machine must be stated clearly on the front cover of the answer book.

THIS EXAMINATION PAPER MUST NOT BE REMOVED FROM THE EXAMINATION ROOM

PART A: Answer TWO questions from this section

QUESTION 1

(1) Given the following 8 bit unsigned binary integer, 1 0 1 1 0 0 1 1:

(a) Give the corresponding hexadecimal and decimal values.

(b) What would the decimal value be if the above number was represented as an 8 bit signed (two's complement) integer instead?

(c) Find the range of integers represented in a 32-bit two's complement notation.

[6 Marks]

(2) (a) Give the 8 bit two's complement representation of the integer -23.

(b) Use the sign extension rule to find the 32 bit two's complement representation of the integer -23.

(c) What advantage has two's complement notation over signed notation?

[7 Marks]

(3) Assume we are using the 32-bit IEEE single precision floating point format. The mantissa has 24 bits including the hidden bit. There is one sign bit and there are eight exponent bits.

(a) What decimal floating point number is represented by the following 32 bits? Show your workings.

1100 0001 1000 1110 0000 0000 0000 0000

(b) What is the range of positive numbers in this representation? State when positive overflow and underflow occur.

[12 Marks]

QUESTION 2

(1) Explain the role of each of the following CPU registers:

(a) PC

(b) IR

(c) AC

(d) MBR

[6 Marks]

(2) (a) What is the difference between SRAM and DRAM?

(b) Explain how the cache memory uses temporal and spatial locality to enhance a computer's performance.

(c) Explain the difference between the following two technologies for memory caching: direct mapping memory cache and fully associative memory cache.

[12 Marks]

(3) Suppose you have designed a processor implementation whose five pipeline stages take the following amounts of time: IF=20ns, ID=10ns, EX=20ns, MEM=35ns and WB=10ns.

(a) What is the minimum clock period for which your processor functions properly?

(b) What should be redesigned first to improve this processor's performance?

(c) Assume this processor is redesigned with 50 pipeline stages. Is it true to say that the new processor is 10 times faster than the previous design with 5 pipeline stages? Explain your answer.

[7 Marks]

QUESTION 3

(1) Compare I/O based on polling with interrupt driven I/O. In what situation would you favour one technique over the other?

[6 Marks]

(2) Why is it generally correct to favour I/O bound processes over CPU-bound processes?

[5 Marks]

(3) What is the difference between preemptive scheduling and non-preemptive scheduling? What is the issue with the latter?

[6 Marks]

(4) Operating systems frequently exploit locality to improve performance. Briefly describe two examples where operating systems do so, and state how locality is exploited.

[8 Marks]

PART B: Answer TWO questions from this section

QUESTION 4

(1) Explain and state which layer the following protocols belongs to.

(a) UDP

(b) IMAP

(c) ARP

[6 Marks]

(2) Explain the role of subnetting in computer networks.

[3 Marks]

(3) Given a host configuration with an IP address 192.168.10.17 and a subnet mask 255.255.255.248.

(a) What is the subnet address?

(b) What is the host address?

(c) What is the broadcast address?

(d) What is the number of possible hosts and range of host addresses in this subnet?

[12 Marks]

(4) Explain how error control is achieved in the TCP/IP model and state which layer is responsible for this.

[4 Marks]

QUESTION 5

(1) (a) Explain the difference between XML and HTML.

(b) Why is XHTML necessary when most current browsers already render web pages written in HTML?

[10 Marks]

(2) How does a computer know what IP address should be used to view a particular URL?

[4 Marks]

(3) How does the router know where to send packets?

[5 Marks]

(4) What is the role of HTTP in the process of delivering this content?

[6 Marks]

QUESTION 6

(1) Explain the difference between the following Malware:

- Viruses
- Macro viruses
- Worms
- Trojan Horses

[8 Marks]

(2) (a) State three levels of offence under the Computer Misuse Act of 1990. Illustrate each with a relevant example.

(b) What are techniques to prevent unauthorized computer access and use?

[9 Marks]

(3) Discuss the current limitations and problems associated with prosecutions under the Computer Misuse Act.

[8 Marks]