

UNIVERSITY OF LONDON

GOLDSMITHS COLLEGE

B. Sc. Examination 2010

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 two 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. 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**

PART A: Answer TWO questions from this section

QUESTION 1

(1) Explain the role of the main three components of a computer's bus system.

[3 Marks]

(2) Explain how cache memory enhances a computer's performance.

[5 Marks]

(3) (a) Explain how data is stored in a magnetic disc (i.e. floppy disc).

(b) In a magnetic disc the rotation speed is constant whereas in an optical disc it varies. Explain why.

[9 Marks]

(4) Suppose a computer memory with 990 memory cells is linked to a decoder with 5 address lines.

(a) What problem might this computer have?

(b) Suggest and explain two ways to solve this problem.

[8 Marks]

QUESTION 2

(1) Consider the following 8-bits binary sequence, 10101011. Find the decimal value it represents in:

- (a) Signed notation,
- (b) Excess notation and,
- (c) Two's Complement notation.

[6 Marks]

(2) (a) Explain the advantage of Two's complement notation over signed magnitude one.
(b) Evaluate $10111011_2 + 10100011_2$ in Two's complement and say if this operation contains an overflow. Explain your answer.

[7 Marks]

(3) 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 $2^7 - 1 = 127$.

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

1		10000111		1101 0000 0000 0000 0000 000
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- (b) Find the range of positive numbers in this representation.
- (c) What is negative underflow?
- (d) Under what condition will a negative underflow arise in this representation?

[12 Marks]

QUESTION 3

(1) Explain the concept of interrupt-driven I/O. How does the CPU deal with interrupts?

[6 Marks]

(2) Explain and state the advantages and disadvantages of the following memory management schemes:

- swapping
- simple paging
- demand paging

[9 Marks]

(3) An 8-bit processor has instructions that consist of a 3-bit op-code with a 5-bit operand, as described in the following table. (The operand “dddd” 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	dddd	Load the accumulator with the data 000dddd
010	aaaaa	Add to the accumulator the data at the address aaaaa
011	aaaaa	Subtract from the accumulator the data at the address aaaaa
100	aaaaa	Write the content of the accumulator to the address aaaaa
101	aaaaa	Make the content of the cell aaaaa to 11111111
110	aaaaa	Make the content of the cell aaaaa to 00000000
111	aaaaa	Halt.

Write a program in machine code which subtracts the number stored in the cell 10010 from the number stored in the cell 10011, and stores the result in cell 10100.

[10 Marks]

PART B: Answer TWO questions from this section

QUESTION 4

(1) Briefly describe the function of the following protocols and state which TCP/IP layers they belong to.

- FTP
- UDP
- ARP
- ICMP

[8 Marks]

(2) (a) Explain how different classes of IP addresses identify the network and host addresses.

(b) Explain what subnetting is.

(c) Given the following IP address and subnet mask, identify the subnet and host addresses, and state the class the network ID belongs to.

Mask: 255.224.0.0

IP Address: 35.123.13.73

[11 Marks]

(3) Explain how the TCP/IP suite addresses error control and flow control. State which layer is responsible for this.

[6 Marks]

QUESTION 5

(1) Describe the three-way handshake for setting up a TCP connection.

[4 Marks]

(2) Explain the difference between the Internet and the World Wide Web.

[4 Marks]

(3) Which elements are mandatory in an XHTML document?

[5 Marks]

(4) State the rules an XHTML documents must conform to.

[6 Marks]

(5) Describe each of the following document type declarations (DTDs).

- strict
- transitional
- frameset

[6 Marks]

QUESTION 6

(1) Explain between the following malicious exploits.

- (a) Virus
- (b) Worms
- (c) Trojan horses

[6 Marks]

(2) (a) Explain the difference between patenting and copyright in computer software.
(b) Give an example of patentable and non patentable software.

[8 Marks]

(3) (a) List and explain three categories of offence Under the Computer Misuse Act 1990.
(b) The Computer Misuse Act 1990 (CMA) does not cover denial of service (DoS) attacks. In your own words discuss why DoS should or should not be covered by the CMA.

[11 Marks]