THIS PAPER IS NOT TO BE REMOVED FROM THE EXAMINATION HALLS

**UNIVERSITY OF LONDON** **CO1110 ZB**

**BSc and Diploma Examination**

**COMPUTING AND INFORMATION SYSTEMS AND CREATIVE COMPUTING**

**Introduction to Computing and the Internet**

Date and Time: Thursday 12 May 2016 : 14:30 - 17:30

Duration: 3 hours

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** questions from part B.

Full marks will be awarded for complete answers to a total of **FOUR** questions, TWO from part A and TWO from part B. The marks for each part of a question are indicated at the end of the part in [.] brackets.

Only your first TWO answers from part A and your first TWO from part B, in the order that they appear in your answer book, will be marked.

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.

## PART A: Answer TWO questions from this section

### Question 1

(a) i. Which one of the following represents the largest decimal number that can be represented in an 8-bit two's complement representation?

1. 8
2. 127
3. 128
4. 256

[2]

ii. In which one of the following two's complement addition problems does an overflow error occur?

1. 0100 0000 + 0111 1111
2. 1100 0000 + 0111 1111
3. 0100 0000 + 0011 1111
4. 1111 1111 + 0111 1111

[2]

iii. Which of the following statements about IEEE 754 single precision floating point numbers are CORRECT? More than one answer may apply.

1. the exponent is represented in two's complement notation
2. the exponent is represented in signed notation
3. the exponent is represented in Excess notation
4. the number 0.2 cannot be represented exactly.

[2]

(b) i. A computer has 16 MB (megabytes) of memory . How many bits are needed to address any single byte in memory?

ii. A computer has 64 MB of memory. Each word in the computer is eight bytes. How many bits are needed to address each single word in memory?

[9]

(c) 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.

i. Using this representation, calculate the decimal value represented by the following 32 bits. Your answer should show all of your working.

01000111 0110 11010000000000000000

ii. Give the range of positive numbers in this representation.

[10]

## Question 2

(a) i. The register which keeps track of the execution of a program and which contains the memory address of the next instruction to be executed is known as

1. index register
2. memory address register
3. memory data register
4. program counter

[2]

ii. Which of the following is the fastest type of memory?

1. CPU registers
2. Main memory
3. magnetic memory
4. optical memory

[2]

iii. Which access method is used for obtaining a record from a cassette tape?

1. direct
2. sequential
3. random
4. none of the above

[2]

(b) Draw a diagram showing the three main components of the CPU and the relationship between them. Explain the role of each component in your diagram. [9]

(c) Define data hazard and structural hazard in the context of pipelining. For each hazard describe and explain one technique to reduce it. [10]

## Question 3

(a) i. Which of the following is a memory management technique that uses hard drive space as additional RAM?

1. virtual private network
2. virtual memory
3. virtual machine
4. none of the above

[2]

ii. In the memory hierarchy, as the speed of operation increases the memory size increases. True or false?

1. true
2. false

[2]

iii. Which of the following is true about the instruction register (IR)?

1. holds the address of the next instruction
2. holds the instruction that has just been fetched
3. holds the instruction being executed
4. holds the address of the instruction being executed

[2]

(b) i. How many 128 x 8 RAM chips are needed to provide a memory capacity of 1024 bytes?

ii. How many lines of the address bus must be used for the above RAM chip selection?

iii. How many lines of the address bus must be used to access 1024 bytes of memory ?

iv. How many of these lines are required to address just one of these chips?

[9]

(c) Explain the concept of interrupt-driven I/O and how it differs from programmed I/O? [10]

## PART B: Answer TWO questions from this section

### Question 4

(a) i. What does the IP protocol do?

1. recombines packets to reform the message
2. divides the message into packets
3. divides the message into packets, checks that all packets arrive, and recombines packets to reform the message
4. defines addresses for computers on the network and specifies the routing information

[2]

ii. You have a class A network address 30.0.0.0 and you are required to add 30 subnets. You would like to still allow for the largest possible number of host IDs per subnet. Which subnet mask should you assign?

1. 255.240.0.0
2. 255.248.0.0
3. 255.252.0.0
4. 255.254.0.0

[2]

iii. What is a Web Server?

1. a hypermedia document designed for the WWW
2. software that tracks Internet activity
3. a computer system that processes requests via HTTP
4. a collection of Web pages related to a single topic or theme

[2]

(b) i. Name two well known data transport protocols provided by the Internet Transport Layer.

ii. Briefly describe each data transport protocol and state a type of application that could use the service.

[9]

(c) i. Give two advantages of layering in TCP/IP.

ii. Explain how TCP deals with flow control.

[10]

**Question 5**

(a) i. Say which of the following statements are true about SMTP:

1. SMTP stands for Simple Mail Transfer Protocol
2. SMTP can only transfer text
3. SMTP is part of the TCP/IP transport layer
4. all of the above

[2]

ii. HTML was first implemented using

1. SGML
2. Java
3. Java script
4. none of the above

[2]

iii. It is easier to process HTML than XML.

1. true
2. false

[2]

(b) i. Give five rules that XHTML documents must follow.

ii. Explain what a **well formed XML** document is.

[9]

(c) Consider a class C network with the network address 193.132.112.0. A network administrator decides to subnet this network with a subnet mask of 255.255.255.224.

i. Find the number of possible usable subnets.

ii. Find the number of possible usable hosts in each subnet.

iii. Find the address of the first subnet.

iv. What is the range of possible host addresses in the first subnet?

[10]

**Question 6**

(a) i. Which statement best describes a worm virus?

1. malicious code that is designed to slow down your computer
2. malicious code that spreads itself, from file to file and from computer to computer
3. malicious code that is designed to shut down a server
4. malicious code that masquerades as a legitimate program

[2]

ii. Which of the following are sensitive personal data as defined by the UK Data Protection Act 1998? More than one answer may apply

1. nationality
2. religious beliefs
3. personal finances
4. political views.

[2]

iii. Under the UK Data Protection Act 1998, who is responsible for the safe storage of personal information held on record?

1. the data subject
2. the data controller
3. both data subject and controller
4. none of the above

[2]

(b) i. Define and explain a Trojan horse and a macro virus in the context of computer security.

ii. Briefly discuss copyright and patent law as it applies to computer software.

[9]

(c) An EU company decides to send its customer data to a non-EU country for processing. Explain the steps this company should take to ensure that the transfer of the data is lawful under the UK Data Protection Act of 1998. [10]

END OF PAPER