

THIS PAPER IS NOT TO BE REMOVED FROM THE EXAMINATION HALLS

UNIVERSITY OF LONDON

CO1110 ZA

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.

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PART A: Answer TWO questions from this section

Question 1

- (a) i. Which one of the following represents the smallest 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. $1100 + 1100$
2. $1011 + 1011$
3. $0100 + 1011$
4. $1100 + 0111$

[2]

- iii. A computer with a 32-bit word size uses two's complement to represent numbers. The range of integers that can be represented by this computer is:

1. -2^{32} to 2^{32}
2. -2^{32} to 2^{31}
3. -2^{31} to $2^{31} - 1$
4. -2^{31} to $2^{32} - 1$

[2]

- (b) i. A computer has 32 MB (megabytes) of memory. How many bits are needed to address any single byte in memory?

- ii. A computer has 128 MB of memory. Each word in the computer is 8 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. What decimal floating point number is represented by the following 32 bits? Show all of your working.

1100 0001 1111 1110 0000 0000 0000 0000

ii. When will a positive underflow occur in this representation?

[10]

Question 2

- (a) i. The register which contains the data to be written into or read out of the addressed location is known as

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

[2]

- ii. A memory in which any location can be reached in a fixed and short amount of time after specifying its address is called

1. sequential access memory
2. random access memory
3. secondary memory
4. mass storage

[2]

- iii. Which of the following interprets program instructions and initiates control operations?

1. input
2. storage unit
3. logic unit
4. control unit

[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 control hazard in the context of pipelining. For each hazard describe and explain one technique to reduce it.

[10]

Question 3

(a) i. Which one of the following is the best definition of virtual memory?

1. an extremely large main memory
2. an extremely large secondary memory
3. an illusion of extremely large main memory
4. a type of memory used in super computers

[2]

ii. Which computer component holds processed information before it is output?

1. RAM
2. ROM
3. bus
4. ports

[2]

iii. Which of the following is used to describe the number of bits that a CPU accesses at any one time?

1. byte
2. word
3. character
4. string

[2]

(b) i. How many 128 x 8 RAM chips are needed to provide a memory capacity of 2048 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 2048 bytes of memory ?

iv. How many of these lines will be common to all RAM chips?

[9]

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

PART B: Answer TWO questions from this section

Question 4

(a) i. Which one of the following provides a reliable communications protocol?

1. UDP
2. TCP
3. IP
4. all of the above

[2]

ii. What is the size of the network bits and host bits of a class A network?

1. network bits 7 and host bits 24
2. network bits 6 and host bits 24
3. network bits 7 and host bits 23
4. network bits 8 and host bits 24

[2]

iii. What does a router do in a computer network?

1. forwards a packet to all outgoing links
2. forwards a packet to next free outgoing link
3. determines on which outgoing link a packet is to be forwarded
4. forwards a packet to all outgoing links except the original link

[2]

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

ii. Explain how TCP/IP uses headers to implement layering.

[10]

(c) Explain the concept of subnetting and the problem(s) that it addresses. [9]

Question 5

(a) i. FTP is an acronym for:

1. file transport protocol
2. file translation protocol
3. file transfer protocol
4. file transmission protocol

[2]

ii. HTML was first implemented using

1. C++
2. Java
3. SGML
4. none of the above

[2]

iii. Say which of the following statements are true and which are false:

1. SMTP stands for Simple Mail Transfer Protocol
2. SMTP can transfer images and text
3. SMTP is part of the application layer
4. all of the above

[2]

(b) i. List and describe four problems with HTML and explain how XHTML addresses these problems.

ii. Explain what a **valid XML** document is.

[9]

(c) Consider a class C network with the network address 220.193.97.0. A network administrator decides to subnet this network with a subnet mask of 255.255.255.248.

- 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. The use of software routines to tie up a computer hosting a Web site that denies legitimate visitors access is called:

1. denial of service
2. hacking
3. spoofing
4. none of the above

[2]

- ii. The UK Data Protection Act 1998 states that if data is no longer needed for the purposes for which it was gathered, it must be destroyed.

1. true
2. false

[2]

- iii. Assuming that all the other Data Protection Principles have been met, which of the following is not a valid transfer of data outside the European Economic Area (EEA) under the eighth Data Protection Principle?

1. the transfer is to a country approved by the EU
2. the transfer is for valid commercial reasons
3. the data subject has consented to the transfer
4. the transfer is necessary for a performing a contract with the data subject

[2]

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

- ii. Briefly discuss under what conditions computer software would be eligible to be patented.

[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