

UNIVERSITY OF EDINBURGH
COLLEGE OF SCIENCE AND ENGINEERING
SCHOOL OF INFORMATICS

Computer Literacy 1

Degree Examination

Date: 11 December 2007
Time: 9:30 – 11:00 pm (one and a half hours)
Place: Appleton Tower Concourse (Rear)

Board of Examiners
Chair: Michael O'Boyle
External Examiner: Robert Irving

Instructions to Candidates

1. Check that the question paper contains 5 pages. If not, inform the invigilator.
2. Attempt **ALL** questions in part 'A' and **ONE** question from part 'B'.
3. The questions vary in difficulty. During your first pass through the paper, you are advised not to dwell on questions to which the answer is not readily apparent.
4. Please write legibly.
5. The marks allocated to each part of each question are indicated in brackets. Each question is worth 20 marks and the total for the exam is 100.

Part "A"

Answer ALL FOUR questions from this section

1. (a) What are the following and how do they contribute to the process of communication between computers across a network?:
- i. A Cyclic Redundancy Check (otherwise known as a CRC or checksum) [2 marks]
 - ii. A datagram [2 marks]
 - iii. The TCP network protocol layer [3 marks]
- (b) What is a *dongle*? [1 mark]
- (c) Imagine you are the parent of children aged 10 and 12. What guidelines would you give them to ensure their safety when using the Internet? [3 marks]
- (d) What factors would you consider when assessing the reliability of a source of information on the Internet? [3 marks]
- (e) My elderly computer is accessing the hard disk a lot more often than I would expect, especially when I am running several applications at once. What might be happening, what is the condition called and how do I stop it from happening? [3 marks]
- (f) Which of the following situations are protected by the Consumer Credit Act (1974)?
- i) I order goods via the Internet using my credit card but they are not what I ordered
 - ii) Someone gains access to an account containing my credit card details and uses them to buy goods
 - iii) I pay for goods on eBay via PayPal but they never arrive [3 marks]
2. (a) Describe some of the ways that malicious code such as viruses or Trojan horse programs can reach your computer [2 marks]
- (b) Describe the major characteristics of a good application. [3 marks]
- (c) A spreadsheet is a member of a class of programs called *decision support systems*. What features of a spreadsheet enable it to support business decisions? [3 marks]
- (d) Why might I want to use the following in construction of a Web site?
- i. Cascading Style Sheets
 - ii. Java
 - iii. Metadata [6 marks]

- (e) i. Compare and contrast the principal features of two common formats for storing images. [3 marks]
ii. What do you understand by the term 'lossy' ? [1 mark]
- (f) What is *firmware*, where might you find it in a modern computer and what will it do there? [2 marks]
3. (a) What do you understand by the term convergence or confluence when applied to computers and communications? Give some examples. [3 marks]
- (b) Describe or illustrate the key functions of
i Data mining
ii Geographical Information Systems (GIS) [4 marks]
- (c) What do you understand by the term fault tolerance? How are programs made fault-tolerant? [3 marks]
- (d) Approximately how long would it take to download a 1 Megabyte file from
i) a typical modem connected to the phone network.
ii) a typical office Ethernet.
Show your assumptions and working. [4 marks]
- (e) Outline some of the major landmarks in the historical development of computers as we see them today. What trends are likely to affect the look and feel of computers over the next few years? [4 marks]
- (f) What is Moore's Law? Is it still true? [2 marks]

4. (a) What are the advantages and disadvantages of communicating via text (e.g. paper letter, SMS text, Instant Messaging or email) versus a phone or video call? [3 marks]
- (b) Why is the IP address “129.317.25.5” invalid? How many IP addresses is it possible to have? You may express this figure as a product of numbers. [2 marks]
- (c) A very simple automaton to manage a communications interface can be described as follows:
1. Wait for a clock tick.
 2. When the clock ticks, check to see if a packet is waiting to be sent.
 3. If no packet is waiting, wait for the next clock tick.
 4. If a packet is waiting, send it and wait for a response.
 5. If the response is positive, go and wait for the next clock tick.
 6. If the response is negative, resend the packet and wait for a response.
- Draw a state transition diagram that describes this automaton. [4 marks]

Will this automaton cope with all possible eventualities? If not, describe one problem and explain how you could amend the automaton to fix it.[2 marks]

- (d) The human eye and brain have particular strengths and weaknesses when it comes to assimilating information. Explain how computer software writers take this into account when designing medical imaging software. [4 marks]
- (e) The cost of air travel has gone down in real terms by about a factor of 10 in the last 30 years. What contribution do you think computers have made to this process? [5 marks]

Part "B"

Answer ONE question only from this section

- B1.** In the computer-enabled world what do you understand by the term 'Intellectual Property'? In what forms is it encountered, who owns it, how is it infringed and what protection exists under the law for its rightful owners? [20 marks]
- B2.** Computers are invariably agents of change. Explain what issues have to be considered to ensure that a major change in IT systems in a big office goes smoothly both from an organisational and from a human point of view. Use as an example the merger of two companies with incompatible office IT systems. [20 marks]
- B3.** The UK Government is considering introducing a national ID card within the next few years. IT will clearly be a key factor in making the scheme work. Discuss the likely benefits and dangers of an IT-based ID card and some of the technical, ethical and legal problems and issues likely to be encountered as the card is introduced. [20 marks]
- B4.** In the course you were presented with some ideas from current research in Informatics and invited to read around a topic that interested you. What do you understand about the current situation in the topic of your choice, where is it going and what benefits (or dangers) is it likely to bring to business or society? [20 marks]