

UNIVERSITY OF EDINBURGH
COLLEGE OF SCIENCE AND ENGINEERING
SCHOOL OF INFORMATICS

Computer Literacy 1

Degree Examination

Date: 9 December 2006
Time: 9:30 – 11:00 pm (one and a half hours)
Place: Adam House Ground Floor

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

Instructions to Candidates

Attempt **ALL** questions in part 'A' and **ONE** question from part 'B'.

Marks for questions are indicated in brackets after each question. Each question is worth 20 marks and the total for the exam is 100.

Candidates in the third or later year of study for the degrees of MA(General), BA(Relig Stud), BD, BCom, BSc(Social Science), BSc(Science) and BEng should put a cross (×) in the box on the front cover of the script book.

Part "A"

Answer ALL FOUR questions from this section

1. (a) What are the principal functions of
 - i. A mainframe computer [2 marks]
 - ii. A networked server ? [2 marks]
 - (b)
 - i. Describe two key differences between the GIF and JPEG image formats. [2 marks]
 - ii. Why would JPEG be a bad choice for storage of diagrams? [1 mark]
 - (c) A PC requires a complex interaction between the hardware, firmware and parts of the operating system in order to work. Identify three aspects of the 'behind the scenes' operation of a PC and explain how they work together to help you launch an application such as Office. [3 marks]
 - (d) What is a Distributed Denial of Service attack and how does it work? [3 marks]
 - (e) What are the key features of:
 - 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 [2 marks]
 - iv. A DNS server ? [1 mark]
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2. (a) Describe the critical differences between client-server and peer-to-peer networks. Why are businesses interested in P2P systems for sharing files between large numbers of users? [4 marks]
 - (b) Processor performance has followed Moore's Law for many years but there are signs that this will not be the case for much longer. What techniques are computer processor manufacturers using to achieve maximum overall processor performance? [3 marks]
 - (c) I purchase an item on the Internet using my credit card and the goods that arrive are not what I ordered. What is my protection under the Consumer Credit Card Act 1974? What would have happened had I made this purchase from eBay using PayPal? [3 marks]
 - (d) Describe two schemes that have been used to defraud Internet users. Why do they succeed and how can they be defended against? [2 marks]

(Question 2 continues on the next page)

2. (e) I want to create a home network with the following characteristics:
- i. The network will have a broadband connection.
 - ii. I want to be able to use a fixed PC from my study and at the same time a laptop from anywhere in the house.
 - iii. My son wants to be able to exchange data between his PC and mine at speeds of at least 100 Mbit/second.
 - iv. The whole network needs to be reasonably secure.

My laptop is network-ready but the other PCs are not. What hardware and software components will I need to install and what will be their purpose?
[3 marks]

What would I have to do in order to run an externally-visible Web server from this network?
[2 marks]

- (f) My web site content and style are as good as I can make them. How else can I increase the prominence of my Web site on the Internet and increase the number of visitors?
[3 marks]

3. (a) What are the *peripherals* of a computer? Give examples of three different peripherals and in each case describe the measures you would use to distinguish between different peripherals of the same type. [3 marks]

- (b) Give a characterization of analogue values and of digital values, and provide an illustration of each. Give an example of a device that converts between the two types of representation. What are two main advantages of digital over analogue? [4 marks]

- (c) In the context of file storage, what is *fragmentation*, how does it occur, and why is it undesirable? [3 marks]

- (d) In the context of genetic algorithms, name and describe the two basic operators that transform the chromosomes. How does an Elitist genetic algorithm move the generations along? [4 marks]

- (e) Give both a positive and a negative aspect of information technology in the spheres of:
- i. commerce
 - ii. the environment
 - iii. the workplace
 - iv. quality of life
- [6 marks]

4. (a) Consider the Turing machine specified by the program $\langle 1,1,1,1 \rangle, \langle 1,0,0,1 \rangle$. If it begins its computation in state 1 reading a 1, what 'actions' will it perform next? If in state 1 reading a 0? Describe the overall computational behaviour of the machine. [4 marks]
- (b) In relational database terminology give a characterization of the following:
- i. record
 - ii. field
 - iii. primary key
 - iv. foreign key
- [4 marks]
- (c) What is the general notion of an effective procedure? [3 marks]
- (d) Describe the Eliza program and the design strategy behind it. [4 marks]
- (e) What does 'multiple realizability' mean in the context of computation? Give a non-computational example as well. Why is multiple realizability important for Artificial Intelligence? [5 marks]

Part "B"

Answer ONE question only from this section

- B1.** IBM has been exploring the possibilities of using the “Second Life” virtual world to hold business meetings. Discuss and speculate on the benefits and disadvantages of using this as opposed to other computer-mediated and real world mechanisms for holding meetings.
[20 marks]
- B2.** What issues does the chief Web architect of a multinational corporation have to consider in designing and maintaining the corporation’s web sites
[20 marks]
- B3.** Making explicit use of material covered in the course, write an essay discussing the basic phenomenon of linguistic communication, including attempted definitions and models, and the role of computers *both* in understanding *and* facilitating this phenomenon. Be sure to include discussion of the basic strengths and weakness of computers in processing human language.
[20 marks]
- B4.** There are at least three primary dimensions to being ‘computer literate’. One is familiarity with the rapidly changing techniques and technologies made possible by computer applications. Another is an acquaintance with the fundamental concepts and theories of computation underlying the technology. Third is an appreciation of the effects these technologies have on human culture and ways of life, both for better and for worse.
- Write an essay in which you discuss what you found most beneficial and/or interesting about the course along each of these three dimensions.
[20 marks]