UNIVERSITY OF EDINBURGH

COLLEGE OF SCIENCE AND ENGINEERING

Computer Literacy 1h

Degree Examination
<mark>Specimen Solutions</mark>

Date: 30 May 2003
Time: 2:00 p.m. – 3:30 p.m.

Board of Examiners
Chair: M.R. Jerrum
External Examiner: R. Dyckhoff

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 and the total for the exam is 70.

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 tick (√) in the box on the front cover of the script book.

Part "A"

Answer ALL questions from this section

1. **(a)** Name two ways in which I.T. will be developing and changing over the next few years. [2 marks]
    Wireless, pervasive computing, convergence of mobiles and PDAs, intelligent services, voice and natural language I/O etc. etc. (lecture 2)

    (b) Describe two mechanisms which enable accented or special characters to be included in e-mail or web pages. [2 marks]
    Character =2E quoting =2E, HTML " special characters ", Unicode, MIME-encoding. (slide 3.14)

    (c) Name four items that contribute to the *cost of ownership* of a computer. [2 marks]
    Purchase cost of hardware, ditto software, hardware and software maintenance costs, effort to install software, do upgrades, fix faults, apply patches, backup data, eventually upgrade or replace hardware and software, training, ...(slide 5.9)

    (d) Name two types of information you might expect to find on the web and elsewhere that provide support for an application after you have purchased it. [2 marks]
    FAQs, HOWTOs, bug reports, patches, upgrades, add-ons, drivers, product information. Slide 6.11 refers.

    (e) I have data on CD-ROM that I may still need to use in 20 years time. What will I have to do between now and then to ensure that I can still access this data in 2023? [2 marks]
    Keep transferring the data to the latest medium and application data format. I would also accept that they will need to keep backing it up and that tapes and even CDs deteriorate over time. Slide 16.16 covers data obsolescence.

2. (a) Draw a diagram showing the major hardware 'building blocks' of a computer and describe the function of each. [5 marks]

This is the slide 3 from lecture 4:

Basic Computer Architecture
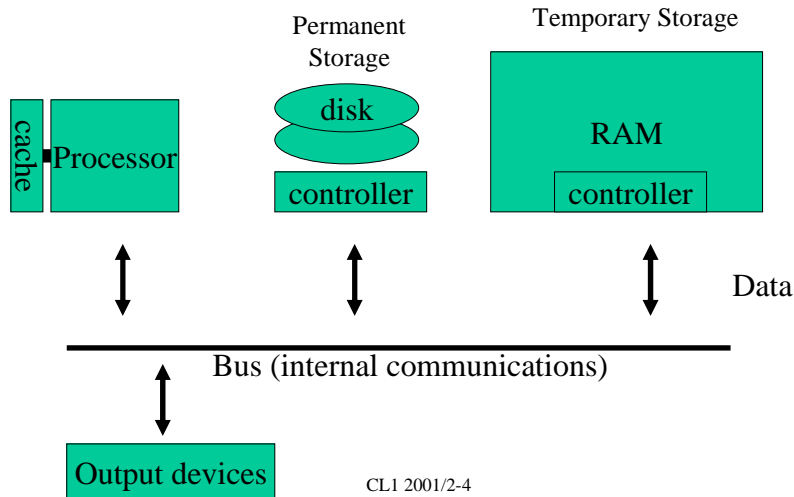
(b) Describe some of the ways in which the Internet can be used to commit crimes against its users and some of the elementary precautions that users should take to prevent this happening. [5 marks]
Viruses (use anti-virus packages), paedophiles preying on children (be aware, teach children not to part with personal information or to meet people in the Real World without someone present and to report anything strange), stalking and harassment (same goes), identity theft (keep personal information secure), scams (don't believe everything you see), attacks on personal machines (firewalls, keeping software up to date), terrorism (no obvious defence), general (knowing your rights). Lecture 36 covers social aspects of IT.

3. **(a)** Describe some of the possibilities and limitations in using *groupware* (bulletin boards, chatrooms, shared documents, desktop videoconferencing etc.)

[5 marks]

Lecture 19. Possibilities: ability to meet cheaply and rapidly without airfares and jetlag, while sharing material and possibly in real time. Limitations: poor image resolution and no eye contact (video), limited or no 'body language', loss of cues such as how to manage a meeting in a controlled manner, flaming and wandering off the topic (bulletin boards), loss of synchronisation (chatgroups)

(b) Good content is wasted if a web page is unattractive or difficult or frustrating to use. Describe some of the principles of good web page design. [4 marks]

Lecture 24. Considering the user's perspective; Having a page structure which doesn't lose the user or lead them up dead ends or is too deep; consistent and attractive style and icons; using white space to improve readability; keeping it simple – avoiding gimmicks; avoiding huge graphics which take ages to load; progress indicators if there is a delay; considering users who are disabled or on slow lines or restricted browsers; removing dead information, e.g. last week's news, etc. etc.

(c) Name one way in which a web site can be made easy to *maintain*. [1 mark]

Separating style and content e.g. by CSS so a stylistic change only has to be made in one place.

4. **(a)** List four tasks a communications protocol has to perform to enable the exchange of information between two computers. [2 marks]

Initialising; addressing; determining control; rate of flow; exchanging control information; terminating; dealing with errors and breakdowns; exchanging data.

(b) How has old telephone cable continued to play a part in the age of high speed digital communication? [2 marks]

The existing telephone network can be used for ADSL to provide MBit/s Internet access. Mentioning asymmetry and the importance of not having to lay a new network also accepted.

(c) List three key features of a *mesh* network. [3 marks]

Mobile; wireless; robust; every device acts as a router, repeater and sender/receiver. A device may be a laptop, PDA, mobile phone etc. Traffic hops to any device within range, seeking a route to the destination.

(d) Describe the operation of Bidirectional Bubblesort when used to sort a jumbled list of names into dictionary order. You may answer using a worked example.

[3 marks]

Pass through the list swapping pairs of words into order as you go. The effect will be to 'ripple' the last word to the end of the list. Reverse the order and perform the same operation in the reverse direction (pushing the earliest item to the start) till the list is sorted.

5. (a) What is a cable modem? [2 marks]
It is a box connecting a computer to a high-speed cable laid for telephone/TV/data which offers always-on broadband access.

(b) What is a logic bomb? [2 marks]
A "Trojan Horse", dormant until triggered by a particular event or series of events. Key point: – a 'useful' program but which eventually does damage

(c) Explain what is meant by an insecure communication channel. How can encryption be used to provide security? [2 marks]
Messages can be intercepted and listened to as they travel along fixed wires or through the air. This can't be prevented but security can be provided by making the message readable or unusable by altering it with encryption to be restored by the receiver.

(d) What is WiFi and how can it be used? [2 marks]
It is a wireless (Ethernet) standard; 100m range; 10 MBit/s data rate. It allows you to establish a wireless LAN giving always-on access to the Internet via normal access paths.

(e) Describe how a home computer can be connected to the Internet. How is this likely to differ from the way a computer in a university microlab is connected to the Internet? [2 marks]
Home: dial-up via modem and telephone or ADSL/cable. Microlab: connected to a LAN which is in turn connected to a backbone and thence to the Internet.

Part "B"

Answer ONE question only from this section

B1. Discuss the ways in which information technology has contributed to the development of commerce and business and some of the barriers to the adoption of "e-commerce" that need to be overcome. [20 marks]
Lecture 33: Rapid communication, particularly e-mail; communication networks e.g. point-of-sale or airline terminals linked to large and integrated databases managing stock and accounts; the Internet and Web allowing global dissemination of information and convenient interaction with customers; intranets allowing access to comprehensive and up-to-date information by all employees; secure communication allowing electronic cash transactions. A general reduction in the cost of providing services. Problems include trust, lack of qualified people to develop services, out-of-date business models, speed and availability of access, worries about fraud. (slide 33.22)

B2. Any large organisation will have an I.T. department or computing service that covers all aspects of I.T. from long-term planning through service and system management to user support. Using what you have learned in the course and any relevant personal experience, describe what will be the principal functions of the Computing Service in the University of Edinburgh and the likely job descriptions and content of a representative selection of the people working for it. [20 marks]
Directorate: Overseeing capital projects (machine replacement, networks), keeping up-to-date with trends and planning new services to exploit them (e.g. wireless). Service and system management: maintaining efficient services – identifying user requirements and meeting them, purchasing hardware and software, setting up backup regimes, sorting faults and user problems, planning software upgrades and scheduling them, informing the directorate of trends and requirements, training. Operations: looking after consumables, selling on media, manuals, user notes etc., creating user accounts and restoring lost data and passwords. You could also divide the service by function – mail service manager, web services, network services, payroll, student records etc., not forgetting the library. Anything that shows they've been keeping their eyes open and applying what they know is acceptable here.

B3. Describe the major changes in computing and communications technology that have taken place that allow terms such as computer confluence and digital convergence to be useful and meaningful. Give examples from your own personal experience and what you have read. [20 marks]
Analogue telephone network; digital computer networks; speed, protocols, robust/reliable and affordable equipment and communications . Key aspect is

digitisation – data, voice, music, video, mail, email, newspapers, books, voice-mail, on-line libraries and information sources generally.

B4. IT stands for Information Technology. Explain how Invasive Technology could be another meaning. What is being invaded or threatened? Does it matter? Can it be prevented? [20 marks]

This is a general invitation to talk about security and privacy in the digital age. This invites re-use of material from an essay assignment in a related area.