BCS THE CHARTERED INSTITUTE FOR IT

BCS HIGHER EDUCATION QUALIFICATIONS
BCS Level 4 Certificate in IT

COMPUTER & NETWORK TECHNOLOGY

Wednesday 20th April 2011 - Afternoon
Time: TWO hours

Section A and Section B each carry 50% of the marks. You are advised to spend about 1 hour on Section A (30 minutes per question) and 1 hour on Section B (12 minutes per question).

Answer the Section A questions you attempt in Answer Book A
Answer the Section B questions you attempt in Answer Book B

The marks given in brackets are **indicative** of the weight given to each part of the question.

Calculators are **NOT** allowed in this examination.

SECTION A

Answer TWO questions out of FOUR in Answer Book A. Each question carries 30 marks.

A1. a) A computer can deal with input and output in several ways; for example, programmed I/O, DMA, and interrupt-driven I/O.

Explain what we mean by the expression *interrupt-driven I/O* used in the above statement. Your answer should include a detailed description of how a peripheral uses an interrupt (hardware exception) to request attention and how the computer deals with (services) that request. Your answer should include the role of the operating system in this process. It will be necessary to draw one or more diagrams to illustrate this activity.

(24 marks)

b) In the context of interrupt handling, what is the meaning of

i) prioritized interrupts
ii) vectored interrupts

(6 marks)

A2. Over the past 40 years, personal computers and computers in small offices have become much more powerful and are able to store vast amount of data. An equally significant change has been the degree of connectivity between computer and peripherals and other computers.

Write an account of the way in which connectivity has changed over the past three decades and describe the basic principles and properties of some of the technologies involved. Your answer should cover both long-distance connectivity and local connectivity.

(30 marks)

A3. A circuit has four natural binary encoded inputs D, C, B, A where D is the most-significant bit. These values represent 0 to 15 in decimal. It has a single output X.

A designer wishes to construct a logic circuit using AND, OR, and NOT gates that will provide a 1 output if the input on D, C, B, A is either less than four or in the range 10 to 12 inclusive.

a) Construct a truth table with four inputs, D, C, B, A in the range 0 0 0 0 to 1 1 1 1 and an output X.

(6 marks)

b) Using Boolean algebra write down an expression (unsimplified) for X.

(6 marks)

c) By means of Boolean algebra or a Karnaugh map write down a simplified Boolean expression for X.

(6 marks)

d) Draw a circuit using AND, OR, and NOT gates to implement the simplified Boolean expression for X.

(6 marks)

e) If each gate has a delay of 2ns (the time between the inputs being available and the corresponding output valid) what is the worst case (longest) time between inputs becoming valid and output X valid.

(6 marks)

A4. a) With the aid of diagrams draw the structure of a computer at the level of registers, buses and functional units and explain the sequence of actions that take place when an instruction is read from memory and executed.

(22 marks)

b) Computers (microprocessors) are often described as being RISC or CISC; for example, Intel's Pentium and core i7 computers are broadly CISC machines and ARM, the PowerPC, MIPS and SPARC are RISC machines.

Briefly explain the difference between RISC and CISC machines and describe the fundamental characteristic of each machine.

(8 marks)

SECTION B

Answer FIVE questions out of EIGHT in Answer Book B. Each question carries 12 marks.

B5. a) Explain why it is necessary to use a data communications protocol to control a data link.

(6 marks)

b) What role does TCP play in a data transmission system?

(6 marks)

B6. a) Describe the factors that need to be considered as to whether to use a laser or an ink jet printer.

(6 marks)

b) Explain the operation of a laser printer.

(6 marks)

B7. With reference to computer security, explain each of the terms below:

a) Firewall

(6 marks)

b) Data Encryption

(6 marks)

B8. Wireless computing (Wi-Fi) has changed the way people use computers and associated devices.

a) Using Wi-Fi as an example, describe how wireless computing operates.

(8 marks)

b) Give four examples of typical devices that make use of Wi-Fi

(4 marks)

B9. a) Explain the importance of IP addressing in computer networks.

(6 marks)

b) What are the differences between an intranet and an extranet?

(6 marks)

B10. Explain the terms below as applied to operating systems.

a) Multi user

(3 marks)

b) Multi tasking

(3 marks)

c) Multi processing

(3 marks)

d) Real Time

(3 marks)

B11. There has been considerable development in the way computer networks are set up and used. One area which has become popular is *cloud computing*. Briefly describe *cloud computing*. Using suitable examples, explain potential uses of cloud computing.

(12 marks)

B12. Briefly, explain the following processor related terms.

a) Logic gate

(4 marks)

b) Memory Address Register

(4 marks)

c) Bus

(4 marks)