BCS THE CHARTERED INSTITUTE FOR IT

BCS HIGHER EDUCATION QUALIFICATIONS
BCS Level 4 Certificate in IT

COMPUTER & NETWORK TECHNOLOGY

Tuesday 1st April 2014 - Morning
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 2 questions (out of 4) in Answer Book A. Each question carries 30 marks

A1 a) What are the essential differences between an assembly language (like Intel IA32 assembly language or Motorola 68000 assembly language) and a high-level language like C or Java?

(5 marks)

b) Many programmers today write programs in a scripting or high-level language. Suggest reasons why universities and organisations like the BCS still include **assembly languages** in their curricula?

(5 marks)

c) Translate the following algorithm which adds 20 consecutive positive integers in memory (expressed both in pseudocode and in C) into assembly language form. You may use any assembly language you wish. However, your program must be appropriately documented and the meaning of each instruction made clear.

(20 marks)

Pseudocode version

```
Sum = 0
i = 0
REPEAT
  Read x_i from memory
  Sum = Sum + x_i^2 + 3
  i = i + 1
UNTIL i = 20
```

C language version

```
{
  int i, Sum;
//assume array x[20] exists
  Sum = 0;
  for (i = 0; i < 20; i++)
  Sum = Sum + x[i]*x[i] + 3;
}
```

A2 The table below gives the specification of a typical computer. For each item in the table, there is a value (i.e., description).

Briefly define the meaning of each item and explain the meaning of the value quoted in the table.

	Item	Description
1.	Type	Personal computer
2.	Form Factor	Mini tower
3.	Processor	1 x Intel Core i5 (3rd Gen) 3.2 GHz (Quad-Core)
4.	Cache Memory	6 MB L3 Cache
5.	RAM	4 GB (installed) / 8 GB (max) - DDR3 SDRAM
6.	Storage Controller	SATA
7.	Hard Drive	1 TB - SATA-300
8.	Optical Storage	DVD±RW
9.	Monitor	22” LCD with DVI input
10.	Graphics Controller	PCIe x16
11.	Video Memory	1 GB
12.	Audio Output	Integrated - 5.1 channel surround
13.	Networking	Gigabit LAN, 802.11b, 802.11g, 802.11n
14.	USB	2 x USB 2.0, 3 x USB 3.0
15.	Power	AC 120/230V (50/60 Hz), 1W standby, 47W idle, 225W active

(15 x 2 marks)

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

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 in the range 3 to 5 (inclusive) or 7 to 8 (inclusive) or 10.

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

(8 marks)

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

(5 marks)

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

(5 marks)

d) Draw a circuit diagram using AND, OR, and NOT gates to implement this function.

(5 marks)

e) Suppose that the inputs corresponding to the decimal values 0, 1, and 2 could never occur (i.e., they are do not care conditions). Using this information construct a simplified Boolean equation for F.

(7 marks)

A4 Arguably, the most important piece of software running on many computers is the operating system.

Explain what the role of the operating system is and why it is needed. Your answer should address at least some of the following points:

- A brief history of the operating system
- The purpose of the operating system
- The role of the operating system in memory management
- The role of the operating system in file management
- The role of the operating system as a user interface
- The future of operating systems

Your answer may look at general principles, or you may take examples from one or more actual operating systems.

(30 marks)

SECTION B

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

B5 Explain the meaning of the following terms used when describing a computer's hardware:

a) Temporary memory storage **(6 marks)**
b) Permanent disk storage **(6 marks)**

B6 Briefly explain the meaning of the following two technologies and provide examples of their application:

a) Bluetooth **(6 marks)**
b) WiFi **(6 marks)**

B7 As a computer technician, you have been asked to provide advice on a range of computers and devices. Briefly differentiate between:

a) Desktop computers **(4 marks)**
b) Laptop computers **(4 marks)**
c) Tablet computers **(4 marks)**

B8 Describe the following operating system and network related terms:

a) I/O management **(4 marks)**
b) Device driver **(4 marks)**
c) Router **(4 marks)**

B9 Describe the following devices:

a) HDMI monitor **(3 marks)**
b) Ink jet printer **(3 marks)**
c) Data projector **(3 marks)**
d) Scanner **(3 marks)**

B10 Computers need to be protected from malware. Describe how the following can contribute to computer security.

a) Fingerprint reader **(3 marks)**
b) Cookie **(3 marks)**
c) Access Control List **(3 marks)**
d) Pop up blocker **(3 marks)**

B11 a) Describe how wireless technology can be used to interconnect computers and associated devices. **(8 marks)**
b) Outline typical uses of wireless technology **(4 marks)**

B12 Describe the four layers of the TCP/IP model. **(12 marks)**