**BCS THE CHARTERED INSTITUTE FOR IT**

BCS HIGHER EDUCATION QUALIFICATIONS
BCS Level 4 Certificate in IT

**COMPUTER & NETWORK TECHNOLOGY**

Tuesday 27th September 2016 - 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). Each question carries 30 marks.**

**A1** A digital circuit has 4 inputs D, C, B, A representing the binary values 0000 to 1111 (0 to 15 decimal). The output F is true if the input falls in the range 8 to 10 (inclusive), or if the input is divisible by 3, or if the input is divisible by 7. It is false otherwise. Zero is considered as indivisible by 3 or 7.

a) Construct a truth table for this system
(7 marks)

b) From the truth table write down a Boolean equation for F in terms of D,C,B,A
(7 marks)

c) Using either Boolean algebra or Karnaugh maps, obtain a simplified expression for F.
(8 marks)

d) Draw a circuit to implement the circuit for F using NAND gates only.
(8 marks)

**A2**

a) Draw the block diagram of a computer's CPU at the level of registers, buses, and functional units. Your diagram must include a Program Counter, PC.

(8 marks)

b) What is the purpose of a Program Counter (PC) in a computer?

(4 marks)

c) Starting with the Program Counter (PC), explain how an instruction is fetched and executed.

(10 marks)

d) Computer instructions at the machine level, or assembly language level, are expressed in various ways depending on whether the computer has a RISC architecture or a CISC architecture, and on the particular manufacturer of the processor. Describe the structure of two different instruction set formats in terms of the fields of an instruction.

(8 marks)

**A3**

a) The ISO Open Systems Interconnection model, OSI, divides a communication system into seven levels or layers. Briefly define each of these layers and explain its function in the design of a network. Note that this is also called the *OSI reference model*.

(14 marks)

b) Why was the ISO model for OSI developed, and how can it be used to aid the design of networks?

(8 marks)

c) Briefly explain the difference between the OSI reference model and the TCP/IP reference model used to implement the Internet.

(8 marks)

**A4** A computer system has a wide variety of memory systems from cache to optical storage and to magnetic tape. Each of these memory systems has its own characteristic, such as speed, bit-size, cost-per-bit, and so on.

a) Explain why computers implement such a wide range of memory technologies.

(10 marks)

b) Briefly describe the basic operating principles and characteristics of any FOUR memory technologies.

(16 marks)

c) What trends do you expect to see in memory technology over the next few years?

(4 marks)

## SECTION B

**Answer 5 questions (out of 8). Each question carries 12 marks.**

**B5** When selecting a laptop computer, explain why each of the following is important:

a) Processor speed
b) RAM size
c) Wireless connection
d) Display resolution (4 x 3 marks)

**B6** In the context of printing technology, differentiate between

a) 3D printer
b) Laser printer
c) Ink jet printer
d) Dot matrix printer (4 x 3 marks)

**B7**

a) Briefly explain how IP addressing is used in network connectivity. (8 marks)
b) Describe the purpose of a packet in the transfer of data in a computer network. (4 marks)

**B8**

a) Describe FOUR types of malware products which affect computers. (8 marks)
b) Suggest suitable methods to protect against these malware products. (4 marks)

**B9** Explain the following the meaning and purpose of each of the following:

a) Executable file (3 marks)
b) PDF file (3 marks)
c) System file (3 marks)
d) Archive file (3 marks)

**B10**

a) Explain the difference between an intranet and an extranet. (8 marks)
b) What is the purpose of a MAC address? (4 marks)

**B11** Differentiate between the following devices:

a) Switch (4 marks)
b) Router (4 marks)
c) Hub (4 marks)

**B12** Describe FOUR functions of a typical operating system. (4 x 3 marks)