BCS THE CHARTERED INSTITUTE FOR IT

BCS HIGHER EDUCATION QUALIFICATIONS
BCS Level 4 Certificate in IT

COMPUTER AND NETWORK TECHNOLOGY

Thursday 22nd March 2018 – 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 any Section A questions you attempt in Answer Book A
Answer any 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 logic circuit has four binary inputs D, C, B, A that represent the sixteen values 0 (0,0,0,0) to 15 (1,1,1,1). The output F is true if the input on D, C, B, A is divisible by 3, 8, 13, or 14. Note that 0 is not divisible by any number.

a) Draw a truth table for this system with inputs D, C, B, A and output F.
(8 marks)

b) From the truth table, write down an expression for the output F (unsimplified).
(8 marks)

c) Simplify this expression.
(8 marks)

d) For the simplified expression create a circuit using NAND gates.
(6 marks)

A2

a) The performance of microprocessors has been improving quickly since they were first manufactured. However, over the last few years, the advance of microprocessor performance has slowed. Why is this and what is limiting the increase in microprocessor performance?
(7 marks)

b) How are computer manufacturers attempting to increase the performance of microprocessors?
(10 marks)

c) Cache memory can increase the performance of a microprocessor system. What is a cache memory and briefly explain how it improves performance?
(7 marks)

d) The main memory of a computer has an access time of 50 ns. The cache memory has an access time of 5 ns. The hit ratio for the memory system is 0.9 (i.e., 90% of memory accesses are to the cache). What is the speedup ratio of this system?
(6 marks)

A3

a) A computer has a program counter. What is a *program counter* and what is its function?
(5 marks)

b) Under what circumstances would the program be counter modified by the program?
(5 marks)

c) In the context of computer architecture, what is a *stack pointer register*? Describe how it is used to implement subroutines in a computer.
(10 marks)

d) What is the function of an *index register* (also called pointer register or an address register) in a CPU. Give a simple example of the use of an index register.
(10 marks)

A4

The operation of the simple von Neumann computer with its fetch/execute cycle has been enhanced by several techniques to improve its performance. Write notes on the following THREE mechanisms that are found in most computers. In each case, state what the technique is, how it works, and why it increases computer performance.

a) The interrupt.

(10 marks)

b) Virtual memory.

(10 marks)

c) Direct memory access (DMA).

(10 marks)

Section B
Answer 5 questions (out of 8) in Answer Book B. Each question carries 12 marks.

B5

Describe the following data storage mediums:

a) Flash memory **(6 marks)**
b) Magnetic disk **(6 marks)**

B6

Describe the following types of computer networks:

a) Client server **(6 marks)**
b) Peer to peer **(6 marks)**

B7

Briefly differentiate between:

a) Mainframe computer **(4 marks)**
b) Embedded computer **(4 marks)**
c) Tablet computer **(4 marks)**

B8

Describe the following operating systems related terms:

a) System boot process **(4 marks)**
b) Disk management **(4 marks)**
c) Process management **(4 marks)**

B9

Compare and contrast the following input devices:

a) Touch screen **(3 marks)**
b) Scanner **(3 marks)**
c) Barcode reader **(3 marks)**
d) Trackball **(3 marks)**

B10

Describe the following computer related threats:

a) Trojan **(3 marks)**
b) Hacking **(3 marks)**
c) Phishing **(3 marks)**
d) Pop up **(3 marks)**

B11

a) Describe the different components required to access the internet. **(8 marks)**
b) Outline typical uses of wireless technology. **(4 marks)**

B12

a) Differentiate between a router and a switch. **(8 marks)**
b) Explain the meaning and purpose of an 'IP address'. **(4 marks)**

END OF EXAM