BCS THE CHARTERED INSTITUTE FOR IT

BCS HIGHER EDUCATION QUALIFICATIONS
BCS Level 4 Certificate in IT

COMPUTER AND NETWORK TECHNOLOGY

Tuesday 26th March 2019 - 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) The digital computer is often referred to as a "*von Neumann stored program machine that implements a fetch/execute cycle*." Explain the meaning of this phrase and define the TWO terms *stored program* and *fetch/execute cycle*.

(8 marks)

b) Draw a diagram of the structure of a simple CPU with a PC (program counter), registers, buses, memory, and an ALU.

(8 marks)

c) Using the diagram created in b) explain how the fetch/execute cycle operates.

(8 marks)

d) Modern high-performance microprocessors do not implement the basic von Neuman machine. Briefly describe two ways in which a modern microprocessor differs from the ideal von Neuman machine.

(6 marks)

A2.

a) Workstations and similar general-purpose computers do not use a single type of memory system. A typical computer normally uses four or more different types of memory to store programs and data. The characteristics of these different types of memory vary widely in terms of speed, cost, and operational characteristics. These different memories are often described as forming a *hierarchy* in terms of speed and memory size. Explain why such a memory hierarchy is necessary in today's computers.

(10 marks)

b) Describe FOUR different types of memory and give their advantages and disadvantages (in comparison with other memories). Your description should provide the basic operational features/characteristics of each of these types of memory.

(20 marks)

A3.

A combinational logic circuit has four inputs D, C, B, A representing the binary values 0000 to 1111 (i.e., 0 to 15 decimal). The output F is 1 if the binary input on DCBA is greater than eleven or is divisible by five or by seven.

a) Draw a truth table for this system.

(8 marks)

b) Obtain an expression for F from the truth table.

(6 marks)

c) Obtain a simplified expression for F using either Boolean algebra or a Karnaugh map.

(8 marks)

d) Draw a circuit diagram using logic gates that will implement this function.

(8 marks)

A4.

a) What are the differences between the WiFi and Bluetooth communication technologies? Your answer should briefly describe their characteristics, strengths and weaknesses, and their applications.

(10 marks)

b) The ISO Standard for open systems interconnection uses a 7-layer model to describe a communications network. The bottom layer of this model is the physical layer. Briefly describe the physical layer and its purpose. Explain why the physical layer is fundamentally different to the other six layers.

(10 marks)

c) The physical layer link of a communications network can use many technologies; for example, microwave wireless, co-axial cable, fibre optics. Describe the structure and operation of a fibre-optic link and explain its advantages and disadvantages with respect to other types of physical link.

(10 marks)

Section B

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

B5.

Discuss the advantages and disadvantages of laser and inkjet printers.

(12 marks)

B6.

Discuss TWO advantages and TWO disadvantages of using cloud storage.

(12 marks)

B7.

Describe the differences between UDP and TCP protocols.

(12 marks)

B8.

Explain THREE differences between Peer to Peer and Client Server architecture.

(12 marks)

B9.

Describe the THREE most important functions of an Operating System.

(12 marks)

B10.

Discuss THREE measures to improve a computer's performance without upgrading the hardware.

(12 marks)

B11.

Discuss THREE measures to safeguard your computer from unauthorised access and cyber-attacks.

(12 marks)

B12.

Discuss the following with at least one example:

a. DHCP;
b. DNS;
c. Proxy Server.

(12 marks)