

BCS THE CHARTERED INSTITUTE FOR IT

BCS HIGHER EDUCATION QUALIFICATIONS
BCS Level 4 Certificate in IT

COMPUTER AND NETWORK TECHNOLOGY

Friday 7th May 2021 - 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). Each question carries 30 marks.

A1.

This question is about FUNDAMENTALS.

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 decimal input on DCBA is in the range 0 to 3, or 7 to 10, or is divisible by **TWO**. The number ranges are inclusive.

- a) Draw a truth table for this system. **(8 marks)**

- b) Obtain an expression for F from the truth table. **(7 marks)**

- c) Obtain a simplified expression for F using either Boolean algebra or a Karnaugh map. **(8 marks)**

- d) Suppose that inputs in the range 13 to 15 (i.e., 1101 to 1111) could never occur. Obtain a new simplified expression for F taking these don't care conditions into account. **(7 marks)**

A2.

This question is about PROCESSOR ARCHITECTURE.

- a) Over the past four decades, personal computer systems and workstations have become more and more powerful. Describe **THREE** areas of a computer system that have experienced considerable growth in their performance.

Your answer should include a description of the features of the component/subsystem and an explanation of what measures have contributed to an increase in performance. You should also provide an indication of the increase in performance.

Note that this question does **NOT** include peripherals and communications systems. **(25 marks)**

- b) What do you think are the obstacles to the continued increase in computer performance? **(5 marks)**

A3.

This question is about PROCESSOR ARCHITECTURE.

- a) With the aid of a diagram, explain the operation of a computer's CPU at the level of registers, functional units, and buses.

You must provide a diagram of the structure of a computer and explain how an instruction is executed in terms of the flow of information between registers and functional units.

(20 marks)

- b) Explain why indexed addressing mode (also called register indirect addressing) has been implemented and what it does.

Give a typical example of the use of indexed addressing.

(10 marks)

A4.

This question is about OPERATING SYSTEMS AND SYSTEM SOFTWARE.

One of the key innovations in operating systems is memory management and virtual memory. Explain how memory management operates and what advantages it brings to the computer user. Your answer should include the following concepts:

- i) Logical address;
- ii) Physical address;
- iii) Address translation;
- iv) Paging;
- v) Memory management unit (MMU);
- vi) Memory protection;
- vii) Page-fault;
- viii) Thrashing.

(30 marks)

[Turn Over]

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

B5.
This question is about FUNDAMENTALS.

With the support of diagrams describe the following gates:

- i) AND;
- ii) OR;
- iii) NOR;
- iv) EOR;
- v) NAND;
- vi) Inverter.

(12 marks)

B6.
This question is about PROCESSOR ARCHITECTURE.

Explain the concept of stack, in processor architecture, and its use in implementing subroutines and exceptions, local storage and recursion.

(12 marks)

B7.
This question is about PROCESSOR ARCHITECTURE.

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

- a) Desktop computers;
- b) Laptop computers;
- c) Tablets.

(4 marks)

(4 marks)

(4 marks)

B8.
This question is about PROCESSOR ARCHITECTURE.

- a) Describe the characteristics of single core and multicore processors.

(6 marks)

- b) Discuss the limits of Moore's law.

(6 marks)

B9.
This question is about NETWORKS.

Discuss **FOUR** cyber security threats that every user must be aware of.

(12 marks)

B10.
This question is about NETWORKS.

- a) Describe the concept of Cloud Computing.

(3 marks)

- b) With the support of **ONE** example each, discuss **THREE** models of cloud computing.

(9 marks)

B11.
This question is about NETWORKS.

Describe the purpose of at least **SIX** of the **SEVEN** layers of the ISO/OSI Model.

(12 marks)

B12.
This question is about OPERATING SYSTEMS AND SYSTEM SOFTWARE.

Indicate the role of the following in the implementation of multitasking:

- a) Interrupts;
- b) Concurrency;
- c) Scheduling and timers.

(12 marks)

End of Examination