

BCS THE CHARTERED INSTITUTE FOR IT
BCS HIGHER EDUCATION QUALIFICATIONS
BCS Level 4 Certificate in IT
COMPUTER AND NETWORK TECHNOLOGY

Tuesday 5th October 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

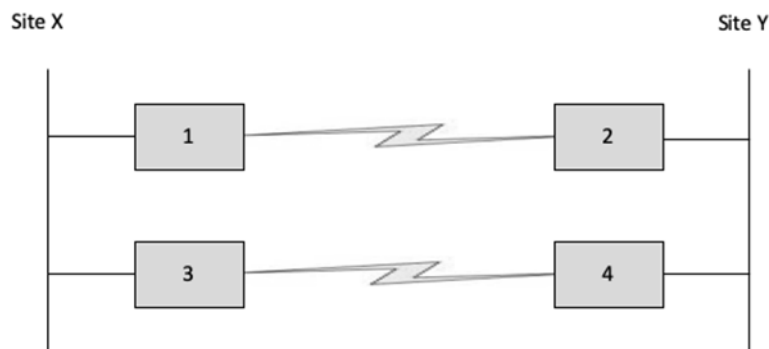
Answer 2 questions (out of 4) in Answer Book A. Each question carries 30 marks.

A1.

- a) What infrastructure devices are typically used at the following layers of the OSI model? Describe their operation and what type of data unit is communicated across the network for each layer.

- i) Network Layer;
- ii) Data Link Layer;
- iii) Physical Layer.

(12 marks)



- b) Given the above geographic dispersed network topology, which network devices from part (a) would you recommend to fill positions 1, 2, 3, and 4 in the diagram. Justify your answer detailing which devices could not be used, which ones can cause potential problems (documenting the issues) and your preferred solution.

(18 marks)

A2.

Combinational logic can be used to build several computer circuits relating to maths.

- a) A key device needed for computational functions is a full adder. Describe from first principles how to build a full adder which adds two-bits and a carry.

(18 marks)

- b) Another useful circuit is a shift register. Using D-type flip flops show how to build a four-bit shift register and explain how it works. There is no need to show the individual gates inside the D-type flip flops.

(12 marks)

A3.

Data storage is a key component of modern computer systems as are peripherals that provide backup storage to these systems. Both Hard disks and DVD drives provide different storage functions in these regards.

- a) Explain, with the aid of diagrams, how raw binary data would be represented and organised on a two-platter hard disk system.

(15 marks)

- b) Again, with the aid of diagrams, explain how a DVD system represents and organises data and the ways in which it differs from a hard disk.

(15 marks)

A4.

- a) From an operating system perspective what is meant by a:

- i) Process;
- ii) Thread.

Explain the similarities/differences between them.

(8 marks)

- b) When designing OS memory management there is a choice between:

- i) Swapping;
- ii) Paging.

Define each of these terms and clarify their respective roles in OS memory management.

(12 marks)

- c) iOS Memory management also requires a key design decision between:

- i) Paging;
- ii) Segmentation.

Compare and contrast these **TWO** approaches highlighting the strengths and weaknesses of each.

(10 marks)

[Turn Over]

Section B

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

B5.

Describe the function of the following devices with the help of a diagram:

- a) Switch; **(6 marks)**
- b) Router. **(6 marks)**

B6.

Describe **SIX** points to explain the purpose and functions of an operating system. **(12 marks)**

B7.

In terms of computer processor, explain with the help of a diagram how the fetch-decode-execute (also known as the instruction) cycle works. **(12 marks)**

B8.

With the help of a diagram, describe each of the following:

- a) RS Flip-Flop; **(4 marks)**
- b) JK Flip-Flop; **(4 marks)**
- c) D Flip-Flop. **(4 marks)**

B9.

Explain the purpose of each of the following commands:

- a) FTP; **(3 marks)**
- b) Pathping; **(3 marks)**
- c) Tracert; **(3 marks)**
- d) Netstat. **(3 marks)**

B10.

Explain each of the following:

- a) Program counter; **(4 marks)**
- b) Memory address register; **(4 marks)**
- c) Memory buffer register. **(4 marks)**

B11.

- a) Explain the concept of cyber security. **(3 marks)**
- b) Describe **THREE** methods to safeguard your computer from viruses. **(9 marks)**

B12.

Explain the purpose and uses of the following:

- a) Virtualisation; **(6 marks)**
- b) Cloud computing. **(6 marks)**

End of Examination