BCS THE CHARTERED INSTITUTE FOR IT

BCS HIGHER EDUCATION QUALIFICATIONS
BCS Level 4 Certificate in IT

COMPUTER & NETWORK TECHNOLOGY

Thursday 3rd October 2024 - 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.
Optical disk technology has often been used as a convenient and secure way to store, transfer and backup smaller capacity computer data.

a) With the aid of a diagram, explain how computer data on a standard CD is organised and why this means a CD drive needs to be able to change the rotation speed of the disk.

(12 marks)

b) Describe how computer data on a CD-R or DVD+R/DVD-R can be written and read (using supporting diagrams as needed).

(6 marks)

c) The standard storage capacity of a DVD is around 4.7GB of data. Discuss ways in which DVD's (but **not** Blue-Ray discs) could increase this capacity.

(12 marks)

A2.
Reference frameworks and international standards are essential for the smooth interoperability of modern network communications.

a) With the aid of a supporting diagram, describe how both the ISO OSI 7 layer model and the TCPIP Reference Model are constructed and explain the interrelationship between them.

(16 marks)

b) One of the advantages of the models in part a) is the use of a layered approach. Explain the use of encapsulation in such layered models.

(6 marks)

c) As part of this encapsulation, each layer has a PDU associated with its operations, explain what is meant by a PDU and detail the PDUs used in the lower layers of both models.

(8 marks)

B11.

a) Describe the below Wireless Networking Technologies:

i. WEP.
ii. MIMO.
iii. SSID.

(6 marks)

b) Discuss different transmission mediums that can be used for data communications.
(3 marks)

c) Discuss the difference between a PAN and a LAN.
(3 marks)

B12.

a) Discuss **three** different methods of authenticating a user at the point of login.
(3 marks)

b) Describe **three** functions of an Anti-Virus software.
(6 marks)

c) Discuss the operations the operating system will take when a new USB peripheral device is connected to the system.
(3 marks)

END OF EXAMINATION

A3.
Modern operating systems need to be seen to be making the best use of scarce resources.

a) From an operating system and CPU perspective, explain what is meant by the following terms and how they are linked:

i. Multitasking.
ii. Process.
iii. Interrupt.

(10 marks)

b) Describe **three** key features or principles of a multiprogramming operating system.
(6 marks)

c) When considering multitasking operating systems, what is meant by the problem of "deadlock" when multiple processes are running and how might it be addressed.
(6 marks)

d) Utilising a state diagram, describe the **three** "states" of a process in a multitasking system.
(8 marks)

A4.
Flip flops provide the basic memory elements for computing circuitry.

a) One of the basic types of flip flop is known as the JK flip flop as illustrated below.

Using standard logic gates design, with a logic circuit diagram, a basic JK flip flop with the required inputs and outputs as shown in the diagram above, minimising the number of logic gates required.
(10 marks)

b) For the JK flip flop shown in part a) complete its characteristic table and determine the characteristic equation (remember to show all the steps in your calculations).
(20 marks)

[Turn Over]

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

B5.

a) Demonstrate the truth table for the below logic gates:

i. NAND.
ii. NOR.

(4 marks)

b) You have 3 inputs A, B and C and 1 output R. For the below scenarios, design the logic using gates to produce the correct result. You must show in a diagram the gates used, but the truth table is not required.

i. R must be True when A and B are True but C is False, and otherwise R must be False.
ii. R must be True when A or B is False and B and C is True, otherwise R must be False.

(8 marks)

B6.

a) Define STP as it refers to networks and the function it provides.

(3 marks)

b) Name and describe the **five** different STP port states.

(9 marks)

B7.

a) Define **three** different system components that can be benchmarked and provide a suitable metric.

(6 marks)

b) For the below workloads, state the most appropriate type of device and the main reason you selected it:

i. Watching Videos on the move.
ii. Working on Documents on the move.
iii. Editing Videos in an office.

(6 marks)

B8.

a) Represent the following decimal numbers in Binary and Hexadecimal:

i. 18
ii. 66
iii. 242

(6 marks)

b) Represent the following decimal numbers using 2's complement (8 bit) in Binary and show your working:

i. -9
ii. -38
iii. 64

(6 marks)

B9.

a) Give **three** factors that influence the selection of a PC monitor for a user.

(3 marks)

b) Provide **three** advantages and **three** disadvantages of an Inkjet Printer in comparison to a Dot-Matix Printer.

(6 marks)

c) Give **three** factors that influence the selection of a keyboard for a user:

(3 marks)

B10.

a) Describe the **key** principles of Moore's Law.

(3 marks)

b) Describe the memory hierarchy within a computer system and explain the purpose and relative speed of that level of memory.

(9 marks)

[Turn Over]