**BCS THE CHARTERED INSTITUTE FOR IT**

BCS HIGHER EDUCATION QUALIFICATIONS

BCS Level 5 Diploma in IT

**COMPUTER NETWORKS**

Monday 22nd April 2024 - Afternoon

Answer **any** FOUR questions out of SIX. All questions carry equal marks

Time: TWO hours

**Answer any <u>Section A</u> questions you attempt in <u>Answer Book A</u>**
**Answer any <u>Section B</u> questions you attempt in <u>Answer Book B</u>**

The marks given in brackets are **indicative** of the weight given to each part of the question.

Only **non-programmable** calculators are allowed in this examination.

**Section A**
**Answer Section A questions in Answer Book A**

**A1.**

Considering ICMP and the TCP/IP model.

a)  Indicate the meaning of the ICMP acronym.

**(1 mark)**

b)  Detail at what level(s) of the TCP/IP model ICMP operates.

**(1 mark)**

c)  Describe the header format of ICMP as well as the main purpose of the protocol.

**(3 marks)**

d)  Identify and explain what **FIVE** of the main message types are, and/or
combinations used by ICMP and indicate the purpose of **each**.

**(20 marks)**


**A2.**

a)  With the aid of supporting diagrams, explain the features and differences
between the following transmission modes:

   i.   Simplex.

**(3 marks)**

   ii.  Half duplex.

**(3 marks)**

   iii. Full duplex.

**(3 marks)**


b)  For the following scenarios, explain and justify which of the transmission modes
detailed in part (a) is being used in **each** scenario:

   i.   Switched Ethernet Campus network with Layer 2 Ethernet Switches
connected.

**(4 marks)**

   ii.  Ethernet hub-based network interconnecting Industrial Control Systems.

**(4 marks)**

   iii. Keyboard and mouse connected to USB ports on a desktop computer.

**(4 marks)**

   iv.  2-way radio transceiver (walkie talkie) Short Range Voice communication.

**(4 marks)**

**A3.**

a) When travelling and using the "open access" WIFI access points commonly available at airport departure lounges, justify why the use of a VPN should always be a mandatory necessity rather than an "optional extra".

**(12 marks)**

b) What standard-based VPNs could a user utilise in a scenario such as what is described in Part a)? Justify which standard might be a better choice.

**(13 marks)**

**[Turn Over]**

**Section B**
**Answer Section B questions in Answer Book B**

**B4.**

    a)  In the context of Asynchronous Transfer Mode (ATM) and Quality of Service (QoS), explain what is meant by the following terms and detail what types of applications/services may utilise them.

        i.   CBR.

**(4 marks)**

        ii.   ABR.

**(4 marks)**

        iii.  VBR.

**(4 marks)**

        iv.  UBR.

**(4 marks)**

    b)  Explain, with the aid of supporting diagrams as necessary, why network traffic prediction is so much easier for ATM technology and why latency is generally so much lower.

**(9 marks)**

**B5.**

In Local Area Networks, Ethernet is used as the most common wired digital communication technology.

    a)  Encode the bitstream "0110010111" using Manchester encoding. Justify your answer with clocking, data and encoded output diagrams.

**(15 marks)**

    b)  Explain why Manchester encoding is considered to be inefficient.

**(5 marks)**

    c)  What are the possible solutions to increasing the efficiency of Manchester encoding?

**(5 marks)**

**B6.**

    a)  Using the TCP/IP model, describe and illustrate how data is encapsulated and decapsulated between sending and receiving applications over a network connection.

**(18 marks)**

    b)  At what layer(s) in the OSI 7 Layer model are the following PDUs represented?

        i.   Frames
        ii.   Packets
        iii.  Segments
        iv.  Bits
        v.   Data.

**(7 marks)**

**END OF EXAMINATION**