0 1 . 1 What is encryption?

[1 mark]

0 1 . 2 A sensitive message could be encrypted using either the Vernam cipher or the Caesar cipher.

Explain why the Vernam cipher is a better choice.

[2 marks]

The bit pattern 1010011 1001111 1001110 represents the string 'SON' in 7-bit ASCII.

The bit pattern 1000001 represents the character 'A' in 7-bit ASCII and other characters follow on from this in sequence. For example, the bit pattern 1001000 represents the character 'H'.

0 1 . 3 What bit pattern results from encrypting the string 'SON' using a Vernam cipher with the key 'HOG'?

You **must** show your working.

[3 marks]

0 2 . 1 The bit pattern `00111000` is the character code for the numeric character '`8`'

The bit pattern `00001000` represents the decimal number 8

Explain how a computer could convert the character code for '`8`' to the bit pattern for its corresponding decimal value.

[1 mark]

0 2 . 2 ASCII and Unicode are two common information coding systems.

Explain why Unicode was introduced as an alternative to ASCII.

[2 marks]

0 3 . 1 When transmitting data, the wireless network uses the following systems:

- Carrier Sense Multiple Access with Collision Avoidance (CSMA/CA) with Request to Send/Clear to Send (RTS/CTS)
- Majority Voting.

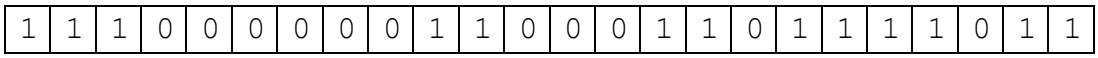
Explain an advantage that majority voting has over using parity bits when transmitting data.

[1 mark]

0 4 . 1 A data transmission system transmits one byte of data, using the majority voting system for error correction.

Figure 1 shows the bit pattern that was received.

Figure 1



Shade **one** lozenge to indicate the byte of data that the receiver will assume was sent.

[1 mark]

A 10010011 ⬭

B 10011011 ⬭

C 10010111 ⬭

D 10011110 ⬭

0 5 . 1 A check digit can be used to detect errors when data are entered or transmitted.

Explain what a check digit is and outline how the check digit is generated.

[2 marks]

0 6 . 1 A data transmission system uses even parity. Data are transmitted in bytes, with each byte containing seven data bits and one parity bit.

Explain how the receiver will perform error detection on a received byte.

[2 marks]

0 7 . 1 ASCII is one character coding system.

Explain the term 'character code'.

[1 mark]

0 7 . 2 Explain why Unicode was introduced as an alternative to ASCII.

[2 marks]

Figure 3 shows a 7-bit ASCII character code. The character code is to be sent across a network using a parity system.

Figure 3

0	0	1	0	1	1	1

0 7 . 3 Describe how the parity bit would be generated for the character code in **Figure 3** using even parity.

[2 marks]

0 7 . 4 Write the parity bit below to complete the byte that will be sent using even parity.

[1 mark]

	0	0	1	0	1	1	1

0 7 . 5 The bit pattern 1000001 represents the character ‘A’ in 7-bit ASCII. Other characters follow on from this in sequence. For example, the bit pattern 1000100 represents the character ‘D’.

The bit pattern 1000100 1000001 1000010 represents ‘DAB’ in 7-bit ASCII.

What bit pattern results from encrypting the string ‘DAB’ using a Vernam cipher with the key ‘EGG’?

You **must** show your working.

[3 marks]