**Learning Aim E – Transmittion, Encryption, Compression and Error Detection of Data**

1.Would a simplex, half-duplex, or full-duplex channel be most suitable for each of the following? Explain your answers.

a) A temperature sensor in a thermostat

It would be simplex because it only needs to send data of the surrounding temperature, not receive it. [2]

b) A connection making a voice call

full duplex because both people can talk at the same time [2]

c) A game of chess being played over the Internet

half duplex because it can send data in both directions but not at the same time, in this case it takes turns to move chess pieces. [2]

2.Give one advantage and one disadvantage of using Bluetooth instead of Wi-Fi for data transfer.

Wi fi has longer range than Bluetooth.

Bluetooth is more secure than wifi as you can only connect one device to a Bluetooth device at once.[2]

3.Give one advantage and one disadvantage of using parallel instead of serial data transmission.

It is faster than serial, it can only be used over short distances. [2]

4.Give two components of the header of a data packet, and explain how they are used for data transfer.

Packet length, the length of the packet, is mainly contained in fixed length packets but some networks contain it in the header.

Packet number, the order in which the packets are arranged [4]

5.Why are protocols important for transferring data across the Internet?

They set the rules and instructions for the computer to follow in order to send the information correctly. [1]

6.Encrypt the message CIPHER with a Vigenère cipher using the key ‘safe’.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| plaintext | c | i | p | h | e | r |
| key | s | a | f | e | s | a |
| offset | 18 | 0 | 5 | 4 | 18 | 0 |
| ciphertext | v | i | u | l | x | r |

[2]

7.Why is lossy compression sometimes used instead of lossless compression even though it   
can lose data? [1]

It has a smaller file size than lossless compression.

8.What is a parity bit? [1]

a bit which acts as a check on a set of binary values

9.Give one advantage and one disadvantage of using a repetition scheme instead of a checksum. [2]

Advantage – it is simple

Disadvantage – it is long and inefficient

10.Why are automatic repeat requests used? [1]

to provide reliable transmissions over unreliable services.

11.What is the true value of the following corrupted even-parity Hamming code? [2]

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 1 | 1 | 0 | 0 | 0 | 1 | 1 |

12.Why is forward error correction used when it requires more data to be sent than a simple parity bit? [1]

More information to be sent and more clear instructions to the computer.