

S228/202

**DUBLIN INSTITUTE OF TECHNOLOGY
KEVIN STREET, DUBLIN 8**

B.Sc. in Computer Science

Year 2

Summer Examination 2001

Algorithms, Data Structures and Data Communications

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Attempt
2 questions from *Section A*
and
2 questions from *Section B*

All questions carry equal marks.

Section A

1. (a) List and explain three different uses for computer networks.
(6 marks)
- (b) Explain what is meant by a protocol in data communications. What elements should a protocol include.
(6 marks)
- (c) Give an account of the OSI Seven Layer model. Using diagrams explain the functions that are associated with each layer, and explain how Protocol Data Units are exchanged between layers on separate nodes in a network.
(13 marks)
2. (a) Give an account of **three** different types of guided transmission media.
(9 marks)
- (b) Explain the difference between differential and non differential schemes for encoding digital data as a digital signal. Then encode the digital data below as a digital signal using
1. Manchester Encoding
 2. Differential Manchester Encoding
- 10110101010010111
- (9 marks)
- (c) An analogue signal can be modulated to represent digital data using PSK, FSK or ASK. Briefly explain each of these. Explain how more than one bit can be carried on a single change in the analogue signal.
(7 marks)
3. (a) Explain the need for data compression in data communications. Generate a Huffman code tree for the alphabet shown below.
- WXXYYYYZ
- What is the average number of bits necessary to encode a character in this alphabet.
(8 marks)

(b) A sliding window protocol is an algorithm used to implement flow control. Explain how the SWP could also handle errors. **(6 marks)**

(c) Explain *parity* error control.
Explain why a more sophisticated algorithm such as Cyclic Redundancy Check (CRC) might be used instead of parity.
Generate the CRC for the data block 10100100 using the generator polynomial $x^3 + x + 1$. **(11 marks)**