

UNIVERSITY OF LONDON
IMPERIAL COLLEGE OF SCIENCE, TECHNOLOGY AND MEDICINE

EXAMINATIONS 1997

BEng Honours Degree in Computing Part II
MEng Honours Degrees in Computing Part II
for Internal Students of the Imperial College of Science, Technology and Medicine

*This paper is also taken for the relevant examinations for the
Associateship of the City and Guilds of London Institute*

PAPER 2.10

COMMUNICATIONS

Tuesday, May 6th 1997, 2.00 - 3.30

Answer THREE questions

For admin. only: paper contains 4
questions

- 1 In "Internetworking with TCP/IP" Douglas Comer states:

"No single network can serve all users"
"Users desire universal interconnection"

How does TCP/IP seek to address these requirements? Describe the TCP/IP protocol suite.

Include in your description:

- MAC level addressing
- IP addressing
- IP, UDP and TCP protocols
- how local and remote machines are located
- how messages are addressed to different services at the same host
- the names of some services that use UDP and TCP
- the length of time that information should be held in tables
- when and why fragmentation occurs. Discuss the advantages and disadvantages of recombining fragments as soon as possible or at the destination

- 2a Why is error detection and correction necessary in a computer network? Briefly describe the use of parity, Cyclic Redundancy Check (CRC) and Hamming Code for error detection and correction. Under what circumstances might you use each of these methods rather than the others?
- b Given a 7-bit ASCII character describe how you would create a Hamming Codeword that would give 1 bit error correction using four code bits. Show how you would correct a one bit error after receiving a codeword.
- c Given that most errors are likely to be burst errors affecting a contiguous string of bits how could you minimise the possibility of a multibit error occurring within a Hamming Codeword?

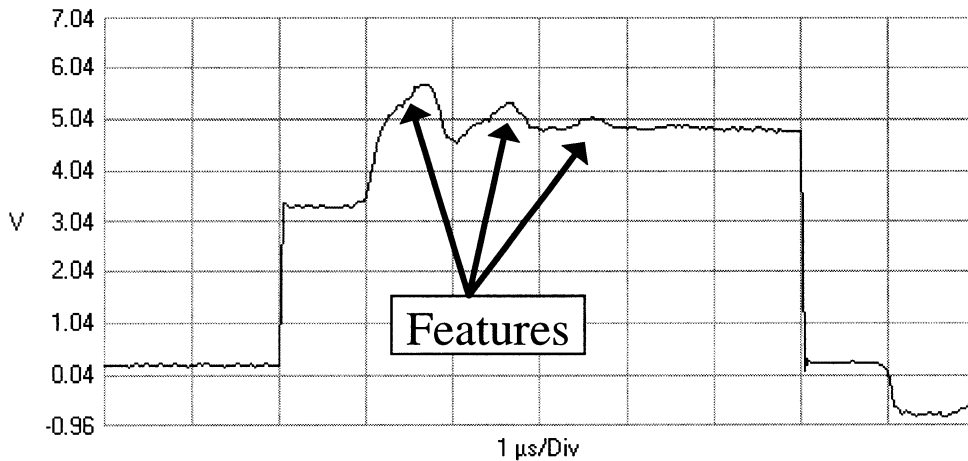
The three parts carry, respectively, 40%, 40%, 20% of the marks.

- 3a Describe two different LAN technologies. Include a description of the media used and how a message is transmitted from one station to another.
- b What happens if two stations want to transmit at the same time? What type of error checking is performed on the LANs that you have chosen?

The two parts carry, respectively, 60%, 40% of the marks.

Turn over ...

- 4 The following trace was taken from an unshielded, twisted pair cable that forms part of a computer network.



- a
- Was this trace taken at the receiver or the driver end of the cable and how do you know?
 - What does the trace tell you about the termination of the cable?
 - Carefully describe what has caused the three features indicated
 - Assuming the propagation of electricity in this cable is 2×10^8 m/s, what is the length of this cable?
- b
- What is the maximum bit rate that I can reliably use if I wish to send frames of data that contain 8 bits over a network that strongly attenuates frequencies above 3600Hz but is otherwise a perfect channel?
- c
- The network designers have now included a filter which strongly attenuates frequencies below 300Hz. and as a consequence I have introduced a modem that modulates the phase of an appropriate carrier signal. If the maximum baud rate of the channel is 2400 draw an appropriate constellation diagram for my modem that would give me a maximum bit rate of 19200 bits per second. Give reasons for your arrangement.

The three parts carry, respectively, 40%, 20%, 40% of the marks.