UNIVERSITY OF EDINBURGH

FACULTY OF SCIENCE AND ENGINEERING

COMPUTER SCIENCE THREE

COMPUTER COMMUNICATIONS

Tuesday 5 September 2000

09:30 to 11:00

Examiners:

Prof. K. Turner (External)

Prof. G. Brebner (Chairman)

INSTRUCTIONS TO CANDIDATES

Answer any TWO questions.

All questions carry equal weight.

1. (a) A TCP/IP inter-network may be described as a *connectionless packet delivery service* providing a foundation for a *reliable transport service.* Explain carefully what the two italicised terms mean. [*8 marks*]

   (b) Discuss the main problems faced, and possible solutions, when providing an inter-networking service that makes use of widely differing physical networks. [*9 marks*]

   (c) Outline how the overall operation and use of a TCP/IP inter-network might be viewed in terms of the ISO Reference Model for Open Systems Interconnection (RM/OSI). [*8 marks*]

2. (a) Describe the structure and operation of:

   (i) a contention bus ('ethernet') local area network (LAN);

   (ii) a token ring LAN. [*12 marks*]

   (b) Discuss circumstances in which each of these types of LAN might be better suited than the other. [*6 marks*]

   (c) Briefly explain the problems involved in building a *bridge* between LANs of these different types. [*7 marks*]

3. (a) Cyclic Redundancy Codes (CRCs) are often used for error *detection* when information is sent over a noisy channel. Explain how CRCs work, and discuss why CRCs are usually only used at the lower (i.e., more physical) layers of communication. [*12 marks*]

   (b) Outline the types of channel error that can be detected using CRCs, and comment on how a communication system using CRCs might typically implement error *correction*. [*6 marks*]

   (c) In the Internet, error correction (if performed at all) is done end to end, i.e., between pairs of computers connected by an inter-network. Discuss the merits of this approach, compared with one that is based on providing error-free physical channels inside, and between, networks. [*7 marks*]