UNIVERSITY OF EDINBURGH

FACULTY OF SCIENCE AND ENGINEERING

COMPUTER SCIENCE THREE

COMPUTER COMMUNICATIONS

Tuesday 4 June 2002

14:00 to 15:30

Examiners:

Prof. K. Turner (External)

Prof. C. Stirling (Chairman)

INSTRUCTIONS TO CANDIDATES

Answer any TWO questions.

All questions carry equal weight.

1. (a) In most protocols for implementing connection-oriented services, each message carrying user information also carries a sequence number. Explain the main facilities that can be enabled by this feature. [*9 marks*]

   (b) *Source routing* is a technique that can be used in message switching networks: each message carries an ordered list of all the switching computers that it should pass through on the path between its source and destination. Discuss the merits and demerits of this approach, compared with one in which messages only carry the address of their destination. [*8 marks*]

   (c) In some protocols, each message carries a 'time to live' value, which is meant to indicate for how many more seconds the message is allowed to exist within a network or inter-network; if this number reaches zero, the message is destroyed. Discuss the problems involved in implementing, and using, such a facility. [*8 marks*]

2. (a) Describe the structure of the ISO Reference Model for Open Systems Interconnection (OSI), and give a brief description of the role of each layer in the model. [*12 marks*]

   (b) Consider the problem of reliably transmitting a customer order, which includes a credit card number, from a portable computer located in a remote rain forest in Australia to the order-processing computer of a waterproof clothing supplier located near Glasgow, Scotland. Discuss how the communication protocol functions required might fit into the layers of the OSI model. [*8 marks*]

   (c) Comment on the impact that the OSI model has had on practical computer communications systems over the past twenty years. [*5 marks*]

3. (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*]