11 Principles of Communications (JAC)

(a) Feedback-based congestion control is employed by the Internet's transport protocol, TCP (the Transmission Control Protocol), using a window-based approach. An alternative is to adjust the sender's *rate* explicitly.

   (i) What feedback signals are used to adjust the window-based scheme?

   [4 marks]

   (ii) What additionally has to be measured for the rate-based approach?

   [2 marks]

   (iii) In feedback-based congestion control schemes, the signal is sometimes referred to as a *price*. Explain, perhaps with reference to a diagram, why this is so. [3 marks]

(b) Round Robin Schedulers provide what is known as *Fair Queueing*.

   (i) What is a general formulation of the max-min fairness property?

   [4 marks]

   (ii) Where do the overheads arise in implementing Fair Queueing in an IP router? [4 marks]

   (iii) In what circumstances might a FIFO (first-in first-out) queue approximate a fair queue? [3 marks]