

## 2006 Paper 8 Question 3

### Digital Communication II

- (a) The Transmission Control Protocol (TCP) employs a transmit window and cumulative acknowledgement and timeout system, as well as sequence numbering of packets, to achieve reliable delivery of data.
- (i) Outline the procedure for round-trip time estimation and the calculation of the retransmission timer. [8 marks]
  - (ii) Explain the function of buffering at the sender and receiver. [3 marks]
  - (iii) How do fast retransmit and fast recovery improve performance after packet loss? [3 marks]
- (b) In a wireless network, delay to access the channel due to scheduling of the media access control protocol, and random packet loss due to interference, may be non-negligible.
- (i) Explain how this can interfere with the round-trip time estimation process above. [3 marks]
  - (ii) Explain how this can interfere with the congestion control scheme that TCP employs. [3 marks]