COMPUTER SCIENCE TRIPOS Part IB – 2025 – Paper 5

2 Computer Networking (awm22)

Consider the principles of flow and congestion control in network protocols.

(a) Describe how window-based congestion control differs from rate-based congestion control in terms of buffer management and throughput optimization.

[4 marks]

(b) Consider a communication link with propagation delay τ and bandwidth b. For a packet size p, derive expressions for the maximum achievable throughput under:

(i) A simple stop-and-wait protocol   [4 marks]

(ii) A window protocol with window size 2   [4 marks]

(c) Explain how buffer overflow conditions are managed in:

(i) On-off flow control   [4 marks]

(ii) Window-based congestion control with Selective Acknowledgments (SACK)

[4 marks]