Digital Communication I

(a) Compare flow control with congestion control. [2 marks]

(b) Describe what is meant by sliding-window protocol. [2 marks]

(c) Describe how a sliding-window protocol may be used to implement flow control. [2 marks]

(d) Explain why implementing flow control in this manner is not a good idea. [2 marks]

(e) Provide an alternative to a sliding-window protocol for the implementation of flow control. [2 marks]

(f) Consider a sliding-window protocol for a point-to-point link from the surface of the earth to a geostationary satellite. The link speed is 1Gbps and the one-way latency is 125ms.

(i) Assuming each packet of data is fixed to 1KByte in length, what is the minimum number of bits you need for the sequence number? [2 marks]

You have been asked to construct an emulation of the satellite link, replicating the behaviour (delay and speed), allowing others to test their applications without using the satellite system. A simple way to do this is to provide an artificial delay of packets, emulating their flight to and from the satellite.

(ii) For a simple packet length of 1KByte, how much memory is required to emulate the satellite link alone? Comment on other sources of memory utilisation. [2 marks]

(iii) What capabilities must a standard computer have to emulate a link with 1Gbps capacity? Consider the speed and delays in the CPU, memory, and PCI interconnect. Comment on the suitability of a standard PC platform for such a task. [6 marks]