5. (a) (i) Describe the operation of the Go-Back-N sliding window data link protocol. Do not give details of all the possible error scenarios. [7]

(ii) What advantage and what disadvantage does the Go-Back-N protocol have over a simple Stop-and-Wait protocol? [2]

(iii) The following data fragment occurs in a data stream to which a (data-link) byte-stuffing algorithm is to be applied:

A B ESC C ESC FLAG FLAG D.

What is the output after stuffing? [2]

(b) (i) List the essential function(s) of the Internet Protocol (IP) and state the ISO OSI level at which it operates. [3]

(ii) In IP, the checksum covers only the header and not the data. Why do you suppose this design was chosen? [3]

(iii) A network on the Internet has a subnet mask of 255.255.240.0. What is the maximum number of hosts it can handle? [2]

(c) (i) List the essential function(s) of the Transmission Control Protocol (TCP) and state the ISO OSI level at which it operates. [3]

(ii) A client sends a 125-byte request to a server located 100 km away over a 1 Gbps optical fibre. The speed of signal propagation in the optical fibre is 2×10^8 m/s. What is the efficiency of the line during the remote procedure call? [3]