

City University of Hong Kong  
Department of Electrical Engineering

**EE3009 Data Communications and Networking**

**Assignment 2**

**Due Date: 2 November 2024**

1. Consider four stations that are all attached to two different bus cables. The stations exchange fixed-size packets of length 1 sec. Time is divided into slots of 1 sec. When a station has a packet to transmit, the station chooses either bus with equal probability and transmits at the beginning of the next slot with probability  $p$ . Find the value of  $p$  that maximizes the rate at which packets are successfully transmitted.  
[5 marks]
2. A channel using non-persistent CSMA has three stations on a bus with end-to-end propagation delay  $\tau$ . Station A is located at one end of the bus, and stations B and C are together located at the other end of the bus. Frames arrive at the three stations and are ready to be transmitted at stations A, B, and C at the respective times  $\tau_A = 0$ ,  $\tau_B = \tau/2$ , and  $\tau_C = 3\tau/2$ . Frames require transmission times of  $4\tau$ . The timeout value is  $2\tau$ . Draw a figure, with time as the horizontal axis, to show the transmission activity of each of the three stations.  
[5 marks]