**MASENO UNIVERSITY**

**DEPARTMENT OF INFORMATION TECHNOLOGY**

**DATA COMMUNICATION**

CLASS EXERCISE

1. What are the propagation time and the transmission time for a 5-Mbyte message (an image) if the bandwidth of the network is 1 Mbps? Assume that the distance between the sender and the receiver is 12,000 km and that light travels at 2.4 x 108 mls.
2. If the bandwidth of the channel is 5 Kbps, how long does it take to send a frame of 100,000 bits out of this device?
3. A file contains 2 million bytes. How long does it take to download this file using a 56-Kbps channel? 1-Mbps channel?
4. What is the transmission time of a packet sent by a station if the length of the packet is 1 million bytes and the bandwidth of the channel is 200 Kbps?
5. What is the length of a bit in a channel with a propagation speed of 2 x 108 mls if the channel bandwidth is
   1. 1 Mbps?
   2. 10 Mbps?
   3. 100 Mbps?
6. What is the total delay (latency) for a frame of size 5 million bits that is being sent on a link with 10 routers each having a queuing time of 2 µs and a processing time of 1 µs. The length of the link is 2000 Km. The speed of light inside the link is 2 x 108 mls. The link has a bandwidth of 5 Mbps. Which component of the total delay is dominant? Which one is negligible?