University of Toronto
Dept. of Electrical and Computer Engineering
ECE 460
Final Examination
April 16th 2001
Time 2 hours

Name_____

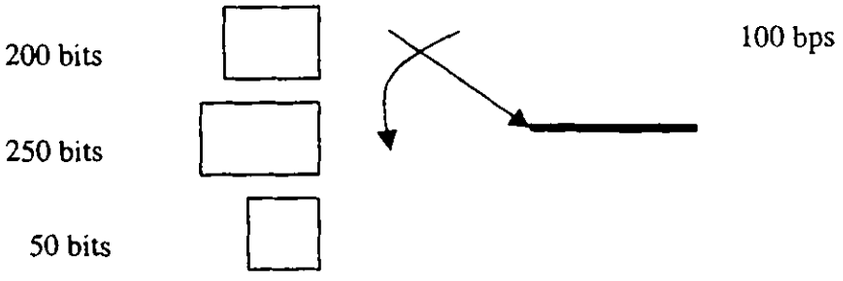
ID_____

Solve questions 1 through 8 in the space provided, if you need more space, use the back of the page

Question	Marks
1	/6
2	/6
3	/4
4	/6
5	/4
6	/5
7	/5
8	/4
Total	

Question 1 (6 points)

Consider a switch port with three queues, with packets of 200, 250 and 50 bits respectively..
Consider pure fair queueing system, what time each queue finishes transmitting?.
Repeat for packet-by-packet fair queueing
Consider the transmission rate of the outgoing link to be 100 bits per unit time.



Question 2 (6 points)

Consider sending a 50 Kbits message across two networks (one switch in the middle).
We have two choices

1. Sending the entire message where it is received and relayed by the switch to the destination network
2. Using virtual circuit with packet size of 1000 bits

The propagation delay in each network is 0.05 msec. ($0.05 * 10^{-3}$ sec.)
The transmission speed is 500 Kbps

How long does it take to send the message using both of the two methods amentioned above
(Neglect the time to tear down the virtual circuit, the header bits, the size (length) of set-up packets, and the processing time at each node.

Question 3 (4 points)

Consider a TCP connection between two nodes. If a node receives a segment with ACK to some of the previous data it sent.
In deciding on sending more data (assume that it has an infinite data to be transmitted), what are the factors it takes into consideration regarding the number of bits to send in the next segment?

Question 4 (6 points)

(a) If in a token ring network, the receiver will remove the frame instead of the sender doing so.
What are the advantages and drawbacks of such a modification?

(b) Fragmentation and reassembly is done at the IP level (an IP packet could be segmented into smaller ones, the segments will arrive in-order or out-of-order), the IP entity and the receiver reassemble them together before handing it to the TCP entity.
Does that mean that the TCP need not to worry about receiving data out of order ? Explain

Question 5 (4 points)

Consider the problem of subnetting.
A class B address was given to an organization, the organization wants to use subnetting to connect three different LANs,
Show the address of three machines (one at each LAN) by filling the appropriate bits in the IP address

10	00001111111111	

Class B address

10	00001111111111	

Host 1 on LAN 1

10	00001111111111	

Host 1 on LAN 2

10	00001111111111	

Host 1 on LAN 3

Question 6 (5 points)

Consider this coding technique
If the sender wants to send logical 1, it sends the codeword 111
If the sender wants to send the logical 0, it sends the codeword 000
The receiver simply takes the majority of the three bits received as the symbol transmitted
If the probability of any bit being in error is 10^{-3} and is independent of each other.
What is the probability of undetected error?

Question 7 (5 points)

Briefly explain how leaky bucket algorithm is used in traffic policing

Question 8 (4 points)

Statement	True	False
Bit stuffing in HDLC frame is used to prevent the premature termination of the frame by the receiver	( )	( )
You can have a reliable communication built on top of unreliable Packet switching network	( )	( )
Ethernet provides hard limit on the delay for interactive communication	( )	( )
Both Ethernet and FDDI use Manchester coding	( )	( )
IP responds with a Negative ACK (NAK) if the packet was delayed or arrived corrupted	( )	( )
TCP does support multicasting efficiently	( )	( )
The IP address is a property of the network interface card and should be changed if we change the network interface card	( )	( )
If a process A on host1 has been assigned port A, another process B on host2 has been assigned port q. It is possible to establish more than one TCP connection between these two processes	( )	( )