Chapter 11

Q1. Compare and contrast byte-stuffing and bit-stuffing. Which technique is used in byte-oriented protocols? Which technique is used in bit-oriented protocols?

Q2. Compare and contrast flow control and error control.

Q3. Byte-stuff the data in Figure



Q4. Bit-stuff the data in Figure



Q5. A sender sends a series of packets to the same destination using 5-bit sequence  
numbers. If the sequence number starts with 0, what is the sequence number after  
sending 100 packets?  
Q6. Using 5-bit sequence numbers, what is the maximum size of the send and receive  
windows for each of the following protocols?  
a. Stop-and-Wait ARQ  
b. Go-Back-N ARQ  
c. Selective-Repeat ARQ

Q7. The timer of a system using the Stop-and-Wait ARQ Protocol has a time-out of 6 ms. Draw the flow diagram for four frames if the round trip delay is 4 ms. Assume no data frame or control frame is lost or damaged.  
Q8. Repeat Q7 if the time-out is 4 ms and the round trip delay is 6.  
Q9. Repeat Q7 if the first frame (frame 0) is lost.  
Q10. A system uses the Stop-and-Wait ARQ Protocol. If each packet carries 1000 bits of data, how long does it take to send 1 million bits of data if the distance between the sender and receiver is 5000 K and the propagation speed is 2 x 108 m? Ignore transmission, waiting, and processing delays. We assume no data or control frame is lost  
or damaged.  
Q11. Repeat Q 10 using the Go-back-N ARQ Protocol with a window size of 7. Ignore the overhead due to the header and trailer.  
Q12. Repeat Q 10 using the Selective-Repeat ARQ Protocol with a window size of 4. Ignore the overhead due to the header and the trailer.