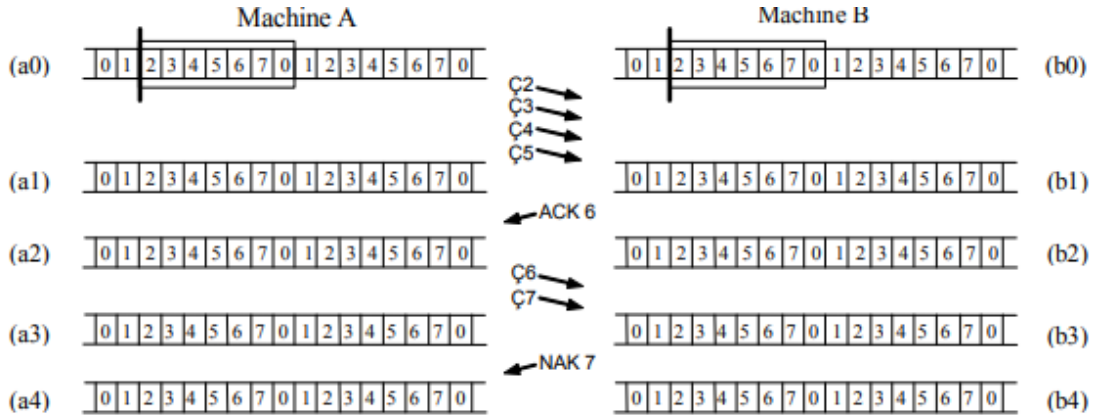
CEC13 - Computer Networking

Assignment – 2

Q1. Go-back-N sliding window protocol is used between the data link layers of machines A and B with a window size of 7 frames at both sides. The figure below shows the a0 and b0 states of the sliding windows of machines A and B, respectively, just before Frame 2 is sent by A. The same figure also shows the sequence numbers of the frames sent by A and acknowledgements sent by B. a) Indicate the frame numbers that should be contained in the sliding windows and buffer memories at the sender and receiver for the states a1, b1, a2, b2, a3, b3, a4, b4,a5, b5, and b6.



b) Write a formula showing the relation between the window size (N, in terms of number of frames) and the size of the sequence number field (k, in terms of bits).

Q2. In a data link connection where CRC (Cyclic Redundancy Check) is used, a 10-bit information is given as 1 0 0 1 0 1 1 0 1 1. The generating function used in the CRC is G(x) = x4 + x3 + x + 1. a) Calculate the CRC code. b) Write the T(x) polynomial corresponding to the bit string that will be sent, and show which terms belong to data and which terms belong to the CRC code. c) Write the bit string that will be sent, and show which bits belong to data and which bits belong to the CRC code.

Q3. Q6. A 1-km long, 10-Mbps CSMA/CD LAN has propagation speed of 200 m/µsec. Data frames are 66 bytes long, including 26 bytes header, checksum and other overhead. The first bit slot after a successful transmission is reserved for the receiver to capture the channel to send a 32-bit acknowledgement frame. What is the effective data rate (TRIB: Transmission Rate of Information Bits), assuming that there are no collisions.

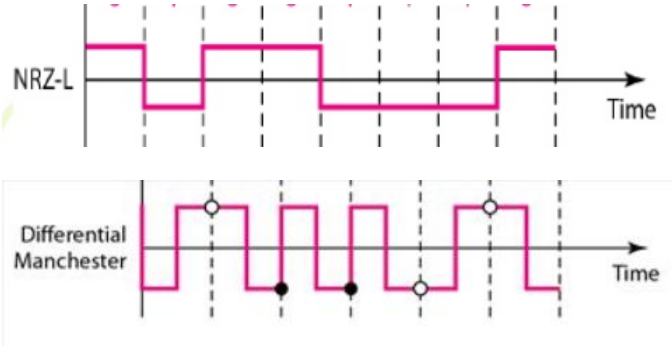
Q4. Q8. In a data link layer, character-oriented framing and character stuffing method is applied. In this method, FLAG characters are used as the starting and ending delimiter. a) At the sender, if the character string delivered by the network layer to the data link layer is given as follows, obtain the character string at the data field of the sender's data link layer frame. A B FLAG ESC C ESC D E F FLAG G

Q5. Q10. Station A uses 32 byte packets to transmit messages to Station B using a sliding window protocol. The round trip delay between A and B is 80 milliseconds and the bottleneck bandwidth on the path between A and B is 128 kbps. What is the optimal window size that A should use?

Q6. If the bandwidth of a communication channel is 3000 Hz, what is maximum rate at which data can be transmitted if the SNR is 30 dB?

Q7. We have a channel with 1MHz bandwidth. The SNR for this channel is 63. What is the appropriate bit rate and signal level?

Q8. Give the bit stream for the following signal encoding schemes:



Q 9. What is the transmission time of a packet sent by a station if the length of a packet is 1 million bytes and the bandwidth of the channel is 200 Kbps.

Q 10.