Data Communication Quiz #2 (2016. 11. 29)

Student ID: _____ Name: _____

1. Circuit switching and virtual circuit networks require three phases in data transfer. What are they?__**connection setup**_, __**data transfer**___, __**connection teardown**__. **(3×3 pts)**
2. Both virtual circuit and datagram networks use forwarding tables. When you create an entry in the tables in virtual circuit network, however, the switch needs to do one more thing than just completing the entry. What is it? _____**resource reservation for forwarding**_____ **(6 pts)**
3. The telephone network is a representative circuit switching network. What end-to-end address does it use when establishing a connection (a.k.a. "call")? ___**telephone number**___ . **(3 pts)**
4. Why does the datagram network suffer non-negligible waiting time at each switch? [Hint: the answer is related with the answer for Prob. 2] ___**resource has not been reserved**____. **(5 pts)**
5. What is the minimum number of crosspoints according to the Clos criteria for a 3-stage, 200×200 switch? ___**4*200*($\sqrt{2 * 200} - 1$) = 15200**___. **(10 pts)**
6. What are the two conditions under which the banyan switch does not experience blocking? **(3×2 pts)**
   A. __**packets should be sorted to use the input ports in the order of their output port number**_____
   B. __**no unused input port at the start and in between the used ports**__
7. What value does the least significant bit (lsb) of the most significant byte (MSB) have if a link-layer address is a multicast address? ____**1**_____ **(3 pts)**
8. A linear block code guarantees that any dataword has at least three 1's (e.g. `10001100`). How many errors can this code detect? _____**2**_____ How many can it correct? _____**1**_____ **(5×2 pts)**
9. The CRC polynomial $x^{16} + x^{15} + x^2 + 1$ is used in USB. It can catch all odd number of errors since it can be factorized into $(x + 1) \cdot T(x)$.
   A. What is the polynomial T(x) above? ____**$x^{15} + x + 1$**_____ **(8 pts)**
   B. What is T(1)? _____**1**_____ **(3 pts)**
10. What are three functionalities that DLC layer should perform? __**framing**__, _**error control**__, _**flow control**_ **(3×3 pts)**
11. If the sender performs bit stuffing by inserting `0` after five consecutive `1`s, If the receiver received `011111001111101`, what is the data recovered by unstuffing? ____**0111110111111**_____ **(4 pts)**
12. In HDLC, suppose the sender has sent packet #1, #2, #3, #4, and #5. Among these, #2 was lost, so the receiver received only #1, #3, #4 and #5. Depending on the S-frame from the receiver, the sender may retransmit different packets. **(4×3 pts)**
    A. What is/are the retransmitted packet(s) if the receiver sends REJ(#2)? _**#2,#3,#4,#5**___
    B. What is/are the retransmitted packet(s) if the receiver sends SREJ(#2)? ___**#2**_____
    C. What is the acknowledgement number after the successful retransmission(s) in (B)? ___**#6**____
13. In PPP, what are the three categories of "shim" layer protocols that can be multiplexed in PPP frames? (in acronyms) _____**LCP**____, __**NP**___, _**NCP**_____ **(3×3 pts)**
14. What is the authentication protocol that has the advantage of not revealing the secret password to possible eavesdroppers? (in acronym)____**CHAP**_____ **(3 pts)**