**Student Name: -** ……………………………………………………………………… **ID: -** …………………………………………

**Question 1:** choose the correct answer for the following questions.　　**12 points**

1- Which of the following encoding has a transition at the middle of each bit.

A)  RZ　　　B)  Manchester  C)  Differential Manchester　　D)  All the above

2- which cables are composed of a glass or plastic inner core surrounded by cladding, all encased in an outside jacket.

A) Coaxial　　　B) Fiber-optic　　　C) Twisted-pair　　D) none of the above

3- In _____ error correction, the receiver corrects errors without requesting retransmission.

A) backward　　　B) onward　　　C) forward　　　D) none of the above

4- In Go-Back-N ARQ, if frames 4, 5, and 6 are received successfully, the receiver may send an ACK _____ to the sender.

A)  5　　　　　B)  6　　　C)  7　　　D)  any of the above

5- Bit stuffing means adding an extra 0 to the data section of the frame when there is a sequence of bits with the same pattern as the _____.

A)  header　　　B)  trailer  C)  flag　　D)  none of the above

6- In HDLC protocol which mode, the configuration is balanced, and each station can function as a primary and a secondary.

A)  ABM　　　　B)  NRM　　　C)  ARM　　　D)  NBM

7- Which Ethernet standard  uses thin coaxial cable.

A)  10Base5　　　B)  10Base2　　C)  10Base-T  D)  10Base-F

8- In IEEE 802.11, communication between two stations in two different BSSs usually occurs through_____

A)  BSSs　　　B)  ESSs　　C)  APs　　D)  DS

9- An IPv6 address consists of _____ bits.

A)  32　　　　B)  64　　C)  128　　D)  256

10- The number of host addresses in a class C IPv4 Addresses is _____.

A)  65,536　　　B) 16,777,216　C) 254　　D) none of the above

11- UDP is called a _____transport protocol.

A) connectionless, reliable　　　　　B) connection-oriented, unreliable

C) connectionless, unreliable　　　　D) none of the above

12- TCP assigns a sequence number to each segment that is being sent. The sequence number for each segment is the number of the _____ byte carried in that segment.

A) first　　　　B) last　　C) middle　　D) none of the above

**Question 2:** Given the following network IP address; divide the network to 4 sub networks. Show the network mask,IP and broadcast addresses to each subnetwork

**5 points**

192.168.0.0

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**Question 3:** Given the following data use complement addition to calculate the checksum value where the checksum field is 16 bit long. **5 points**

36EA F305 AC63 6570 524A

**Question 4:** Given the following string of bits                    **6 points**

1 1 0 0 0 0 0 0 0 0 1 1 0 0 0 0 1 0 0 1

1- draw the wave form using bipolar AMI
2- draw the wave form for bipolar AMI using B8ZS substitution.
3- draw the wave form for bipolar AMI using HDB3 substitution(Assume even
number of 1's since last substitution).

1 1 0 0 0 0 0 0 0 0 1 1 0 0 0 0 1 0 0 1

1- draw the wave form using bipolar AMI
2- draw the wave form for bipolar AMI using B8ZS substitution.

**Question 5:** Two neighboring nodes (A and B) use HDLC protocol with 4 bit sequence number. With ARQ mechanism go-back-N . draw a diagram that show the messages exchanged between A and B when the following events occur (show the types of message with N(S) and N(R )).                    **5 points**

   1- A send messages 0,1,2,3 and B receives them successfully
   2- B send messages 0,1 to A and A receive them successfully.
   3- A send messages 4,5,6 to A and A receive 4,6 successfully and receive 5
      with error.
   4- After resolve error message in the previous statement A send  messages
      7,8 and B receive them successfully.
   5- B send acknowledgement for message 8 but the acknowledgement lost.

**Question 6:** Explain how Checksum field in TCP header is computed.    **2 points**

**Question 7:** What are the differences between layer 2 switch and bridge.

**3 points**

**Question 8:** How fragmentation process is performed in IPv6 protocol.    **2 points**