(20 points) Select the single choice of correct answer or fill out blanks:

(1) Which of the following is a valid IPv4 address?
   (A) 111.56.045.78
   (B) 221.34.7.8.20
   (C) 75.45.301.14
   (D) None of the above

(2) The binary notation of the IP address 111.56.45.78 is ________________________________

(3) The address class (Class A, B, or C) of the IP address, 11000001 10000011 00011011 11111111, is ______________________

(4) For IP address 208.34.54.12, the network ID is ____________________, host ID is ____________________.

(5) In an IPv4 packet, the value of the Internet Header Length (IHL) field is 1000 in binary. How many bytes of options are being carried by this packet?
   ________________________________

(6) In the header of an IPv4 datagram, the more bit is set to 1 and the offset field has a value of 0. This means:
   (A) This datagram is the first fragment
   (B) This datagram is the last fragment
   (C) The datagram has not been fragmented
   (D) None of the above

(7) An IPv4 fragment offset has arrived with an offset value of 100. How many bytes of data were already sent by the source before the data in this fragment?
   ________________________________
(8) The number of total available IPv6 addresses is _______________________________.

(9) Which of the following is a necessary part of an IPv6 datagram?
   (A) Base header
   (B) Extension header
   (C) Payload from the upper layer
   (D) None of the above

(10) The Open Shortest Path First (OSPF) routing protocol is based on ______ routing.
    (A) distance vector
    (B) link state
    (C) path vector
    (D) None of the above

(11) Connection establishment in TCP is called __________ handshaking.
    (A) one-way
    (B) two-way
    (C) three-way
    (D) None of the above

(12) A TCP sender is sending a file of 5000 data bytes. Suppose each TCP segment carries 1000 data bytes. The first segment has a sequence number 10,001. The sequence number of the 5th segment is _________________________________.

(13) In a TCP connection, if the acknowledgement number is 200, then byte _____ has been received successfully.
    (A) 199
    (B) 200
    (C) 201
    (D) None of the above

(14) In a TCP connection, the congestion window (cwnd) size is 3000 bytes and the receiver window (rwnd) size is 5000 bytes. The TCP sender has sent 2000 bytes which has NOT been acknowledged. How many more bytes can be sent by the sender?
    (A) 1000
    (B) 2000
    (C) 3000
    (D) None of the above
(15) UDP protocol is a _________ and ___________ transport protocol.

(A) connection-oriented; reliable
(B) connection-oriented; unreliable
(C) connectionless; reliable
(D) connectionless; unreliable

(16) A port address in UDP is ____________ bits long.

(A) 8  (B) 16   (C) 32   (D) None of the above

The following questions are based on the above figure:

(17) Identify the intervals of time (from T=?? to T=??) when TCP _slow start_ is operating:

___________________________________________________________________________

(18) Identify the intervals of time (from T=?? to T=??) when TCP _congestion avoidance_ is operating:

___________________________________________________________________________

(19) When T = 1, the value of the slow start threshold is _____________________________

(20) When T = 18, the value of the slow start threshold is _____________________________