CS570 Fall 2007 Midterm 1 Name _____

For multiple choice questions, circle the letter of the correct answer. If more than one answer is correct, choose the most accurate one.

For short-answer questions, your answer should fit in the space provided.

1. "100Gbps" refers to:
   a. 10^{10} Bytes per second
   b. 10^{11} bits per second
   c. 100 x 2^{30} bytes per second
   d. 100 x 2^{30} bits per second

2. Fixed-slot TDM is used on a particular link. This means that if there are n channels supported by the link, the effective bandwidth that each channel gets is:
   a. 1/n of the total bandwidth, continuously
   b. The total bandwidth, 1/n of the time
   c. (a) and (b) mean the same thing

3. "PAN" is an acronym for _____.

4. The "Postal Service Model" of communication that we discussed in class is an example of a:
   a. Circuit-switched model
   b. A datagram model
   c. A connection-oriented model
   d. None of these is correct

5. A protocol allows agreement on the _____ and _____ of messages.

6. Consider two layers in a multi-layer protocol stack, N and N+1. There is _____ interface between the layer N protocol at one node and the layer N+1 protocol at another node.
   a. a virtual
   b. a physical
   c. no direct
   d. None of the above is correct -- they are the same protocol.

7. List the layers of the ISO OSI model, starting with L1.

8. Which of the following is not usually referred to as a “node” of a network?
    a. a computer
    b. the edge
    c. a router
    d. a host

9. In the TCP/IP Reference model, the OSI Network Layer corresponds to:
    a. IP
    b. TCP
    c. UDP
    d. There is no Network Layer in the TCP/IP model

10. A link over which data can be sent in either direction, but not simultaneously, is referred to as a _____ link.

11. Briefly explain how a receiver can implement Flow Control under the Sliding Window algorithm.

12. If we call an Ethernet “10BaseT”, we are implying:
    a. It has a bandwidth of 10Kbps and runs on optical fiber
    b. It has a bandwidth of 10Kbps and runs on twisted pair copper
    c. It has a bandwidth of 10Kbps and the type of link is not specified
    d. None of these is correct

13. Name the sublayers of L2 and briefly describe the difference between their purpose.

14. What is the highest-numbered OSI protocol layer that would normally be found on a network router?
    a. L7
    b. L4
    c. L3
    d. L2

15. A server in a client-server system would normally be expected to execute a:
    a. Blind socket open
    b. Active socket open
    c. Passive socket open
    d. Permissive socket open

16. What standard governs the design of Token Ring LANs?
    a. ISO 802.3
    b. ISO 802.5
    c. IEEE 802.3
    d. IEEE 802.5

17. To have a reliable network:
    a. All protocol layers must be reliable.
    b. Some protocol layers can be unreliable as long as there is a reliable protocol at a higher level of the protocol stack.
    c. Some protocol layers can be unreliable as long as there is a reliable protocol at a lower level of the protocol stack.
    d. All protocol layers must be best effort.

18. A multicast must involve:
    a. Multiple destinations
    b. Multiple sources
    c. Multiple senders and receivers

19. The latency of a fiber link is 0.5 sec. Its length is:
    a. 115Km
    b. 150Km
    c. 100Km
    d. None of these

20. Bits are being streamed onto a particular link. The link can accept a new bit every 20 nsec. The link's bandwidth is:
    a. 100Mbps
    b. 50Mbps
    c. 20Mbps
    d. 10Mpbs

21. Which of the following could be an Ethernet MAC address?
    a. "250.76.4.4"
    b. "04:A2:11:F6:2B:11"
    c. "04:A2:11:F6"
    d. "250,76.4"

22. Define RTT

23. We refer to the Transport Layer of the ISO OSI model as L___. It manages _____-to-_____ transfers. The data unit is the _____.

24. "16MB"refers to:
    a. 2^{27} bits
    b. 2^{20} bytes
    c. 16 x 2^{13} bits
    d. 16 x 10^{8} bits

25. Which would be better suited for an environment where there is a large amount of electrical noise
    a. Twisted Pair
    b. coaxial cable

26. Briefly explain what we mean when we say that the Manchester code is "Self-clocking."

27. Which of the following did we NOT discuss for use in a "last-mile link"?
    a. FSK
    b. CSU/DSU
    c. T1
    d. ISDN

28. Nyquist's Theorem states:
    a. The optimum sampling rate for a signal is half the highest frequency in the signal.
    b. The optimum sampling rate for a signal is equal to the highest frequency in the signal.
    c. Neither of these

29. Show the reason that the standard sampling interval for telephone-grade voice signals is 125 usec.

30. An Ethernet frame carries 12 bytes of data. What is the length of the frame, excluding the Preamble?
    a. 30 bytes
    b. 46 bytes
    c. 64 bytes
    d. 128 bytes

31. You would be more likely to see “byte stuffing” used in a frame format that also uses:
    a. Byte counts
    b. Bit-stuffing
    c. Clock-based framing
    d. Sentinels

32. A T1 frame must be sent each 125 usec. This means a T3 frame must be sent each:
    a. 41.7 usec
    b. 3.5 msec
    c. 4.5 usec
    d. None of these is correct

33. Which of the following is an error-correction method?
    a. Byte counts
    b. Sampling
    c. CRC
    d. None of these

34. Briefly explain the difference between a blocking and non-blocking socket call.

35. When we analyzed the LLC algorithm that we called “Simplex + Acknowledgements”, we found that the algorithm deadlocks. What did we add to prevent deadlock?
    a. Timeouts
    b. Sequence numbers
    c. Sliding window
    d. Byte counts

36. TCP/IP:
    a. Supports both connection-oriented and connectionless paradigms
    b. Sends and receives all data using packet switching
    c. Provides no packet-switching construct to the user
    d. (a) and (b) are true, but not (c)
    e. (b) and (c) are true, but not (a)
    f. (a) and (c) are true, but not (b)

37. Which of the following is used by the Stop-And-Wait ARQ protocol?
    a. Acknowledgements
    b. Timeouts
    c. “Last Flag” or sequence number
    d. (a), (b), and (c)
    e. (a) and (b), but not (c)
    f. (a) and (c), but not (b)

38. A modem provides a rate of 1Kbps. You would expect the baud rate of this modem to be:
    a. Less than 1000 signals per second
    b. Equal to 1000 signals per second
    c. Greater than 1000 signals per second

39. A protocol layer in a multi-protocol stack:
    a. Encapsulates data received from the layer below
    b. Does not always use the same rules and formats that are used by peer protocols at the same layer
    c. Depends to a great extent on the detailed design of the layers below it.
    d. None of these is correct.

40. Which of the following statements most accurately describes the Go-Back-N protocol?
    a. It is efficient
    b. It is not efficient
    c. It is efficient for links that have low error rates
    d. It is efficient when a link has a high error rate

41. The developers of the Sliding Window algorithm made one fundamental change to the Go-Back-N algorithm that greatly improved efficiency. What was it?

42. Briefly explain Implicit Acknowledgement as used in the Sliding Window Algorithm.

43. Which of the following is NOT an element of reliable network communication, as we discussed it in class:
    a. Data received on time
    b. All data received
    c. Data received in order
    d. All of these were discussed as elements of reliable network communication

44. Define jitter

45. Briefly explain what “CS” and “CD” mean in “CSMA/CD”. It is not acceptable to simply state what the acronyms stand for.

46. True or False: In their paper, Cerf and Kahn discuss a case in which a 600-byte packet, on its first transmission, is broken into 2 300-byte packets, and on its re-transmission, is broken into 3 200-byte packets. They point out that this may lead to confusion at the receiving TCP because sequence numbering does not handle this case.

47. Which of the following is not a field in all Ethernet frames?
    a. Source address
    b. CRC
    c. Pad
    d. Type/Size

48. In Ethernet, the concept of the “longest collision” is most closely related to:
    a. The maximum physical length and slot time
    b. The number of cycles in the exponential backoff algorithm
    c. The maximum number of nodes that can be connected
    d. Promiscuous mode and broadcasting

49. True or False: the “accept” socket operation performs an active open.

50. Two devices on an Ethernet, device A and device B, experience a collision. They run the exponential backoff algorithm and experience a second collision. What is the probability that A and B will collide on their next attempt?
    a. 1/8
    b. 1/4
    c. 1/2
    d. 1

51. Assume there has been a collision on an Ethernet. The probability of the collision repeating after only one cycle of the exponential backoff algorithm is:
    a. Almost 1.0
    b. 0.75
    c. 0.5
    d. 0.25

52. A FDDI ring can operate after:
    a. One link fails
    b. Two links fail anywhere
    c. Two links in different rings fail
    d. Any number of links fail

53. The equipment that connects subnets at the Network Layer is called a:
    a. Bridge
    b. Router
    c. Channel
    d. Subnetwork connector

54. Briefly explain how a learning bridge "learns" which port to send frames to, and how it is kept up-to-date.

55. Perlman's algorithm:
    a. Helps determine where to place bridges
    b. Breaks loops in bridged LANs
    c. Both (a) and (b) are correct
    d. Neither (a) nor (b) is correct

56. Briefly explain how Virtual LANs are accommodated in the Ethernet frame format.

57. Name and briefly explain the difference between the two primary functions of a router.

58. Briefly explain the difference between a blocking and non-blocking switch fabric.

59. The "end-to-end argument" relates to:
    a. Correcting bit errors in higher protocol layers
    b. The timing of packets sent from edge to edge in the network
    c. The location of application-specific functions in a network
    d. The way that network crashes propagate to the end user

60. In a connectionless network, a router's Routing Table specifies:
    a. The address of the next router in the path to the destination
    b. The virtual circuits that pass through the router
    c. Input ports that data will be accepted through
    d. None of these is correct