

Name _____

**CS513/ECE506
Spring 2006
Computer Networks
Mid Term Exam
March 14, 2006**

Question	Points	Score
0	1	
1	3	
2	4	
3	9	
4	3	
5	5	
6	4	
7	3	
8	5	
9	5	
10	6	
11	15	
12	6	
13	9	
14	4	
15	3	
16	16	
Total	100	

Trivia Question (1 extra credit point)

0. (a) Name the **country** involved in the recent effort to take control of the docks in six United States ports.

-OR-

(b) Name the location of this year's **Final Four** NCAA basketball tournament.

(3 pts.) 1. What are the responsibilities of the **Presentation Layer**?

(4 pts.) 2. Define the **bandwidth-delay product**. What is its significance?

(5 pts.) 3a. Explain briefly **HTTP** and discuss the relationship between **HTTP** and **TCP**.

(4 pts.) 3b. Discuss the differences between **TCP** and **UDP**.

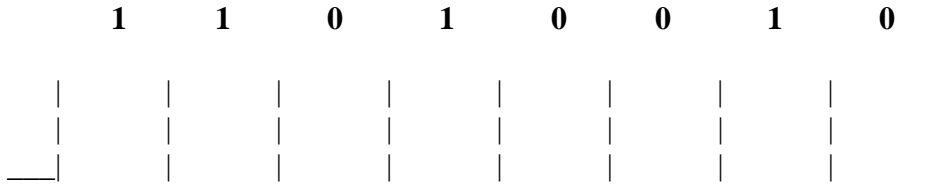
(3 pts.) 4. Explain the role of the **bind** function in socket programming.

(5 pts.) 5. Give the algorithm the **sender** uses to prepare a frame for transmission that includes a **CRC** field.

(4 pts.) 6. Explain the difference between using **repeaters** in digital transmissions versus using **amplifiers** in analog transmissions.

(3 pts.) 7. Explain the difference in potential capacity for data transmissions over a twisted pair with a **30 db** signal-to-noise ratio versus another twisted pair with a **50 db** signal-to-noise ratio. Assume both sets of twisted pairs are voice-grade with a bandwidth of **3600 Hz**.

(5 pts.) 8. Assume that the voltage level at time $t = 0$ is low, fill in the diagram below to show the **Differential Manchester encoding** (as defined in class) for the bit stream 11010010.



(5 pts.) 9. Explain how a **T1 carrier** works to handle voice-grade phone lines.

(6 pts.) 10. Explain how **ADSL** works.

(6 pts.) 11a. Explain the concept of **sliding windows** for a data link layer sender. How does the sliding window mechanism improve performance?

(4 pts.) 11b. Discuss the factors that need to be considered when determining the setting of **timeouts** in a data link layer protocol.

(5 pts.) 11c. Draw two pictures and explain how adding **NAKs** to the **Selective Repeat** scheme can improve throughput.

(6 pts.) 12. Explain how **Slotted Aloha** works. Why is the **normalized throughput** better for **Slotted Aloha** than **Aloha**?

(3 pts.) 13a. Define **Ethernet**.

(6 pts.) 13b. Explain how **Switched Ethernet** works. How does **Switched Ethernet** provide improved performance over **Ethernet**?

(4 pts.) 14. Explain the concept of **collision domains** and the difference between **collision domains** for a **repeater** versus a **bridge**.

(3 pts) 15. Explain how the **relative propagation time** is affected when a 10BASE5 LAN is connected to another 10BASE5 segment using a repeater.

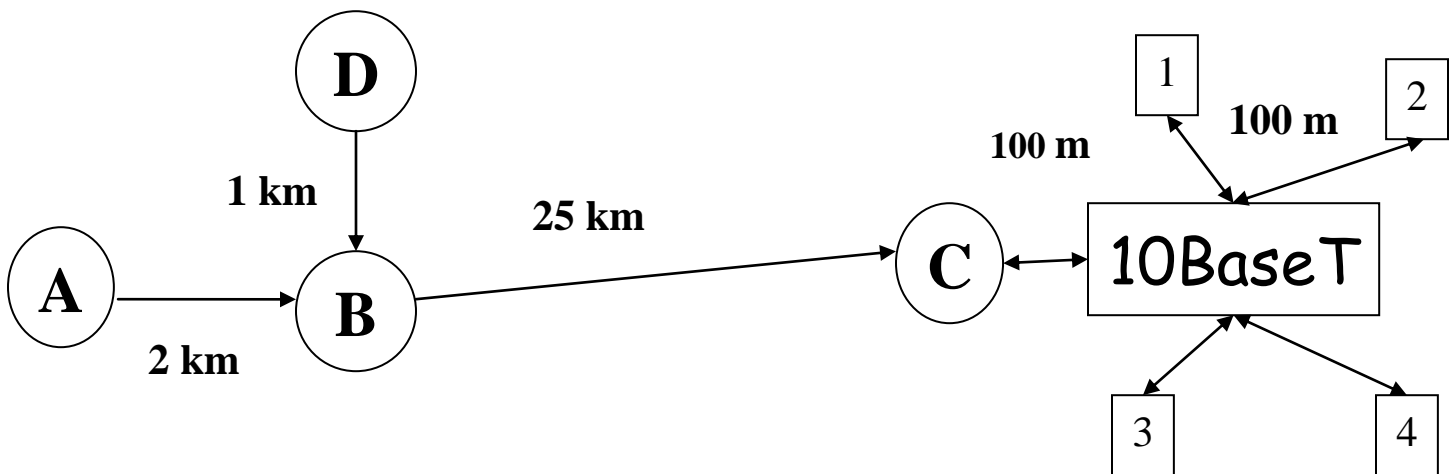
(16 pts.) 16. Given the internet pictured below with a propagation speed of 150 m/microsec on the packet-switched WAN and 200 m/microsec through the 10BASET LAN and:

nodes **A-D** are spaced in WAN as shown with 1 Gbps links between nodes. Assume processing time for nodes **A, C and D** is **0** and that processing time for node **B** is 20 ms.

Nodes **C, 1- 4** are all 100 m from the 10BASET hub.

Assume a packet = frame = 1250 bytes on this internet.

How long will it take to send a packet from node A to node 4 in the situation that when the packet arrives at node C there are 2 packets in front of it waiting in the queue to go to node 3. Assume there is no other traffic on the LAN. {Show all work to get some partial credit.}



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