CS 4251 Computer Networks II **Spring Semester, 2003**

Midterm Examination

February 13

Be neat and concise. Show your work. Good luck!

Name: _____

Problem	Points	Score
1	15	
2	20	
3	15	
4	15	
5	15	
6	20	
Total	100	

1. **Digital encoding, channel capacity.** Consider a channel with a frequency of 100 kHz.

   (a) What is the maximum theoretical data rate of this channel? Explain. (No need to solve the equation.)

   (b) If the signal to noise ratio is 5000, what is the maximum theoretical rate? Explain. (No need to solve the equation.)

   (c) Should Manchester encoding be used on this channel? Explain your answer.

2. **Short answer.** Give short answers to the following questions:

   (a) What is the difference between forward error control and backward error control?

   (b) Give one advantage and one disadvantage of using copper wire as a link medium.

   (c) Give one advantage and one disadvantage of using optical fiber as a link medium.

   (d) Describe the most significant change to the Ethernet CSMA/CD protocol needed for Gigabit Ethernet.

3. **CRC.** Consider a CRC algorithm with a polynomial $P = 10011$ and a message $M = 10100011$.

   (a) Show the computation of the CRC check bits for this message.

   (b) Give an example of a set of bit errors that will **not** be detected by this CRC polynomial, and explain why.

4. **True/False.** Write out the word "True" or "False" for each of the following.

   (a) IP checksum detects all 1 bit errors.

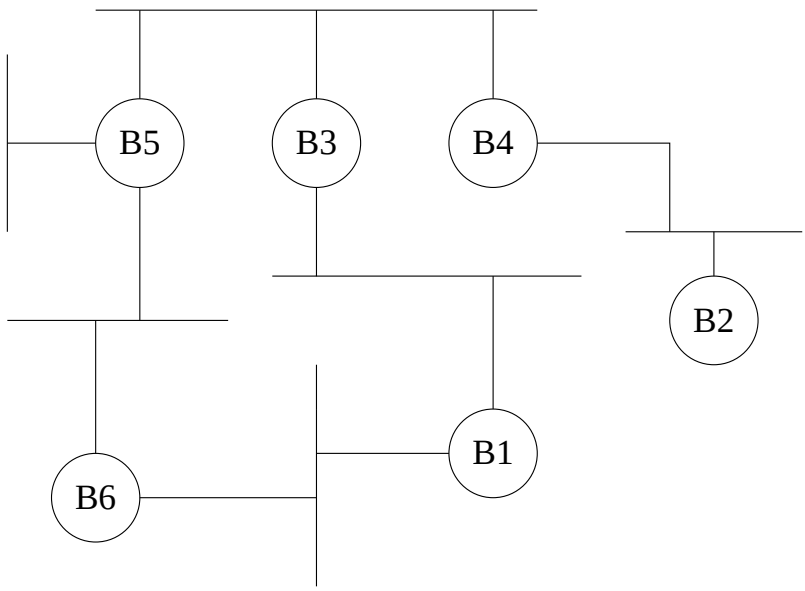
   (b) IP checksum detects all 2 bit errors.

   (c) Gigabit Ethernet cannot be implemented over copper wire.

   (d) Signals degrade more quickly in wired medium than in wireless medium.

   (e) The 802.11 frame header contains more than two addresses.

5. **Ethernet Bridging.** For the topology shown below, mark each port as "on" or "off" according to the algorithm described in class. Assume the bridge IDs are the integers shown on the topology, and that ties are broken in favor of the lower bridge ID.



6. **Token Ring.** Consider a four station ring, with stations labeled A, B, C, D (clockwise) and assuming a one packet time delay between each pair of stations. Give an example that shows the maximum number of packets from different stations that can be on the ring at one time. Explain your example and show a timing diagram (like in class) that illustrates the maximum number.