

## Final Examination

December 7

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

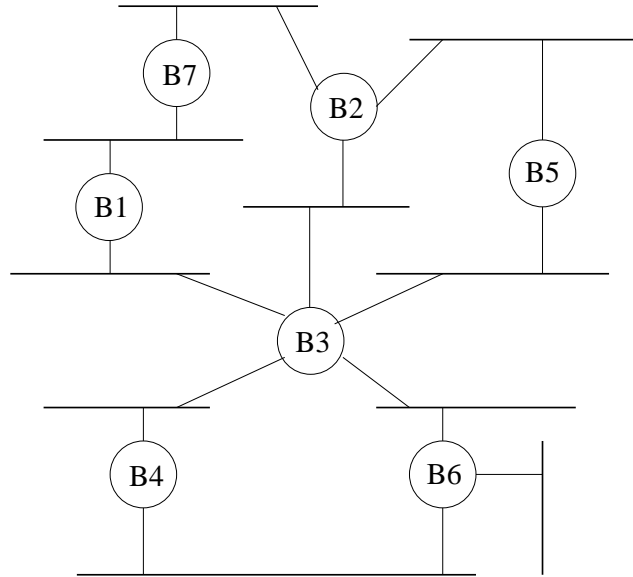
Name: \_\_\_\_\_

Problem	Points	Score
1	15	
2	12	
3	15	
4	15	
5	15	
6	15	
7	13	
Total	100	

If you are likely to attend class on Thursday, please circle which topic you would be most interested in. (If you are not likely to attend, this won't count against you, and please don't vote!)

- Multicast
- ATM
- Research in networking at GT (with possible opportunities for undergrads)
- Other:

1. **Bridges.** Consider the following network, containing Ethernet segments joined by bridges. Label each bridge port as “on” or “off” according to the spanning tree algorithm. Assume that the ID of each bridge is the integer value shown in the label.



2. **Network devices.** For each of the following statements indicate whether it is true for a repeater (P), a bridge (B), and a router (R), by writing zero or more of the letters P,B,R beside the statement. (That is, write the letter if the statement is true for the corresponding device.)

- (a) Runs IP
- (b) Runs a medium access control protocol when connected to an Ethernet segment
- (c) Extends the geographic coverage and number of endsystems in the network
- (d) Can add non-negligible delay to the time to deliver a packet

3. **HTTP.** Suppose in a web session you access two base documents in quick succession on the same web server. The first base document contains two imbedded objects; the second base document contains one imbedded object. The imbedded objects are also located on the same server. Assume that all of the objects are small enough so that the transmission time is negligible. Give the minimum number of round trip times needed to receive the entire set of objects (base documents and imbedded objects) under the following assumptions. Give a brief explanation.

(a) Non-persistent connections

(b) Persistent connections without pipelining

(c) Persistent connections with pipelining

4. **Ethernet.** Suppose you are working on a new transmission media for Ethernet. This new media allows up to six repeaters between any two endsystems. The length of a segment is limited to 100 meters, which corresponds to one-way maximum propagation delay of 20 microseconds on a segment. The new media will operate at 10 Mbps. What is the minimum packet size? Show your work.

5. **TCP.** Draw a timing diagram that illustrates how a TCP sender can (correctly) receive an advertised window field with value 0. Use as few packet transmissions as possible, and be sure to state any necessary assumptions that lead to this situation.

6. **IP.** Give the steps that are followed when an IP packet is received at an end-system. Be sure to include “deliver to upper layer” at the appropriate point.

