

Final exam -- open book section
17 December, 1992

The entire exam is to be turned in at 11:55AM. Work the closed book section first and turn it in before you consult your books and notes to work on the open book section. For the closed book section, write your answers either on the exam itself or on your own paper (for the long questions).

Name: _____

Question 1 (5 points)

Show how the character '%' which is 045 in octal (and 25 in hexadecimal) is transmitted using eight-bit odd-parity with NRZ-L (RS-232) encoding. Your answer should look something like Figure 4-1(a) on the top of page 120 of the textbook.

Question 2 (5 points)

If the probability of one data packet being transmitted without error is .99, what is the probability of three consecutive data packets being transmitted without error? (You don't need to give an exact number. An equation with filled in constants, such as $.73 \cdot .72^{12}$, will do.)

Question 3 (10 points)

Suppose two computers separated by 1,000 km (1,000,000 m) are sending data to each other in 1,000 bit frames at 500,000 bps. Assuming that the electronic signal between the two computers travels at 200,000,000 m/sec what is t_{frame} , the time required to place the frame on the wire, and t_{prop} , the time required for one bit of the frame to travel between the two computers.

If the stop-and-wait ARQ protocol is used, how long will it take to send 1,000,000 bits between the two computers if no frames are lost?

Estimate how long it will take to send the 1,000,000 bits if a Go-back-N ARQ with a sliding window size of three is used.

Question 4 (5 points)

What scheme is used to detect errors in Ethernet (802.3) packets? (Just give the name. You can answer this in less than ten letters.)

Question 5 (5 points)

Suppose you have two Ethernets joined by a *learning* bridge. On one Ethernet there are 50 machines. On the other Ethernet there are 20 machines. What is the least number of packets that must be transmitted before the bridge learns the location of every machine? Explain how you arrive at your answer.

Question 6 (5 points)

How do bridges increase network security?

Question 7 (5 points)

What bad things could happen if the network level flow control of GTE's X.25 public data network didn't work properly?

Question 8 (10 points)

A recent issue of *Open Systems Today* defined *meetingware* as ``software for silent meetings, where people type messages to each other in real time and create an ongoing transcript that can later be referred to and annotated.''

Would it be difficult to implement a meetingware system on top of X.400? Are there better alternatives?

Question 9 (10 points)

Attached to this exam is a copy of an article from a recent *Newsweek* magazine. The article discusses schemes for networking portable personal computers. All sorts of hardware and software are mentioned in the article, and *obviously* these facilities *must* be related to the seven-layer ISO model. Read the article, choose four of the seven layers, and then point out how aspects of networking discussed in the article relate to your four chosen layers.