CIS 350 – INFRASTRUCTURE TECHNOLOGIES
HOMEWORK # 6

NAME(S): _____
(You may do this homework in groups of 2 students maximum.)

Topics: Networks and Data Communications (Chapter 12), Ethernet and TCP/IP Networking (Chapter 13), Communication Channel Technology (Chapter 14)

Show your calculations!

Problem 1

A mask representing some IP address is 255.255.248.0. Write the mask in

the binary form: _____
the prefix notation: _____

Problem 2

What is the class of the following IP addresses?
11000110.10000111.11001100.00000011 _____
10000011.10000111.11001100.00000011 _____
01111110.10000111.11001100.00000011 _____

Problem 3

Your start-up company has been assigned the following IP address by IANNA: 198.226.10.0. Your boss told you to design 11 subnetworks within this network, with each subnetwork supporting up to 20 hosts. Can these subnetworks and hosts be designed? If not, which address class A, B, C, D, or E would allow for this particular design?

Problem 4

Your company has been assigned the following IP address by IANNA: 141.200.0.0. Design a network that consists of 1000 subnetworks with each subnetwork having up to 30 hosts.

What address class is it? _____

Express this IP address in the binary form: _____

What is the mask associated with this IP address? Write the mask in the decimal, binary and prefix form.

Mask in decimal _____
Mask in binary _____
Mask in prefix form _____

Perform calculations below to check if this network can be designed.

What is the subnetwork mask? Write the subnetwork mask in the decimal, binary and prefix form.

Mask in decimal _____
Mask in binary _____
Mask in prefix form _____

Write the address for the 1st subnetwork as well as the 1 host, 2nd host, the last host, and the broadcast address for the 1st subnetwork. Present the addresses in the binary and decimal forms.

Write the address for the 2st subnetwork as well as the 1 host, 2nd host, the last host, and the broadcast address for the 2nd subnetwork. Present the addresses in the binary and decimal forms.

Write the address for the last subnetwork as well as the 1 host, 2nd host, the last host, and the broadcast address for the last subnetwork. Present the addresses in the binary and decimal forms.

Problem 5

A signal travels from point A to B in a communication channel. The signal power at point A and B are 1000 and 100 watts, respectively. Calculate the signal gain/loss in [decibels – dB] at point B. Was the signal attenuated or amplified?

Problem 6

A signal travels from point A to B in a communication channel. The signal power at point A and B are 100 and 1000 watts, respectively. Calculate the signal gain/loss in [decibels – dB] at point B. Was the signal attenuated or amplified?

Problem 7

You should know from chapter 14 that the speed of data transmission over a communication channel depends on the bandwidth of the channel as well as the power of the signal and noise of the channel. Shannon proposed a formula that allows one to calculate the maximum data rate [bps] for an analog signal with noise send over a channel.

$S = f \times \log_2 (1+W/N)$

where:

- S – data transfer rate in bps
- f – signal bandwidth
- W – signal power in watts, and
- N – noise power in watts

Calculate the data rate (speed of transmission) of the telephone signal of 3100 Hz bandwidth, 0.2 watts of power, and 0.0002 watts of noise? (Note that the log function uses the base 2.)