Sample Midterm

Select 4 out of the following problems. They are all worth 20 points. The remaining 20 points are awarded in the Quiz part.

Problem 1:

A satellite TV channel has a signal-to-noise ratio of 20 dB and a bandwidth of 20MHz. What is the maximum data rate?

Problem 2:

Attenuation in a Cat. 5 UTP cable is 9.3 dB/100 m at 20 MHz frequency. We want to transmit over a 20 MHz channel over Cat. 5 UTP of length up to 1000 m with a bit-rate of 5 Mbps. Noise is expected to be at less than 5μW. Can we do it? What is the minimum signal level at the source?

Problem 3:

Using the 15/11 Hamming code from lecture and homework, what happens if the message [1,0,0,1,1,1,0,0,0,1,1,1,0,0,0] is received?

Problem 4:

We have just standardized a new amazing data link layer format , the TS1, that uses inter-frame compression so that the average size of a header is only 3.3B with a maximum of 12B. The data field is fixed to exactly 150 B. How many of the TS1 frames would fit into a new SONET SPE that spans **two** frames? What would be the data rate of TS1 over SONET.

Problem 5:

If we use Aloha to send frames over a CAT-7 twisted pair (with velocity factor of 75%) at a rate of 10 Mbps over a 500 m cable, what is the minimum frame size?

Problem 6:

Calculate a / the spanning tree of the following network starting in Node A.