Midsem

CS425 (Computer Networks)
February 27, 2022

Name: _____

1. (*10 points*) **Short Answer type Questions**

1. What tasks are performed by the network access layer and the transport layer?

2. What is the bandwidth of the signal $s(t) = 4\sin(2\pi t) + 2\sin(6\pi t) + \Big(8/\pi\Big)\sin(7\pi t)$?

3. If the transmit power of a signal is 20 mW and the received power is 5 mW, then what is the loss in dBw?

4. Describe the advantage of parabolic reflective antenna.

5. Explain is *Sampling Theorem.*

2. (*10 points*) **Shannon's Theorem and Nyquist Theorem:**

- Suppose a spectrum of a channel is between 3 MHz and 4 MHz and $\text{SNR}_{db} = 24$ dB. Then using Shannon's formula calculate the maximum capacity of the channel.

- From this capacity calculate how many signal levels are required (by using Nyquits's theorem)?

3. (*10 points*) **Antenna Design:** Recall that for an isotropic antenna, the free space loss is given by $\frac{P_t}{P_r} = \frac{(4\pi d)^2}{\lambda^2}$, where d is the distance between antennas.

- Determine the isotropic free space loss at 4 GHz, if the shortest path to the satellite antenna from earth is 35863 Km.

- If the transmitter and receiver antenna gains are 44 dB and 48 dB, respectively, calculate the free space loss.

- If the transmitted power at the earth is 250 W, calculate the received power at the satellite antenna.

4. (*10 points*) **Signal Encoding Formats:** For a bit stream 01001100011, sketch the NRZ-L, NRZ-I, Manchester and Differential Manchester signals.

5. (*10 points*) **Miscellaneous:**

- Calculate the thermal noise power density at room temperature. Assume Boltzmann's constant to be 1.38×10^{-23} J/K?

- What is "slope overload noise" and "quantizing noise" in delta modulation?

- What is the difference between "optical line of sight" and "radio line of sight"?

Scrap Page
(please do not remove this page from the test packet)