

KFUPM - COMPUTER ENGINEERING DEPARTMENT

COE-341 – Data and Computer Communication

Quiz 03 - March 31st, 2010 Take home quiz

Due on Mon April 5th, 2010 (class time)

Student Name:

Student Number:

1) (10 points) Consider the square wave shown in textbook Figure 3.7c. Let the period T equal to 1 msec. If the signal is passed through a low pass filter that passes frequencies up to 8 kHz with no attenuation.

a) (5 points) Compute the power in the output waveform?

b) (5 points) Assuming that at the filter input there is a thermal noise voltage with $N_0 = 1 \mu\text{Watt/Hz}$, find the output signal to noise ratio in dB.

c) (5 points) Calculate the maximum possible capacity for this channel given the SNR figure computed in part (b).

2) (15 points) A microwave transmitter has an output of 0.1 W at 2GHz. Assume that this transmitter is used in a microwave communication system where the transmitting and receiving antennas are parabolas, each 1.2 m in diameter.

- a) (5 points) What is the gain of each antenna in decibels?
- b) (5 points) Taking into account the antenna gain, what is the effective radiated power of the transmitted signal?
- c) (5 points) If the receiving antenna is located 24 km from the transmitting antenna over free space path, find the available signal power out of the receiving antenna in dBm units.

Hint: for part (b) you need to define/know the term "effective radiated power"!!