KFUPM - COMPUTER ENGINEERING DEPARTMENT

COE-241 – Data and Computer Communication

Assignment 2 – Due date: Oct 28th, 2014

Student Name:
Student Number:

Problem #	Maximum Mark	Mark
1	20+10	
2	20	
3	20	
4	10	
Total	40 + 10	

Problem 1: On the subject of Z-transform

a) (5 points) Compute the Z-transform for the sampled signal $x(n) = 10 \times 0.6^n$ for $n = 0, 1, ...$

b) (5 points) Compute the Z-transform for the sampled signal $x(n) = 10 \times 0.6^n u(n)$.

c) (5 points) Compute the Z-transform for the sampled signal $x(n) = 10 \times 0.6^n u(n-2)$.

d) (5 points) Compute the inverse Z-transform for $X(z) = \frac{20z}{z-0.1}$.

e) (10 points - **bonus**) Compute the inverse Z-transform for $X(z) = \frac{6}{(z-0.8)(z-0.2)}$.

Student must show their work and required steps.

Problem 2: On noise and channel capacity

(20 points) Consider the system with low-pass filter described in quiz02. Let the effective system temperature be equal to 1000 kelvin. Compute the thermal noise power in Watts, miliwatts, and in dBmW.

Problem 3: On noise and channel capacity

(20 points) Consider the system with low-pass filter described in quiz02. Let the effective system temperature be equal to 20000 kelvin. Compute the SNR for the system in dB and the corresponding maximum theoretical capacity of the system in bits per second.

Problem 4: On noise and channel capacity

(10 points) An amplifier is used to amplify power of a signal by 30 dBs. If the power of signal at the input of the amplifier is 0.5 mW, compute the power of the signal at the output of the amplifier.