KING FAHD UNIVERSITY OF PETROLEUM & MINERALS
COLLEGE OF COMPUTER SCIENCES & ENGINEERING

COMPUTER ENGINEERING DEPARTMENT

COE 540 – Computer Networks
Assignment 1 – Due Date Feb 25th, 2012

Problem #	Maximum Mark	Mark
1	20	
2	10	
3	20	
4	10	
5	20	
6	40+20 bonus	
Total	120	

Problems (1)-(4): Textbook Chapter 1 problems (page 105-108): 12 (20 points), 16 (10 points), 22 (20 points), and 25 (10 points).

Problem (5): (20 points) Compare and contrast the connection-oriented and connectionless services.

Problem (6):

(40 points + 20 bonus) Consider the periodic signal $s(t)$ shown in the figure below. Assume A = 1 volts and T = 1 second.

a) (2 points) Write a mathematical representation for $s(t)$.

b) (2 points) Is $s(t)$ analog or discrete and why? What is the period of the function $s(t)$? What is the fundamental frequency for $s(t)$?

c) (3 points) Compute the DC component of $s(t)$.

d) (2 points) Compute fmin and fmax and determine the bandwidth of $s(t)$.

e) (3 points) Compute the energy and power of $s(t)$.

f) (15 points) Find the Fourier series expansion of $s(t)$.

g) (3 points) Specify the terms containing frequencies lower than the fundamental frequency and those containing frequencies higher than the fundamental frequency.

h) (5 points) Compute the power using the Fourier Series expansion and show that is it equal to that obtained in part (e)

i) **(20 points - bonus)** $s(t)$ has infinite bandwidth (line spectrum) and it is required to truncate it such that it has a limited bandwidth but still has 95% of the original power. What terms of the original series expansion should be included? Produce a table similar to that in slides shown in class on Fourier Series Expansion (slide 78). Show the percent of power as the number of terms in $s\_e(n = k)$ are increased.

j) (5 points) What is the new bandwidth and power of the new truncated series?