KFUPM - COMPUTER ENGINEERING DEPARTMENT
COE-540 – Computer Networks - Quiz 01

Student Name:
Student Number:

1) (20 points) A file of size K bits is to be sent from Node 1 to Node N traversing the intermediate N-1 point-to-point links as shown in Figure. If the file is to be segmented into packets of size P bits where an overhead of H bits is added to each packet. If the transmission rate of the links is equal to R bits/sec and ignoring propagation and processing delays, find the optimal packet size for minimum overall transfer time for the file.

Hint: Write a formula of the overall file transfer time and differentiate it with respect to P. Assume K/P >> 1.

2) (20 points) Consider the signal $s(t) = A\prod(t/T)$ where $A > 0$ and $T > 0$.

    a) Compute the Fourier Transform for $s(t)$, $S(f)$?

    b) Plot $S(f)$ for $A = 1$ and $T = 2$ using Matlab for $-3 \leq f \leq 3$ Hz.

    c) Specify the frequency points where $S(f)$ is equal to zero.

    d) Comment on the relation between T and the bandwidth occupied by $s(t)$.

3) (20 points) Consider the input signal $s(t) = A\prod((t - T/2)/T)$ where $A > 0$ and $T > 0$ and the system impulse response function $h(t) = ae^{-bt}$ for $t > 0$ where again $a > 0$ and $b > 0$.

a) Compute the system response $r(t)$.

b) Plot $s(t)$, $h(t)$, and $r(t)$ for $A = T = a = b = 1$ using Matlab on the same figure for $0 \leq t \leq 5$. Use proper markers/line-styles and legend to illustrate the three different curves.

c) Discuss the effect of the pulse width (i.e. T) on the duration of the response $r(t)$. Support this discussion with several plots (on the same figure) for $r(t)$ for different values of T.