COE 342, Term 012

Data & Computer Communications

Programming Assignment #1

Due Date: Monday 25/03/02

Q.1. Given a square wave signal of period T = 1 ms and peak amplitude A = 2V. One period of the signal is shown below:

$$s(t) = \begin{cases} 2 & 0 \le t < T/2 \\ 0 & T/2 \le t < T \end{cases}$$

(i) You are required to calculate the Fourier Series of such a signal and determine its frequency components. Limit yourself to the first 6 frequency components.

(ii) Using Matlab, plot the signal s(t) and plot its frequency spectrum.

(iii) The above signal is sent through different media with different bandwidths. If the media have the following bandwidths, what effects does this have on the signal at the receiver?

1. BW = 20 KHz,
2. BW = 10 KHz.
3. BW = 4.5 KHz.

For each case, reconstruct the signal and plot it using Matlab. What do you conclude?

Q.2. Consider the triangular wave shown in Figure 3.15. Assume that the period of the signal T = 1us and A = 1V.

(i) You are required to calculate the Fourier Series of the signal and determine its frequency components. Limit yourself to the first 6 frequency components.

(ii) If you were required to transmit this signal across a transmission media, what bandwidth would you recommend? Draw the received signal using the recommended bandwidth.

Q.3. Given the triangular pulse shown in Figure 3.16, find its Fourier transform and then plot it using Matlab.