Subject :	**SEHH2238 : Computer Networking**
Lab/Tutorial :	**Session 2 : Signal Transmission**

1) Time and Frequency Domain

1) Draw the time-domain plot of a sine wave (for only 1s) with maximum amplitude of 15V, frequency of 5 and phase 270°.

2) What is the bandwidth of a signal that can be decomposed into four sine waves with frequencies at 0, 20, 50, 100 and 200 Hz? All maximum amplitudes are the same. Draw the frequency spectrum.

3) A periodic composite signal with a bandwidth of 2000 Hz is composed of two sine waves. The first one has a frequency of 100 Hz with the maximum amplitude of 20V; the second one has a maximum amplitude of 5 V. Draw the frequency spectrum.

2) Transmission Impairment

1) The loss in a cable is usually defined in decibels per kilometer (dB/km). If the signal at the beginning of a cable with −0.3 dB/km has a power of 2 mW, what is the power of the signal at 5 km?

2) If the power of a signal is 0.5W and the power of the noise is 10mW. What is the SNR? What is SNR_{dB}?

3) Data Rate

1) We need to send data at a rate 265 kbps over a noiseless channel with a bandwidth of 20 kHz. How many signal levels do we need?

2) A measurement is done on a telephone line (4kHz of bandwidth). When the signal is 10W, the noise is 5mW. What is the maximum data rate supported by this telephone line?

3) We have a channel with a 1-MHz bandwidth. The SNR for this channel is 63. What are the appropriate bit rate and signal level?

4) What is the bit rate for signal in the following figure?