CSE Department, North South University

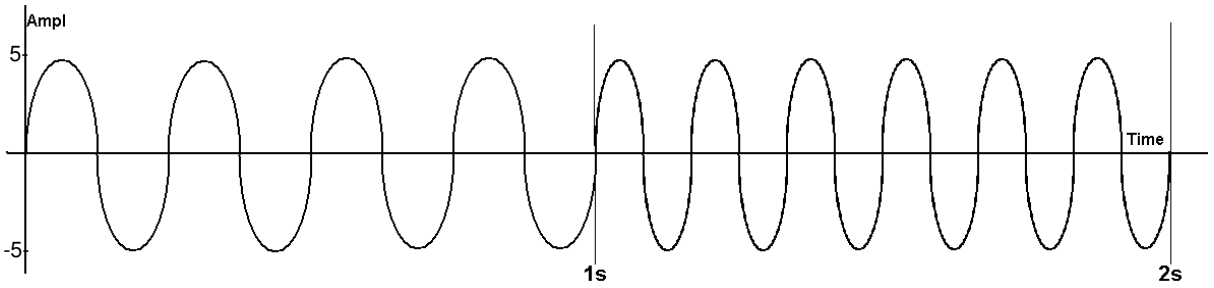
ETE131: Introduction to Telecommunications & Computer Engineering (SyR)

Problem Sheet 5: Digital Modulation and PCM

Question 1: You are required to transmit the bit pattern 101 via ASK with a carrier frequency of 30Hz and a baud rate of 10units/second. The peak amplitude for bits 1 and 0 are 5V and 3V respectively. Show the waveform transmitted for 101 using ASK.

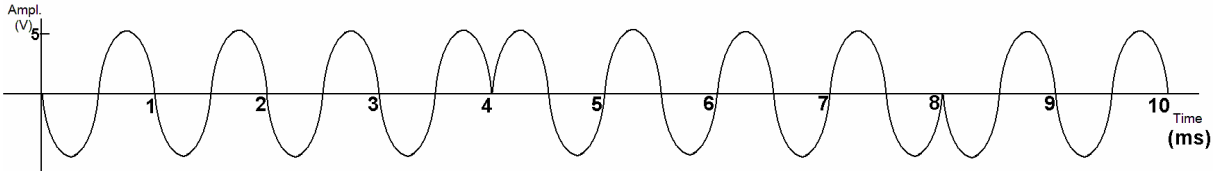
Question 2: You are required to transmit the bit pattern 001 via FSK with amplitude of 5V and bit interval of 2s. The carrier frequencies for bits 0 and 1 are 2Hz and 2.5Hz respectively. Show the waveform transmitted for 001 using FSK.

Question 3: The given transmission uses FSK with a high frequency for bit 1 and a low frequency for bit 0. Compute the carrier frequencies for bits 1 and 0. Given that each bit duration is 0.5s, compute the bit stream being transmitted. Draw the spectrum for the bandwidth requirements for this transmission system.

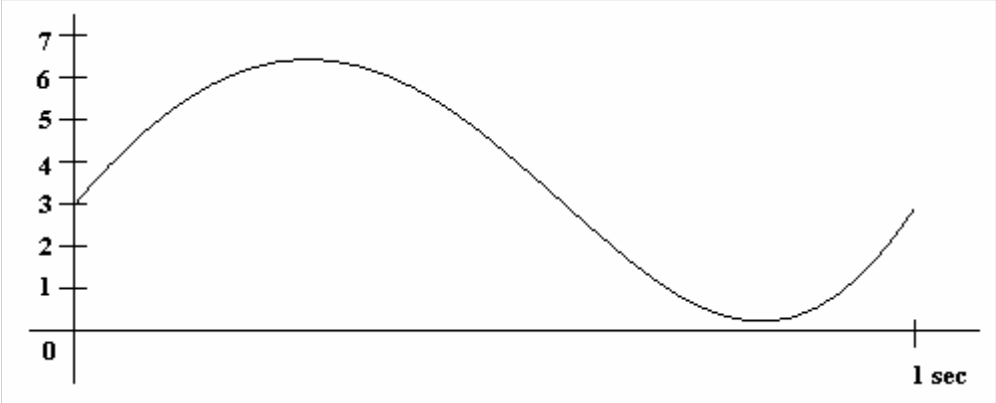


Question 4: You are required to transmit the bit pattern 00101100 via QPSK with an amplitude of 5V, a frequency of 10Hz, and a baud rate of 5 units/second. Show the waveform transmitted for this signal. What is the bit rate of this transmission?

Question 5: The given BPSK signal is being transmitted with a bit-rate 500bps. Compute the carrier frequency of the signal. What is the bit stream being transmitted?



Question 6: You are given the following analog wave pattern. Assume you can sample at 8 voltage levels (0, 1, 2, 3, 4, 5, 6 and 7). You are told that the sampling rate is 6 samples per second and that time 0 is not being accounted for as a sample.



a) Show the waveform after Pulse Amplitude Modulation is applied to it.
b) How many bits are needed to represent each sample?
c) Convert each of the sampled values into a string of bits via quantization and encoding.