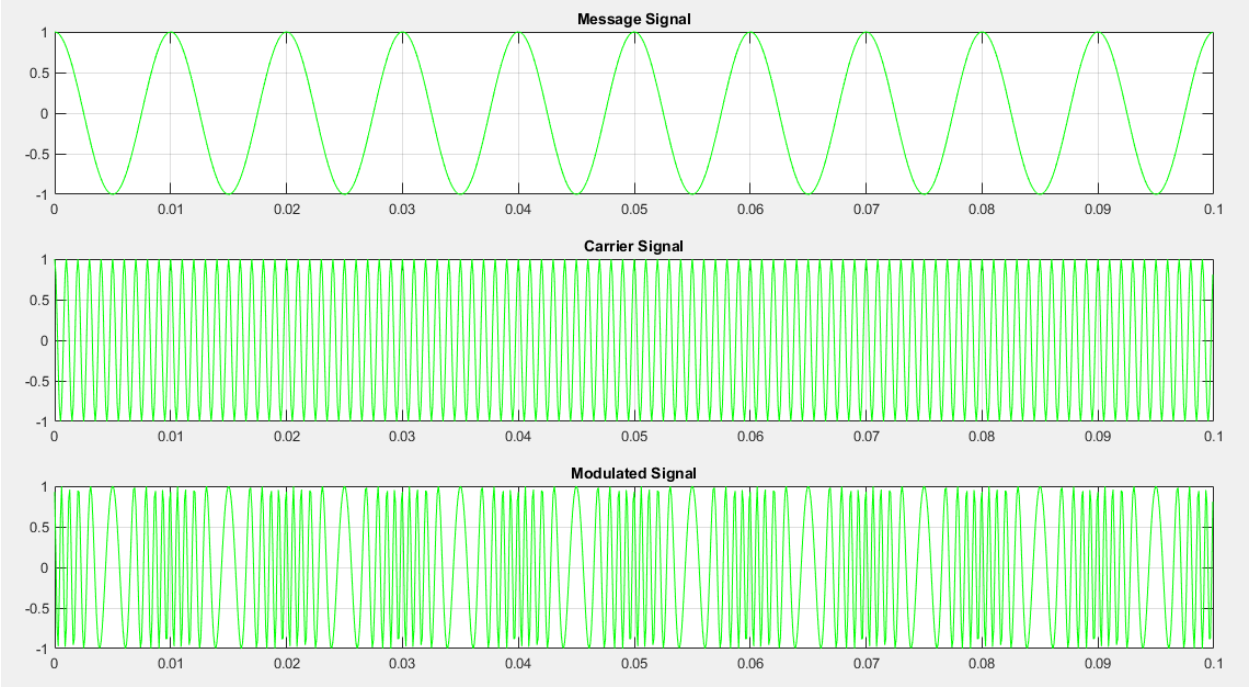
CT-Assignment -4

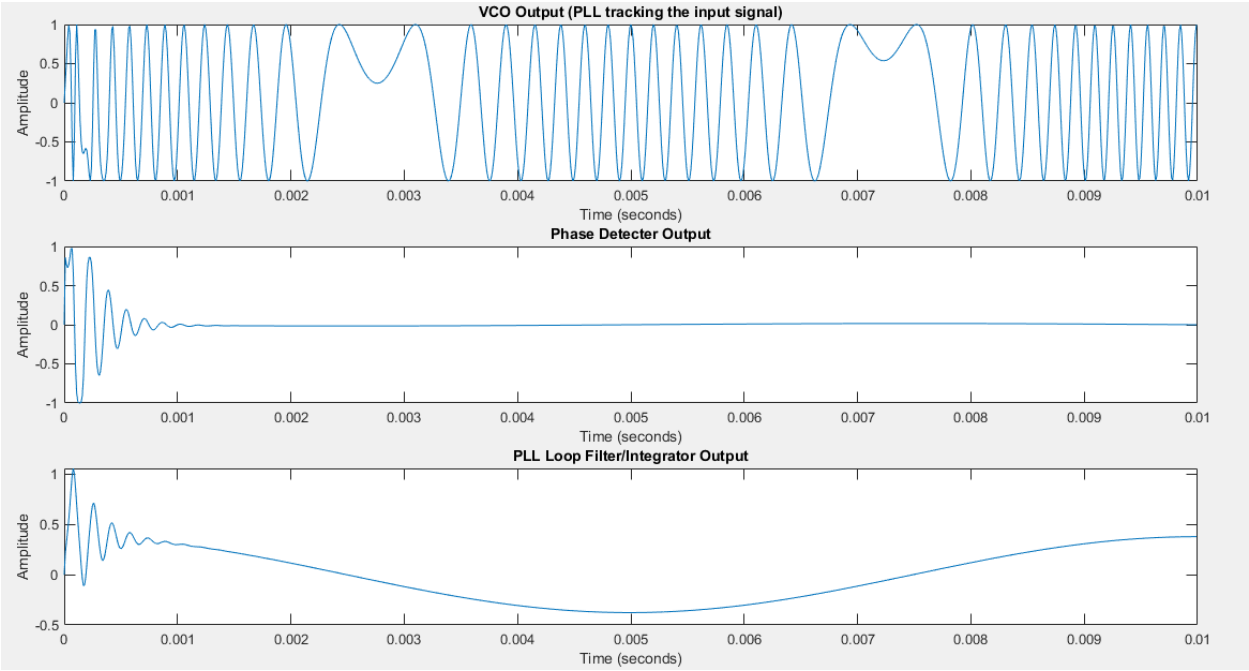
Simulations Report

a. We have a sinusoidal message signal of frequency 100Hz(fm) and a sinusoidal carrier signal of frequency 1KHz(fc). Now we modulate the message signal with the carrier signal.
Fs = 100000. Time scale from 0 to 4999/fs in step of fs(t = 0 : 1/fs:4999/fs).
Kf = 0.06(given).
Umodulated = cos(2*pi*fct + 2pi*Kf*cumsum(m)) (cumsum(m) is equivalent to the integral of m over 0 to tau).
The plots for them are:

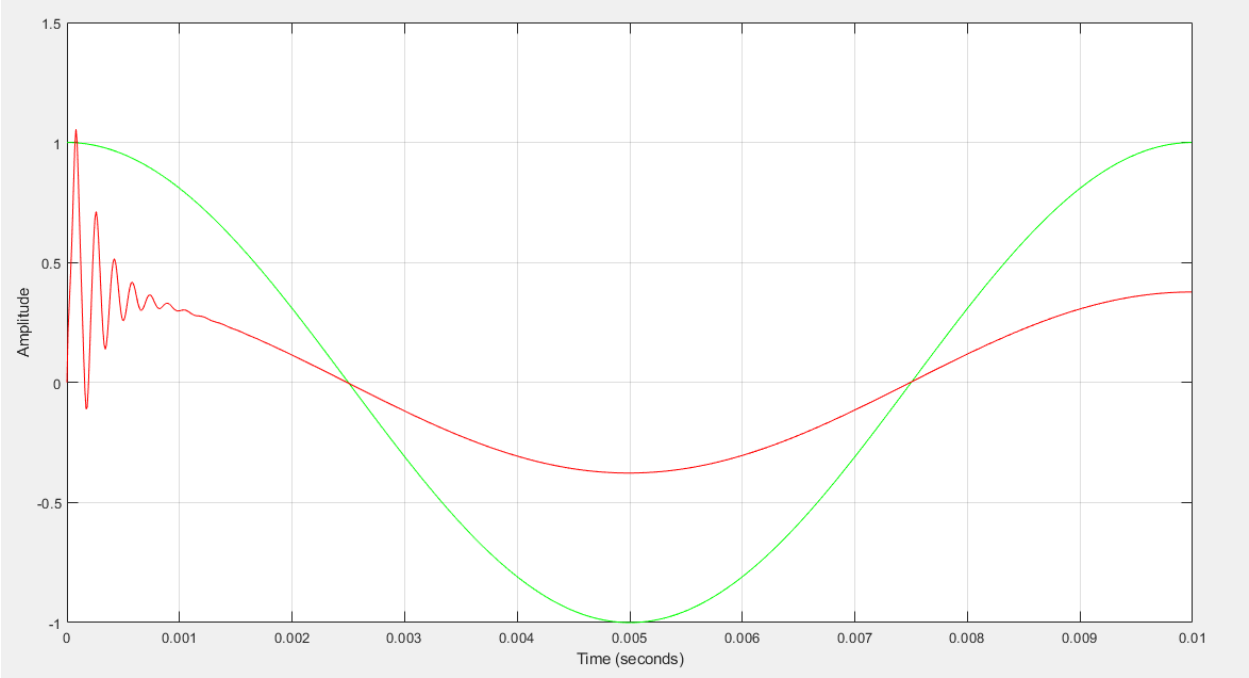


b. Now we perform phase locked loop(PLL) to the modulated signal to obtain the original message signal. For this we have VCO output, a mixer, and a loop filter. We pass the modulated signal and the output of the VCO to the mixer and then we filter out the frequency components from there to get the expression in terms of phase difference. This is then fed to the VCO. This works as a feedback

system trying to minimize the phase difference between the input the local oscillator. The outputs of each the blocks are given as:



c. Now let us plot the original message signal and the demodulated signal from the PLL.



Green signal is the message signal and the red one is the demodulated one. Initially there is a phase difference between the two but eventually it decreases and ceases to zero.