Indian Institute of Information Technology, Allahabad
Department of Electronics and Communication Engineering

Course Name: Principle Of Communication
EXPERIMENT NO: 2
Time and frequency domain analysis

Objective – Study time domain and single sided as well as double sided line spectra of 3 tone signals on MATLAB. Plot the one sided and two sided magnitude and phase response for sampling frequency 200 Hz. Comment to the magnitude of the response at different sampling frequencies.
Materials Required – MATLAB software, laptop.
Calculation-
A1=1;
A2=2;
A3=1;
f1=10;
f2=20;
f3=30;
fs =200;t=0:1/fs:1;
x = A1 * cos(2 * pi * f1 * t+pi/3)+A2 * cos(2 * pi * f2 * t+pi/4)-A3 * cos(2 * pi * f3 * t+pi/6);
X1 = fft(x);
X2=abs(X1);
X3=fftshift(X2);
z=phase(X1);
n = length(x);
c = 0:fs / n:fs - fs / n;
c1 = -fs/2:fs / n:fs/2 - fs / n;
subplot(2, 4, 1),plot(t,x);
xlabel('time'),ylabel('amplitude'),title('Time Domain Representation of 3 Tone Signals');
subplot(2, 4, 2),plot(c,X1);
xlabel('frequency'),ylabel('Magnitude'),title('One sided Response');
subplot(2, 4 ,3),plot(c,X2);
xlabel('frequency'),ylabel('Magnitude'),title('One sided Magnitude Response');
subplot(2, 4 ,4),plot(c,X3);
xlabel('frequency'),ylabel('Magnitude'),title('One sided Magnitude Response Centre');
subplot(2, 4, 5),plot(c1,X1);
xlabel('frequency'),ylabel('Magnitude'),title('Two sided Response');

subplot(2,4,6),plot(c1,X2);
xlabel('frequency'),ylabel('Magnitude'),title('Two sided Magnitude Response');
subplot(2, 4 ,7),plot(c1,X3);
xlabel('frequency'),ylabel('Magnitude'),title('Two sided Magnitude Response Center');
subplot(2, 4, 8),plot(c1,z,'-r',c,z,'–g');
legend('Two sided','one sided')
xlabel('frequency'),ylabel('Magnitude'),title('Twoe sided Phase Response');
Graphs - Obtain the figure by running the code.
Results - Result obtain by the code.
Precautions- All the required precautions in performance of experiment is to write code very carefully.
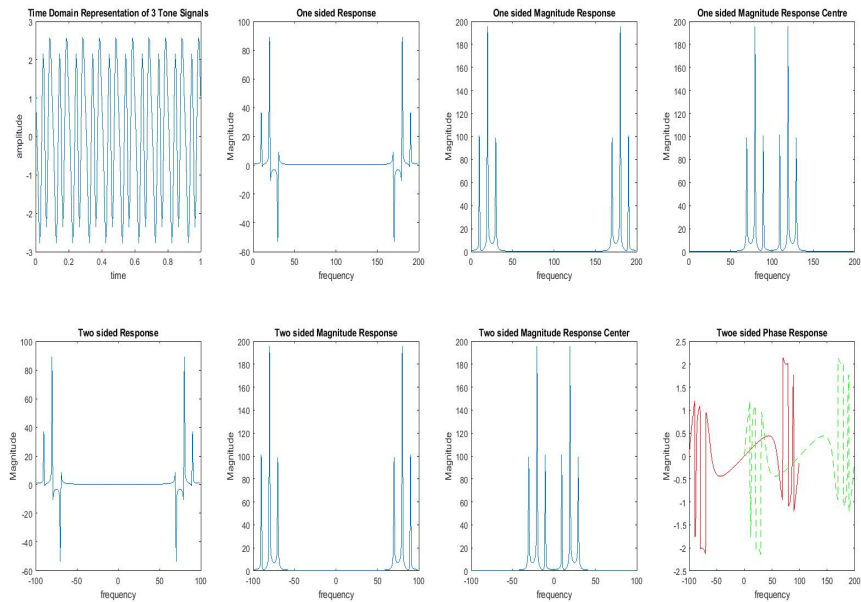

Figure 1: Result of time and frequency domain analysis of 3 tone signal.