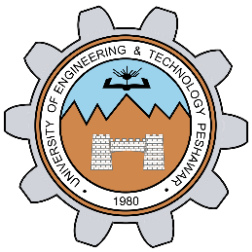
IMPLEMENTATION / ANALYSIS OF FREQUENCY MODULATED AND DEMODULATED SIGNAL USING MATLAB

LAB # 07



Fall 2023

CSE-402L

Digital Signal Processing Lab

Submitted by: **AIMAL KHAN**

Registration No.: **21PWCSE1996**

Class Section: **A**

"On my honor, as student of University of Engineering and Technology, I have neither given nor received unauthorized assistance on this academic work."

Student Signature: 

Submitted to:

Dr. Yasir Saleem Afridi.

Monday, December 11, 2023

Department of Computer Systems Engineering

University of Engineering and Technology, Peshawar

CSE 402L: Digital Signal Processing

Demonstration of Concepts	**Poor (Does not meet expectation (1))** The student failed to demonstrate a clear understanding of the assignment concepts	**Fair (Meet Expectation (2-3))** The student demonstrated a clear understanding of some of the assignment concepts	**Good (Exceeds Expectation (4-5)** The student demonstrated a clear understanding of the assignment concepts	**Score** **30%**
Accuracy	The student completed (<50%) tasks and provided MATLAB code and/or Simulink models with errors. Outputs shown are not correct in form of graphs (no labels) and/or tables along with incorrect analysis or remarks.	The student completed partial tasks (50% - <90%) with accurate MATLAB code and/or Simulink models. Correct outputs are shown in form of graphs (without labels) and/or tables along with correct analysis or remarks.	The student completed all required tasks (90%-100%) with accurate MATLAB code and/or Simulink models. Correct outputs are shown in form of labeled graphs and/or tables along with correct analysis or remarks.	**30%**
Following Directions	The student clearly failed to follow the verbal and written instructions to successfully complete the lab	The student failed to follow the some of the verbal and written instructions to successfully complete all requirements of the lab	The student followed the verbal and written instructions to successfully complete requirements of the lab	**20%**
Time Utilization	The student failed to complete even part of the lab in the allotted amount of time	The student failed to complete the entire lab in the allotted amount of time	The student completed the lab in its entirety in the allotted amount of time	**20%**

Dr. Yasir Saleem Afridi

Implementation / Analysis of Frequency Modulated And Demodulated Signal Using MATLAB.

Objectives:

- Modulate a baseband signal using carrier signal.
- Demodulate a modulated signal using carrier signal.

Tasks:

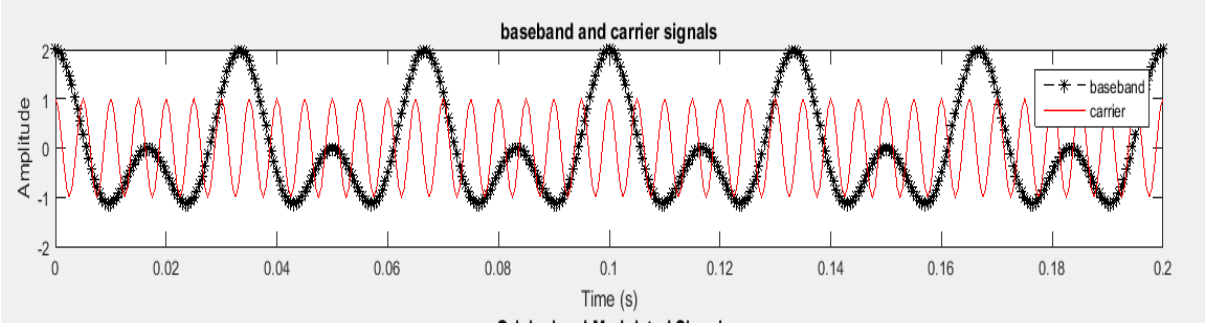
Provide .m file with detailed comments

Code:

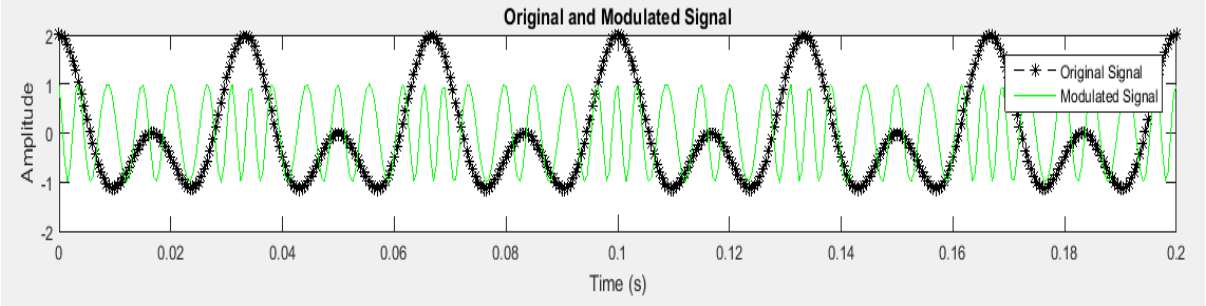
```
clc;
clear;
close all

%% 1.   Set the sampling frequency to 1kHz and carrier frequency to
200 Hz. Generate a time vector having a duration of 0.2 s.
samplingFrequency = 2000; % Sampling Frequency
carrierFrequency = 200;  % Carrier Frequency
time = (0:1/samplingFrequency:0.2);

%% 2.   Create two tone sinusoidal signal with frequencies 30 and 60
Hz
basebandSignal1 = cos(2*pi*30*time);
basebandSignal2 = cos(2*pi*60*time);
toneSignal = basebandSignal1 + basebandSignal2;

%% 3.   Generate a Carrier Signal with the freq of 200Hz
carrierSignal = cos(2*pi*carrierFrequency*time);


%% 4.   Plot the modulating Signal and Carrier Signal figures;
subplot(3, 1, 1);
plot(time, toneSignal, 'k*--', time, carrierSignal, 'r');
xlabel('Time (s)');
ylabel('Amplitude');
legend('baseband', 'carrier');
title('baseband and carrier signals');


%% 6. Set the frequency deviation to 50 Hz.
frequencyDeviation = 50;

%% 7. Frequency modulate x (Modulating Signal) using fmmod.
```

```
modulatedSignal =
fmmod(toneSignal,carrierFrequency,samplingFrequency,frequencyDeviati
on);

%% 8. Plot the original and modulated signals.
subplot(3, 1, 2);
plot(time,toneSignal,'k*--',time,modulatedSignal,'g')
xlabel('Time (s)')
ylabel('Amplitude')
legend('Original Signal','Modulated Signal');
title('Original and Modulated Signal');

%% 11. Perform Frequency Demodulation using Matlab function fmdemod
demodulatedSignal =
fmdemod(modulatedSignal,carrierFrequency,samplingFrequency,frequency
Deviation);

%% 12. Plot the original and demodulated signals
subplot(3, 1, 3);
plot(time,toneSignal,'k',time,demodulatedSignal,'co');
xlabel('Time (s)');
ylabel('Amplitude');
legend('Original Signal','Demodulated Signal');
title('Original and Demodulated Signals');
```

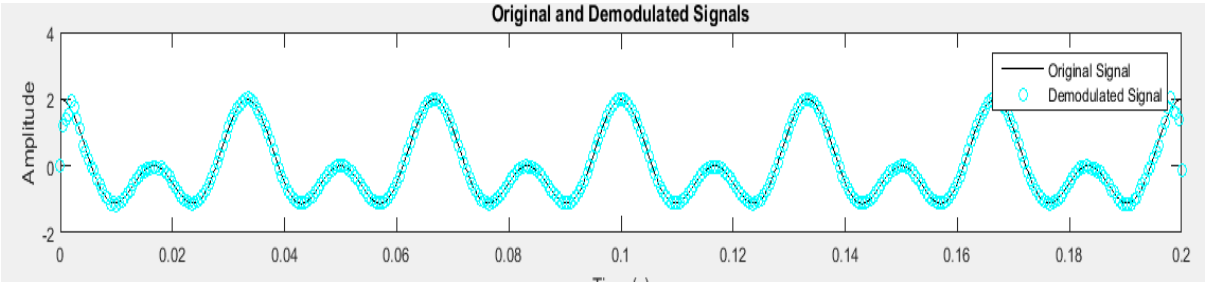
Output 1: Plot the modulating Signal and Carrier Signal figure.



Output 2: Plot the original and modulated signals.



Output 3: Plot the original and demodulated signals.



Reference:

To view my codes, please refer to my GitHub account.

Conclusion:

I have learned how to analyze modulation and demodulation of a signal. I have also learned about the built-in function of MATLAB used for modulation and demodulation.

The End.