Benha University
Benha Faculty of Engineering

Electrical Engineering Department

Communication System Project

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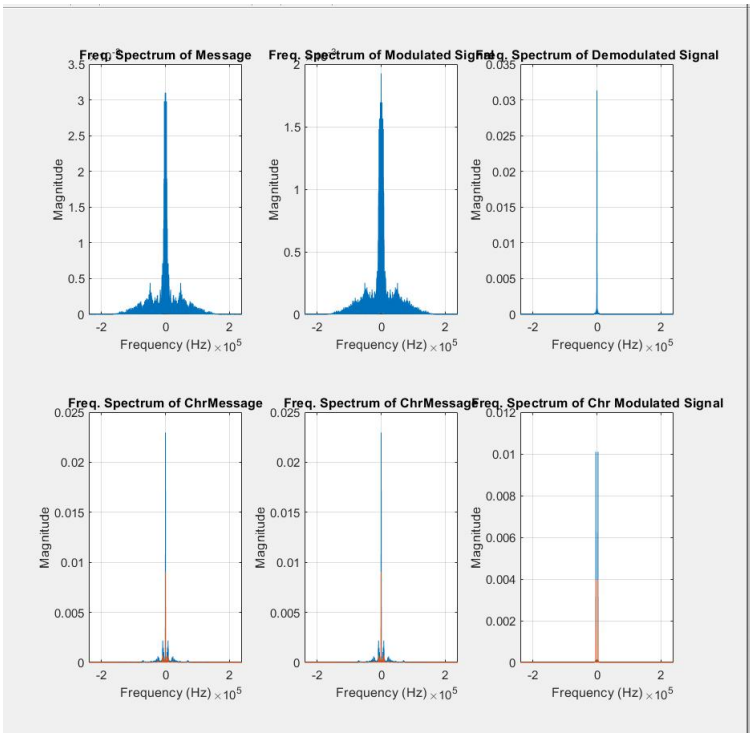
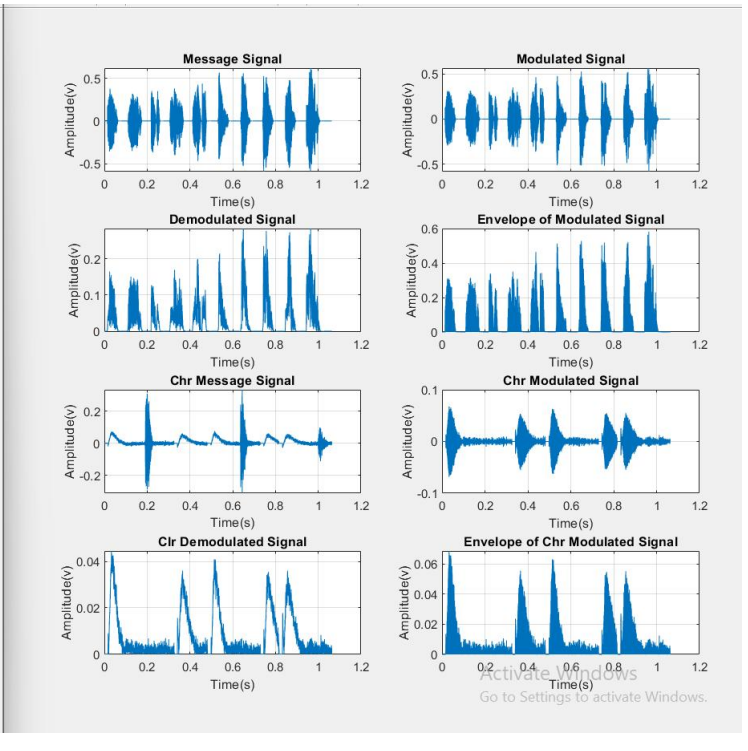
- • Introduction

In the realm of modern communication systems, the efficient transmission of information is of paramount importance. Modulation techniques have emerged as indispensable tools for encoding and decoding signals, enabling reliable and high-quality communication in various domains.
The purpose of this report is to explore the fundamental principles of modulation, examining how it allows for the efficient transmission of data by imposing information on carrier signals. Furthermore, we will analyze the various modulation schemes employed in different communication systems, considering their strengths, limitations, and trade-offs.

1- Part 1 Deliverables

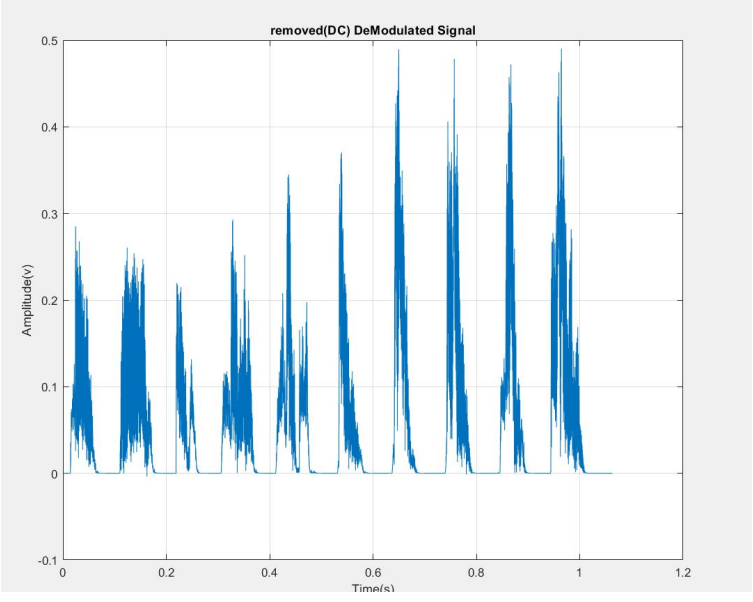




Signals plot in time domain audio massage and characters
Signals plot in frequency domain audio massage and characters

cutoff frequency after which the signal becomes unintelligible is under 1KHz.
cutoff frequency after which the characters signal becomes unintelligible = 750Hz.

after removing DC Component

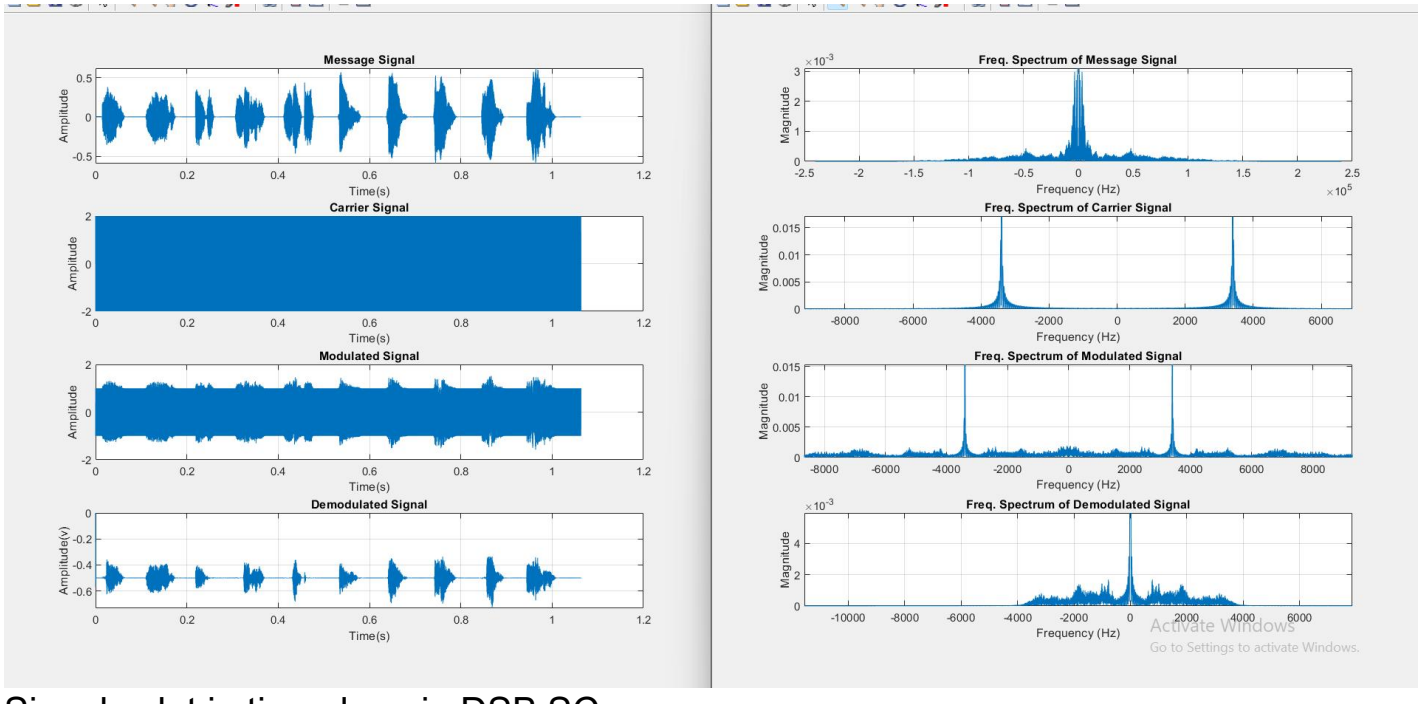


Signals plot in time domain

the energy of the recorded and demodulated signals. Then multiply the demodulated signal by an appropriate factor so that it has the same energy as the recorded signal.
to remove any DC component in the demodulated signal before scaling.

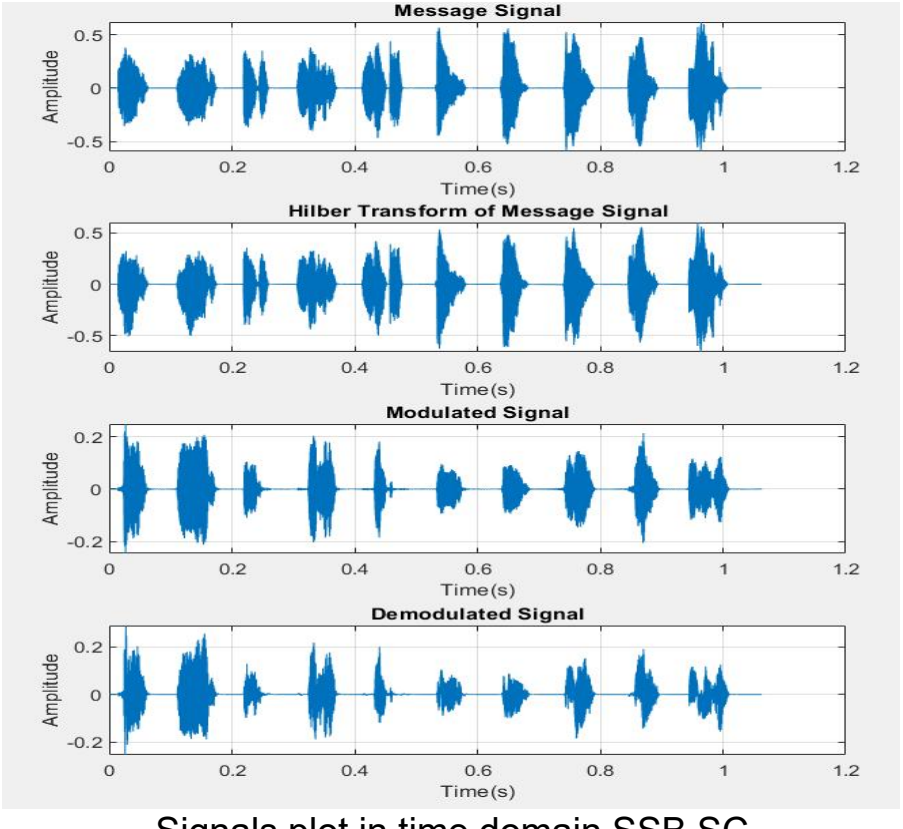
2- Part 2 Deliverables

When I added several values of frequency offset to LO in both DSB-SC and SSB-SC the signal got distorted.
In DSB-SC there is time varying phase.
In SSB-SC there is a phase shift for all frequencies.

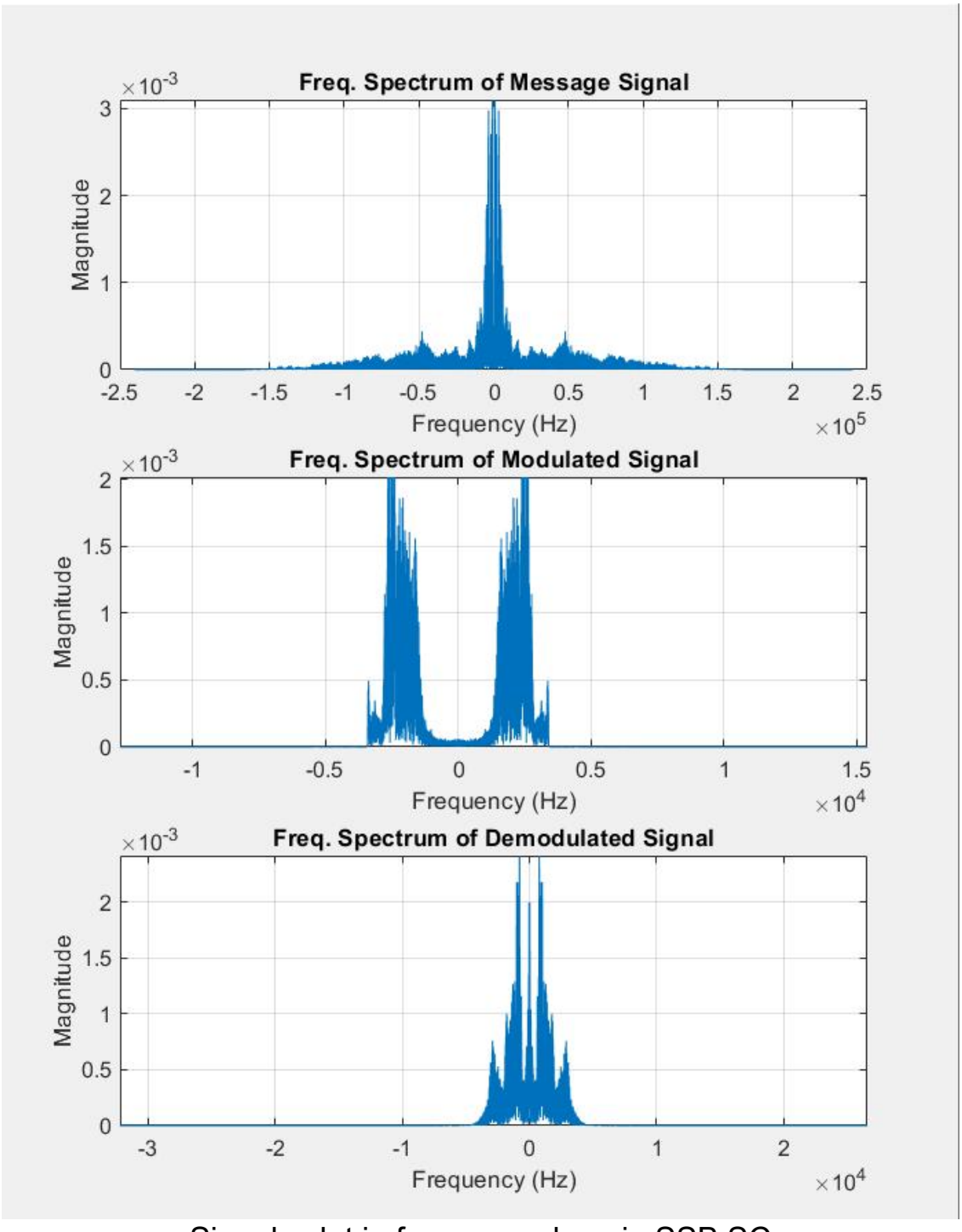


Signals plot in time domain DSB SC

Signals plot in frequency domain DSB_SC



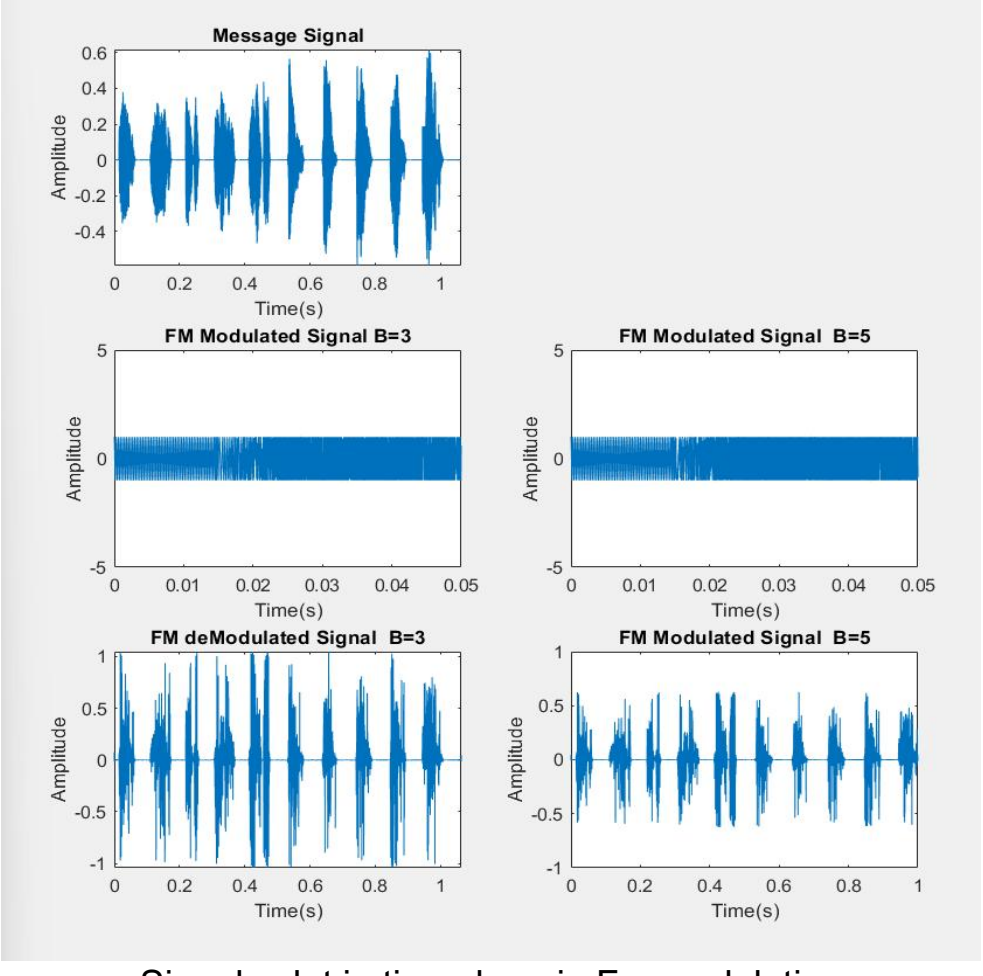
Signals plot in time domain SSB SC



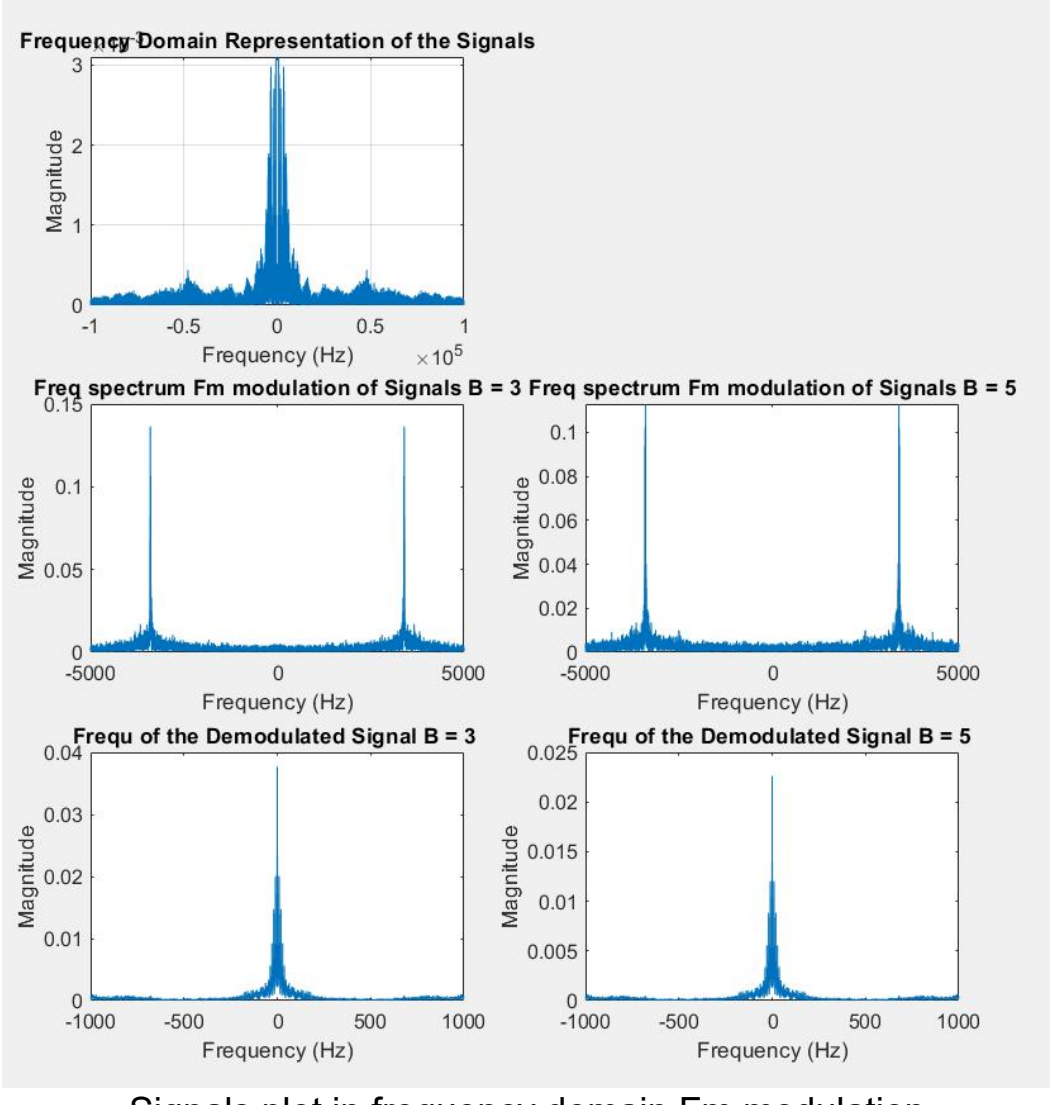
Signals plot in frecuancy domain SSB SC

3- **Part 3 Deliverables**

Single Tone signal versus different values of Beta



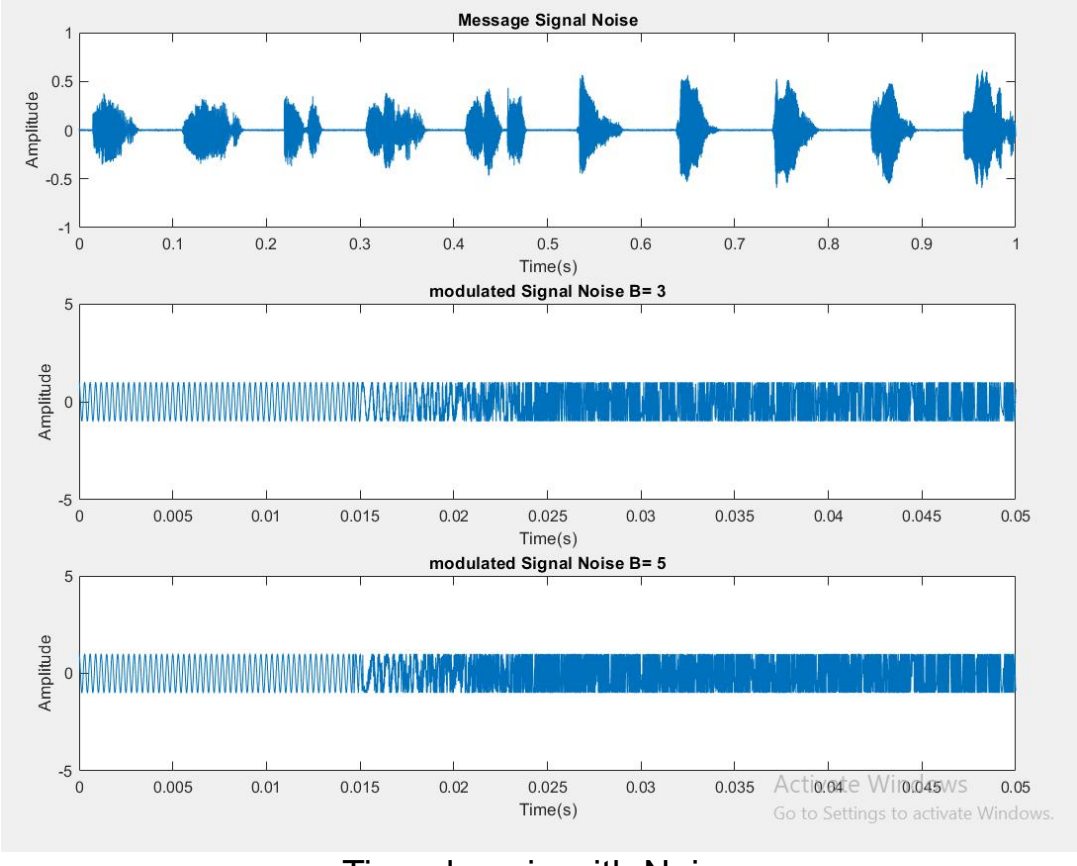
Signals plot in time domain Fm modulation



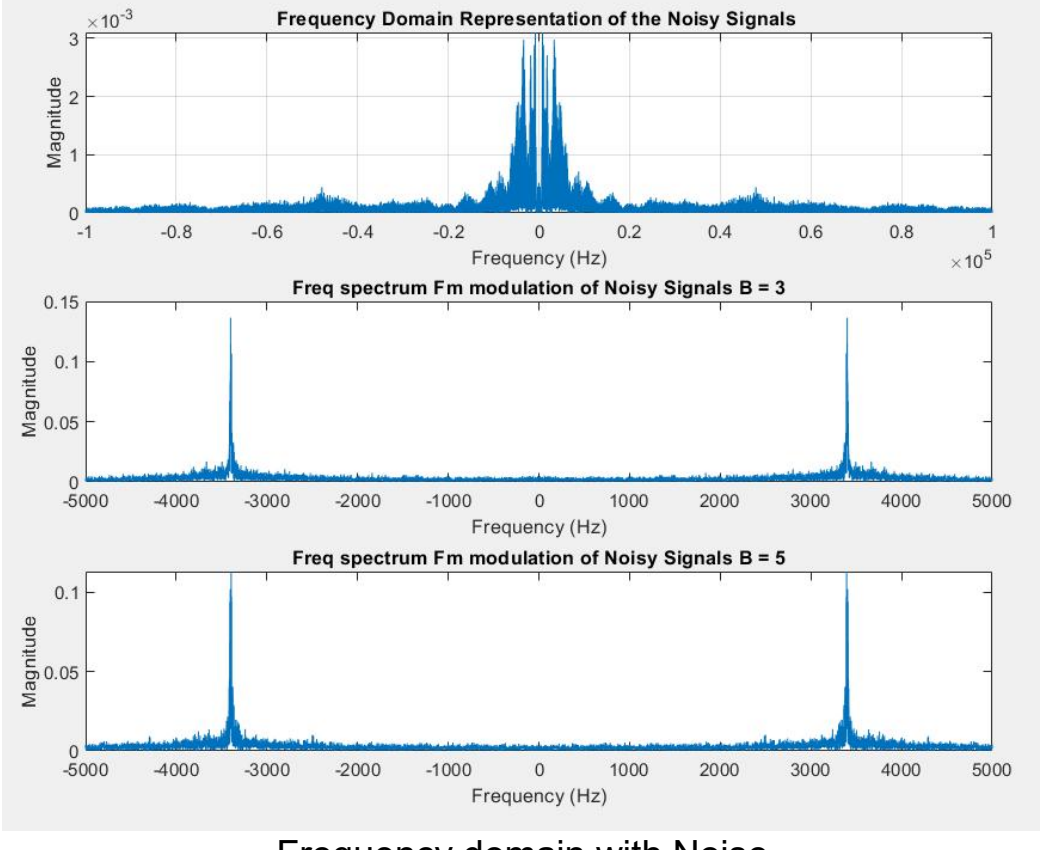
Signals plot in frequency domain Fm modulation

4- Part 4 Deliverables

I tried different SNR levels on modulated signal and signal quality affected really bad under SNR 20 dB for β = 3 and under 25 dB for β=5 before adding LPF and after adding LPF the signal got really distorted at greater SNR level.
I increased β from 10 to 60 and made SNR level constant = 30 dB, I noticed that the value of β at which threshold occurs is around 45.



Time domain with Noise



Frequency domain with Noise