

NAME: Siddharth Bose

REGISTRATION NO.: 19BEC1278

EXP. NO: 6

Noise in AM Receiver

AIM: Write a MATLAB program to execute and display the output for Amplitude modulation and demodulation.

SOFTWARE REQUIRED: MATLAB

THEORY:

Noise is an unwanted signal, which interferes with the original message signal and corrupts the parameters of the message signal. This alteration in the communication process, leads to the message getting altered. It most likely enters at the channel or the receiver. Noise is some signal which has no pattern and no constant frequency or amplitude. It is quite random and unpredictable.

If modulation signal $m(t) = A_m \cos(2\pi f_m t)$ and carrier signal $c(t) = A_c \cos(2\pi f_c t)$, then the noise signal $n(t) = (A_c + NF \cdot (\cos(2\pi f_m t))) \cdot \cos(2\pi f_c t)$ where,

A_c = Amplitude of carrier signal

NF = Noise factor

f_m = Frequency of modulating signal

f_c = Frequency of carrier signal

ALGORITHM:

Step 1: Define the values for A_m (message signal amplitude), A_c (carrier signal amplitude), f_m (message signal frequency), f_c (carrier signal frequency).

Step 2: Use the equation

- $m = A \cdot \sin(2\pi f_m t)$ to define the message signal
- $Carr = A \cdot \sin(2\pi f_c t)$ to define the carrier signal

Step 3: Use the equation

- $s = (A_c + NF \cdot \cos(\omega_m t)) \cdot \cos(\omega_c t)$ to plot the noise signal

and vary the value of NF from 1 to 10 with an increment of 2.

Step 4: Use the awgn() command to plot the noise signal using in-built command.

Step 5: Finally, save and click on Run to obtain the output graphs.

MATLAB CODE:

```
clc;

clear;

close all;

t=linspace(0,1,10000);

%% Message Signal

fm=100; %% message Signal Freq

Am=2;

msg = Am*sin(2*pi*fm*t);

subplot(6,1,1)

plot(msg,'r',LineWidth=2);

xlabel('time');

ylabel('Amplitude');

title('plot of Message signal 19BEC1278');

%% Carrier Signal

Ac=5;

fc=500; %% carrier Signal Freq . must be higher than message signal freq

car = Ac*sin(2*pi*fc*t);

subplot(6,1,2)

plot(car,'b',LineWidth=2);

xlabel('time');

ylabel('Amplitude');

title('plot of Carrier signal 19BEC1278');

n=2;

for NF=linspace(1,10,3)
```

```
s=(Ac+ NF*cos(2*pi*fm*t)).*cos(2*pi*fc*t);n=n+1;
```

```
subplot(6,1,n)
```

```
plot(s,'g',LineWidth=2);
```

```
title('Noise Amplitude ',NF);
```

```
end
```

```
mod=msg.*car;
```

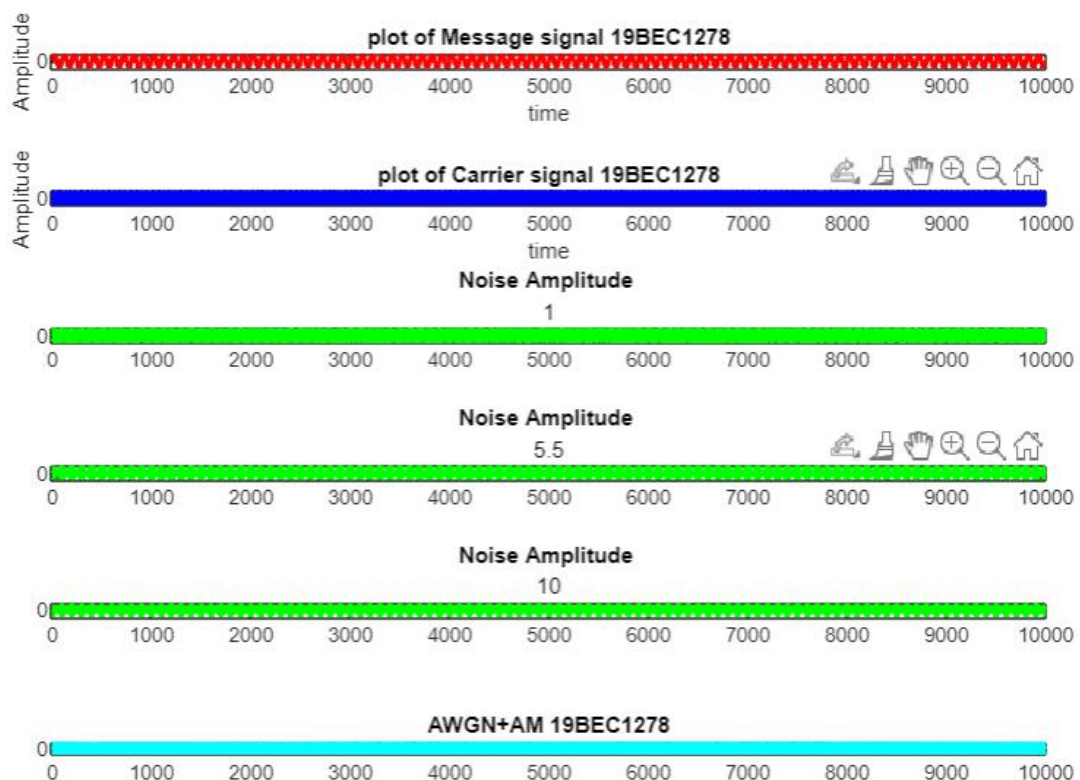
```
noised=awgn(mod,20,0);
```

```
subplot(6,1,6)
```

```
plot(noised,'c',LineWidth=2);
```

```
title('AWGN+AM 19BEC1278');
```

OUTPUT:



INFERENCE:

The noise signal in AM receiver was generated using theoretical formulae and in built command.