Amplitude Modulation

```
%Amplitude Modulation
clc;
close all;
clear all;
fm=input('modulating signal freq between 10Hz to 20KHz'); %15000    (15KHz)
fc=input('carrier freq between 100KHz to 800KHz'); %200000  (200KHz)
m=input('enter the modulation index');



Fs=8*fc;
t=0:1/Fs:1;
carr=sin(2*pi*fc*t);
msg=sin(2*pi*fm*t);
y1=carr.*(1+m*msg);

figure(1)
subplot(3,1,1)
plot(t,msg,'linewidth',1.5)
axis([0 .0002 -1 1])
xlabel('time')
ylabel('Amplitude')
title('Modulating signal')

subplot(3,1,2)
plot(t,carr,'linewidth',1.5)
axis([0 .0002 -1 1])
xlabel('time')
ylabel('Amplitude')
title('Carrier signal')
```

```
subplot(3,1,3)
plot(t,y1,'linewidth',1.5)
axis([0 .0002 -2 2])
ylabel('Amplitude')
xlabel('time')
title('Modulated signal')

d1=abs(fft(y1))/(.5*Fs);
%plot the spectrum of the modulatted signal)
figure(2)
plot(d1)
ylabel('Normalised mag')
axis([0 Fs/4 0 1.2*max(abs(d1))])
title('Spectrum of modulated signal')
```

Single Side Band Suppressed Carrier

```
clc
clear all
close  all
fm=input('modulating signal frequency=');   %10KHz
fc=input('carrier signal frequency=');      %100KHz
Fs=8*fc;%select sampling frequency 5 times of carrier frequency
t=0:1/Fs:1;

msg1=sin(2*pi*fm*t);
carr1=cos(2*pi*fc*t);

msg2=cos(2*pi*fm*t);
carr2=sin(2*pi*fc*t);
```

```
BM1=msg1.*carr1;%BM 1 modulated signal
BM2=msg2.*carr2;%BM 2 modulated signal

USB=BM1+BM2;%ssb sum modulated signal
LSB=BM1-BM2;%ssb difference modulated signal
%fig 1 signal plot

figure(1),
clf,
hold on
subplot(4,1,1)
plot(t,msg1,'linewidth',1.5)
axis([0 0.0002 -1 1])
ylabel('amplitude')
title ('mod signal')

subplot(4,1,2)
plot(t,carr1,'linewidth',1.5)
axis([0 0.0002 -1 1])
ylabel('amplitude')
title ('carrier signal')

subplot(4,1,3)
plot(t,USB,'linewidth',1.5)
grid;
axis([0 0.0002 -1 1])
ylabel('amplitude')
%xlabel('normalized frequency')
title('SSB sum modulated signal')
```

```
subplot(4,1,4)
plot(t,LSB,'linewidth',1.5)
grid;
axis([0 0.0002 -1 1])
ylabel('amplitude')
%xlabel('normalized frequency')
title( 'SSB difference modulated signal')


d1=abs(fft(BM1))/(.5*Fs);
d2=abs(fft(USB))/(.5*Fs);
d3=abs(fft(LSB))/(.5*Fs);
%plot the spectrum of the modulated signal

figure(2)
subplot(3,1,1)
plot(d1')
ylabel('normalized magnitude')
axis([0 Fs/2 0 1.2*max(abs(d1))])
title ('spectrum of BM modulated signal')

subplot(3,1,2)
plot(d2')
ylabel('normalized magnitude')
axis([0 Fs/2 0 1.2*max(abs(d2))])
title ('spectrum of SSB LSB (fc-fm) modulated signal')

subplot(3,1,3)
plot(d3')
ylabel('normalized magnitude')
xlabel('frequency')
```

```
axis([0 Fs/2 0 1.2*max(abs(d3))])
title ('spectrum of SSB USB (fc+fm) modulated signal');
```

Frequency Modulation

```
%Frequency Modulation

clc;
clear all;
close all;

fm=input('modulating signal frequency=');
fc=input('carrier signal frequency=');
B=input('enter the modulation index:');


Fs=8*fc;
t=0:1/Fs:1;
carr=cos(2*pi*fc*t);
msg=cos(2*pi*fm*t);


Ac=1;
figure(1)
subplot(2,1,1)
plot(t,msg,'linewidth',1.5)
axis([0 0.0002 -2 2])
xlabel('time')
ylabel('Amplitude')
title('Modulating signal')

subplot(2,1,2)
```

```
s=Ac*sin((2*pi*fc*t)+B*msg);
 plot(t,s,'r','linewidth',1.5);
 axis([0,0.0002,-1,1]);
xlabel('time')
ylabel('Amplitude')
title('Carrier signal')

Fs = 8*fc;
d1 = abs(fft(s))/(0.5*Fs);
figure(2);
plot(d1)
axis([0 Fs/4 0 1.2*max(abs(d1)) ]);
title('Spectrum of modulated signal')
```

Pulse Amplitude Modulation

```
close all ;clear all;clc;
t=0:0.0001:0.2;
f1=15;f2=100;

msg=sin(2*pi*f1*t);

subplot(3,1,1);
plot(t,msg);
title('message')
axis([0 .2 -1.5 1.5])

carr=square(2*pi*f2*t)
for i=1:length(msg)
    if(carr(i)<0)
        pam_sig(i)=0;
```

```
    else
        pam_sig(i)=msg(i);
    end
end
subplot(3,1,2)
plot(t,carr);
axis([0 .2 -1.5 1.5])
title('clk')
subplot(3,1,3)
plot(t,pam_sig);
title('pam')
axis([0 .2 -1.5 1.5])
```