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%B.Tech, ECE, SEM-5, G-2 - Group-6
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%AIM: - Study of SSB-SC Amplitude Modulation and Demodulation
%-----
%message signal
t=0:0.001:1;
Ts=0.001;
Am=5;
Ac=5;
fm=10;
fc=100;
m=Am*sin(2*pi*fm*t);
c=Ac*cos(2*pi*fc*t);
figure(1);
subplot(2,2,1);
plot(t,m);

title('Message Signal');
xlabel('time');
ylabel('Amplitude');
subplot(2,2,2);
plot(t,c);
title('carrier signal');
xlabel('time');
ylabel('Amplitude');
%u=0.6;
x=m.*c;
subplot(2,2,3);
plot(t,x);
title('modulated signal');
xlabel('time');
ylabel('Amplitude');
%grid on;

%DSB-SC in frequency domain
N=1024;
XC=fft(x,N);
f=(-N/2:1:(N/2-1))*(1/(N*Ts));

figure(2);
subplot(2,1,1);
%SSB-SC in frequency domain
plot(f,abs(XC));
title('Modulated signal in frequency');
xlabel('Time');
ylabel('Amplitude');

%SSB-SC modulated signal

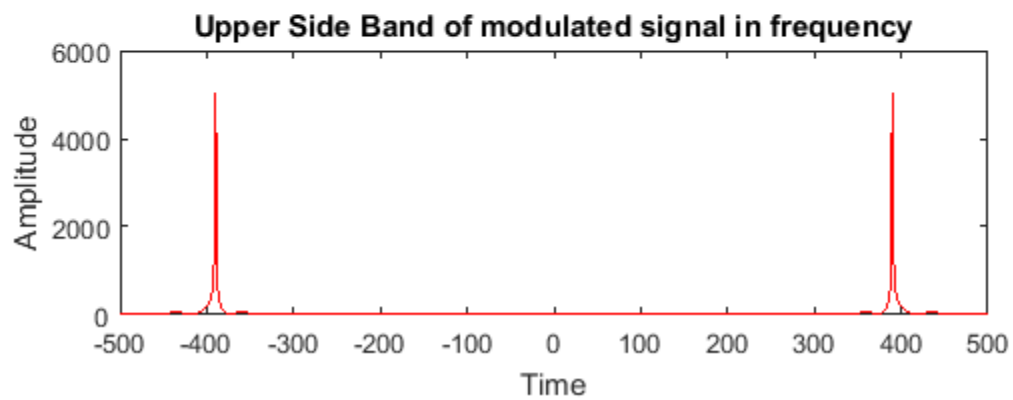
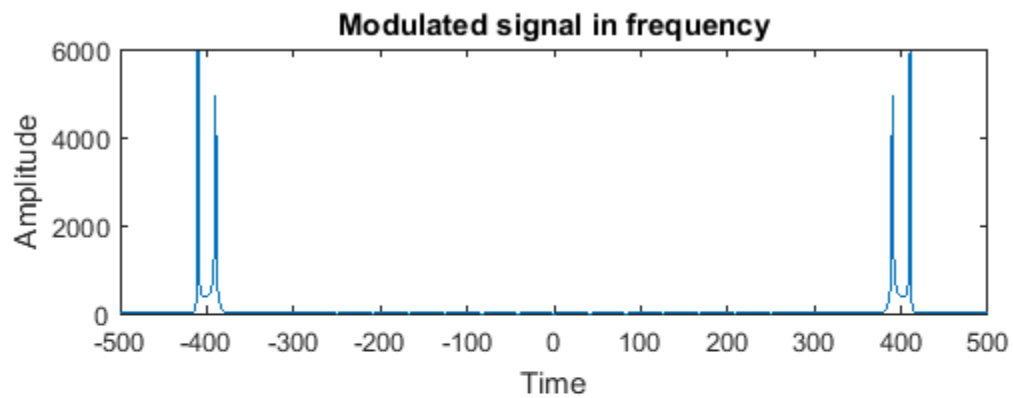
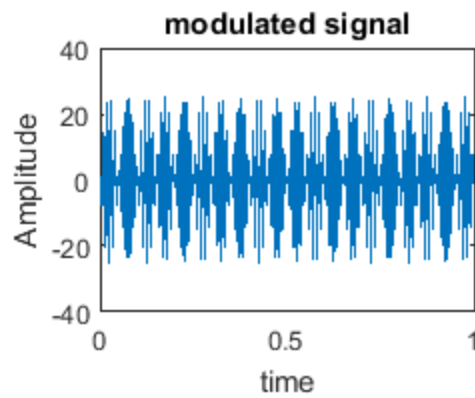
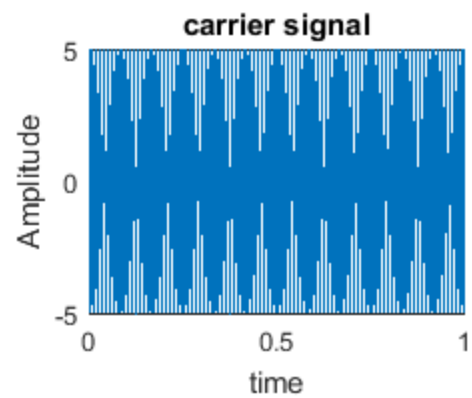
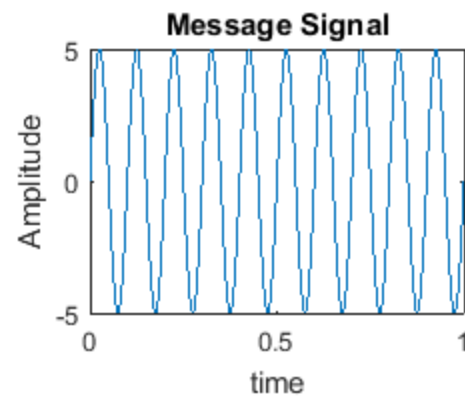
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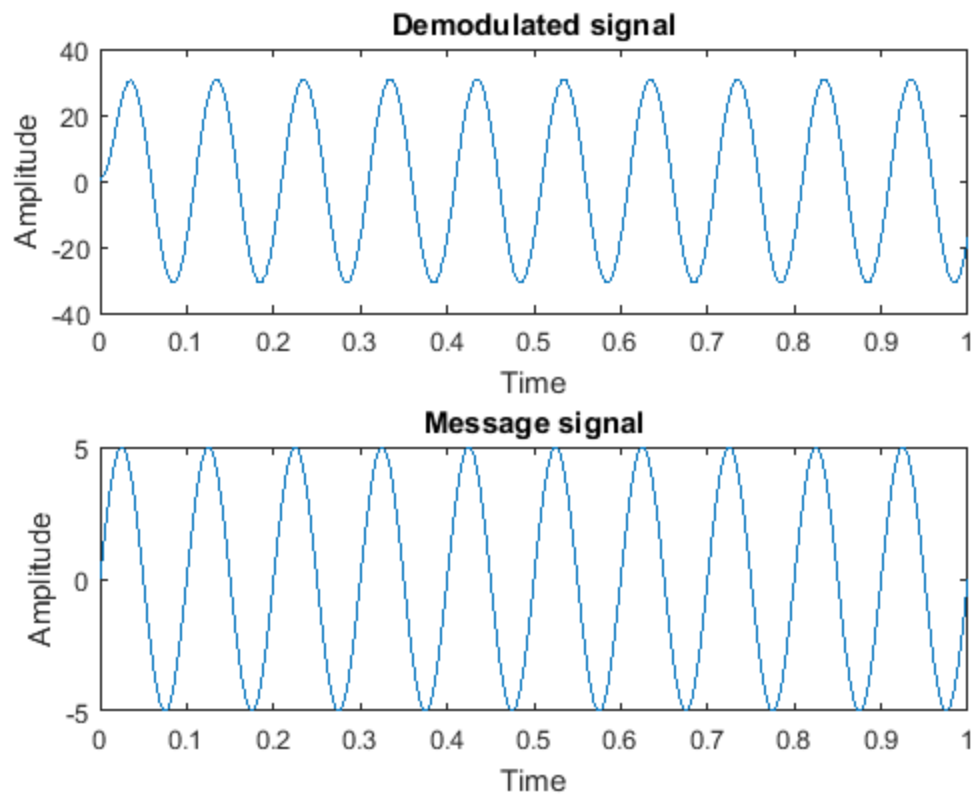
```
mh = -Am*cos(2*pi*fm*t);
ch=  Ac*sin(2*pi*fc*t);
xu = 0.5*( (m.*c) - (mh.*ch));
XU = fft(xu,N);
subplot(2,1,2);
%hold on;
plot(f,abs(XU),'r');
title('Upper Side Band of modulated signal in frequency');
xlabel('Time');
ylabel('Amplitude');

%demodulation
d=xu.*c;
w=0.05;
[num,dem]=butter(2,w);
Y=filter(num,dem,d);
figure(3)

subplot(2,1,1);
plot(t,Y);

title('Demodulated signal');
xlabel('Time');
ylabel('Amplitude');
subplot(2,1,2);
plot(t,m);
title('Message signal');
xlabel('Time');
ylabel('Amplitude');
```





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