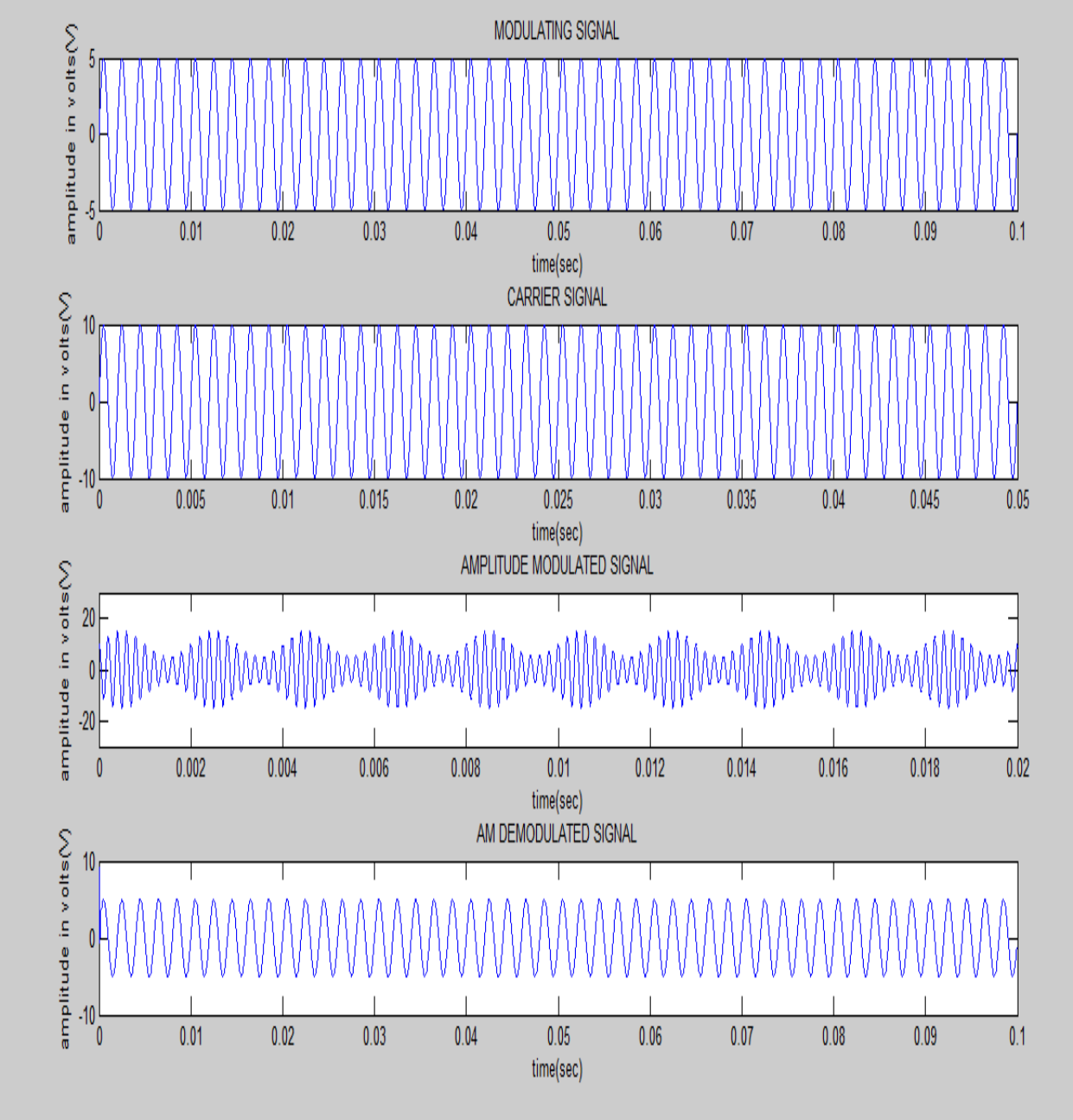
1. AMPLITUDE MODULATION& DEMODULATION

PROGRAM:

```
clc;
clear all;
close all;
t=0:0.01:2;
fc=50;
fm=5;
m=cos (2*pi*fm*t);
subplot (6,1,1);
plot (t, m);
title ('message signal');
c=cos(2*pi*fc*t);
subplot (6,1,2);
plot (t, c);
title ('carrier signals');
m1=0.5;
```

```
s1=(1+(m1*m)).*c;
subplot (6,1,3),
plot (t, s1);
title ('under modulation');
m2=1;
s2=(1+(m2*m)). *c;
subplot (6,1,4);
plot (t, s2);
title ('Perfect modulation'
m3=1.5;
s3=(1+(m3*m)).*c;
subplot (6,1,5);
plot (t, s3);
title (' Over modulation');
s5=s2. *c;
[b, a] =butter (5,0.1);
s4=filter (b, a, s5);
subplot (6,1,6);
plot (t, s4);
title ('demodulation');
```

OUTPUT WAVEFORM OF AM:



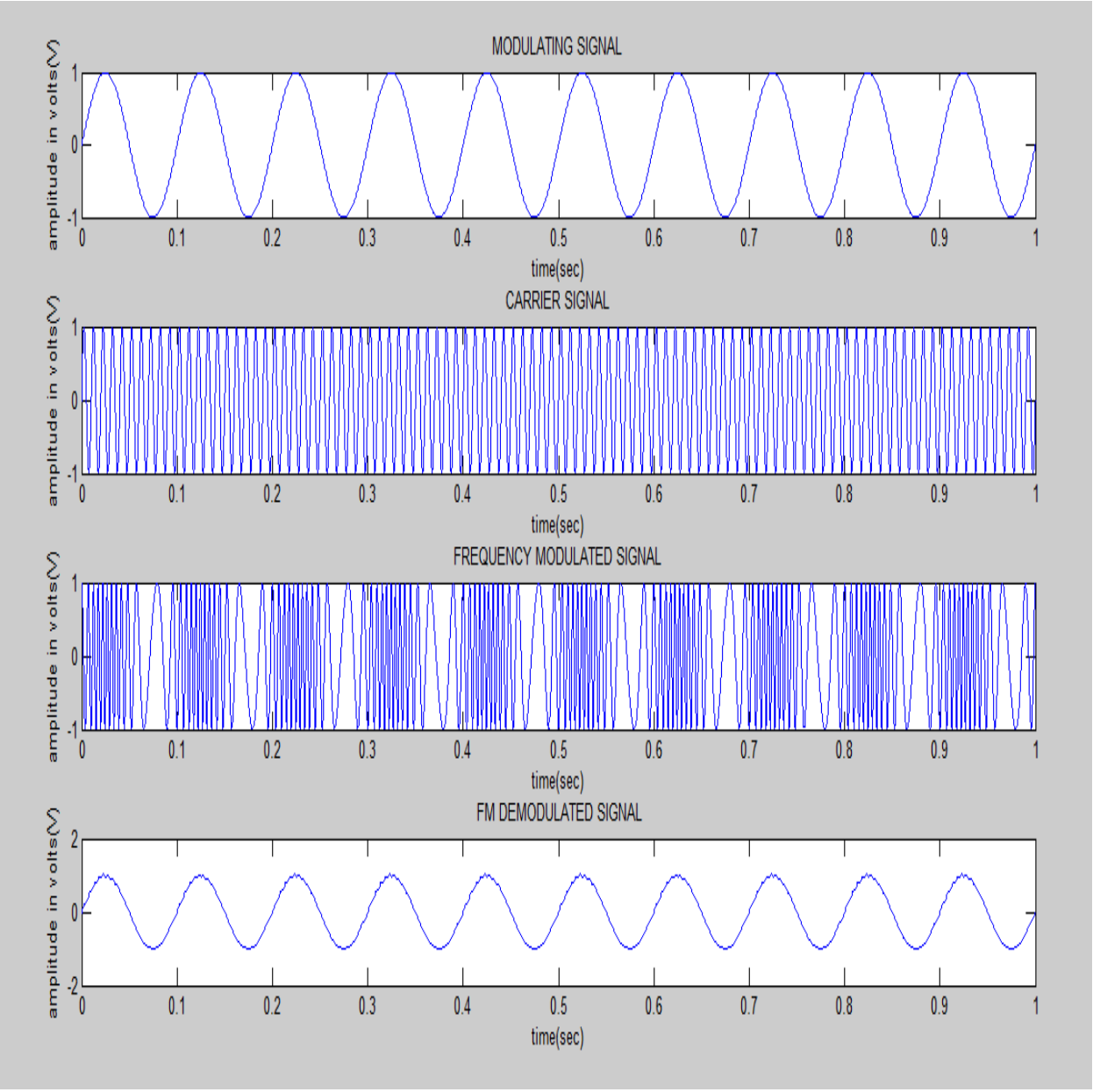
2.FREQUENCY MODULATION& DEMODULATION

PROGRAM:

```
clc;
clear all;
close all;
t = 0:0.001:4;
f1=1;
m = cos(2*pi*f1*t);
subplot (4,1,1);
plot (t, m);
xlabel('time');
ylabel('amplitude ');
title ('message signal');
f2=30;
c=cos(2*pi*f2*t);
subplot (4,1,2);
```

```
plot (t, c);
 xlabel ('time');
ylabel ('amplitude);
title ('CARRIER SIGNAL');
B=20;
 s=cos((2*pi*f2*t) +B*sin(2*pi*f1*t));
subplot (4,1,3);
plot (t, s);
title ('FREQUENCY MODULATED SIGNAL');
x=diff(s);
y=abs(x);
[b, a] =butter (10,0.033);
s1=filter (b, a, y);
subplot (4,1,4);
plot(s1);
title (' FREQUENCY DEMODULATED SIGNAL');
```

OUTPUT WAVEFORM OF FM:

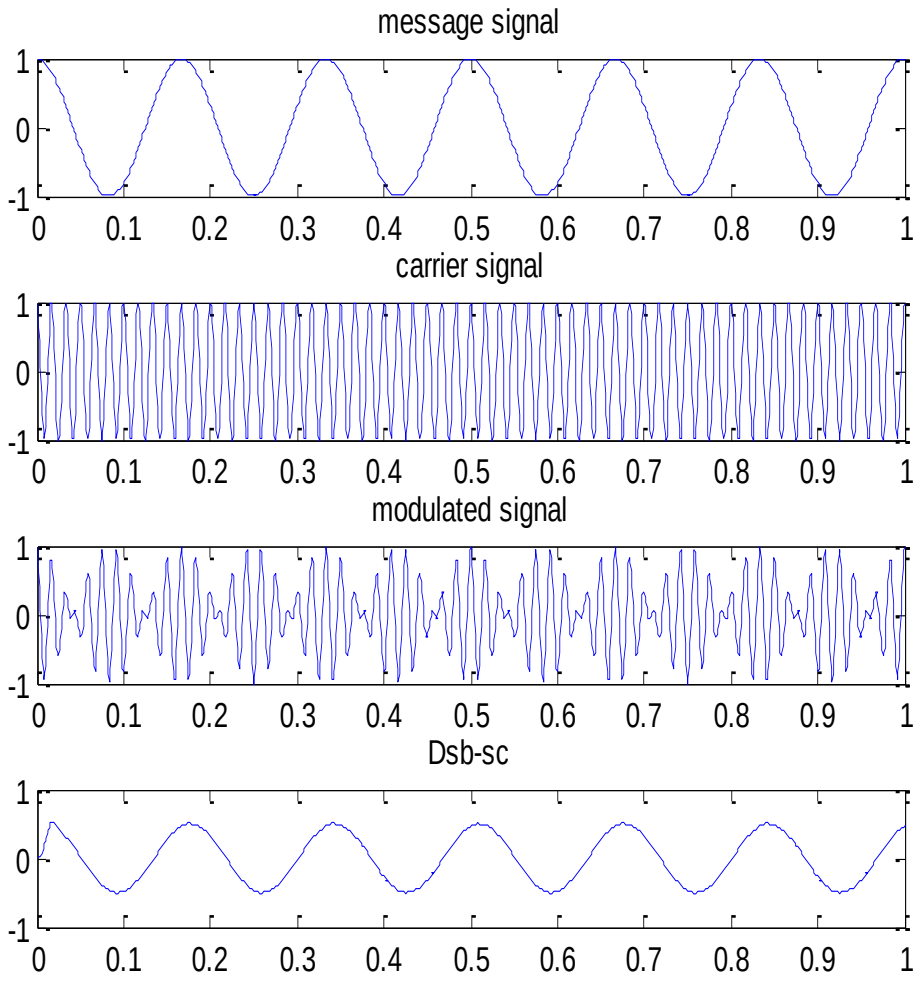


DSB_SC MODULATOR & DEMODULATOR

PROGRAM:

```
clc;
clear all;
close all;
t=0:0.001:1;
f1=6;
m=cos(2*pi*f1*t);
subplot(4,1,1);
plot(t,m);
title('message signal');
f2=60;
c=cos(2*pi*f2*t);
subplot(4,1,2);
plot(t,c);
title('carrier signal');
s=m.*c;
subplot(4,1,3);
plot(t,s);
title('modulated signal');
s1=s.*c;
[b,a]=butter(5,0.1);
s2=filter(b,a,s1);
subplot(4,1,4);
plot(t,s2);
title('Dsb_sc');
```

OUTPUT WAVEFORM OF DSB_SC:



SSB-SC MODULATOR & DETECTOR

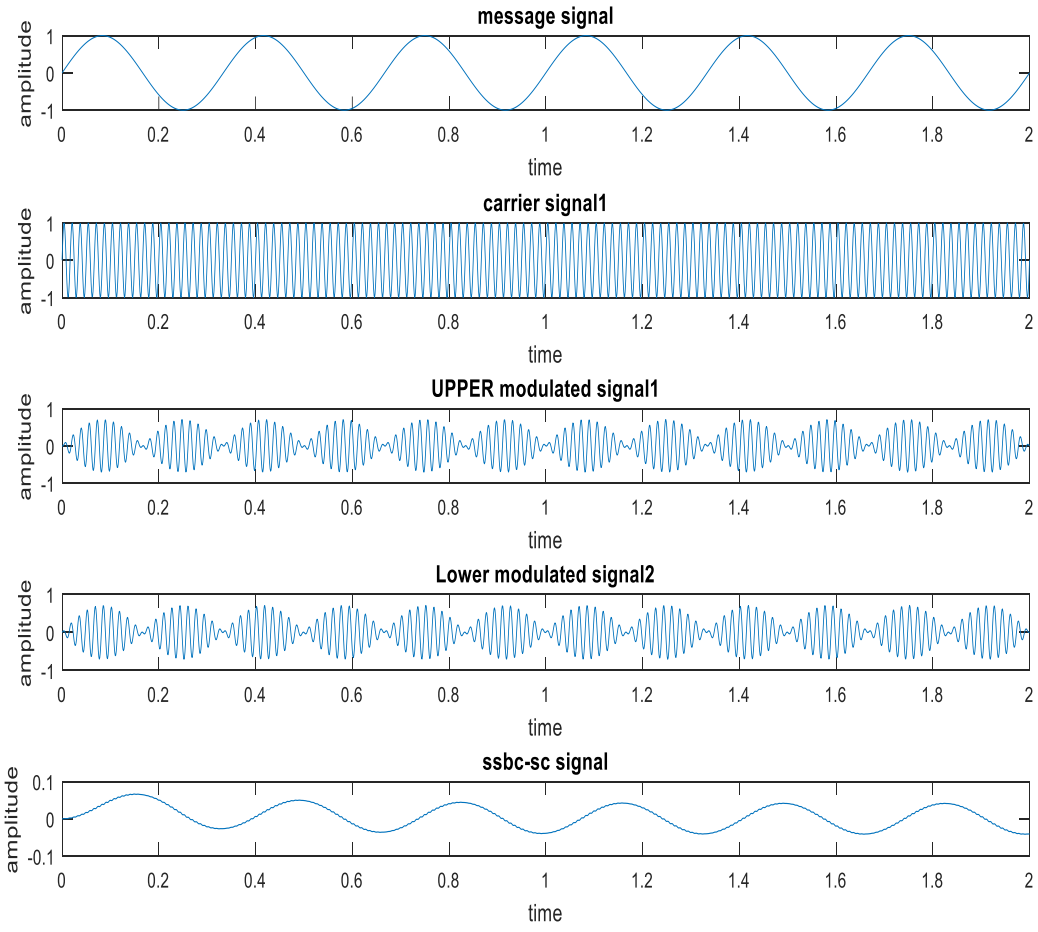
PROGRAM:

```
clc;
close all;
clear all;
t=0:0.001:2;
f1=3;
m1=sin(2*pi*f1*t);
m2=hilbert(m1);
subplot(4,1,1);
plot(t,m1);
xlabel('time');
ylabel('amplitude');
title('message signal');
f2=60;
c1=sin(2*pi*f2*t);
c2= cos(2*pi*f2*t);
subplot(4,1,2);
plot(t,c1);
xlabel('time');
```

```
ylabel('amplitude');
title('carrier signal');
s=0.5*m1.*c1-0.5*m2.*c2;
subplot(4,1,3);
plot(t,s);
xlabel('time');
ylabel('amplitude');
title('Upper modulated signal');
x=0.5*m1.*c1+0.5*m2.*c2;
subplot(4,1,3);
plot(t,x);
xlabel('time');
ylabel('amplitude');
title('Lower modulated signal');
s1=s.*c1;
[b,a]=butter(1,0.001);
s2=filter(b,a,s1);
subplot(4,1,4);
plot(t,s2);
xlabel('time');
```

```
ylabel('amplitude');
title('ssb-sc signal');
```

OUTPUT WAVEFORM OF SSBC-SC:



GENERATION & DETECTION OF FREQUENC DIVISION MULTIPLEXING (FDM)

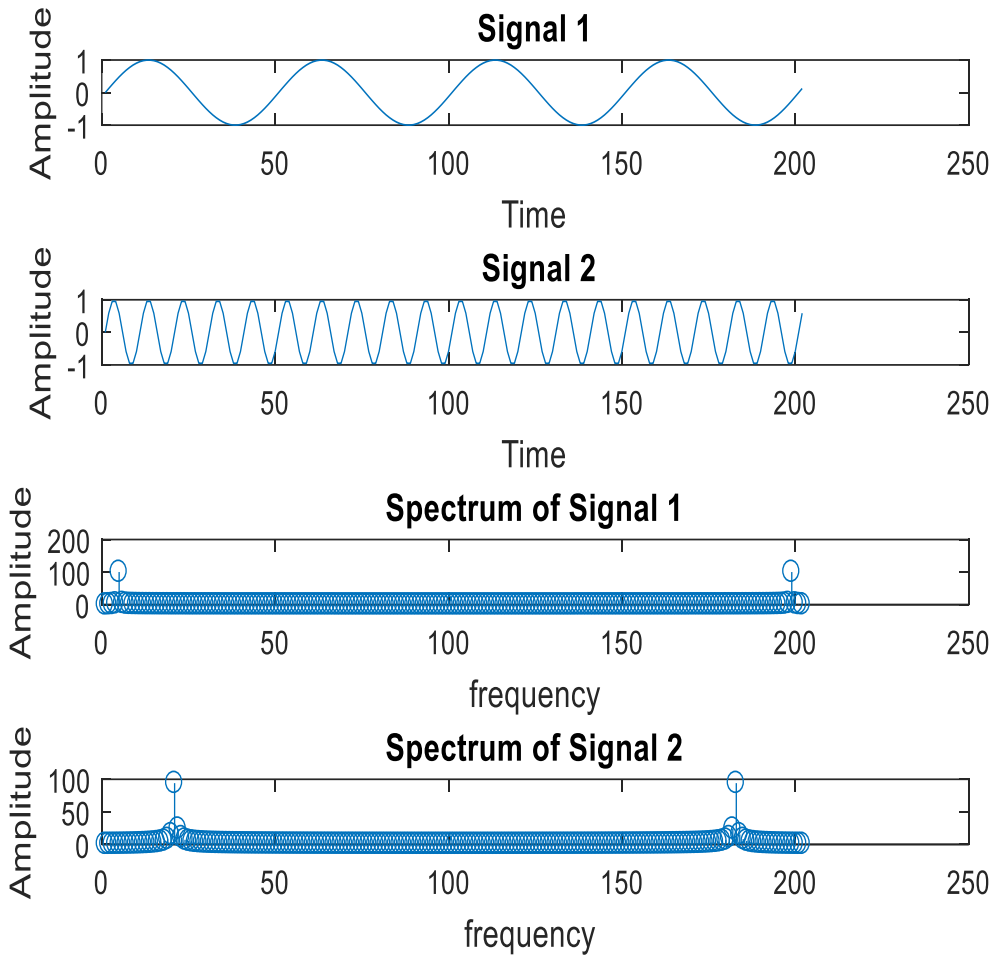
PROGRAM:

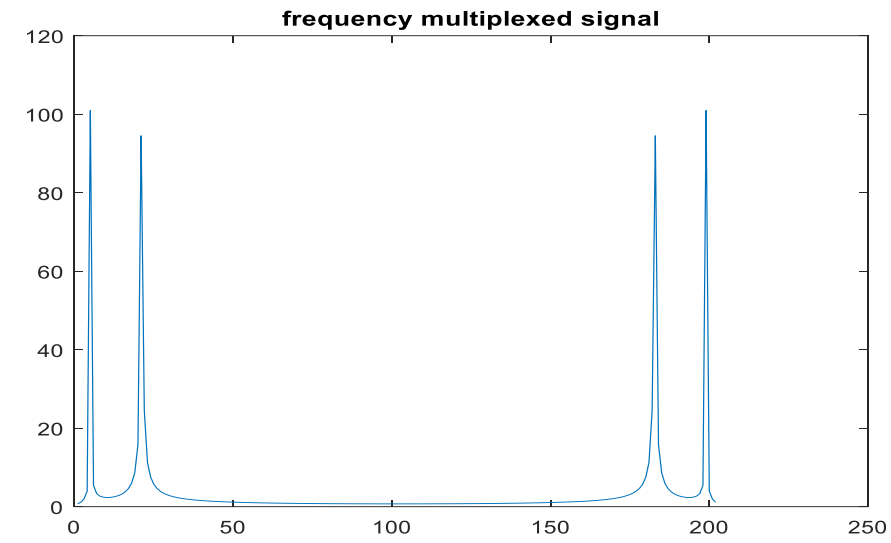
```
clc;
close all;
clear all;
fs=100;
t=(0:2*fs+1)/fs;
x1=sin(2*pi*2*t);
z1=fft(x1);
z1=abs(z1);
x2=sin(2*pi*10*t);
z2=fft(x2);
z2=abs(z2);
figure;
subplot(4,1,1);
plot(x1);
title('Signal 1');
ylabel('Amplitude');
xlabel('Time');
subplot (4,1,2);
```

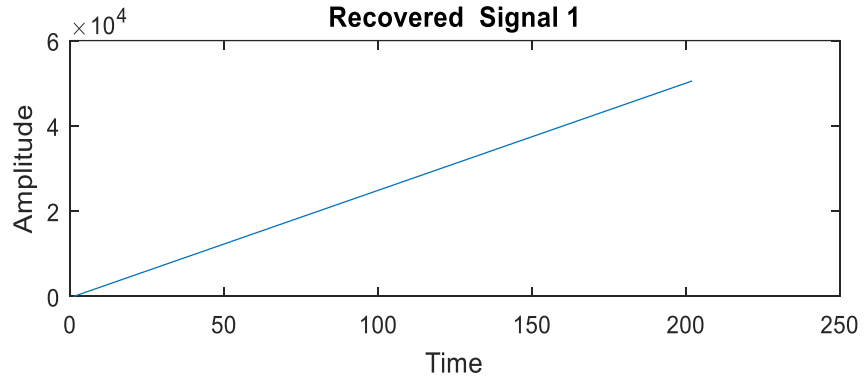
```
 plot(x2);
 title(' Signal 2');
 ylabel('Amplitude');
xlabel('Time');
subplot (4,1,3);
 stem(z1);
title('Spectrum of Signal 1');
 ylabel('Amplitude');
 xlabel('frequency');
 subplot(4,1,4);
 stem(z2);
 title('Spectrum of Signal 2');
 ylabel('Amplitude');
 xlabel('frequency ');
z=z1+z2;
figure;
plot(z);
title('frequency multiplexed signal');
figure;
f1=[ones(10,1);zeros(182,1);ones(10,1)];
dz1=z *f1;
```

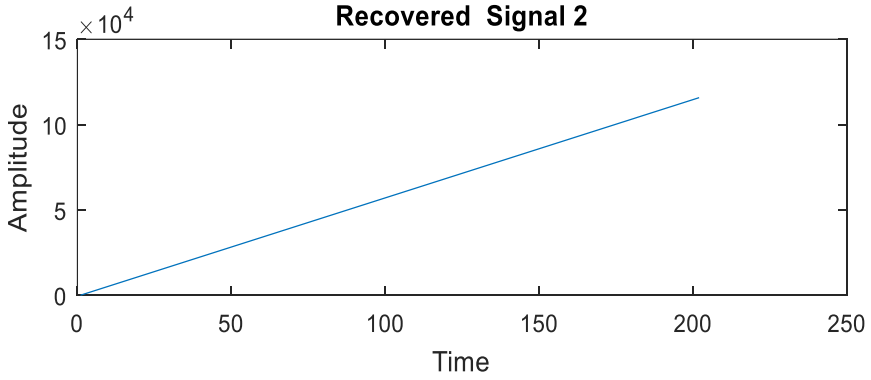
```
d1=ifft(dz1);
subplot (2,1,1)
 plot(t*100*d1);
title('Recovered  Signal 1');
 ylabel('Amplitude');
 xlabel('Time');
 f2=[zeros(10,1);ones(182,1); zeros(10,1)];
 dz2=z*f2;
 d2=ifft(dz2);
subplot(2,1,2)
 plot(t*100*d2);
title('Recovered  Signal 2');
 ylabel('Amplitude');
 xlabel('Time');
```

OUTPUT WAVEFORM OF FDM:




frequency multiplexed signal
120
100
80
60
40
20
0
0
50
100
150
200
250


Recovered Signal 1
×10^4
6
4
2
0
Amplitude
0
50
100
150
200
250
Time


Recovered Signal 2
×10^4
15
10
5
0
Amplitude
0
50
100
150
200
250
Time

TIME DIVISION MULTIPLEXING&DEMULTIPLEXING (TDM)

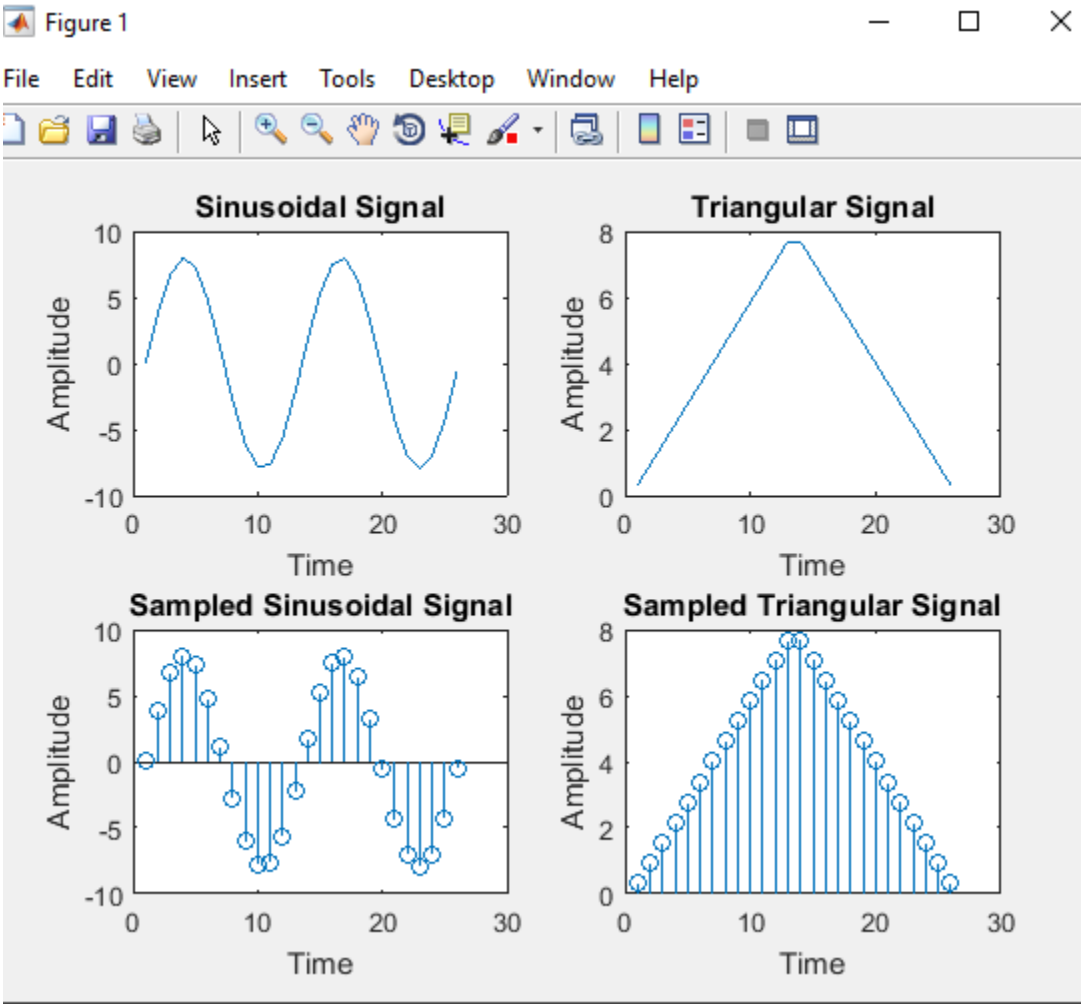
PROGRAM:

```
clc;
close all;
clear all;
x=0:0.5:4*pi;
sig1=8*sin(x);
L=length(sig1);
sig2=8*triang(L);
subplot(2,2,1);
plot(sig1);
title('Sinusoidal Signal');
 ylabel('Amplitude');
 xlabel('Time');
subplot(2,2,2);
plot(sig2);
 title('Triangular Signal');
 ylabel('Amplitude');
xlabel('Time');
```

```
subplot(2,2,3);
 stem(sig1);
title('Sampled Sinusoidal Signal');
 ylabel('Amplitude');
 xlabel('Time');
 subplot(2,2,4);
 stem(sig2);
 title('Sampled Triangular Signal');
 ylabel('Amplitude');
 xlabel('Time');
 L1=length(sig1);
L2=length(sig2);
for i=1:L1
sig(1,i)=sig1(i);
sig(2,i)=sig2(i);
end
tdmsig=reshape(sig,1,2*L1);
figure
stem(tdmsig);
```

```
ylabel('Amplitude');
 xlabel('Time');
 title('tdmsignal');
demux=reshape(tdmsig,2,L1);
 for i=1:L1
 sig3(i)=demux(1,i);
sig4(i)=demux(2,i);
 end
  figure
 subplot(2,1,1);
 plot(sig3);
title('Recovered Sinusoidal Signal');
 ylabel('Amplitude');
 xlabel('Time');
 subplot(2,1,2);
 plot(sig4);
 title('Recovered Triangular Signal');
 ylabel('Amplitude');
 xlabel('Time');
```

OUTPUT WAVE FORM OF TDM:



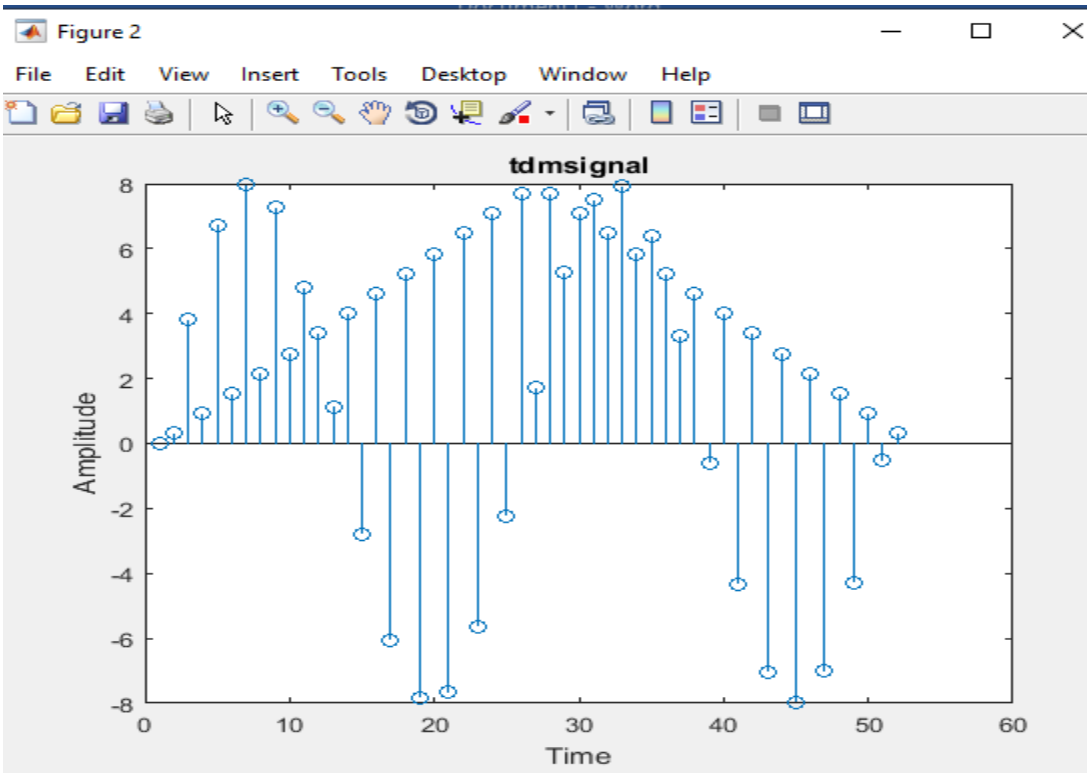


Figure 2
File Edit View Insert Tools Desktop Window Help
tdmsignal
Amplitude
Time
8
6
4
2
0
-2
-4
-6
-8
0
10
20
30
40
50
60

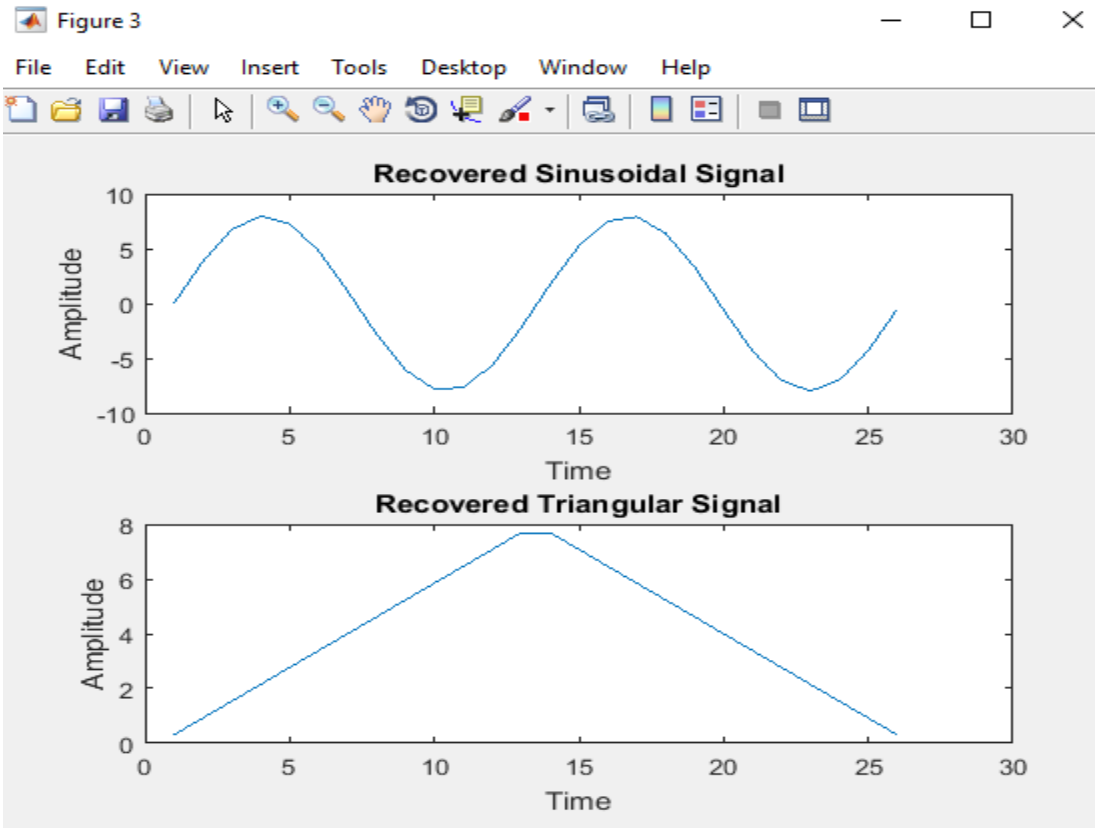


Figure 3
File Edit View Insert Tools Desktop Window Help
Recovered Sinusoidal Signal
Amplitude
Time
10
5
0
-5
-10
0
5
10
15
20
25
30
Recovered Triangular Signal
Amplitude
Time
8
6
4
2
0
0
5
10
15
20
25
30

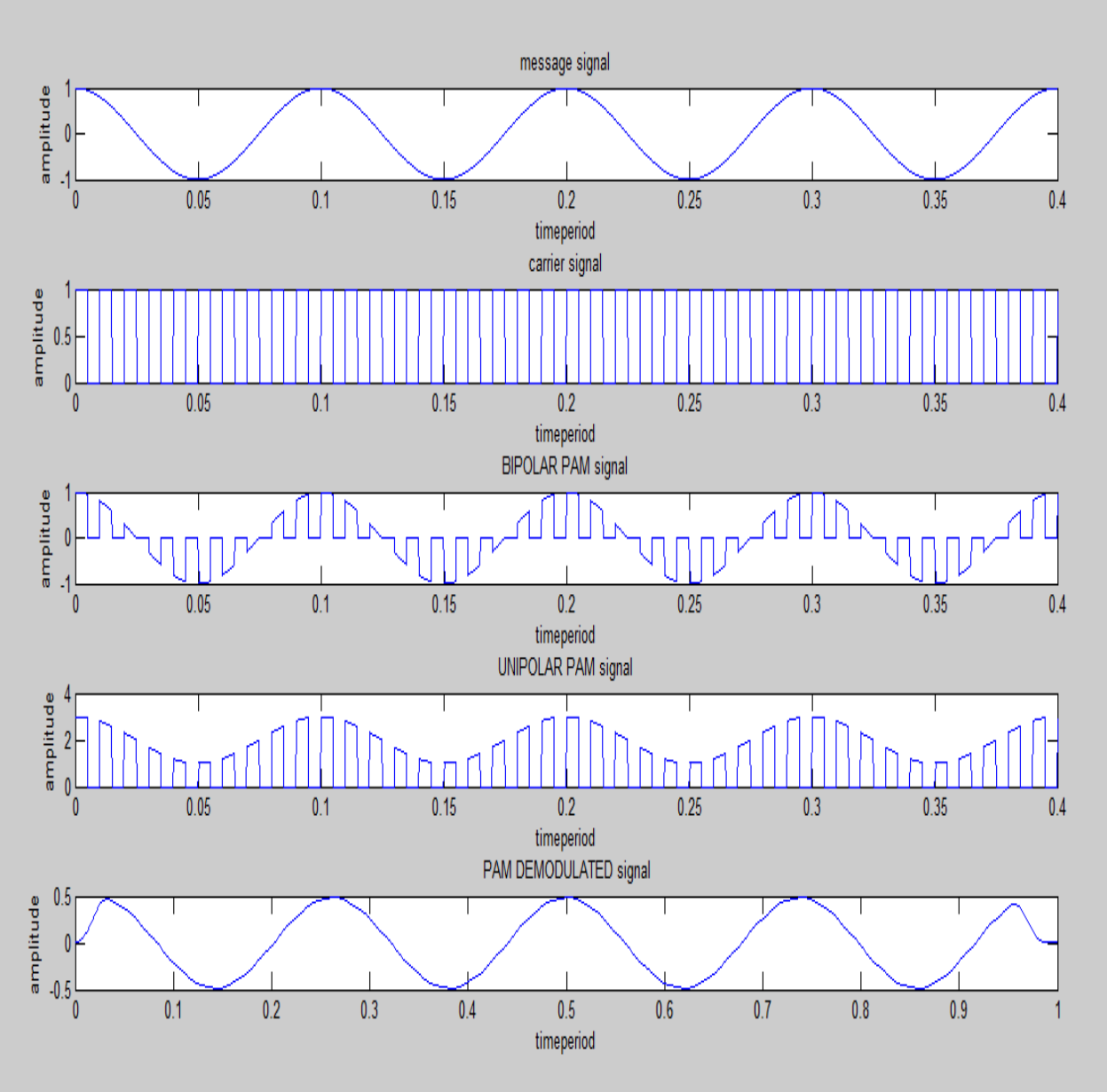
PAM GENERATION &DETECTION

PROGRAM:

```
clc;
clear all;
close all;
fc=100;
fm=fc/10;
fs=100*fc;
t=0:1/fs:4/fm;
mt=cos(2*pi*fm*t);
ct=0.5*square(2*pi*fc*t)+0.5;
st=mt.*ct;
tt=[ ];
for i=1:length(st);
    if st(i)==0;
tt=[tt,st(i)];
else
tt=[tt,st(i)+2]; end
end
figure(1)
subplot(4,1,1);
plot(t,mt);
title('message signal');
xlabel('time period');
ylabel('amplitude');
subplot(4,1,2);
plot(t,ct);
```

```
title('carrier signal');
xlabel('time period');
ylabel('amplitude');
subplot(4,1,3);
plot(t,st);
title('modulated signal of double side band');
xlabel('time period');
ylabel('amplitude');
subplot(4,1,4);
plot(t,tt);
title('PAM of single side band');
xlabel('time period');
ylabel('amplitude');
[b,a]=butter(2,0.0002);
s1=filter(b,a,st);
subplot(4,1,4);
plot(t,s1);
title('demodulated  PAM');
xlabel('time period');
ylabel('amplitude');
```

OUTPUT WAVEFORMS OF PAM:



GENERATION AND DETECTION OF PULSE WIDTH MODULATION

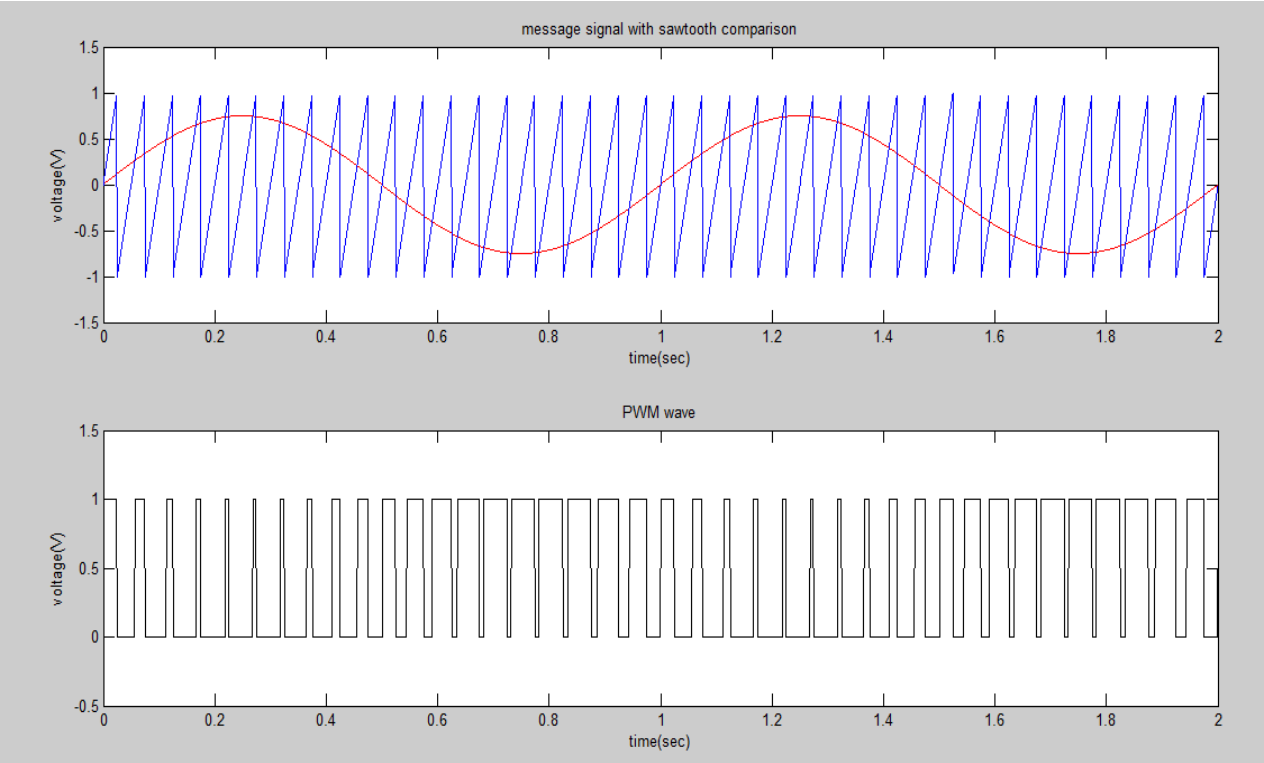
PROGRAM:

```
clc;
clear all;
 close all;
 t=0:0.001:2;
s=sawtooth(2*pi*10*t+ pi);
 m=0.75*sin(2*pi*1*t);
 n=length(s);
for i=1: n;
if (m(i)>=s(i))
 pwm (i)=0;
else if (m(i)<=s(i))
 pwm (i)=1;
end
  end

    end
 subplot (2,1,1);
 plot (t, m,'r', t, s,'b');
 axis ([0 2  -1.5 1.5]);
 title ('message signal with sawtooth comparison');
 xlabel ('time(sec)');
 ylabel ('voltage(V)');
 subplot (2,1,2);
 plot (t, pwm,'k');
```

```
axis([0 2 -0.5 1.5]);
title ('PWM wave');
xlabel ('time(sec)');
ylabel ('voltage(V)');
```

OUTPUT WAVEFORM OF PWM:



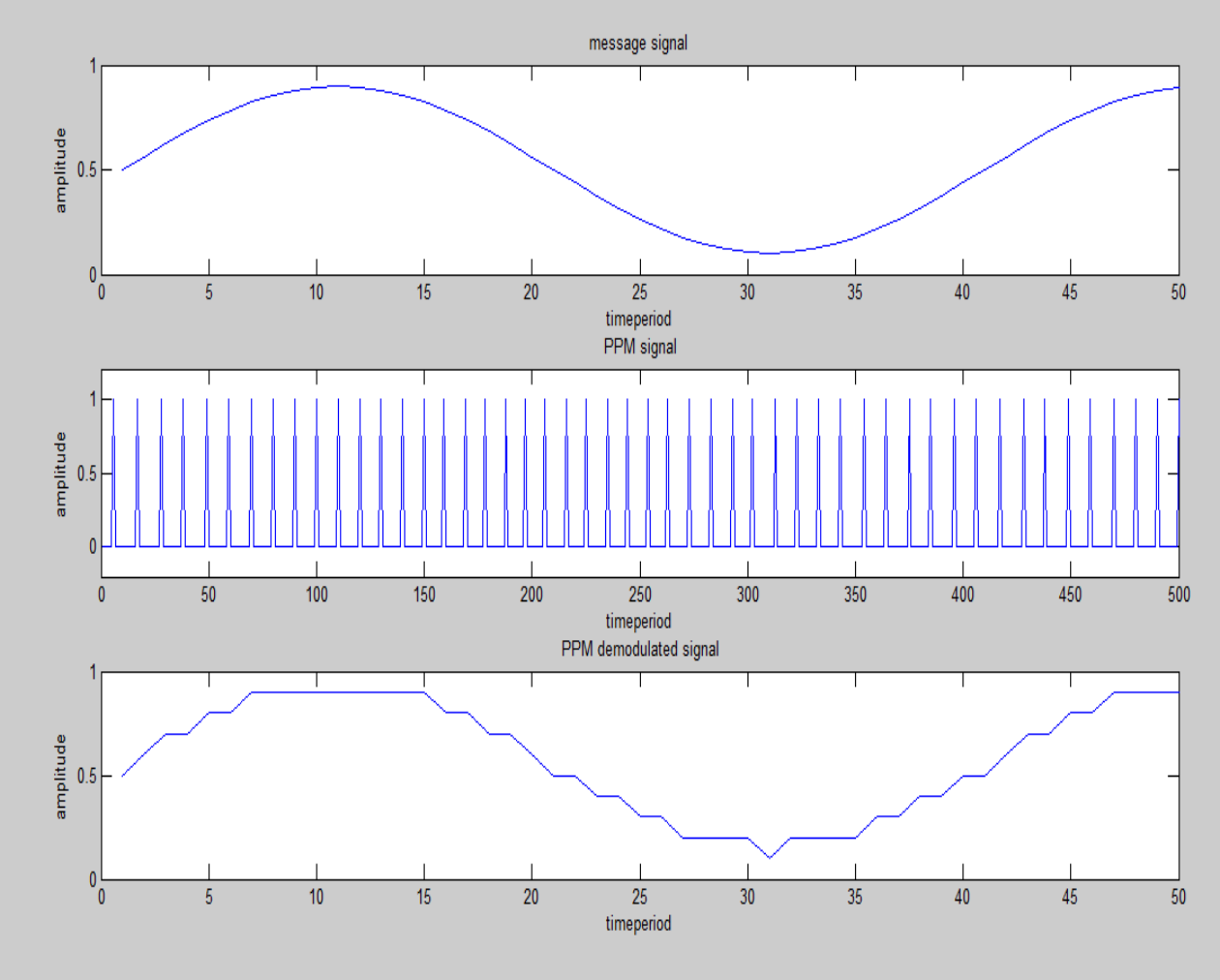
GENERATION AND DETECTION OF PULSE POSITION MODULATION

PROGRAM:

```
clc;
clear all;
close all;
fc=1000;
fs=10000;
fm=200;
t=0:1/fs:(2/fm-1/fs);
m=0.4*sin(2*pi*fm*t) +0.5;
s=modulate (m, fc ,fs, 'PPM');
d=demod (s, fc, fs, 'PPM');
figure
subplot (3,1,1);
 plot (m);
title ('message signal');
xlabel ('time period');
 ylabel ('amplitude');
axis ([0 50 0 1]);
subplot (3,1,2);
plot(s);
title (‘ppm modulated signal’);
```

```
xlabel ('time period');
ylabel ('amplitude');
axis ([0 500 -0.2 1.2]);
subplot (3,1,3);
plot(d);
title (‘demodulated signal’);
xlabel ('time period');
ylabel ('amplitude');
```

OUTPUT WAVEF0RM OF PPM:

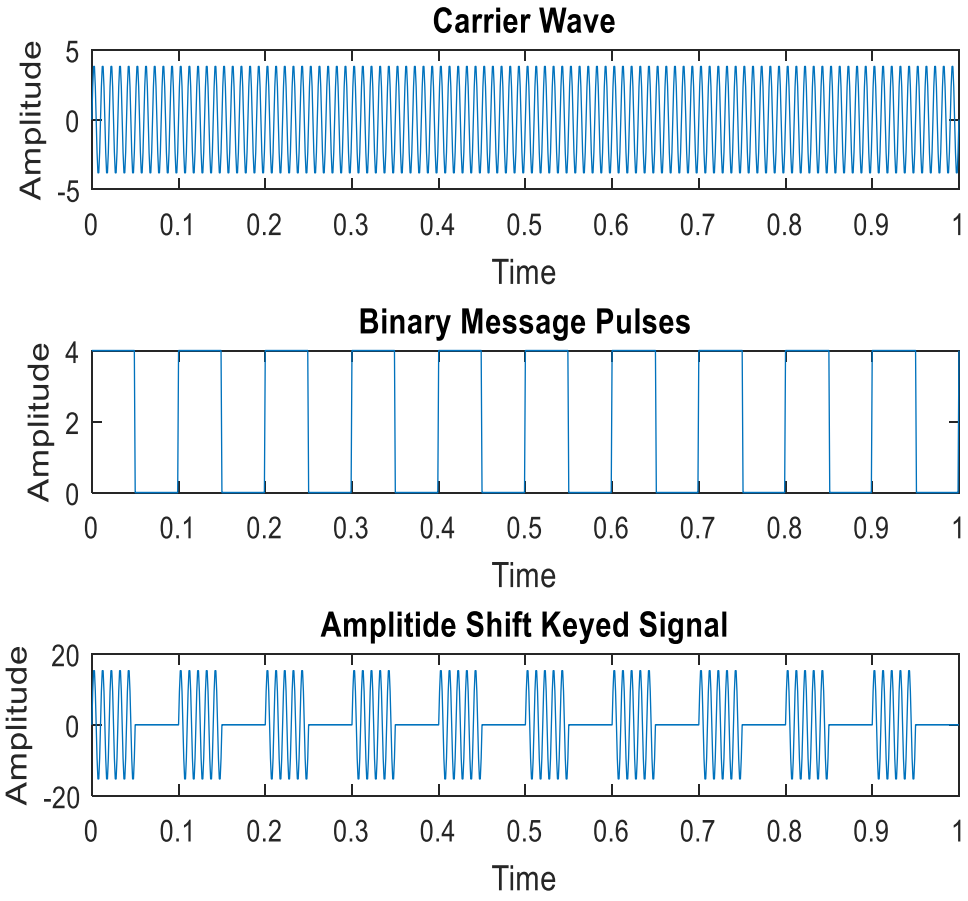


GENERATION & DETECTION OF AMPILITUDE SHIFT KEYING (ASK)

PROGRAM:

```
clc;
close all;
clear all;
fc=100;
fp=10;
amp=4;
t=0:0.001:1;
c=amp.*sin(2*pi*fc*t);
subplot(3,1,1);
plot(t,c);
xlabel('Time');
ylabel('Amplitude');
title('Carrier Wave');
m=amp/2.*square(2*pi*fp*t)+(amp/2);
subplot(3,1,2);
plot(t,m);
xlabel('Time');
ylabel('Amplitude');
title('Binary Message Pulses');
w=c.*m;
subplot(3,1,3);
plot(t,w);
xlabel('Time');
ylabel('Amplitude');
title('Amplitude Shift Keyed Signal');
```

OUTPUTWAVE FORM OF ASK:



GENERATION & DETECTION OF FREQUENCY SHIFT KEYING

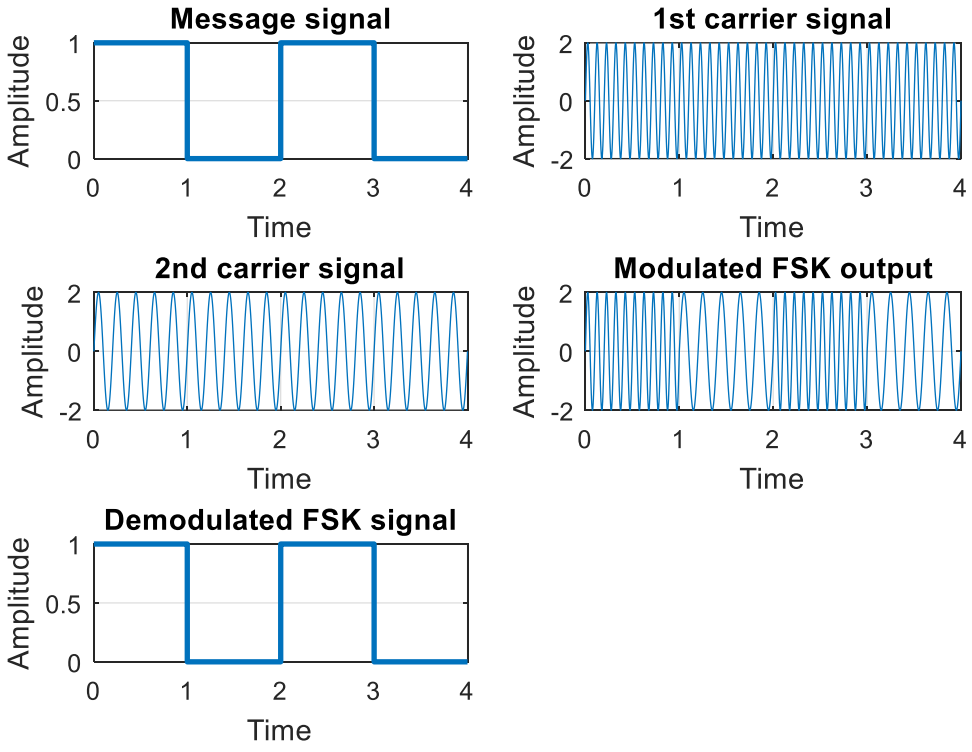
PROGRAM:

```
clc;
close all;
clear all;
n=[1 0 1 0];
N=length(n);
fs = 1000*N;
t=0:1/fs:N;
N1=length(t);
i=1;
for j=1:N1
if t(j)<=i
x(j)=n(i);
else
i=i+1;
end
end
figure(1);
subplot(3,2,1);
plot(t,x,'Linewidth',2);
title('Message signal');
xlabel('Time');
ylabel('Amplitude');
grid on
a=2;
f1=10;
f2=5;
x1=a*sin(2*pi*f1*t);
```

```
subplot(3,2,2);
plot(t,x1);
title('1st carrier signal');
xlabel('Time');
ylabel('Amplitude');
grid on
x2=a*sin(2*pi*f2*t);
subplot(3,2,3);
plot(t,x2);
title('2nd carrier signal');
xlabel('Time');
ylabel('Amplitude');
grid on
for j=1:N1
if x(j)==1
y1(j)=x1(j);
else
y1(j)=x2(j);
end
end
subplot(3,2,4);
plot(t,y1);
title('Modulated FSK output');
xlabel('Time');
ylabel('Amplitude');
grid on
for j=1:N1
if y1(j)==x1(j)
y2(j)=1;
else
y2(j)=0;
```

```
end
end
subplot(3,2,5);
plot(t,y2,'Linewidth',2);
title('Demodulated FSK signal');
xlabel('Time');
ylabel('Amplitude');
grid on
```

OUTPUT WAVE FORMS OF FSK:



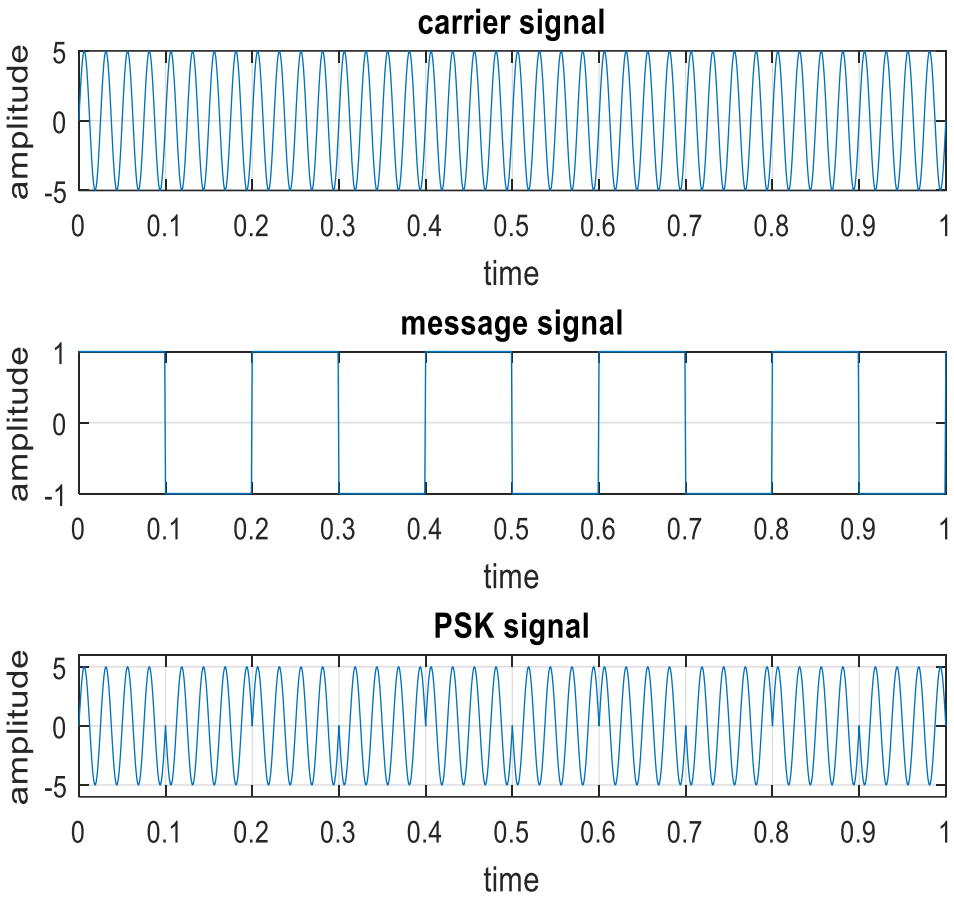
GENERATION & DETECTION OF BINARY PHASE SHIFT KEYING (BPSK)

PROGRAM:

```
clc;
clear all;
close all;
f1=40;
f2=5;
A=5;
t=0:0.001:1;
x=A.*sin(2*pi*f1*t);
subplot(3,1,1);
plot(t,x);
xlabel('time');
ylabel('amplitude');
title('carrier signal')
grid on;
u=square(2*pi*f2*t);
subplot(3,1,2);
plot(t,u);
xlabel('time');
ylabel('amplitude');
title('message signal')
grid on;
v=x.*u;
subplot(3,1,3);
plot(t,v);
```

```
axis([0 1 -6 6]);
xlabel('time');
ylabel('amplitude');
title('PSK signal')
grid on;
```

OUTPUT WAVE FORM OF BPSK:



GENERATION & DETECTION OF QUADRATURE PHASE SHIFT KEYING

PROGRAM:

```
clc;
clear all;
close all;
t=0:0.001:1;
fs=5;
f1=20;
f2=10;
a=8*square(2*pi*fs*t);
subplot(3,2,1);
plot(t,a);
xlabel('time');
ylabel('amplitude');
title('square wave')
grid on;
b=5*sin(2*pi*f1*t);
subplot(3,2,2);
plot(t,b);
xlabel('time');
ylabel('amplitude');
title('message signal of phase zero')
grid on;
c=5*sin(2*pi*f2*t+90);
subplot(3,2,3);
plot(t,c);
```

```
xlabel('time');
ylabel('amplitude');
title('message signal of phase 90 degree')
grid on;
n=length(a);
for i=1:n
    if( a(i)>= 1)
        bpsk(i)=b(i);
    elseif ( a(i)<= 1)
        bpsk(i)=c(i);
        end
end
    subplot(3,2,4);
plot(t,bpsk,'k',t,a,'r');
xlabel('time');
ylabel('amplitude');
title('phase shift keying signal')
grid on;
```

OUTPUT WAVEFORM OF QPSK: