Phase Modulated Signal:

Let, modulating voltage be given by,

$$v_{\mathrm{m}} = V_m \; \mathrm{Cos} \; \omega_m \mathrm{t}$$

Let, the carrier voltage is given by,

$$v_{\mathrm{c}} = V_c \; Cos(\omega_c \mathrm{t} + \theta)$$

So, the phase modulated wave is given by,

$$s(t) = A_c \; Cos[2\pi f_c t + K_p v_{\mathrm{m}} \,]$$

Code in Matlab:

```
clear all;
clc;
t=0:0.001:1;
Am=1;
fm=2;
Ac=1;
fc=50;
kp=20;
Wm=2*pi*fm;
m=Am*cos(Wm*t);
subplot(3,1,1);
plot(t,m);
title('Message Input Signal');
xlabel('Time');
ylabel('Amplitude');
Wc=2*pi*fc;
c=Ac*cos(Wc*t);
subplot(3,1,2);
plot(t,c);
title('Carrier Signal');
xlabel('Time');
ylabel('Amplitude');
s_pm=Ac*cos(Wc*t+m.*kp);
subplot(3,1,3);
plot(t,s_pm);
title('Phase Modulated Signal');
xlabel('Time');
ylabel('Amplitude');
```

Output: