Experiment–5

Aim:

To visualise Frequency Modulation and Phase Modulation using MATLAB.

Description:

MATLAB software with essential configurations.

Theory:

Frequency Modulation (FM) and Phase Modulation (PM) are two important forms of angle modulation, where the angle (phase) of the carrier signal is varied according to the message signal, while the amplitude remains constant. Both techniques offer advantages such as better noise immunity and efficient use of power, making them widely used in radio broadcasting, telecommunications, and digital communication systems.

Code:

```
%to visualize the fm and phase modulation using matlab
clear all
clc
t=0:0.01:10;
Am=input('Enter Message Signal Amplitude(Am) = ');
fm=input('Enter Message Signal Frequency(fm) = ');
Ac=input('Enter Carrier Signal Amplitude(Ac) = ');
fc=input('Enter Carrier Signal Frequency(fc) = ');
kf=input('Frequency Sensitivity(kf) = ');
kp=input('Phase Sensitivity(kp) = ');
wm=2*pi*fm;
m=Am*cos(wm*t);
subplot(2,2,1)
plot(t, m);
hold on
title('Message Signal');
xlabel('Time (s)');
ylabel('Amplitude');
wc=2*pi*fc;
c=Ac*cos(wc*t);
subplot(2,2,2)
plot(t, c);
hold on
title('Carrier Signal');
xlabel('Time (s)');
ylabel('Amplitude');
s_fm = Ac*cos(wc*t + 2*pi*kf*cumsum(m));
subplot(2,2,3)
plot(t, s_fm);
hold on
```

```
title('FM Modulated Signal');
xlabel('Time (s)');
ylabel('Amplitude');
s_pm = Ac*cos(wc*t + kp*m);
subplot(2,2,4)
plot(t, s_pm);
hold on
title('PM Modulated Signal');
xlabel('Time (s)');
ylabel('Amplitude');
sgtitle('Sujal Singh (04119051723)')
```

Output: