Experiment–9

Aim:

To study Pulse Position Modulation and Demodulation technique using MATLAB software.

Description:

MATLAB software with essential configurations.

Theory:

Pulse Position Modulation (PPM) is a pulse modulation technique in which the position of each pulse within a time slot is varied in accordance with the instantaneous amplitude of the message signal, while the pulse width and amplitude remain constant. The information is conveyed by the time shift of the pulse from its reference position. PPM offers better noise immunity compared to other pulse modulation methods but requires accurate synchronization at the receiver.

Code:

```
% Pulse Position Modulation (PPM)
close all; clear; clc;

fc = 100;          % Carrier frequency
fs = 1000;         % Sampling frequency
f1 = 80;           % Message frequency

t = 0:1/fs:((2/f1)-(1/fs));
x1 = 0.4 * cos(2*pi*f1*t) + 0.5;

% Modulation
y1 = modulate(x1, fc, fs, 'ppm');

subplot(3,1,1);
plot(x1);
axis([0 15 0 1]);
title('Original Signal (f1 = 80Hz, fs = 1000Hz)');
xlabel('Time (s)');
ylabel('Amplitude');

subplot(3,1,2);
plot(y1);
axis([0 250 -0.2 1.2]);
title('PPM Modulated Signal');
xlabel('Time (s)');
ylabel('Amplitude');

% Demodulation
x1_recover = demod(y1, fc, fs, 'ppm');
```

```
subplot(3,1,3);
plot(x1_recover);
axis([0 15 0 1]);
title('Recovered Signal (Single Tone, f1 = 80Hz)');
xlabel('Time (s)');
ylabel('Amplitude');
sgtitle('Sujal Singh (04119051723)')
```

Output: