Experiment–8

Aim:

To study Pulse Width modulation and demodulation technique using MATLAB software.

Description:

MATLAB software with essential configurations.

Theory:

Pulse Width Modulation (PWM) is a pulse modulation technique in which the width (duration) of each pulse is varied in proportion to the instantaneous amplitude of the message signal, while the pulse amplitude and position remain constant. The modulation conveys information through the changing duty cycle of the pulses. PWM is simple to generate and widely used in communication systems, motor speed control, and power electronics.

Code:

```
%pulse width modulation and demodulation
close all; clear; clc;

fc = 1000;          % Carrier frequency
fs = 10000;         % Sampling frequency
f1 = 200;           % 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, 'pwm');

subplot(3,1,1);
plot(x1);
axis([0 50 0 1]);
title('Original Signal (f1 = 200Hz, fs = 10000Hz)');
xlabel('Time (s)');
ylabel('Amplitude');

subplot(3,1,2);
plot(y1);
axis([0 50 -0.2 1.2]);
title('PWM Modulated Signal');
xlabel('Time (s)');
ylabel('Amplitude');

% Demodulation
x1_recover = demod(y1, fc, fs, 'pwm');
subplot(3,1,3);
```

```
plot(x1_recover);
axis([0 50 0 1]);
title('Recovered Signal (PWM Demodulated)');
xlabel('Time (s)');
ylabel('Amplitude');
sgtitle('Sujal Singh (04119051723)')
```

Output: