

# LAB-SIMULATION OF PULSE CODE MODULATION (PCM)

**ECE 416 – DIGITAL COMMUNICATION**

**Friday, 07 October 2022**

# OBJECTIVE

- To design, simulate the Pulse code modulation and demodulation system and display the waveforms.

# MATLAB CODE

```
clc; clear all;
f=2; %Maximum frequency of the signal
fs=20*f; % Sampling frequency
t=0:1/fs:1;
a=2; %Amplitude
x=a*sin(2*pi*f*t);
x1=x+a; %level shifting
q_op=round(x1); %Quantization
pcm=de2bi(q_op,'left-msb') %encode to PCM
disp(pcm)
deco=bi2de(pcm,'left-msb'); %Decode PCM value
xr=deco-a; % shift amplitude level to the original value
plot(t,x,'r- ',t,xr,'k+-');
xlabel('Amplitude');
ylabel('original Signal');
legend('original signal','Reconstructed Signal');
```

## PCM Output

pcm =

|   |   |   |
|---|---|---|
| 0 | 1 | 0 |
| 0 | 1 | 1 |
| 0 | 1 | 1 |
| 1 | 0 | 0 |
| 1 | 0 | 0 |
| 1 | 0 | 0 |
| 1 | 0 | 0 |
| 1 | 0 | 0 |
| 0 | 1 | 1 |
| 0 | 1 | 1 |
| 0 | 1 | 0 |
| 0 | 0 | 1 |
| 0 | 0 | 1 |
| 0 | 0 | 0 |
| 0 | 0 | 0 |
| 0 | 0 | 0 |
| 0 | 0 | 0 |
| 0 | 0 | 0 |
| 0 | 0 | 1 |
| 0 | 0 | 1 |
| 0 | 1 | 0 |
| 0 | 1 | 1 |
| 0 | 1 | 1 |
| 1 | 0 | 0 |

# ORIGINAL & RECONSTRUCTED WAVEFORMS

