**Experiment No: - 5**

Aim: To study modulation and demodulation of pulse code modulation (PCM).

clc;

close all;

clear all;

n=input('Enter n value for n-bit PCM system: ');

n1=input('Enter number of samples in a period: ');

L=2^n;

x=0:2\*pi/n1:4\*pi;

s=8\*sin(x);

subplot(3,1,1);

plot(s);

title('Analog signal');

ylabel('Amplitude--->')

xlabel('Time--->');

subplot(3,1,2);

stem(s);

grid on;

title('Sampled signal');

ylabel('Amplitude--->');

xlabel('Time--->');

vmax=8;

vmin=-vmax;

del=(vmax-vmin)/L;

part=vmin:del:vmax;

code=vmin-(del/2):del:vmax+(del/2);

[ind,q]=quantiz(s,part,code);

l1=length(ind);

l2=length(q);

for i = 1:l1

if(ind(i)~=0)

ind(i)=ind(i)-1;

end

i+1;

end

for i=l2

if(q(i)==vmin-(del/2))

q(i)=vmin+(del/2);

end

end

subplot(3,1,3);

stem(q);

grid on;

title('Quantized signal');

ylabel('Amplitude---->');

xlabel('Time--->');

figure

code=de2bi(ind,'left-msb');

k=1;

for i=1:l1

for j=1:n

coded(k)=code(i,j);

j=j+1;

k=k+1;

end

i=i+1;

end

subplot(2,1,1);

grid on;

stairs(coded);

axis([0 100 -2 3]);

title('Encoded signal');

ylabel ('Amplitude--->');

qunt=reshape(coded,n,length(coded)/n);

index=bi2de(qunt','left-msb');

q=del\*index+vmin+(del/2);

subplot(2,1,2);

grid on;

plot(q);

title('Demodulated signal');

ylabel('Amplitude--->');

xlabel ('Time---->');