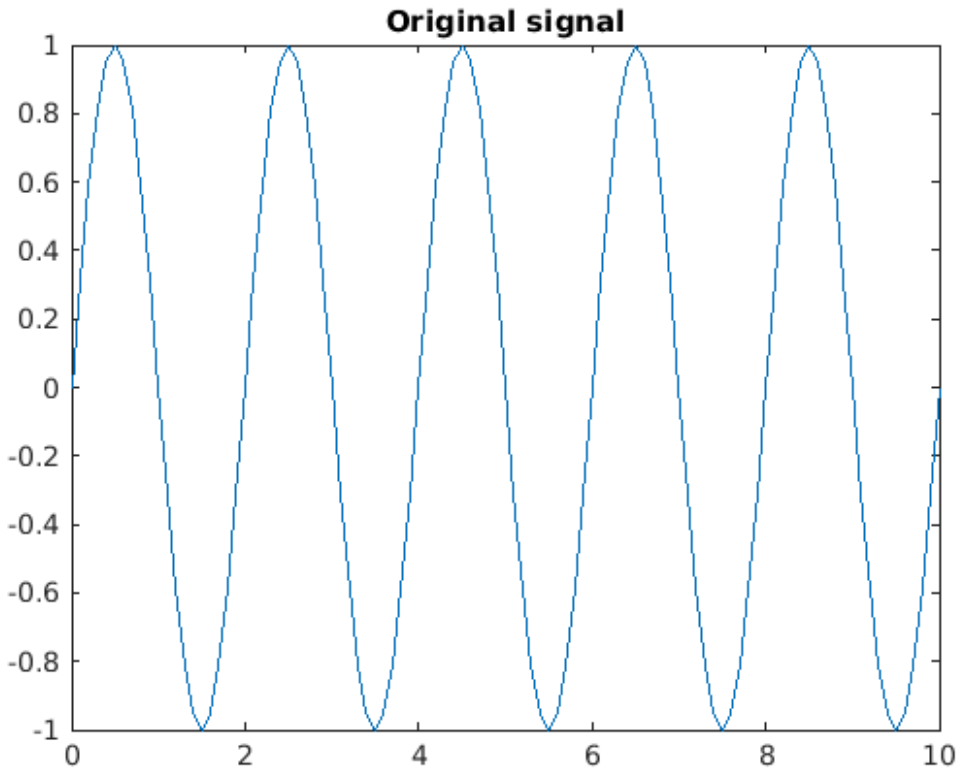
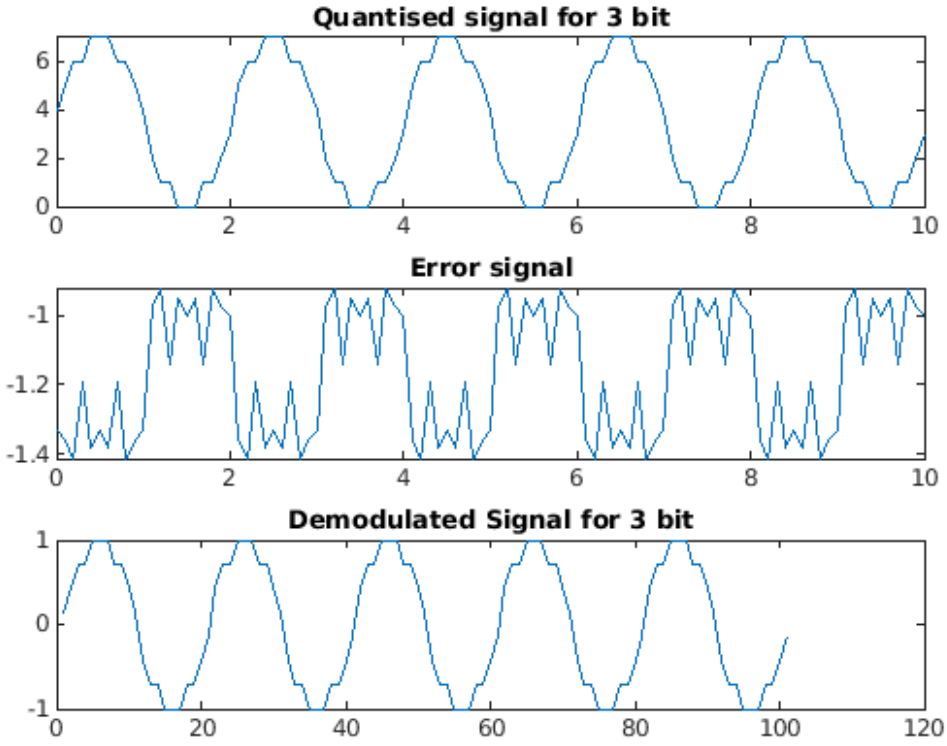
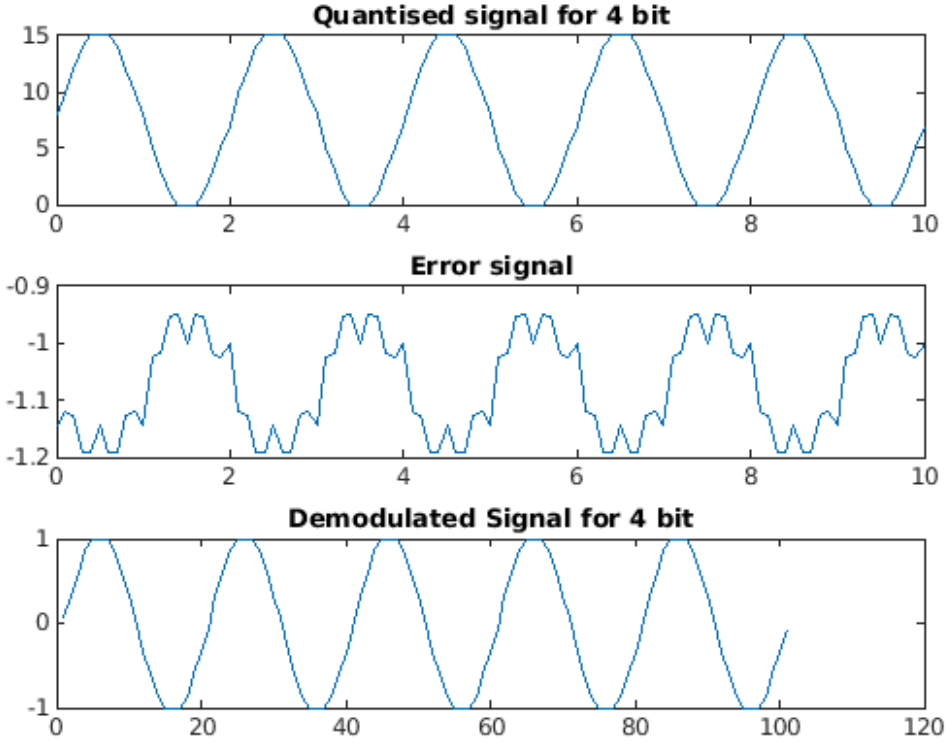
```
% Yogesh
% ROLL no-181EC155

%SIMULATION OF PULSE CODE MODULATION AND DEMODULATION

clc;
clear all;
close all;

t= [0:0.1:10];

signal=sin(pi*t);
plot(t,signal);
title('Original signal');

%3-bit Quantization----------------------------------
n1=3;
code1=quantize(n1, signal, t);

%4-bit Quantization----------------------------------
n2=4;
code2=quantize(n2, signal, t);
%function for quantization
function coded=quantize(n, signal, t)
    %Number of levels is 2^n
    L=2^(n);

    amax=max(abs(signal));
    b=signal+amax;
    c=(L-1)*(b/(2*amax));
    d=round(c);

    figure;
    subplot(3,1,1);
    plot(t,d);

    title("Quantised signal for "+ n+" bit");

    a_quant=2*amax*d/((L-1)-amax);
    a_error=signal-a_quant;
    subplot(3,1,2)
    plot(t,a_error);
    title('Error signal');

    % Calculating SQNR----------------------------------
    S = sum(signal.^2);
    N = sum(a_error.^2);
    SQNR=10*log10(S/N);
    disp('SQNR = ');disp(SQNR);
```

```
    %Convert the decimal to binary
    bin=dec2bin(d);%binary encoded signal
    coded=reshape(bin',length(t)*n,1);
    %disp(coded);

    % Demodulation Of PCM signal

    quant = reshape(coded,n,length(coded)/n);
    % Getback the index in decimal form
    index = bin2dec(quant');
    % getback Quantized values
    q=2*amax*d/(L-1)-amax;

    subplot(3,1,3);
    grid on;
    plot(q); % Plot Demodulated signal
    title("Demodulated Signal for "+ n+" bit");
end
```

```
SQNR =
   -4.5124

SQNR =
   -3.6880
```




Quantised signal for 3 bit
Error signal
Demodulated Signal for 3 bit


Quantised signal for 4 bit
Error signal
Demodulated Signal for 4 bit

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