clc;

clear all;

close all;

f=10;

A=1;

t=0:.01/f:1/f;

xt=A\*sin(2\*pi\*f\*t+(pi/6));

plot(t,xt);

hold on;

% sampling-----------------------------------------------------------------

fs=100;

n=0:1/fs:1/f;

xn=A\*sin(2\*pi\*f\*n+(pi/6));

stem(n,xn,'r');

grid on;

hold on;

% defining the array and level for quantization-------------------------

xq=zeros(1,length(xn));

b=3;

L=2^b;

del=(A+A)/(L-1);

Lq=zeros(1,L);

% setting quantized level-------------------------------------------------

for i=0:1:L-1

Lq(i+1)=-A+(i\*del);

end

% quantization-------------------------------------------------------------

for j=1:1:length(xn)

for k=1:1:length(Lq)

if ((Lq(k)-(del/2)) < xn(j) && xn(j) < (Lq(k)+(del/2)));

xq(j)=Lq(k);

end

end

end

%stem(n,xq,'g');

%hold on

%Pe=(del^2)/12

%Px=(1^2)/2

%SNR=Px/Pe

%SNRdb=1.76+6\*b

% reconstruction of signal-------------------------------------------------

ni=0:.1/fs:1/f;

yi=interp1(n,xq,ni);

plot(n,xq,'o',ni,yi,':.');

axis tight

%encoding of the quantized signal

U=0.23;

n=3;

q=U/(2^n-1)

t=0:1/fs:0.23;

y1=abs(A\*sin(2\*pi\*f\*t+(pi/6)));

a=fix(y1/q);

yd=dec2bin(a,n)

yq=a\*q

stem(t,yq)

plot(t,yq,'r')

