clc;

clear all;

close all;

t=linspace(0,5,150);

%generating 150 points for time using linspace for signal x

t1=linspace(5,10,10);

%generating 10 points for time using linspace for signal y.

t2=linspace(0,10,160);

%generating 160 points for time using linspace for plotting the strain signal

x=t.^2.\*sin(2\*pi/5.\*t.^2);

%x is a sine signal with exponential increase in frequency and amplitude.

x=x./max(x)\*10^(-21);

%normalising the amplitude and changing the order of the magnitude to 10^(-21)

y=-sin(2\*pi/1000.\*t1.^4)./t1.^4;

%y is a sine signal with exponential decrease in frequency and amplitude.

y=y./max(y)\*10^(-21);

%normalising the amplitude changing the order of the magnitude to 10^(-21)

z=[x y];

%concatinating x and y to produce the simplified version of the strain signal.

figure(1)

plot(t2,z)

%plotting the strain signal

xlabel('TIME');

ylabel('STRAIN');

title('STRAIN OVER TIME')

n1=4;

L=2^n1;

%number of quantization levels

xmax=1\*10^(-21);

%maximum value of the quantization level

xmin=-1\*10^(-21);

%minimum value of the quantization level

del=(xmax-xmin)/L;

%delta

partition=xmin:del:xmax;

%A quantization partition defines several contiguous, nonoverlapping ranges of values within the set of real numbers

codebook=xmin-(del/2):del:xmax+(del/2);

%codebook tells the quantizer which common value to assign to inputs that fall into each range of the partition.

[index,quants]=quantiz(z,partition,codebook);

% quantiz gives the quantised values of the sampled points.

figure(2)

%plotting the sampled signal

stem(z)

title('SAMPLED SIGNAL');

xlabel('TIME');

ylabel('STRAIN');

figure(3)

%plotting the Quantized signal

stem(quants);

title('SAMPLED AND QUANTIZED SIGNAL');

xlabel('TIME');

ylabel('STRAIN');

figure(4)

%plotting the reconstructed signal

stairs(quants);

title('RECONSTRUCTED SIGNAL');

xlabel('TIME');

ylabel('STRAIN');