%upsampling and downsamplig

**EX 10 Illustration of Upsampling**

clc;

clear all;

close all;

N=input('length of sinusoidal signal=');

L=input('upsampling factor=')

n=0:1:N-1;

x=0.25\*sinc(0.25\*(n-(N/2)));

subplot(2,2,1);

stem(n,x);

xlabel('n');

ylabel('x');

title('Input signal');

y=[zeros(1,L\*N)];

n1=1:1:L\*N

j=1:L:L\*N;

y(j)=x

subplot(2,2,2)

stem(n1,y);

ylabel('y');

title('upsampled signal');

f=-2:(1/(N/2)):2;

h=freqz(x,1,pi\*f);

subplot(2,2,3);

plot(f,abs(h));

xlabel=("frequency");

ylabel("Magnitude");

title('frequency response of Input signal');

h1=freqz(y,1,pi\*f);

subplot(2,2,4)

plot(f,abs(h1));

xlabel=("frequency");

ylabel("Magnitude");

title('frequency response of upsampled signal');

**EX 9 : - Illustration of Downsampling**

clc;

clear all;

close all;

N=input('Length of sinusoidal signal = ');

M=input('Downsampling factor = ');

n =0:1:N-1; % time vector

x =0.25 \* sinc(0.25 \* (n- floor(N/2)));

subplot(2,2,1);

stem(n, x, 'filled');

xlabel('n');

ylabel('x');

title('Input Signal');

y =x(1:M:N);

n1 = 1:1:length(y);

subplot(2,2,2);

stem(n1, y, 'filled');

xlabel('n');

ylabel('y');

title('Downsampled Signal');

f = linspace(0, pi, 512);

h =freqz(x, 1, f);

subplot(2,2,3);

plot(f, abs(h));

xlabel('Frequency (rad/sample)');

ylabel('Magnitude');

title('Frequency Response of Input Signal');

h1 = freqz(y, 1, f);

subplot(2,2,4);

plot(f, abs(h1));

xlabel('Frequency (rad/sample)');

ylabel('Magnitude');

title('Frequency Response of Downsampled Signal');