10. UPSAMPLING A SINUSOIDAL SIGNAL

AIM:

To generate the up sample (interpolation) by an integer factor

APPARATUS:

PC with MATLAB

PROGRAM:

```
% Program for upsampling a sinusoidal signal by factor L
N=input('Input length of the sinusoidal sequence=');
L=input('Up Samping factor=');%take min 1000
fi=input('Input signal frequency=');
intv = 1/N;
% Generate the sinusoidal sequence for the specified length N
n=0:intv:1; % range of time
x=5*sin(2*pi*fi*n);
% Generate the upsampled signal
y=zeros (1,L*length(x));
y([1:L:length(y)])=x;
%Plot the input sequence
subplot (2,1,1);
stem (n,x);
title('Input Sequence');
xlabel('Time n');
ylabel('Amplitude');
%Plot the output sequence
subplot (2,1,2);
stem (n,y(1:length(x)));
title(['output sequence,upsampling factor=',num2str(L)]);
xlabel('Time n');
ylabel('Amplitude');
```
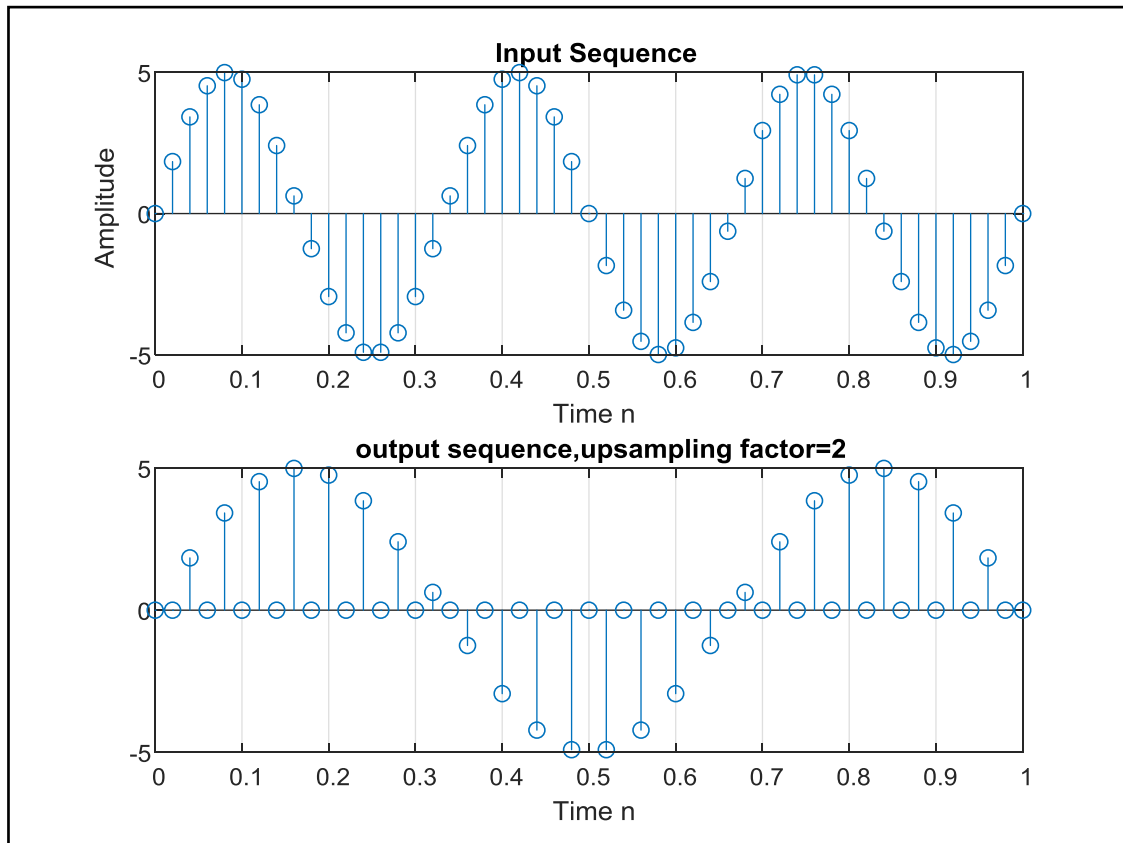
INPUT::
Input length of the sinusoidal sequence=50

Up Samping factor=2

Input signal frequency=3

OUTPUT

PROGRAM:

```
% Interpolation of the Signal
clc;
clear all;
close all;
N=20;
n=0:1:N-1;
x=sin(2*pi*n/15);
L=2;
figure(1)
subplot(3,1,1)
stem(n,x);
grid on;
xlabel('No.of.Samples');
ylabel('Amplitude');
title('Original Sequence');
x1=[zeros(1,L*N)];
n1=1:1:L*N;
j =1:L:L*N;
x1(j)=x;
figure(1)
subplot(3,1,2)
stem(n1-1,x1);
grid on;
xlabel('No.of.Samples');
```

```
ylabel('Amplitude');
title('Upsampled Sequence');
a=1;
b=fir1(5,0.5,'Low');
y=filter(b,a,x1);
figure(1)
subplot(3,1,3)
stem(n1-1,y);
grid on;
xlabel('No.of.Samples');
ylabel('Amplitude');
title('Interpolated upsampled Sequence');
```

OUTPUT