

11. DOWNSAMPLING A SINUSOIDAL SIGNAL

AIM:

To generate the down sample (decimation) by an integer factor

APPARATUS:

PC with MATLAB

PROGRAM:

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

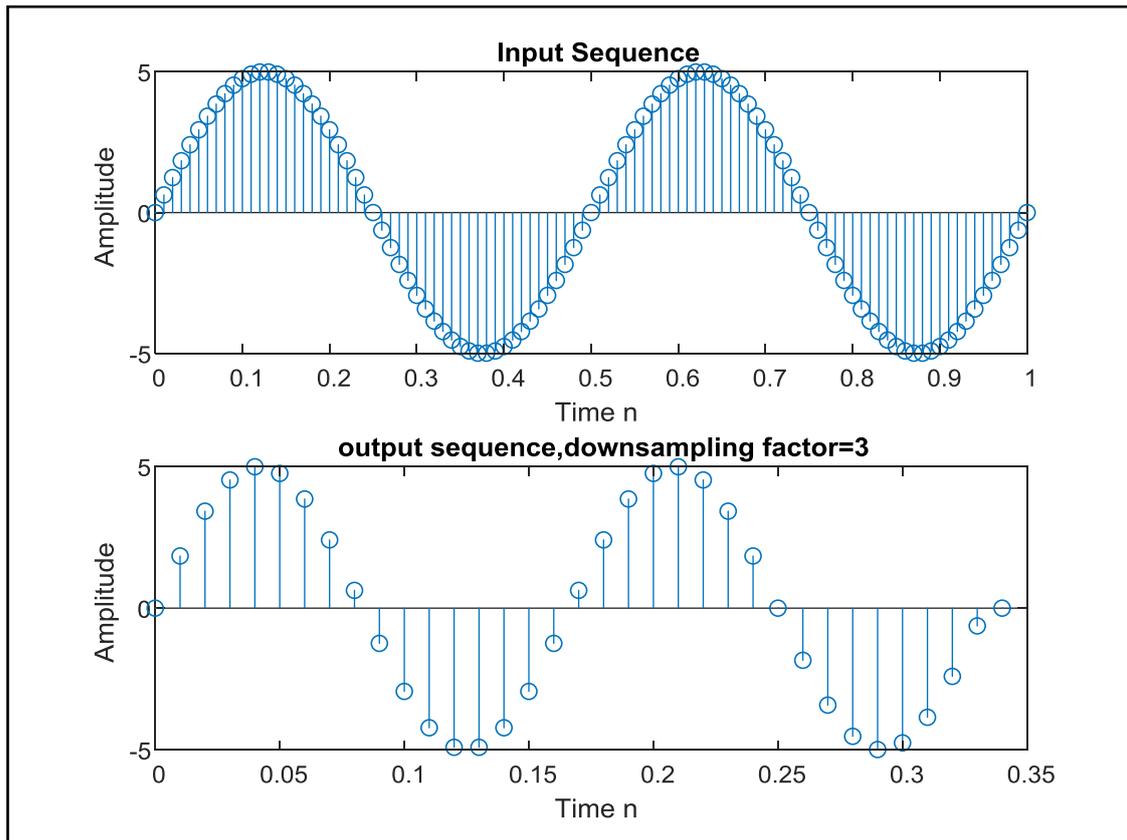
INPUT::

Input length of the sinusoidal sequence=100

Down Samping factor=3

Input signal frequency=2

OUTPUT



PROGRAM:

```

% To generate the down sample (decimation) by an Integer
factor
clc;
clear all;
close all;
N=20 ;
n=0:1:N-1;
x=sin(2*pi*n/15);
M=2;
figure(1)
subplot(3,1,1)
stem(n,x);
grid on;
xlabel('No.of.Samples');
ylabel('Amplitude');
title('Original Sequence');
a=1;
b=fir1(5,0.5,'Low');
y=filter(b,a,x);
figure(1)
subplot(3,1,2)
stem(n,y);
grid on;

```

DIGITAL SIGNAL PROCESSING LAB

```
xlabel('No.of.Samples');  
ylabel('Amplitude');  
title('Filtered Sequence');  
x1=y(1:M:N);  
n1=1:1:N/M;  
figure(1)  
subplot(3,1,3)  
stem(n(1:length(x1)),x1);  
grid on;  
xlabel('No.of.Samples');  
ylabel('Amplitude');  
title('Decimated Sequence');
```

OUTPUT

