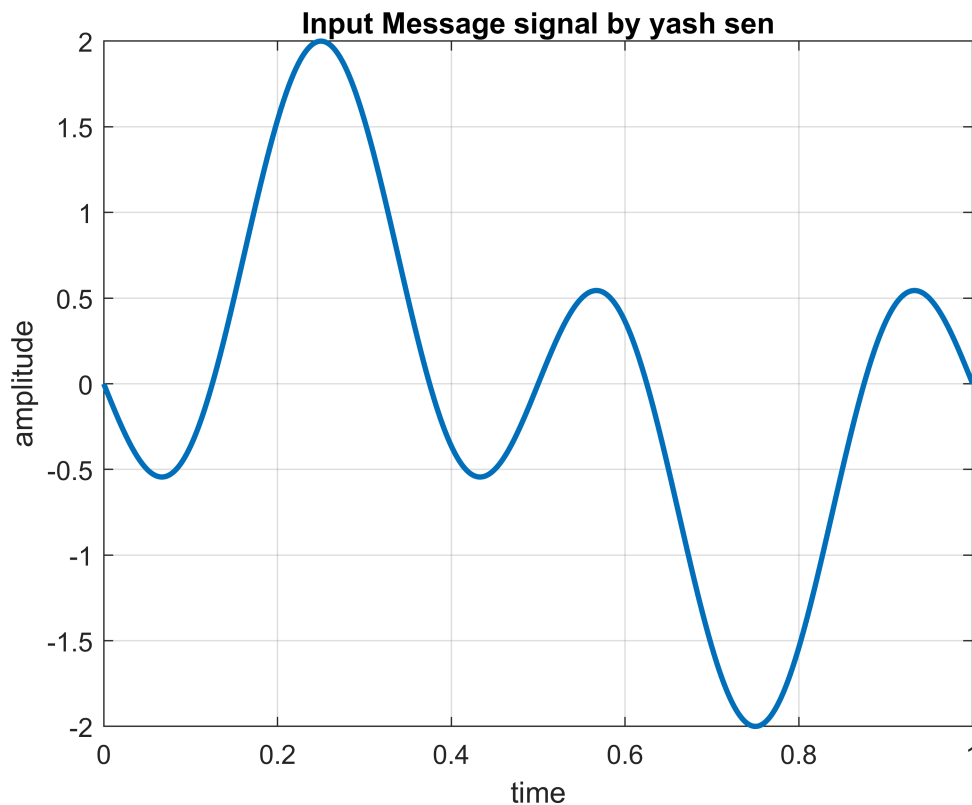# EXPERIMENT NO 09

AIM: To Verify Sampling Theorem using MATLAB

```
clear all;
close all;
clc;
tot=1;
td=0.002;
t=0:td:tot
```

```
t = 1×501
        0    0.0020    0.0040    0.0060    0.0080    0.0100    0.0120    0.0140 ···
```

```
L=length(t);
x=sin(2*pi*t)-sin(6*pi*t);
figure(1);
plot(t,x,'linewidth',2);
xlabel('time');ylabel('amplitude');
grid;
title('Input Message signal by SATYAM VISHWAKARMA');
```

```
% Fast Fourier Transform for Message Signal
Lf=length(x);Lfft=2^ceil(log2(Lf)+1);
fmax=1/(2*td);
Faxis=linspace(-fmax,fmax,Lfft);
xfft=fftshift(fft(x,Lfft));
figure(2);
plot(Faxis,abs(xfft)); % Frequency Domain Representation or Spectrum
xlabel('frequency');ylabel('amplitude');
axis([-50 50 0 300]);
title('Spectrum of Input Message Signal by SATYAM VISHWAKARMA');
grid;
```
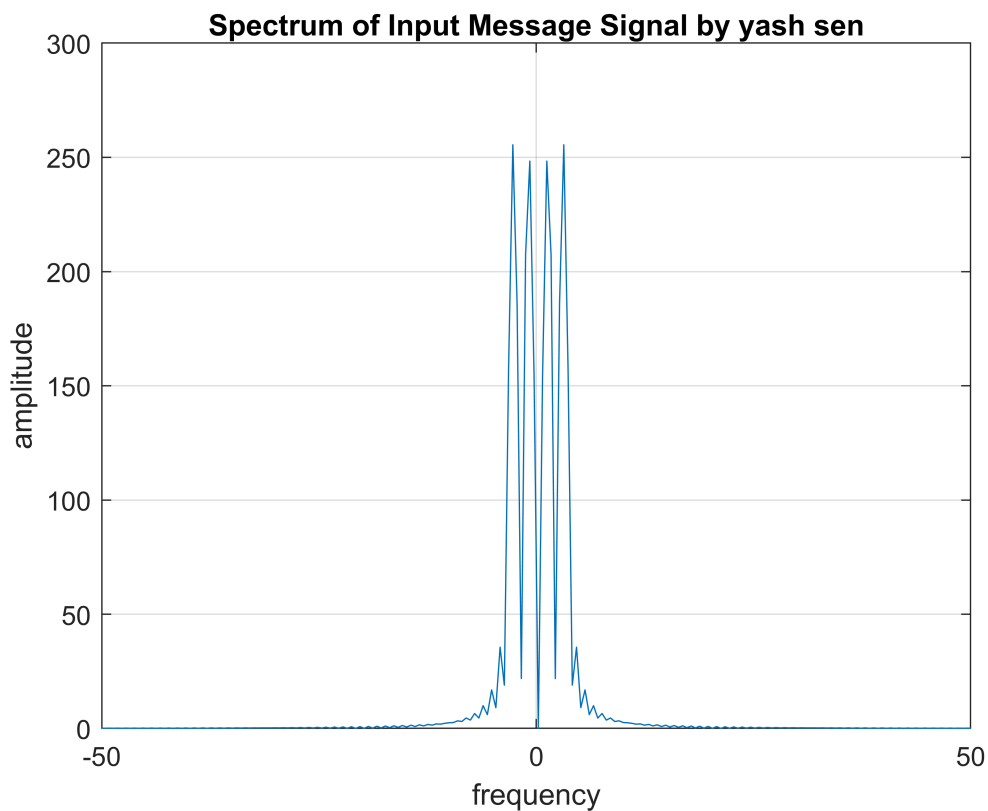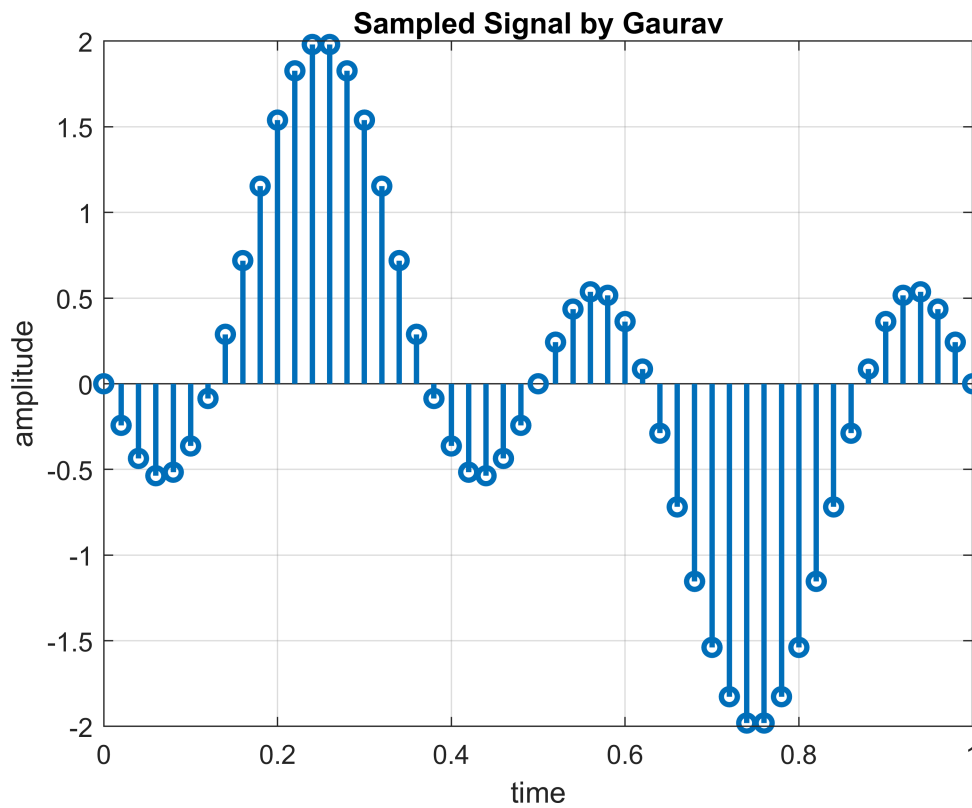


```
ts=0.02;
Nfactor=round(ts/td);
xsm=downsample(x,Nfactor);
tsm=0:ts:tot;
figure(3);
stem(tsm,xsm,'linewidth',2);
xlabel('time');ylabel('amplitude');
grid;
title('Sampled Signal by SATYAM VISHWAKARMA');
```

Sampled Signal by Gaurav


```
xsmu=upsample(xsm,Nfactor);
Lfu=length(xsmu);
Lffu=2^ceil(log2(Lfu)+1);
fmaxu=1/(2*td);
Faxisu=linspace(-fmaxu,fmaxu,Lffu);
xfftu=fftshift(fft(xsmu,Lffu));
figure(4);
plot(Faxisu,abs(xfftu));
xlabel('frequency');ylabel('amplitude');
axis([-120 120 0 300/Nfactor]);
title('Spectrum of Sampled signal by yash sen
```

```
');
grid
```

Spectrum of Sampled signal by yash sen