Experiment No: 2 Date: 06/08/24 **Verification of Sampling Theorem**

Aim:

To verify Sampling Theorem.

Theory:

The Sampling Theorem, also known as the Nyquist-Shannon Sampling Theorem, states that a continuous signal can be completely reconstructed from its samples if the sampling frequency is greater than twice the highest frequency present in the signal. This critical frequency is known as the Nyquist rate.

fs ≥ 2.fmax Where:

- fs is the sampling frequency (rate at which the signal is sampled),
- fmax is the highest frequency present in the signal.

Applications:

- Digital audio and video processing
- Communication systems
- Image processing
- Medical imaging

Program:

```
clc; clear all;
close all;
subplot(2,2,1);
t = 0:0.01:1;
f=10;
```

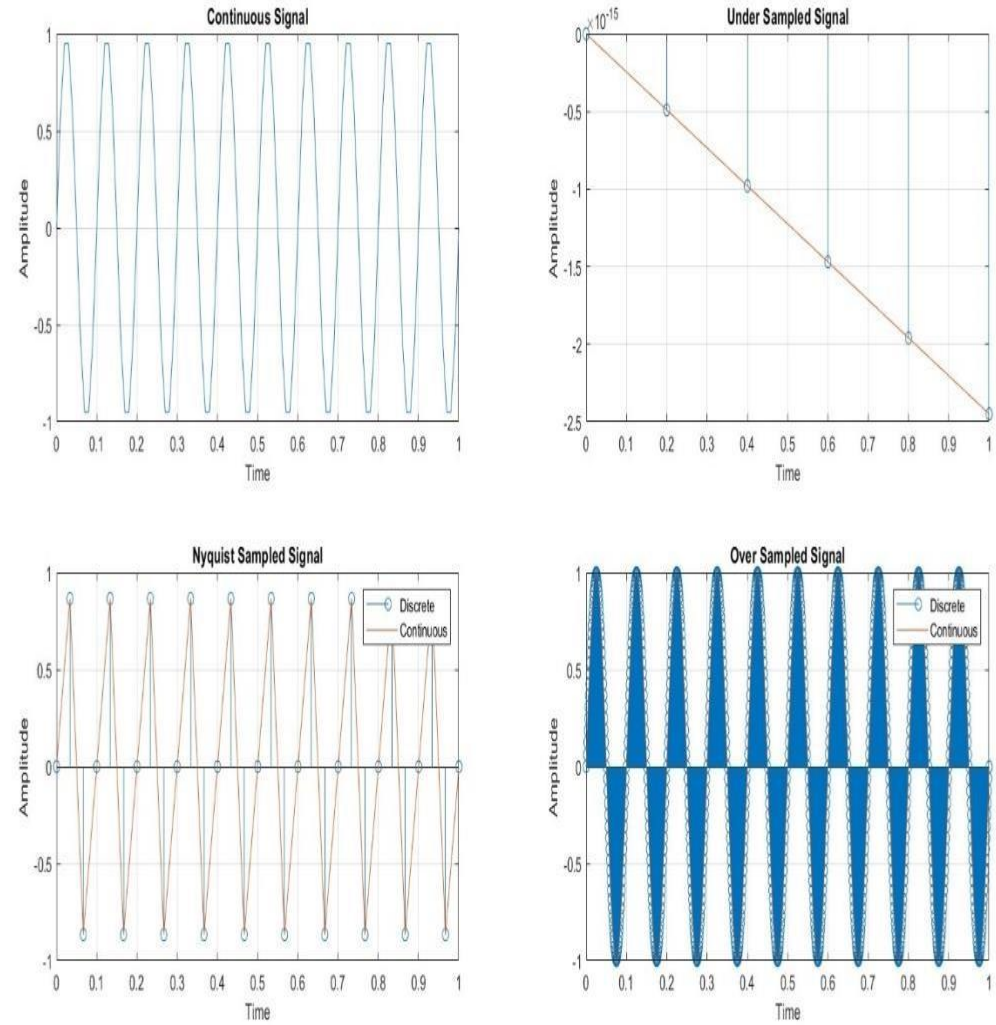
```
y = sin(2*pi*f*t);
plot(t,y); grid(true);
xlabel("Time");
ylabel("Amplitude");
title("Continuous Signal");
 subplot(2,2,2); fs= 0.5*f;
%undersampled t1 = 0:1/fs:1;
y1 = sin(2*pi*f*t1);
stem(t1,y1); hold on;
plot(t1,y1); grid(true);
xlabel("Time");
ylabel("Amplitude");
title("Under Sampled Signal");
 subplot(2,2,3); fs2= 3*f;  t3
= 0:1/fs2:1; y2 =
sin(2*pi*f*t3); stem(t3,y2);
hold on; plot(t3,y2);
xgrid(true); xlabel("Time");
ylabel("Amplitude");
legend("Discrete","Continuous"
) title("Nyquist Sampled
Signal");

 subplot(2,2,4); fs2= 100*f;
t3 = 0:1/fs2:1; y2 =
sin(2*pi*f*t3); stem(t3,y2);
hold on; plot(t3,y2);
grid(true); xlabel("Time");
ylabel("Amplitude");
legend("Discrete","Continuous"
```

```
) title("Over Sampled
Signal");
```

Result:

Verified Sampling Theorem using MATLAB.

Observation:



Experiment No: 3 Date: 13/08/24