Experiment 6

Aim: To understand the effect of Sampling using MATLAB

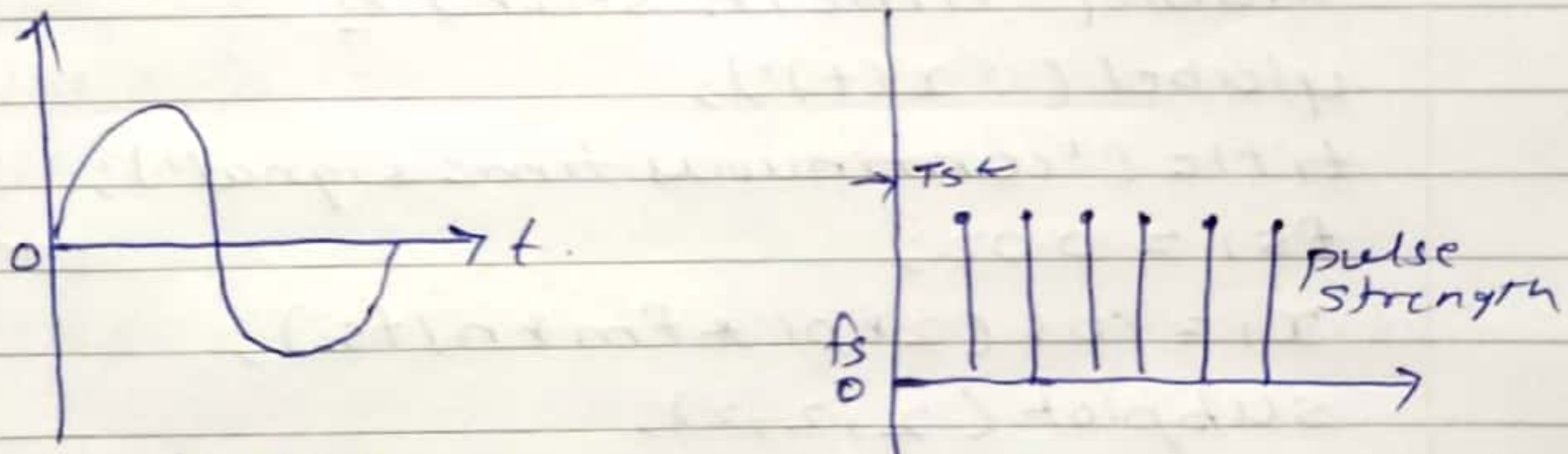
Apparatus: MATLAB software

Procedure:

1) Click on MATLAB icon
2) from file menu click on new button and select script to open untitle window
3) Enter the program for sampling
4) Save the file and run
5) Obsere the output waveform

Theory:

Sampling: Sampling is nothing but converting continuous signal into discrete time signal



continous signal

Ts = sampling time
fs = sampling frqency

By the product of continuous signal and pulse strength we get a discrete signal

where, $f_s = \frac{1}{T}$, T = Time

• Nyquist state , $f_s \geq 2f_m$
- Sampling frequency should be greater than or equal to the sampling frequency
- Sampling time depends upon the frequency.
- There are 3 types of sampling:
1) Ideal Sampling
2) Natural Sampling
3) flat top sampling.

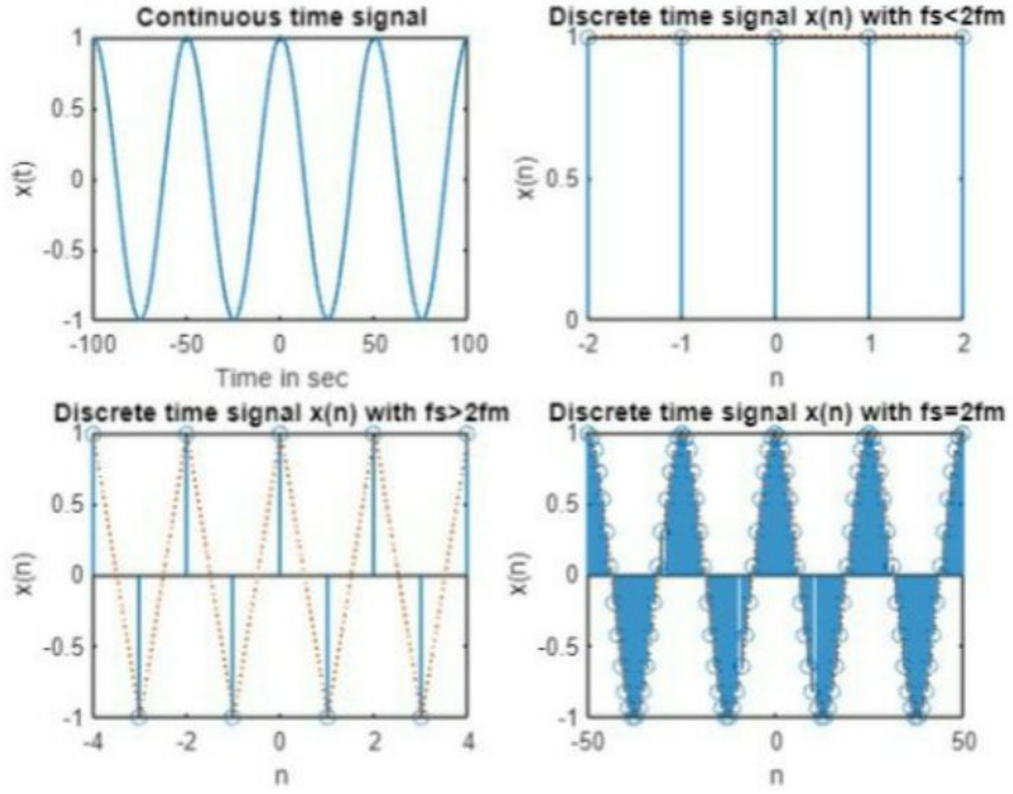
Program:

```
clc
clear all
close all
t = -100 : 01 : 100;
fm = 0.02;
x = cos(2*pi*t*fm);
subplot(2;2,1);
plot(t,x);
xlable('time in second');
ylabel('x(t)');
title('continuous time signal');
fs1 = 0.02;
x1 = cos(2*pi*fm*n/fs1);
subplot(2;2,2);
stem(n, x1);
hold on
subplot(2,2,2);
plot(n, x1, ':');
title('discrete time signal x(n) with
      fs<2fm');
```

```
xlabel('n');
ylabel('x(n)');
fs2 = 0.04;
n1 = -4.4;
x2 = cos(2*pi*fm*n1/fs2);
subplot(2,2,3);
stem(n1,x2);
hold on
subplot(2,2,3);
plot(n1,x2,':');
title('discrete time signal x(n) with fs>2fm');
xlabel('n');
ylabel('x(n)');
n2 = -50:50;
fs3 = 0.5;
x3 = cos(2*pi*fm*n2/fs3);
subplot(2,2,4);
Stem(n2,x3);
hold on
subplot(2,2,4);
plot(n2,x3,':');
xlabel('n');
ylabel('x(n)');
title('discrete time signal x(n) with
fs=2fm');
```

Conclusion:

We have successfully validated sampling theorem using MATLAB.



MATLAB

matlab.mathworks.com

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CURRENT FOLDER

WORKSPACE

dcs_practical.m dcs4.m dcs2.m dcs5.m untitled1.m dcs3.m

```
clc
clear all
close all
t=-100:01:100;
fm=0.02;
x=cos(2*pi*t*fm);  subplot(2,2,1);
plot(t,x);
xlabel('Time in sec');
ylabel('x(t)');
title('Continuous time signal');
fs1=0.02;
n=-2:2;
x1=cos(2*pi*fm*n/fs1);
subplot(2,2,2);
stem(n,x1);
hold on
subplot(2,2,2);
plot(n,x1,':');
title('Discrete time signal x(n) with fs<2fm');
xlabel('n');
ylabel('x(n)');
fs2=0.04;
n1=-4:4;
x2=cos(2*pi*fm*n1/fs2);
subplot(2,2,3);
stem(n1,x2);
```

COMMAND WINDOW 9 usages of "n" found

UTF-8 CRLF script Ln 1 Col 1