Subject: - Digital communication

Enrollment number : BT19ECE010

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LAB REPORT- 1

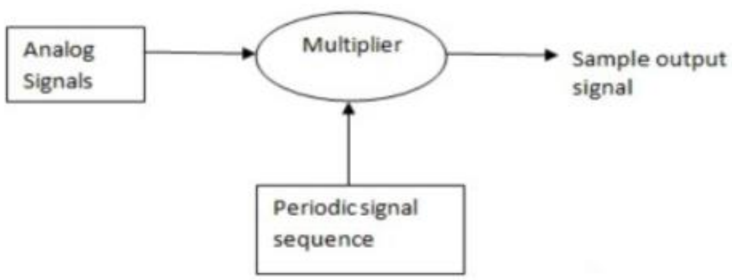
Aim : To study sampling Theorem and analyze the process of Reconstruction

of the input signal.

Apparatus : Octave software

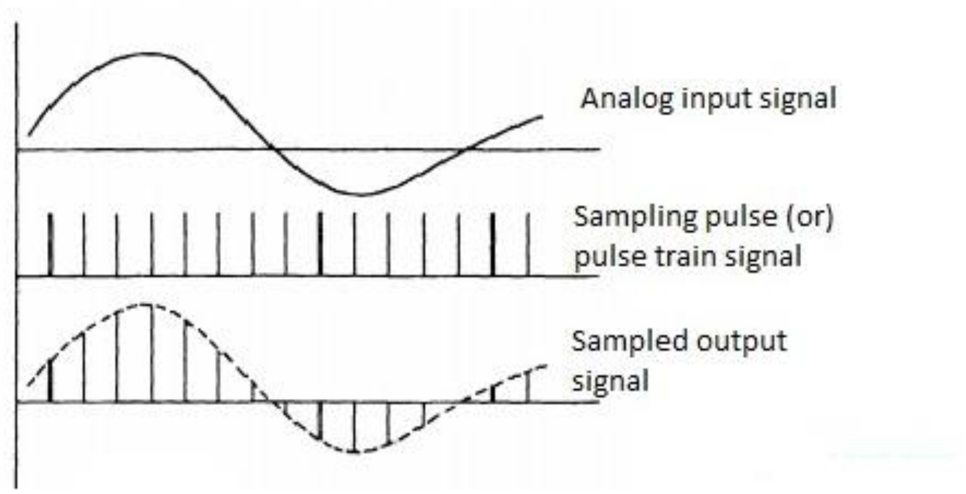
Theory:

In sampling theorem, the input signal is in an analog form of signal and the second input signal is a sampling signal, which is a pulse train signal and each pulse is equidistance with a period of “Ts”. This sampling signal frequency should be more than twice of the input analog signal frequency. If this condition satisfies, analog signal perfectly represented in discrete form else analog signal may be losing its amplitude values for certain time intervals.



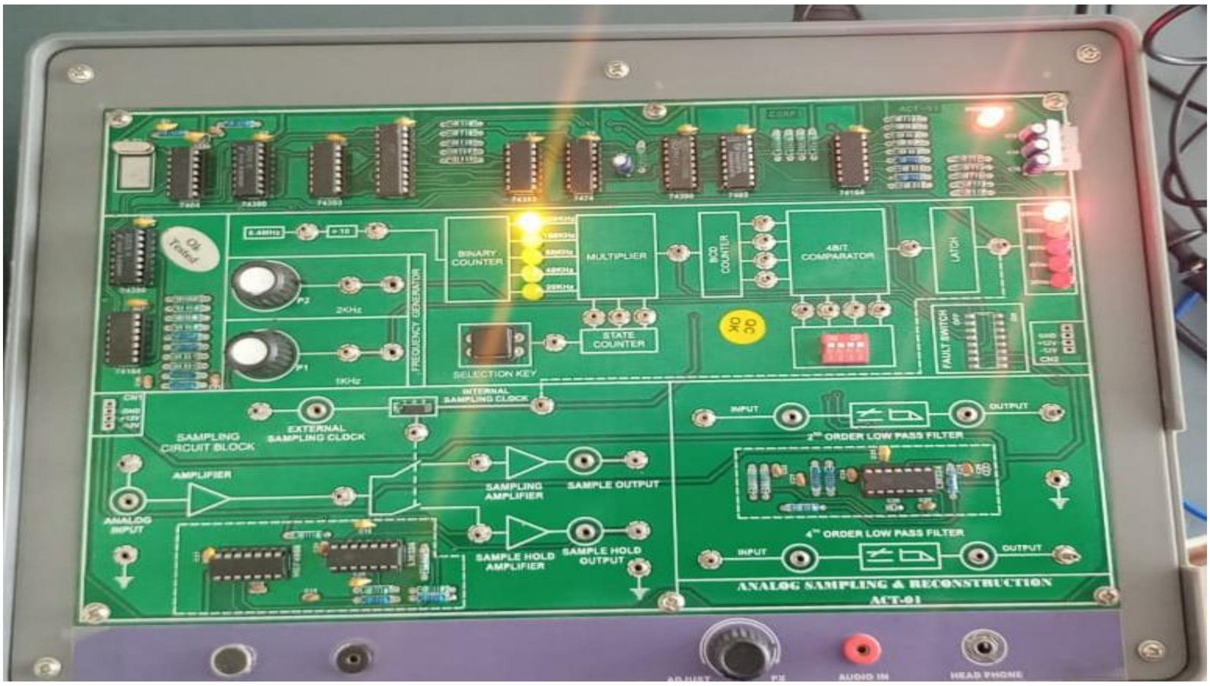
- Sampling theorem states that “continues form of a time-variant signal can be represented in the discrete form of a signal with help of samples and the sampled signal can be recovered to original form when the sampling signal frequency Fs having the greater frequency value than or equal to the input signal frequency Fm.

$F_s \geq 2F_m$



Sampling Techniques

1. **Ideal sampling**
2. **Natural Sampling**
3. **Flat-Top Sampling**



Procedure:-

Provide analog message signal to analog input pin

Provide sampling frequency to board which may be provided by external or internal.

Analog signal is amplified using op-amp amplifier provided within the kit.

We have option to hold as well as to pass signal.

Now signal irrespective of order of signal is passed through low pass filter for sampling

Code:-

```
clc;
clear all;
close all;
t=0:0.01:3;
a=sin(2*pi*t); %message signal
p=square(2*pi*10*t); %carrier signal
p(p<0)=0;
s=a.*p;
subplot(4,1,1)
plot(t,a)
xlabel('time')
ylabel('Amplitude')
title('message signal')
subplot(4,1,2)
plot(t,p)
xlabel('time')
ylabel('Amplitude')
title('carrier signal')
subplot(4,1,3)
plot(t,s)
xlabel('time')
ylabel('Amplitude')
title('sampling signal')
```

Screenshot:

lab1_DC.m

```
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clear all;
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plot(t,s)
xlabel('time')
ylabel('Amplitude')
title('sampling signal')
```
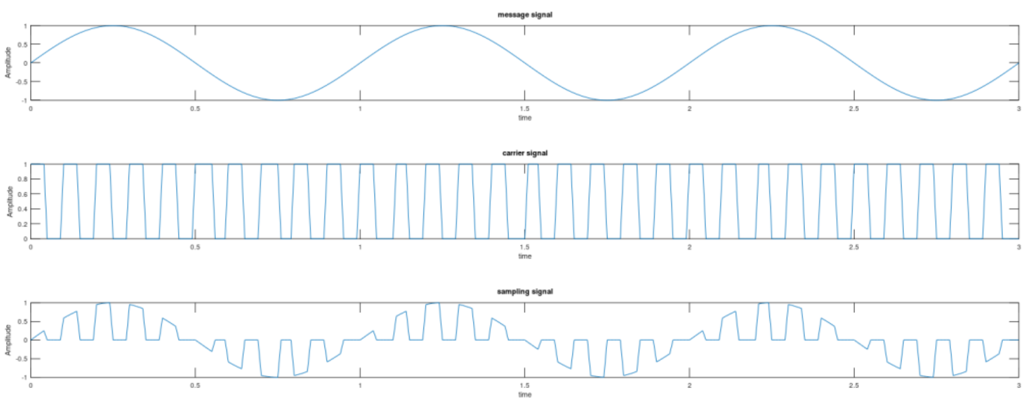

Output:



Results and Discussion :

We obtained the message signal carrier signal and sampling signal and reconstructed the signal.

Conclusion:

We successfully performed the given task.