CONTROL SYSTEM LABORATORY RECORD (EE314)

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Semester: 5th

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EXP NO : 01

TITLE: GENERATION OF BASIC SIGNALS

Date :09/09/2021

Objective:

To generate the following waveforms:-

(i) Unit step

(ii) Unit ramp

(iii) Unit impulse

(iv) Exponential wave

(viii) Sine wave

(ix) Cosine wave

Hardware and Software required:

Computer

MATLAB R2021a

Program:

Basic Signals:

```
clear all
close all
clc

%Unit Impulse
n1=-10;
n2=10;
n=0;
```

```
x=n1:n2;
y=(x-n==0);

figure
subplot(2,3,1)
stem(x,y,'r','LineWidth',2)
xlabel('Time axis')
ylabel('Amplitude')
title('\bf\color{blue}\fontsize{10}Unit Impulse')
grid on
axis tight
```

%Unit Step

```
a=n1:n2;
b=(a-n>=0);

subplot(2,3,2)
stem(a,b,'r','LineWidth',2)
xlabel('Time axis')
ylabel('Amplitude')
title('\bf\color{blue}\fontsize{10}Unit Step')
grid on
axis tight
```

%Unit Ramp

```
c=n1:n2;
d=c.*(c-n>=0);

subplot(2,3,3)
stem(c,d,'r','LineWidth',2)
xlabel('Time axis')
ylabel('Amplitude')
title('\bf\color{blue}\fontsize{10}Ramp Signal')
grid on
axis tight
```

%Sine wave

```
r=0:0.001:pi;
s=sin(2*pi*r);

subplot(2,3,4)
plot(r,s,'y','LineWidth',2);
xlabel('Time axis')
```

```
ylabel('Amplitude')
title('\bf\color{blue}\fontsize{10}Sine Wave')
grid on

%Cosine wave
q=0:0.001:pi;
e=sin(2*pi*q);

subplot(2,3,5)
plot(q,e,'y','LineWidth',2);
xlabel('Time axis')
ylabel('Amplitude')
title('\bf\color{blue}\fontsize{10}Cosine Wave')
grid on

%Exponential wave
z=0:0.001:pi;
l=exp(2*z);

subplot(2,3,6)
plot(z,l,'y','LineWidth',2);
xlabel('Time axis')
ylabel('Amplitude')
title('\bf\color{blue}\fontsize{10}Exponential signal')
grid on
```

Assignment 1 :

```
clear all
clc

%Triangular

fs=2;
f=10;
t=0:1/fs:30-1/fs;
y=10*sawtooth(2*pi*1/f*t,1);

figure
subplot(2,1,1)
stem(t,y);
```

```
grid on
```

%Square

```
fs=2;
f=10;
t=0:1/fs:30-1/fs;
y=10*square(2*pi*1/f*t);

subplot(2,1,2)
stem(t,y);
grid on
```

Assignment 2:

```
clear all;
clc;
```

%graphical representation:

```
n=-5:5;
for i= 1:length(n)
    if n(i)>=-3 && n(i)<=-1
        x(i)=1;
    else if n(i)>=0 && n(i)<=3
            x(i)=1-(n(i)/3);
    else
        x(i)=0;
        end
    end
end
subplot(3,1,1);
stem(n,x)
xlabel('n');
ylabel('X[n]');
title('Assignment 2 a')
grid on;
axis([-5 5 -2 2]);
```

%sequence

```
n=-3:1:3;
```

```
x=[11 1 1 1 2/3 1/3 0]
subplot(3,1,2);
stem(n,x)
axis([-5 5 -2 2]);
title('Assignment 2 b')
%in terms of unit ,ramp

t=-3:3;
step=t<=0;
step2=t>0;
ramp=(1-(t/3)).*step2;
signal=step+ramp;
subplot(3,1,3);
stem(t,signal);
axis([-5 5 -2 2]);
xlabel('n');
ylabel('X[n]');
title('Assignment 2 c')
```

Outputs:

Basic Signals:

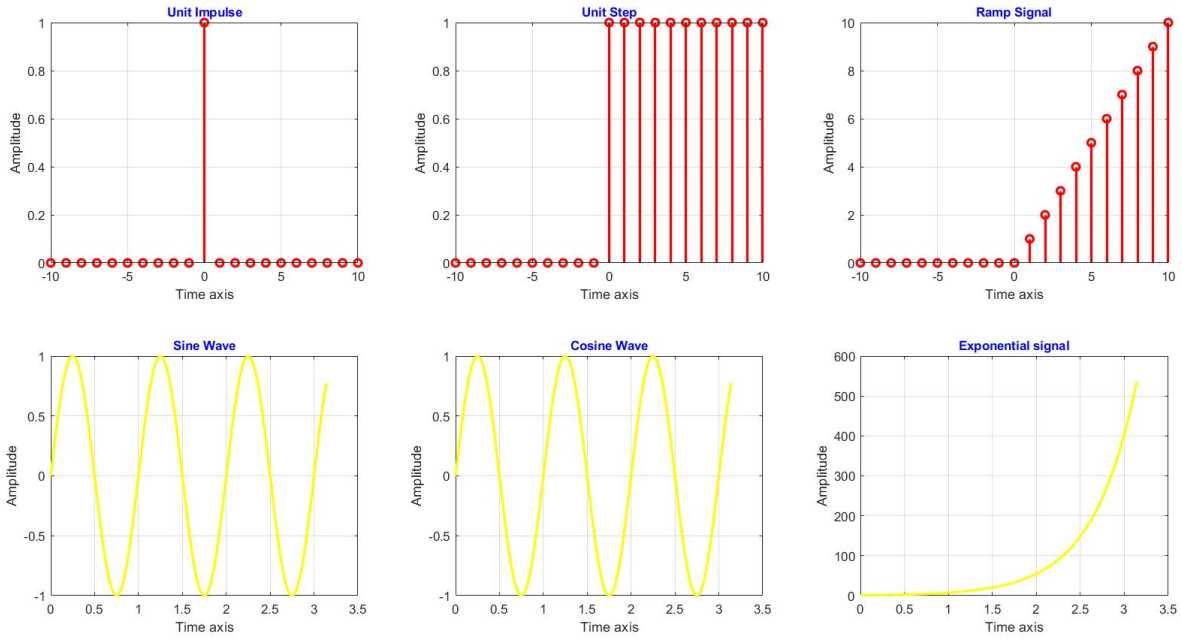

Fig 1: Graphical Representation of Basic Signal.

Assignment (1):

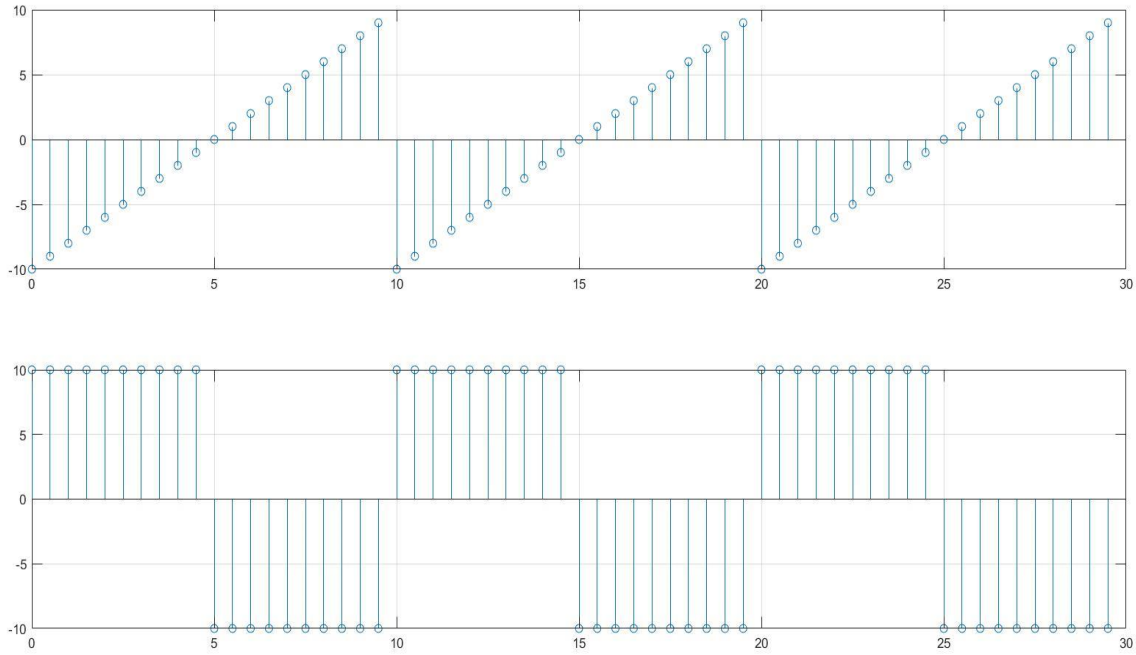

Fig 2: Graphical Representation of Sawtooth & Square waveforms using Functions

Assignment (2):

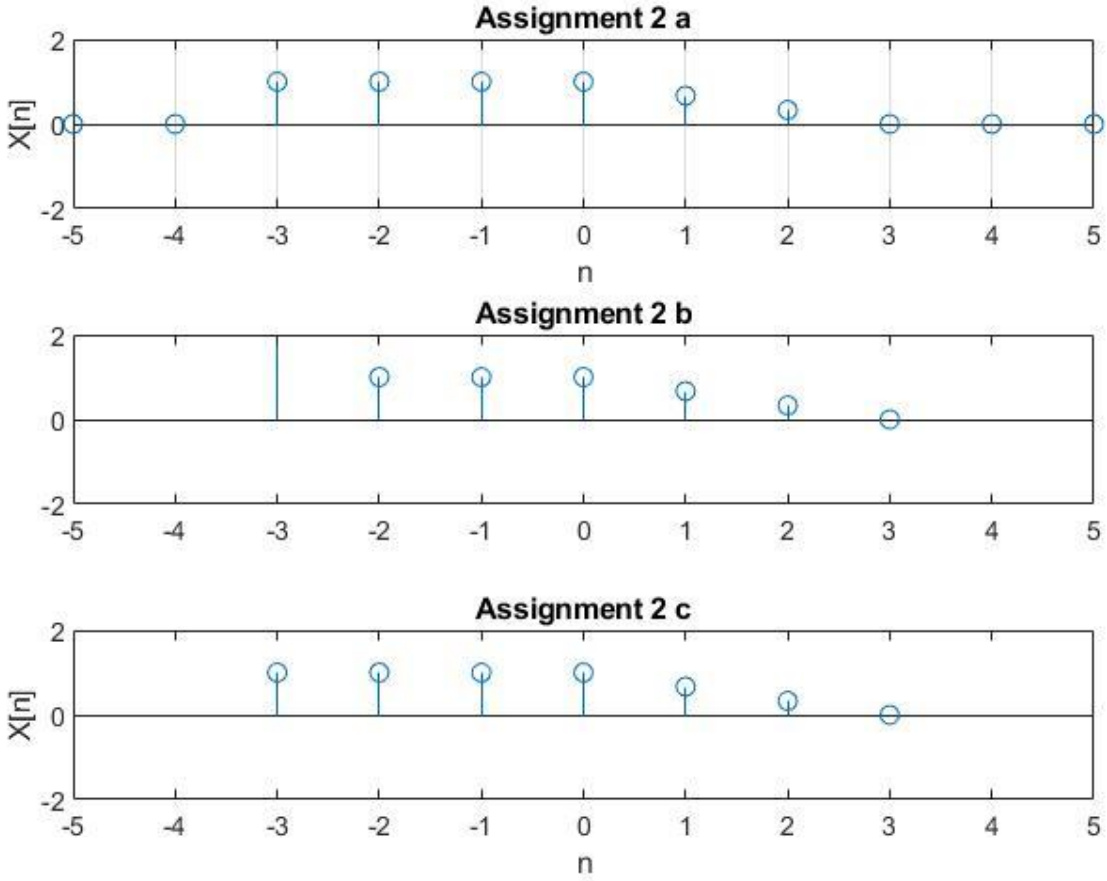

Fig 3: Plotting of given function.

Result and Discussion:

In this experiment we generated the figures of basic signals and the signals given in assignment using MATLAB R2021a. Some discrete waveforms were also generated using ‘stem’ function. Hence it concludes that ‘stem’ function is used to generate discrete waveform same as ‘plot’ function used for the continuous waveforms.

Conclusion:

Basic Signals, Triangular and Square signals were plotted using MATLAB and some function and tools were learned.