RAJSHAHI UNIVERSITY OF ENGINEERING AND TECHNOLOGY

LAB REPORT

Dept: Electrical and Computer Engineering

SUBMITTED BY:

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Course name : Digital Signal Processing
Course no : ECE 4124

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Experiment no:01

Experiment Name :

i) Plot unit step, unit ramp, unit impulse signal using MATLAB.
ii) Plot discrete signal using MATLAB.
iii) Plot two different discrete signal and show their addition and subtraction using MATLAB.
iv) Plot two different continuous signal using MATALB

Objective : to learn how to

i) Plot unit step, unit ramp, unit impulse signal using MATLAB.
ii) Plot discrete signal using MATLAB.
iii) Plot two different discrete signal and show their addition and subtraction using MATLAB.
iv) Plot two different continuous signal

using MATALB

Theory : A continuous signal or a continuous-time signal is a varying quantity whose domain, which is often time, is a continuum. That is, the function's domain is an uncountable set. The function itself need not to be continuous. A discrete signal or discrete-time signal is a time series consisting of a sequence of quantities. Unlike a continuous-time signal, a discrete-time signal is not a function of a continuous argument; however, it may have been obtained by sampling from a continuous-time signal. If a step signal has unity magnitude, then it is known as unit step signal or unit step function. It is denoted by u(t). The step signal is equivalent to applying a signal to a system whose magnitude suddenly changes and remains constant forever after application. An ideal impulse signal is a signal that is zero everywhere but at the origin (t = 0), it is infinitely high. Although, the area of the impulse is finite. The unit impulse signal is the most widely used standard signal used in the analysis of signals and systems. A ramp function or ramp signal is a type of standard signal which starts at $t = 0$ and increases linearly with time. The unit ramp function has unit slop.

Code :

Code for plotting unit step, unit ramp, unit impulse signal:

```
clc
```

```
clear all
close all
t = -10:0.01:10
step = t>=0
subplot(3,1,1);
plot(t,step);
xlabel('time');
ylabel('amplitude');
title('unit step');
ramp = t.*step
subplot(3,1,2);
plot(t,ramp);
xlabel('time');
ylabel('amplitude');
title('unit ramp');
impulse = t==0
subplot(3,1,3);
plot(t,impulse);
xlabel('time');
ylabel('amplitude');
title('unit impulse');
```

Code for plotting discrete signal:

```
x = -4:3
y = [1,2,3,3,2,1,4,1]
stem(x,y);
```

Code for plotting two different discrete signal and show their addition and subtraction:

```
clc
clear all
close all
t = -10:2:20
n1 = t>=0 & t<=10
subplot(4,1,1);
stem(t,n1);
xlabel('time');
ylabel('amplitude');
title('1st Signal');
n2 = t>=5 & t<=15
subplot(4,1,2);
stem(t,n2);
xlabel('time');
ylabel('amplitude');
```

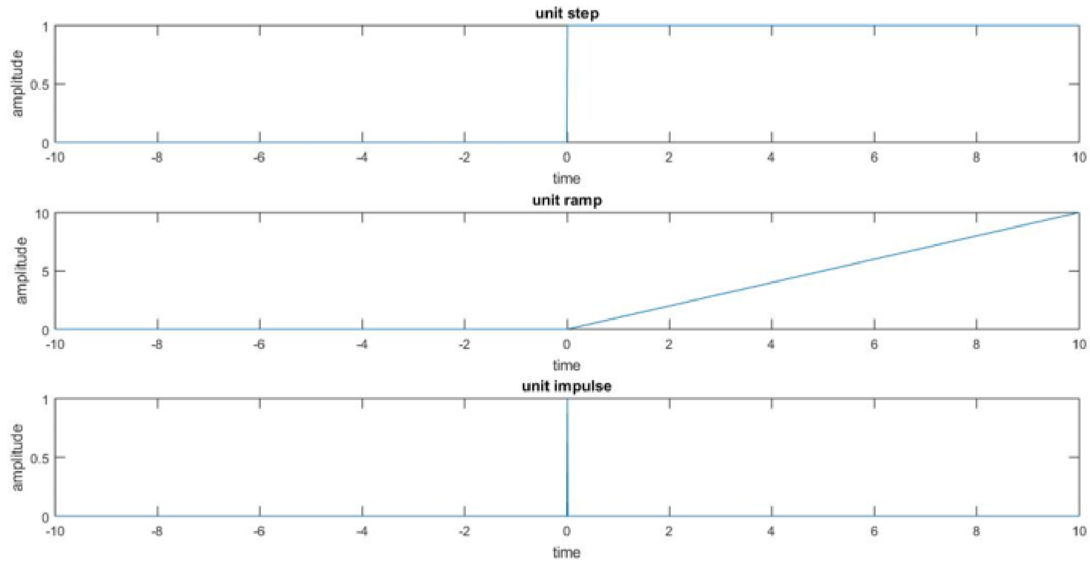
```
title('2nd Signal');
add = n1+n2
subplot(4,1,3);
stem(t,add);
xlabel('time');
ylabel('amplitude');
title('Addition');
sub = n1-n2
subplot(4,1,4);
stem(t,sub);
xlabel('time');
ylabel('amplitude');
title('Subtraction');
```

Code for plotting two different continuous signal:

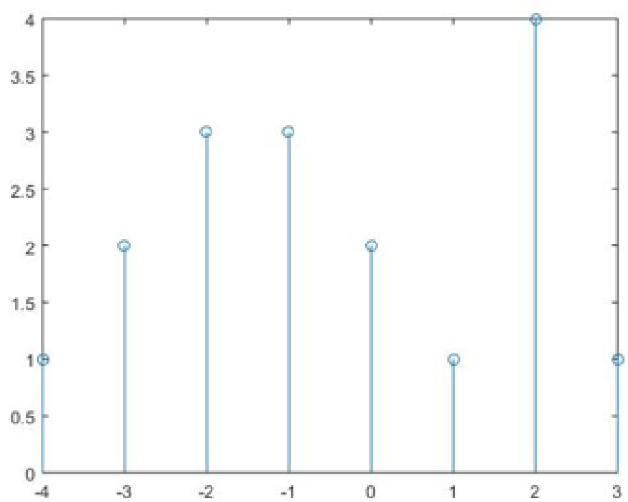
```
clc
clear all
close all
t = -10:0.01:20
n1 = t>=0 & t<=7
n2 = t>=1 & t<=6
n3 = t>=2 & t<=5
s1 = n1+n2+2*n3;
subplot(4,1,1);
plot(t,s1);
xlabel('time');
ylabel('amplitude');
title('1st signal');
t1 = -3:0.01:3
impulse = t1>=0
n11 = t1.*impulse
n22 = t1>=3 & t1<=5
s2 = n11+n22;
subplot(4,1,2);
plot(t1,s2);
xlabel('time');
ylabel('amplitude');
title('2nd signal');
```

Output :

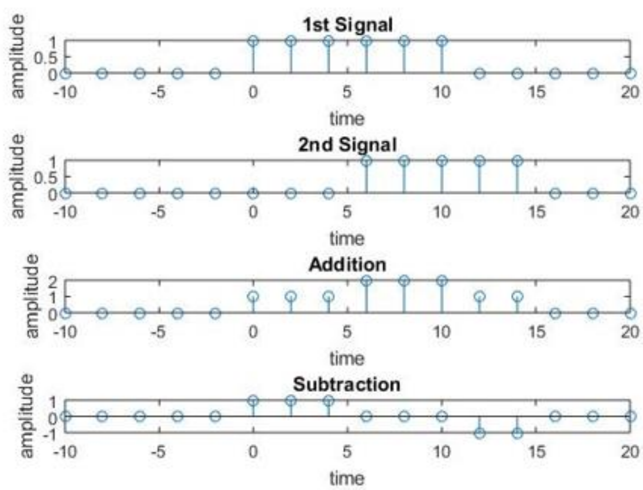
Output for plotting unit step, unit ramp, unit impulse signal:



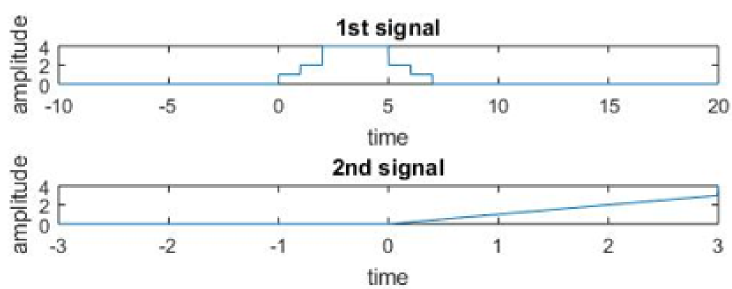
Output for plotting discrete signal:



Output for plotting two different discrete signal and show their addition and subtraction:



Output for plotting two different continuous signal:



Discussion :

In this experiment, we used conditions rather than the built-in functions to work with the unit step, unit impulse, and unit ramp signals. Before time zero, all values for a unit step are zero, and after time zero, all values are one. Only one value at zero for impulse; all other values are zero. Stem function was used to create the discrete plot. Two separate signals were used, and we added and subtracted them using steps. We utilized ones and zeros to build functions in the last piece of code that plots the two provided signals. The first plot in code 4 was close to the one provided but not exact. The second performed similarly to the one that was specified.

For taking too small time difference in lab , the output of Unit step was not perfect.