"Heaven's light is our guide"

Rajshahi University of Engineering & Technology

Department of Electrical & Computer Engineering

Course Name : Digital Signal Processing Sessional
Course No : ECE 4124

Lab Report

Submitted To	***Submitted By***
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Experiment No: 01

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Experiment Name:

i. *Plot Unit-Step, Unit Impulse, Ramp signal using MATLAB.*

ii. *Plot two different discreate signal and show their addition and subtraction using MATLAB.*

Theory:

Signal is a function that convoys information about a phenomenon. It is basically in two types. Continuous & Discreate signal.

A **Continuous signal** is a signal that varies continuously over time or space. It is represented by a continuous function that can take any value within a given range. On the other hand, a **Discreate signal** is a signal that define only at discreate points in time or space. Which is represented by a sequence of values, where each value corresponds to a specific time or location.

There are some **Singularity functions** which are the basis of every functions & also used in Heaviside operation. They are Unit Step Function, Unit Impulse & Ramp Function.

Unit Step Function denoted by **u(t)**, where u(t) = 1 (at t>=0) & zero otherwise.

Unit Impulse Function is also called Dirac delta. It is function at certain location with no area inside the function & infinite in the length. It is the differentiation of the Unit Step Function. It is denoted by **Δ(t)**, where Δ(t)=infinite or ideally one for mathematical calculation & zero otherwise.

Ramp function is a function with linearly increasing with time. Basically, it is the integration of the Unit Step Function. It is represented by **r(t)**.

Code:

- ***Code for plotting Singularity functions:***

```
1 -    t=-10:1:10;
2 -    unit=t>=0;
3 -    subplot(3,1,1);
4 -    stem(t, unit);
5 -    title('Unit Step Signal');
6
7 -    impulse=t==0;
8 -    subplot(3,1,2);
9 -    stem(t, impulse);
10 -   title('Unit Impulse Signal');
11
12 -   unit1=t;
13 -   unit2=t>0;
14 -   unit3=unit1.*unit2;
15 -   subplot(3,1,3);
16 -   stem(t, unit3);
17 -   title('Ramp Signal');
```

Output:

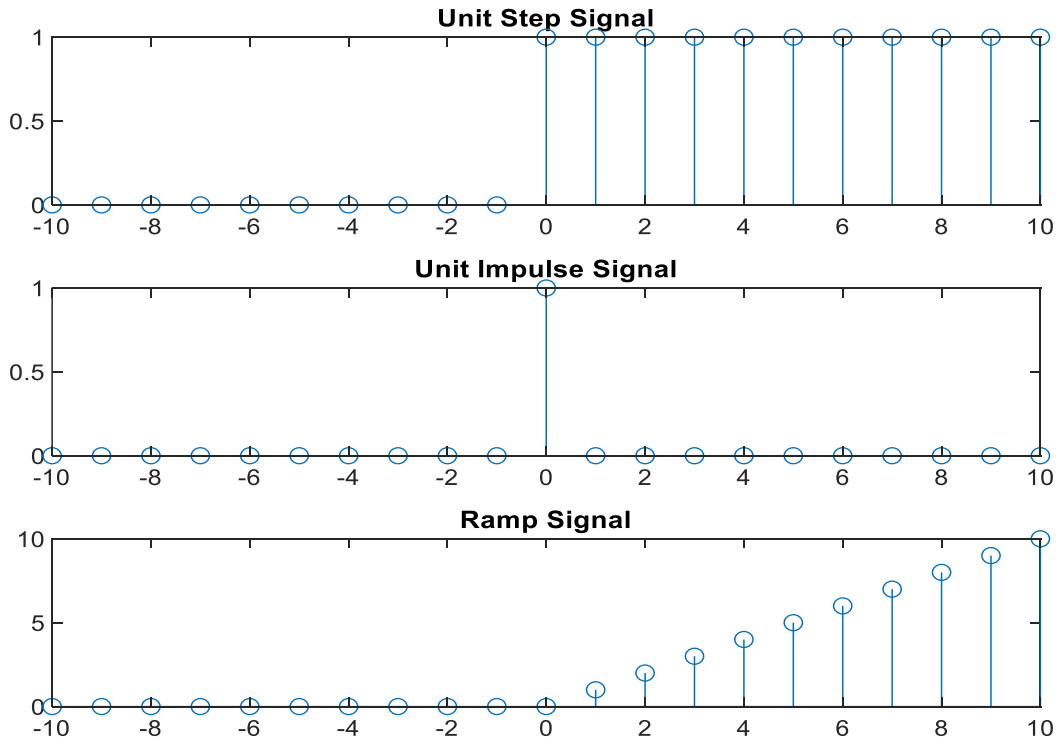

Fig. 1: Output of the Singularity Functions Signal.

- ***Code for Arithmetic Operations of Discreate function:***

```
t=-20:1:20;
x=zeros(size(t));
for i=21:31
    x(i)=1;
end
subplot(4,1,1);
stem(t,x);
title('First Signal');

y=zeros(size(t));
for i=26:36
    y(i)=1;
end
subplot(4,1,2);
stem(t,y);
title('Second Signal');

add=x+y;
subplot(4,1,3);
stem(t,add);
title('Addition of two signal');

sub=x-y;
subplot(4,1,4);
stem(t,sub);
title('Substration of two signal');
```

Output:

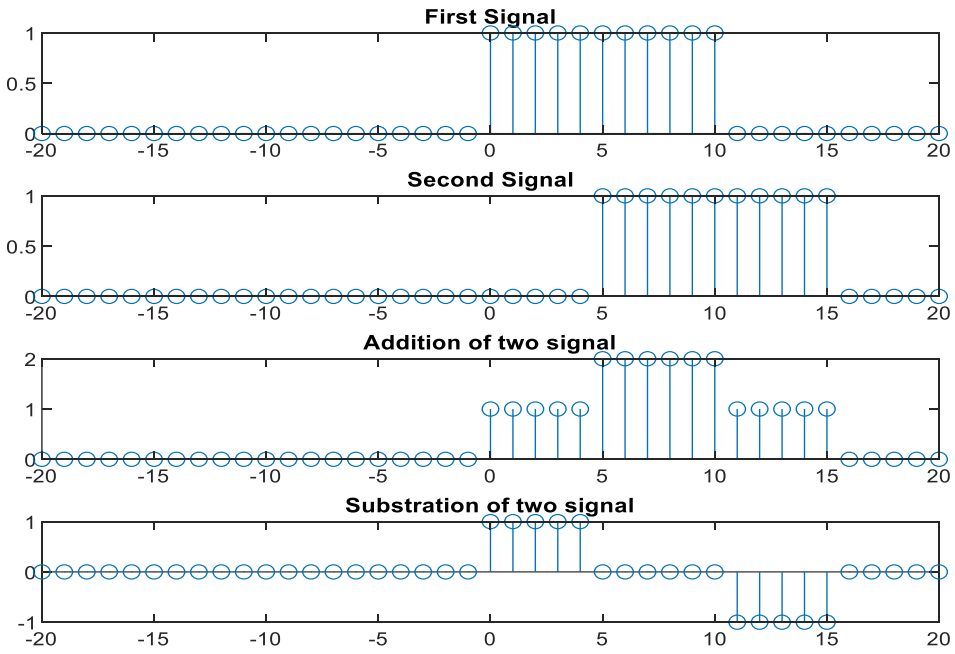

Fig. 2: Output of Arithmetic Operations of Discreate Signal.

Discussion:

This experiment is based on MATLAB simulation. Here we have plotted unit step, unit impulse and ramp function. We have added and subtract two discrete functions. In the case of continuous signal, I've faced some difficulties of MATLAB implementation.