Rajshahi University of Engineering & Technology

Department of Electrical and Computer Engineering

Course No: ECE 4124

Course Title: Digital Signal Processing Sessional

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Experiment Name: Presentation and Convolution of some signals using MATLAB.
1. Study of circular convolution of two signals using MATLAB.
2. Plot two discrete signal, their addition and subtraction.
3. Figure Drawing of two signals

Theory: When circularly-shifted copies of a signal are important, circular convolution, a form of convolution that is defined for two finite-length sequences, is helpful in signal processing and other applications. Circular convolution creates an output sequence that is the same length as the input sequences, as opposed to linear convolution, which creates an output sequence whose length is equal to the sum of the input sequences' lengths minus one. MATLAB can quickly plot a function's graph and create the appropriate illustrations.
Additionally, it has mathematical capabilities and displays the real plot figure.

Required software: MATLAB

Code 1: Circular Convolution-

```matlab
%y=ifft(fft(x).*fft(h,length(x)));
%disp(y);
clc;
clear;
close all;
x=input('Enter the first array: ');
l1=length(x);
h=input('Enter the second array: ');
l2=length(h);
z=zeros(1,l1);
for i=1:l1
    for j=1:l1
        k=mod(i-j,l1)+1;
        z(i)=z(i)+x(j)*h(k);
    end
end
disp('Input Signals: ')
disp(x);
disp(h);
disp('Circular Convolution: ');
disp(z);
stem(z);
```

Output Graph:

## Output 1: Circular Convolution-
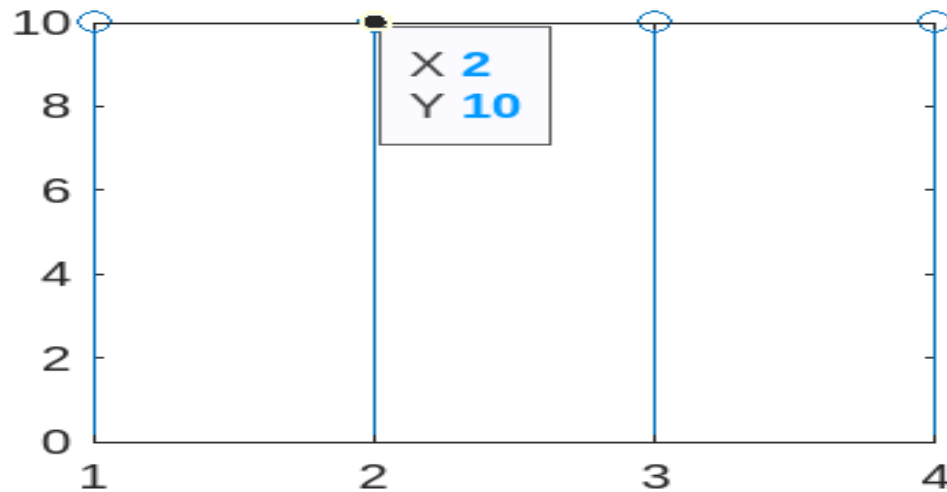
Code 2: Addition and Substraction-

```
n1 = [0, 0, 0, 2, 2, 2, 1, 1, 1, 0, 2]
subplot(4, 1, 1);
stem(n1);
title('1st signal');
xlabel('Index');
ylabel('Value');
n2 = [2, 2, 0, 1, 1, 1, 0, 0, 0, 0, 3]
subplot(4, 1, 2);
stem(n2);
title('2nd signal');
xlabel('Index');
ylabel('Value');
n3=n1+n2;
subplot(4, 1, 3);
stem(n3);
title('Summation');
xlabel('Index');
ylabel('Value');
n4=n1-n2;
subplot(4, 1, 4);
stem(n4);
title('Subtraction');
xlabel('Index');
ylabel('Value');
```

Output Graph:
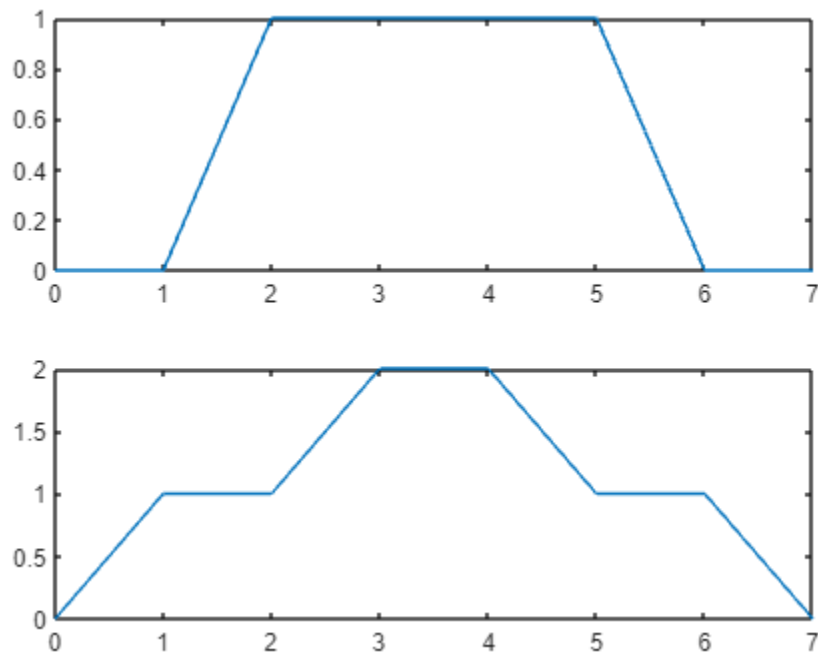
Output 2: Addition and Substraction of Signals-
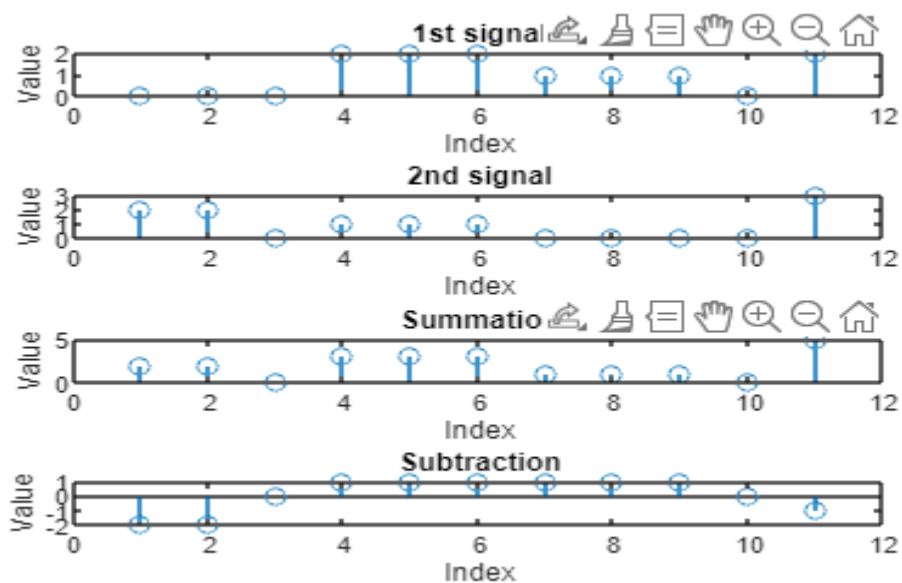
Code 3: Figure Drawing-

```
x=[0 0 1 1 1 1 0 0];
t=0:1:7;
subplot(2,1,1);
plot(t,x);
y=[0 1 1 2 2 1 1 0];
t=0:1:7;
subplot(2,1,2);
plot(t,y);
```

Output Graph:

Output 3: Figure Drawing-

Conclusion: In the experiment, The codes gave correct output graphs which were same as the theoretical explanation and given functions.