***Heaven’s Light is Our Guide***

**Rajshahi University of Engineering & Technology**

****

*Department of Electrical & Computer Engineering*

**Course Title:** Digital Signal Processing Sessional

**Course No. :** ECE 4124

**Submitted by:        Submitted to:**

**Name:** Anika Nawer       Hafsa Binte Kibria

**Roll:**    1810012       Lecturer

**Submission Date:** 08-05-2023Dept. of ECE

      RUET

**Experiment No:** 02

**Experiment Date:** 03.05.23

**Experiment Name:** (i) Study of Circular Convolution and implementation by MATLAB code.

(ii) Plotting the summation and subtraction of two discrete signals on MATLAB.

(iii) Constructing two signals draw them on MATLAB.

**Objective:** The main objective of this experiment is to find the circular convolution of the input sequence and to learn summation and subtraction of two signals and to construct figure from signals on MATLAB.

**Theory:** Circular convolution, also known as cyclic convolution, is a special case of periodic convolution, which is the [convolution](https://en.wikipedia.org/wiki/Convolution) of two periodic functions that have the same period. Periodic convolution arises, for example, in the context of the [discrete-time Fourier transform](https://en.wikipedia.org/wiki/Discrete-time_Fourier_transform) (DTFT).

The circular convolution formula is

**Required Platform:** Matlab

**Code with figure:**

**i) Circular Convolution:**

clc;

clear all;

xn=[1,2,3,4];

hn=[1,1,1,1];

n=length(xn);

y=zeros(1,n);

for i=1:n-1

for j=1:n-1

z=mod(i-j,n);

y(i)=y(i)+xn(j).\*hn(z+1);

end

end

subplot(3,1,1);

stem(xn);

title('Signal xn');

subplot(3,1,2);

stem(hn);

title('Signal hn');

subplot(3,1,3);

stem(y);

title('Signal y');

**ii) Plotting, summation and subtraction of two discrete signal:**

clc;

clear all;

n1=[0,0,0,2,2,2,1,1,1,0,2];

n2=[2,2,0,1,1,1,0,0,0,0,3];

sum=n1+n2;

sub=n1-n2;

subplot(4,1,1);

stem(n1);

title('Signal n1');

subplot(4,1,2);

stem(n2);

title('Signal n2');

subplot(4,1,3);

stem(sum);

title('Signal sum');

subplot(4,1,4);

stem(sub);

title('Signal sub');

**iii) Constructing and drawing two signals:**

clc;

clear all;

h=1;

a=2;

b=4;

A=[0 0];

B=[b,0];

C=[0.5\*(b-a)+a h];

D=[0.5\*(b-a) h];

coor=[A;B;C;D;A];

subplot(2,1,1);

plot(coor(:,1),coor(:,2));

t=[1,2];

u=[2,2];

v=[3,4];

w=[4,4];

x=[5,2];

y=[6,2];

z=[7,0];

coor1=[A;t;u;v;w;x;y;z;A];

subplot(2,1,2);

plot(coor1(:,1),coor1(:,2));

**Discussion:**

From this experiment we have calculated circular convolution without using any default function. As we got same theoretical and experimental value so our implementation was right. We have also done summation and subtraction of two signals and have plotted them. And lastly we have constructed signals and have plotted them. As we got same theoretical and experimental value so our experiment was successful without any error.

**Conclusion:** As all of our experimental values and calculated values according to theory was same, so our whole experiment was successful.

**References:**

[1], *Circular Convolution*",wikipedia,2023. [Online]. Available: <https://en.wikipedia.org/wiki/Circular_convolution>.[Accessed:08-May- 2023].