Rajshahi University of Engineering& Technology

Department of Electrical & Computer Engineering

Course No: ECE 4123
Course Name: Digital Signal Processing

Submitted by:
Name: Sabiha Rubiatunnesa.
Roll: 1810007

Submitted to:
Hafsa Binte Kibria
LECTURER
OF ECE, RUET

Experiment No: 01

Experiment Date: 19.03.2023

Experiment Name: Implementation of convolution of 2 signal with and without conv function.

Theory:

Convolution is a mathematical way of combining two signals to form a third signal. It is the single most important technique in Digital Signal Processing. Convolution is used in digital signal processing to study and design linear time-invariant (LTI) systems such as digital filters. Convolution for linear time-invariant systems. In practice, the convolution theorem is used to design the filter in the frequency domain.

In equation form: y[n] x[n] ✳ h[n] ' y[n] Expressed in words, the input signal convolved with the impulse response is equal to the output signal. Just as addition is represented by the plus, +, and multiplication by the cross, ×, convolution is represented by the star, ✳.

Required software: Matlab

1. Convolution using conv function:

   Code:

```
clc;

clear all;

close all;
x = [1 2 3 4]
h = [4 4 3 2]
n = -4:1:4
N = 7;
w = conv(x,h)
figure(1)
stem(w)
```
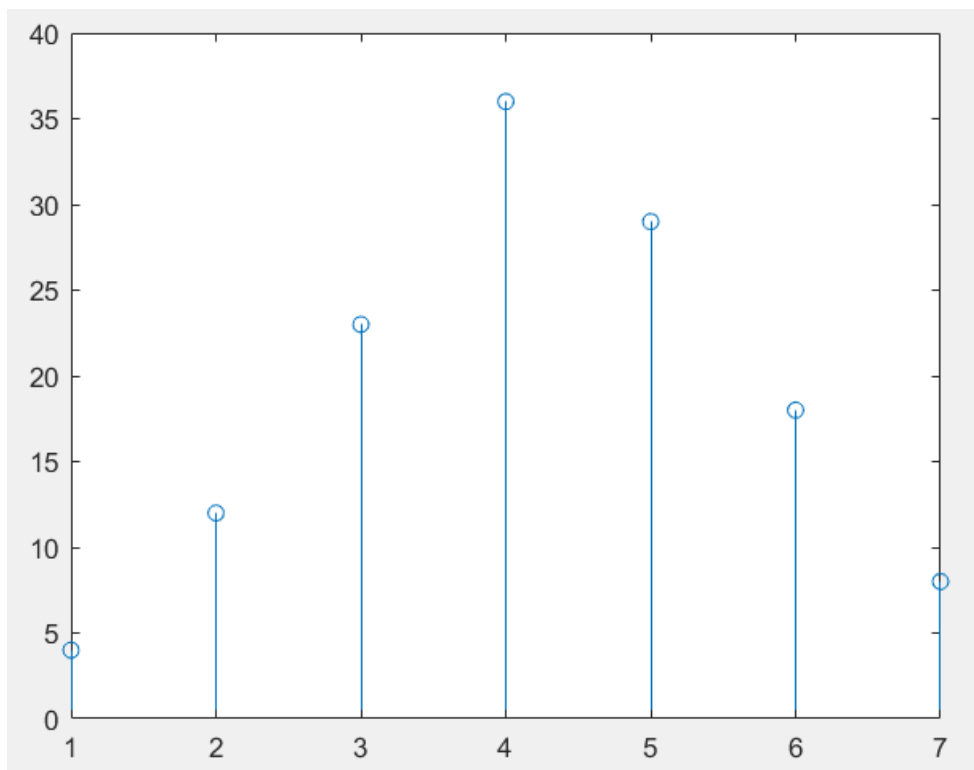
Output:

```
x =

     1     2     3     4

h =

     4     4     3     2

n =

    -4    -3    -2    -1     0     1     2     3     4

w =

     4    12    23    36    29    18     8
```

Figure:

2. Convolution without using conv function:

Code:

```
clc;
clear all;
close all;
L = input('input L: ');
M = input('input M: ');
x = input('input matrix x: ');
h = input('input matrix h: ');
n = -4:0:3;
limit = L+M-1;
for i = 1:limit
    y(i) = 0;
    for k = 1:M
        if(i>M)
            h(i) = 0;
        end
        if(i-k+1>0)
            y(i) = y(i) + x(k)*h(i-k+1);
        else
        end
    end
end
y
figure(1)
stem(y)
```
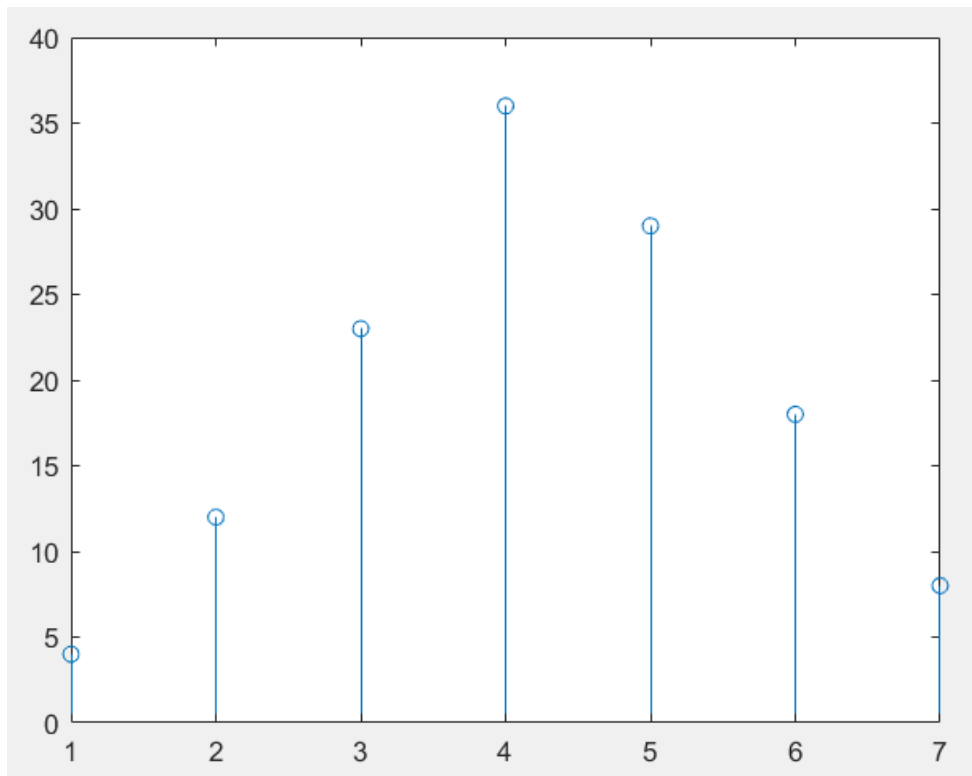
Output:

```
input L: 4
input M: 4
input matrix x: [1 2 3 4]
input matrix h: [4 4 3 2]


y =

     4    12    23    36    29    18     8
```

Figure:

Conclusion:

The experiment was done successfully as the output of both the code using and without using conv function has given the same result as we have found in theoretical analysis.