Rajshahi University of Engineering & Technology
Department of Electrical & Computer Engineering

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Course Title: Digital Signal Processing Sessional

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Submitted to

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Experiment No: 02

Experiment Name: Study of Linear Convolution

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Theory :

In signal processing, the convolution procedure is frequently used to combine two signals into one. Convolution is a term used in signal processing to explain how input signals and output signals of linear systems interact. Two signals, one of which is typically referred to as the input signal and the other as the impulse response or the kernel, are multiplied in a convolutional algorithm. The end result is then integrated over time to create a new signal that serves as the system output. The convolution operation accomplishes the filtering, and the impulse response can be thought of as a filter that shapes the incoming signal.

Convolution is a fundamental operation in digital signal processing, and it has a wide range of applications in various fields, including audio and image processing, computer vision, and telecommunications. It is used to perform tasks such as noise reduction, signal filtering, feature extraction, and pattern recognition.
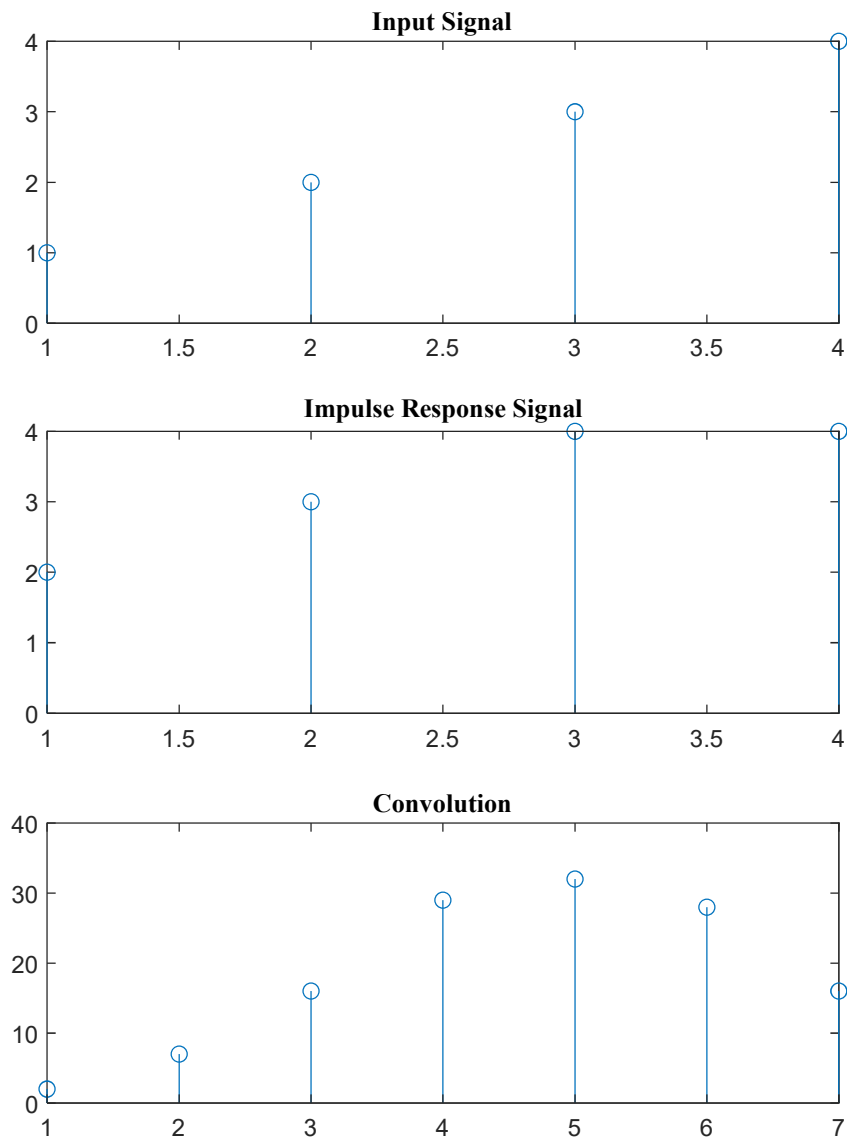

Software: MATLAB

Code:

```
1. clc
2. clear all
3. x = [1, 2, 3, 4];
4. h = [2 3 4 4];
5. y = zeros(1,length(x) + length(h)-1);
6. for n = 1:length(y)
7. for k = 1:length(h)
8. if n-k+1>0 && n-k+1 <= length(x)
9. y(n) = y(n)+h(k)*x(n-k+1);
10.       end
11.       end
12.       end
13.
14.       subplot(3,1,1);
15.       stem(x);
16.       title('Input Signal');
17.
18.       subplot(3,1,2);
19.       stem(h);
20.       title('Impulse Response Signal');
21.
22.       subplot(3,1,3);
23.       stem(y);
24.       title('Convolution');
```

Output :

Discussion : Without using the MATLAB convolution function, we learned how to build linear convolution in MATLAB for digital signal processing in this experiment.

Conclusion : The graph we got was as expected. The code worked as intended and was executed without any errors. So, we can come to a conclusion that the experiments were done successfully.