

*Heaven's Light is Our Guide*

## **Rajshahi University of Engineering & Technology**



*Department of Electrical & Computer Engineering*

**Course No:** ECE 4124

**Course Name:** Digital Signal Processing Sessional

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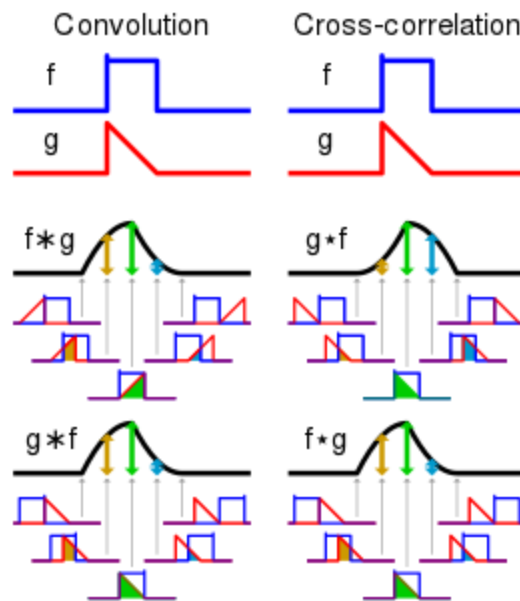
## Experiment No : 04

Experiment Date : 14-05-2023

Experiment Name : Finding the delay of given two signals using cross-correlation in matlab

Theory : Correlation coefficient is a measure of how well two signals are related to each other in terms of their similarity, alignment, and dependence. It is widely used in digital signal processing (DSP) for various purposes, such as signal detection, estimation, compression, enhancement, and classification.

In signal processing, cross-correlation is a measure of similarity of two series as a function of the displacement of one relative to the other. This is also known as a sliding dot product or sliding inner-product. It is commonly used for searching a long signal for a shorter, known feature.



**Figure** : Convolution and cross-correlation

Code :

```
1. clc ;
2. clear all;
3. close all;

4. t = 0 : 1 : 10;

5. a = t>=1 & t<=2
6. b = t>=2 & t<=3
7. x = a+b;

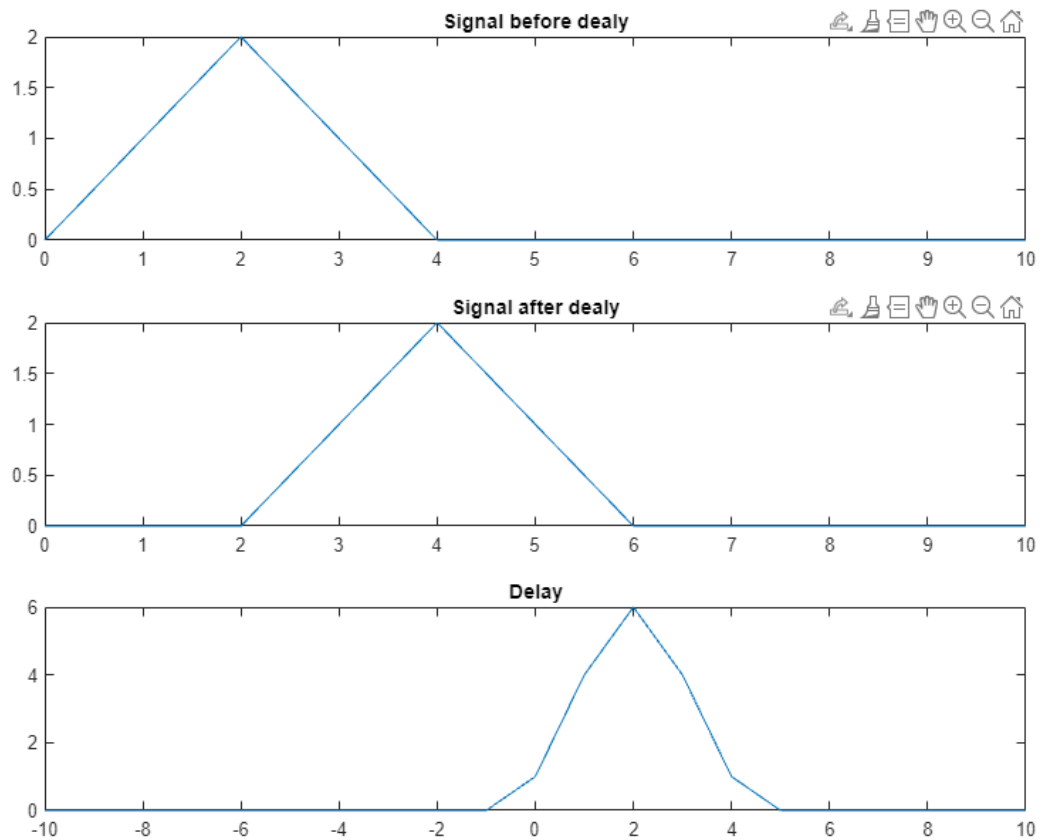
8. subplot (3,1,1)
9. plot (t,x)
10.title ('Signal before dealy')

11.c = t>=3 & t<=4
12.d = t>=4 & t<=5
13.y = c+d;

14.subplot (3,1,2)
15.plot (t,y)
16.title ('Signal after dealy')

17.range = length (t) - 1;
18.z = ( - range : range);
19.cor = xcorr (y,x);

20.subplot (3,1,3);
21.plot (z,cor);
22.title ('Delay');
```



**Figure** : Matlab simulation results

**Discussion & Conclusion** : In this experiment, the values were give carefully so that the accurate signals were generated. After the values were given and code was written the simulation showed the expected results.