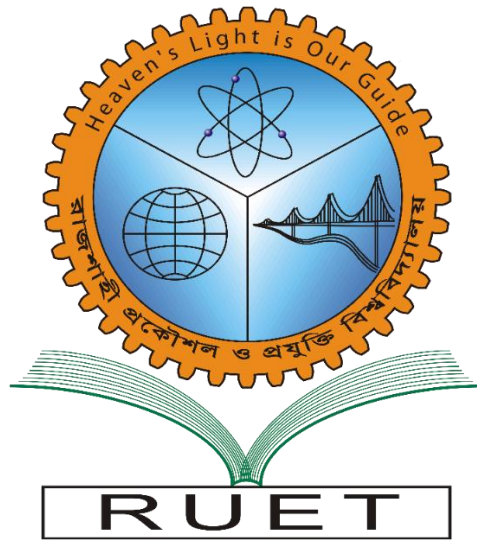


Heaven's Light is Our Guide

## RAJSHAHI UNIVERSITY OF ENGINEERING & TECHNOLOGY



### Department of Electrical & Computer Engineering

**Course Title** : Digital Signal Processing Sessional

**Course No.** : ECE 4124

**Experiment No.** : 03

**Experiment Name** : Study and Implementation of Auto Co-Relation and Cross Co-Relation in MATLAB

**Experiment Date** : 07-May-2023

#### Submitted By,

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### 3.1) Experiment No.: 03

### 3.2) Experiment Date: 07-May-2023

### 3.3) Name of the Experiment:

Study and Implementation of Auto Co-Relation and Cross Co-Relation in Matlab.

### 3.4) Theory:

#### Auto Co-Relation:

Autocorrelation is an important concept in signal processing because it allows us to analyze the similarity between a signal and its delayed versions. In signal processing, autocorrelation is often used to identify periodicity in a signal, estimate the pitch of a sound, or determine the delay between two signals.

A signal's autocorrelation function can provide important details about the signal's properties. For instance, the autocorrelation function of a periodic signal will have peaks at multiples of the period. A signal's autocorrelation function will have a high value at zero lag and a low value at other delays if the signal is noisy.

#### Cross Co-Relation:

A statistical concept called cross-correlation assesses how similar two signals are in proportion to their temporal delay. Cross-correlation is a technique used in signal processing to determine the delay between two signals or to determine whether a signal is there in a noisy environment.

By multiplying one signal by a time-reversed counterpart of the other signal, and then integrating over the full signal, cross-correlation is determined. The outcome is a new signal that depicts how similar the two signals are in relation to the temporal delay that separates them.

### 3.5) Code:

#### Auto Correlation:

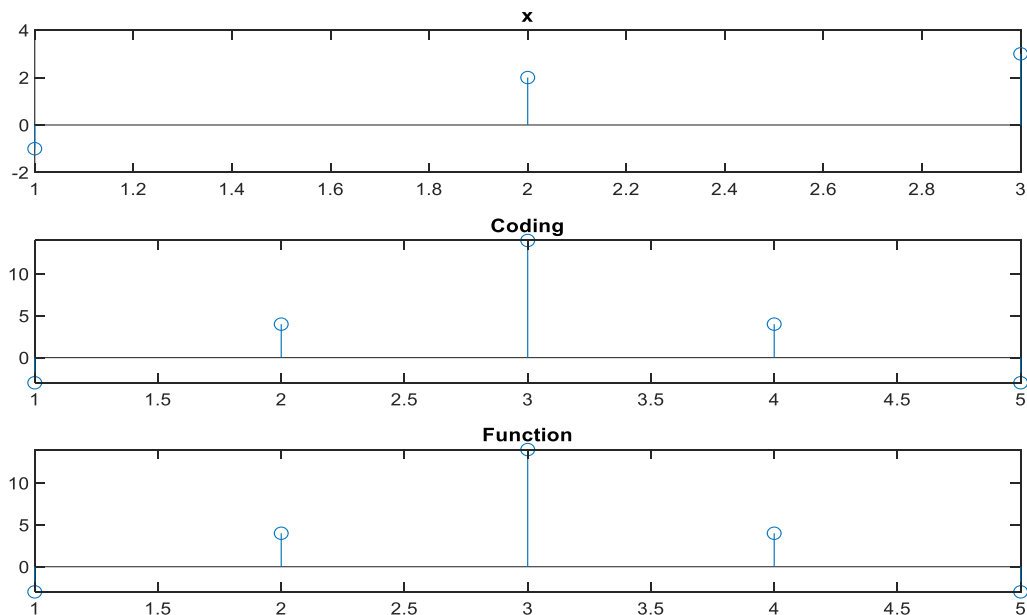
```
1  clear all;
2  clc;
3  x=input('Input the Value of x:');
4  %negative side
5  f=0;
6  for i=1:length(x)
7      ans=0;
8      p=1;
9      for j=length(x)-f:length(x);
10         ans=ans+x(j)*x(p);
11         p=p+1;
12     end
13     y(i)=ans;
14     f=f+1;
15 end
16 %positive
17 for i=2:length(x)
18     ans=0;
19     p=i;
```

```

20     for j=1:length(x)-i+1
21         ans=ans+x(p)*x(j);
22         p=p+1;
23     end
24     y(length(x)+i-1)=ans;
25 end
26
27 subplot(3,1,1);
28 stem(x);
29 title('x');
30
31 subplot(3,1,2);
32 stem(y);
33 title('Coding');
34
35 subplot(3,1,3);
36 stem(xcorr(x));
37 title('Function');

```

### Output of Auto Co-relation:



### Cross Co-relation:

```

1 clear all;
2 clc;
3 x=input('Input the Value of x:');
4 yy=input('Input the Value of y:');
5 %negative side
6 f=0;
7 for i=1:length(x)
8     ans=0;
9     p=1;
10    for j=length(x)-f:length(x);
11        ans=ans+yy(j)*x(p);
12        p=p+1;
13    end
14    y(i)=ans;
15    f=f+1;

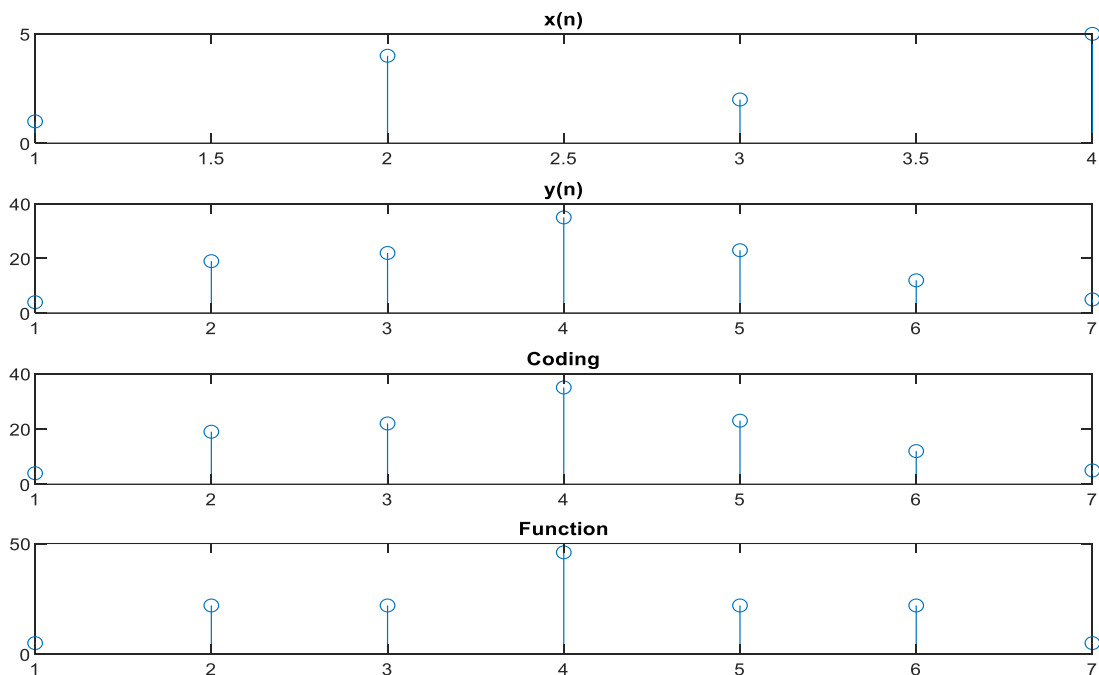
```

```

16 end
17 %positive
18 for i=2:length(x)
19     ans=0;
20     p=i;
21     for j=1:length(x)-i+1
22         ans=ans+x(p)*yy(j);
23         p=p+1;
24     end
25     y(length(x)+i-1)=ans;
26 end
27
28 subplot(4,1,1);
29 stem(x);
30 title('x(n)');
31
32 subplot(4,1,2);
33 stem(y);
34 title('y(n)');
35
36 subplot(4,1,3);
37 stem(y);
38 title('Coding');
39
40 subplot(4,1,4);
41 stem(xcorr(x));
42 title('Function');

```

### Output of Cross Co-relation:



### 3.6) Discussion & Conclusion:

In this experiment, we have implemented auto correlation and cross correlation in MATLAB. Here we have implemented by manually and also tested this result with the function of MATLAB. We have found similarities with two signals with the function. Thus, this experiment was successfully implemented and there was no error found during the execution.