# Rajshahi University of Engineering & Technology


## Department : Electrical & Computer Engineering

**Course No: ECE 4124**

**Course Name: Digital Signal Processing Sessional**

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## Experiment No:4

**Experiment Name:** Study about delay time with correlation.

## Theory:

When a signal sent is sent from a transmitter,suppose the signal arrives at the receiver after being delayed by an unknown interval of time.Now, suppose that we need to find this delay, which is a result of being transmitted over the communication channel. This objective can be achieved by cross-correlating the signal sent with the signal received.

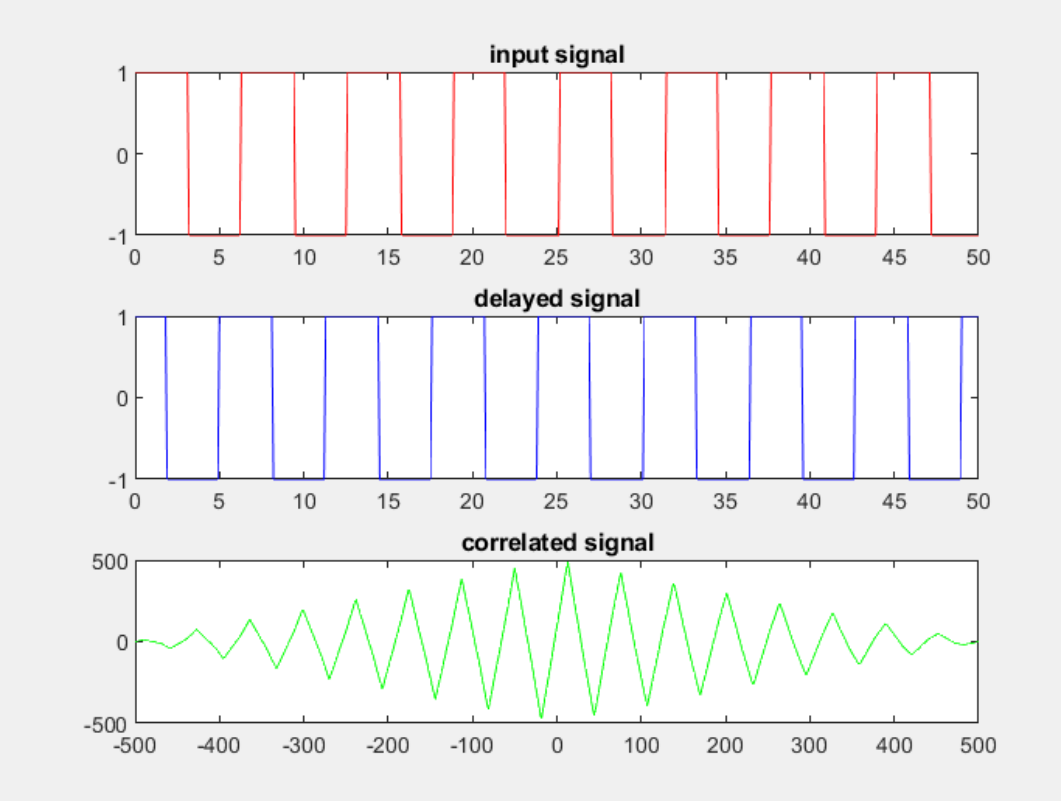
## Code:

```
clc;
clear;
close all;
t=0:0.1:50;
x1=square(t);
x2=square(t-5);
subplot(3,1,1);

plot(t,x1,'r');
title('input signal');
subplot(3,1,2);

plot(t,x2,'b');
title('delayed signal');
corr=xcorr(x1,x2);
t2=-length(x1)+1 : length(x1)-1;
subplot(3,1,3);
plot(t2,corr,'g');
title('correlated signal');
[max_val,max_index]=max(abs(corr));
```

time_delay=(max_index -1 )/10 ;

fprintf('timedelay is %.3f\n s',time_delay);

**Output:**




```
timedelay is 51.300
```

## Conclusion:

The graph exhibits a peak at time t = 51.30s. This means that the received signal matches with the test signal the best when the test signal is shifted by 51.30s units along the time-axis.