EXPERIMENT NO. 3

OBJECT: Write a MATLAB program to obtain linear convolution of the given sequences.

SOFTWARE USED: MATLAB 7.9

PROCEDURE:-

- Open MATLAB
- Open new M-file
- Type the program
- Save in current directory
- Compile and Run the program
- For the output see command window\ Figure window

THEORY:

Convolution is a mathematical operation used to express the relation between input and output of an LTI system. It relates input, output and impulse response of an LTI system as

$$y(t)=x(t)\square h(t)$$

Where y (t) = output of LTI

x (t) = input of LTI

h (t) = impulse response of LTI

There are two types of convolutions:

a) Continuous Convolution

$$y(t) = x(t) * h(t)$$
$$= \int_{-\infty}^{\infty} x(\tau)h(t-\tau)d\tau$$

b) Discrete Convolution

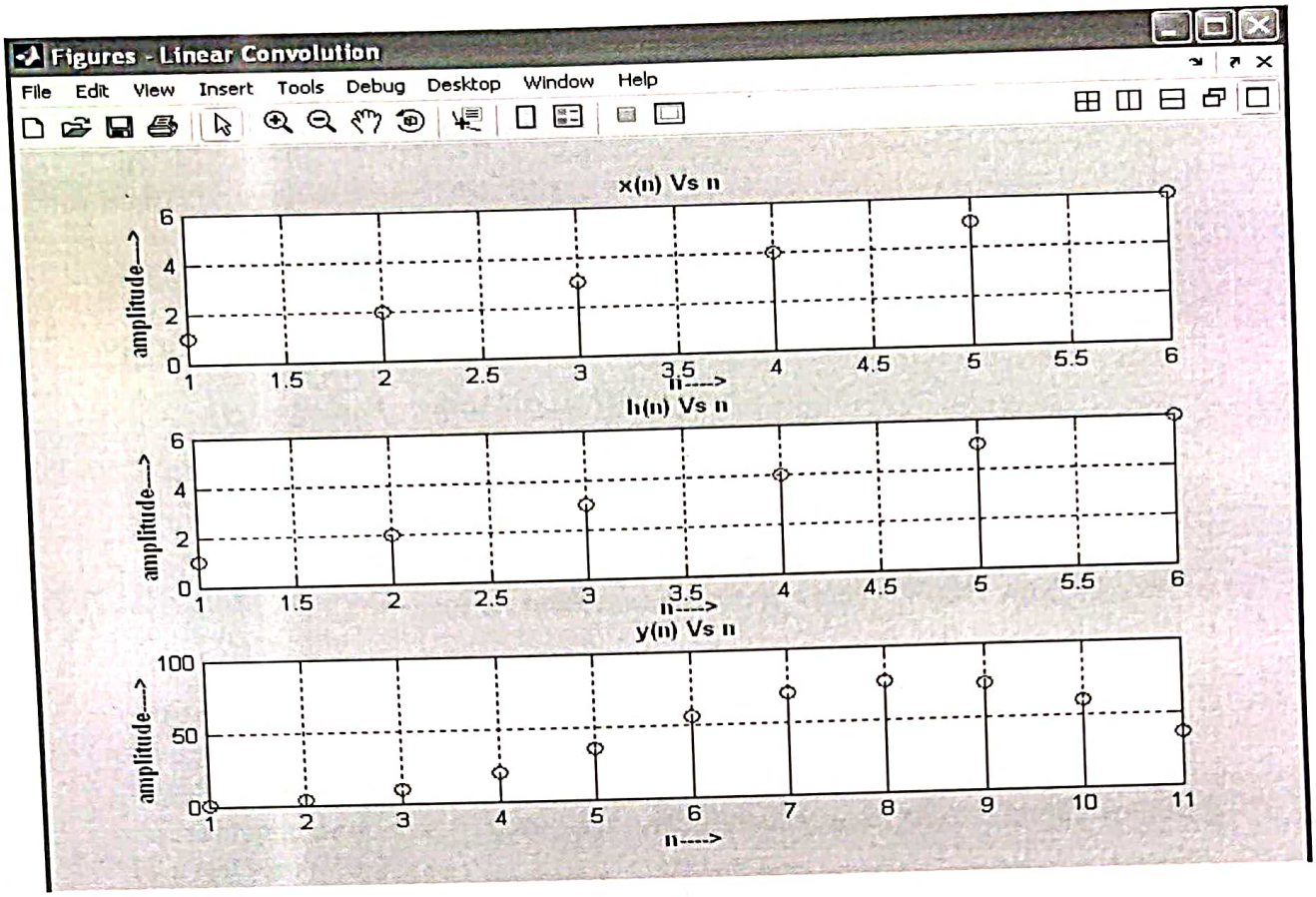
$$y(n) = x(n) * h(n)$$
$$= \Sigma_{k=-\infty}^{\infty} x(k)h(n-k)$$

PROGRAM:

```
clc;
clear all;
close;
disp('enter the length of the first sequence m=');
m=input('');
disp('enter the first sequence x[m]=');
for i=1:m
   x(i)=input('');
end
disp('enter the length of the second sequence n=');
n=input('');
disp('enter the second sequence h[n]=');
for j=1:n
   h(j)=input('');
end
y=conv(x,h);
figure;
subplot(3,1,1);
stem(x);
ylabel ('amplitude --->');
xlabel('n--- >');
title('x(n) Vs n');
subplot(3,1,2);
stem(h);
ylabel('amplitude --->');
xlabel('n--- >');
title('h(n) Vs n');
subplot(3,1,3);
stem(y);
ylabel('amplitude --->');
xlabel('n--- >');
title('y(n) Vs n');
disp('linear convolution of x[m] and h[n] is y');
```

INPUT:--

Enter the length of the first sequence m=



PRECAUTIONS:

1) Program must be written carefully to avoid errors.

2) Programs can never be saved as standard function name.

3) Functions in MATLAB are case sensitive so commands must be written in proper format.

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Enter the length of first sequence x[m]=

1

2

3

4

5

6

Enter the length of the second sequence n=

6

Enter the length of second sequence h[n]=

1

2

3

4

5

6

OUTPUT:-

Linear convolution of x[m] and h[n] is y=

1 4 10 20 35 56 70 76 73 60 36

RESULTS: - Thus the program for linear convolution is written using MATLAB and verified.