

LAB-I MANUALS

(EC-506)

M-Tech ECE(P.T.)

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Experiment No 1

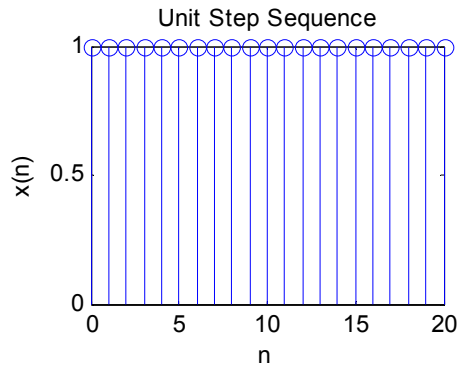
Aim of Experiment: -To develop programs for generating elementary signal functions like Unit Step, Ramp, Exponential, Sine and Cosine sequences.

Appartus: - PC installed with Matlab software.

Program: -

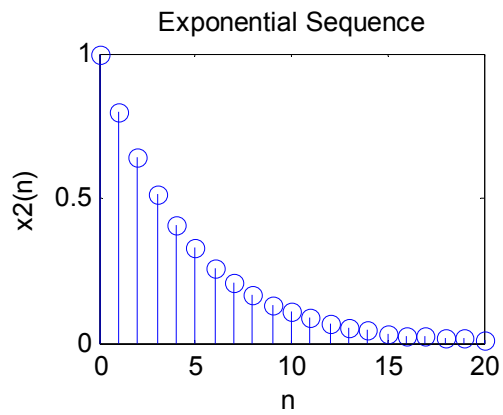
(a) %Unit Step Sequence:-

```
N=21;  
x=ones(1,N);  
n=0:1:N-1;  
subplot(2,2,1);stem(n,x);  
xlabel('n');ylabel('x(n)');  
title('Unit Step Sequence');
```



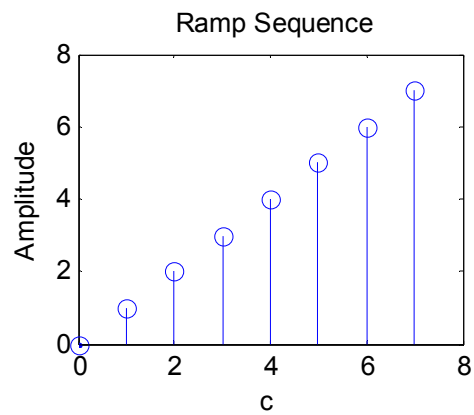
(b) %Exponential sequence: -

```
x2=0.8.^(n);  
subplot(2,2,3);stem(n,x2);  
xlabel('n');ylabel('x(n)');  
title('Exponential Sequence');
```



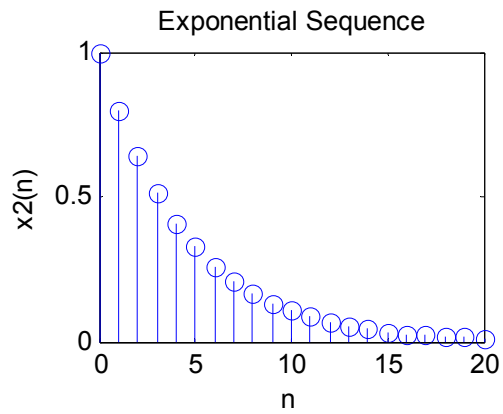
(c) % Ramp Sequence

```
x=input('enter the length of ramp sequence')
enter the length of ramp sequence
x =
    7
t=0:7;
subplot(2,2,1);stem(t,t);
xlabel('c');
ylabel('Amplitude');
title(' Ramp Sequence');
```



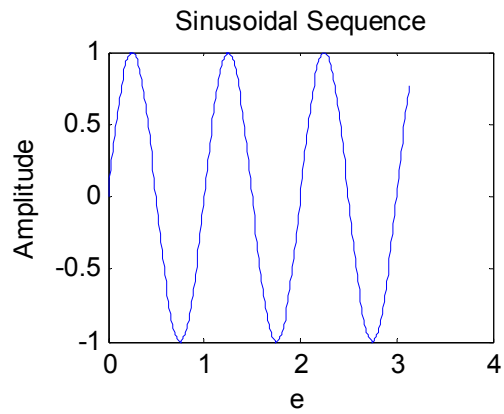
(d) %Exponential sequence: -

```
x2=0.8.^(n);  
subplot(2,2,3);stem(n,x2);  
xlabel('n');ylabel('x(n)');  
title('Exponential Sequence');
```



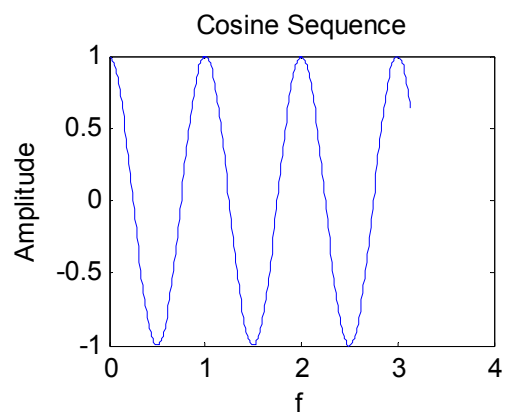
(e) %Sinusoidal sequence:-

```
t=0:0.01:pi;  
y=sin(2*pi*t);  
subplot(2,2,1);  
plot(t,y);  
ylabel('Amplitude');  
xlabel('e');  
title('Sinusoidal Sequence');
```



(f) % Cosine Sequence:-

```
t=0:0.01:pi;  
y=cos(2*pi*t);  
subplot(2,2,1);  
plot(t,y);  
ylabel('Amplitude');  
xlabel('f');  
title('Cosine Sequence');
```



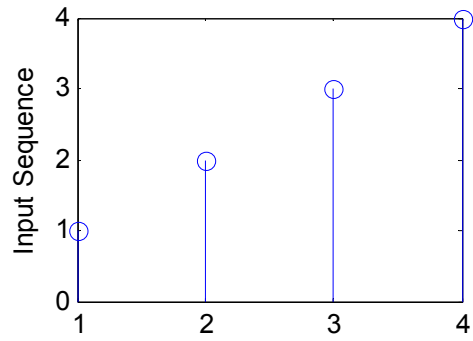
Experiment:-2

Aim of Experiment:- To develop the program for finding the convolution between two sequences.

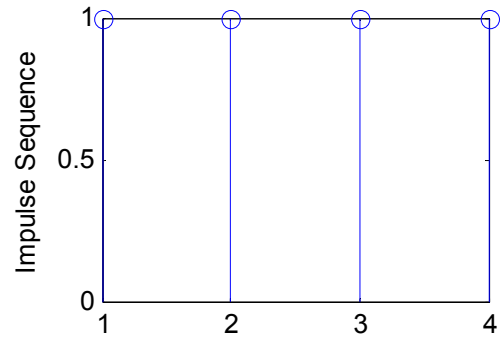
Appartus:- PC installed with Matlab Software.

Program:-

```
x=input('enter the first sequence')
enter the first sequence[1 2 3 4]
h=input('enter the second sequence')
enter the second sequence[1 1 1 1]
y=conv(x,h);
subplot(2,2,1);
stem(x);
xlabel('a');
ylabel('Input Sequence');
subplot(2,2,2);
stem(h);
xlabel('b');
ylabel('Impulse Sequence');
subplot(2,2,3);
stem(y);
xlabel('c');
ylabel('output sequence');
title('Convolution between two Sequences');
```

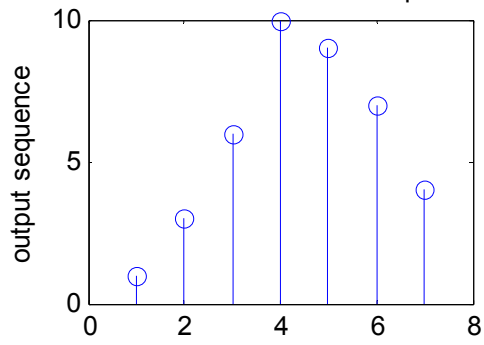


a



b

Convolution between two Sequences



c

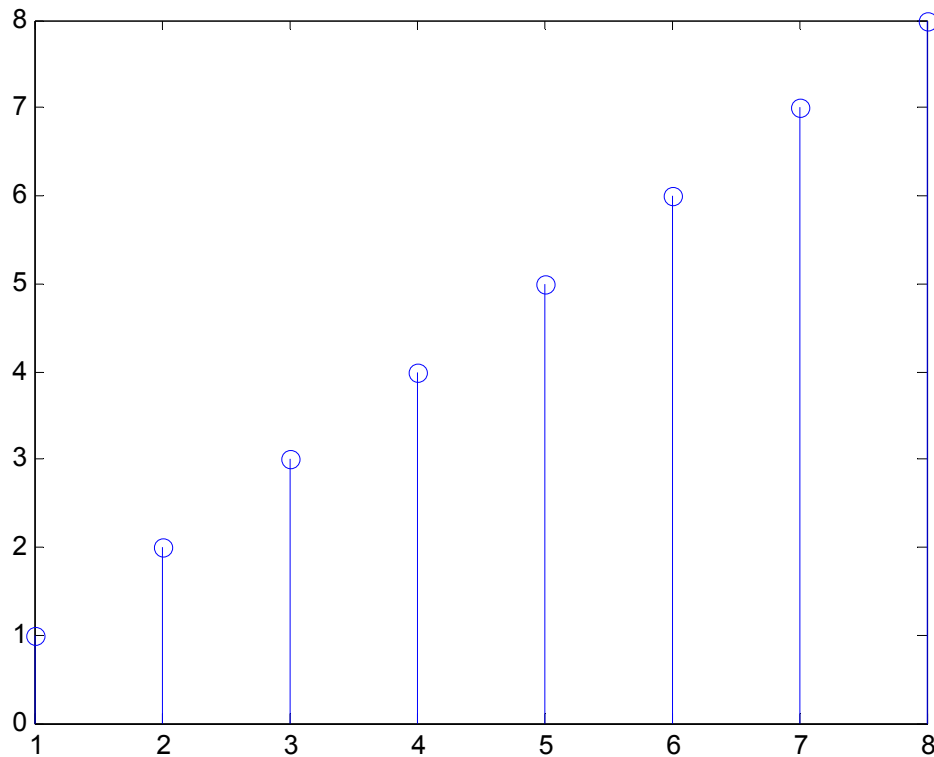
Experiment:-3

Aim of Experiment:- To develop the program for finding the DFT

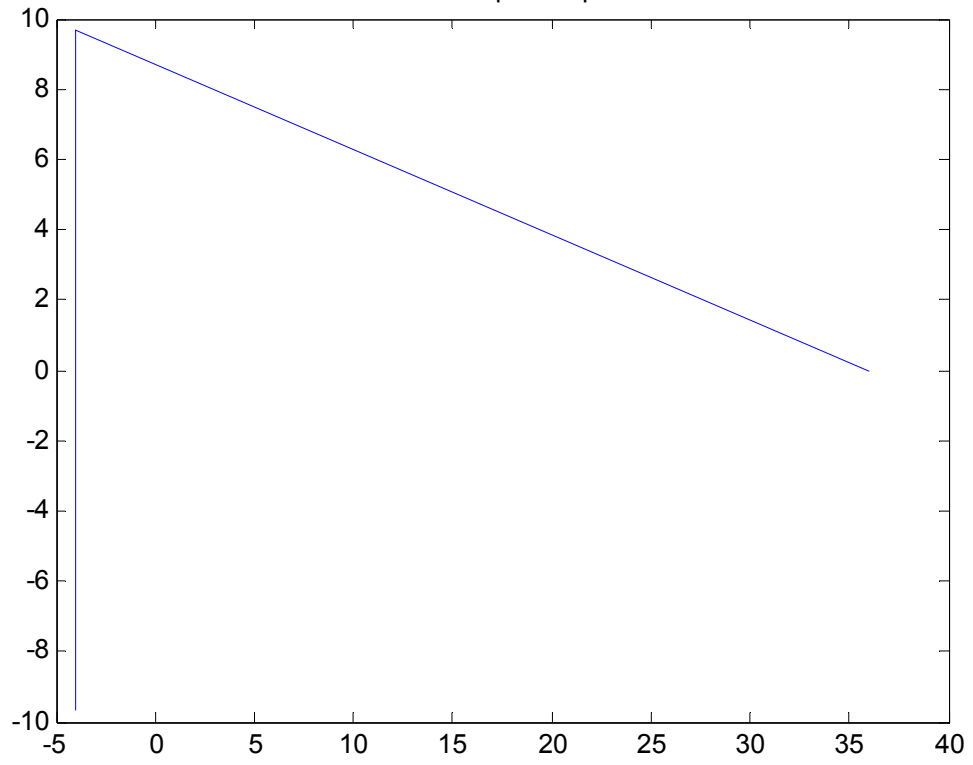
Appartus:- PC installed with Matlab Software

Program:-

```
x=input('enter the input sequence');  
enter the input sequence[1 2 3 4 5 6 7 8]  
n=input('enter the length of sequence');  
enter the length of sequence8  
X=fft(x,n);  
stem(x);  
plot(x);  
plot(X);  
title('DFT of the Input Sequence');
```



DFT of the Input Sequence



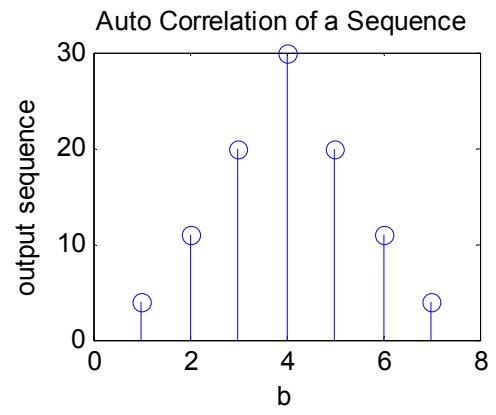
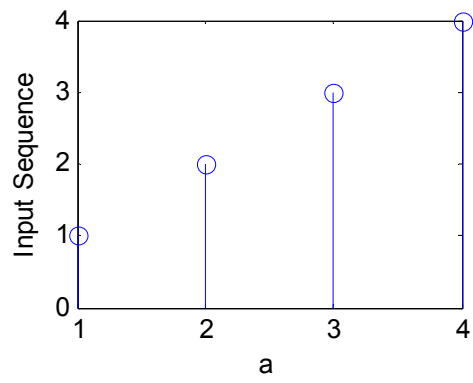
Experiment:-4

Aim of Experiment:- To develop the program for finding the Autocorrelation of a sequence.

Appartus:- PC installed with Matlab Software.

Program:-

```
x=input('enter the first sequence')
enter the first sequence[1 2 3 4]
y=xcorr(x,x);
subplot(2,2,1);
stem(x);
xlabel('a');
ylabel('Input Sequence');
subplot(2,2,2);
stem(y);
xlabel('b');
ylabel('output sequence');
title('Auto Correlation of a Sequence ');
```



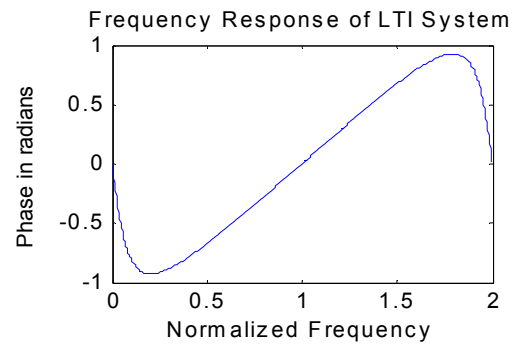
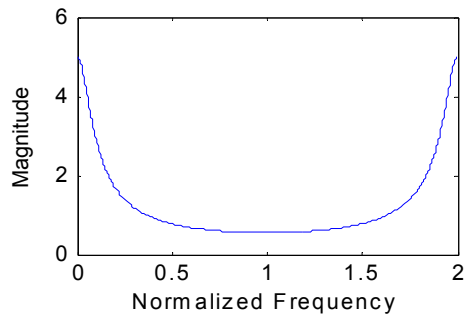
Experiment:-5

Aim of Experiment:- To develop the program for finding the magnitude and phase response of system described by system function $H(s)$.

Appartus:- PC installed with Matlab Software.

Program:-

```
b=[1];
a=[1,-0.8];
h=freqz(b,a,w);
w=0:0.01:2*pi;
[h]=freqz(b,a,w);
subplot(2,2,1);
plot(w/pi,abs(h));
xlabel('Normalized Frequency');
ylabel('Magnitude');
subplot(2,2,2);
plot(w/pi,angle(h));
xlabel('Normalized Frequency');
ylabel('Phase in radians');
title('Frequency Response of LTI System');
```



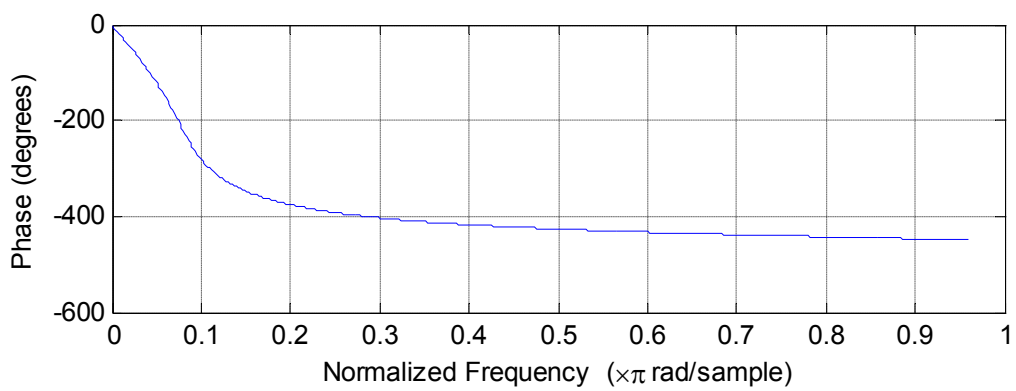
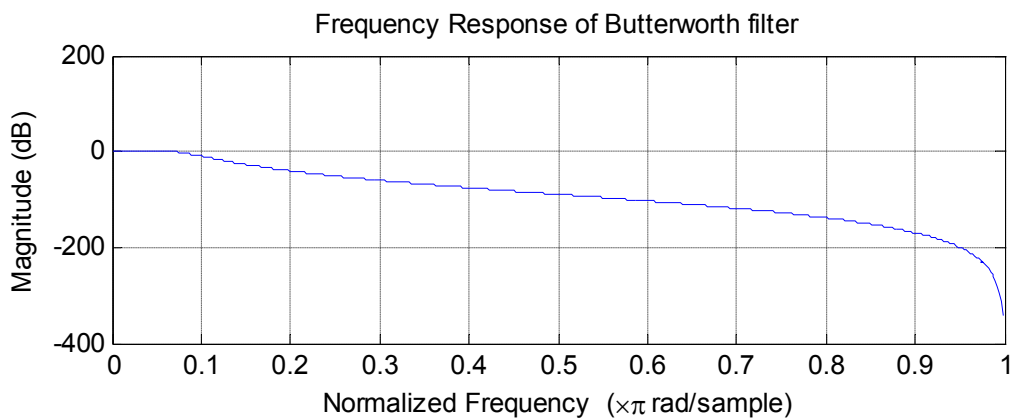
Experiment:-6

Aim of Experiment:- To develop the program for designing Low Pass Butterworth filter having passband defined from 0-40 Hz and stopband in the range of 150-500Hz having less than 3 dB of ripple in the passband and atleast 60dB of attenuation in the stopband.

Appartus:- PC installed with Matlab Software.

Program:-

```
wp=40/500;  
ws=150/500;  
[n,wn]=buttord(wp,ws,3,60);  
n =  
    5  
wn =  
    0.0810  
(b,a)=butter(n,wn);  
freqz(b,a)  
title('Frequency Response of Butterworth filter')
```



Experiment:-7

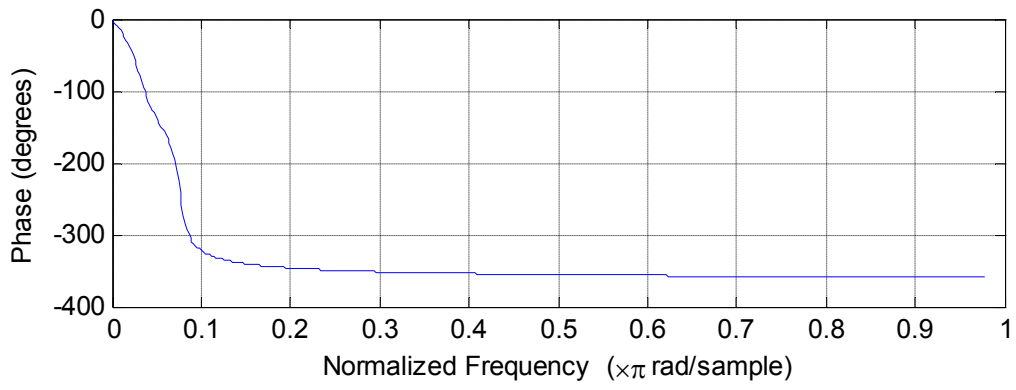
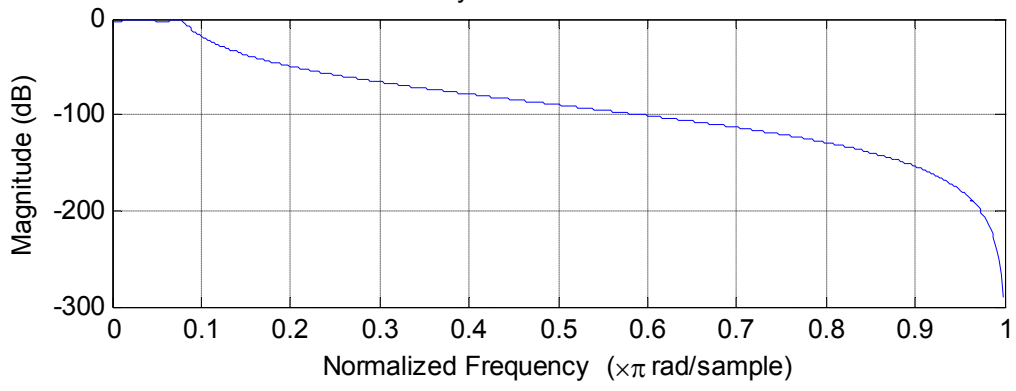
Aim of Experiment:- To develop the program for designing Low pass Type 1 Chebyshev filter having passband defined from 0-40 Hz and stopband in the range of 150-500Hz having less than 3 dB of ripple in the passband and atleast 60dB of attenuation in the stopband.

Appartus: - PC installed with Matlab Software.

Program: -

```
wp=40/500;
ws=150/500;
[n,wn]=cheb1ord(wp,ws,3,60)
n =
    4
wn =
    0.0800
[b,a]=cheby1(n,3,wn);
freqz(b,a)
title('Chebyshev Low Pass Filter');
```

Chebyshev Low Pass Filter



Experiment:-8

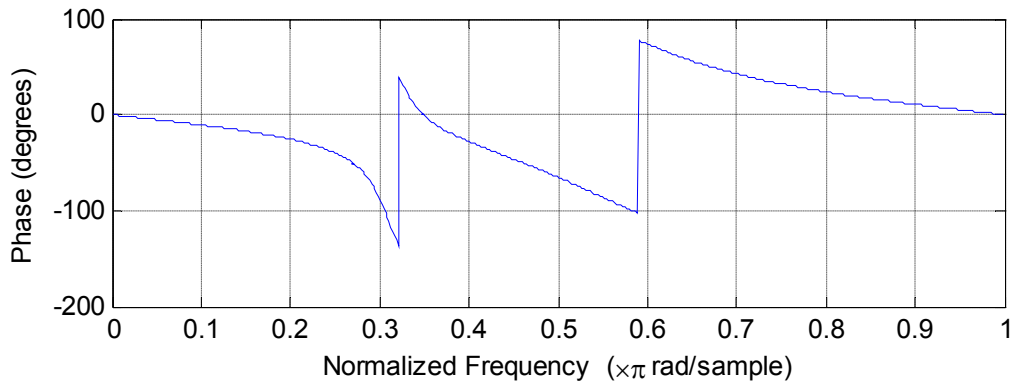
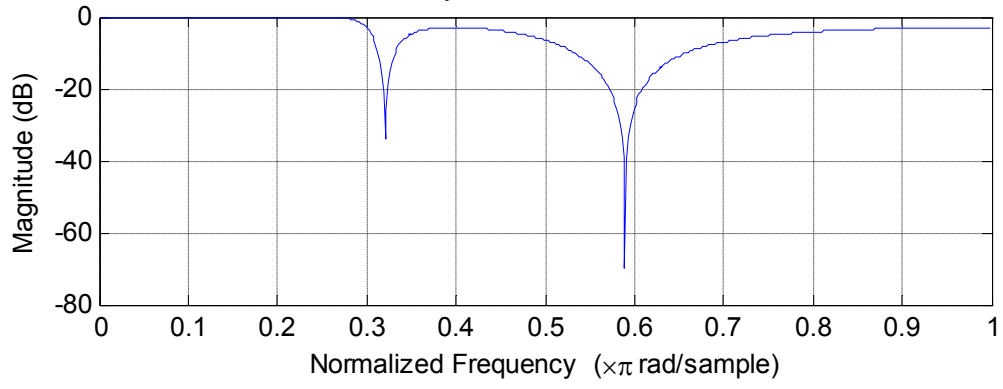
Aim of Experiment:- To develop the program for designing Low pass Type II Chebyshev filter having passband defined from 0-40 Hz and stopband in the range of 150-500Hz having less than 3 dB of ripple in the passband and atleast 60dB of attenuation in the stopband.

Appartus: - PC installed with Matlab Software.

Program: -

```
wp=40/500;
ws=150/500;
[n,wn]=cheb2ord(wp,ws,3,60)
n =
    4
wn =
    0.0800
[b,a]=cheby2(n,3,wn);
freqz(b,a)
title('Chebyshev Low Pass Filter');
```

Chebyshev Low Pass Filter



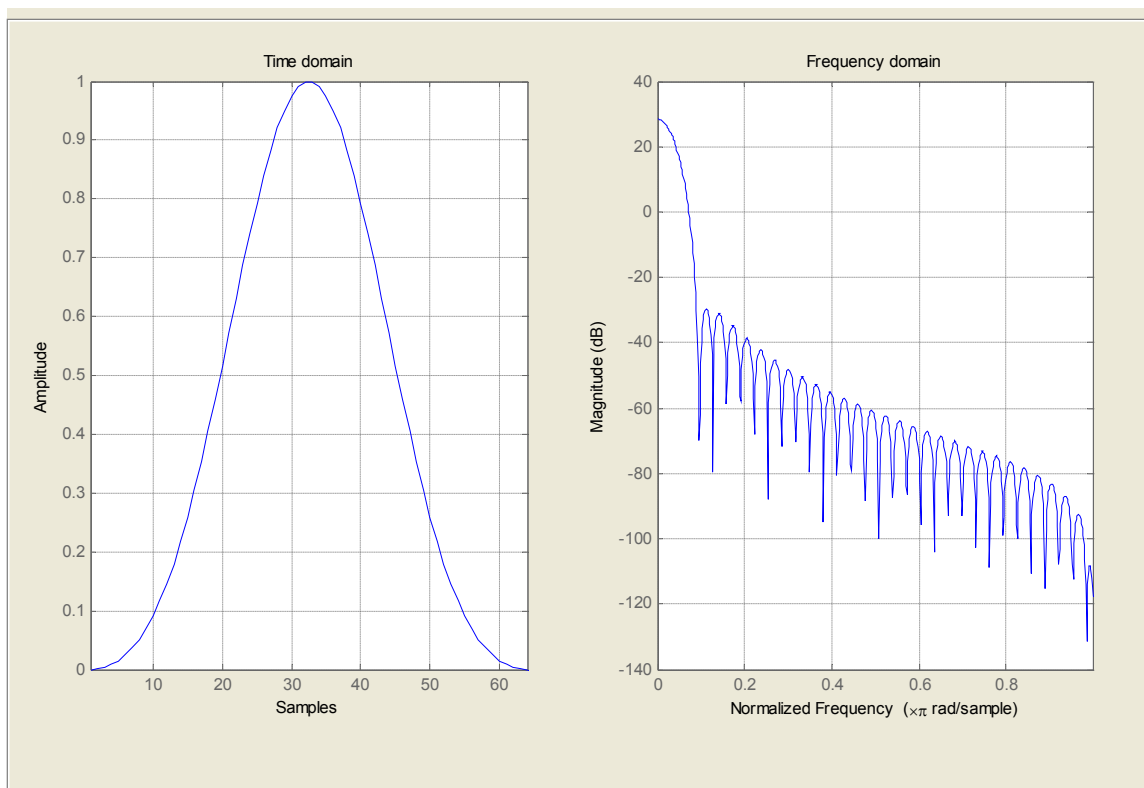
Experiment:-9

Aim of Experiment:- To develop a program for designing FIR Filters

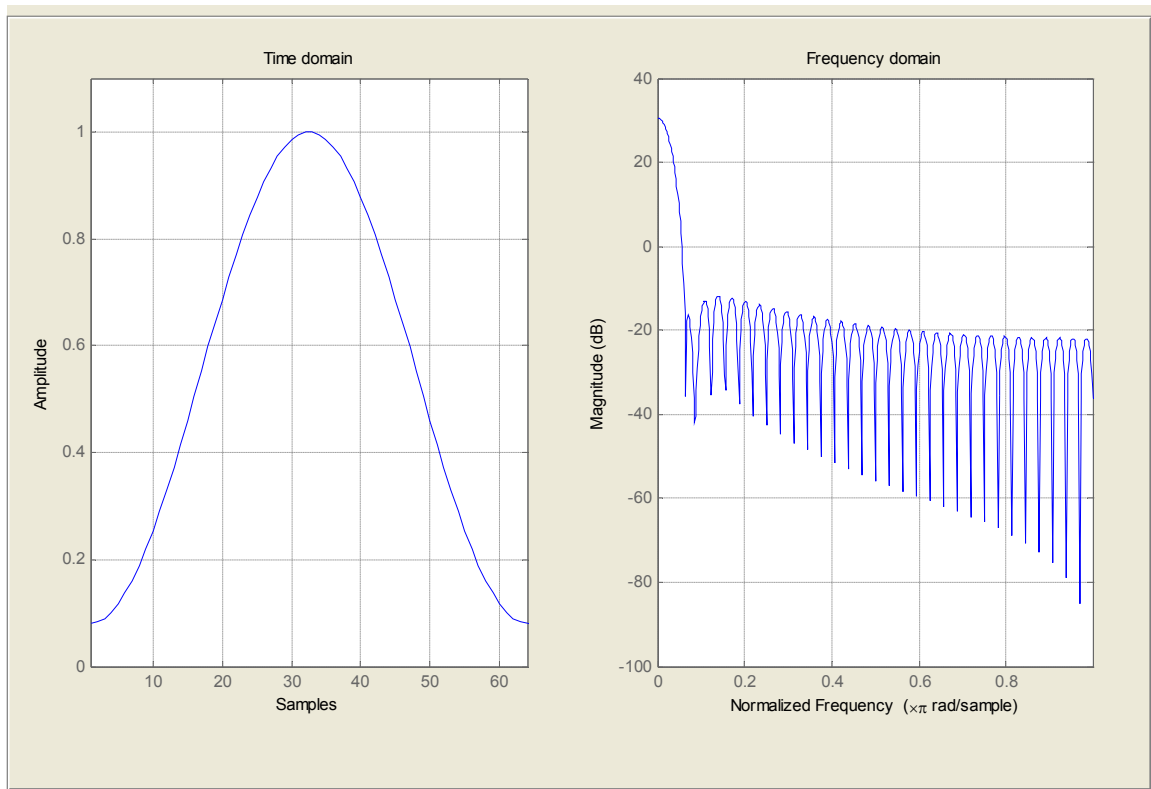
Appartus:- PC installed with Matlab Software.

Program:-

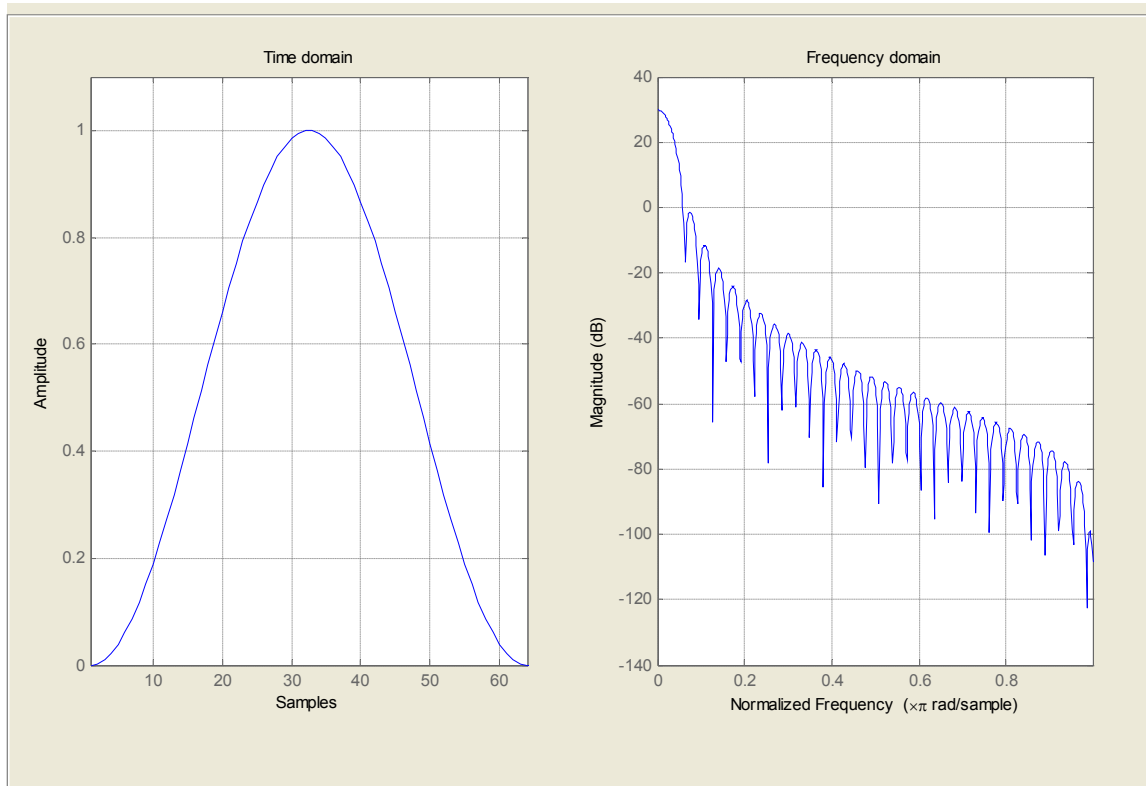
```
N=64;  
wvtool(blackman(N))  
wvtool(hamming(N))  
wvtool(hann(N))  
wvtool(gausswin(N))  
wvtool(Blackman(N),hamming(N),hann(N),gausswin(N))
```



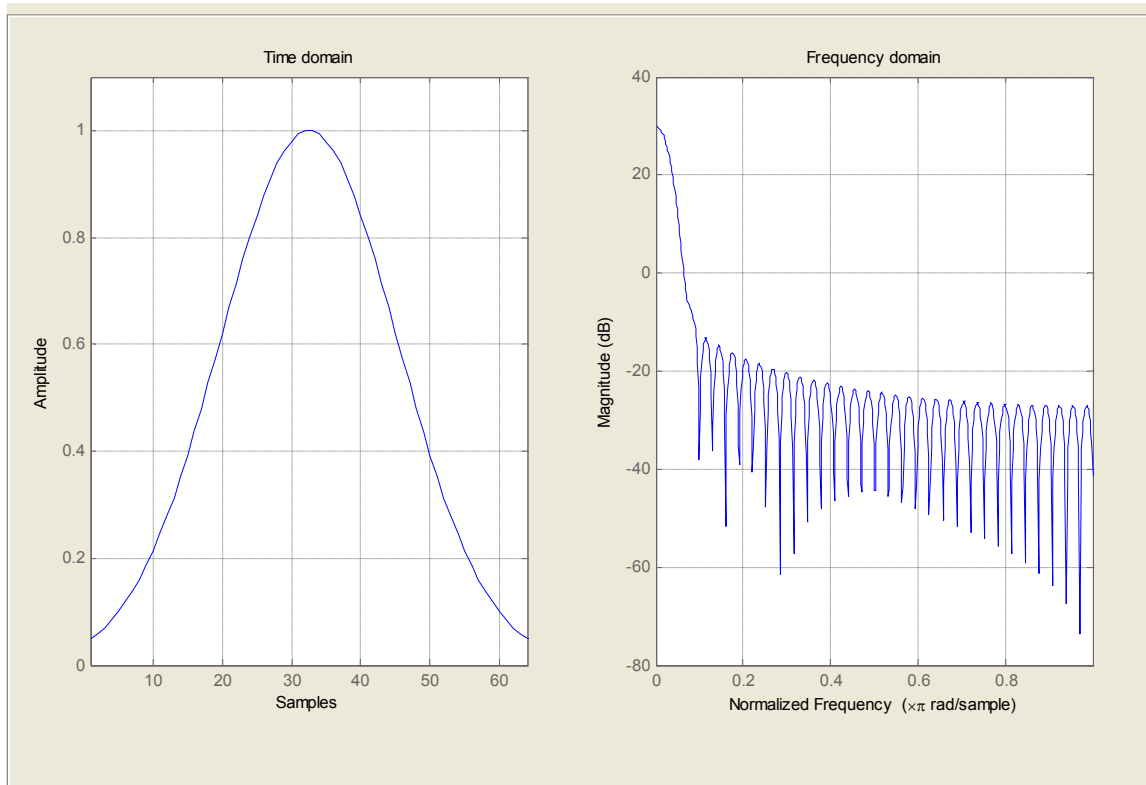
Blackman Window



Hamming Window



Hanning Window



Gaussian window

Experiment:-10

Aim of Experiment:- To develop a program for designing IIR Filters .

Appartus: - PC installed with Matlab Software.

Program:-

(A). **Using bilinear transformation.**

```
b=[2];
a=[1,3,2];
fs=1;
[B,A]=bilinear(b,a,fs);
B =0.1667  0.3333  0.1667
A =1.0000 -0.3333  0.0000
```

(B). **Using impulse invariant method**

```
b=[2];
a=[1,3,2];
fs=1;
[B,A]=impinvar(b,a,fs)
B =
    0  0.4651
A =
    1.0000 -0.5032  0.0498
```