

Tribhuvan University
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Lab Report on :
IIR FILTERS

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Given that

| | | |
|------------------------------|-------------------------------|-------------------------------|
| $fs=8000;$ | $pb=1200;$ | |
| $sb=2000;$ | $Rp=0.5;$ | $Rs=40;$ |
| $fn=fs/2;$ | $wp=pb/fn;$ | $ws=sb/fn;$ |

a) Butterworth

Code:

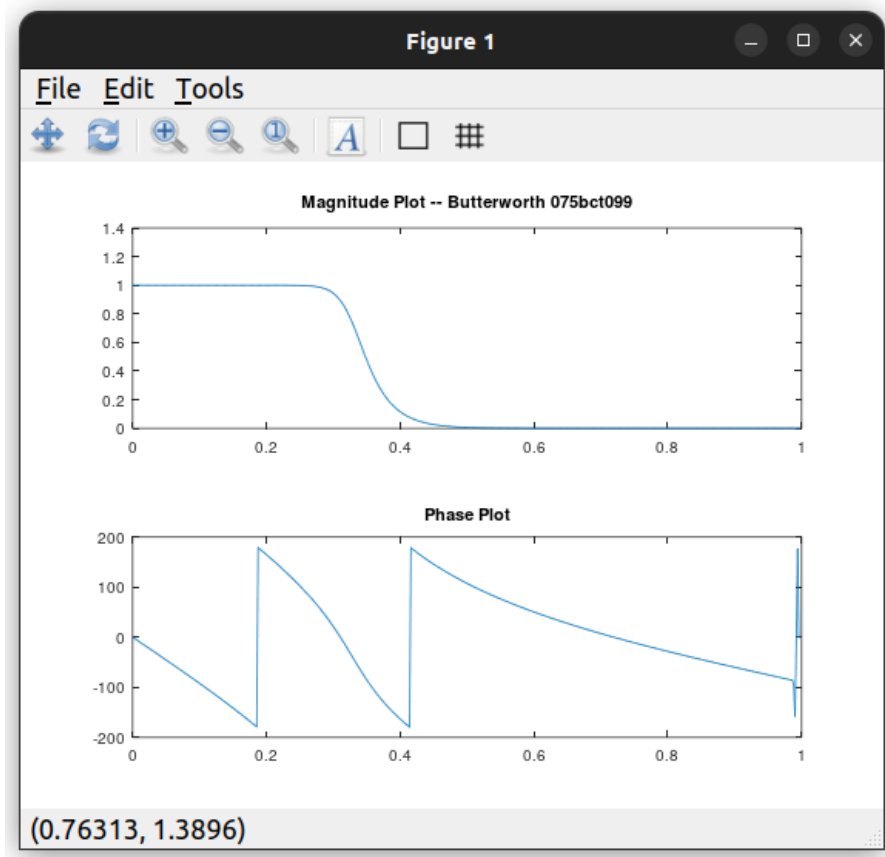
```
pkg load signal;
clc;
fs=8000; pb=1200;
sb=2000;Rp=0.5;
Rs=40;
fn=fs/2;
wp=pb/fn;
ws=sb/fn;

[N,wc]=buttord(wp,ws,Rp,Rs);
[num1,den1]=butter(N,wc);

[Hd,wd]=freqz(num1,den1);
magd=abs(Hd);
phase=angle(Hd)*180/pi;
subplot(2,1,1);
plot(wd/pi,magd);title('Magnitude Plot -- Butterworth 075bct099')
subplot(2,1,2);
plot(wd/pi,phase);title('Phase Plot')
```

Output :

N = 9
wc = 0.3311



b) Chebyshev

Code:

```
pkg load signal;
clc;
fs=8000; pb=1200;
sb=2000;Rp=0.5;
Rs=40;
fn=fs/2;
wp=pb/fn;
ws=sb/fn;

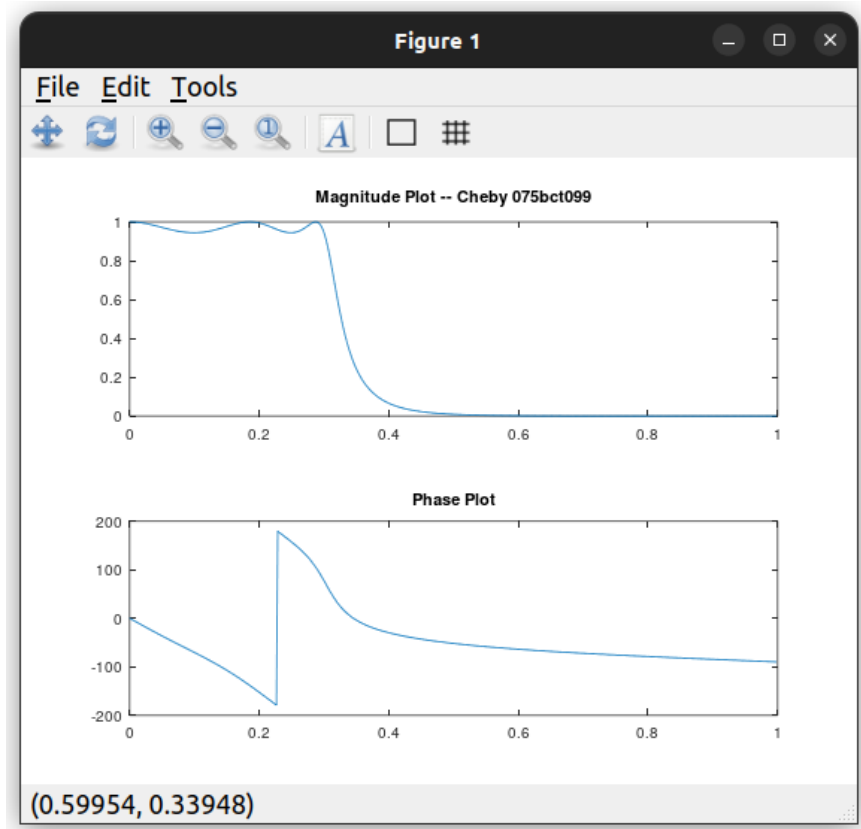
[N,wc]=cheb1ord(wp,ws,Rp,Rs)
[num1,den1]=cheby1(N,Rp,wc);

[Hd,wd]=freqz(num1,den1);
magd=abs(Hd);
phase=angle(Hd)*180/pi;
subplot(2,1,1);
plot(wd/pi,magd);title('Magnitude Plot -- Cheby 075bct099')
subplot(2,1,2);
plot(wd/pi,phase);title('Phase Plot')
```

Output :

$N = 5$

$w_c = 0.3000$



c) Elliptical

Code:

```
pkg load signal;  
clc;  
fs=8000; pb=1200;  
sb=2000;Rp=0.5;  
Rs=40;  
fn=fs/2;  
wp=pb/fn;  
ws=sb/fn;
```

```
[N,wc]=ellipord(wp,ws,Rp,Rs)  
[num1,den1]=ellip(N,Rp, Rs, wc);
```

```

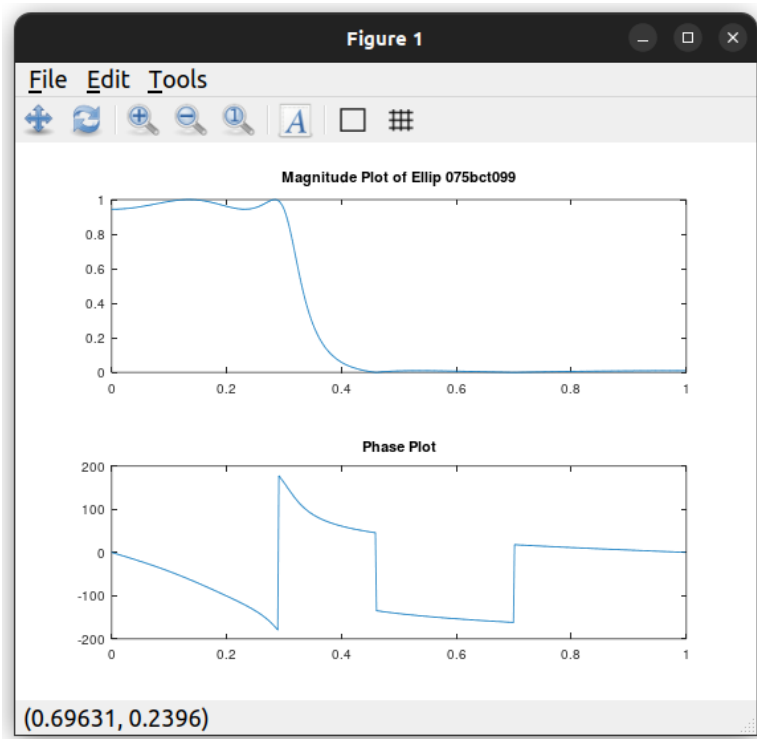
[Hd,wd]=freqz(num1,den1);
magd=abs(Hd);
phase=angle(Hd)*180/pi;
subplot(2,1,1);
plot(wd/pi,magd);title('Magnitude Plot of Ellip 075bct099')
subplot(2,1,2);
plot(wd/pi,phase);title('Phase Plot')

```

Output:

N = 4

wc = 0.3000



Conclusion:

Thus in this lab we studied Infinite Impulse Response(IIR) filters with their magnitude response and phase response .