

Tribhuvan University
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Lab Report on :
IIR FILTERS

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DSAP Lab5 IIR filters

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')
```

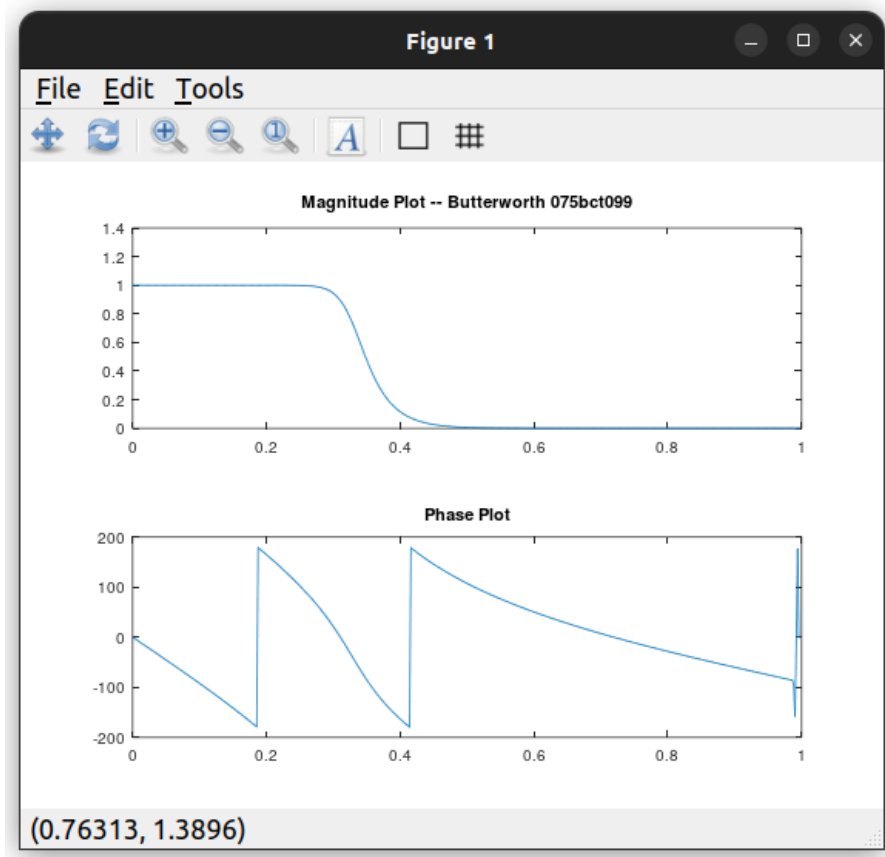
```
subplot(2,1,2);
```

```
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;

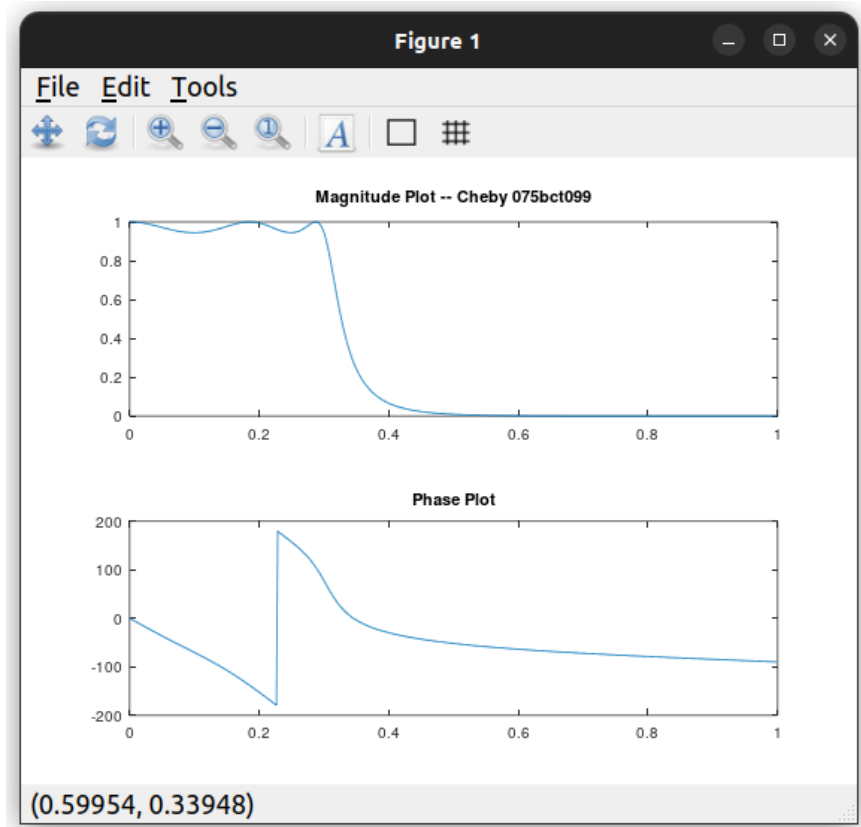
[N,wc]=cheb1ord(wp,ws,Rp,Rs)
[num1,den1]=cheby1(N,Rp,wc);

[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

