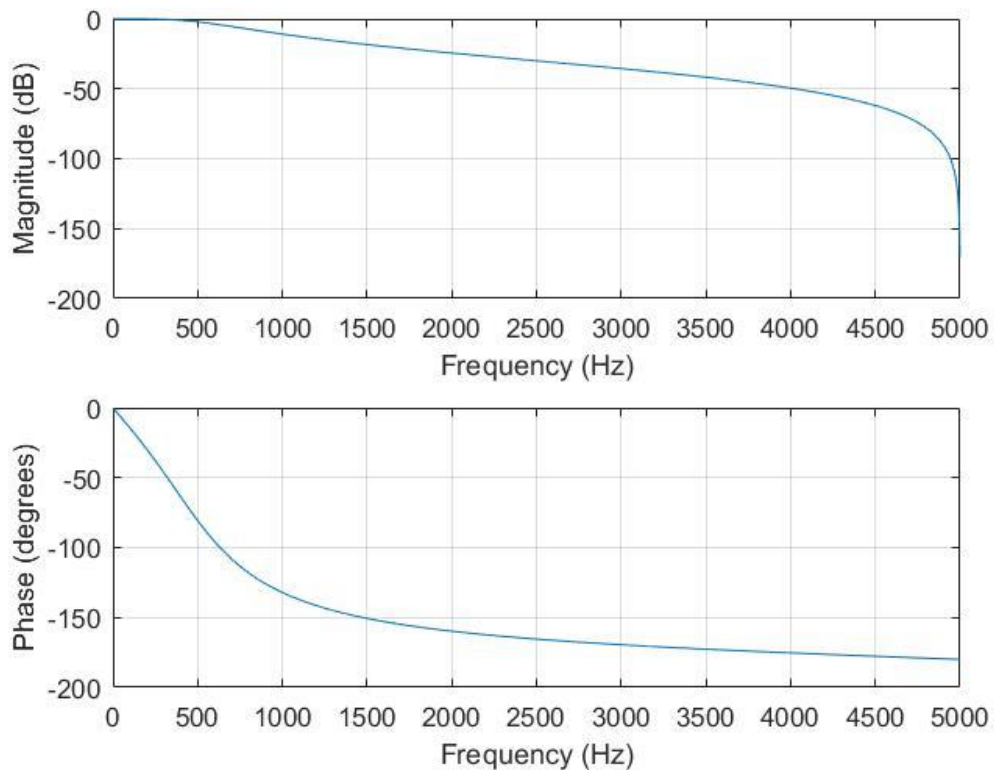


Laboratory 04 – Filter Design using MATLAB

1. Design the Butterworth filter with the following specifications: $F_p = 1000$ Hz; $F_s = 5000$ Hz;

```
clear all;  
close all;  
Fp=1000;  
Fs=5000;  
Fsample=10000;  
  
Wp=Fp/Fsample;  
Ws=Fs/Fsample;  
  
[N,Wn]=buttord(Wp,Ws,3,30);  
[zeros_,poles_,scale_]=butter(N,Wn);  
[num,den]=butter(N,Wn);  
  
tf=zpk(zeros_,poles_,scale_);  
figure  
freqz(num,den,5000,Fsample)
```



2. Design the Butterworth filter with $F_p = 1000$ Hz, $N = 4$;

```

clear all;
close all;

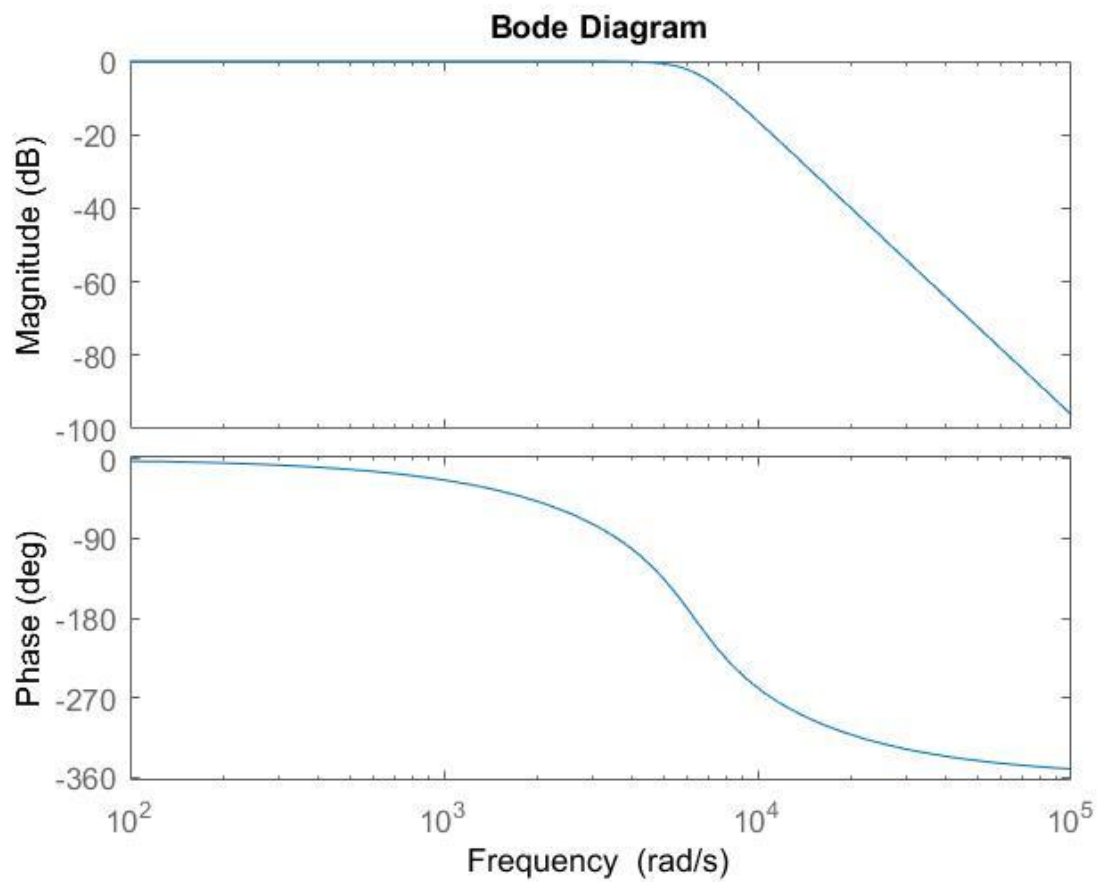
N=4;

Fp=1000;

Wp=2*pi*Fp;

[num,den]=butter(N,Wp,'s');
fil=tf(num,den);
bode(fil);

```



3. Design Chebyshev Type 1 filter with $N = 4$, $R_p = 2$; $F_p = 1000$.

```
clear all;  
close all;  
  
N=4;  
Rp=2;  
fp=1000;  
  
Wp=2*pi*fp;  
  
[num,den]=cheby1(N,Rp,Wp,'s');  
fil=tf(num,den);  
bode(fil);
```

