LAB 10

```
clc;
clear all;
close all;
pkg load signal;

fp = [100];
fs = [450];
rp = [0.01];
rs = [0.05];
f = [3500];

wp = 2*fp/f;
ws = 2*fs/f;

[n,wc]=cheb1ord(wp,ws,rp,rs);
[b,a]=cheby1(n,rp,wc,'low');  % Design a low-pass Chebyshev Type I filter
disp('Numerator coefficients');
disp('Denominator coefficients');

% Low Pass Filter

w = 0:0.01:pi;
[h,om]= freqz(b,a,w);
m = 20*log10(abs(h));
an = angle(h);
subplot(4,2,1);
plot(om/pi,m);
xlabel('Normalized frequency');
ylabel('Gain in dB');
title('Magnitude response (LPF)');
subplot(4,2,2);
plot(om/pi,an);
xlabel('Normalized frequency');
ylabel('Phase (radians)');
title('Phase response (LPF)');

% High Pass Filter

[b,a]=cheby1(n,rp,wc,'high');
disp('Numerator coefficients');b
disp('Denominator coefficients');a

w = 0:0.01:pi;
[h,om]= freqz(b,a,w);
```

```
m = 20*log10(abs(h));
an = angle(h);
subplot(4,2,3);
plot(om/pi,m);
xlabel('Normalized frequency');
ylabel('Gain in dB');
title('Magnitude response (HPF)');
subplot(4,2,4);
plot(om/pi,an);
xlabel('Normalized frequency');
ylabel('Phase (radians)');
title('Phase response (HPF)');

% Band Pass Filter
wn=[wp,ws];
[b,a]=cheby1(n,rp,wn,'pass');  % Design a band-pass Chebyshev Type I filter
w = 0:0.01:pi;
[h,om]= freqz(b,a,w);
m = 20*log10(abs(h));
an = angle(h);
subplot(4,2,5);
plot(om/pi,m);
xlabel('Normalized frequency');
ylabel('Gain in dB');
title('Magnitude response (BPF)');
subplot(4,2,6);
plot(om/pi,an);
xlabel('Normalized frequency');
ylabel('Phase (radians)');
title('Phase response (BPF)');
disp('Numerator coefficients');b
disp('Denominator coefficients');a

% Band Stop Filter
wn=[wp,ws];
[b,a]=cheby1(n,rp,wn,'stop');  % Design a band-stop Chebyshev Type I filter
w = 0:0.01:pi;
[h,om]= freqz(b,a,w);
m = 20*log10(abs(h));
an = angle(h);
subplot(4,2,7);
plot(om/pi,m);
xlabel('Normalized frequency');
ylabel('Gain in dB');
title('Magnitude response (BSF)');
subplot(4,2,8);
plot(om/pi,an);
xlabel('Normalized frequency');
```

```
ylabel('Phase (radians)');
title('Phase response (BSF)');
disp('Numerator coefficients');
disp('Denominator coefficients');
```