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ECEN 444
Lab 3
10/24/2024

Code

L5.1:

```matlab
%%%%%%%%%%%%%%%%%% Part (a) - Lowpass Filter %%%%%%%%%%%%%%%%%%
% given values for lowpass filter
Wp = 0.2 * pi;
Ws = 0.3 * pi;
Rp = 1;
As = 15;
% normalize the frequencies
Wp_n = Wp / pi;
Ws_n = Ws / pi;
% filter order
[n, Wn] = ellipord(Wp_n, Ws_n, Rp, As);
% setup the filter
[b, a] = ellip(n, Rp, As, Wn, 'low');
% frequency response using freqz
freqz(b, a);
%%%%%%%%%%%%%%%%%% Part (b) - Highpass Filter %%%%%%%%%%%%%%%%%%
% given values for highpass filter
Wp = 0.6 * pi;
Ws = 0.4 * pi;
Rp = 1;
As = 15;
% normalize the frequencies
Wp_n = Wp / pi;
Ws_n = Ws / pi;
% filter order
[n, Wn] = ellipord(Wp_n, Ws_n, Rp, As);
% setup the filter
[b, a] = ellip(n, Rp, As, Wn, 'high');
% frequency response using freqz
freqz(b, a);
%%%%%%%%%%%%%%%%%% Part (c) - Bandpass Filter %%%%%%%%%%%%%%%%%%
% given values for bandpass filter
Wp = [0.4 * pi, 0.6 * pi];
Ws = [0.3 * pi, 0.75 * pi];
Rp = 1;
As = 40;
% normalize the frequencies
Wp_n = Wp / pi;
Ws_n = Ws / pi;
% filter order
```
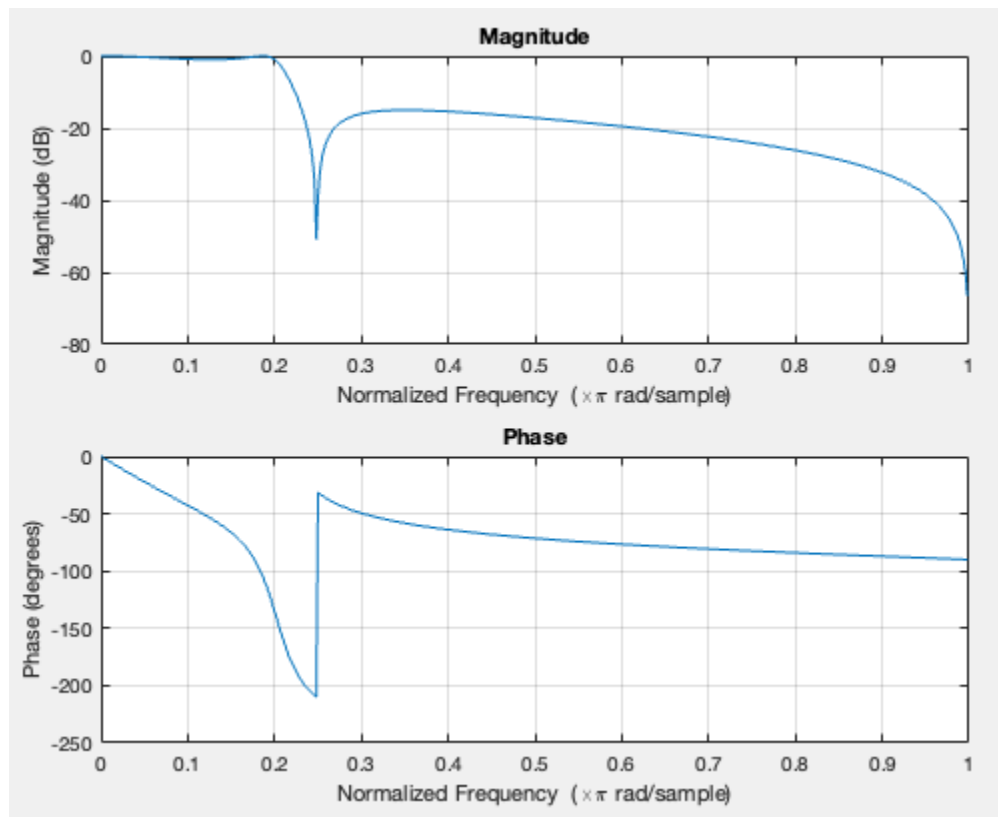
```
[n, Wn] = ellipord(Wp_n, Ws_n, Rp, As);
% setup the filter
[b, a] = ellip(n, Rp, As, Wn, 'bandpass');
% frequency response using freqz
freqz(b, a);
%%%%%%%%%%%%%%%%%%%% Part (d) - Bandstop Filter %%%%%%%%%%%%%%%%%%%%
% given values for bandstop filter
Wp = [0.25 * pi, 0.8 * pi];
Ws = [0.4 * pi, 0.7 * pi];
Rp = 1;
As = 40;
% normalize the frequencies
Wp_n = Wp / pi;
Ws_n = Ws / pi;
% filter order
[n, Wn] = ellipord(Wp_n, Ws_n, Rp, As);
% setup the filter
[b, a] = ellip(n, Rp, As, Wn, 'stop');
% frequency response using freqz
freqz(b, a);
```
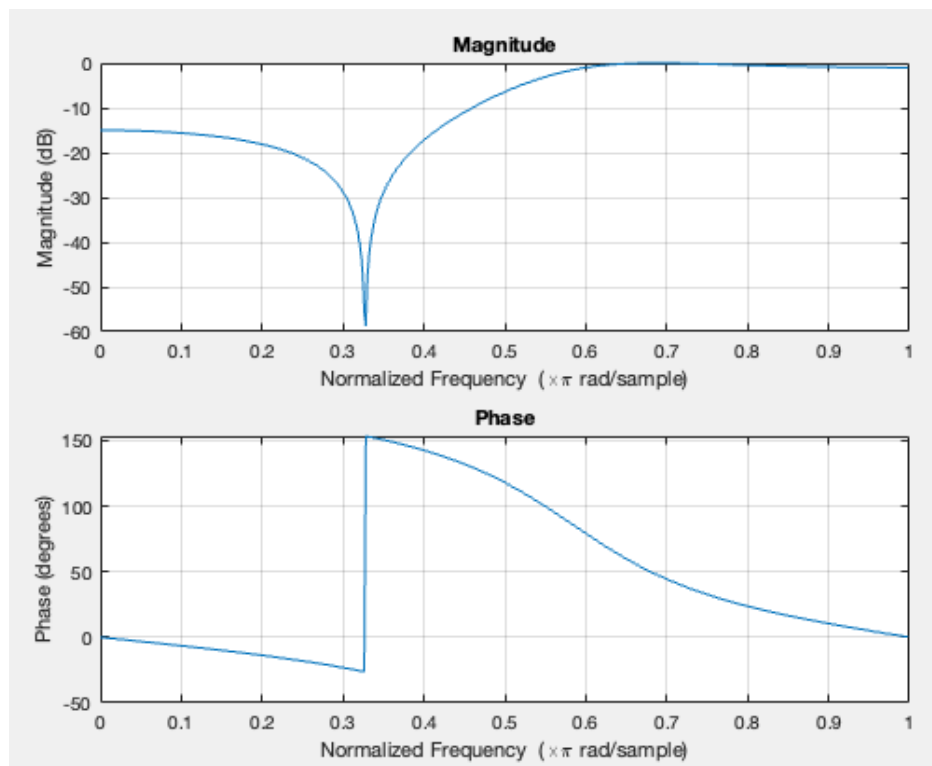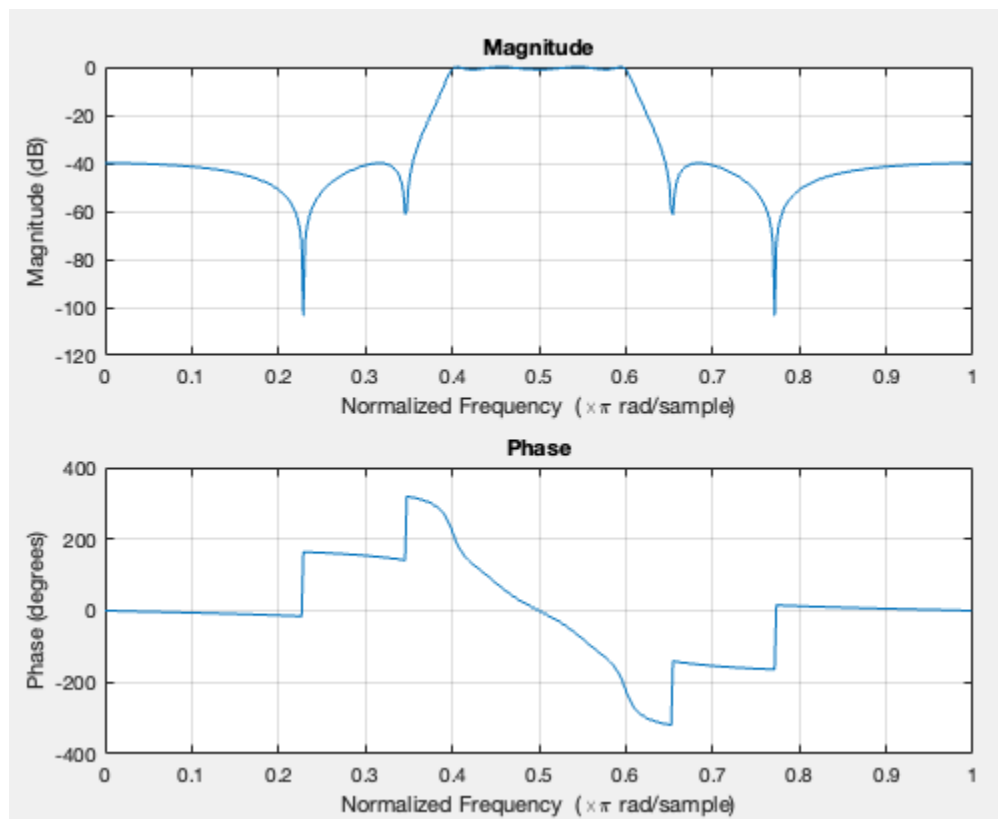
Plots

Part (a):

Part (b):

Part (c):

Part (d):