AVP 213 Drill Problems - Set 2

1. Construct Bode plots for the following G(s). [Asymptotic plot would be fine]

   (a) $\dfrac{1}{s+10}$

   (b) $\dfrac{s+1}{s+10}$

   (c) $\dfrac{10}{s^2+80s+400}$

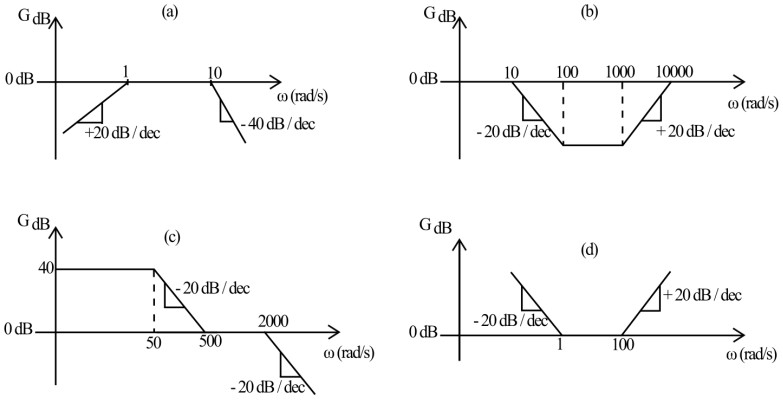
   (d) $\dfrac{10}{s(s^2+80s+400)}$

   (e) $\dfrac{s}{s^2+s+1}$

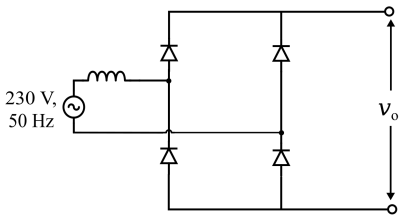
   (f) $\dfrac{s^2+s+1}{s}$

   (g) $\dfrac{s(s+20)}{(s+1)(s^2+60s+400)}$

2. Bode magnitude plots are shown. Find the transfer function.



3. V_o obtained as the output of the following arrangement has to power certain power supplies. One type of those need:
   (i) 100 Hz component to be attenuated by atleast 250 times and the DC components to be passed with unity gain.
   Another type of supplies require:
   (ii) 100 Hz to be passed with unity gain DC components to be attenuated completely.
   Design appropriate passive 1st order filters for these applications.

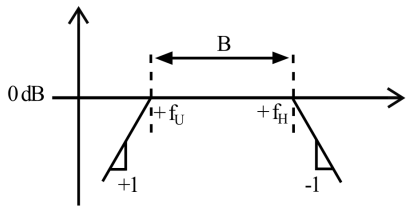


4. Design a passive and an active 1st order high pass filter which passes components $\geq$ 2kHz with a gain of 5.

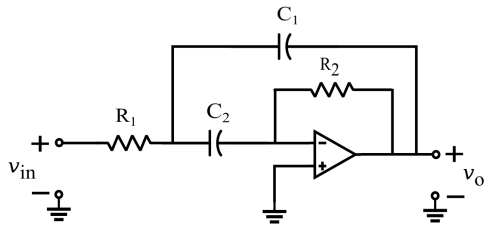
5. For problem 4, assume you have an op-amp in the lab where the manufacturers have recommended the feedback resistance value to be less than 5 kΩ. (It is a common recommendation to avoid additional delay introduced due to parasitic capacitances. The value varies from case to case). Would your design change?

6. For the 1st order bandpass filter bode magnitude plot (asymptotic), 'B' is defined as the bandwidth.

   Design an active 1st order bandpass filter where f_U = 10 Hz and f_H = 2 kHz, using the same op-amps of problem number 5.



7. Draw the $\frac{V_o(s)}{V_{in}(s)}$ transfer function for the following circuit and comment on the type of filtering action.
   R_1 = 200 Ω ; C_1 = 0.05 uF ; R_2 = 28 kΩ and C_2 = 0.05 uF. Use of justifiable assumptions are welcome.



8. What kind of filter is the following? Plot the frequency response.