



# COLLEGE OF ENGINEERING & TECHNOLOGY

Department: Electronics and Communications

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Course : Analog Signal Processing

Course Code: EC434

## Problem Set 3

P1. For Figure 1 shown if  $R_1=R_2=R_3=15k\Omega$ ,  $C_1=C_2=C_3=1nF$ , determine:

- The transfer function  $H(s)$
- The type of filter
- The overall roll-off of the filter and plot its magnitude response
- If  $R_1=15k$ ,  $R_2=10k$ ,  $R_3=5k\Omega$  and  $C_1=C_2=C_3=1nF$ , plot the resulting magnitude response.

What is the purpose of the operational amplifier?

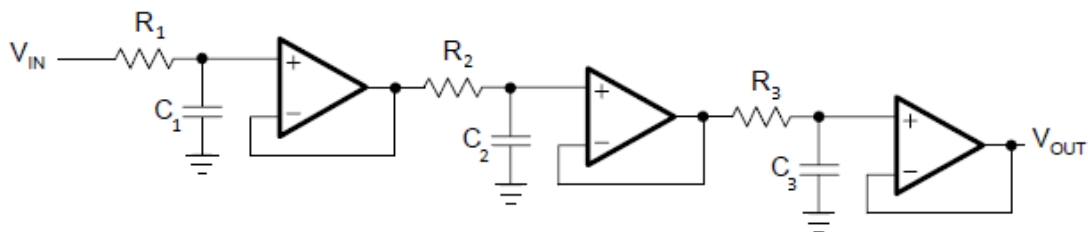


Fig.1

P2. The asymptotic magnitude voltage transfer function for a band-pass filter is shown below in Figure 2.

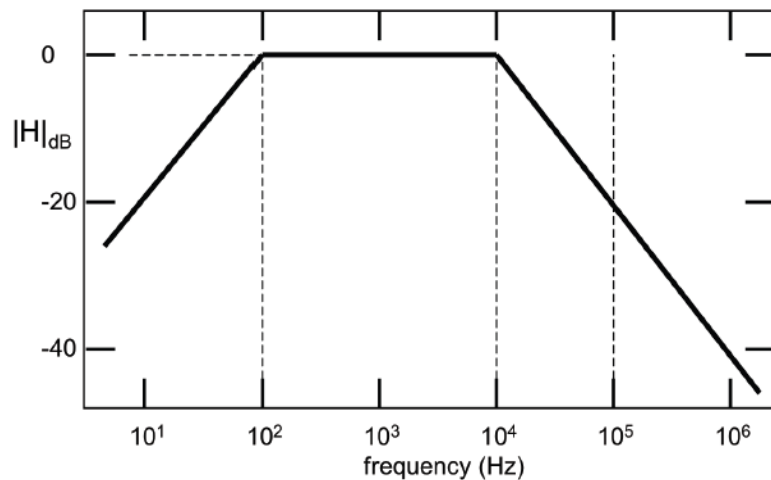
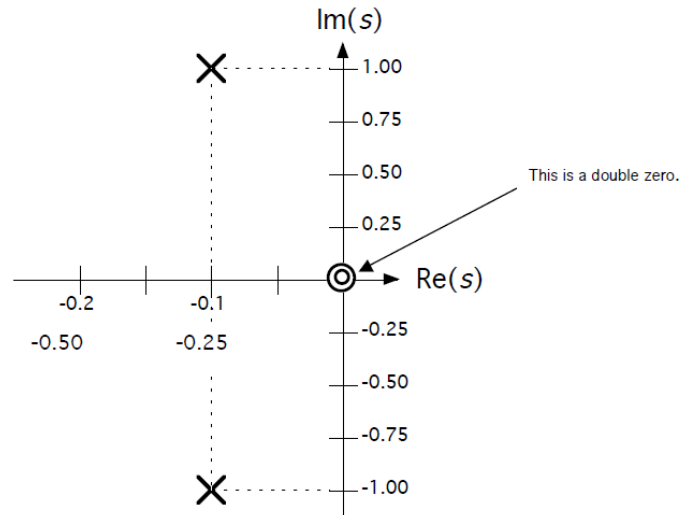


Fig.2

- Get the transfer function  $H(s)$  of this system.
- Determine the type of filter.
- Design an R-C filter that achieves this frequency response.
- Modify your design for  $K=3$  and sketch its corresponding frequency response.

P3. Using the pole-zero plot given in fig. ,find:

- The transfer function of the system
- The filter type.



P4. For a unity gain Sallen and Key Low Pass Filter:

- Determine the relationship among the component's values for  $Q=0.5$ . Design such filter for  $\omega=100\text{kr/s}$ .
- If  $R_1=R_2$ , determine the relationship among the capacitor's values that yields to  $Q = \frac{1}{\sqrt{2}}$ . Design such filter for  $f=1\text{kHz}$ .