Benha University **Electronic circuits (B)** **Electrical Eng. Dept.**
Faculty of Engineering **3rd year communication**
Shoubra **2012-2013**

Sheet (3)

1. A certain low-pass filter has critical frequency of 800Hz. What is its bandwidth?
2. A single pole high-pass filter has a frequency-selective circuit with R=2.2KΩ and C=0.0015μF. What is the critical frequency?
3. What is the roll-off rate of the filter described in problem 3?
4. What is the Bandwidth of a band-pass filter whose critical frequencies are 3.2 KHz and 3.9 KHz? What is the Q of this filter?
5. What is the center frequency of a filter with a Q of 15 and a bandwidth of 1 KHz?
6. What is the damping factor in each active filter shown in figure (1)? Which filter optimized for a Butterworth response characteristic?

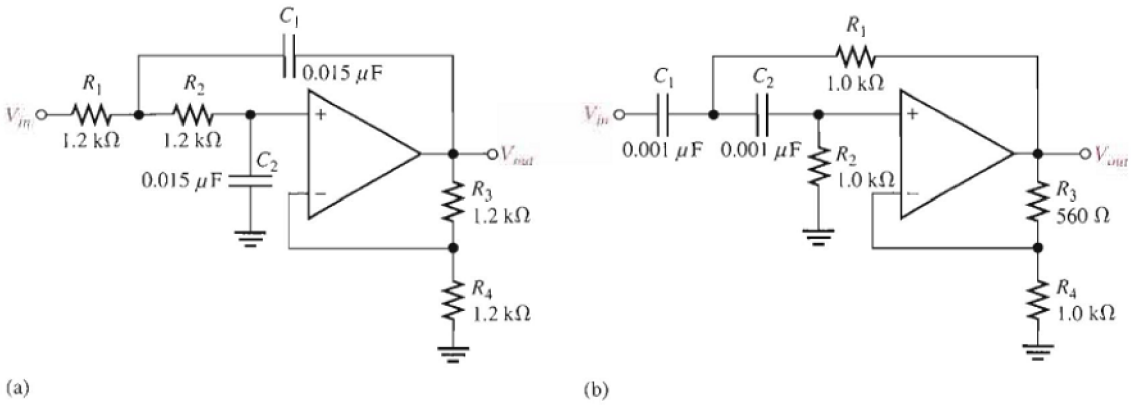

Figure (1)

7. For the filter in figure (1-a) that do not have a Butterworth response, specify the necessary changes to convert it to Butterworth response.
8. For the figure (2) shown:
   (a) Is the four-pole filter approximately optimized for a Butterworth response? What is the roll-off rate?
   (b) Without changing the response curve, adjust the component values in the filter to make it an equal-value filter. Select C=0.22μF for both stages.

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(c) Modify the filter to increase the roll-off rate to -120dB/decade while maintaining an approximate Butterworth response.

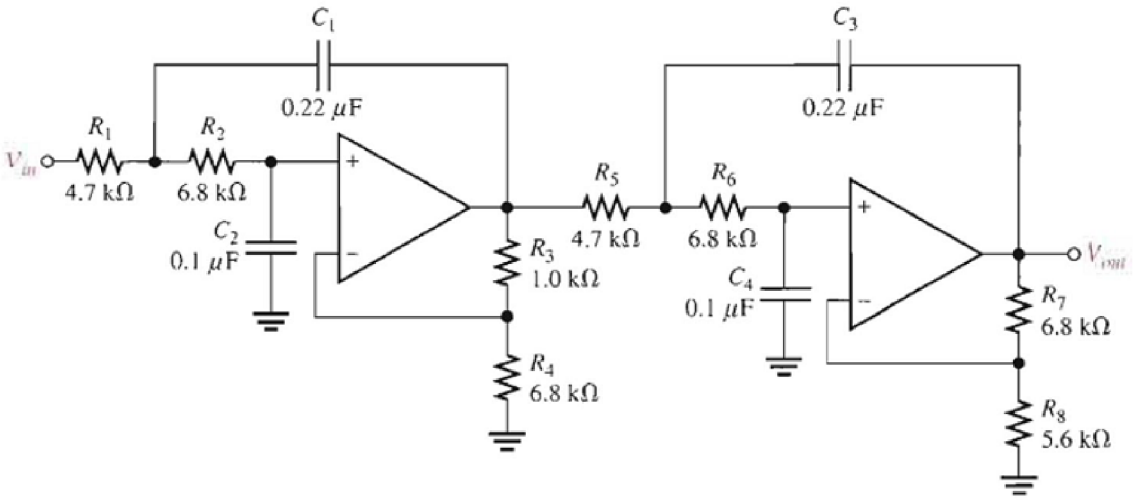


Figure (2)

9. For the filter shown in figure (3):
   (a) How would you increase the critical frequency?
   (b) How would you increase the gain?

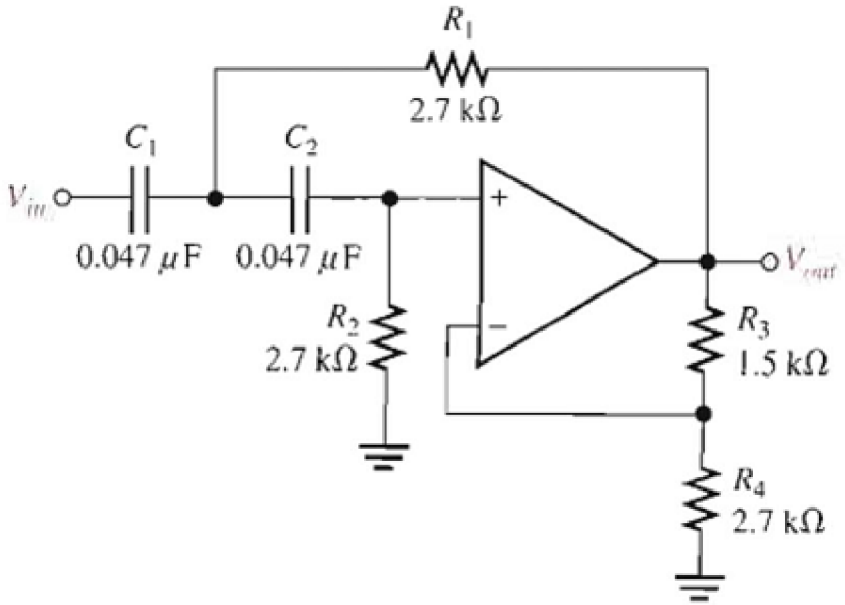


Figure (3)

10. Optimize the state variable filter in figure (4) for Q=50. What bandwidth is achieved?

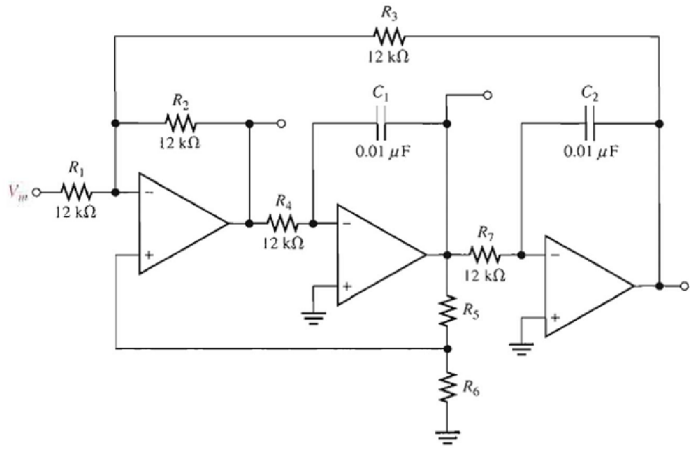
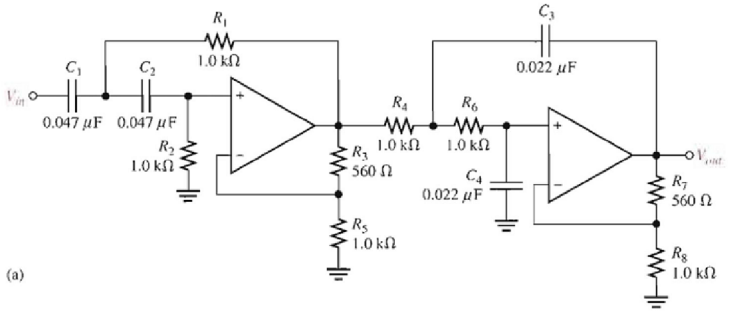
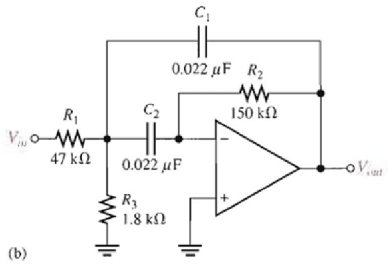
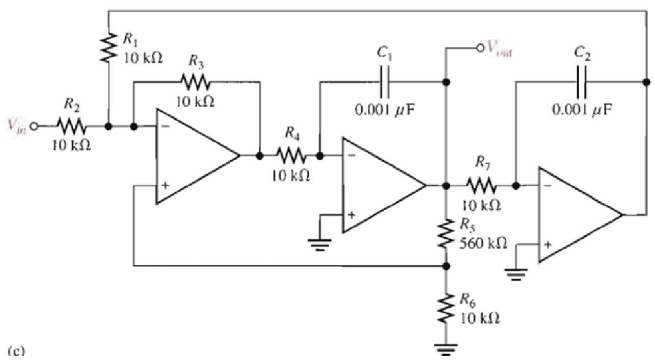


Figure (4)

11. Show how to make a notch filter using the basic circuit in figure (4).
12. Modify the band-stop filter in problem 11 for a center frequency of 120Hz.
13. Determine the center frequency and bandwidth for each filter in figure (5).







Good Luck

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