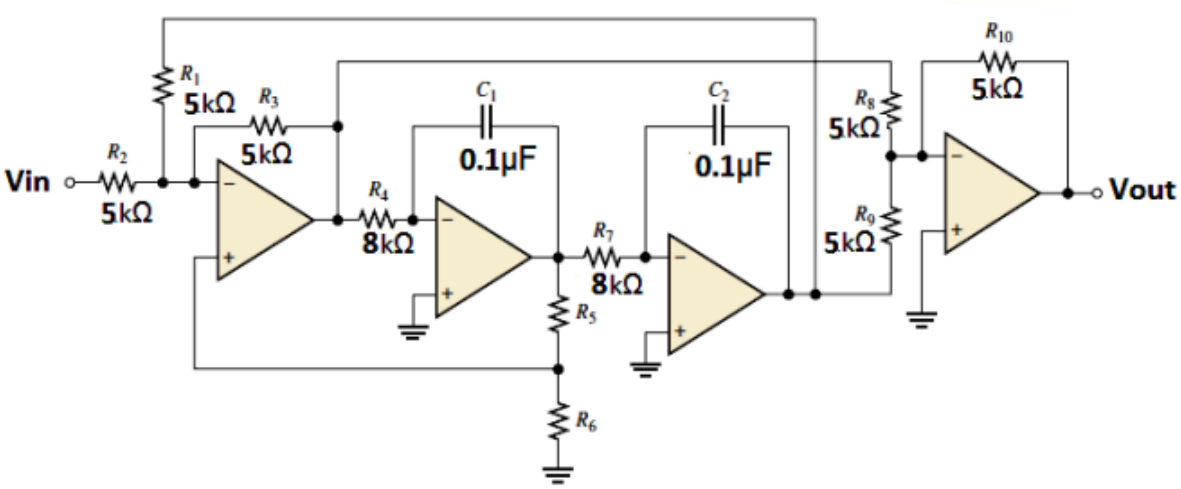
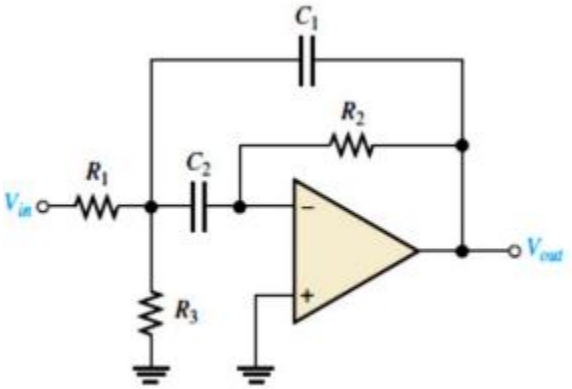
Electronic Systems
Active Filters
Sheet 4

1. For the state variable Band-Stop-Filter (BSF) shown in the following Figure.
   - Calculate the center frequency (fo).
   - Design the value of R5 and R6 for a quality factor (Q) of 20.



2. For the multiple feedback BPF shown,
   - Derive an expression for the Filter Transfer Function (Vout/Vin).
   - Prove that the center frequency is expressed by:



$$f_0 = \frac{1}{2\pi\sqrt{(R_1 \parallel R_3)R_2C_1C_2}}$$

   - Show that:

$$R_1 = \frac{Q}{2\pi f_0 C A_0}$$

$$R_2 = \frac{Q}{\pi f_0 C}$$

$$R_3 = \frac{Q}{2\pi f_0 C(2Q^2 - A_0)}$$

   - Show that the center frequency gain is given by:

$$A_0 = \frac{R_2}{2R_1}$$