EC 205 Analog Electronics Lab

Experiment No. 9

Expt. 9 : Second order Low-pass and High-pass filters

Aim:

To design and study a //A741 based Sallen-Key Low-pass and High-pass filters.

Circuit Diagram:

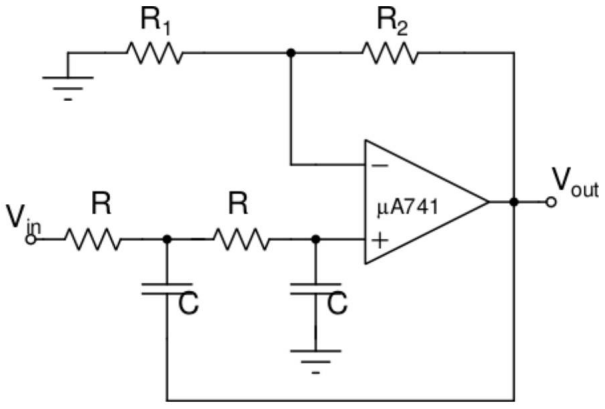

Figure 1: Sallen-key filter

1. Design the low-pass filter for three different Q values (0.5, 0.707 and 2) for a cut-off frequency = 1 kHz. Obtain the magnitude response and phase response. (For hardware lab: Note that the input signal should be such that the peak-to-peak value of the output Is at least 100 mV when the filter attenuation increases to 40 <1B.)
2. Simulate the circuit and obtain the frequency response. Determine the DC gain, the cut-off' frequency and stop-band roll-off and compare with the designed.
3. Tabulate the results in the format shown in Table 1 below.
4. Now, ground the input terminal of the filter (Remember to disconnect the Signal Generator in the hardware lab). Adjust 7?2 such that the gain K = (14- Z?2/Z?i) becomes slightly higher than 3. You will see the filter oscillating. What is the reason?
5. Convert the filter designed in step-1 to a high-pass filter. Observe and note down the salient features for Q = 0.707.

Table 1:

fli =; *R* =; *C* =

Q	*Ri* (9)	*K*	*fo* (Hz) Frequency at which gain = *QK*	H_p (Max. gain)	f_P (Hz) Frequency at which max. gain occurs	Stop band roll-off