

GE 1354 Tutorial

Filter

- Download the following circuit on Canvas.

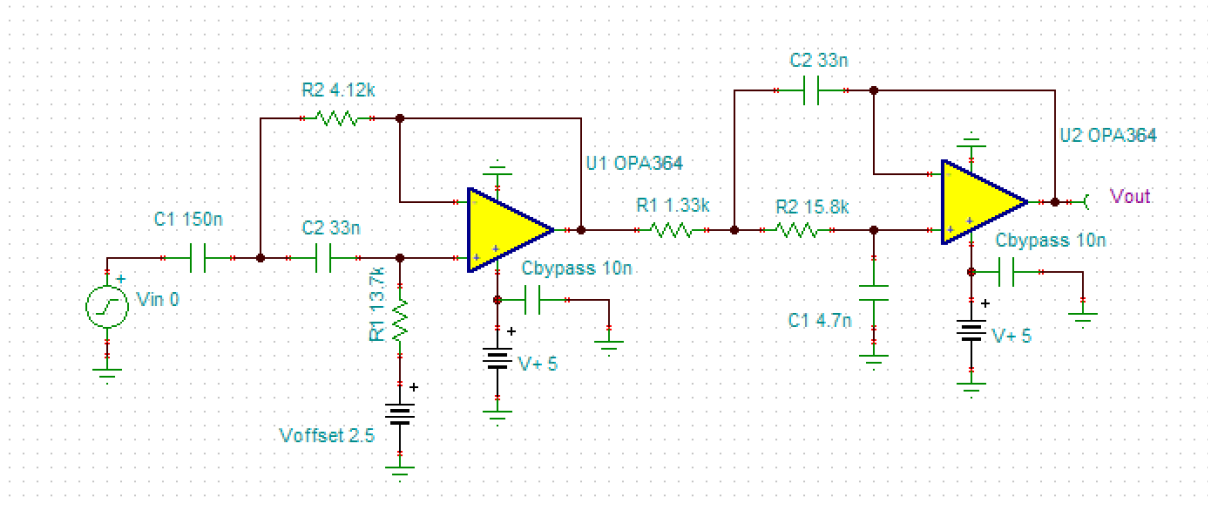


Fig. Q1

Simulate the output voltage under different input frequencies. The input voltage is set at $2V_{pk-pk}$.

Frequency (Hz)	Input voltage (V_{pk-pk})	Vout (V_{pk-pk})	Gain	Gain (dB)
50	2	0.05567	0.0278	-31
100		0.221	0.1105	-19.1
500		1.86	0.93	-0.63
1k		1.95	0.975	-0.22
5k		0.570	0.285	-10.9
10k		0.150	0.075	-22.5
50k		0.00639	0.003195	-50

- What are the passband and stopband of the filter? Discuss the function of the filter in Fig. Q1. Suggest one application of this filter circuit.

Ans. Passband: Between 300Hz – 2.8kHz. Bandpass filter. The frequency band is suitable for extracting human voice.

3. The following shows a sinusoidal waveform with noise. Fill in the following table by filtering the signal with three consecutive samples. Plot the following waveforms. Discuss the function of the low-pass filtering.

Angle	Actual Signal	Signal with noise	Extracted
0	0	0	0
30	0.5	0.78771846	0
60	0.8660254	1.189259949	0.6589928
90	1	1.7231214	1.2333666
120	0.8660254	1.073916398	1.32876592
150	0.5	0.608673721	1.13523717
180	1.2251E-16	2.16492E-16	0.56086337
210	-0.5	-0.820862171	-0.0707295
240	-0.8660254	-0.960551621	-0.5938046
270	-1	-1.755330097	-1.1789146
300	-0.8660254	-0.956450542	-1.2241108
330	-0.5	-0.653460912	-1.1217472
360	-2.45E-16	-3.2701E-16	-0.5366372

