Experiment 6

Basic Electronics Circuits

Design of waveform generators using operational amplifier

Aim: To design sinusoidal, triangular and square waveform generators using op-amps for different frequencies and amplitudes and compare the experimental values with theoretical values.

A. Wein bridge RC (sinusoidal) oscillator

1. The Wein bridge RC oscillator is shown in Fig. 6.1. Connect the circuit as shown in the Fig. 6.1 to generate a sinusoidal waveform with a frequency of 3.38 kHz. The expression for the frequency of the oscillator is given by Eqn. (6.1).
2. Design a Wein bridge RC oscillator to generate a frequency of 10 kHz.

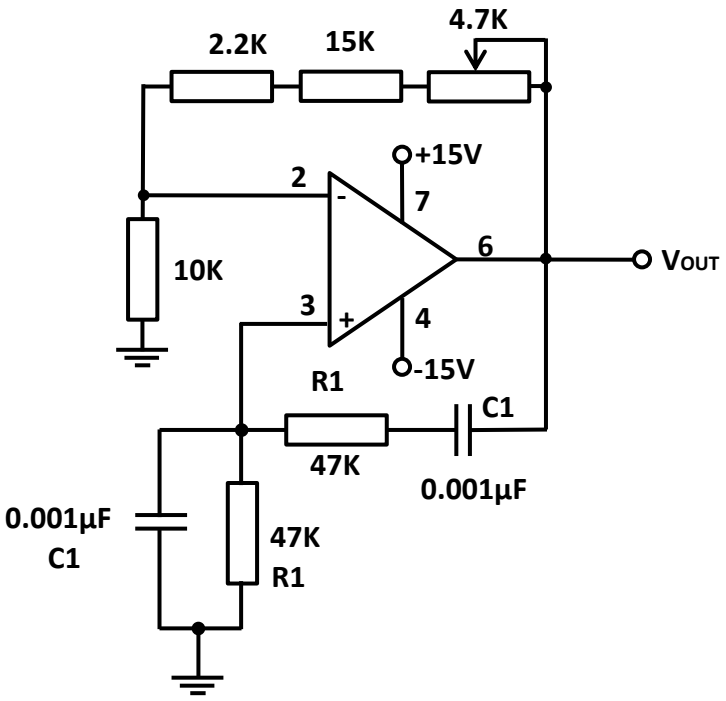

Fig 6.1 : Wein Bridge Oscillator

$$f = \frac{1}{2\pi R1C1}$$

B. Square waveform generator

1. The square wave generator is shown in Fig. 6.2. Connect the circuit as shown in the Fig. 6.2 to generate a square waveform with a frequency of 6 Hz that blinks LED. The expression for the frequency of the square waveform is given by Eqn. (6.2).
2. Design a square wave generator to generate a frequency of 2.77 kHz.

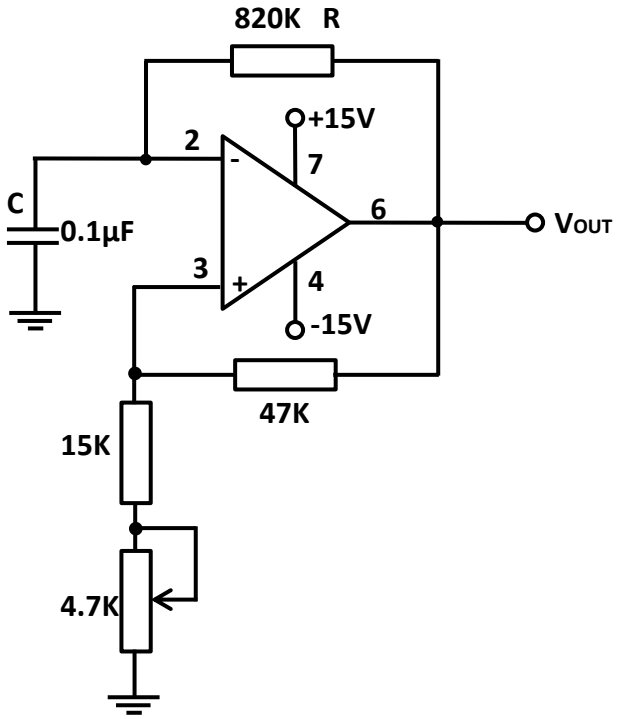

Fig 6.2 : Square Wave Generator

$$f = \frac{1}{RC}$$

C. Triangular waveform generator

1. The triangular wave generator is shown in Fig. 6.3. Connect the circuit as shown in the Fig. 6.3 to generate a triangular waveform with a frequency of 1.15 kHz. The expression for the frequency of the triangular waveform is given by Eqn. (6.3).
2. Design a triangular wave generator to generate a frequency of 10 kHz.

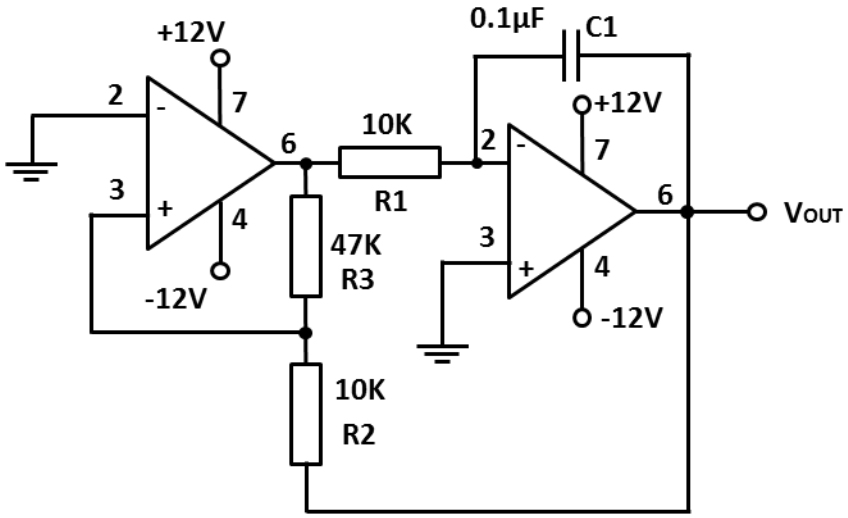

Fig 6.3 : Triangular Wave Generator

$$f = \frac{R3}{4R1C1R2}$$

Note: Plot all the waveforms on a graph sheet