

EE 313 ELECTRONICS II - Homework 1

Two oscillator circuit configurations are shown on Figures 1 and 2.

Simulation objectives for Wien Bridge Oscillator

The circuit shown in the Figure 1 is a Wien Bridge oscillator. For this circuit, perform the following design and analysis steps;

- Express the oscillation frequency in terms of circuit parameters R_1, R_2, R_3, R_4, C_1 , and C_2 .
- Determine R_1 and R_2 to obtain 16kHz oscillation frequency when $C_1 = C_2 = 1nF$.
- Describe the oscillation criterion and determine R_3 accordingly when $R_4 = 10k\Omega$.
- Simulate the designed circuit in LTSpice by using AD795 opamp model with $\pm 12V$ supplies.
- Change R_2 and plot the oscillation frequency as a function of R_2 .

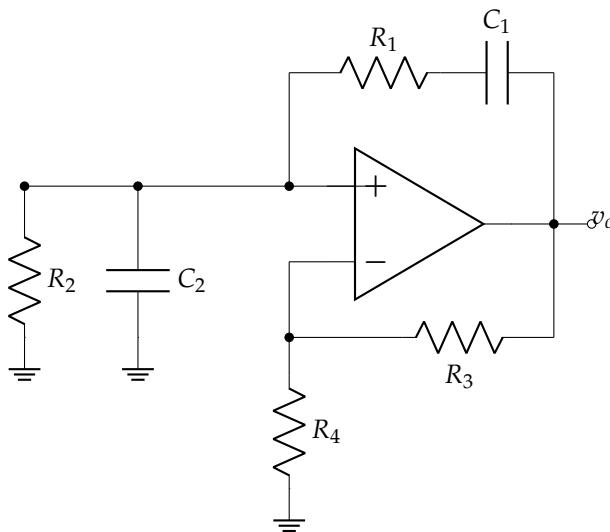


Figure 1: Wien Bridge Oscillator

Simulation objectives for Schmitt Trigger Oscillator

The circuit shown in the Figure 2 is a Schmitt Trigger oscillator. For this circuit, perform the following design and analysis steps;

- Determine the value of R_3 to obtain $4 V_{p-p}$ amplitude at v_n . Assume that v_o changes between -10 V and +10 V in your calculation.
- Determine the value of R_1 to obtain 1 kHz oscillation frequency. Express period of the v_n waveform in terms of the $\tau = R_1 C_1$ time constant and the peak values of v_n and v_o .
- Simulate the oscillator circuit with the calculated values by using AD795 opamp model with $\pm 12V$ supplies.
- Plot v_p , v_n , and v_o .

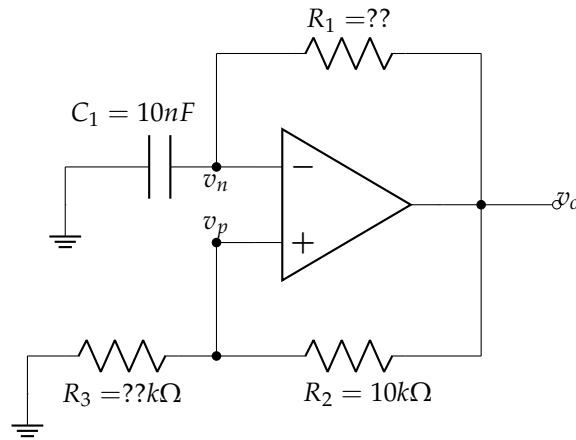


Figure 2: Schmitt Trigger Oscillator