

Sheet 5 Waveform Generators

Problem 1)

For the triangular wave generator shown in the figure, find:

- V_{Omax} and $V_{\text{Omin}}.$
- T₁, T₂, frequency and Duty cycle.
- If $V_{CC} = 10$ V, find the values or the ratios of the resistors, C, V_R, and V_s to obtain a triangular waveform with the following specifications:
- f=10 KHz, offset=0, Peak=5 V, and Duty cycle=1/3

Problem 2)

The triangular wave generator shown consists of a bi-stable circuit followed by a non-inverting integrator. Describe its operation and hence, given $R_1=R_2=10K$, $R_3=1K$, C=0.1 nF, $V_{CC}=15^V$, find:

- The output frequency.
- The peak-to-peak voltage of the waveform.

Problem 3)

For the mono-stable circuit shown, find:

- The minimum input triggering pulse (V_t).
- The condition on R_1 and C_1 for proper operation of the circuit.
- The pulse width.
- The minimum duration between triggering pulses.









Problem 4)

For the mono-stable circuit shown using 555 IC, find:

- The minimum input triggering pulse (V_t).
- The condition on the pulse width for proper operation of the circuit.
- The pulse width.
- The minimum duration between triggering pulses.





Problem 5)

For the astable circuit shown using 555 IC, find T_H , T_L , and frequency of the resulting waveform.





Problem 6)

A voltage controlled square wave generator (VCO) is shown. The frequency of the oscillator is controlled by a multiplier circuit with an input dc voltage V_{ref} .

- Sketch the output waveform and derive an expression for the output frequency as a function of V_{ref} .
- What are the advantage and disadvantage of this VCO compared to other types of VCOs?

