



Department : Electronics and Communications

Course : Electronic Measurements

Course Code: EC410

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Problem Set #5

Signal Generators

- 1- The integrator circuit shown in Fig.1, has $C_1=0.1 \mu\text{F}$, $R_1= 1 \text{ k}\Omega$, and $R_2=10 \text{ k}\Omega$. If the Schmitt trigger circuit has $\pm 3 \text{ V}$ trigger points, calculate the output frequency when the moving contact of R_1 is at the top of the potentiometer, and when it is at 10% of R_1 from the bottom. The supply voltage is $V_{CC}=\pm 15 \text{ V}$.

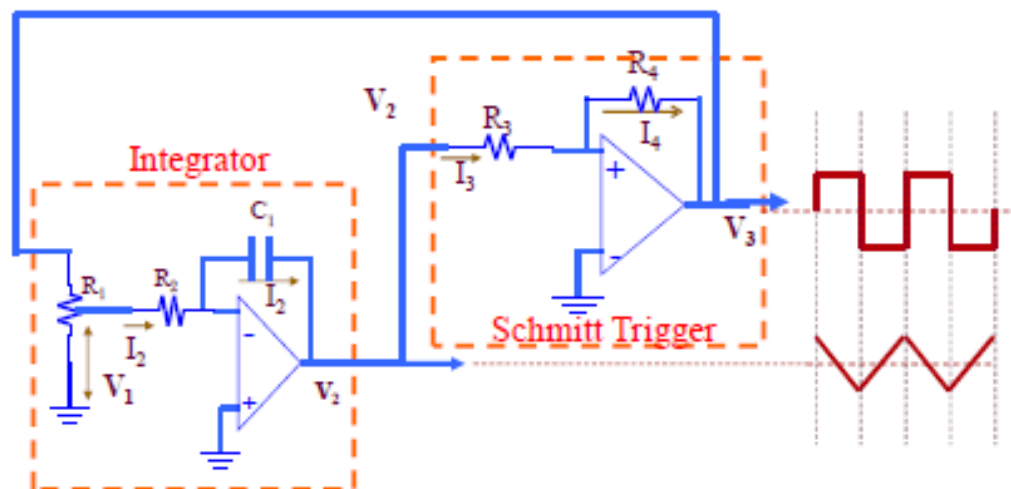


Fig. 1

- 2- For the integrator circuit shown in Fig.1, calculate the value of the capacitor C_1 which yields an output waveform with frequency 500 Hz. Assume that the Schmitt trigger circuit has $\pm 4 \text{ V}$ trigger points and R_1 is set at 50% of R_1 . The supply voltage is $V_{CC}=\pm 15 \text{ V}$, $R_1= 1 \text{ k}\Omega$, and $R_2=3.5 \text{ k}\Omega$.
- 3- The astable multivibrator circuit shown in Fig.2 has $R_1= 20 \text{ k}\Omega$, $R_2= 6.2 \text{ k}\Omega$, $R_3= 5 \text{ k}\Omega$, and $C_1=0.2 \mu\text{F}$. The supply voltage is $V_{CC}=\pm 12 \text{ V}$. Calculate the frequency of the square wave output.
- 4- Given two inductors and two capacitors with the following values: $L_1= 10 \text{ mH}$, $L_2= 5 \text{ mH}$ (assuming zero coupling coefficient), $C_1= 10 \mu\text{F}$, and $C_2= 40\mu\text{F}$. Design a radio frequency (RF) oscillator to generate 265.26 kHz and 3.98 MHz sinusoidal frequencies.

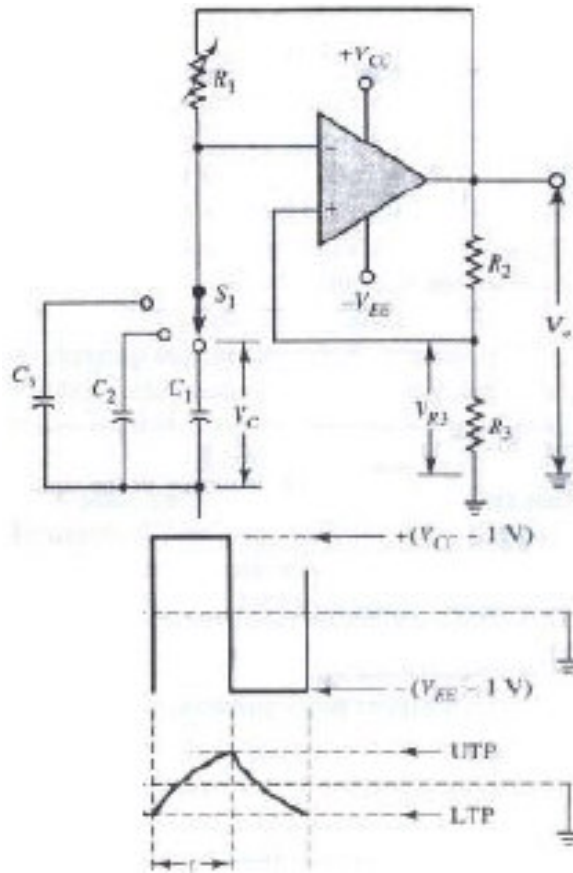


Fig. 2

- 5- Design a Pi (π) attenuator (shown in Fig. 3) to achieve a 15 dB attenuation. Given that the system resistance is 5 k Ω . Also, Calculate the attenuator input resistance and comment on the result.

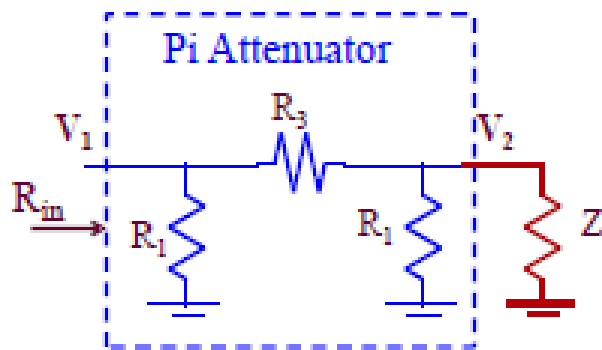


Fig. 3