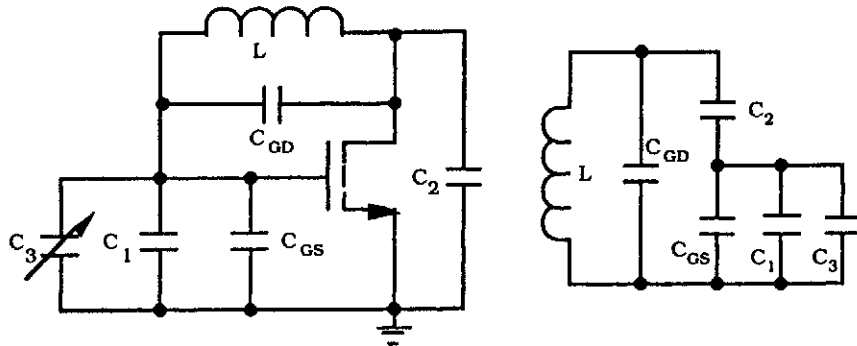
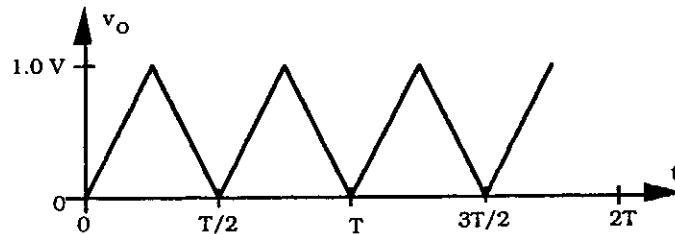


Homework Assignment No. 15**18.70**

$$C_{TC} = C_{GD} + \frac{1}{\frac{1}{C_2} + \frac{1}{C_1 + C_3 + C_{GS}}} = 4\text{pF} + \frac{1}{\frac{1}{50\text{pF}} + \frac{1}{50\text{pF} + 0 + 10\text{pF}}} = 31.27\text{pF}$$

$$f_o = \frac{1}{2\pi\sqrt{LC_{TC}}} = \frac{1}{2\pi\sqrt{(10^{-5}\text{H})(31.27 \times 10^{-12}\text{F})}} = 9.00\text{MHz}$$

$$g_m r_o \geq \frac{C_1 + C_3 + C_{GS}}{C_2} = \frac{50\text{pF} + 0 + 10\text{pF}}{50\text{pF}} = 1.20 \text{ which is easily met.}$$

12.123**12.130**

$$\text{For } v_o = +12\text{V: } V_+ = 6 \frac{24\text{k}\Omega}{3.4\text{k}\Omega + 24\text{k}\Omega} + 12 \frac{3.4\text{k}\Omega}{3.4\text{k}\Omega + 24\text{k}\Omega} = 6.74 \text{ V}$$

$$\text{For } v_o = 0\text{V: } V_+ = 6 \frac{24\text{k}\Omega}{3.4\text{k}\Omega + 24\text{k}\Omega} = 5.26 \text{ V}$$

$$v(t) = V_F - (V_F - V_I) \exp\left(-\frac{t}{RC}\right)$$

$$6.74 = 12 - (12 - 5.26) \exp\left(-\frac{T_1}{RC}\right) \rightarrow T_1 = 6200(3.3 \times 10^{-8}) \ln \frac{6.74}{5.26} = 50.7 \mu\text{s}$$

$$5.26 = 0 - (0 - 6.74) \exp\left(-\frac{T_2}{RC}\right) \rightarrow T_2 = 6200(3.3 \times 10^{-8}) \ln \frac{6.74}{5.26} = 50.7 \mu\text{s}$$

$$f = \frac{1}{50.7 \mu\text{s} + 50.7 \mu\text{s}} = 9.86 \text{ kHz}$$