- زهرا خواجه شامی - ۹۹۲۴۰۲۳ - تمرین سری ۴

- ۸-۲۹:

$R_C = \frac{V_{CC} - V_{CE}}{I_C} = \frac{10}{5} = 2$ $\quad I_C = 100 \times I_L = 100 \times 50 = 5$

$I_B \geq \frac{I_C}{\beta_{min}} = \frac{5}{100} = 50 \Rightarrow \frac{10 - 0.7}{R_B} \geq 50 \rightarrow R_B \leq 186$

$t_1 = t_2 = 0.5T = \frac{0.5}{f} = \frac{0.5}{5} = 100 \quad , C = \frac{t_1}{0.69 R_B} = \frac{100}{0.69 \times 270} = 537$

- ۸-۳۴:

$I_C = 100 I_L = 100 \times 50 = 5$

$Q_1(sat): V_{CC} = R_{C_1} I_{C_1} + V_{CE(on)} + R_{E_1} I_{E_1} \rightarrow V_B = V_{BE(on)} + R_{E_1} I_{E_1}$

$Q_2(sat): V_{CC} = R_{C_1} I_{B_1} + V_{BE(on)} + R_{E_2} I_{E_2}$

$$\Rightarrow \begin{cases} R_{C_1} + R_E = 1.74 \\ V_B - 5R_E = 0.7 \\ 100 R_E + R_{C_1} = 144 \end{cases}$$

$R_E = 1.4 \quad , R_{C_1} = R_{C_2} = 150 \quad , V_B = 8.7$

$T_2 = R_{E_2} C \ln\left(\frac{V_{CC} - 2V_{BE}}{(V_B - V_{BE}) + V_{CE(sat)}}\right) \rightarrow 100 = 1.4 \times C \ln\left(\frac{9 - 2 \times 0.7}{8.7 - 0.7 + 0.2}\right) \rightarrow C = 832$

۸-۳۷: الف) شارژ خازن

$v(0^+) = -\frac{7}{3} \quad , v^-(\infty) = 4 \quad , \tau = RC$

$v^-(t) = 4 + \left(-\frac{7}{3} - 4\right) e^{-t/RC} = 4 - \frac{19}{3} e^{-t/RC}$

$\frac{4}{3} = 4 - \frac{19}{3} e^{-t/RC} \longrightarrow T_1 = 0.865 RC$

دشارژ خازن:

$-\frac{7}{3} = -7 + \frac{25}{3} e^{-T_2/RC} \longrightarrow T_2 = 0.58 RC$

$T = T_1 + T_2 = 0.865 RC + 0.58 RC = 1.445 RC$

$f = \frac{1}{T} = \frac{1}{1.445} = 1KHz \longrightarrow RC = 692 \rightarrow \begin{cases} R = 10K \\ C = 69200P \end{cases}$

Subject:

Year: Month: Date:

duty cycle: $\frac{T_1}{T_1+T_2} \times 100 = \frac{0.144}{1.144} \times 100 = 40\%$ (ب

: ۴۵ - ۸

$$v_o(t) = v_{oH} + (v_{tL} + v_{oH})\, e^{-t/RC}$$

$$v_{tu} = v_{oH} + (v_{tL} - v_{oH})\, e^{-T_1/RC} \rightarrow T_1 = RC \ln\left(\frac{v_{tL} - v_{oH}}{v_{tu} - v_{oH}}\right) = RC \ln \frac{v_{oH} - v_{tL}}{v_{oH} - v_{tu}}$$

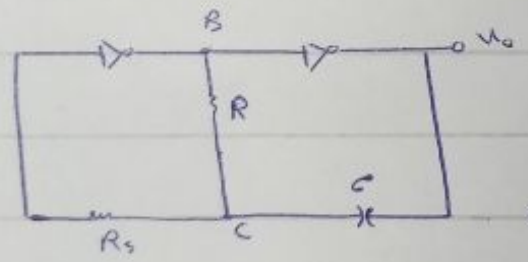
$$v_o(0^+) = v_{tu} \;,\; v_o(\infty) = v_{oL} \;,\; \tau = RC$$

$$v_o(t) = v_{oL} + (v_{tu} - v_{oL})\, e^{-t/RC}$$

$$v_{tL} = v_{oH} + (v_{tL} - v_{oL})\, e^{-T_2/RC} \rightarrow T_2 = RC \ln\left(\frac{v_{tu} - v_{oL}}{v_{tL} - v_{oL}}\right)$$

$$T = T_1 + T_2 = RC\left(\ln \frac{v_{tu} - v_{oL}}{v_{tL} - v_{oL}} + \ln \frac{v_{oH} - v_{tL}}{v_{oH} - v_{tu}}\right)$$

: ۴۸ - ۸



$v_o = 0 \longrightarrow v_B = 1 \;,\; v_A = 0$

$v_C = v_A + R_S I_{G_1}$

C : خازن شارژ شده $\rightarrow v_A = v_T$

$\Rightarrow v_C = v_T + R_S I_{G_1}$

$v_o = 1 \longrightarrow v_C(0^+) = v_T + R_S I_{G_1} + v_{CC}$