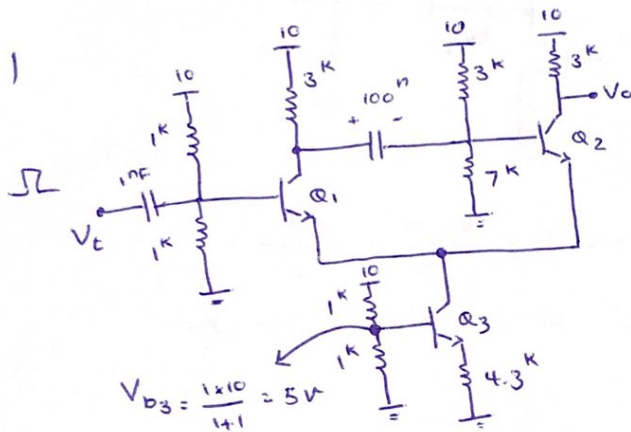کوئیز سوم پالس
رضا ادیب پور
۹۸۱۴۳۰۳

#1

(الف)
$$\begin{cases} V_{c_0} = ? \checkmark \\ V_{b_1} = ? \checkmark \\ V_{b_2} = ? \checkmark \\ I_{Q_3} = ? \checkmark \\ V_0 = ? \end{cases}$$ در حالت پایدار
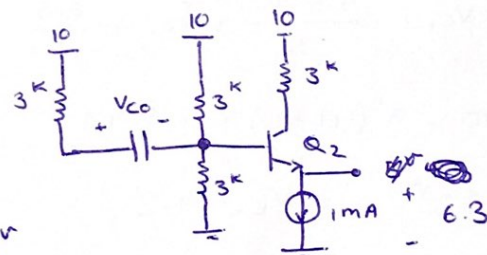
$$V_{b_3} = \frac{1 \times 10}{1+1} = 5v$$

الف) $V_{b_3} = 5^v \implies V_{E_3} = 5 - 0.7 = 4.3^v \implies I_{E_3} = \frac{V_{E_3}}{4.3^k} = \frac{4.3^v}{4.3^k} = 1^{mA}$
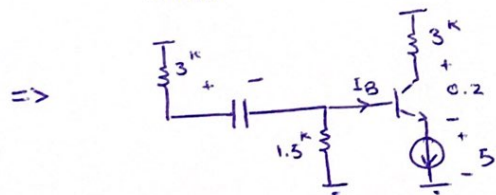
فرض : $I_{c_3} \approx I_{E_3} = 1^{mA}$

در حالت پایدار : $\begin{cases} Q_2 : ON \ (sat) \\ Q_1 : off \end{cases} \implies$

$V_{b_2} = \frac{7 \times 10}{3+7} = 7 \implies V_{E_2} = 7 - 0.7 = 6.3^v$

$10 = 3I_{c_2} + 0.2 + 6.3 \implies I_{c_2} = 1.1^{mA}$ ✗

$I_c + I_B = I_E \implies I_{B_2} = $

فرض اشباع بودن $Q_2 \implies$ غلط است $\implies Q_2$ فعال است

$I_c \approx I_E = 1^{mA} \implies I_B = \frac{I_c}{\beta} \xrightarrow{\text{فرض } \beta = \infty} \boxed{I_B = 0}$

$Q_1 : off \longrightarrow V_{c_0}^- = 10$, $V_{c_0}^+ = V_{B_2} = 6.3^v \implies \boxed{V_{c_0} = 3.7^v}$

$\boxed{V_{B_1} = \frac{1 \times 10}{1+1} = 5^v}$, $V_0 = 10 - 3^k(1^{mA}) = \boxed{7^v}$
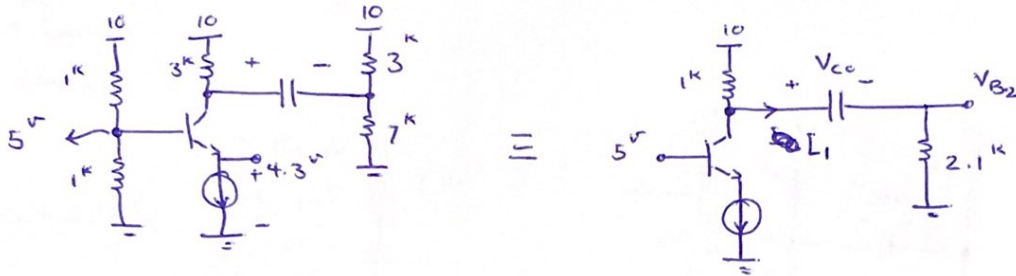
$\begin{cases} Q_1 : ON \rightarrow Active \\ Q_2 : off \end{cases}$

فرض بانش $I_c \simeq I_E = 1^{mA}$

kcl in V_c : $+I_c + \dfrac{V_{c_1} - 10}{3^k} + I_{1Q} = 0 \implies 1 + \dfrac{V_{c_1} - 10}{3} + \dfrac{6.3}{2.1} = 0$

$V_{c_1} - 10 + 3 + 9 = 0 \implies V_{c_1} = -2^v \implies$ فرض فعال بودن غلط است

Q_1 دراشباع است :
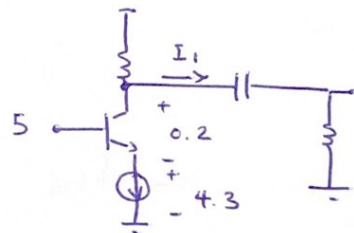
جهت I_1 عکس و I_c مثبت است

kcl in V_{c_1} : $\dfrac{4.5 - 10}{3} + I_{c_1} + \dfrac{6.3}{2.1} = 0 \implies I_{c_1} = 1.83 - 3 = \underline{+1.17}$

$V_{c_1} = 10 - 3^k (+1.17) = +6.49$

$V_{B_2} = 6.3^v$, $V_{E_1} = 4.3$