یالطیف

رضا ادیب پور

۹۸۱۴۳۰۳

امتحان پایانترم الک ۱

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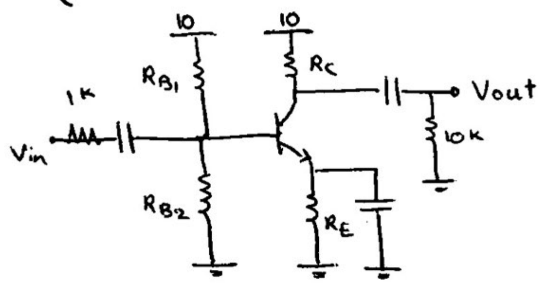
$$\begin{cases} V_{in\,ampl} = 50\ mV \\ R_{in} = 1^k \\ V_{out} = 2.5^v \\ R_L = 10^k \\ V_{CC} = 10\,V \\ \beta = 100 \\ V_T = 25\ mV \\ V_{BE,ON} = 1\ ,\ V_{CE,Sat} = 0.5\,V\ ,\ r_o = \infty \end{cases}$$

$$\rightarrow A_v = \frac{V_{out}}{V_{in}} = \frac{2.5^v}{50^{mv}} = 50\ \tfrac{v}{v}$$

$$A_v > 50$$

ساختار کل :



$$I_{CQ} = \frac{V_{CC} - V_{CE,sat}}{R_{DC} + R_{AC}} = \frac{9.5}{R_E + R_C + (R_C \| 10^k)}$$

if $I_C = 0.5^{mA} \longrightarrow \begin{cases} g_m = 20\ \frac{mA}{v} \\ r_\pi = 5^k \\ r_o = \infty \end{cases}$

$$|A_v| = g_m (R_C \| r_o) = g_m R_C > 50$$

$$20\,R_C > 50 \Rightarrow 20\,(R_C \| 10^k) > 50$$

$$20 \times \frac{10^k R_C}{10 + R_C} > 50 \Rightarrow \frac{200^k R_C}{10 + R_C} > 50$$

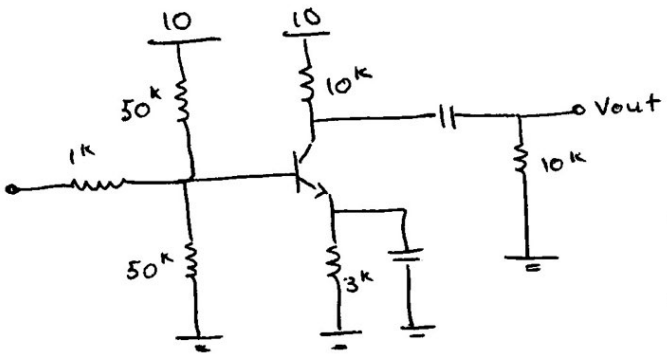
$$\Rightarrow R_C > 3.3^k \Rightarrow R_C = 10^k$$

برای اینکه بتوان از جریان B صرف نظر کرد : $R_E > 10 \times \frac{R_{B1} \| R_{B2}}{100}$

$$R_E > \frac{R_{B1} \| R_{B2}}{10} \Rightarrow R_{B1} \| R_{B2} < 10 R_E$$

برای پایداری مدار : $V_E > 0.1\,V_{CC} \Rightarrow V_E > 1^v \longrightarrow V_E = 1.5^v \rightarrow R_E = \frac{V_E}{0.5^m} = 3^k$

$$\Rightarrow R_{B1} \| R_{B2} < 30^k \Rightarrow R_{B1} = R_{B2} = 50^k \Rightarrow R_{TH} = 25^k < 30^k$$



$A_u = -g_m (R_c \| r_o)$

$= -20 \times (10^K \| 10^K) = -100 \ V/V$