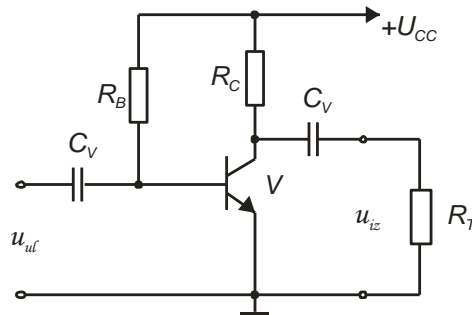


8. domaća zadaća iz Elektroničkih komponenta

1. Za pojačalo sa slike izračunajte statičku radnu točku te napišite jednadžbe statičkog i dinamičkog radnog pravca. Zadano je: $U_{CC} = 24 \text{ V}$, $R_B = 220 \text{ k}\Omega$, $R_C = 820 \Omega$, $R_T = 500 \Omega$, $\beta = 130$.



Rješenje

1. Proračun statičke radne točke:

Krug baze

$$U_{CC} = U_{RB} + U_{BE} = R_B \cdot I_{RB} + U_{BE}$$

$$I_{RB} = I_B$$

$$U_{CC} = R_B \cdot I_B + U_{BE}$$

U radnoj točki Q

$$U_{BE} = U_{BEQ} = 0,7 \text{ V}$$

$$I_{BQ} = \frac{U_{CC} - U_{BEQ}}{R_B} = \frac{24 - 0,7}{220 \cdot 10^3} = 105,9 \mu\text{A}$$

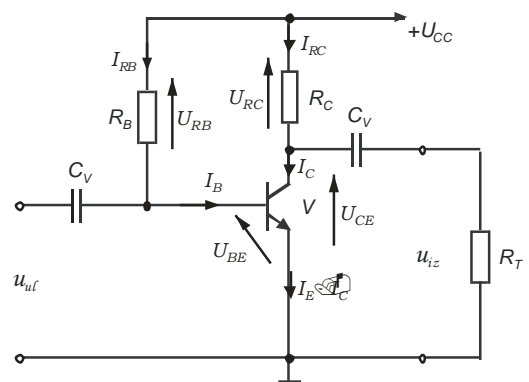
Kolektorski krug

$$I_{CQ} = \beta \cdot I_{BQ} = 13,77 \text{ mA}$$

$$U_{CC} = U_{RC} + U_{CE} = R_C \cdot I_{RC} + U_{CE}$$

$$I_{RC} = I_C$$

$$U_{CC} = R_C \cdot I_C + U_{CE}$$



U radnoj točki Q

$$U_{CC} = R_C \cdot I_{CQ} + U_{CEQ}$$

$$U_{CEQ} = U_{CC} - R_C \cdot I_{CQ} = 24 - 820 \cdot 13,77 \cdot 10^{-3} = 24 - 11,29 = 12,71 \text{ V}$$

Jednadžba statičkog radnog pravca (SRP) ... $I_C = f(U_{CE})$

$$U_{CC} = U_{RC} + U_{CE} = R_C \cdot I_C + U_{CE}$$

$$I_C = -\frac{1}{R_C} \cdot U_{CE} + \frac{U_{CC}}{R_C} = -\frac{1}{820} \cdot U_{CE} + \frac{24}{820} =$$

$$\boxed{I_C = -1,220 \cdot U_{CE} + 29,27 \text{ mA}}$$

Jednadžba dinamičkog radnog pravca (DRP) ... $i_C = f(u_{CE})$

$$i_C = i_c + I_C = -\frac{1}{R_C \parallel R_T} \cdot u_{ce} + I_C = -\frac{1}{R_C \parallel R_T} \cdot (u_{CE} - U_{CE}) + I_C =$$

$$i_C = -\frac{1}{R_C \parallel R_T} \cdot u_{CE} + \frac{U_{CEQ}}{R_C \parallel R_T} + I_{CQ} = -\frac{1}{310,6} \cdot u_{CE} + \frac{12,71}{310,6} + 13,77 \cdot 10^{-3} =$$

$$\boxed{i_C = -3,220 \cdot u_{CE} + 54,69 \text{ mA}}$$