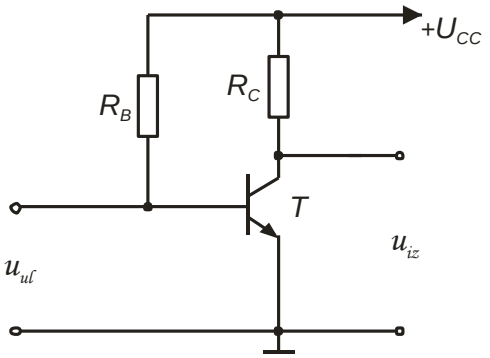
17.01.2007., Zagreb

10. domaća zadaća iz Osnova elektrotehnike i elektronike

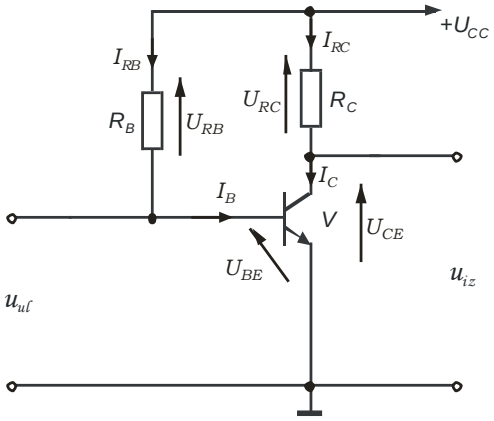
1. Za pojačalo na slici izračunajte statičku radnu točku, ako je poznato: U_{CC} = 24 V, R_B = 36 kΩ, R_C = 110 Ω, β = 240. Što će se dogoditi s radnom točkom, ako se:

   a) stavi drugi tranzistor s β' = 170?

   b) stavi drugi otpornik R_C'' = 75 Ω?



Rješenje:



Kirchhoffovi zakoni:

$$I_{RB} = I_B$$

$$I_{RC} = I_C$$

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

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

Statička radna točka Q

$$U_{BE} = U_{BEQ} = 0{,}7\ V \qquad I_{BQ} = \frac{U_{CC} - U_{BEQ}}{R_B} = 647{,}\dot{2}\ \mu A$$

$$I_{CQ} = \beta \cdot I_{BQ} = 155{,}\dot{3}\ mA \qquad U_{CEQ} = U_{CC} - R_C \cdot I_{CQ} = 6{,}91\dot{3}\ V$$

Statička radna točka Q' ... $\beta \rightarrow \beta'$

$$I'_{BQ} = \frac{U_{CC} - U_{BEQ}}{R_B} = 647{,}\dot{2}\ \mu A = I_{BQ}$$

$$I'_{CQ} = \beta' \cdot I_{BQ} = 110{,}0\ mA$$

$$U'_{CEQ} = U_{CC} - R_C \cdot I'_{CQ} = 11{,}90\ V$$

Statička radna točka Q'' ... $R_C \rightarrow R_C''$

$$I''_{BQ} = \frac{U_{CC} - U_{BEQ}}{R_B} = 647{,}\dot{2}\ \mu A = I_{BQ}$$

$$I''_{CQ} = \beta \cdot I_{BQ} = 155{,}\dot{3}\ mA = I_{CQ}$$

$$U''_{CEQ} = U_{CC} - R''_C \cdot I_{CQ} = 12{,}35\ V$$