ÖDEV-4 GÖZÜMLER

① a) Devre B sınıfı güç kuvvetlendiricisi olarak çalışmaktadır

b) $P_{ymax} = \frac{(V_{cc}/2)^2}{2R_y} = \frac{(16)^2}{2 \cdot 8} = 16\,W$

c) $I_{Cmax} = I_{ymax} = \frac{V_{ymax}}{R_y} = \frac{16}{8} = 2A$ (iletimdeki transistordan alır.)

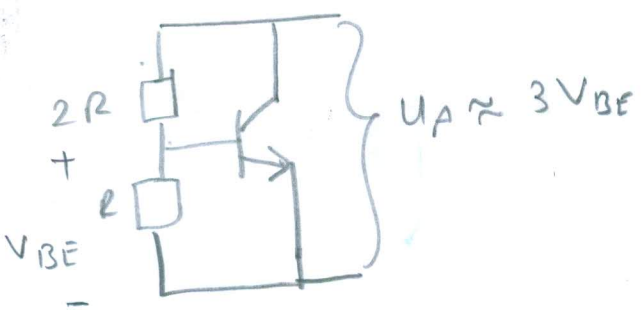
$V_{CEmax} = V_{cc} = 32V$ kesimdeki transistorda oluşur.

② a) $P_{Lmax} = \frac{1}{2} \frac{(V_{cc} - V_{CEsmin})^2}{R_L} = 40\,W$

$R_L = \frac{(22-2)^2}{2 \cdot 40} = \frac{400}{2 \times 40} = 5\,\Omega.$

b) $U_A \cong 3V_{BE}$ (Darlington - sözde Darlington çıkış katı)

$\cong 2{,}1\,V.$



(2)

c) $\beta_{FD} = \beta_{F1} \cdot \beta_{F3} = \beta_{F2} \cdot \beta_{F4}$

$$I_{Lm} = \frac{V_{CC} - V_{CEOmin}}{R_L} = \frac{20}{5} = 4\,A$$

$$\beta_{FD} \geq \frac{I_{Lm}}{I_0} = \frac{4\,A}{5\,mA} = 800$$

$$\beta_{F3} = \beta_{F4} = \frac{800}{20} = \underline{40}$$

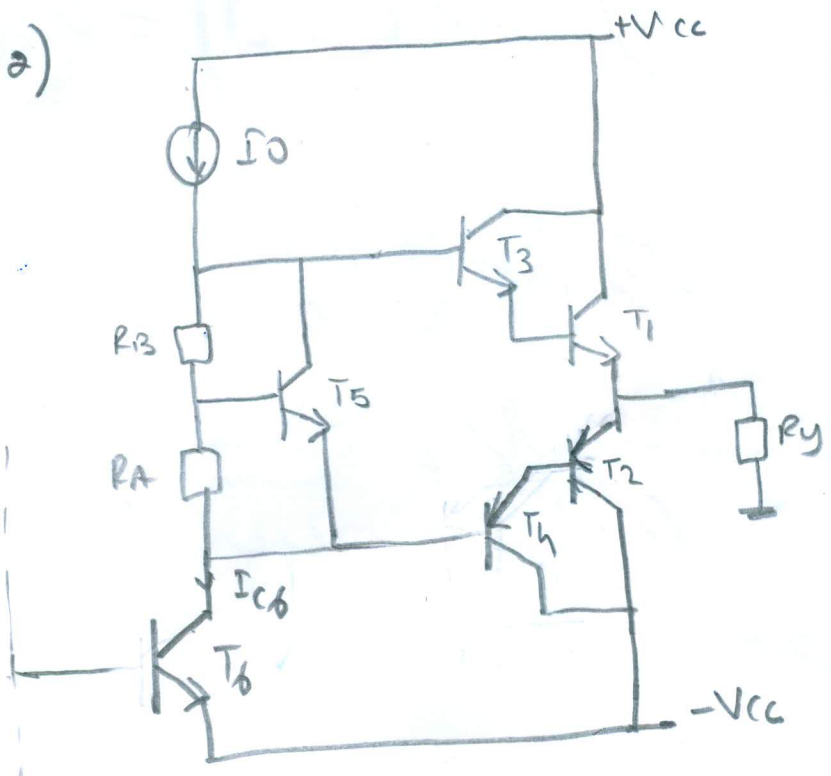
d) $$\frac{22 - V_{BE}}{I_0} = R = \frac{22 - 0,7}{5.10^{-3}} = \underline{4260\,\Omega}$$

e) $$P_{TS} = V_{CES} \times I_{CS} = V_{CES} \times I_0 = (V_{CC} - 2V_{BE}) \cdot I_0$$

$$= (22 - 1,4) \cdot 5.10^{-3} = \underline{103\,mW}$$

(3)

a)



b) $\frac{V_{ymax}^2}{2R_y} = P_{ymax} = 50\,W$ $\qquad I_{ymax} = \frac{V_{ymax}}{R_y} = \frac{20V}{4\Omega} = 5\,A$

$$V_{ymax} = \sqrt{2 P_{ymax} R_y} = \sqrt{2 \times 50 \times 4} = 20\,V$$

$V_{CC} \geq V_{ymax} + V_{CE\,Dmin} = 22\,V$ olur

c) $I_0 = I_{C6} \geq \frac{I_{ymax}}{\beta_{Dmin}} = \frac{5A}{1000} = 5\,mA$

d) i) $P_T = P_{d1} + P_{d2} = 0{,}273\, P_{ymax}$ (ortanca çıkış gücü için)

$$P_T = P_{DC} - P_{ymax} + P_{ymax}\left(\frac{1}{\eta} - 1\right)$$

$\frac{P_{ymax}}{P_{DC}} = \eta$ $\qquad \eta = \left(\frac{V_{CC} - V_{CE\,sat}}{V_{CC}}\right) \pi/4 \simeq \pi/4$ (V_{CE} ihmal)

$$P_T = P_{ymax}\left(\frac{1}{\pi/4} - 1\right) = \left(\frac{4}{\pi} - 1\right) \cdot P_{ymax} \simeq 0{,}273\, P_{ymax}$$

$P_T = 0{,}273 \cdot 50 = 13{,}65\,W$

ii) En kötü halde ısıya dönüşen güç; transistorde harcanan gücün en büyük değeridir. O halde

$$P_T = \frac{4}{\pi^2} P_{ymax} \simeq 0{,}4 \cdot P_{ymax} = \underline{\underline{20\,W}}$$