Elektronik 2 – Ödev 4
GÖZÜMLER

02.06.2017

(1) a) Devre B sınıfı güç kuvvetlendiricisi olarak çalışmaktadır.

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

c) $I_{cmax} = I_{ymax} = \frac{V_{ymax}}{R_y} = \frac{16}{8} = 2A$ (İletimdeki transistörden akar.)

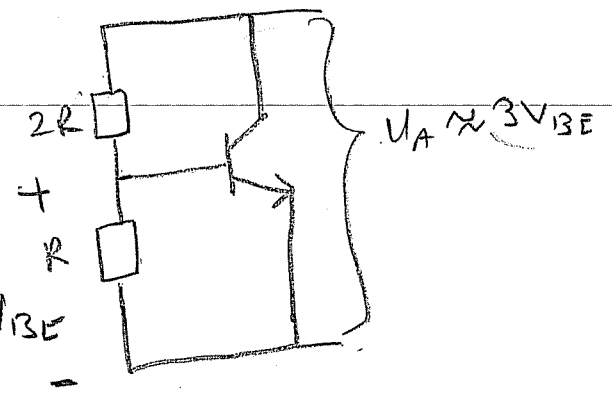
$V_{CE\,max} = V_{cc} = 32V$ Kesimdeki transistörde oluşur.

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

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

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

$\cong 2,1V$



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

$$I_{LM} = \frac{V_{CC} - V_{CEDmin}}{R_L} = \frac{20}{5} = 4A$$

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

$$\frac{I_{LM}}{\beta_2 \beta_4} = I_0$$

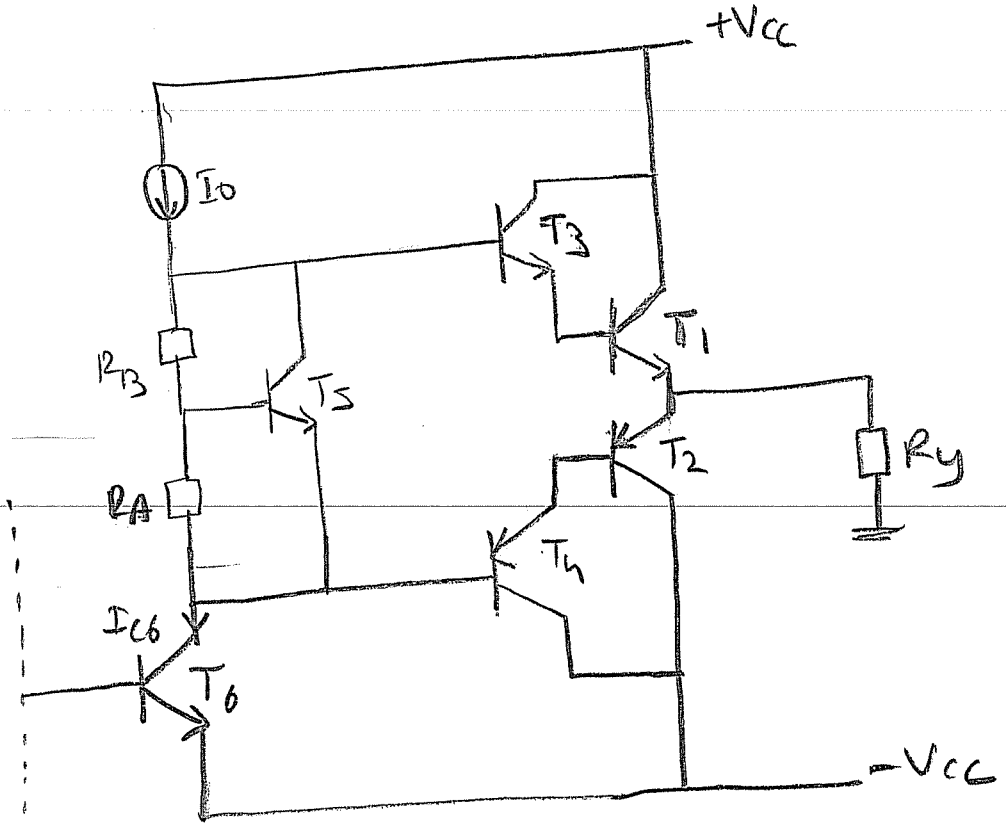
$$\beta_{F3} = \beta_{F4} = \frac{800}{20} = 40$$

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

e) $$P_{TS} = V_{CE\,5} \times I_{C5} = V_{CE5} \times I_0 = (V_{CC} - 2V_{BE}) \cdot I_0$$

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

(3)



b) $\frac{V_{ymax}^2}{2R_y} = P_{ymax} = 50\,W$

$I_{ymax} = \frac{V_{ymax}}{R_y} = \frac{20V}{4\Omega} = 5A$

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

$V_{CC} \geq V_{ymax} + V_{CEO\,min} = 22V$ olur

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

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

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

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

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

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

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

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