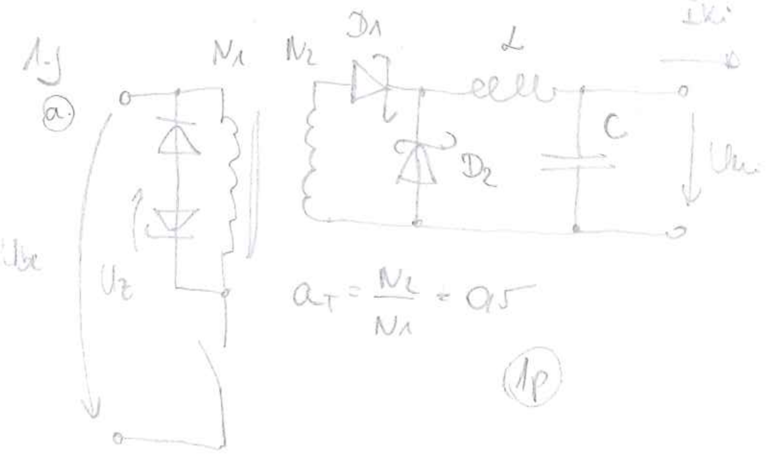
Táplap vizsga 05.21.

1.)

a.)



$U_{be} = 400V$
$U_{ki} = 48V$
$a_T = 0,5$
$L_M = 5mH$
$P_{ki} = 240W$
$f = 50kHz$
$\Delta I_L = 1A$
$\Delta U_{ki} = 0,01$

$a_T = \frac{N_2}{N_1} = 0,5$ (1p)

b.)

$U_{ki} = a_T \cdot U_{be} \cdot \frac{t_{be}}{T} \Rightarrow d = \frac{U_{ki}}{a_T U_{be}} = \frac{48}{0,5 \cdot 400} = 0,24$ (1p)

c.)

$\Delta I_L = \frac{a_T \cdot U_{be} - U_{ki}}{L} t_{be} \Rightarrow L \geq \frac{a_T U_{be} - U_{ki}}{\Delta I_L} t_{be} = \frac{200-48}{1} \cdot 0,24 \cdot 20\mu s =$

$= 729,6 \mu H$ (1p)

$\Delta U_{ki} = \frac{\Delta I_L \cdot T}{8C} \Rightarrow C \geq \frac{\Delta I_L \cdot T}{8 \Delta U_{ki}} = \frac{1 \cdot 20\mu s}{8 \cdot 0,01} = 250\mu F$ (1p)

d.)

$I_{C_{RMS}} = \frac{\Delta I_L}{2\sqrt{3}} = \frac{1}{2\sqrt{3}} = 288mA @ 50kHz$ (1p)

e.)

$\hat{I}_{D1} = \hat{I}_{D2} = I_{LAV} + \frac{\Delta I_L}{2} = I_{ki} + \frac{\Delta I_L}{2} = 5,5A$ (1p)

$\hat{U}_{D2} = a_T \cdot U_{be} = 200V$

$\hat{U}_{D1} = U_Z \cdot a_T + U_{ki}$, max $200V$ (1p)

f.)

$U_{Zmin} = U_{be} \cdot \frac{d}{1-d} = 400 \cdot \frac{0,24}{1-0,24} = 126,3V$ (1p)

$P_Z = \frac{U_{ki}^2}{2 L_M a_T^2 f} = \frac{48^2}{2 \cdot 5 \cdot 10^{-3} \cdot 0,5^2 \cdot 50 \cdot 10^3} = 18,4W$ (1p)

g.)

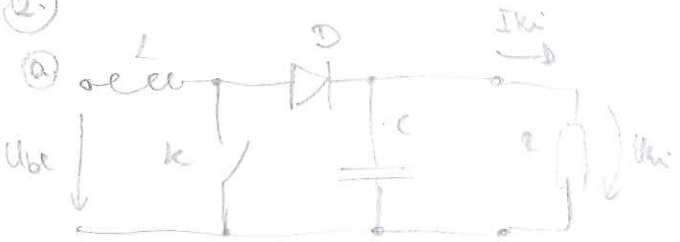
$U_{Tmax} = U_{be} + U_Z = 400 + 126,3 = 526,3V$ (1p)

$I_{Tmax} = \hat{I}_L \cdot a_T + \frac{U_{be}}{L_M} t_{be} = 5,5 \cdot 0,5 + \frac{400}{5 \cdot 10^{-3}} \cdot 0,24 \cdot 20\mu s = 3,134A$ (1p)

$\Sigma 11p$

2.

a)



1p

$U_{be} = 12V$
$U_{ki} = 48V$
$I_{ki} = 5A$
$\Delta I_L = 5A$
$\Delta U_{ki} = 0,01V$
$f = 100kHz$

b)

$d = 1 - \frac{U_{be}}{U_{ki}} = 1 - \frac{12}{48} = 0,75$

$t_{be} = d \cdot T = 0,75 \cdot 10\mu s = 7,5\mu s$

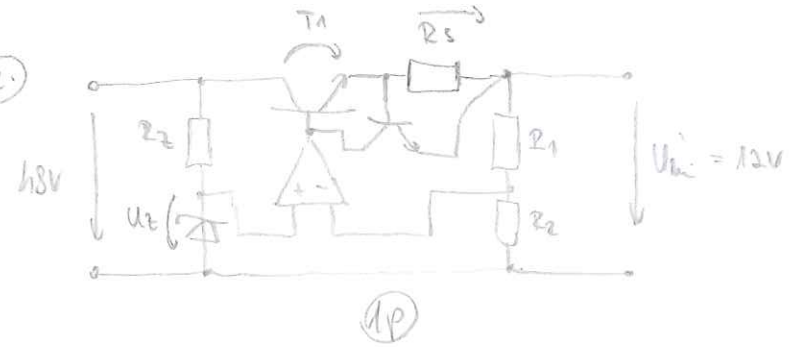
$\Delta I_L = \frac{U_{be}}{L} t_{be} \Rightarrow L \geq \frac{U_{be}}{\Delta I_L} t_{be} = \frac{12}{5} 7,5\mu s = 18\mu H$ 1p

$\Delta U_{ki} = \frac{I_{ki} \cdot t_{be}}{C} \Rightarrow C \geq \frac{I_{ki} \cdot t_{be}}{\Delta U_{ki}} = \frac{5 \cdot 7,5\mu s}{0,01} = 3750\mu F$ 1p

c) $\hat{I}_{VT} = \hat{I}_D = I_{L\,AV} + \frac{\Delta I_L}{2} = \frac{1}{1-d} I_{ki} + \frac{\Delta I_L}{2} = \frac{1}{1-0,75} \cdot 5 + \frac{5}{2} = 22,5A$ 1p

d) $\hat{U}_{VT} = \hat{U}_D = U_{ki} = 48V$ 1p

e)



1p

f) $U_z = 5V$

$\frac{48V - 5V}{I_{Zmin}} = \frac{48V - 5V}{0,5mA} = 86k\Omega > R_z > \frac{48V - 5V}{10mA} = 4,3k\Omega$ 1p $\quad (R_z = 4,0k\Omega)$

$U_{ki} \cdot \frac{R_2}{R_1 + R_2} = U_z \Rightarrow U_{ki} = U_z \cdot \frac{R_1 + R_2}{R_2} \Rightarrow \frac{R_1 + R_2}{R_2} = 2,4$

$R_1 + R_2 > \frac{12V}{1mA} = 12k\Omega$

$R_1 = 1,4 R_2$

1p $\quad (R_2 = 10k\Omega,\ R_1 = 14k\Omega)$

g) $I_{kaléd} = \frac{U_{be}}{R_S} \Rightarrow R_S \approx \frac{0,7V}{0,25A} = 2,8\Omega$ 1p

h) $P_D \approx P_{T1} + I_{ki}^2 R_S = \left(U_{be} - (U_{ki} + I_{ki} R_S)\right) \cdot I_{ki} + I_{ki}^2 R_S = \left(48 - (12 + 0,7)\right) \cdot 0,25 + 0,25^2 \cdot 2,8$

$= 8,825 + 0,175 = 9W$ 1p

(1.) $I_{DCDC} = 0{,}25\,A$

$\underline{I_{L\,AV}} = \frac{1}{1-d} I_{ki} = 4 \cdot 0{,}25 = \underline{1A}$ $\quad \underline{\Delta I_L = 5A}$

Szaggatott vezetés alakul ki

- $\underline{U_{ki}} = U_{be}\left(1 + \frac{U_{be} \cdot t_{be}^2}{2LT\,I_{ki}}\right) = 12\left(1 + \frac{12 \cdot (7{,}5 \cdot 10^{-6})^2}{2 \cdot 11 \cdot 10^{-6} \cdot 10 \cdot 10^{-6} \cdot 0{,}25}\right) =$

$= \underline{102V}$ (1p)

- $\underline{I_Z} = \frac{102V - 5V}{40k\Omega} = \underline{2{,}425\,mA}$ (1p)

- $\underline{P_D} \approx (102V - 12V) \cdot 0{,}25A = \underline{22{,}5\,W}$ (1p)

$\boxed{\leq 14p}$

$\boxed{\text{Összpontszám: 25 pont}}$

0 – 10	:	1
11 – 15	:	2
16 – 19	:	3
20 – 22	:	4
23 – 25	:	5