D) Perdas de condução no transistor

$P_{cond_T} = V_{TON} \cdot I_{TMED}$

$P_{cond_T} = 0,5 \cdot 1$

$P_{cond_T} = 0,5\,W$

Perdas de condução no díodo

$P_{cond_D} = V_{DON} \cdot I_{DMED}$

$P_{cond_D} = 0,3 \cdot 1$

$P_{cond_D} = 0,3\,W$

total Perdas 0,8W

$$\eta = \frac{P_O}{P_O + P_{cond}} \cdot 100 \Leftrightarrow \eta = \frac{12}{12+0,8} \cdot 100 = 94\%$$

Perdas de comutação no transistor

$$P_{comut_T} = \frac{1}{2 \cdot fs} \cdot U \cdot I\,(t_{con} + t_{coff})$$

$$\hat{I}\ (\text{máximo}) = \frac{I_{TMED}}{D} = \frac{1}{0,5} = 2A$$

$$P_{comut_T} = \frac{1}{2 \times 10 \times 10^{3}} \cdot 12 \cdot 2 \cdot (2 \cdot 100 \times 10^{-9})$$

$$P_{comut_T} = 240\,mW$$

Perdas de comutação no díodo

$$I_{DMED} = 1 = \hat{I}_D \cdot \frac{t_{off}}{ts} = \hat{I}_D\,(1-D)$$

$$\hat{I}_D = \frac{I_{DMED}}{(1-D)} = \frac{1}{1-0,5} = 2\,A$$

$$P_{comut_D} = \frac{1}{2fs} \cdot \hat{U} \cdot \hat{I} \cdot t_{coff}$$

$$P_{comut_D} = \frac{1}{2 \times 10 \times 10^{3}} \cdot 6 \cdot 2 \cdot 100 \times 10^{-9} = 60\,mW$$

$$P_{comut_{total}} = (240 + 60) = 300\,mW$$

Nova eficiência do circuito

$$\eta = \frac{P_O}{P_O + P_{perdas}} = \frac{12}{12 + (0,8 + 0,3)} = 92\%$$

D) Perdas de condução no transistor

$P_{cond_T} = V_{TON} \cdot I_{TMED}$

$P_{cond_T} = 0,5 \cdot 1$

$P_{cond_T} = 0,5\,W$

Perdas de condução no díodo

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Nova eficiência do circuito

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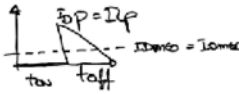
B) $V_L = L \cdot \frac{\Delta I}{\Delta t}$



En ton :

$V_L = V_D$

$\Delta I = I_{lp}$

$\Delta t = t_{on} = D \cdot t_s$

$I_{lp} = I_{pp}$

$L = \frac{D \cdot t_s \cdot V_D}{I_{lp}}$

$I_{dmed} = \frac{1}{t_s} \cdot \frac{t_{off} \cdot I_{pp}}{2}$ e) $I_{dmed} = \frac{I_{pp}(1-D)}{2}$

$\frac{1}{t_s} \cdot \frac{(1-D) \cdot t_s \cdot I_{pp}}{2}$

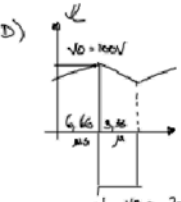
$I_{pp} = \frac{2 \cdot I_{omed}}{1-D} = \frac{2 \cdot I_{omin}}{1-D} = \frac{2 \cdot I_{omin}}{1-D}$

$L = \frac{V_D \cdot D \cdot (1-D) \cdot t_s}{2 I_{omin}}$ e) $L = \frac{V_D \cdot D \cdot (1-D)^2 \cdot T_S}{2 I_{omin}}$

C) $V_D \cdot I_D = V_O \cdot I_O$

$I_D = \frac{V_D \cdot I_O}{V_d} = \frac{300 \times 10}{10} = 30\,A$

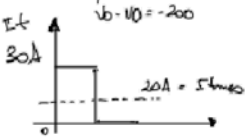
D)

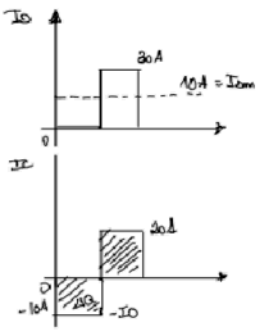


$I_{lmed} = I_{tmed} + I_{Dmed} = I_{tmed} + I_{Omed}$

$I_O = \frac{P_O}{V_O} = \frac{3000}{300} = 10\,A$

$I_{tmed} = I_{lmed} - I_O = 30 - 10 = 20\,A$





$\begin{cases} \Delta Q = I_O \cdot t_{on} = I_O \cdot D \cdot t_s \\ \Delta Q = C \cdot \Delta V_O \end{cases}$

$I_O \cdot D \cdot t_s = C \cdot \Delta V_O$ e) $C \geq \frac{I_O \cdot D \cdot T_S}{\Delta V_O}$

$C \geq \frac{10 \cdot \frac{2}{3} \cdot 10 \times 10^{-6}}{0,01 \cdot 300} = 22,22\,\mu F$