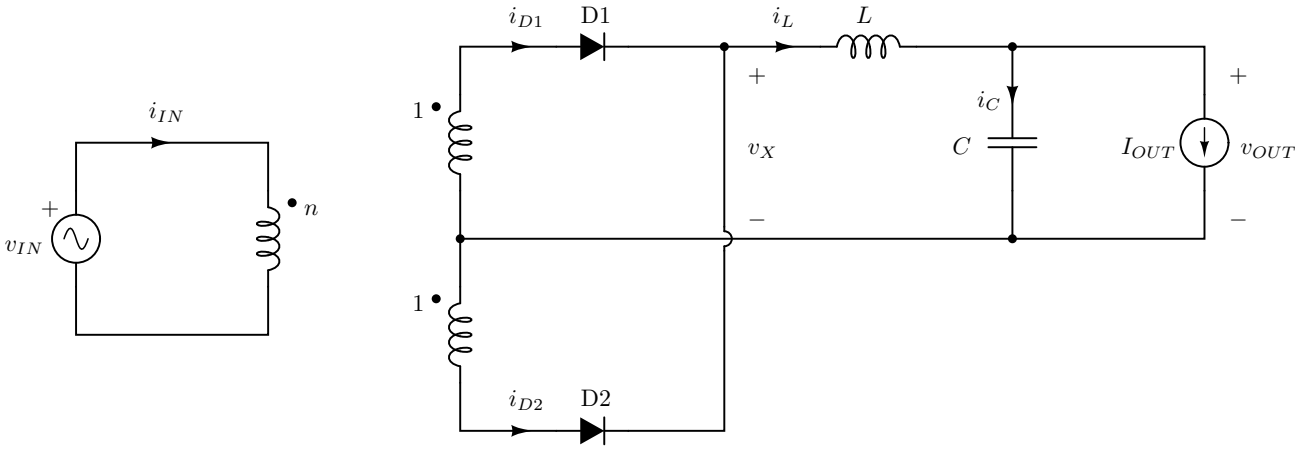
**2.** Ispravljač sa slike 2 ima $v_{IN} = 230\sqrt{2}\,\mathrm{V}\sin\left(2\pi\,(50\,\mathrm{Hz})\,t\right)$, $V_D = 1\,\mathrm{V}$. Smatrati $|\sin x| \approx \frac{2}{\pi} - \frac{4}{3\pi}\cos(2x)$.
a) [2] Odrediti $n$ tako da srednja vrednost izlaznog napona u kontinualnom režimu bude $V_{OUT} = 20\,\mathrm{V}$.
b) [2] Odrediti $L$ tako da ispravljač radi u kontinualnom režimu za $I_{OUT} > 1\,\mathrm{A}$.
c) [2] Odrediti $C$ tako da amplituda talasnosti izlaznog napona u kontinualnom režimu bude $V_{OUTm} = 0.1\,\mathrm{V}$.
d) [2] Odrediti vremenske dijagrame $i_L$, $i_C$, $i_{D1}$, $i_{D2}$, $i_{IN}$, $v_X$ i $v_{out} = \hat{v}_{OUT} = v_{OUT} - V_{OUT}$ za $I_{OUT} = 2\,\mathrm{A}$.
e) [2] Odrediti srednje snage disipacije na diodama D1 i D2, $P_{D1}$ i $P_{D2}$ i koeficijent korisnog dejstva $\eta$ za $I_{OUT} = 2\,\mathrm{A}$.



Slika 2.

**a)**

$$V_{OUT} = \frac{2}{\pi}\,\frac{V_m}{n} - V_D$$

$$n = \frac{2}{\pi}\,\frac{V_m}{V_{OUT} + V_D}$$

$$n = \frac{2}{\pi}\,\frac{230\sqrt{2}}{21} \approx 9.86$$

**b)**

$$V_{L,2} = \frac{4}{3\pi}\,\frac{V_m}{n} = \frac{2}{3}\,(V_{OUT} + V_D) = 14\,\mathrm{V}$$

$$V_{L,2} = 2\,\omega_0\,L\,I_{OUTk}$$

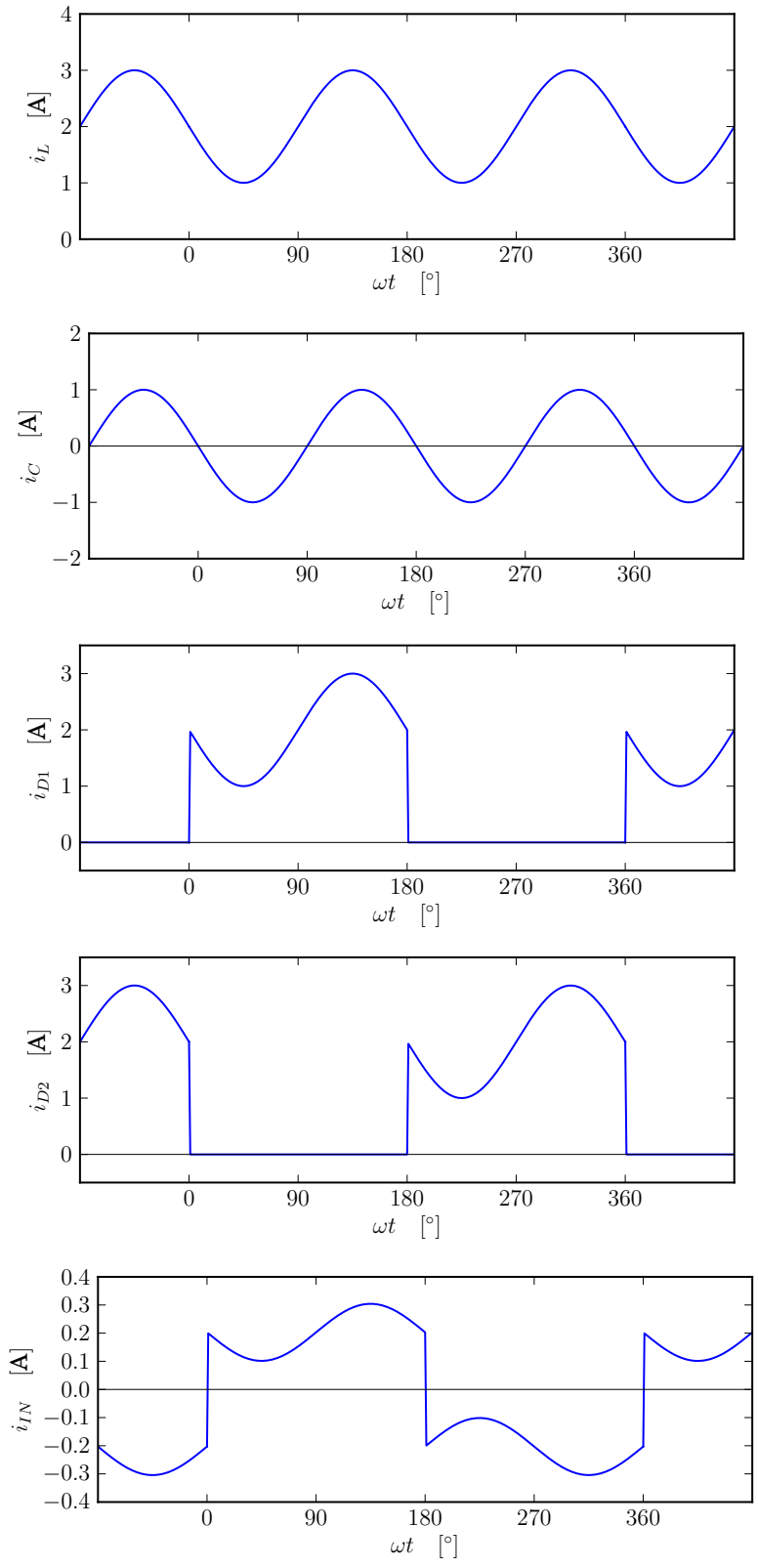
$$L = \frac{V_{L,2}}{2\,\omega_0\,I_{OUTk}} = \frac{14\,\mathrm{V}}{200\pi\,\frac{1}{\mathrm{s}}\,1\,\mathrm{A}} = \frac{7}{100\pi}\,\mathrm{H} \approx 22.28\,\mathrm{mH}$$

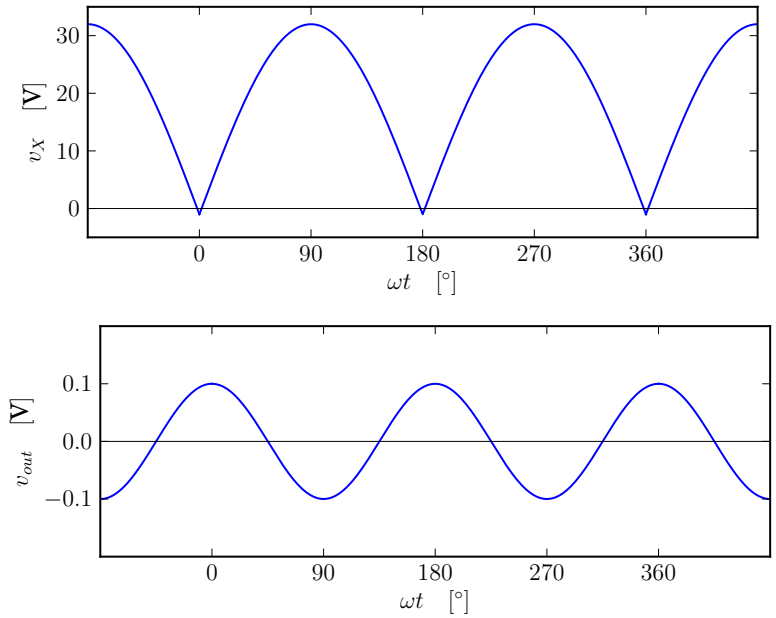
**c)**

$$2\,\omega_0\,C\,V_{OUTm} = I_{OUTk}$$

$$C = \frac{I_{OUTk}}{2\,\omega_0\,V_{OUTm}} = \frac{1\,\mathrm{A}}{200\pi\,\frac{1}{\mathrm{s}}\,0.1\,\mathrm{V}} = \frac{1}{20\pi}\,\mathrm{F} \approx 15.92\,\mathrm{mF}$$

**d)**






**e)**

$$P_{D1} = P_{D2} = V_d \frac{I_{OUT}}{2} = 1\,\mathrm{W}$$

$$\eta = \frac{P_{OUT}}{P_{OUT} + P_{D1} + P_{D2}} = \frac{V_{OUT}}{V_{OUT} + V_D} = \frac{20}{21} \approx 95.24\%$$