

PRIPREMA ZA 2. LABORATORIJSKU VJEŽBU
IZ ELEKTROMEHANIČKIH SUSTAVA

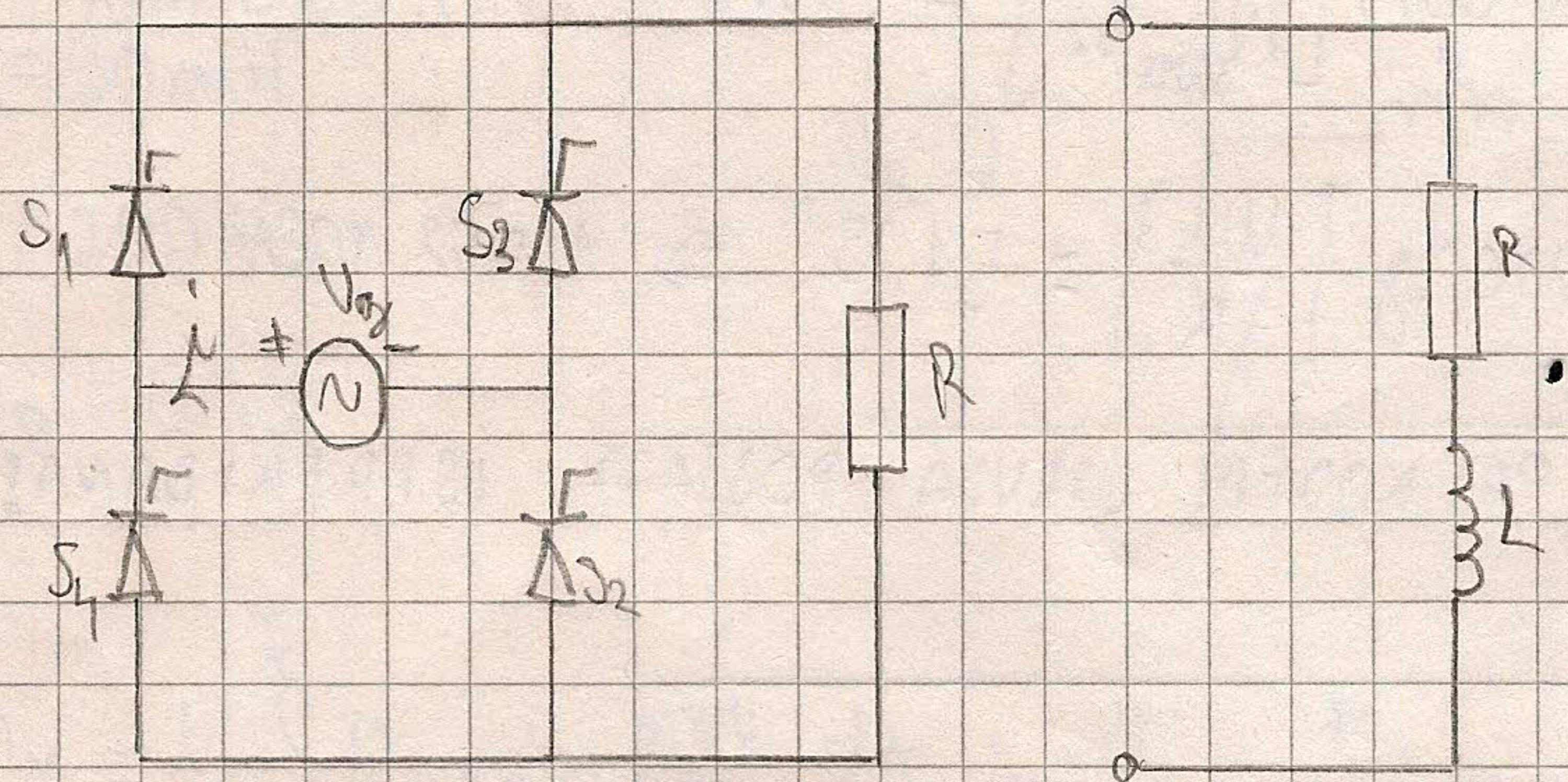
MATANOVIĆ ALMEN

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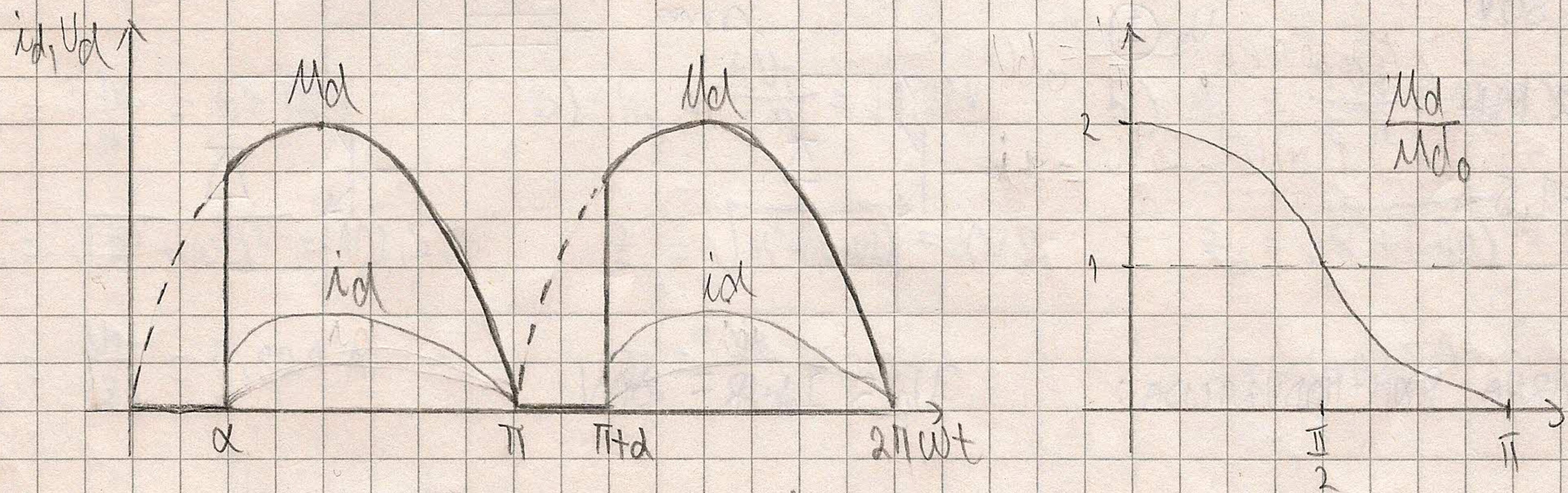
② - UPRAVLJACKA KARAKTERISTIKA - DEFINIRA SE KAO OVISNOST NAPONA U_{dd} O
KUTU UPRAVLJANJA α UZ PARAMETAR J_d .

- IZLAŽNA KARAKTERISTIKA USMISERIVAČA - DEFINIRA SE KAO OVISNOST NAPONA U_{dd}
O STRUJI I_d UZ PARAMETAR α .

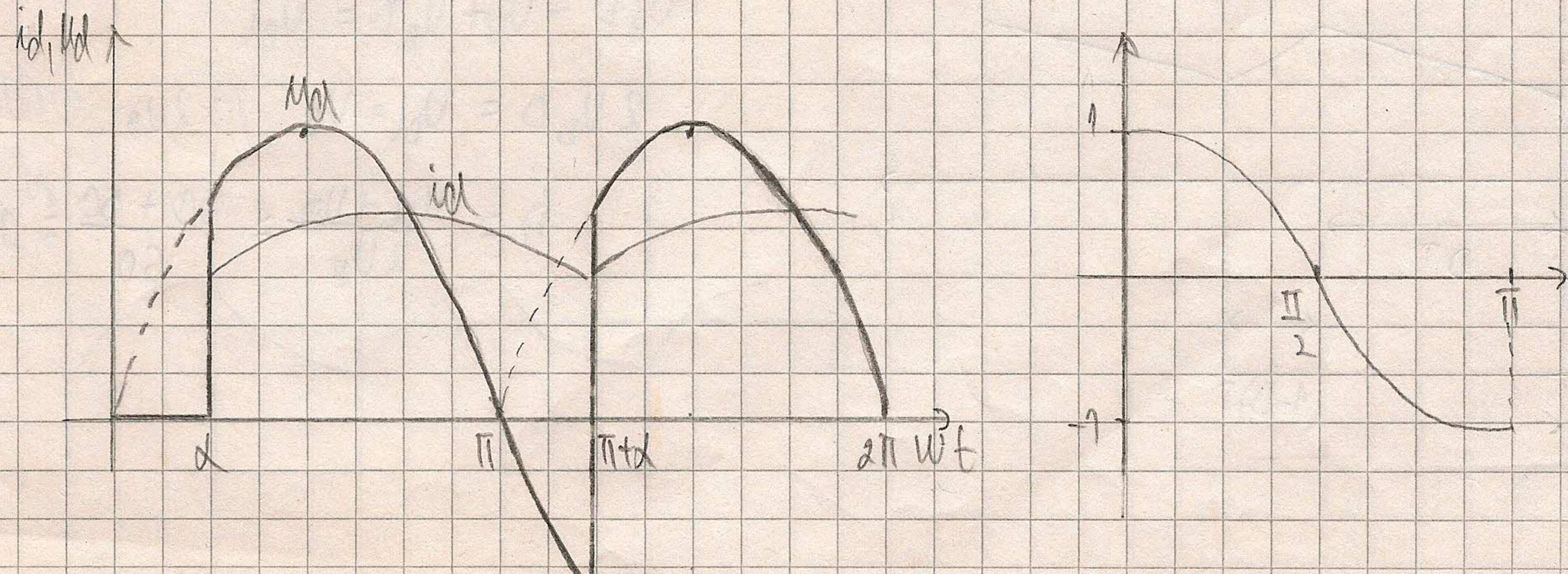
③



$$R - TROŠILO : U_{dd} = \frac{U_{max}}{\pi} [1 + \cos \alpha] ; i_{d0} = \frac{U_{max}}{\pi R} [1 + \cos \alpha]$$



$$R_L - TROŠILO : U_{dd} = \frac{2 U_{max}}{\pi} \cos \alpha ; i_{d0} = \frac{2 U_{max}}{\pi (R + jw)}$$



(4)

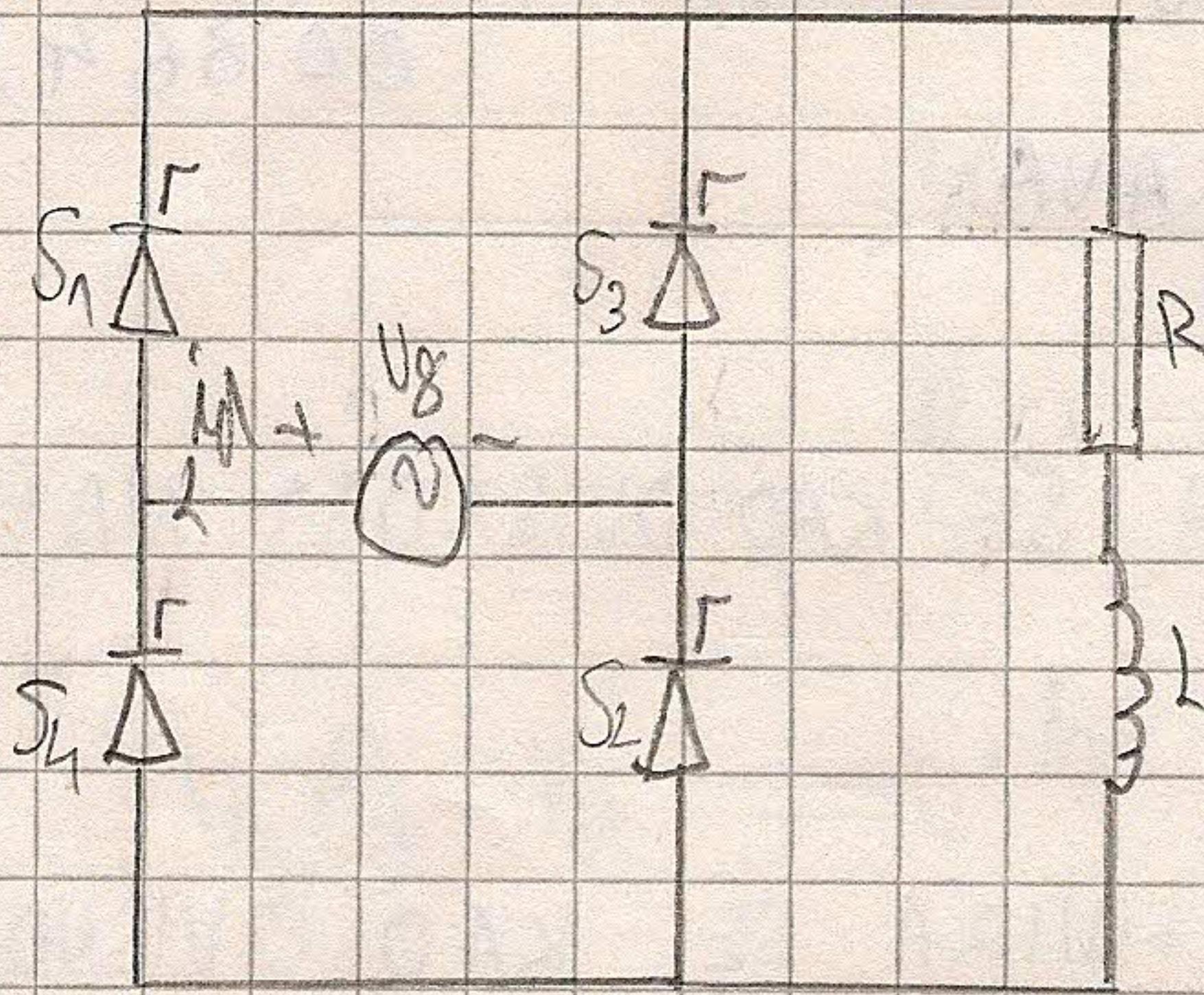
$$R = 20 \Omega$$

$$L = 100 \text{ mH}$$

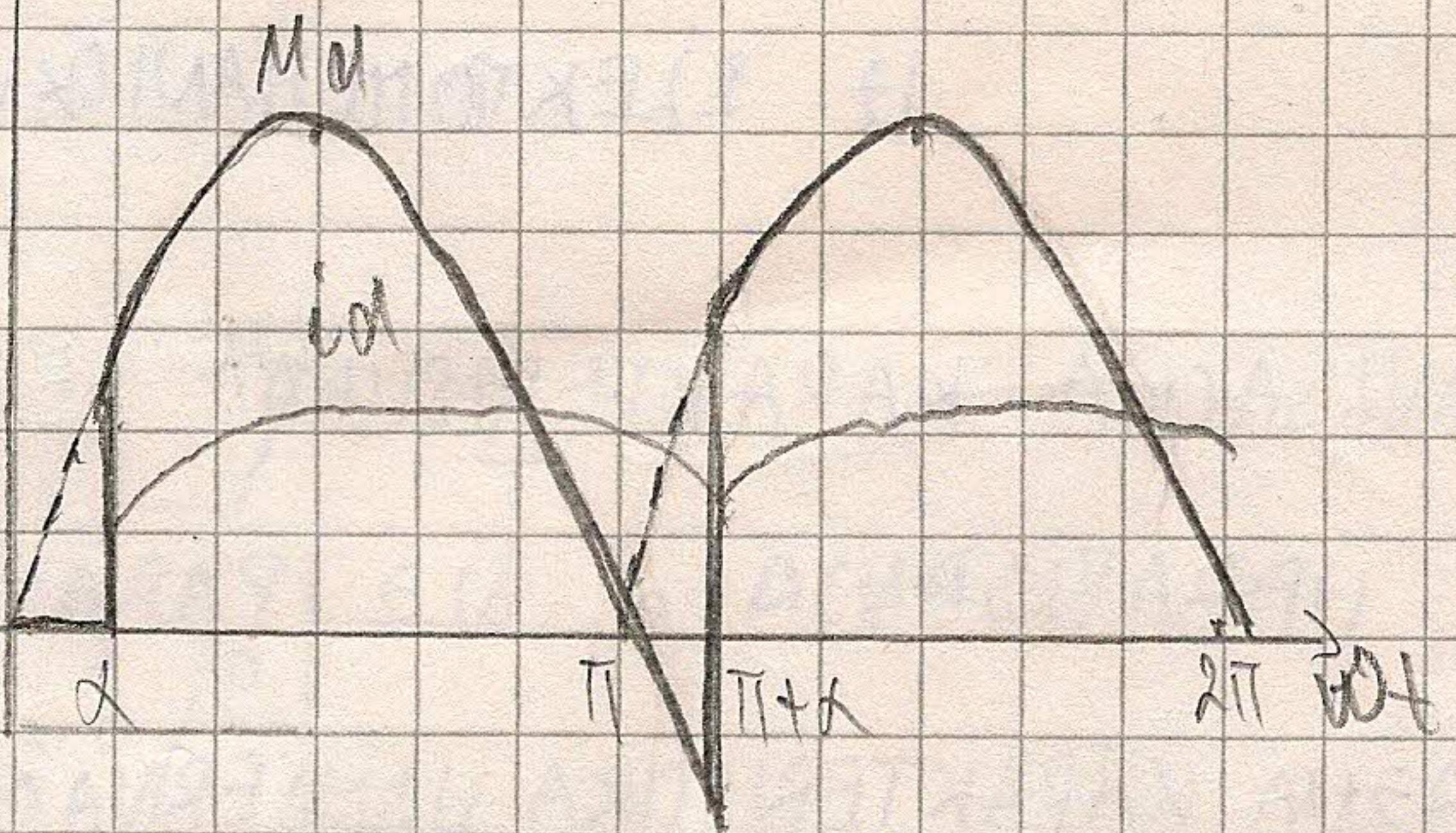
$$V_{SRMS} = 70 \text{ V}$$

$$I_d = 2 \text{ A}$$

$$\alpha = 9^\circ$$



i_d, u_d



$$V_d = I_d \cdot R = 40 \text{ V}$$

$$U_{d0} = \frac{2}{\pi} V_{SRMS} \sqrt{2} \cos \alpha \Rightarrow \alpha = \arccos \left[\frac{\pi U_d}{2 V_{SRMS} \sqrt{2}} \right] = 50.6^\circ \Rightarrow 0.883 \text{ rad}$$

$$\alpha = \arctg \left[\frac{WL}{R} \right] = 54.5^\circ \Rightarrow 1.262 \text{ rad}$$

- KUT PRI KOJEM STVUJA POSTAJE ISPREKIDANAT!

(5)

DC/DC-PRETVARAČ

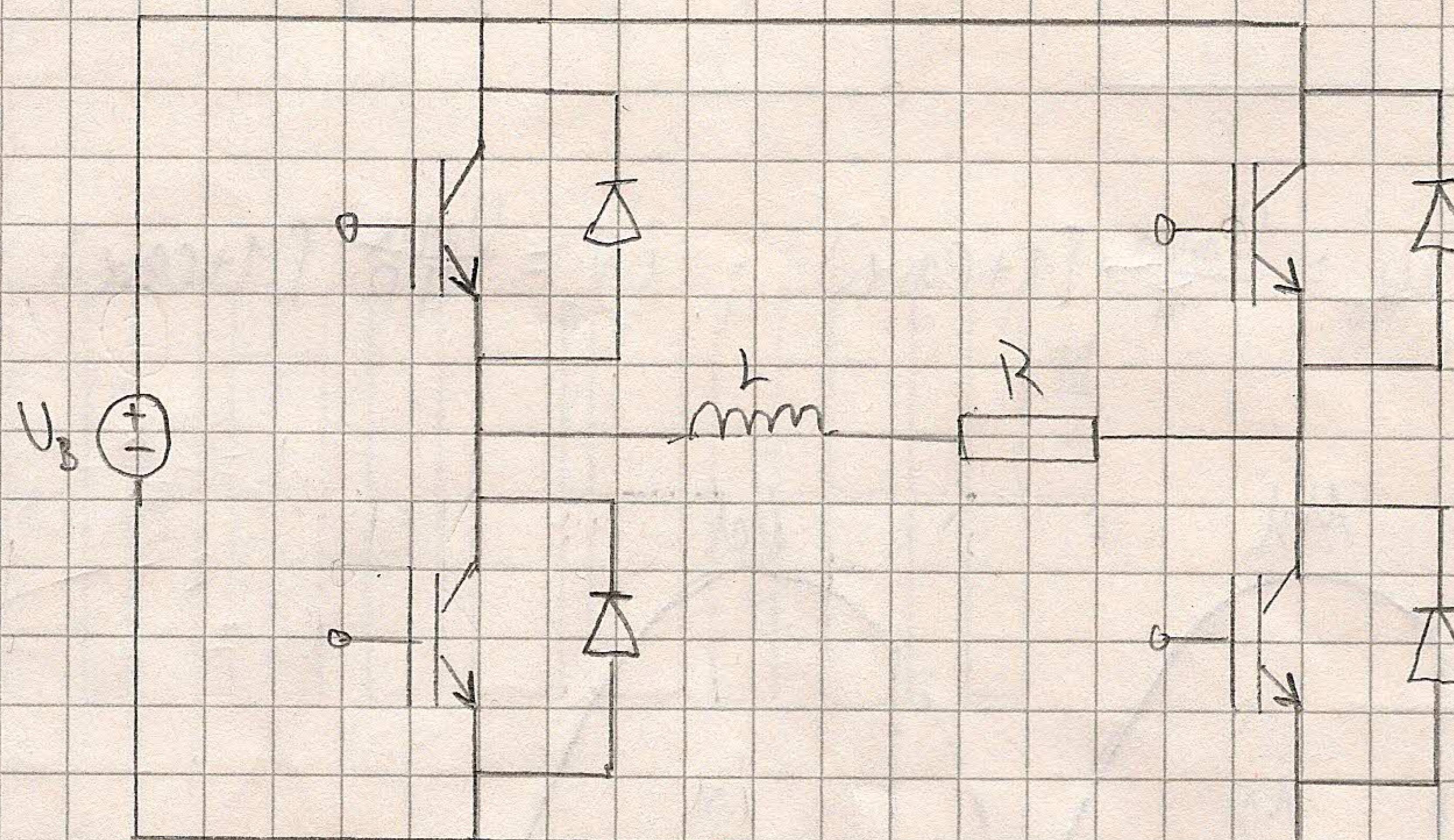
$$R = 20 \Omega$$

$$L = 80 \text{ mH}$$

$$V_B = 50 \text{ V}$$

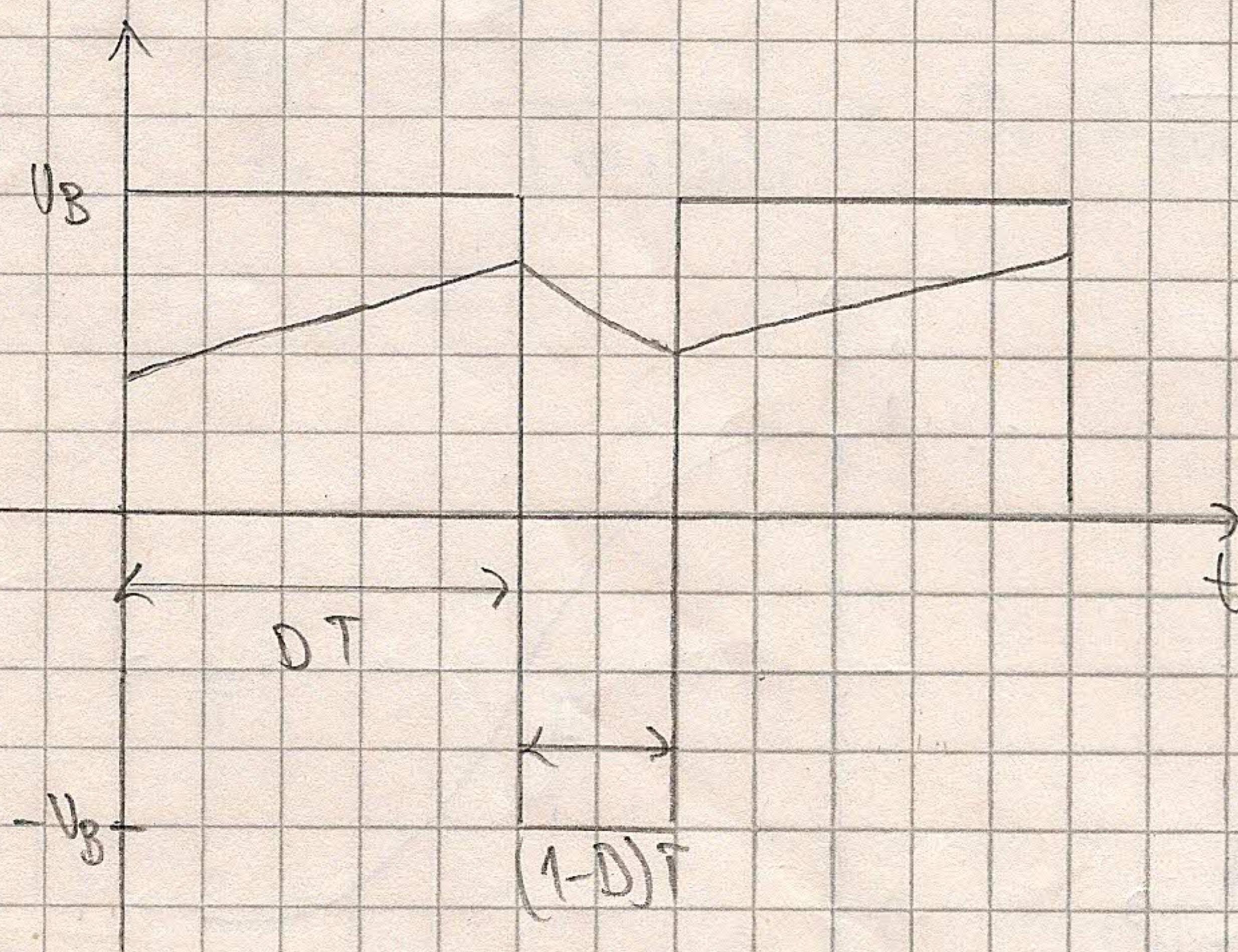
$$f = 2 \text{ kHz}$$

$$I_d = 1.5 \text{ A}$$



a) BIPOLARNA POM-MODULACIJA:

$$V_d = I_d \cdot R = 30 \text{ V}$$



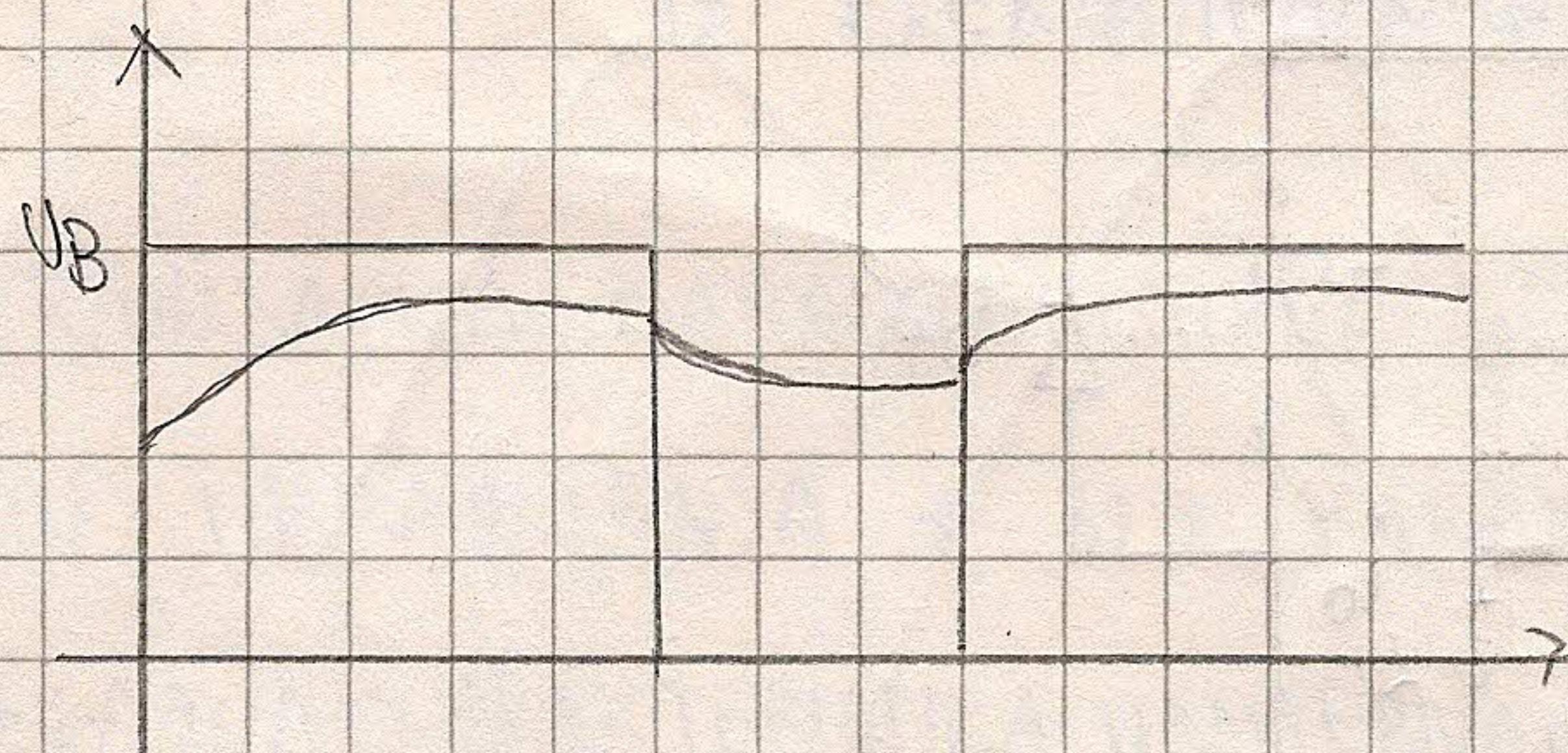
$$V_B DT - V_B(1-D)T = V_d T \quad | : T$$

$$V_B D - V_B + V_B D = V_d$$

$$2V_B D = V_d + V_B \quad | : 2V_B$$

$$D = \frac{V_d + V_B}{2V_B} = \frac{30 + 50}{60} = 0.8$$

2) UNIPOLARNA PWM-MODULACIJA:



$$V_B \cdot D = V_d$$

$$D = \frac{V_d}{V_B} = \frac{30}{50} = 0,6$$

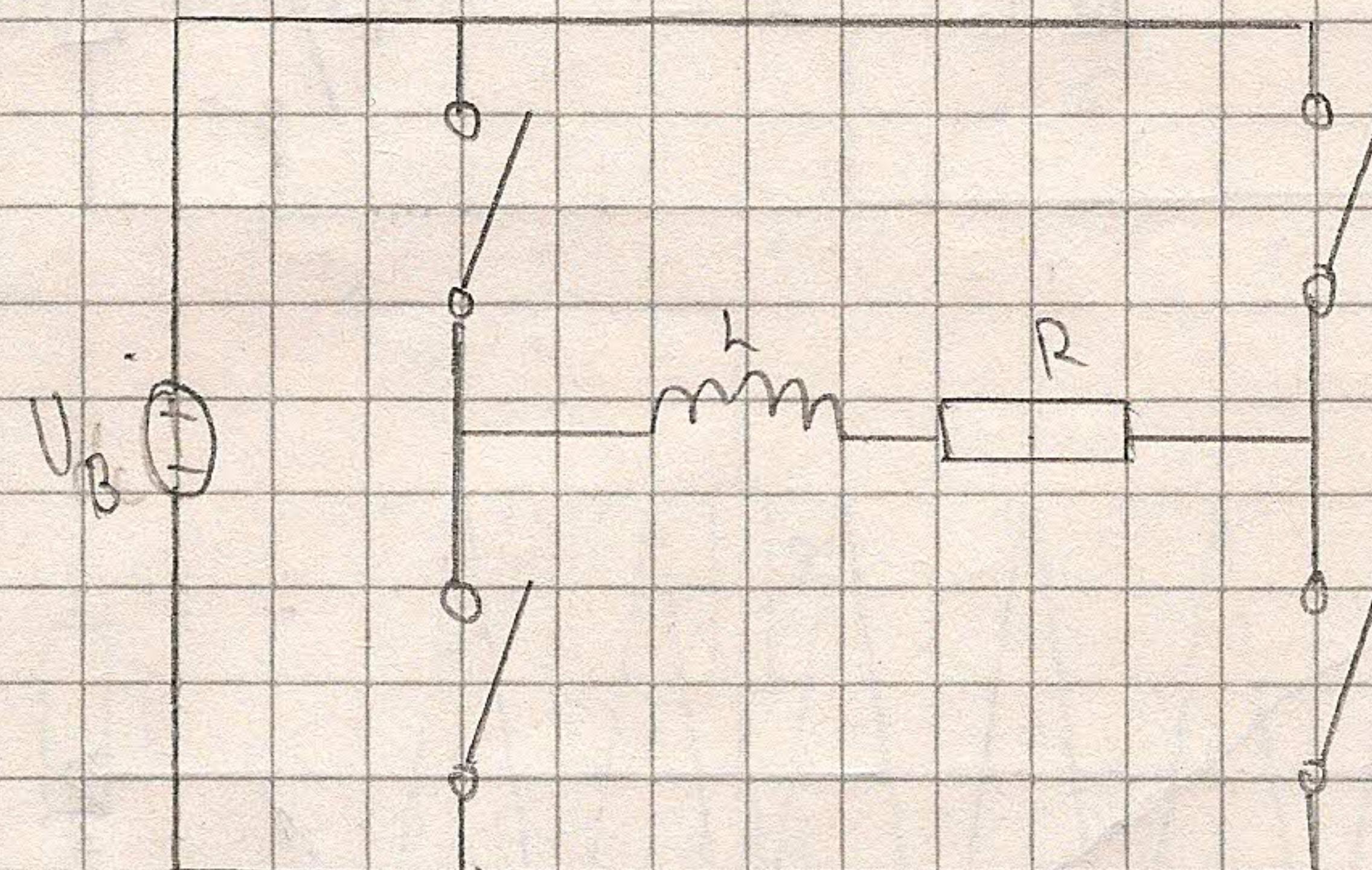
6) DC/AC - IZMJENJIVAC

$$R = 20 \Omega$$

$$L = 80 \text{ mH}$$

$$f = 200 \text{ Hz}$$

$$V_B = 50 \text{ V}$$



$$U_M = \frac{4}{\pi} \int_0^{\frac{\pi}{2}} V_B \sin \frac{m\pi t}{\pi} dt = \frac{4}{\pi} \cdot \frac{\pi}{2m\pi} V_B \left[-\cos \frac{m\pi t}{2} \right]_0^{\frac{\pi}{2}} = \frac{2V_B}{m\pi} [1 - \cos(m\pi)]$$

$$U_{(2m+1)} = \frac{4V_B}{(2m+1)\pi}$$

$$1) \quad U_1 = \frac{4V_B}{\pi} = 63,66 \text{ V}$$

$$3) \quad U_3 = \frac{4V_B}{3\pi} = 21,22 \text{ V}$$

$$5) \quad U_5 = \frac{4V_B}{5\pi} = 12,73 \text{ V}$$

$$Z_1 = \sqrt{R^2 + (\omega L)^2} = 102,55 \Omega$$

$$Z_3 = \sqrt{R^2 + (3\omega L)^2} = 302 \Omega$$

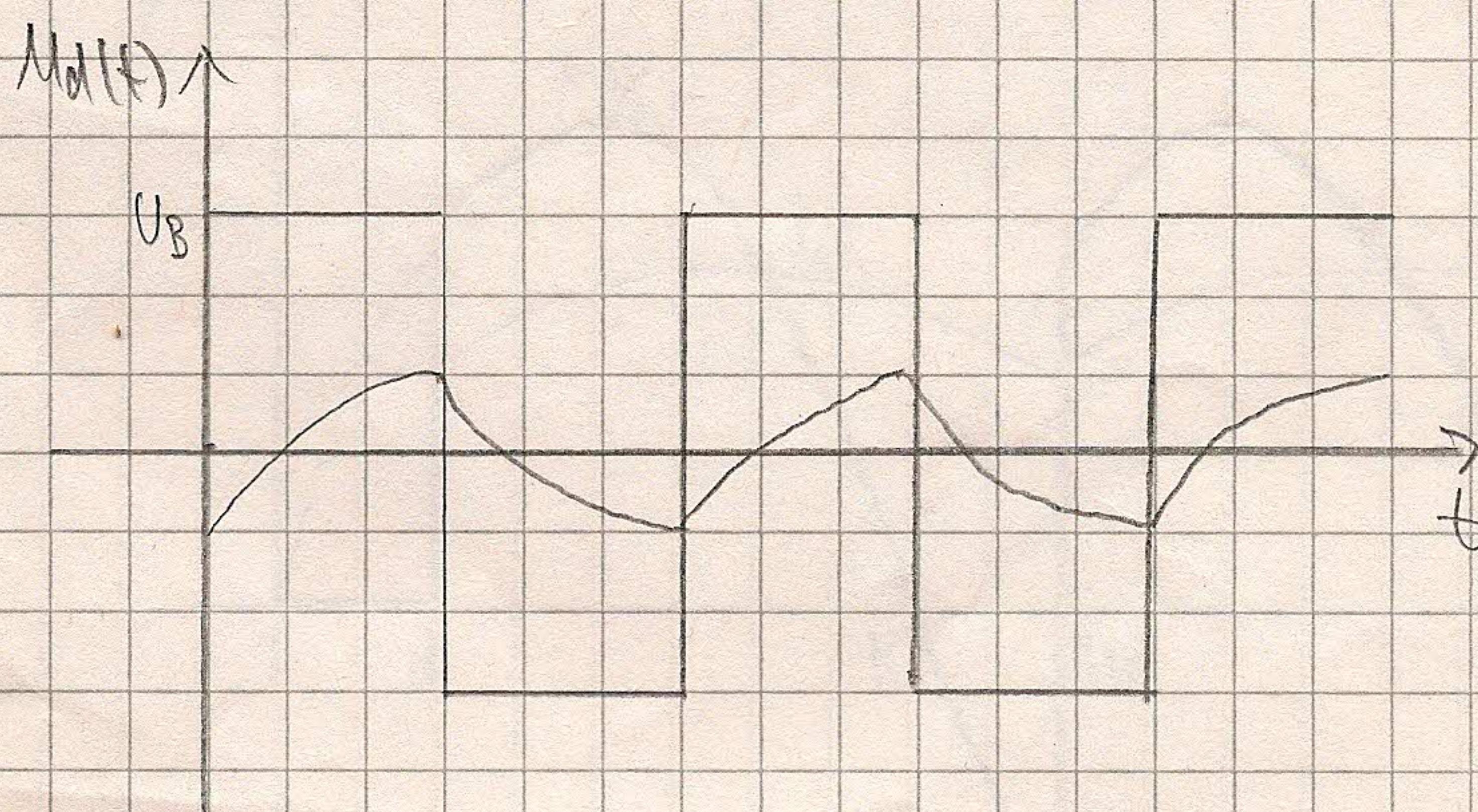
$$Z_5 = \sqrt{R^2 + (5\omega L)^2} = 503 \Omega$$

$$I_1 = \frac{U_1}{Z_1} = 0,621 \text{ A}$$

$$I_3 = \frac{U_3}{Z_3} = 0,07 \text{ A}$$

$$I_5 = 0,025 \text{ A}$$

$$I_{\text{ef}} = \sqrt{\frac{I_1^2 + I_3^2 + I_5^2}{2}} = 0,44 \text{ A}$$



7) DC/AC-PWM-12 MODESNAI

$$R = 20 \Omega$$

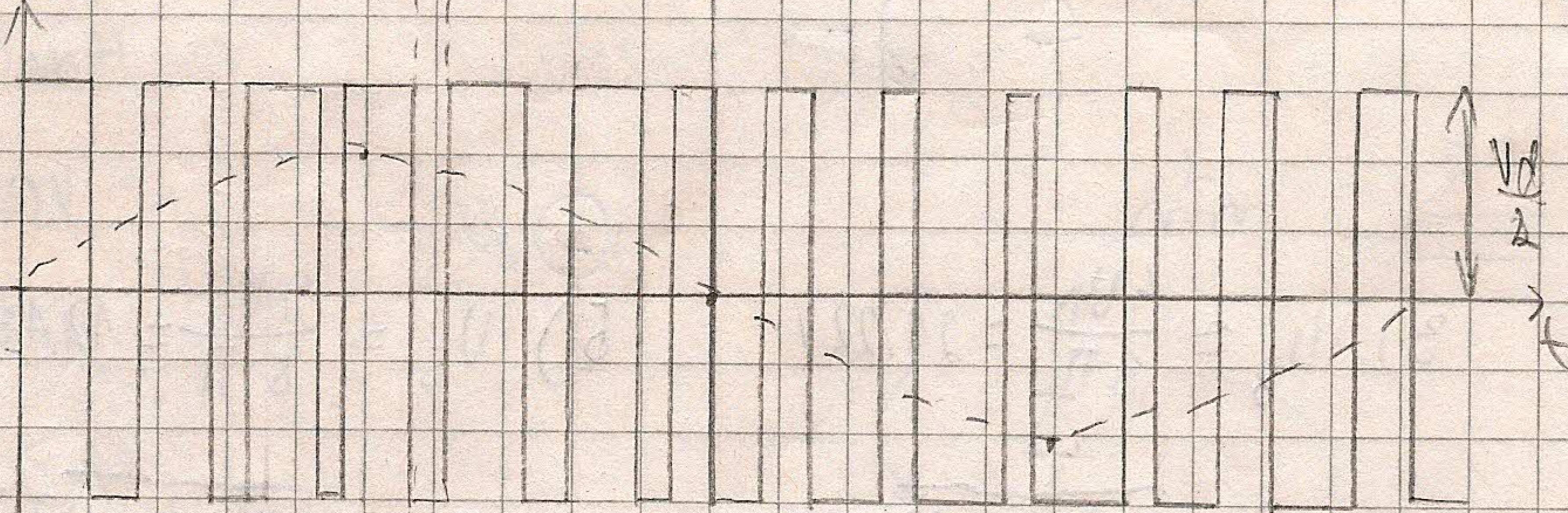
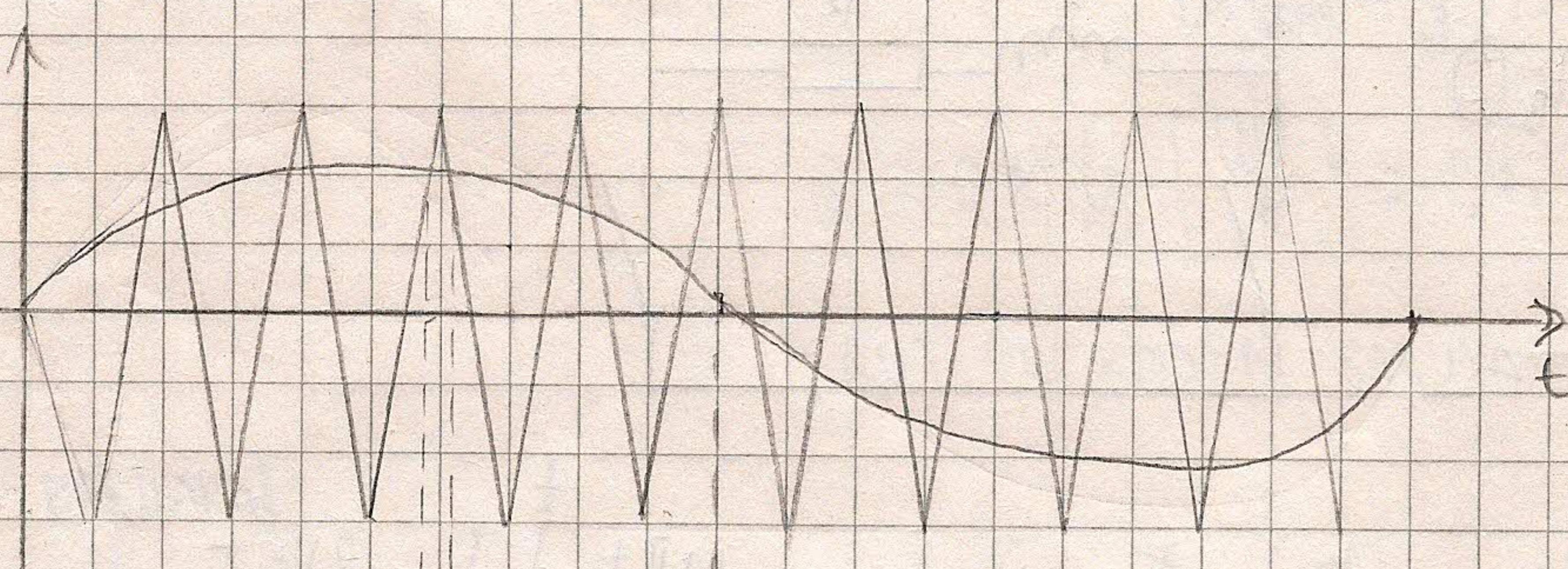
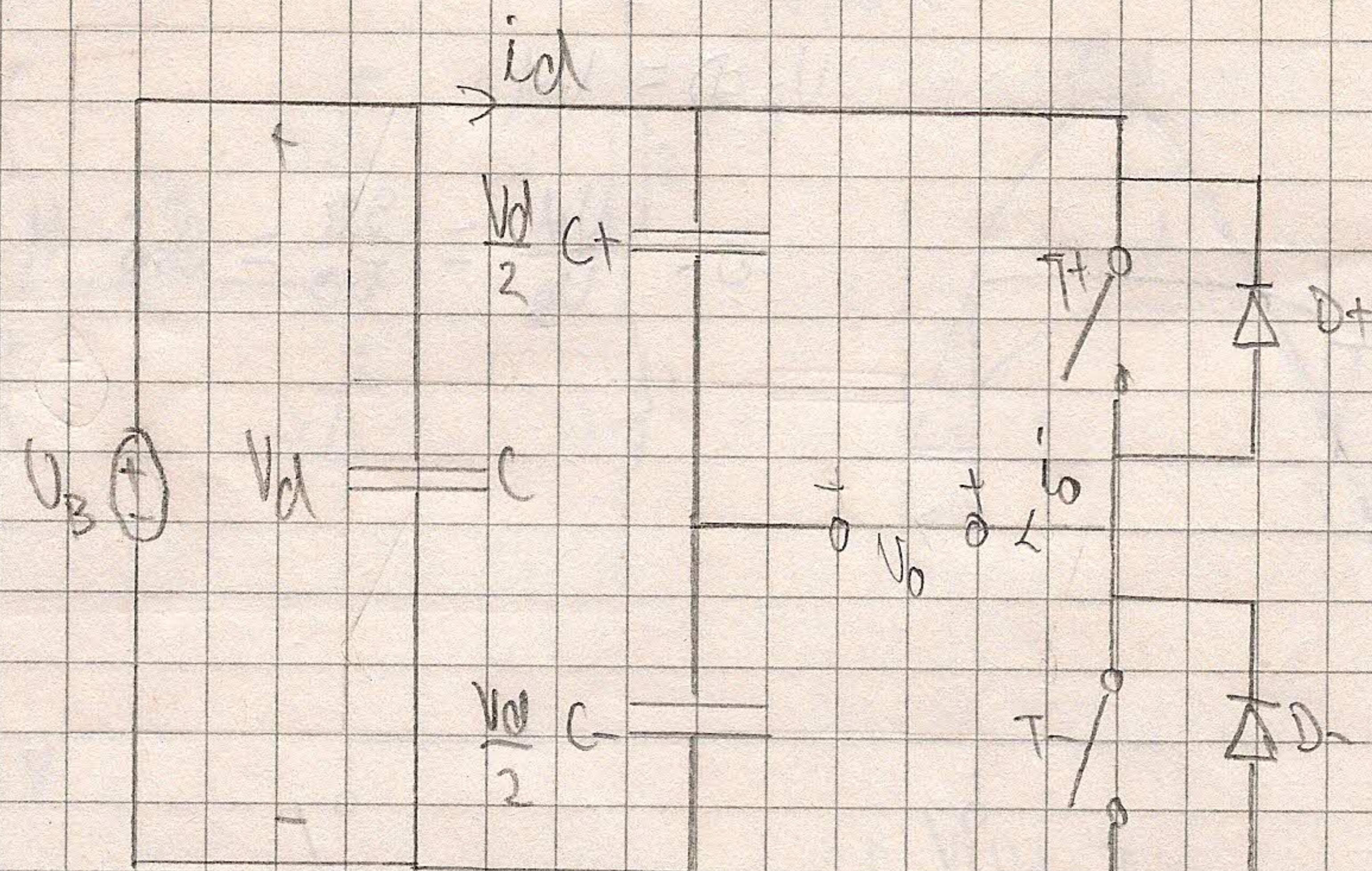
$$L = 80 \text{ mH}$$

$$V_B = 50 \text{ V}$$

$$M_{\alpha} = 1$$

$$M_f = 10$$

$$f_0 = 200 \text{ Hz}$$



$$V_B = 50 \text{ V}$$

$$V_1 = M_{\alpha} \cdot V_B = 50 \text{ V}$$

$$I_1 = \frac{V_1}{Z_1} = \frac{V_1}{\sqrt{R^2 + (wL)^2}} = 0.488 \text{ A}$$