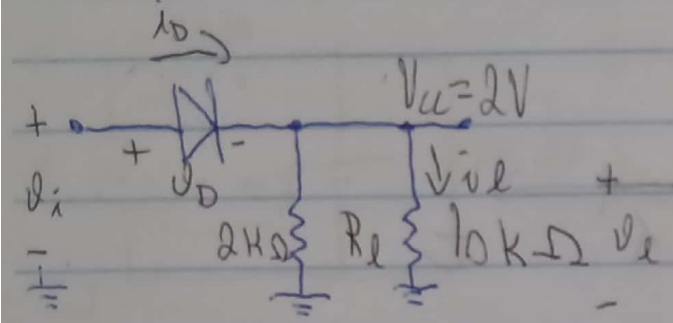
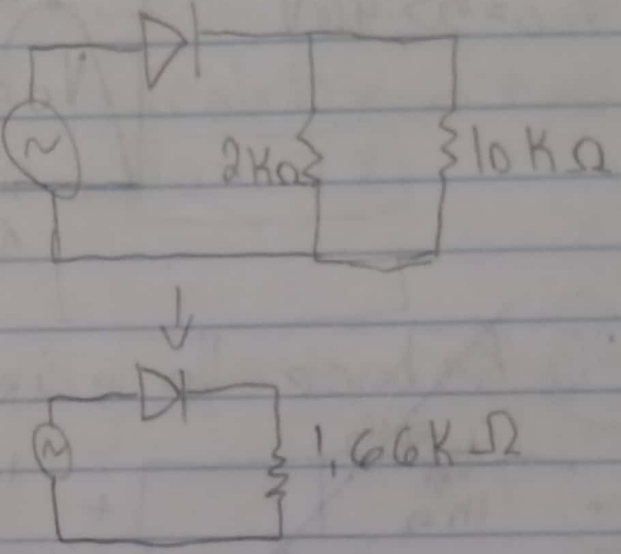
Aluno: Luís Otávio Lopes Amorim Prontuário: SP3034178

(24) Considerando o diodo ideal esboce v_i, v_d, v_l, i_d e i_l para o circuito abaixo. A entrada é senoidal com f=60 Hz. Determine o valor de pico da entrada valores máximo e mínimo de v_D e máximo de i_D.

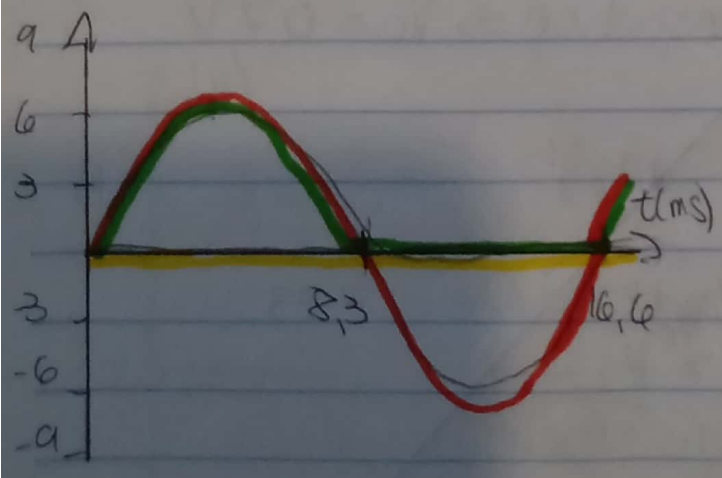


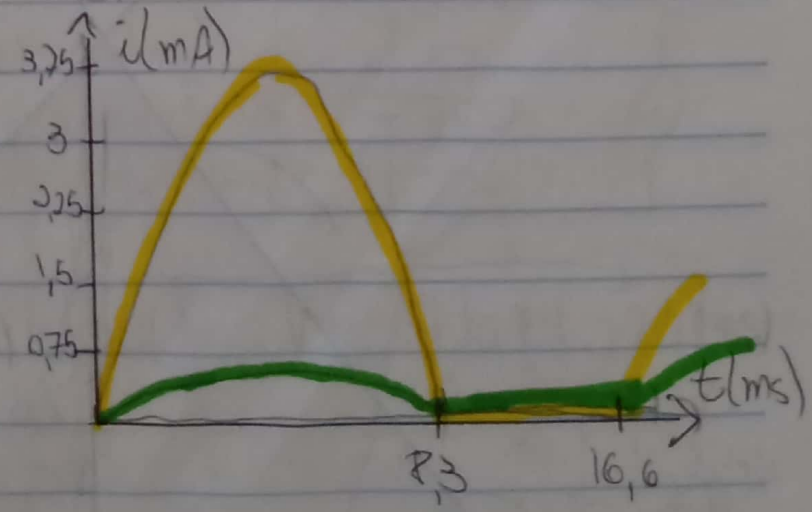


$V_{CC} = 0,318 V_p \Rightarrow V_p = \frac{2}{0,318} = 6,289V$

$i_{Dmax} = \frac{V_p}{1,66K} = 3,789mA$ $i_{lmax} = \frac{V_p}{10K} = 0,629mA$

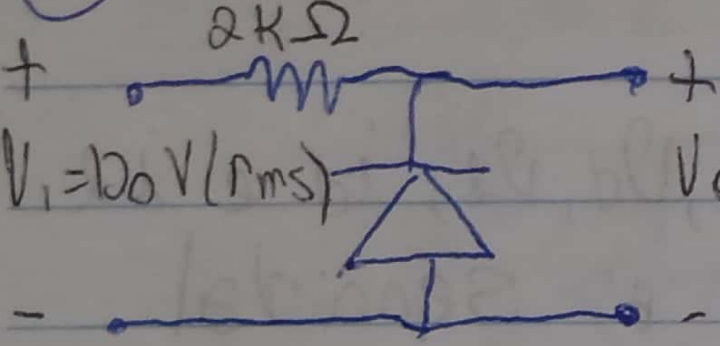
$V_{Dmax} = V_{Dmin} = 0$ $T = \frac{1}{60} = 16,666ms$





Legenda: V_i V_D / i_D $V_p = 6,289V$ $i_{Dmax} = 3,789mA$
V_l / i_l $V_{Dmax} = V_{Dmin} = 0$

(25) Esboce V_o e determine V_{cc}.

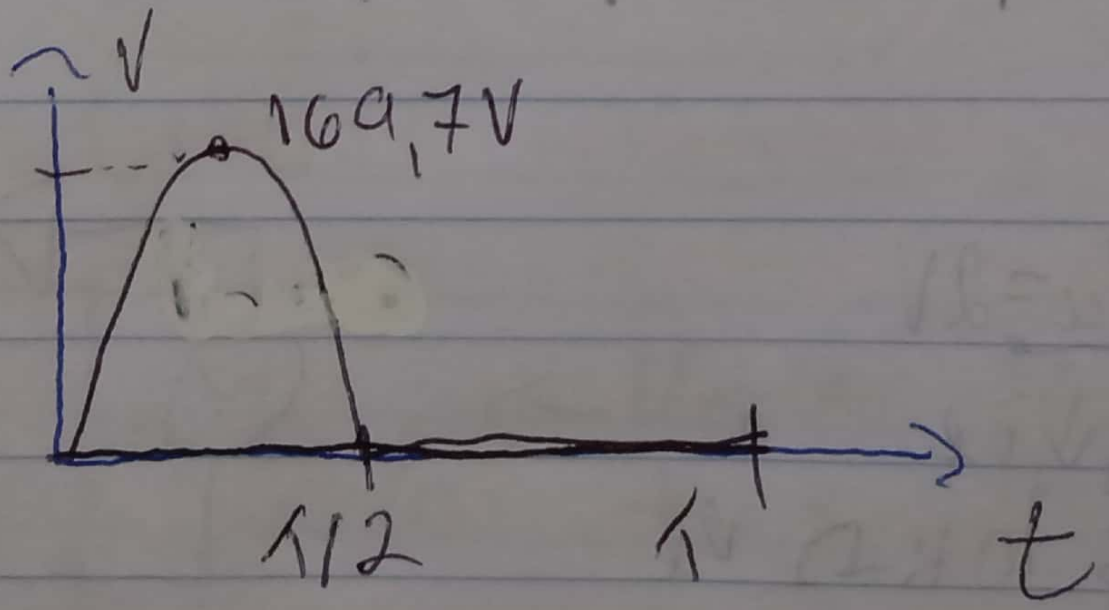


Diodo ideal $\Rightarrow V_o = 0V$

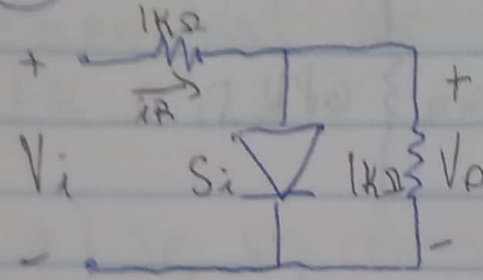
$$V_p = \sqrt{2} \cdot 120 \approx 169,7\ V$$

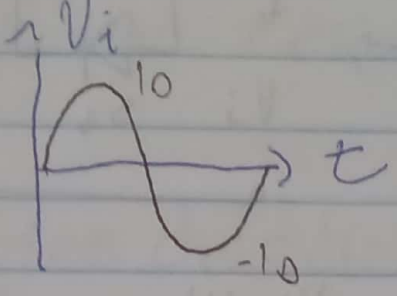
$$V_{cc} = 0,318\, V_p = 53,96\ V$$

$V_{cc} = 53,96V$

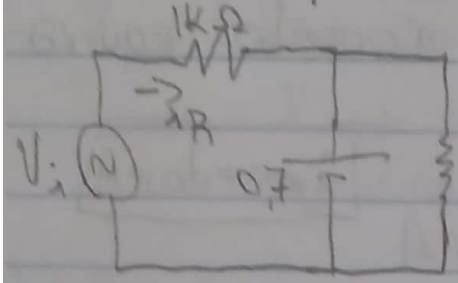


(26) Esboce V_o e i_R





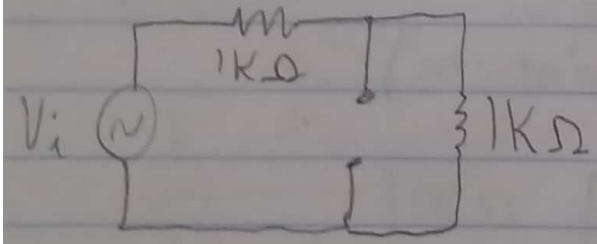
Semiciclo positivo:



Diodo paralelo com resistor $\Rightarrow$ $\boxed{V_o = 0,7\ V}$

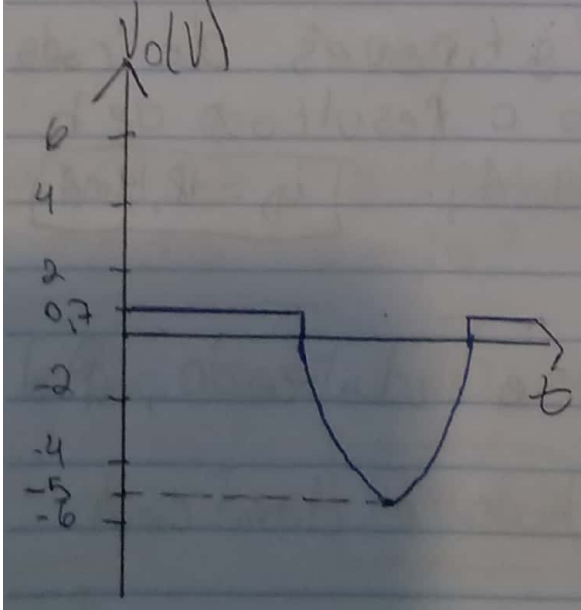
LTK: $-V_i + 1000 i_R + 0,7 = 0 \Rightarrow \boxed{i_R = \frac{V_i - 0,7}{1000}}$

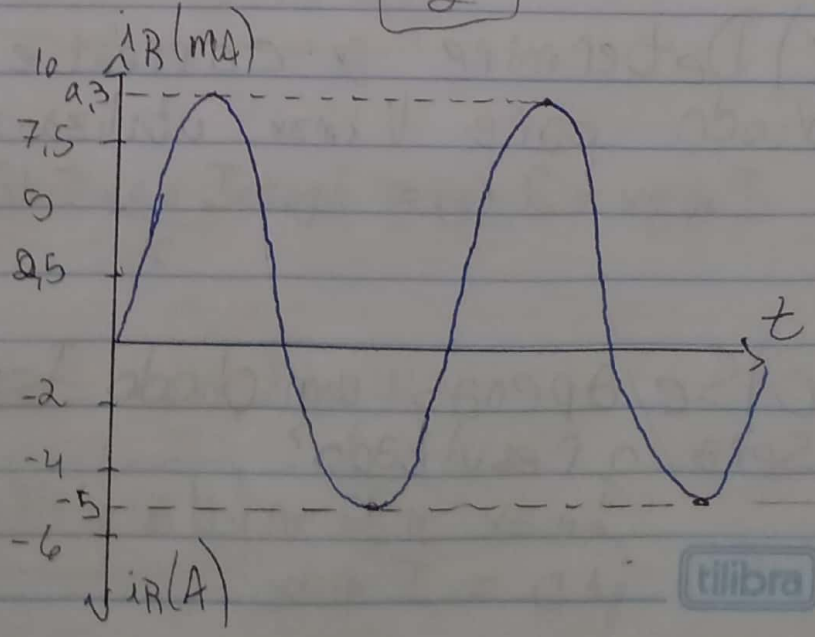
Semiciclo negativo:



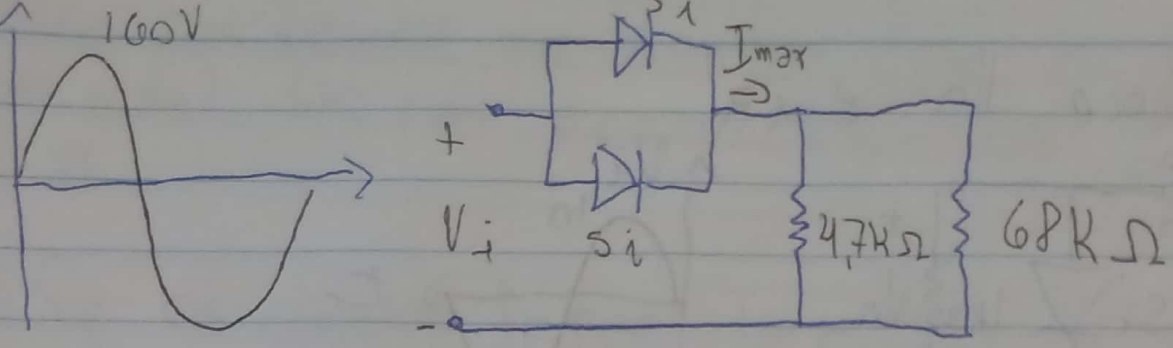
$V_i = R_{eq} \cdot i_R \Rightarrow \boxed{i_R = \frac{V_i}{2000}}$

$V_o = 1000 i_R = \boxed{\frac{V_i}{2}}$





27)



a) Dado $P_{max} = 14mW$ para cada diodo determine a corrente máxima nominal de cada diodo utilizando o modelo equivalente aproximado.

$$P = V \cdot i \Rightarrow i = \frac{P}{V} = \frac{14 \cdot 10^{-3}}{0,7} = 20mA$$

$i_{max} = 20mA$

b) Determine I_{max} para os diodos em paralelo.

$I_{max} = 40mA$

Paralelo ⇒ corrente divide igualmente (componentes idênticos).

$$I_{max} = 2 i_{max} = 40mA$$

c) Determine a corrente através de cada diodo para V_{imax} utilizando o resultado de b.

$$I_{max} = 2 i_D \Rightarrow i_D = \frac{I_{max}}{2} = 18,14mA$$

$i_D = 18,14mA$

d) Se apenas um diodo fosse utilizado, qual será o resultado?

I_{max} não muda diodo é danificado

$i_D = I_{max}$

2) Um retificador em ponte com entrada senoidal 120 rms possui resistor de carga 1 kΩ

a) Se os diodos forem de silício, qual a tensão CC na carga?

$V_{imáx} = V_{RMS}\sqrt{2} = 169,7$

$V_{omáx} = V_{imax} - 1,4 = 168,3$

$V_{CC} = 0,636\ V_{omáx} = 107\ V$

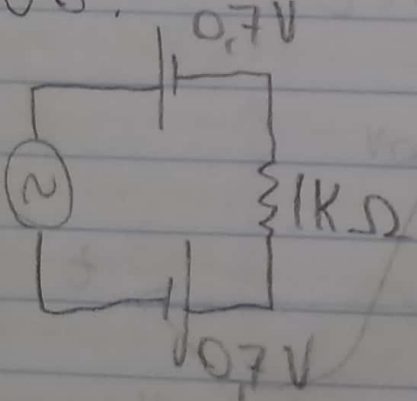
$\boxed{V_{CC} = 107\ V}$

b) Determine a especificação PIV para cada diodo.

$PIV \geq V_m$

$\boxed{PIV \geq 169,7\ V}$

d) Encontre a corrente máxima em cada diodo.



$-169,7 + 0,7 + 1000\, i_{max} + 0,7 = 0$

$i_{max} = \frac{168,3}{1000}$

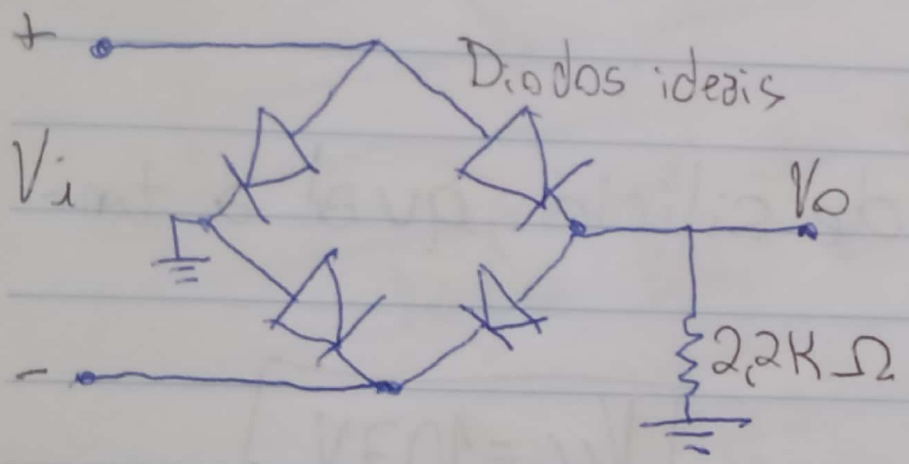
$\boxed{i_{max} = 168,3\ mA}$

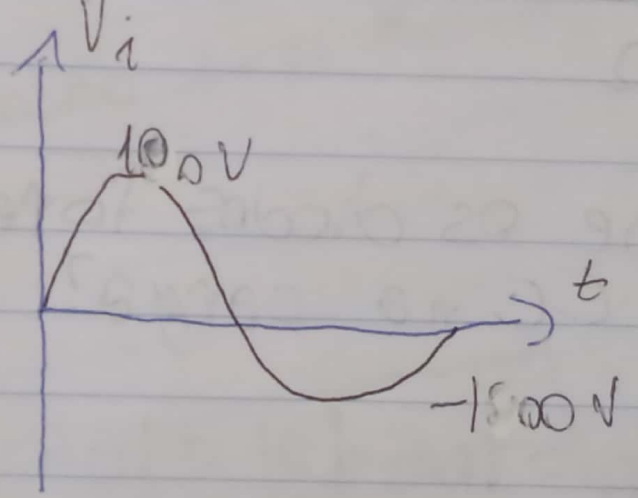
e) Qual é a potência nominal exigida para cada diodo?

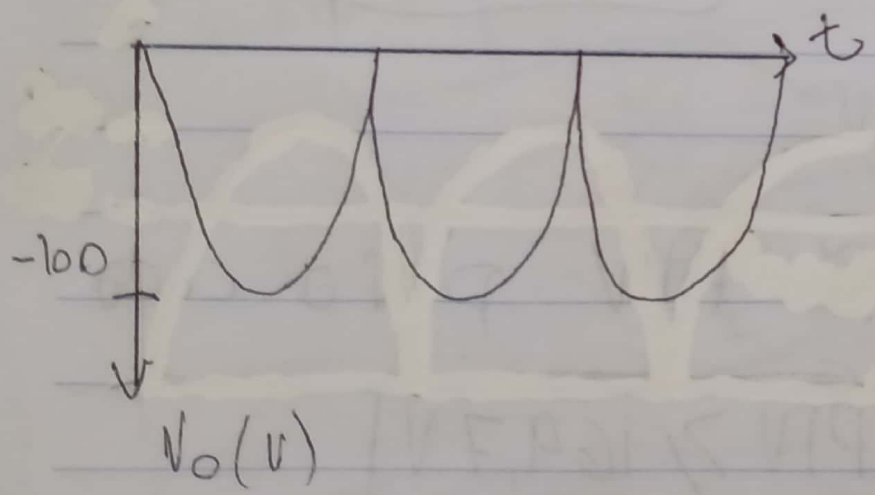
$P_{máx} = V_D \cdot i_{max} = 0,7 \cdot 168,3 = 117,81\ mW$

$\boxed{P = 117,81\ mW}$

29) Determine V_o e PIV para cada diodo ideal da corrente em máxima.







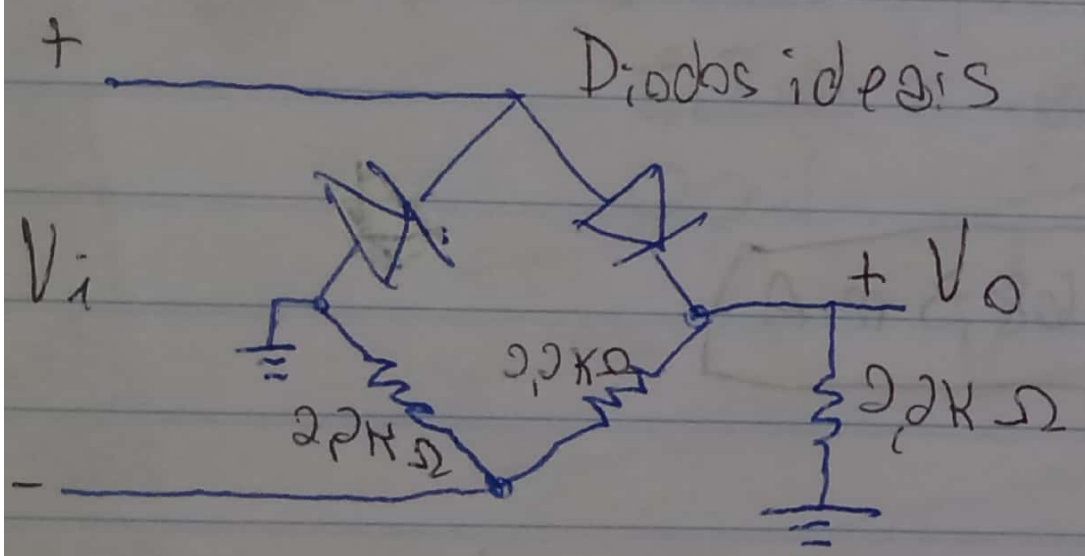
$$V_m = 2,2 \cdot 10^3 \cdot i_m$$

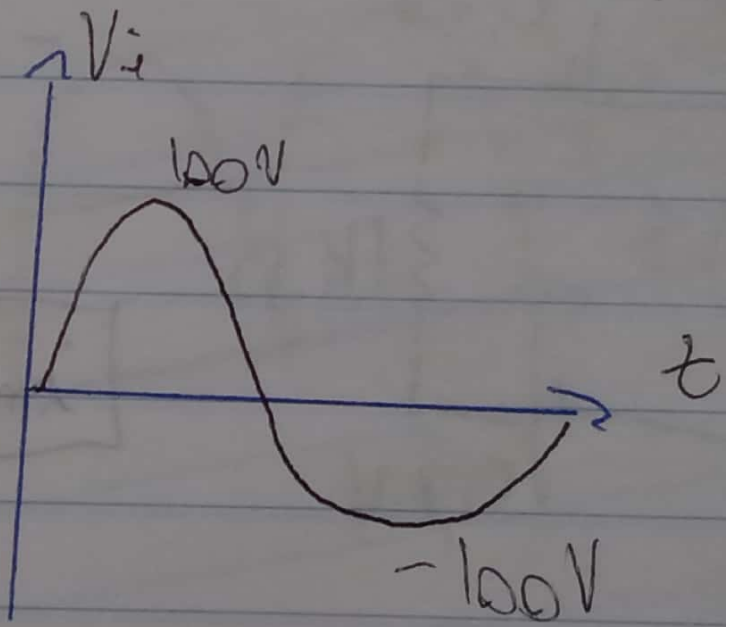
$$i_m = \frac{100}{2,2 \cdot 10^3} = 45,45mA$$

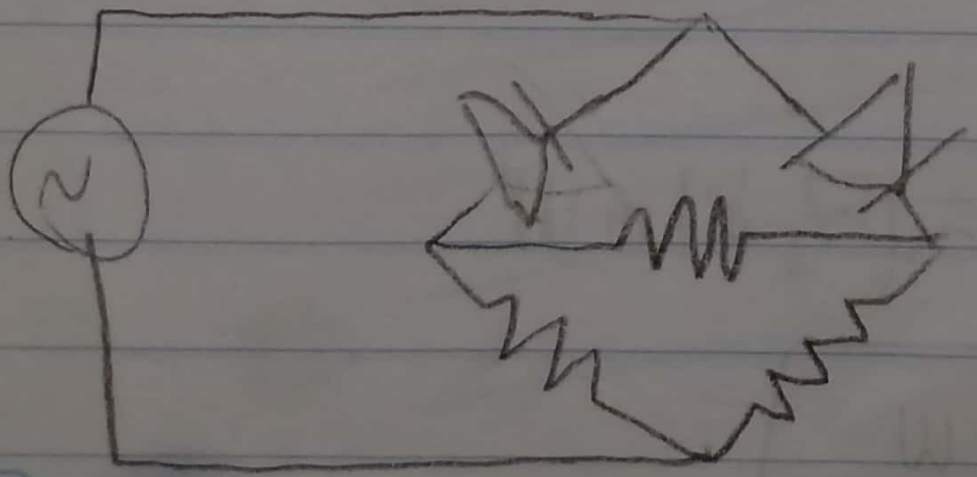
PIV $\geq$ 100V

$i_m = 45,45mA$

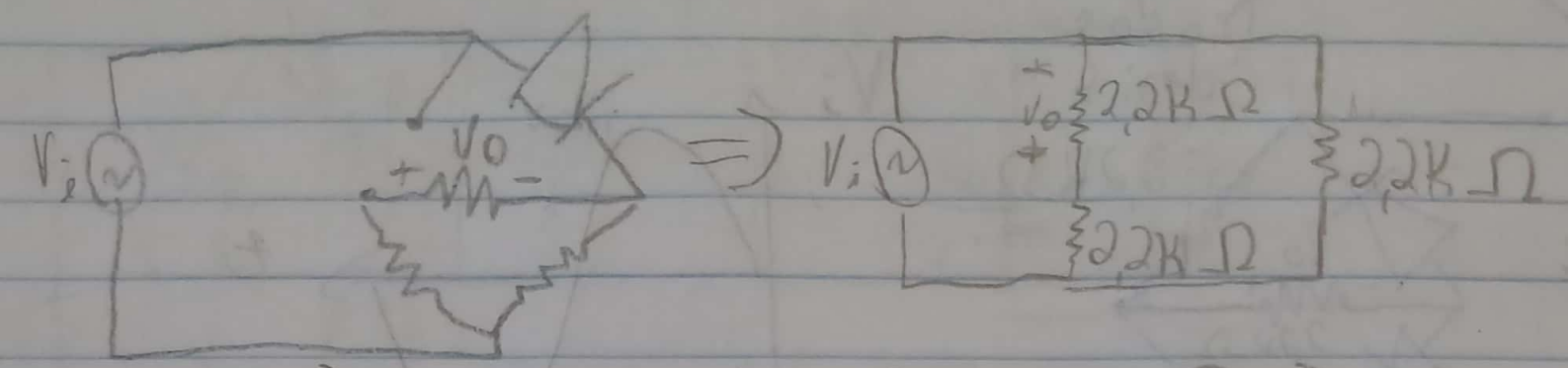
30) Esboce V_o e calcule V_{cc}.





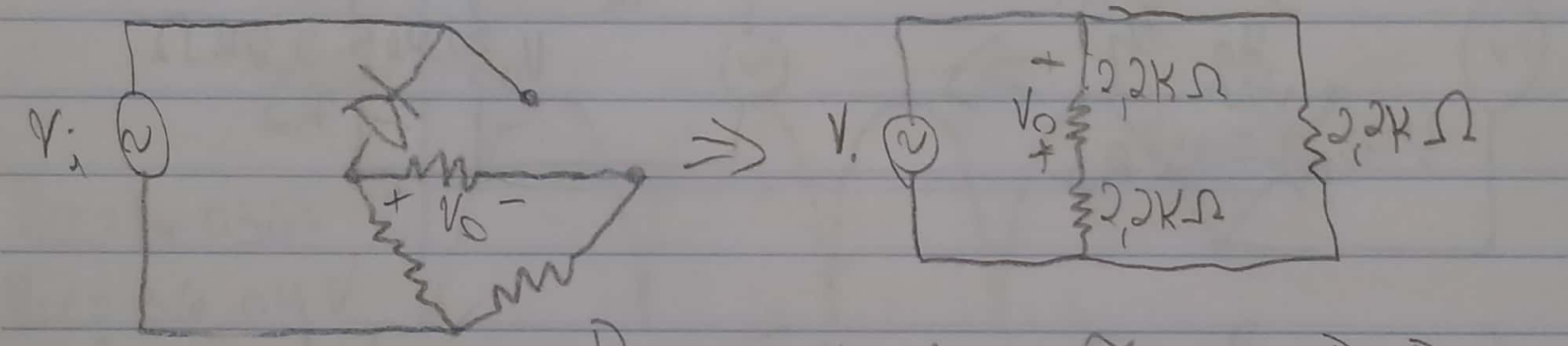


Semiciclo positivo:



Divisor de tensão com $R_1 = R_2$, logo $V_o = V_i / 2$

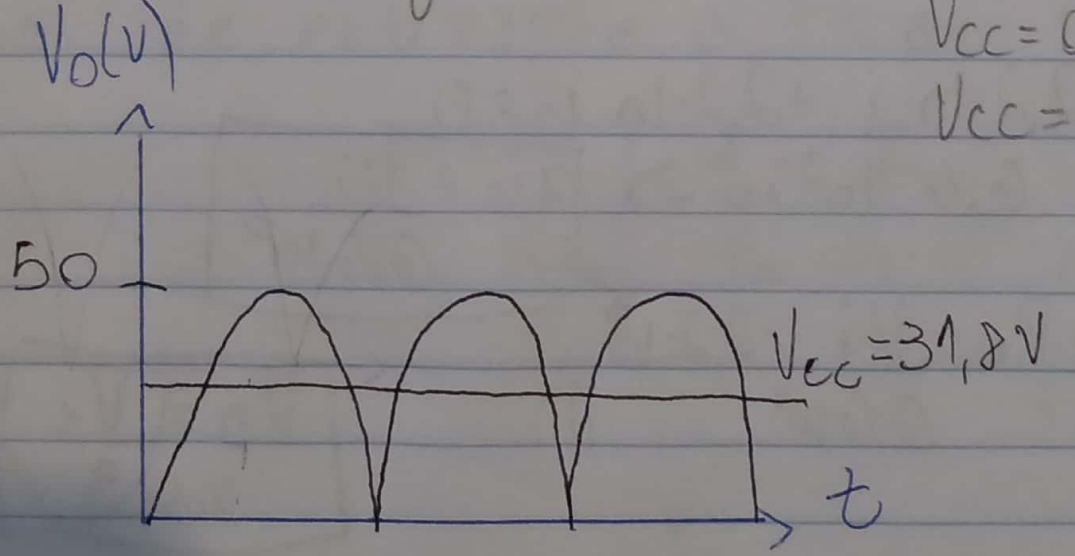
Semiciclo negativo:



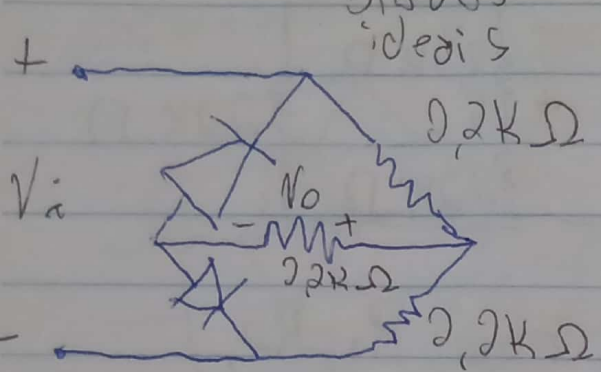
Divisor de tensão com $R_1 = R_2$, logo $V_o = V_i / 2$

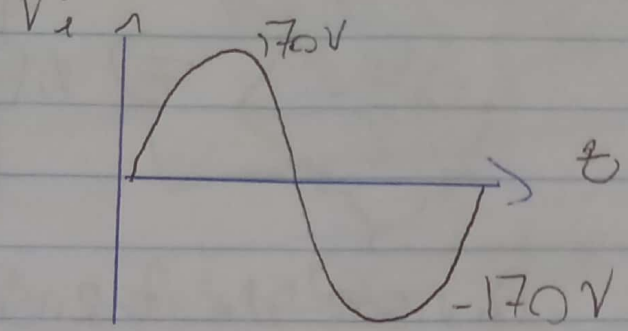
$V_{cc} = 0{,}363\ V_m$

$V_{cc} = 31{,}8\ V$

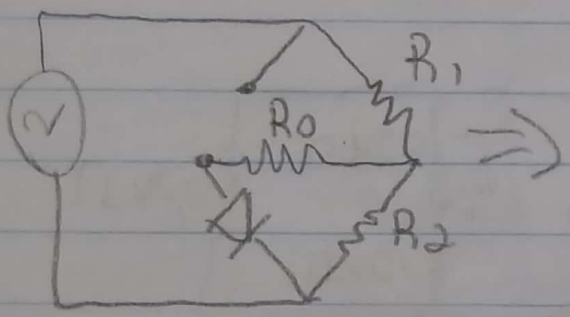


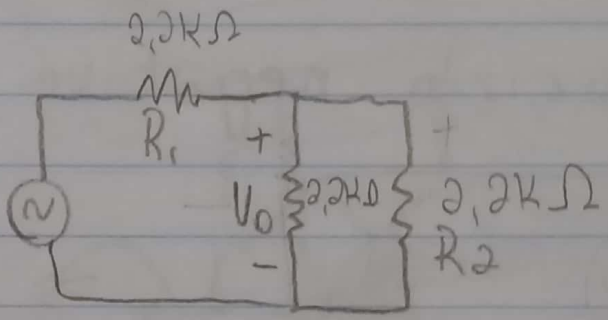
(31) Esboce V_o e determine V_{cc}





Semiciclo positivo





Como $R_0 = R_2$ e estão em paralelo, $i_0 = i_2$ e $i_0 = i_1/2$, aplicando LKT:

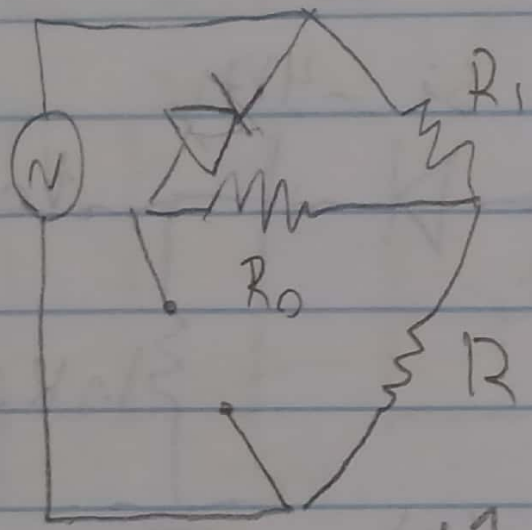
$$-V_i + 2{,}2 \cdot 10^3 i_1 + 2{,}2 \cdot 10^3 i_0 = 0$$

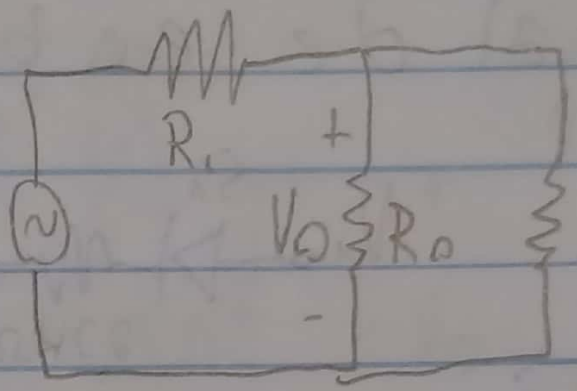
$$V_i = 6{,}6 \cdot 10^3 i_0 \Rightarrow \boxed{i_0 = \frac{V_i}{6{,}6 \cdot 10^3}}$$

$$V_o = i_0 R_0 = \frac{V_i}{6{,}6 \cdot 10^3} \cdot 2{,}2 \cdot 10^3$$

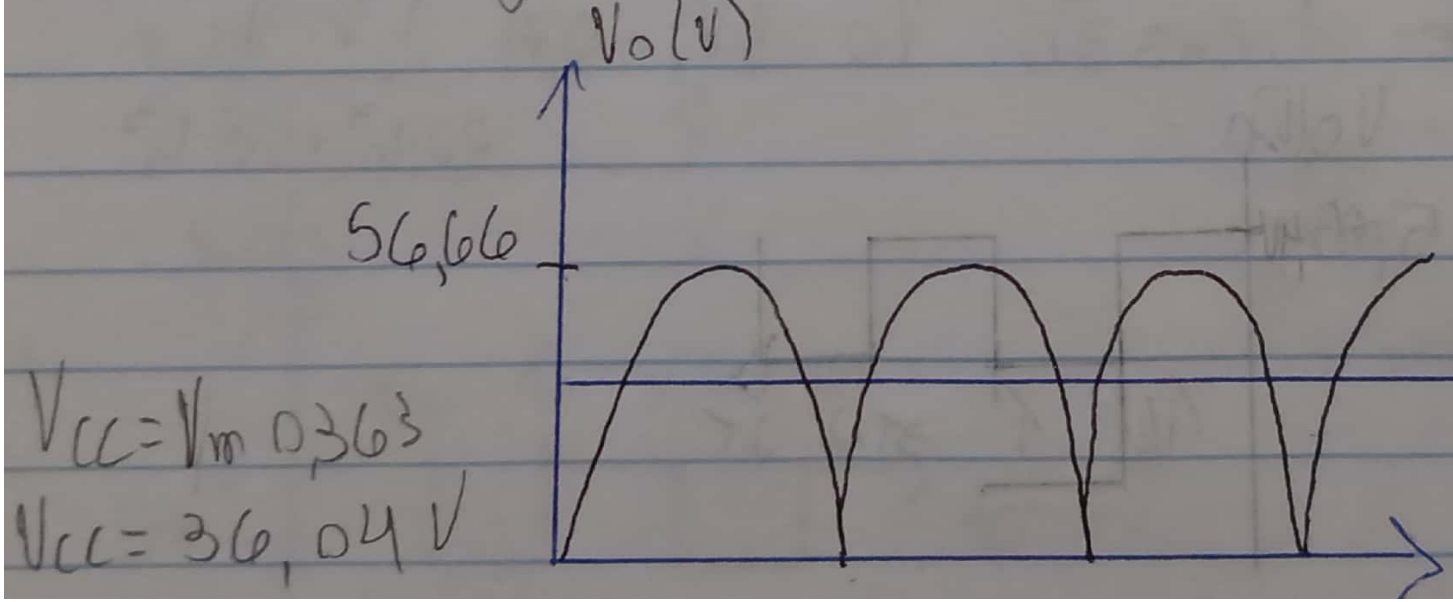
$$\boxed{V_o = \frac{V_i}{3}}$$

Semiciclo negativo:





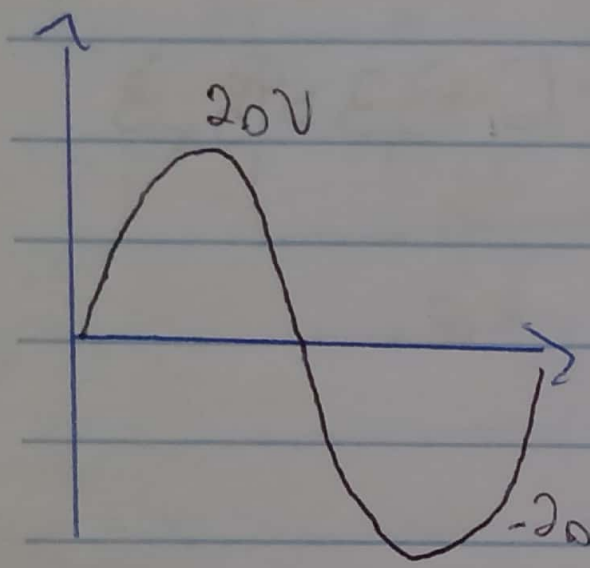
A simplificação torna o circuito idêntico ao do semiciclo positivo, logo $V_o = V_i/3$.

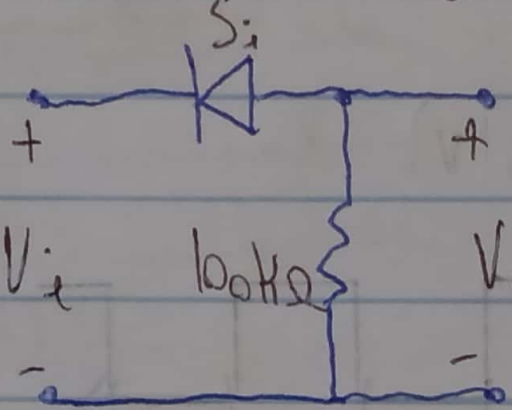


$V_{cc} = V_m \, 0{,}363$

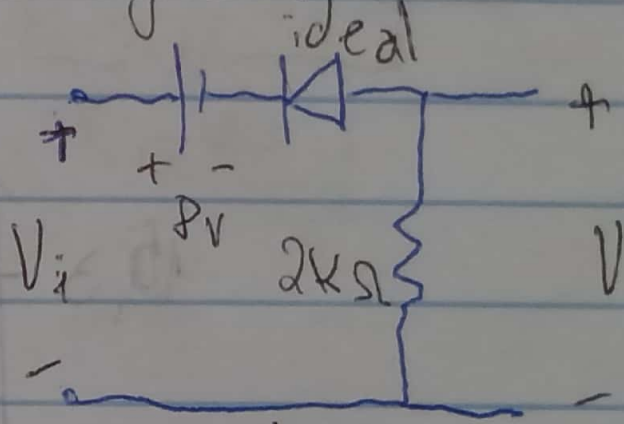
$V_{cc} = 36{,}04\ V$

32) Determine V_o de cada circuito para o sinal de entrada a seguir

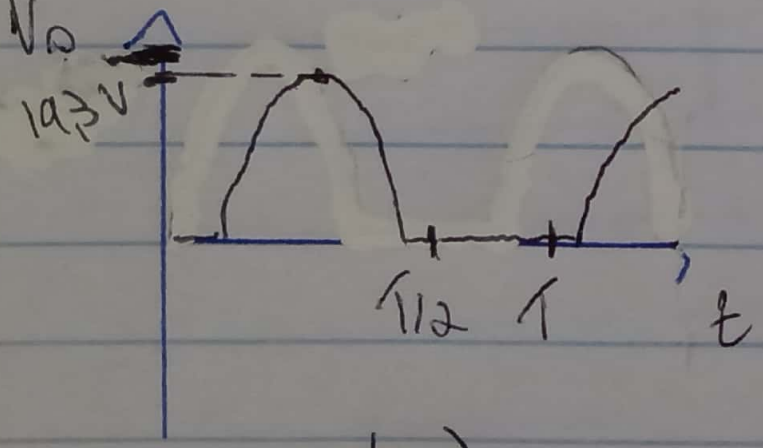




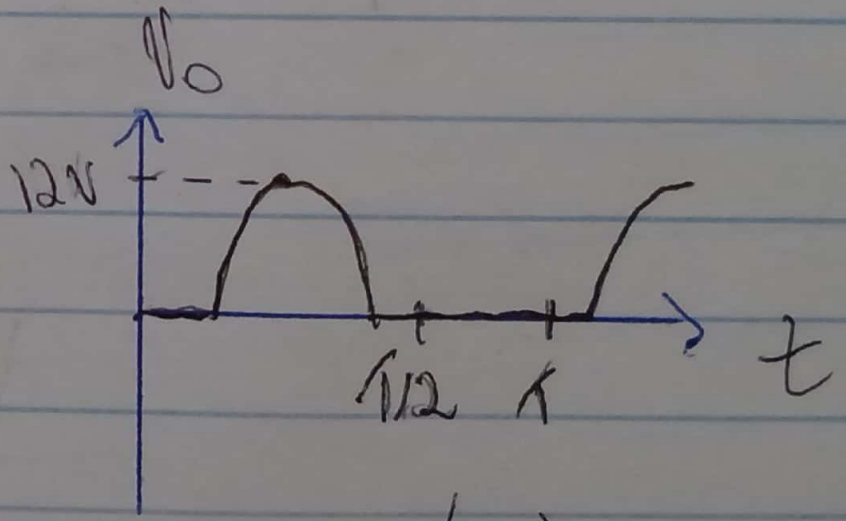
(1)



(2)

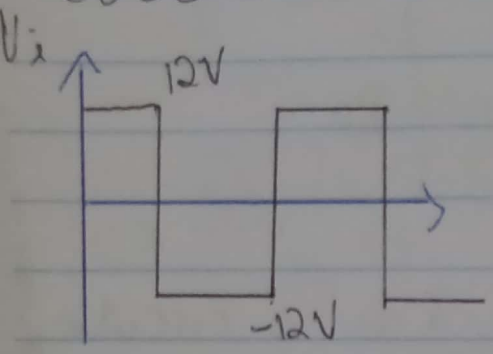


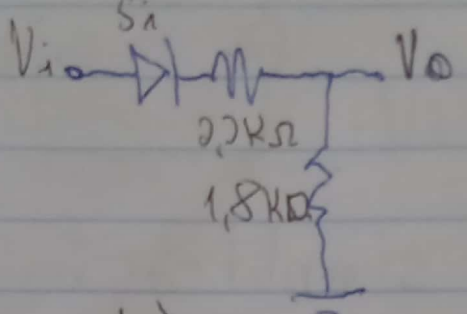
(1)



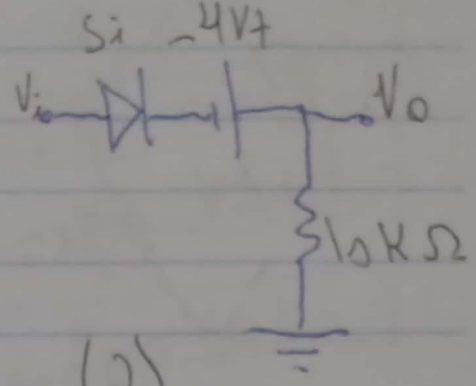
(2)

(33) Determine V_o de cada circuito para ~~cada~~ o sinal de entrada.





(1)

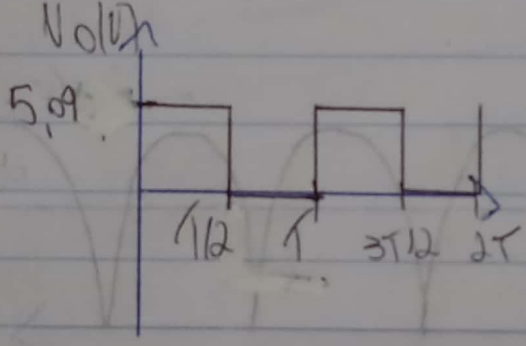


(2)

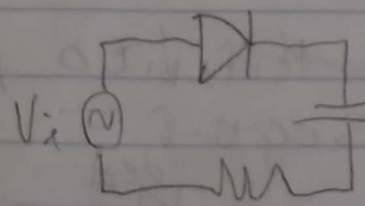
(1) Divisor de tensão: $V_o = (V_i - 0,7)\frac{1,8 \cdot 10^3}{2,2 \cdot 10^3 + 1,8 \cdot 10^3}$

$V_o = 0,45(V_i - 0,7)$

$V_m = 0,45 \cdot 11,3 = 5,09$



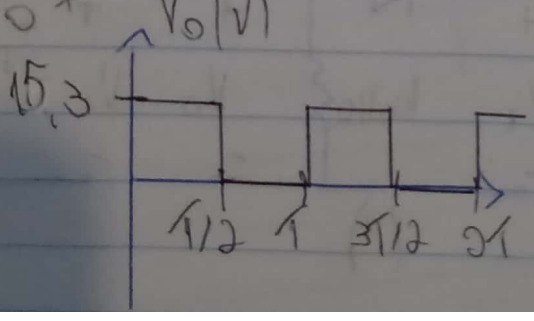
(2)



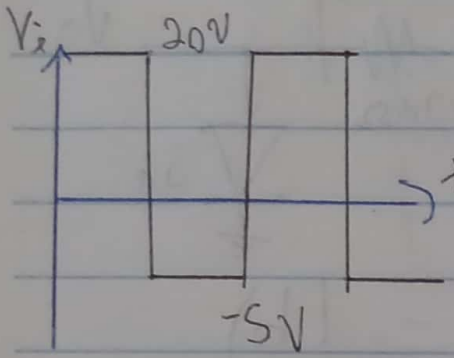
$-V_i + 0,7 - 4 + V_o = 0$

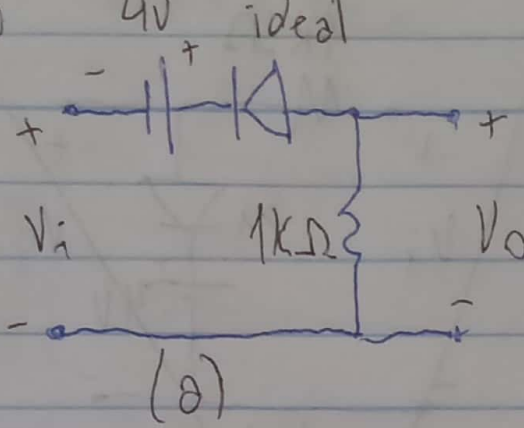
$V_o = V_i + 3,3$

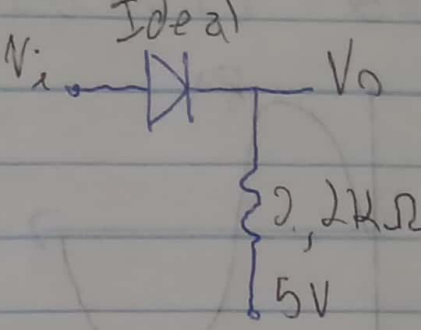
$V_m = 12 + 3,3 = 15,3$



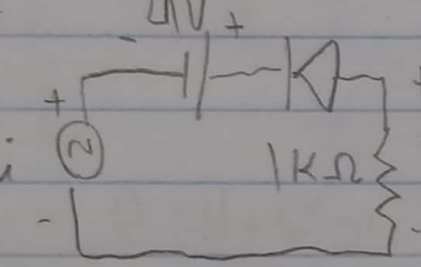
34) Determine V_o de cada circuito para o sinal dado







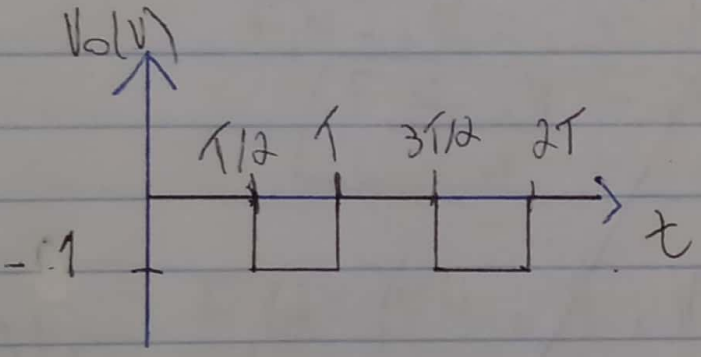
a)



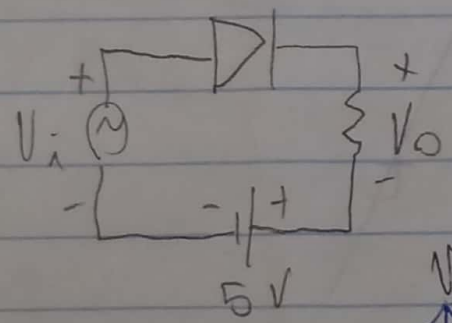
$-V_i - 4 + V_o = 0$

$V_o = V_i + 4$

$V_m = -5 + 4 = -1V$



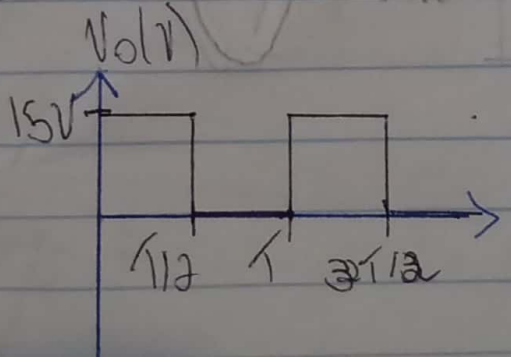
b)



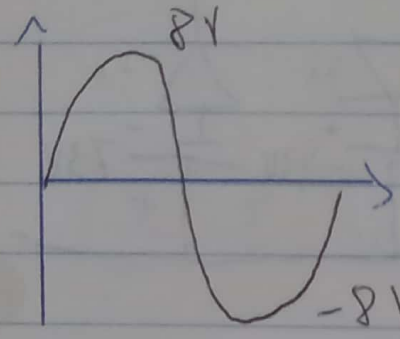
$-V_i + V_o + 5 = 0$

$V_o = V_i - 5$

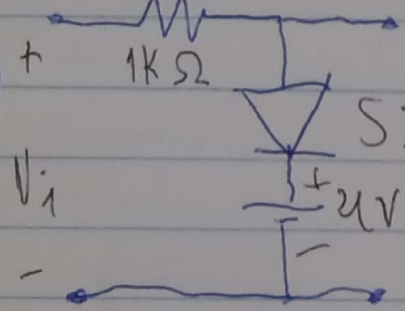
$V_m = 20 - 5 = 15V$



35) Determine V_o para cada circuito para a entrada especifica.



a)

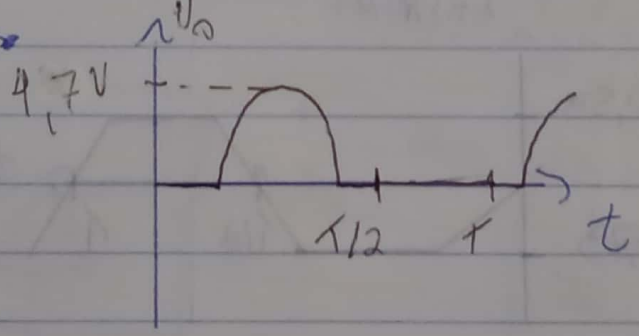


$-V_i + 1000i + 0,7 + 4 = 0 \Rightarrow 1000i = V_i - 4,7$

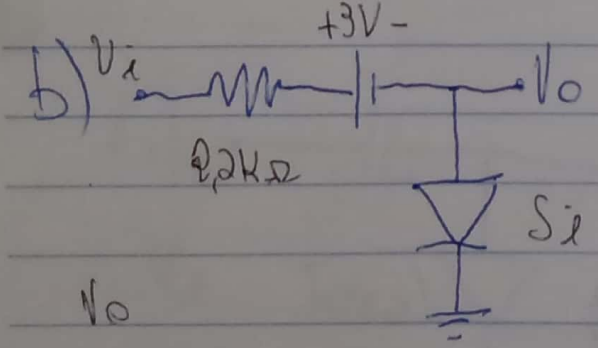
$-V_i + 1000i + V_o = 0 \Rightarrow V_o = V_i - 1000i = 4,7$

↓

cafado em 4,7V



b)

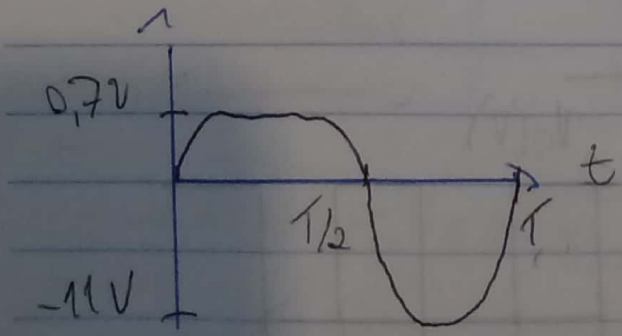


$-V_i + 2200i + 3 = V_o$

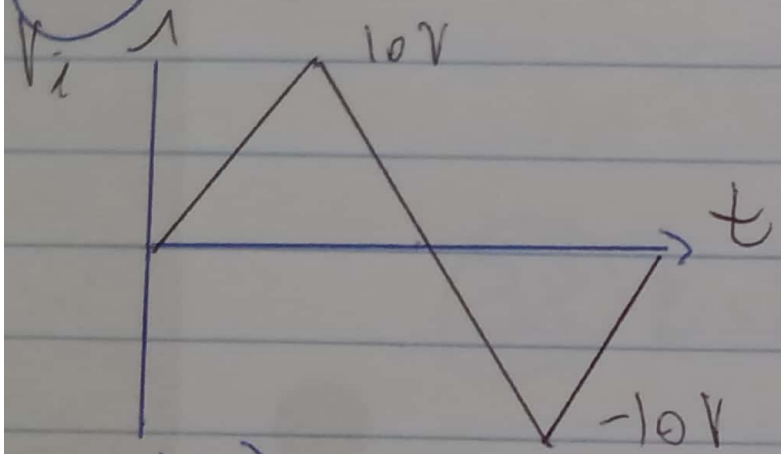
$-V_i + 2200i + 3 + 0,7 = 0$

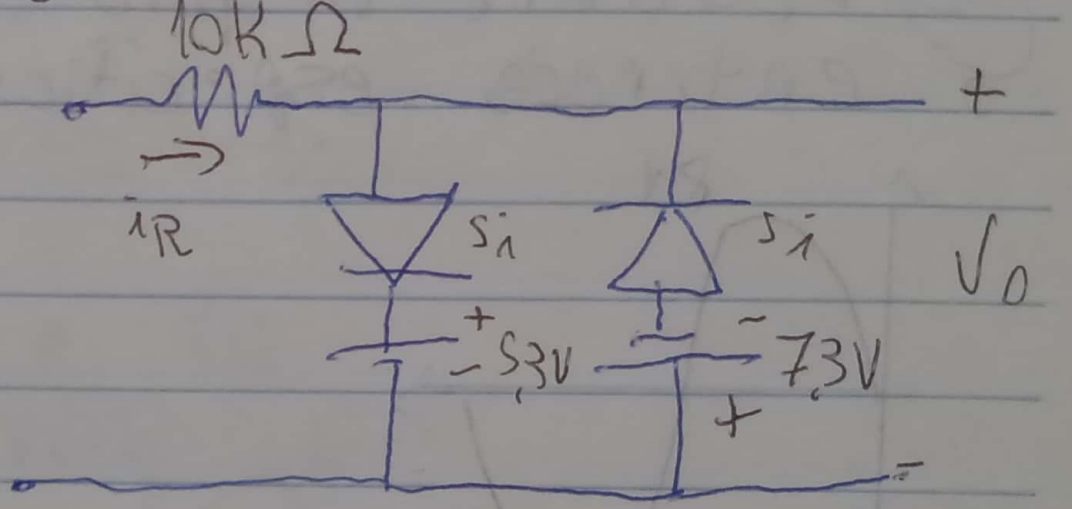
$2200i = V_i - 3,7$ → corte em +0,7

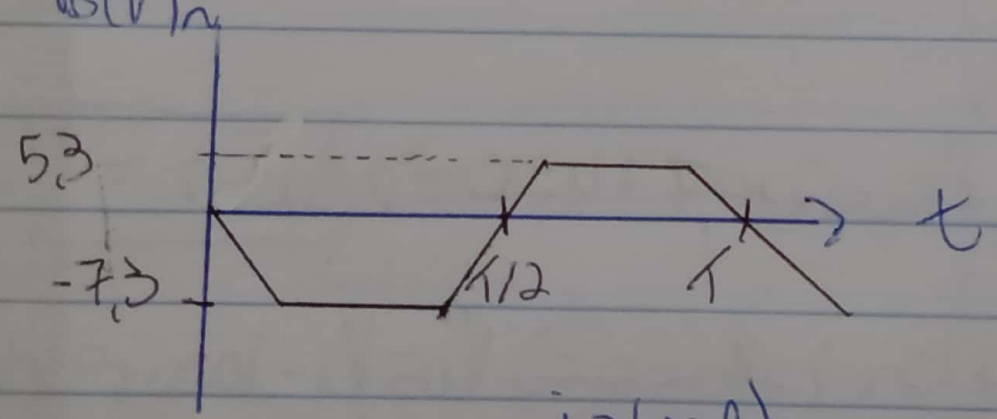
$V_o = -V_i + V_i - 3,7 + 3 = 0,7$

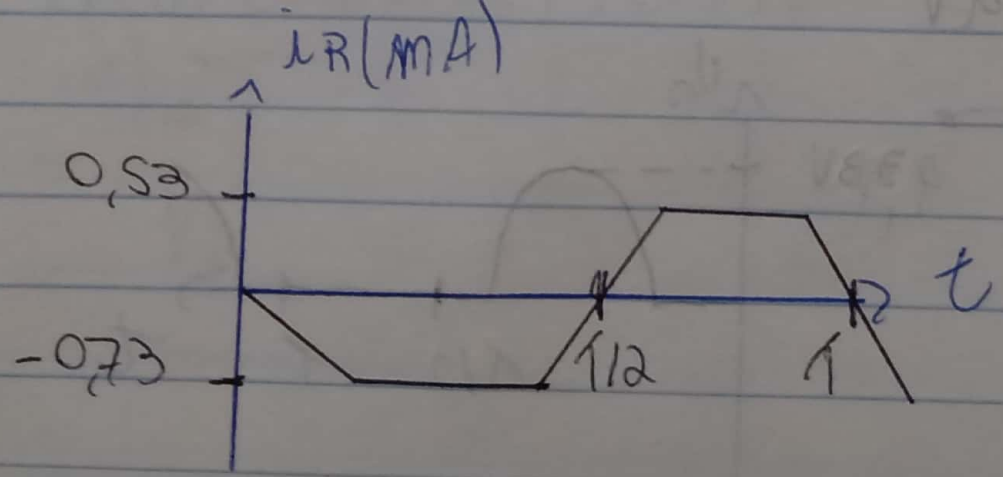


B6) Esboce i_R e V_o

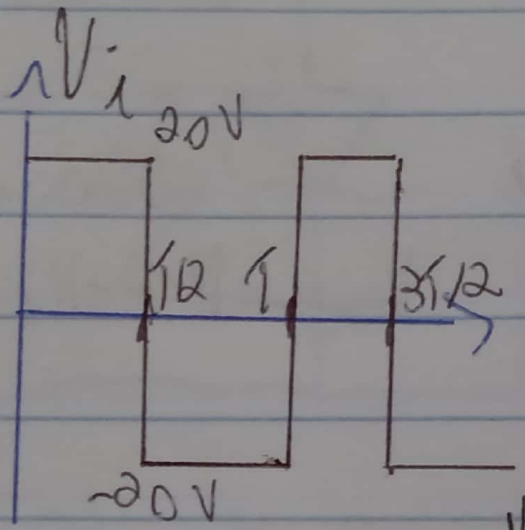




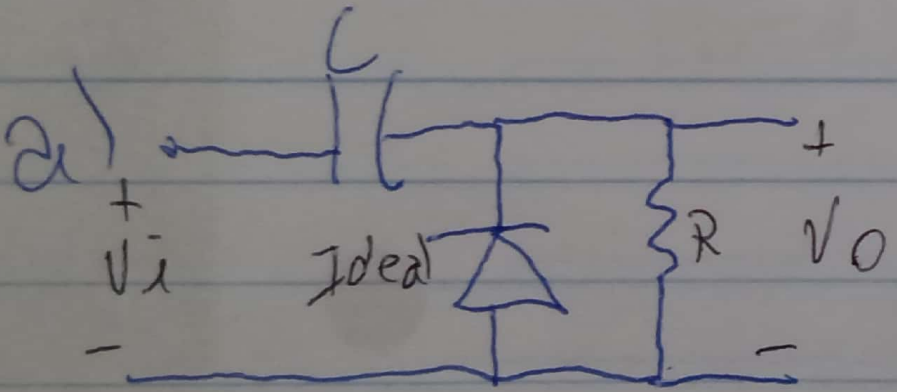


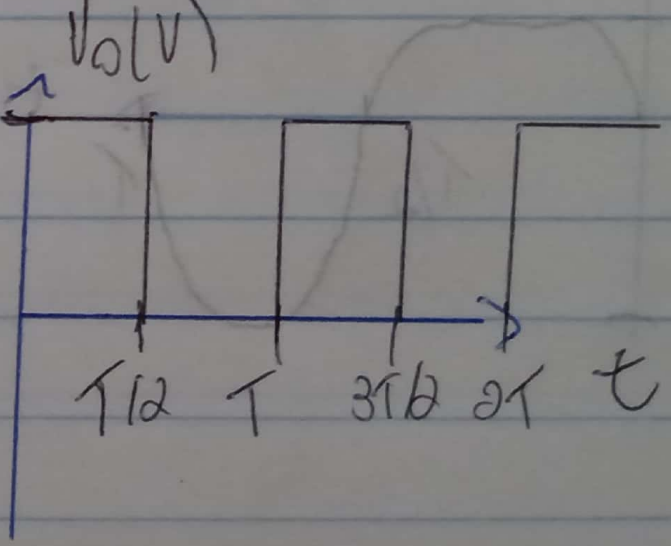


(37) Esboce V_o

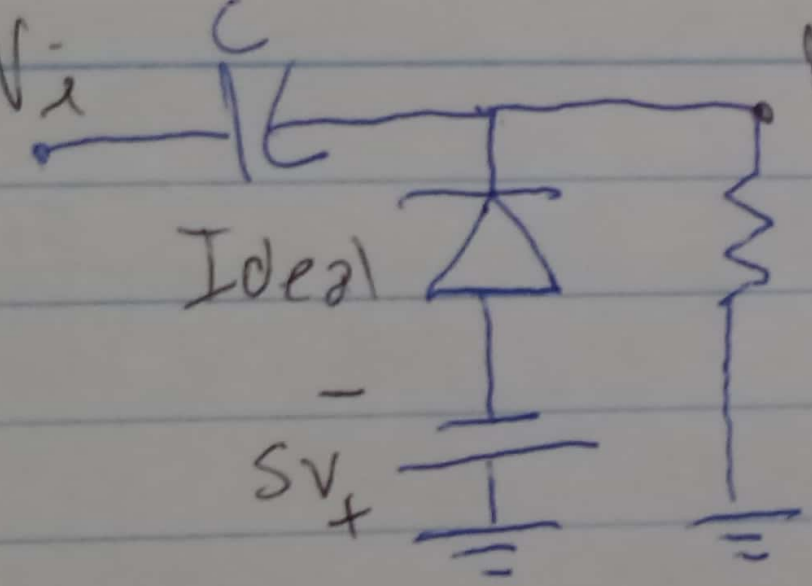


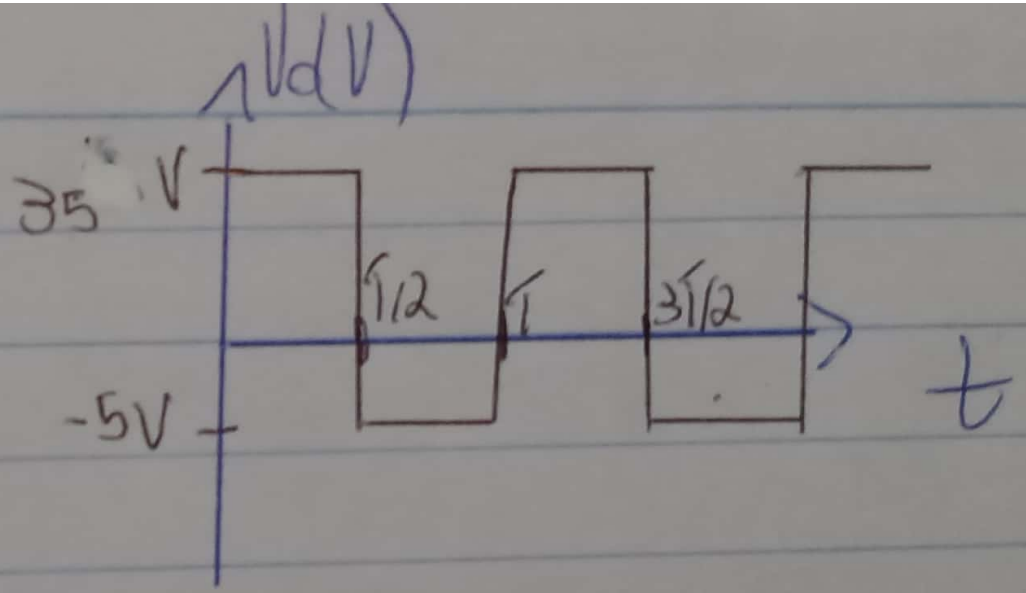
a)





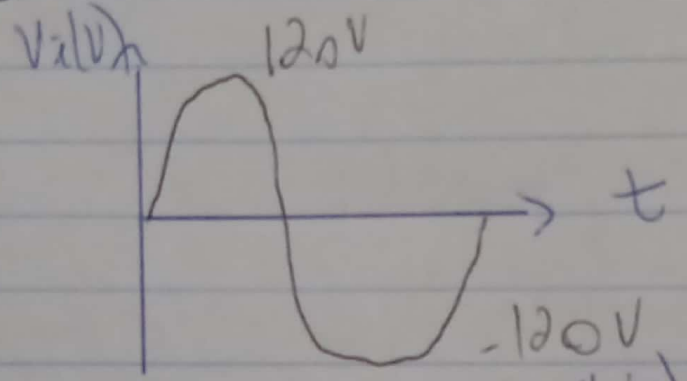
b)



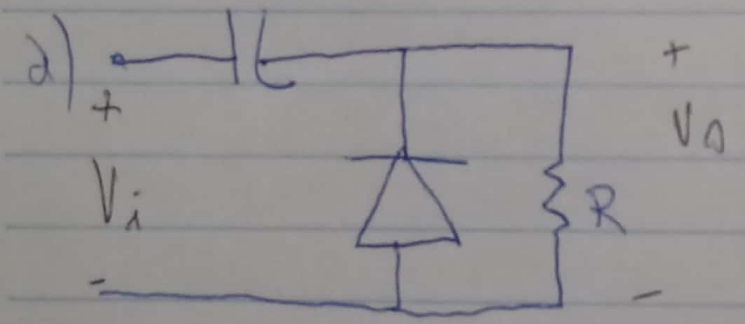


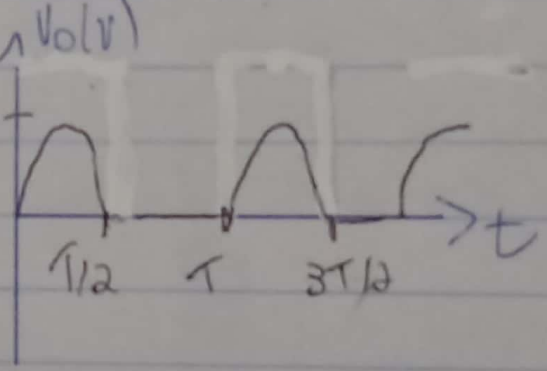
$V_p = 2V_i - V = 40 - 5 = 35\,V$

(38) Esboce V_o

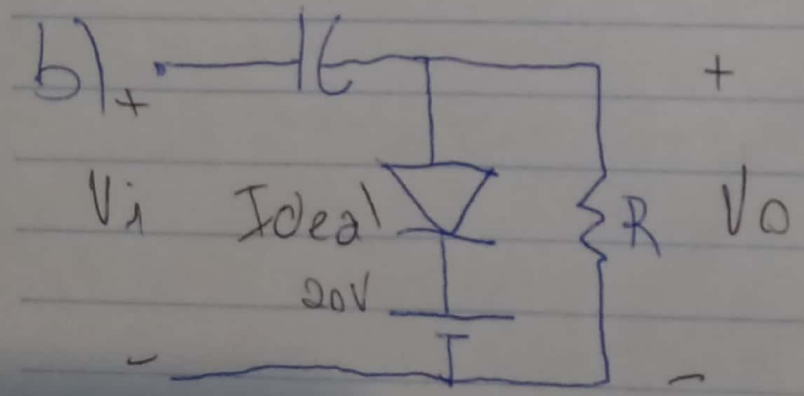


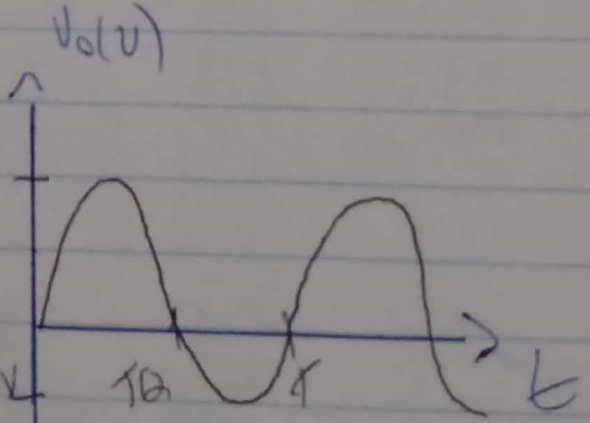
a)





b)





$V_p = 2V_i - V = 240 - 20 = 220V$