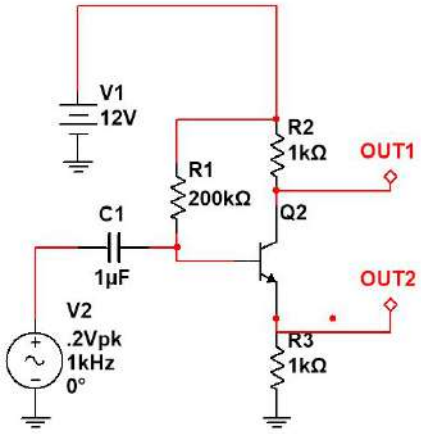
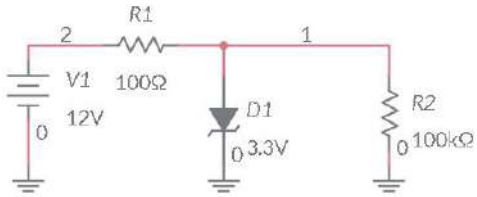
P1 2023.1 Dispositivos Eletrônicos Prof. Marcelo Perotoni Considere vbe e tensão do diodo ON como 0.7

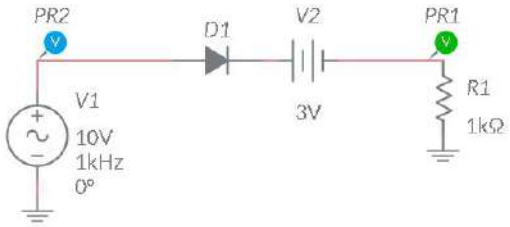
[1] **(a)** Calcule a corrente de coletor do circuito, considerando $\beta = 100$. **(b)** Calcule a tensão DC (quiescente) nos pontos OUT1 e OUT2 e o VCE. **(c)** Sabendo que o sinal de entrada é um seno de 0.2 V pico, calcule os ganhos para os pontos OUT1 e OUT2 e desenhe as formas de onda. Considere ganhos do emissor comum $A_v = -R_C/R_E$ e do coletor comum $A_v = R_E/(R_E + r_e)$.



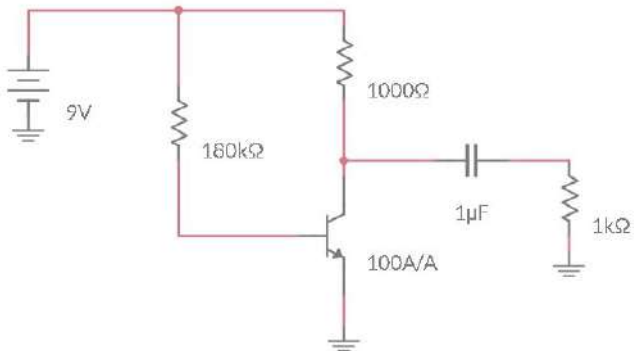
[2] Calcule a tensão e a corrente no resistor de 100 kΩ, o zener é de 3.3 V.



[3] O circuito está excitado por uma senóide oscilando entre +10 e -10V. Mostre de maneira **clara** a forma de onda na saída (ponto PR1 na figura), e a expressão do sinal nesse ponto (quando D é ON). Mostre a corrente máxima que circulará na resistência de 1 kΩ.

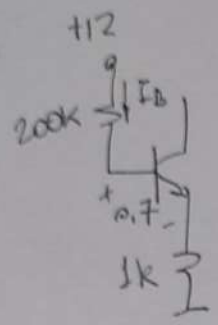


[4] Para o transistor com $\beta = 100$ calcule: **(a)** corrente quiescente de coletor **(b)** V_{CE} quiescente **(c)** ganho de tensão da base para o coletor **(d)** desenhe a reta de carga com os principais valores, colocando o ponto quiescente.



DISPOSITIVOS P1 2023.1

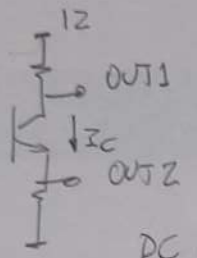
① (a)



$12 - 0.7 = 200K \cdot \frac{I_C}{\beta_{100}} + 1K \cdot I_C \quad \therefore I_C = \frac{11,3}{3}\ mA$

$I_C \approx 3,77\ mA$

(b)

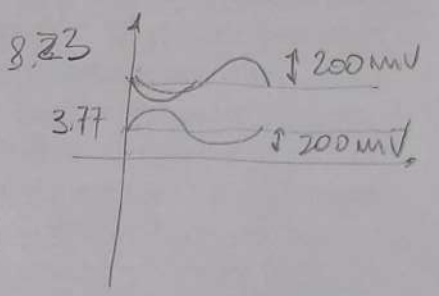


$V_{OUT1} = 12 - 1K \cdot I_C = 12 - 3.77 = 8.23$

$V_{OUT2} = I_C \cdot 1K = 3,77V$

DC: $V_{CE} = 8.23 - 3.77 = 4.46$

(c) $A_{VOUT1} = -\frac{R_C}{R_E} = -1$



$A_{VOUT2} = \frac{R_E}{r_e + R_E} = \frac{1000}{1000 + \frac{26}{3,77}} = 0,99$

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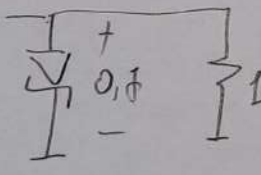
② ZENER polarizado ON (como diodo)



$V_{100K} = 0,7$

$I_{100K} = \frac{0,7}{100k} = 7\mu A$

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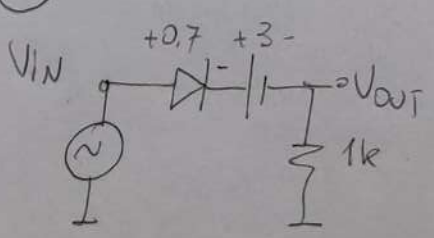
③ (a)

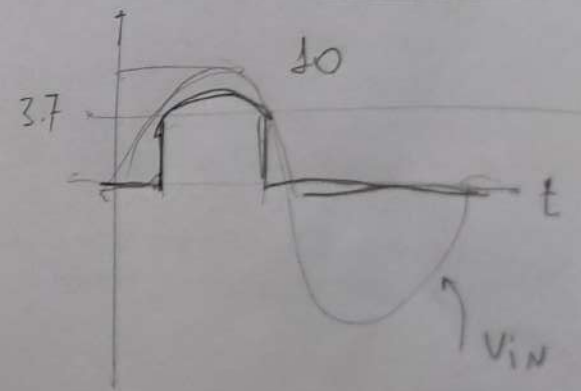


D ON quando:

$V_{IN} > 3,7$

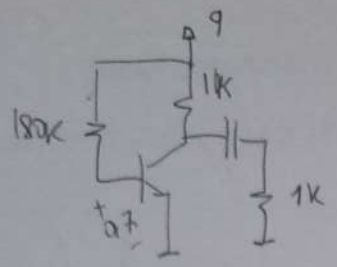
$V_{OUT} = V_{IN} - 3,7$

D OFF → $V_{OUT} = GND$



$i_{MAX} = \frac{10 - 3,7}{1K} = 6,3\ mA$

(4)



(a) $9 - 0.7 = \frac{I_c}{\beta} \times 180K$ $\quad I_c = \frac{8.3}{1.8}$ mA

$= 4.6$ mA //

(b) $V_{CE} = 9 - 1K \times I_c = 9 - 4.6 = 4.4V$ //

(c) $A_V = -\frac{R_c // R_L}{r_e} = -\frac{1000 // 1000}{\frac{26}{4.6}} = -88.5$ //

(d)