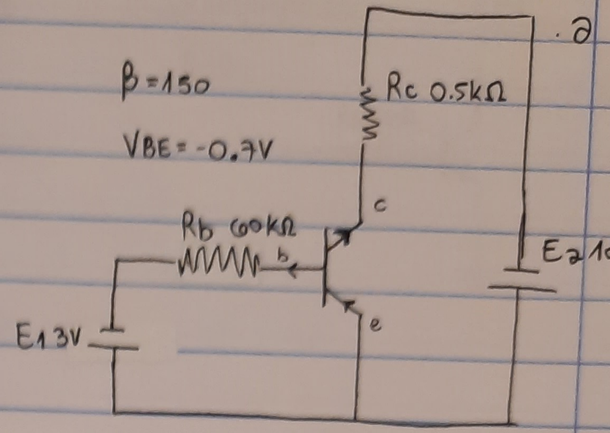
תרגיל 7 פיזיקה

2.

$\beta = 150$

$V_{BE} = -0.7V$



$E_1 - V_{EB} - I_B \cdot R_b = 0$

$3 - 0.7 - 60 \cdot I_B = 0$

$2.3 = 60 I_B$

$\underline{I_B} = 38.33\,\mu A$

$\underline{I_C} = \beta I_B = 150 \cdot 0.03833 = 5.75\,mA$

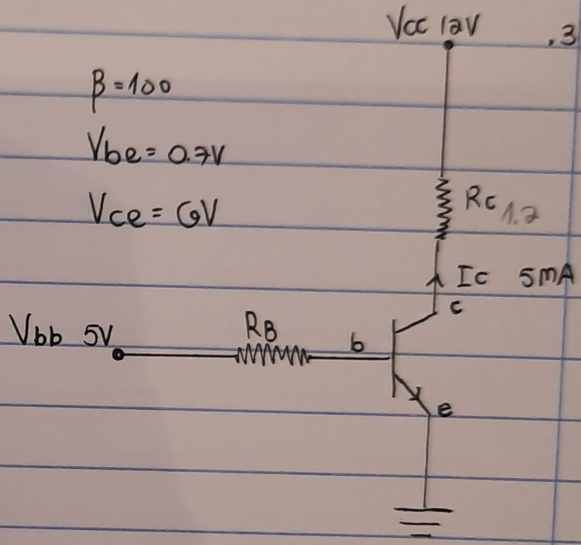
$\underline{I_E} = I_C + I_B = 0.03833 + 5.75 = 5.788\,mA$

3.

$\beta = 100$

$V_{be} = 0.7V$

$V_{ce} = 6V$



$V_{bb} = R_b \cdot I_b + V_{be}$

$5 = R_b \cdot I_b + 0.7$

$4.3 = R_b \cdot I_b$

$V_{cc} = R_C \cdot I_C + V_{ce}$

$12 = R_C \cdot 5 + 6$

$\underline{R_C} = 1.2k\Omega$

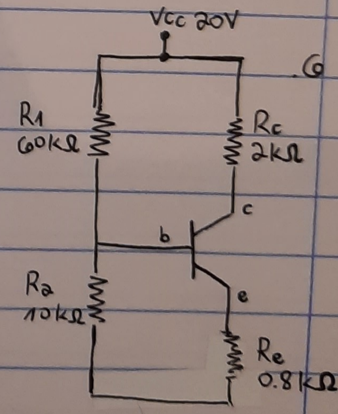
$I_b = \frac{I_C}{\beta} = \frac{5}{100} = 0.05\,mA$

$\underline{R_b} = \frac{4.3}{0.05} = 86\,k\Omega$

6.

$\beta = 100$

$V_{be} = 0.7V$



$R_b = R_1 \| R_2 = \frac{R_1 \cdot R_2}{R_1 + R_2} = \frac{60 \cdot 10}{60 + 10} = 8.571k\Omega$ לפי תרגיל

$V_{bb} = U_{R_2} = V_{CC} \cdot \frac{R_2}{R_1 + R_2} = 20 \cdot \frac{10}{60+10} = 2.857V$

$V_{bb} = I_b \cdot R_b + V_{be} + I_E \cdot R_E$

$V_{bb} = I_b \cdot R_b + V_{be} + I_b (1 + \beta) \cdot R_e$

$2.857 = I_b \cdot 8.571 + 0.7 + 101 I_b \cdot 0.8$

$2.157 = 89.371 I_b$

$I_b = 0.024135A$

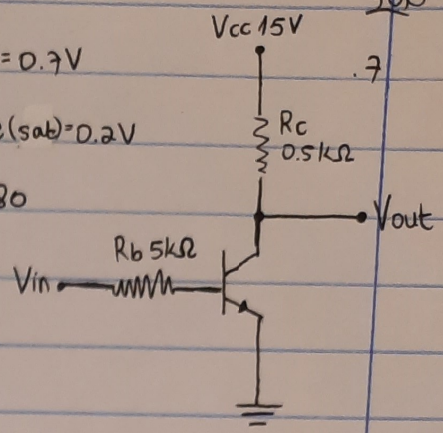
$I_c = \beta \cdot I_b = 0.024135 \cdot 100 = 2.4135A$

$I_e = I_b + I_c = 2.43766A$

$V_{CC} = R_c \cdot I_c + V_{ce} + I_e \cdot R_e$

$20 = 2.413 \cdot 2 + V_{ce} + 2.437 \cdot 0.8$

$\underline{V_{ce}} = 13.224V$



$V_{be}=0.7V$

$V_{ce(sat)}=0.2V$

$\beta=80$

ג. כאשר $V_{in}=0V$ הטרנזיסטור בקיטעון. $I_b=0$ ולכן $I_c=0$.

לכן $V_{Rc}=0$ (לפי חוק אוהם כאשר $I=0$) ולכן:

$V_{cc}=I_c \cdot R_c + V_{ce}$

$15=0+V_{ce}$

$V_{ce}=15V$

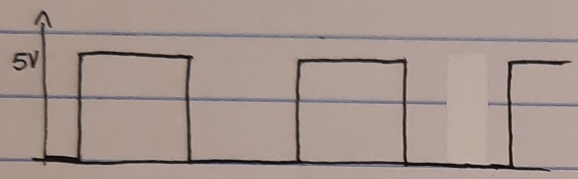
$V_{out}=15V$

כאשר $V_{in}=15V$ הטרנזיסטור בהרוויה, לכן $V_{ce}=0.2V$

$V_{out}=V_{ce}=0.2V$

המעגל מהווה שער NOT.

ד. כניסה:



יציאה: