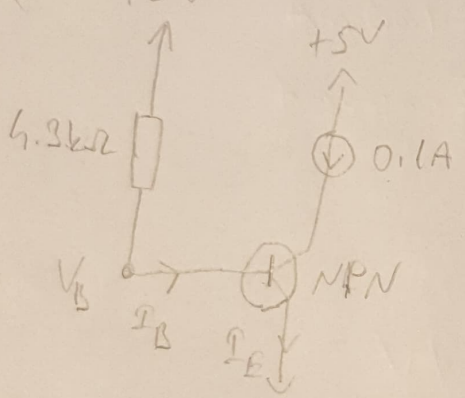
"On my honor, I neither give nor receive any unauthorized and/or inappropriate assistance that by the school code, violation of these principles will lead to a zero grade and is subject to harsh disciplinary issues."

Hüseyin Kerem Mican
150419629

Q11




Active

$\beta = 100$

$V_B = ?$

$I_B = ?$

$I_E = ?$

$\alpha = \frac{\beta}{\beta+1}$


$I_E = (\beta+1) I_B = 101 \cdot 1 = 101\,mA$

$I_C = \beta \cdot I_B$

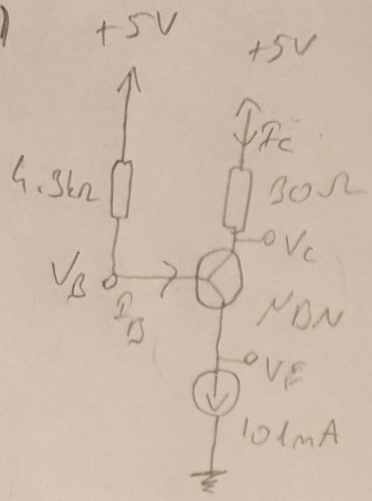
$I_B = \frac{I_C}{\beta} = \frac{0.1A}{100} = 1mA$

$V_B = 5V - 4.3 \cdot I_B = 0.7V$

$V_E = 0V \quad V_{BE} = 0.7V$

| |
|---|
| $V_B = 0.7V$ |
| $I_B = 1mA$ |
| $I_E = 101mA$ |

Q21




Active

$\beta = 100$

$I_B = ?$

$V_B = ?$

$V_E = ?$

$I_C = ?$

$V_C = ?$

$I_E = 101\,mA$

$I_C = \beta \cdot I_B = \beta = 100\,mA$ (1mA)

$I_C = 100\,mA$

$I_B = \frac{I_E}{\beta+1} = 1\,mA$

$\beta+1 \rightarrow 100/101$

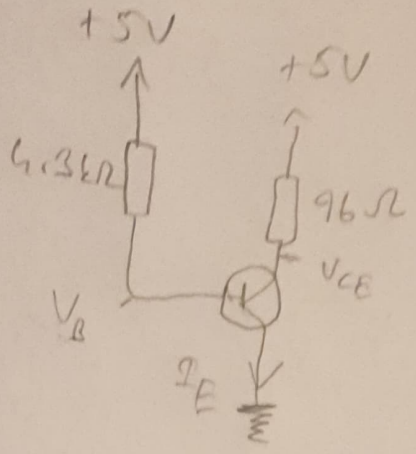
$V_B = 5V - 4.3\,I_B = 5 - 4.3 = 0.7V$

$V_C = 5V - 30\Omega \cdot I_C = 2V$ ($I_C \rightarrow 100\,mA$)

$V_E = V_B - 0.7V = 0V$ ($V_B \rightarrow 0.7$)

| |
|---|
| $I_B = 1mA$ |
| $V_B = 0.7V$ |
| $V_E = 0V$ |
| $I_C = 100mA$ |
| $V_C = 2V$ |

(Q3)




Saturation

$V_a = V_{ab} + V_b$

$V_{CE} = 0.2V$

$I_a = \frac{V - V_b}{R}$

$I_E = ?$

$V_E = 0V$

$V_{BE} = 0.7V$

$V_B = V_{BE} + V_E = 0.7V$

$I_B = \frac{5V - V_B}{4.3k\Omega} = \frac{5 - 0.7}{4.3} = 1mA$

$V_C = V_{CE} + V_E = 0.2V + 0V = 0.2V$

$I_C = \frac{5 - V_C}{96\Omega} = \frac{5 - 0.2}{96} = \frac{4.8}{96} = 0.05 = 50mA$

$I_E = I_B + I_C = 51mA$