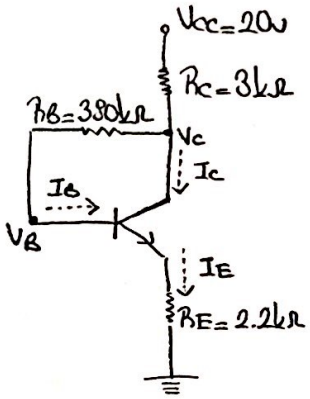
Name:
Surname:

18.05.2017

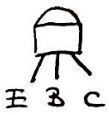
EE 208_Lab. Quiz 2

Question:

a) Construct below collector feedback configuration;



b) Assume that $\beta=300$. Calculate the values of I_B, I_C, I_E, V_B, V_C and V_{CE}.
Transistor is 2N3904



– Solution –

$V_C = V_{CC} - R_C.(I_C + I_B) \Rightarrow V_C = 20 - (3.10^3)(\beta+1).I_B \Rightarrow V_C = 20 - (3000)(301).I_B = 20 - 900000 I_B \Rightarrow$

$\boxed{V_C \cong 11.108 V}$

$V_E = V_B - V_{BE} = I_E.R_E \Rightarrow V_E = (\beta+1).I_B.(2.2).10^3 \Rightarrow \boxed{V_E \cong 6.54 V}$

$V_{CE} = V_C - V_E = 11.108 - 6.54 \Rightarrow \boxed{V_{CE} \cong 4.568 V}$

$V_B = V_{BE} + V_E \Rightarrow V_B = 0.7 + (301)(2.2).10^3.I_B \Rightarrow \boxed{V_B \cong 7.242 V}$

$I_B = \frac{V_C - V_B}{R_B} \Rightarrow I_B = \frac{(20 - 900000 I_B) - (0.7 + (662.2)10^3.I_B)}{(330).10^3} = \frac{19.3 - 900000 I_B - 662200 I_B}{} = 330000 I_B$

$\boxed{I_B \cong 3.88 \mu A}$

$I_E = I_C + I_B \Rightarrow \boxed{I_E \cong I_C \cong 2.964 mA}$

$I_C = \beta.I_B \Rightarrow \boxed{I_C \cong 2.964 mA}$

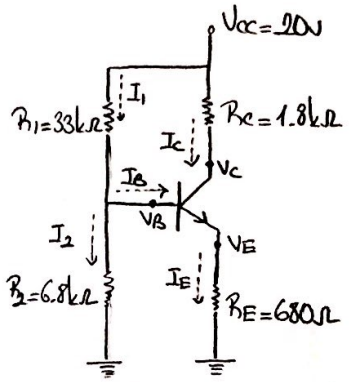
Name:
Surname:

EE 208_Lab. Quiz 2

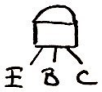
18.05.2017

Question:

a) Construct below voltage divider configuration;



b) Assume that $\beta=300$. Calculate the values of I_B, I_C, I_E, V_B, V_C and V_{CE}.
Transistor is 2N3904



— Solution —

$V_C = V_{CC} - R_C . I_C \Rightarrow V_C = 20 - (1.8).10^3 I_C \Rightarrow V_C = 20 - (1.8\times10^3)(4.53)(10^{-6}) \Rightarrow \boxed{V_C \cong 19.99V}$

$V_E = I_E . R_E = V_B - V_{BE} \Rightarrow V_E = 3.417 - 0.7 \Rightarrow \boxed{V_E \cong 2.717V}$

$V_{CE} = V_C - V_E = 19.99V - 2.717V \Rightarrow \boxed{V_{CE} \cong 17.273V}$

$V_B = V_{BE} + V_E = V_{CC}.\left(\frac{R_2}{R_1+R_2}\right) \rightarrow$ (voltage divider) $\Rightarrow V_B = 20.\left(\frac{(6.8)10^3}{(6.8)10^3+(33)10^3}\right) \Rightarrow \boxed{V_B \cong 3.417V}$

$I_2 = \frac{V_B}{R_2} \Rightarrow I_2 = \frac{3.417V}{(6.8).10^3} \Rightarrow \boxed{I_2 \cong 0.5mA}$

$I_1 = I_2 + I_B = \frac{V_{CC}-V_B}{R_1} \Rightarrow I_1 = \frac{20-3.417}{(33).10^3} \Rightarrow \boxed{I_1 \cong 0.502mA} \Rightarrow I_B = I_1 - I_2 \Rightarrow \boxed{I_B \cong 0.0151\mu A}$

$I_C = \beta . I_B = (300)(0.0151\mu A) \Rightarrow \boxed{I_C \cong 4.53\mu A}$

$I_E = I_C + I_B \Rightarrow \boxed{I_E \cong 4.54\mu A \cong I_C}$