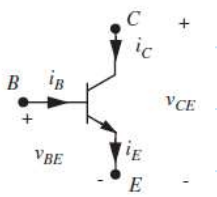
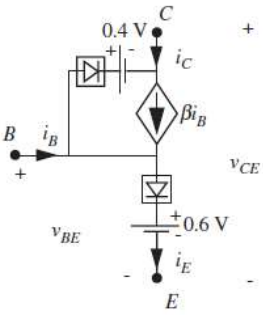
Homework 8

Thursday, June 1, 2017 4:47 PM

Ex 7.8)



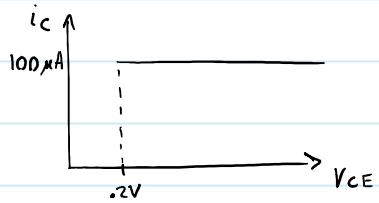


a. $V_{CE} = 2V$, $V_{BE} = .6\ V$

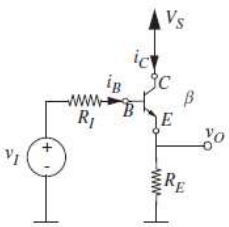
$V_{BE} - .4V = .2V \longrightarrow V_{CE} > V_{BE} - .4V$ (in active region)

$i_c = \beta i_B = 100\mu A$

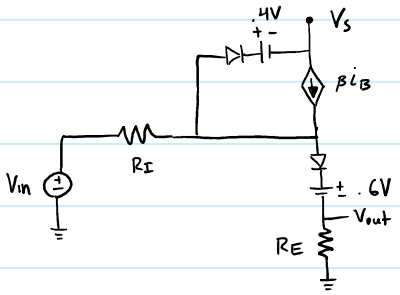
b.



Pr 7.18)



a.



b. $V_{out} = i_E R_E = (1+\beta)\, i_B R_E$

$i_B = \frac{1}{R_I}(V_{in} - (V_{out} + V_{BE})) = \frac{1}{R_I}(V_{in} - V_{out} - .6V)$

$V_{out} = (V_{in} - V_{out} - .6V)\ \frac{(1+\beta)R_E}{R_I}$

$V_{out} = \frac{V_{in} - .6V}{1 + \frac{R_I}{(1+\beta)R_E}}$

Pr 7.18) c. $\beta R_E >> R_I \rightarrow$ $\boxed{V_{out} = V_{in} - .6V}$

d. $R_I = 10\,k\Omega$, $R_E = 100\,k\Omega$ $\beta R_E >> R_I$

$V_{in} = 3V \rightarrow$ $\boxed{V_{out} = 2.4\,V}$

e. current cuts off for $V_{in} < .6\,V$

at active region limit

$V_{CE} = V_{BE} - .4$

$V_s - V_o = .2$ in saturation $V_o = V_{in} - .6$

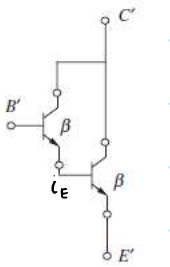
$V_s = V_{in} + .2 - .6 = V_{in} - .4$

$V_{in} = 10.4$

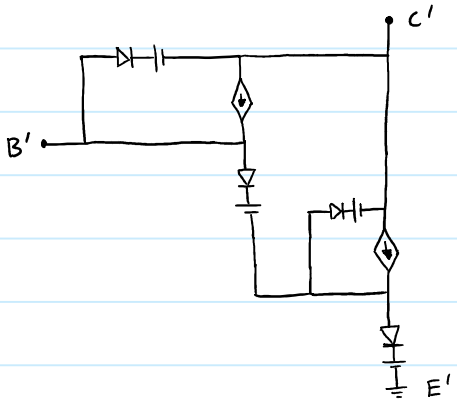
$.6 \le V_{in} \le 10.4$

$\boxed{0 \le V_{out} \le 9.8}$

Pr 7.19)



a.



b. $i_{E'} = (1+\beta)\, i_E$ $\quad i_E = (1+\beta)\, i_B$

$i_{E'} = (1+\beta)^2 i_B$

$= (\beta^2 + 2\beta + 1)\, i_B$

$= (\beta' + 1)\, i_B \rightarrow$ $\boxed{\beta' = (\beta+2)\beta}$

c. $\boxed{V_{B'E'} = 2(.6V) = 1.2V}$