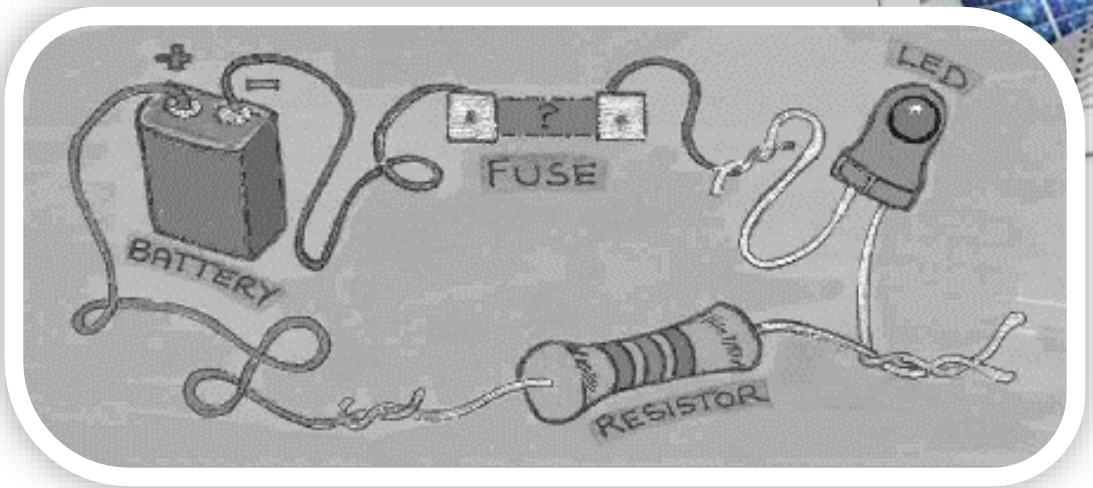
EHB222E QUESTIONS
5th week

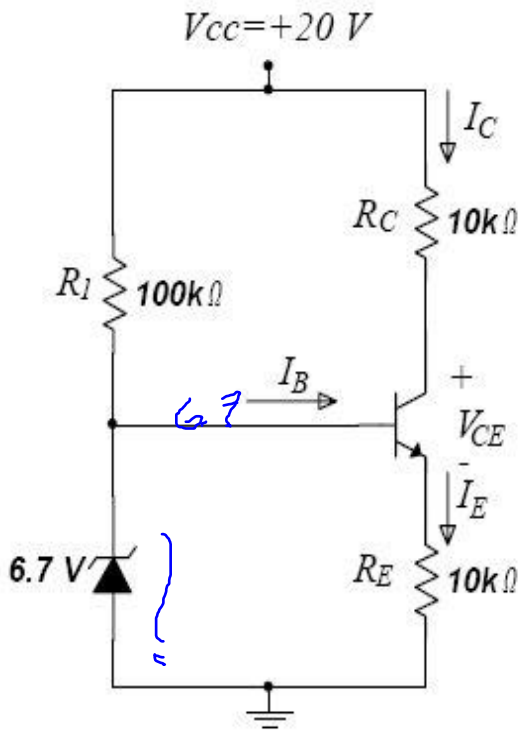


Consider the amplifier shown below. Use the following parameters for your calculations.

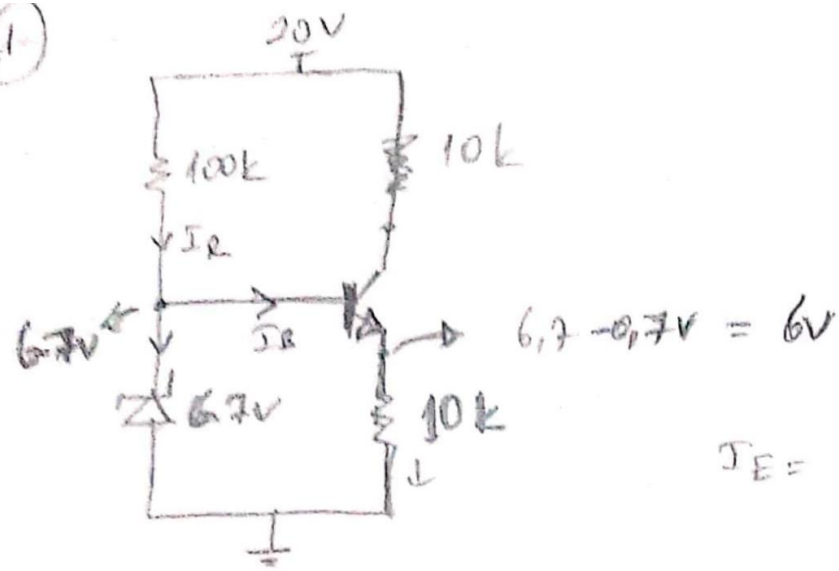
Transistor parameters : β=200, V_{BE}=0.7V, V_T=25mV, V_A=100V.

Zener diode voltage: V_z=6.7V

a. Find diode current and operating point values of the transistor.



(1)



$6{,}7 - 0{,}7\,V = 6\,V$

assume that transistor at active mode

$$I_E = \frac{6V - 0V}{10k} = \underline{0{,}6\,mA}$$

$I_E = (\beta + 1) \cdot I_B$

$\beta \approx 200$

$I_B \cong 3\,\mu A$

$$I_R = \frac{20V}{100k} = 0{,}2\,mA = 200\,\mu A$$

$\underline{I_Z = 197\,\mu A}$

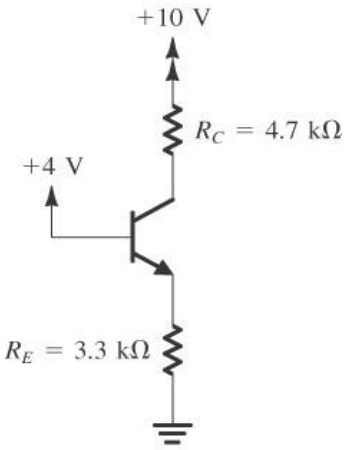
$V_C = 20V - 10k \cdot 0{,}6mA$

$\underline{V_C = 14V}$

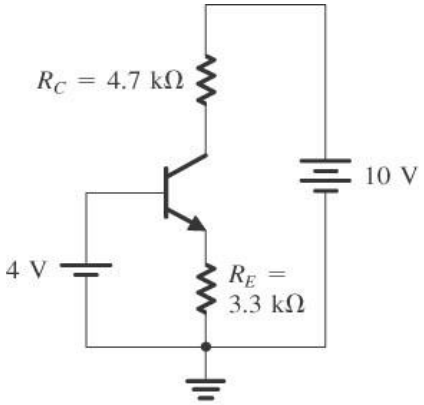
$\boxed{V_{CE} = 8V}$

$\boxed{V_{BE} = 0{,}7V}$

For the transistors shown below $\beta = h_{fe} = h_{FE} = 100$, $V_{BE} = 0.7V$. Calculate operating point current and voltage values. Assume that transistor is in active mode. Check this assumption.

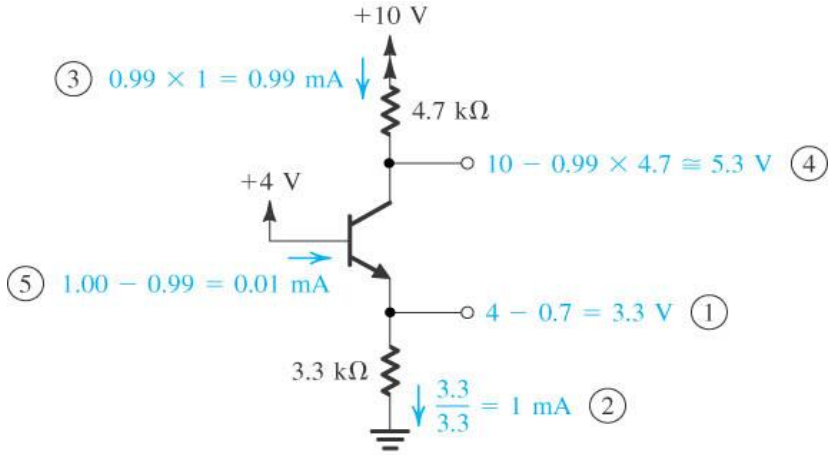


(a)



(b)

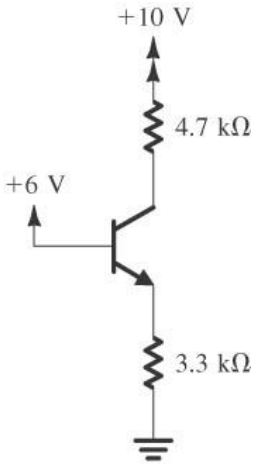
Works in active region



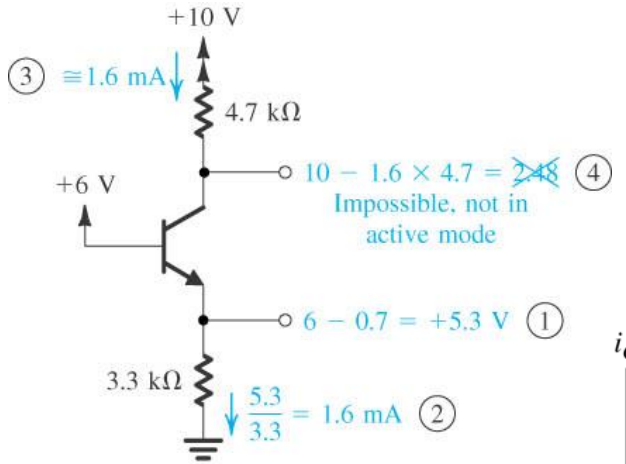
(c)

(a) circuit; **(b)** circuit redrawn **(c)** analysis with the steps numbered.

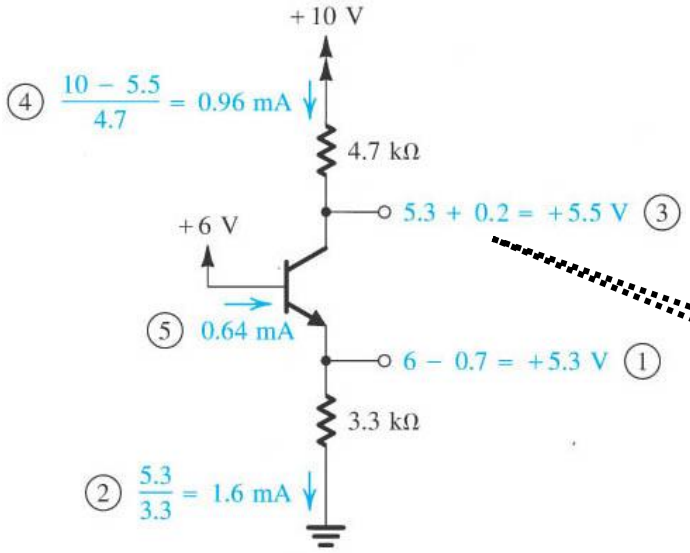
For the transistors shown below β=h_{fe} = h_{FE} = 100, V_{BE} =0.7V. Calculate operating point current and voltage values.



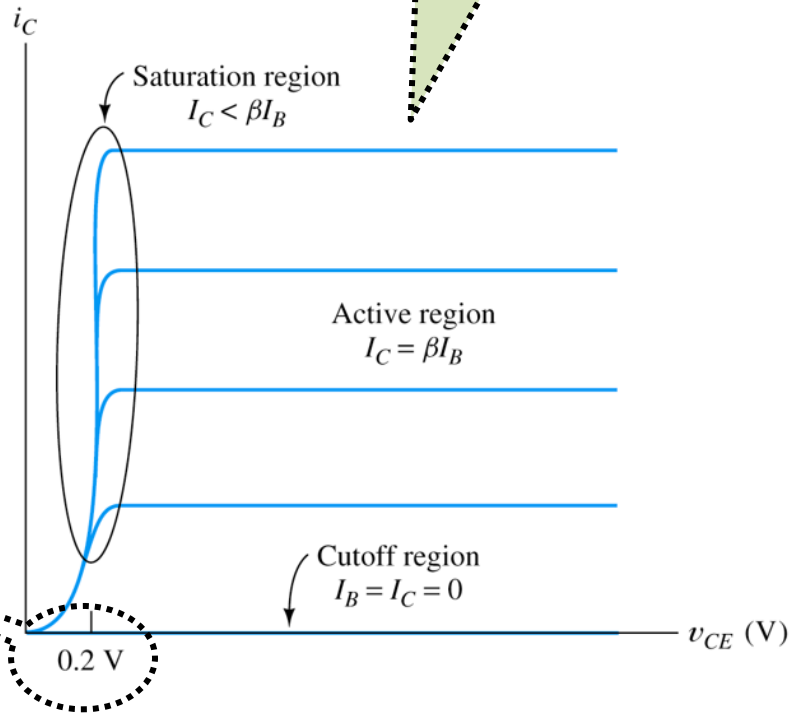
(a)



(b)

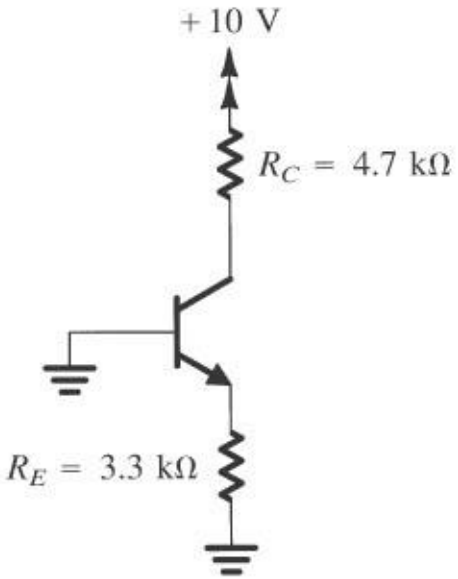


(c)

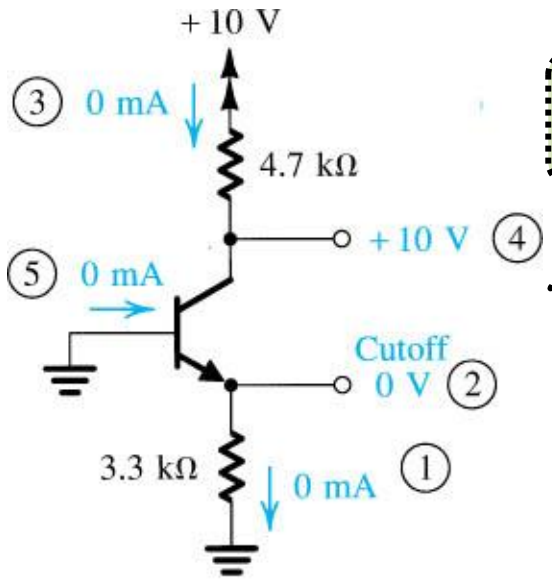


is not valid in saturation mode

For the transistors shown below $\beta = h_{fe} = h_{FE} = 100$, $V_{BE} = 0.7V$. Calculate operating point current and voltage values.



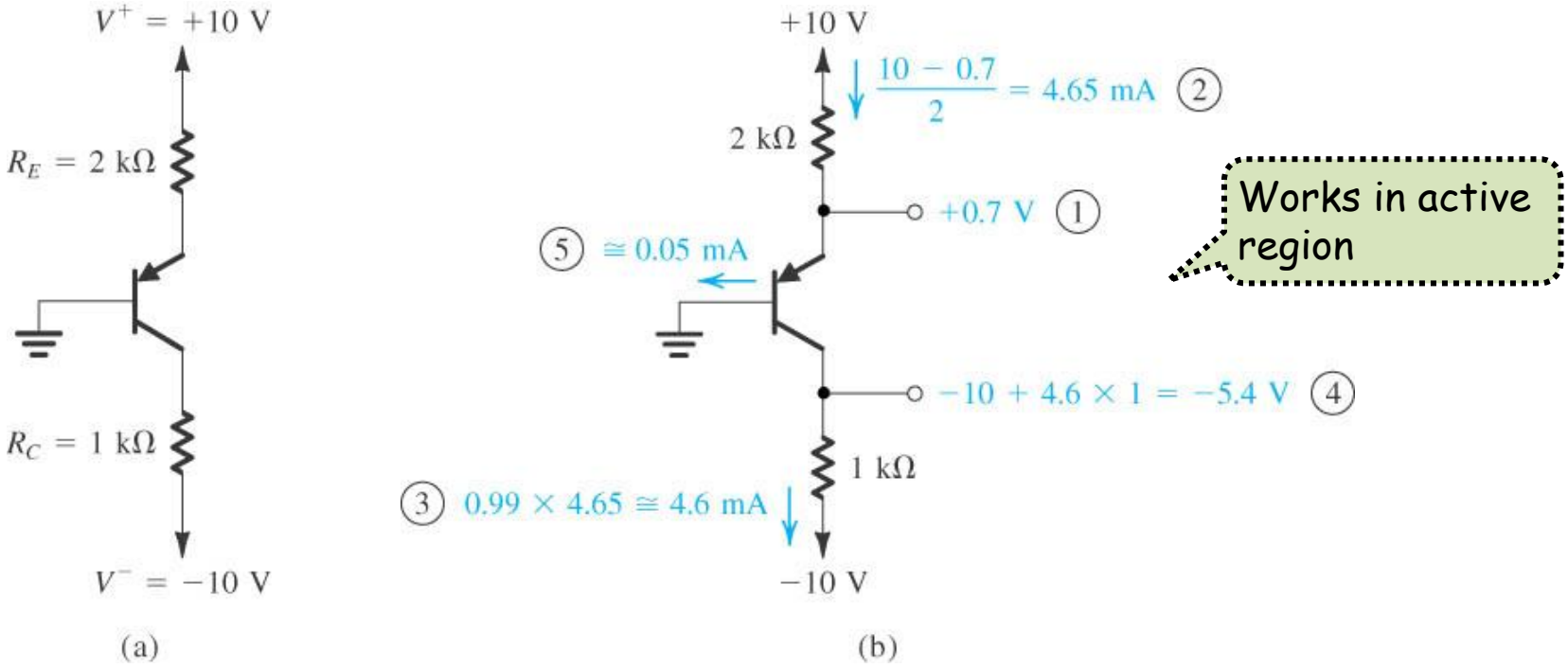
(a)



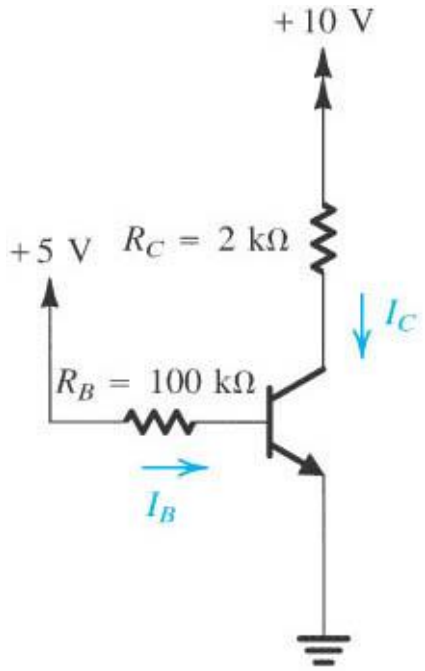
(b)

Works in Cutoff region

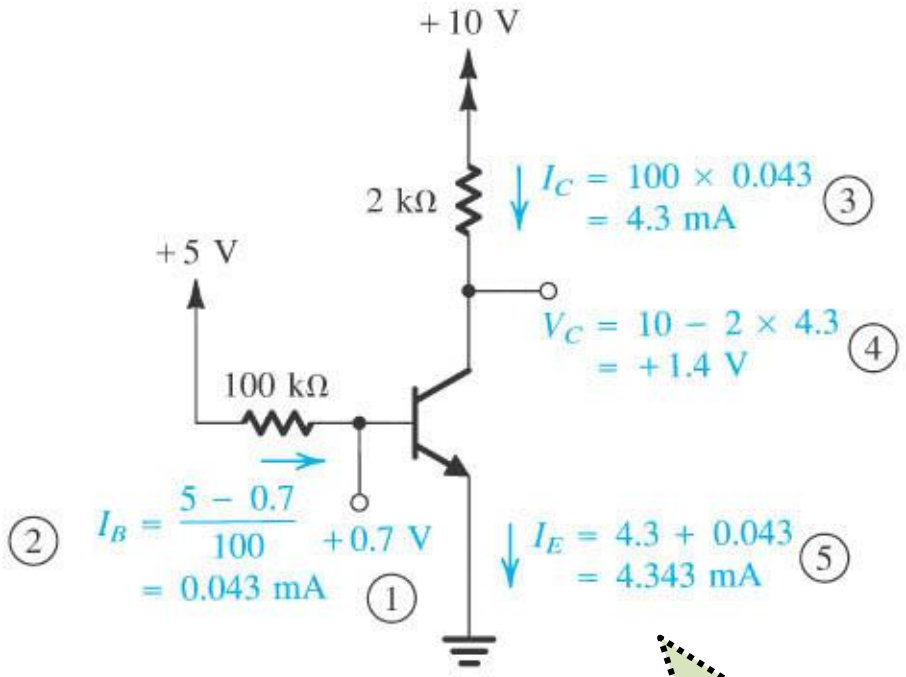
For the transistors shown below $\beta = h_{fe} = h_{FE} = 100$, $V_{EB} = 0.7V$. Calculate operating point current and voltage values.



For the transistors shown below β=h_{fe} = h_{FE} = 100, V_{BE} =0.7V. Calculate operating point current and voltage values.



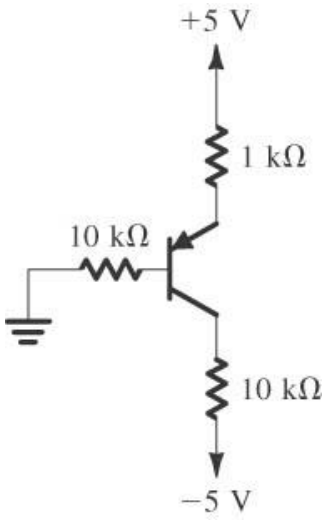
(a)



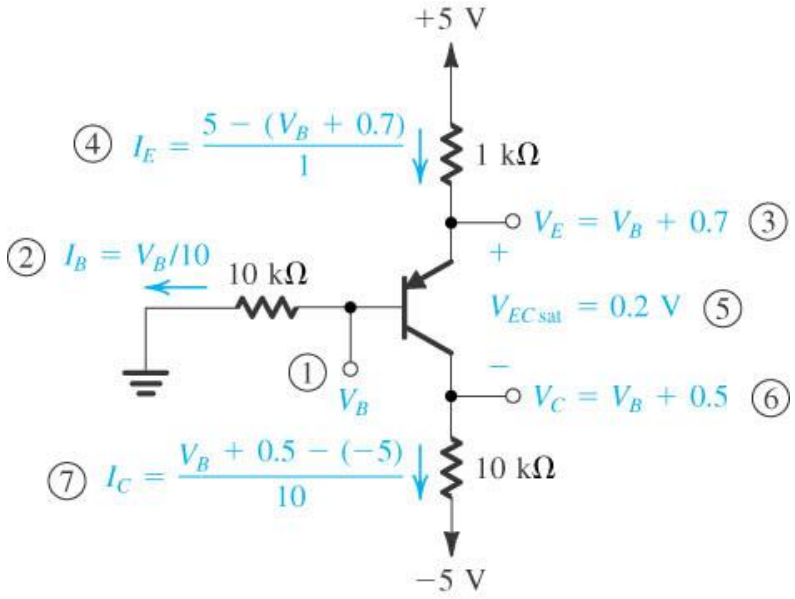
(b)

Works in active region

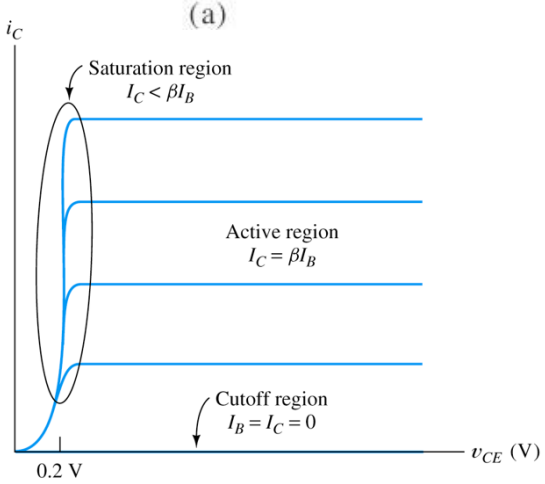
For the transistors shown below β=h_{fe} = h_{FE} = 100, V_{EB} =0.7V. Calculate operating point current and voltage values. Assume that transistor is in saturation mode. Check this assumption.



(a)



(b)



(β = 100 (active mode) ,saturation mode: V_{EC} = 0.2V).