28/09/2020

Tutorial Class 6

Q1.

(a) Using the characteristics of Fig. 3.8, determine the resulting collector current if $I_E = 3$ mA and $V_{CB} = 10$ V.
(b) Using the characteristics of Fig. 3.8, determine the resulting collector current if I_E remains at 3 mA but V_{CB} is reduced to 2 V.

β

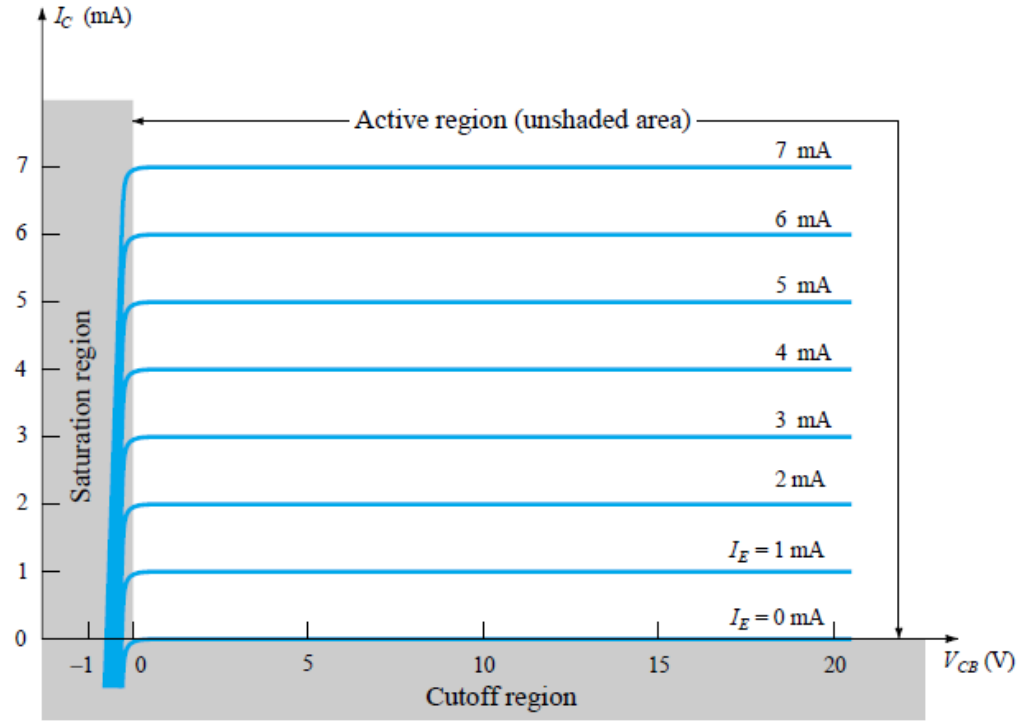

Figure 3.8 Output or collector characteristics for a common-base transistor amplifier.

Q2.

(a) Using the characteristics of Fig. 3.14, determine I_C at $I_B = 30\ \mu A$ and $V_{CE} = 10$ V.

(b) Using the characteristics of Fig. 3.14, determine I_C at $V_{BE} = 0.7$ V and $V_{CE} = 15$ V.

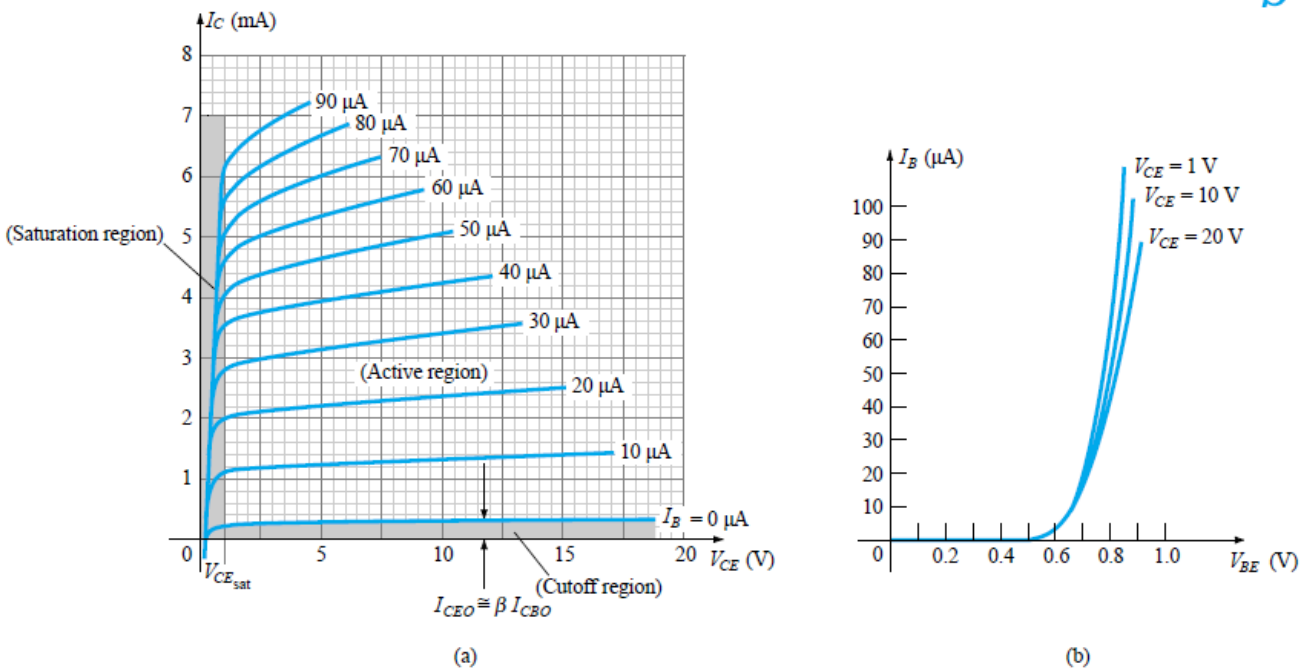

Figure 3.14 Characteristics of a silicon transistor in the common-emitter configuration: (a) collector characteristics; (b) base characteristics.

Q3.

(a) Using the characteristics of Fig. 3.8, determine the resulting collector current if $I_E = 4.5$ mA and $V_{CB} = 4$ V.
(b) Repeat part (a) for $I_E = 4.5$ mA and $V_{CB} = 16$ V.
(c) How have the changes in V_{CB} affected the resulting level of I_C?
(d) On an approximate basis, how are I_E and I_C related based on the results above?

β

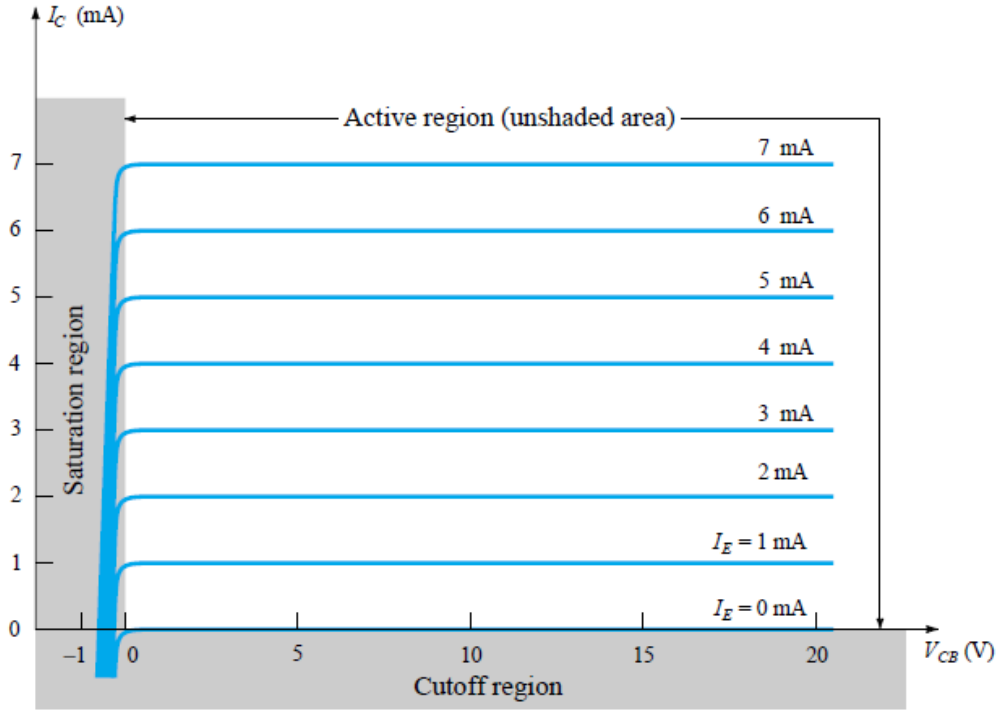

Figure 3.8 Output or collector characteristics for a common-base transistor amplifier.

Q4.

(a) Using the characteristics of Figs. 3.7 and 3.8, determine I_C if $V_{CB} = 10$ V and $V_{BE} = 800$ mV.

(b) Determine V_{BE} if $I_C = 5$ mA and $V_{CB} = 10$ V.

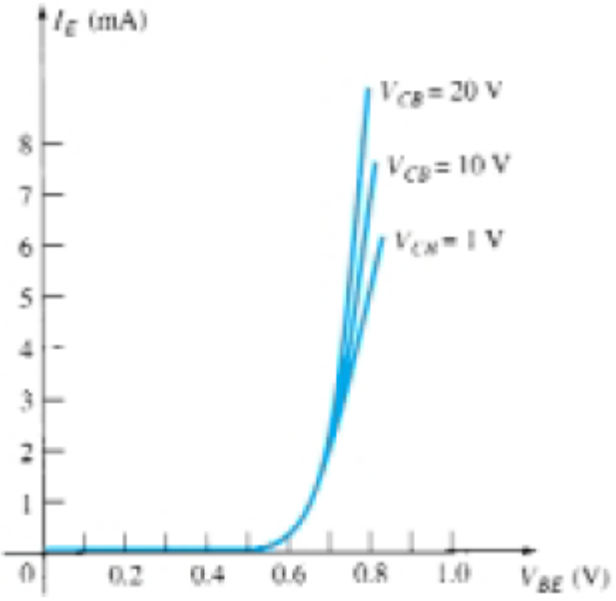

Figure 3.7 Input or driving point characteristics for a common-base silicon transistor amplifier.

β

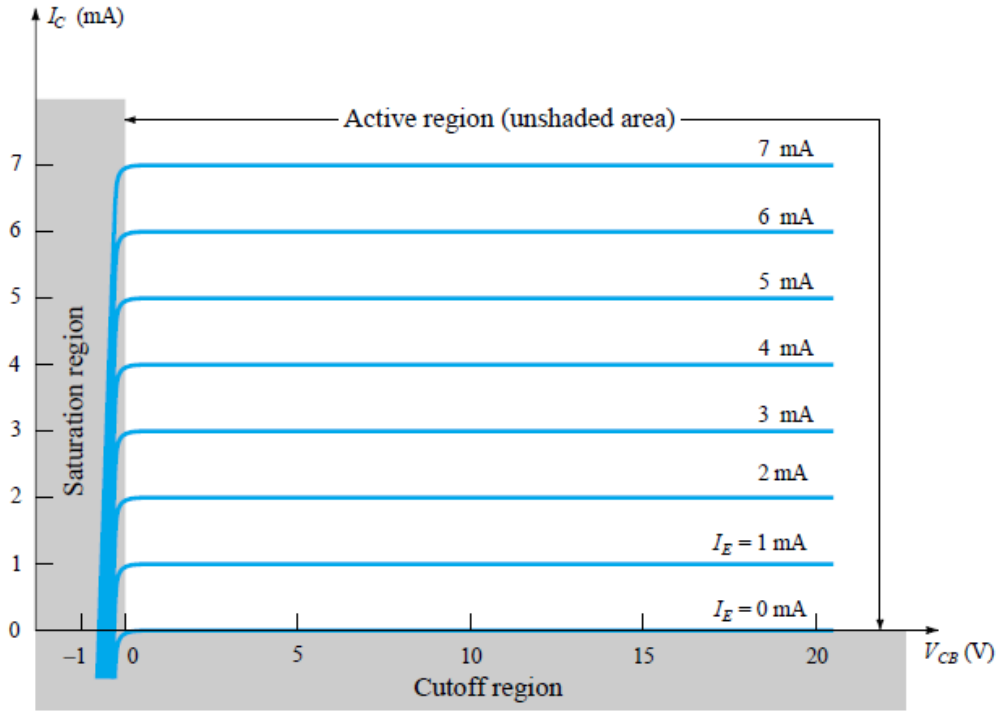

Figure 3.8 Output or collector characteristics for a common-base transistor amplifier.

Q5.

Using the characteristics of Fig. 3.14:
(a) Find the value of I_C corresponding to $V_{BE} = +750$ mV and $V_{CE} = +5$ V.
(b) Find the value of V_{CE} and V_{BE} corresponding to $I_C = 3$ mA and $I_B = 30\ \mu$A.

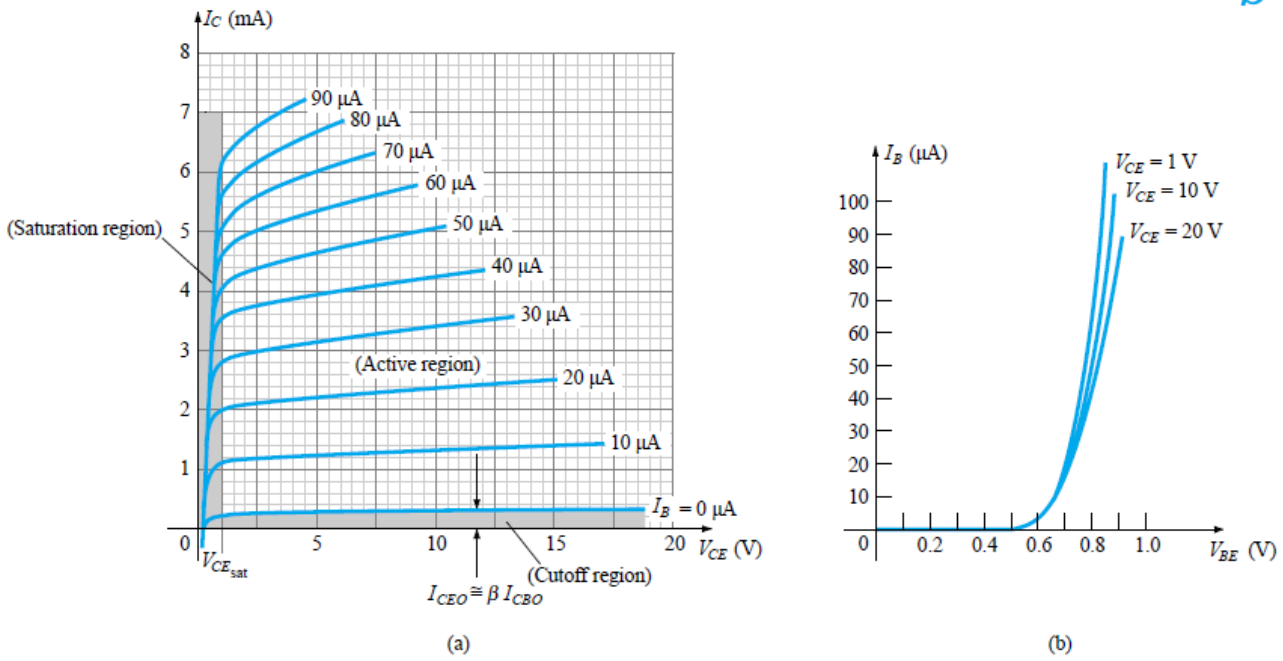

Figure 3.14 Characteristics of a silicon transistor in the common-emitter configuration: (a) collector characteristics; (b) base characteristics.

Q6.

Calculate the voltage gain ($A_v = V_L/V_i$) for the network of Fig. 3.12 if $V_i = 500$ mV and $R = 1$ kΩ. (The other circuit values remain the same.)

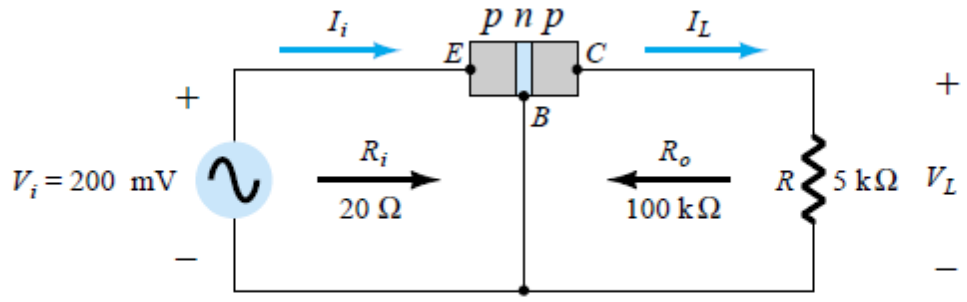

Figure 3.12 Basic voltage amplification action of the common-base configuration.

Q7.

Calculate the voltage gain ($A_v = V_L/V_i$) for the network of Fig. 3.12 if the source has an internal resistance of 100 Ω in series with V_i.

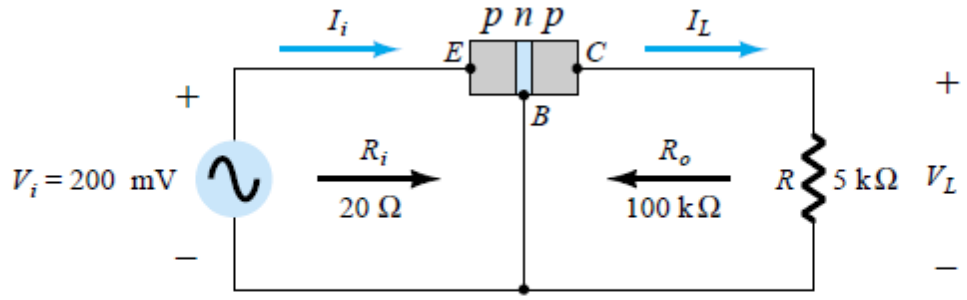

Figure 3.12 Basic voltage amplification action of the common-base configuration.

Q8.

For the fixed-bias configuration of Fig. 4.73, determine:

(a) I_{B_Q}.
(b) I_{C_Q}.
(c) V_{CE_Q}.
(d) V_C.
(e) V_B.
(f) V_E.

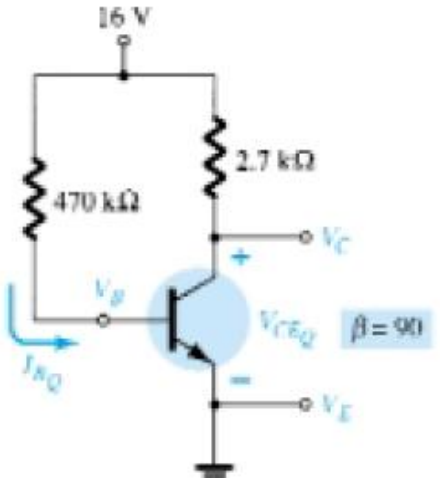

Figure 4.73

47, 51, 52, 53

Q9.

Given the information appearing in Fig. 4.74, determine:

(a) I_C.

(b) R_C.

(c) R_B.

(d) V_{CE}.

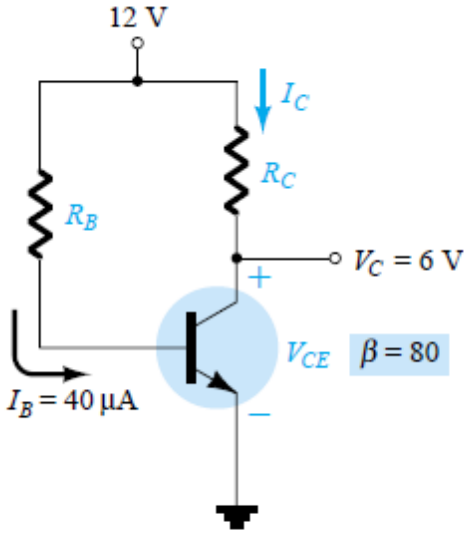

Figure 4.74 Problem 2

Q10.

Given the information appearing in Fig. 4.75, determine:

(a) I_C.

(b) V_{CC}.

(c) β.

(d) R_B.

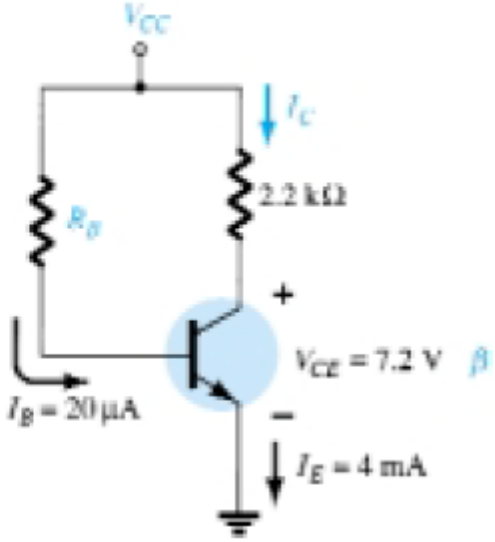

Figure 4.75 Problem 3