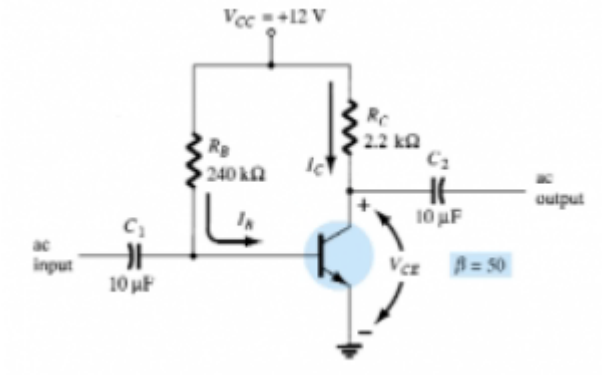
1. Which of the following is the correct relationship between base and emitter current of a BJT?
a) $I_B = \beta I_E$
b) $I_B = I_E$
c) $I_B = (\beta + 1) I_E$
d) $I_E = (\beta + 1) I_B$
View Answer
Answer: d
Explanation: For a BJT, the collector current $I_C = \beta I_B$ and $I_E = I_C + I_B$
Hence, $I_E = (\beta + 1) I_B$.

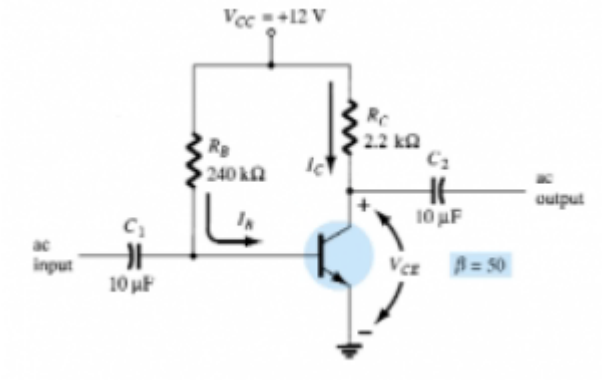
2. For best operation of a BJT, which region must the operating point be set at?
a) Active region
b) Cutoff region
c) Saturation region
d) Reverse active region
View Answer
Answer: a
Explanation: Operating point for a BJT must always be set in the active region to ensure proper functioning. Setting up of Q-point in any other region may lead to reduced functionality.

3. From the given circuit, using a silicon transistor, what is the value of I_{BQ}?

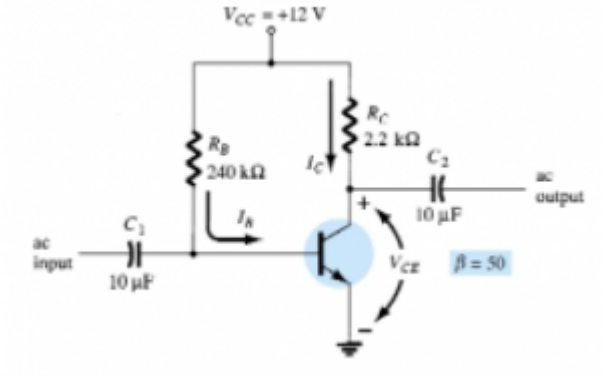


a) 47.08 mA
b) 47.08 uA
c) 50 uA
d) 0 mA
View Answer
Answer: b
Explanation: Consider the BJT to be in saturation. Then I_C=12-0.2/2.2k=5.36 mA
And I_B=12-0.8/240k=0.047 mA
$I_{BMIN}=I_{CSAT}/\beta$=5.09/50=0.1072mA which is greater than above I_B.
Hence transistor is in the active region.
Thus $I_C=\beta I_B$.
V_{BE}=0.7V
I_B=12-0.7/240=47.08μA

4. From the given circuit, using a silicon BJT, what is the value of V_{CEQ}?



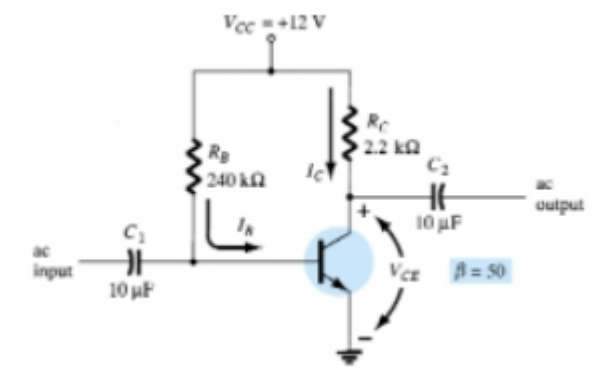
a) 7 V
b) 0.7 V
c) 6.83 V
d) 7.17 V
View Answer
Answer: c
Explanation: Consider the BJT to be in saturation. Then I_C=12-0.2/2.2k=5.36 mA
And I_B=12-0.8/240k=0.047 mA
$I_{BMIN}=I_{CSAT}/\beta$=5.09/50=0.1072mA which is greater than above I_B.
Hence transistor is in the active region.
Thus $I_C=\beta I_B$.
V_{BE}=0.7V
I_B=12-0.7/240=47.08μA
I_C=50×47.08=2.354 mA
$V_{CE}=V_{CC}-I_CR_C$=12-2.354*2.2=12-5.178=6.83V.
5. From the given circuit, using a silicon BJT, what is the value of V_{BC}?



a) 6.13 V
b) -6.13 V
c) 7 V
d) -7 V
View Answer
Answer: b
Explanation: Consider the BJT to be in saturation. Then I_C=12-0.2/2.2k=5.36 mA
And I_B=12-0.8/240k=0.047 mA
$I_{BMIN}=I_{CSAT}/\beta$=5.09/50=0.1072mA which is greater than above I_B.
Hence transistor is in the active region.
Thus $I_C=\beta I_B$.
V_{BE}=0.7V

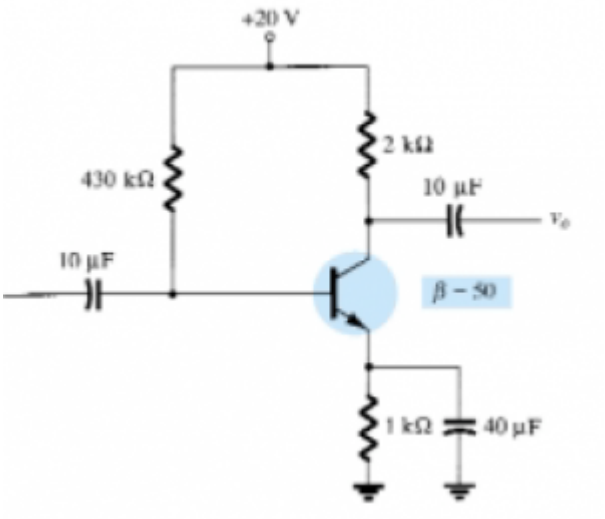
I_B=12-0.7/240=47.08μA
I_C=50×47.08=2.354 mA
V_{CE}=V_{CC}-I_CR_C=12-2.354*2.2=12-5.178=6.83V
Hence V_{BC} = 0.7-6.83 = -6.13V.

6. From the given circuit, using silicon BJT, what is the value of the saturation collector current?



a) 5 mA
b) 5.36 mA
c) 5.45 mA
d) 10.9 mA
View Answer
Answer: b
Explanation: To obtain an approximate answer, under saturation the BJT is ON and hence acts like a short circuit. However, ideally a drop exists for the transistor which is a fixed value. For an exact answer, if the BJT is a Silicon transistor, then drop V_{CE} = 0.2V and current is 12-0.2/2.2=5.36 mA.

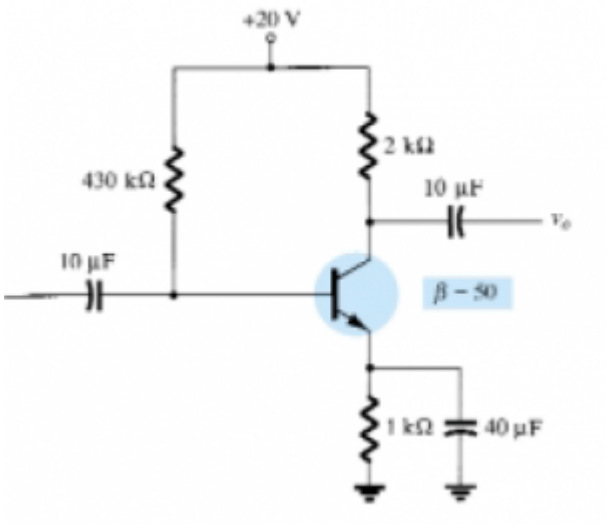
7. In the given circuit, what is the value of I_C if the BJT is made of Silicon?



a) 2.01 mA
b) 2.01 uA
c) 10.05 mA
d) 10.05 uA
View Answer
Answer: a
Explanation: Consider the BJT to be in saturation. Then I_C=20-0.2/2k=9.9 mA
And I_B=20-0.8/430k=0.044 mA

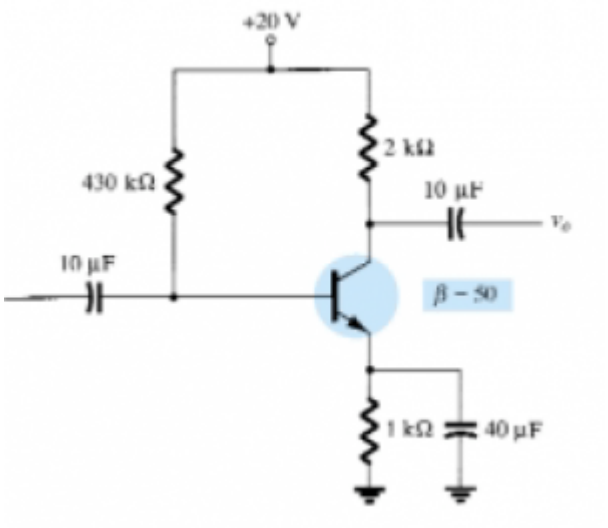
$I_{BMIN}=I_{CSAT}/\beta=5.09/50=0.198mA$ which is greater than above I_B.
Hence transistor is in the active region.
Thus $I_C=\beta I_B$.
$V_{BE}=0.7V$
$I_B=20-0.7/430=44.88\mu A$
$I_C=50\times44.88=2.24$ mA.

8. In the given circuit, using a silicon BJT, what is the value of V_{CE}?

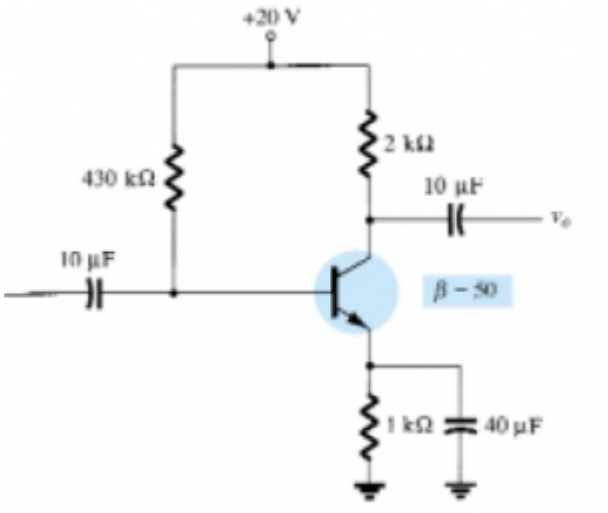


a) 20 V
b) 15.52 V
c) 14.98 V
d) 13.97 V
View Answer
Answer: b
Explanation: Consider the BJT to be in saturation. Then $I_C=20-0.2/2k=9.9$ mA
And $I_B=20-0.8/430k=0.044$ mA
$I_{BMIN}=I_{CSAT}/\beta=5.09/50=0.198mA$ which is greater than above I_B.
Hence transistor is in the active region.
Thus $I_C=\beta I_B$.
$V_{BE}=0.7V$
$I_B=20-0.7/430=44.88\mu A$
$I_C=50\times44.88=2.24$ mA
$V_{CE}=20-2.24*2=15.52V$.

9. In the given circuit, what is the value of V_E when using a silicon BJT?



a) 2.01 V
b) 0.28 V
c) 0 V
d) 2.28 V
View Answer
Answer: d
Explanation: Consider the BJT to be in saturation. Then I_C=20-0.2/2k=9.9 mA
And I_B=20-0.8/430k=0.044 mA
$I_{BMIN}=I_{CSAT}/\beta$=5.09/50=0.198mA which is greater than above I_B.
Hence transistor is in the active region.
Thus $I_C=\beta I_B$.
V_{BE}=0.7V
I_B=20-0.7/430=44.88μA
I_C=50×44.88=2.24 mA
V_{CE}=20-2.24*2=15.52V
$V_E=I_ER_E=(1+\beta)I_BR_E$=51*44.88*1=2.28V.
10. In the given circuit using a silicon BJT, what is the value of saturation collector current?



a) 10 mA
b) 8.77 mA

c) 6.67 mA
d) 5 mA
View Answer
Answer: c
Explanation: To obtain an approximate answer, under saturation the BJT is ON and hence acts like a short circuit. However, ideally a drop exists for the transistor which is a fixed value. For an exact answer, if the BJT is a Silicon transistor, then drop V_{CE} = 0.2V and current is 20-0.2/2.2=9.9 mA.