Electronic Circuits II - Tutorial 03

T & F

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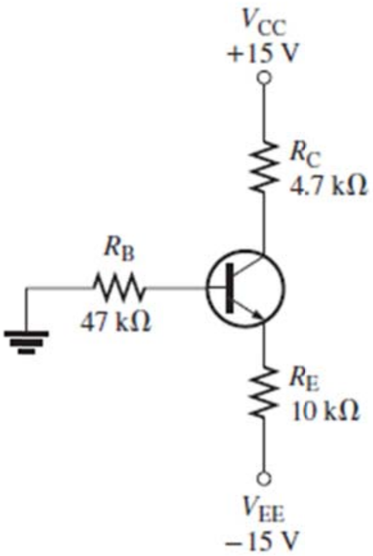
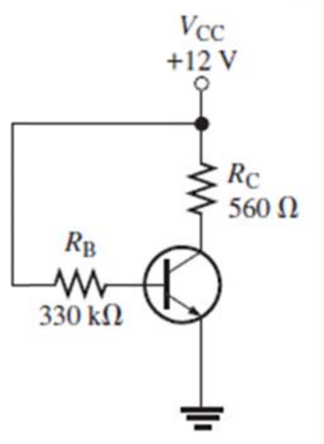
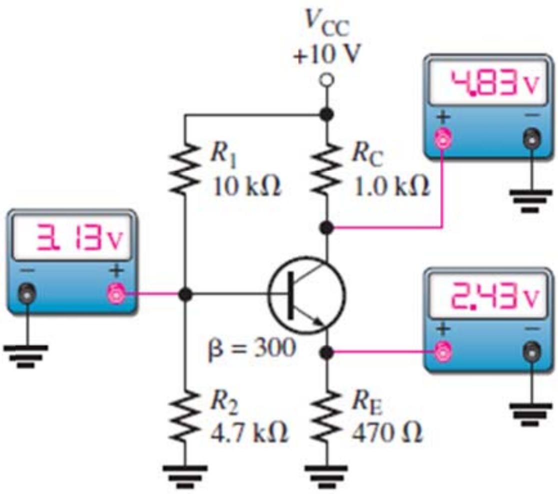
1	Emitter bias uses one dc supply voltage.	F
2	Negative feedback is employed in collector-feedback bias.	T
3	Base bias is less stable than voltage-divider bias.	T
4	A pnp transistor requires bias voltage polarities opposite to an npn transistor	T

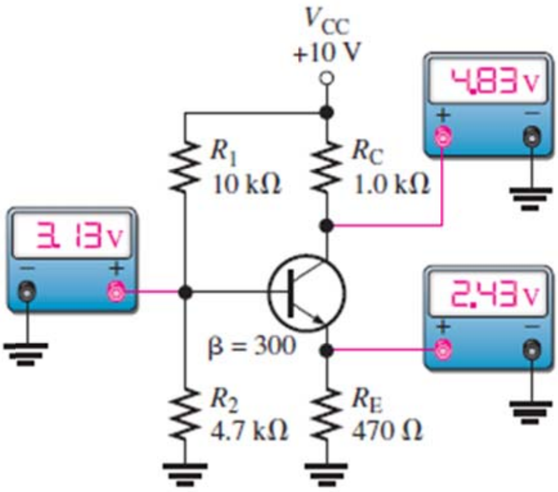
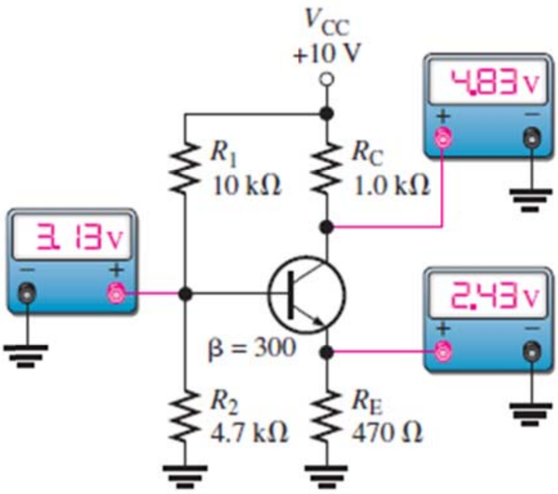
MCQ

#	Question	Answer
1	If *R*B in Figure is reduced, the base-to-emitter voltage will  **(a)** increase **(b)** decrease **(c)** not change	C

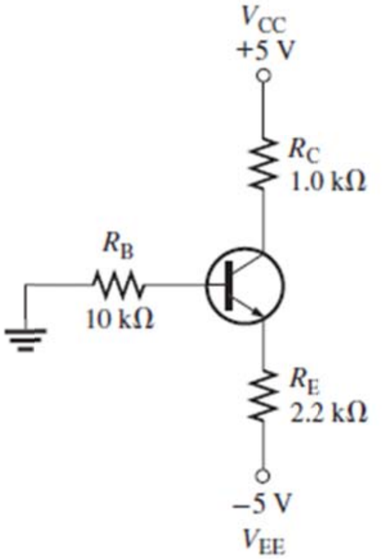
<table>
<tr><td>2</td><td>If VCC in Figure is increased, the base-to-emitter voltage will


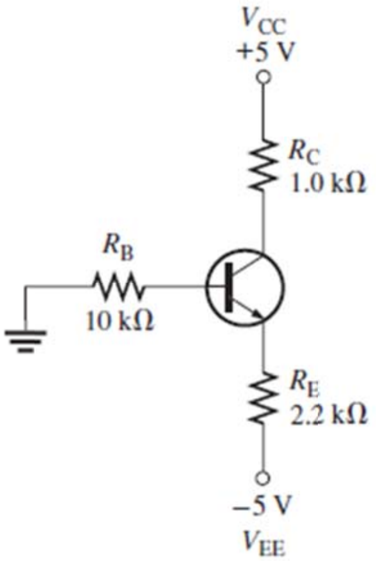
(a) increase (b) decrease (c) not change</td><td>C</td></tr>
<tr><td>3</td><td>If R1 in Figure opens, the collector voltage will


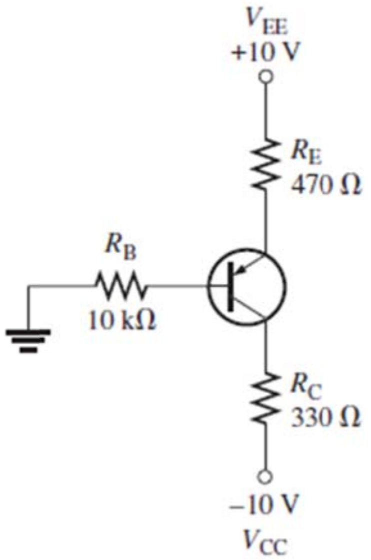
(a) increase (b) decrease (c) not change</td><td>A</td></tr>
</table>

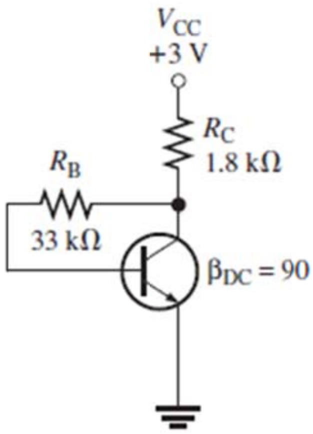
4	If *R*2 in Figure opens, the collector voltage will  **(a)** increase **(b)** decrease **(c)** not change	B
5	If *R*2 in Figure is increased, the emitter current will  **(a)** increase **(b)** decrease **(c)** not change	a

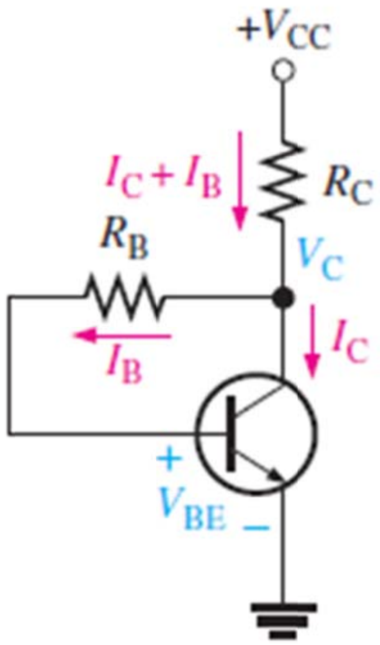
Problems

Q1	Analyze the circuit in Figure to determine the correct voltages at the transistor terminals with respect to ground. Assume $\beta_{DC} = 100$. 
Sol 1	...... $V_B = -186\text{ mV}; V_E = -0.886\text{ V}; V_C = 3.14\text{ V}$ ......

Q2	Taking V_{BE} into account in Figure how much will I_E change with a temperature increase from 25°C to 100°C? The V_{BE} is 0.7 V at 25°C and decreases 2.5 mV per degree Celsius. Neglect any change in β_{DC}. 
Sol 2	………………………………………………………………… … 0.09 mA ………………………………………………………

Q3	Determine I_C and V_{CE} in the *pnp* emitter bias circuit of Figure . Assume $\beta_{DC} = 100$. 
Sol 3	$I_C = 16.3$ mA; $V_{CE} = -6.95$ V

Q4	What value of R_C can be used to decrease I_C 25 percent? 
Sol 4	......2.53 kΩ ......

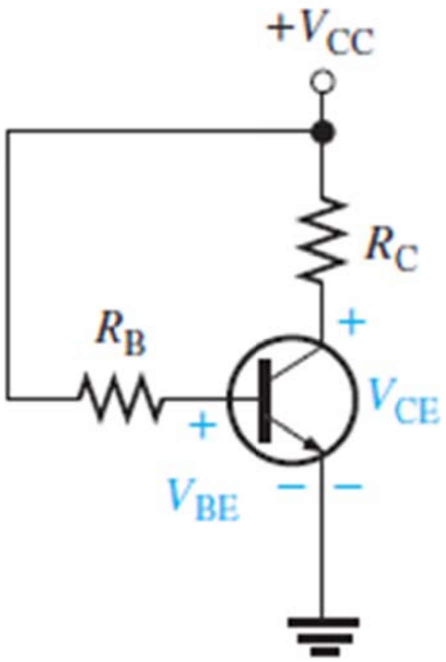
Q5	A collector-feedback circuit uses an *npn* transistor with $V_{CC} = 12$ V, $R_C = 1.2$ kΩ, and $R_B = 47$ kΩ. Determine the collector current and the collector voltage if $\beta_{DC} = 200$. 
Sol 5	7.87 mA; 2.56 V

Q6

a base-biased transistor circuit with the following values:

$\beta_{DC} = 90$, $V_{CC} = 12$ V, $R_B = 22$ kΩ, and $R_C = 100\ \Omega$.

If β_{DC} in Problem doubles over temperature, what are the Q-point values?



Sol 6

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......$I_{CQ} = 92.5$ mA; $V_{CEQ} = 2.75$ V ....

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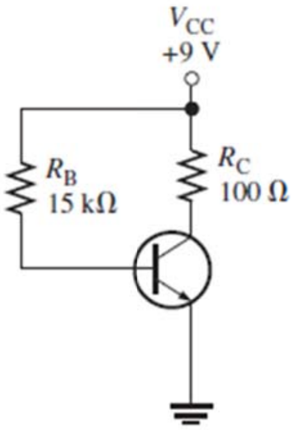
Q7	The datasheet for a particular transistor specifies a minimum β_{DC} of 50 and a maximum β_{DC} of 125. What range of Q-point values can be expected if an attempt is made to mass-produce the circuit in Figure ? Is this range acceptable if the Q-point must remain in the transistor's linear region? 
Sol 7	..... 27.7 mA to 69.2 mA; 6.23 V to 2.08 V; Yes .....