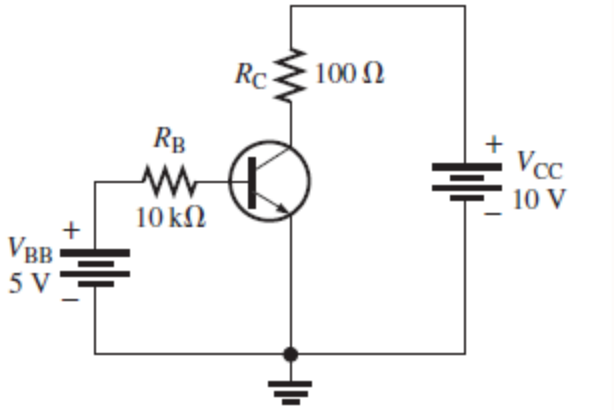
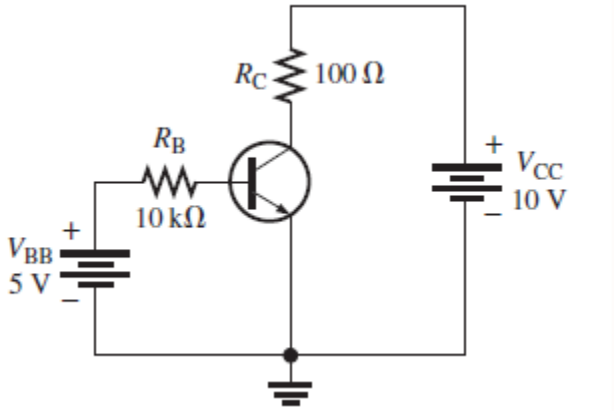
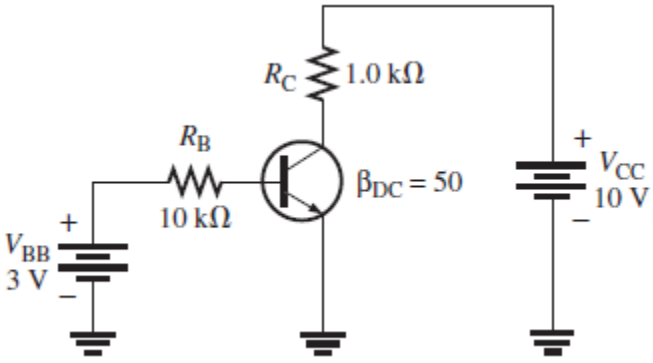
Electronic Circuits - Tutorial 07

BJT transistor 1

T & F

#	Question	
1	A bipolar junction transistor has three terminals.	T
2	For operation in the linear or active region, the base-emitter junction of a transistor is forward biased.	T
3	The base current and collector current are approximately equal.	F
4	DC and hFE are two different transistor parameters.	F

MCQ

#	Question	
1	 If a transistor with a higher β_{DC} is used in Figure, the collector current will **(a)** increase **(b)** decrease **(c)** not change	a
2	 If a transistor with a higher β_{DC} is used in Figure, the base current will **(a)** increase **(b)** decrease **(c)** not change	c
3	 If V_{CC} in Figure is increased, the base current will **(a)** increase **(b)** decrease **(c)** not change	c

4	The three terminals of a bipolar junction transistor are called **(a)** *p*, *n*, *p* **(b)** *n*, *p*, *n* **(c)** input, output, ground **(d)** base, emitter, collector	d
5	For operation as an amplifier, the base of an *npn* transistor must be **(a)** positive with respect to the emitter **(b)** negative with respect to the emitter **(c)** positive with respect to the collector **(d)** 0 V	a
6	The β_{DC} of a transistor is its **(a)** current gain **(b)** voltage gain **(c)** power gain **(d)** internal resistance	a

Problems:

Q1	What are the majority carriers in the base region of an *npn* transistor called?
Sol 1	..... Holes .....

Q2	Explain the purpose of a thin, lightly doped base region.
Sol 2	.....

Q3	Why is the base current in a transistor so much less than the collector current?
Sol 3	The base is narrow and lightly doped so that a small recombination (base) current is generated compared to the collector current.

Q4	In a certain transistor circuit, the base current is 2 percent of the 30 mA emitter current. Determine the collector current
Sol 4	.....

Q5	For normal operation of a *pnp* transistor, the base must be (+ or −) with respect to the emitter, and (+ or −) with respect to the collector.
Sol 5	..... Negative, positive .....

Q6	What is the value of I_C for $I_E = 5.34$ mA and $I_B = 475$ μA?
Sol 6	.....

Q7	What is the α_{DC} when $I_C = 8.23$ mA and $I_E = 8.69$ mA?
Sol 7	..... 0.947 .....

Q8	A certain transistor has an $I_C = 25$ mA and an $I_B = 200$ μA. Determine the β_{DC}.
Sol 8	.....