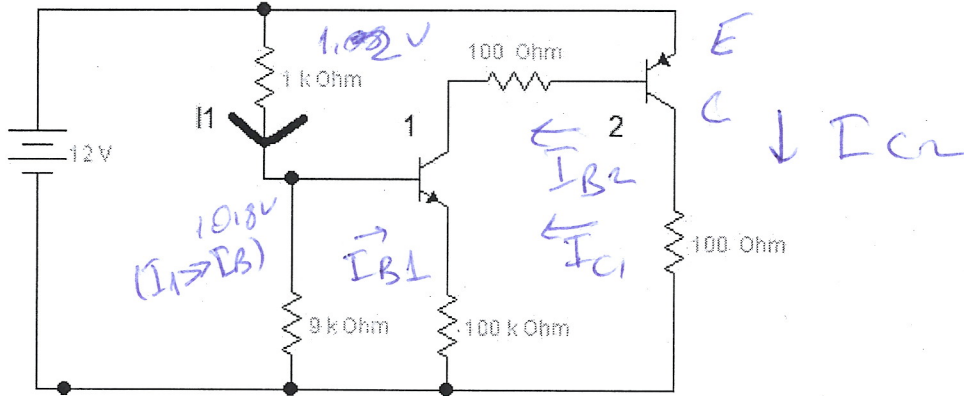


Q3(15p). Make a DC Analyze. $h_{FE}=100$, $V_{BE1}=0.7V$, $V_{BE2}=-0.7V$, $I_{C2} \gg I_{B2}$ (only for second transistor), $I_1 \gg I_{B1}$

Calculate I_{B1} , I_{B2} , I_{C1} , I_{C2} , V_{CE1} , V_{CE2} . You can chose directions of currents. You should show the directions of currents too.



$$+12V - 12V + 0.7V + 100k \cdot I_{E1} = 0$$

$$I_{E1} = 0.101mA$$

$$(\beta + 1)I_B = 0.101mA$$

$$V_{BE2} = -0.7V$$

$$V_{EB2} = 0.7V$$

$$0.1mA = I_{C1}$$

$$0.001mA = I_{B1}$$

$$0.1mA = I_{B2}$$

(I_{E1})

$$-12V + V_{EB2} + 100\Omega \cdot I_{C1} + V_{CE1} + 100k \cdot 0.101mA = 0$$

$$-12V + 0.7V + 0.01V + V_{CE1} + 10.1V = 0$$

$$V_{CE1} = 1.19V$$

$$I_{C2} = 100 \cdot I_{B2}$$

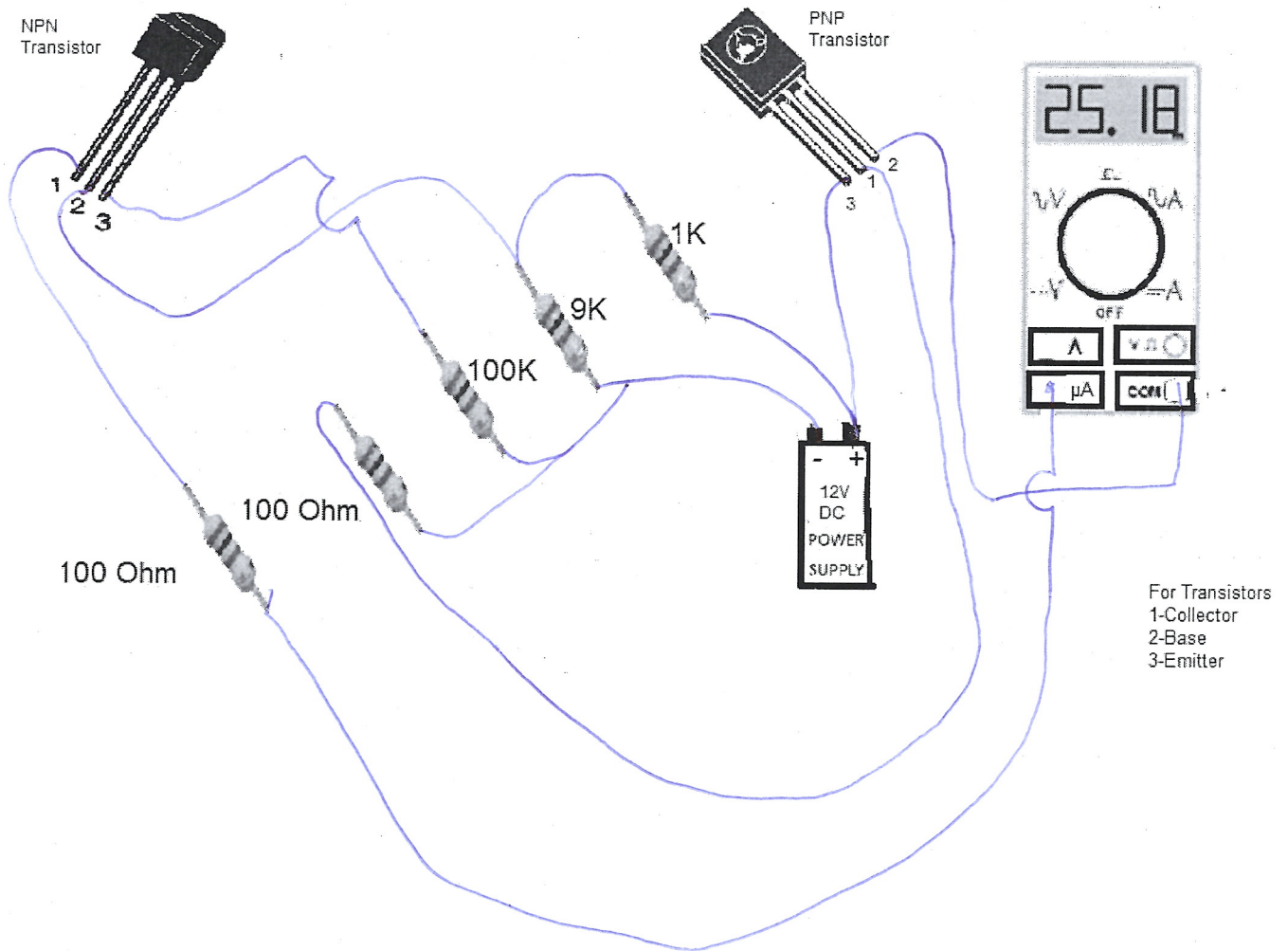
$$= 10mA$$

$$+12V - 100\Omega \cdot I_{C2} + V_{CE2} = 0$$

$$+12V - 1V + V_{CE2} = 0$$

$$V_{CE2} = -11V$$

Q4) (15p) Design this circuit (circuit in Q3), make the connections and measure the base current of second Transistor (PNP Transistor) using Multimeter.



Q7) (20p) Design and draw a circuit, which is explained below. And calculate the period of input signal.

- You have an 0-24V (RMS) adjustable single phase 50 Hz symmetric AC Power Supply
- You have enough diodes, zener diodes, coils, capacitors, resistances. You can use them, but you do not have to use all of them. You do not have to write the value of capacitors and coils.
- Convert the AC voltage to usable DC voltage.
- Connect this converted DC voltage to a 1K Resistance (RL). (The voltage of this resistance is output voltage.)
- The output voltage cannot be more than 6,8V.
- You have to use another resistance to share the output voltage.
- Connect a voltmeter to measure the output voltage.

Periode $\rightarrow T = \frac{1}{f} \rightarrow T = \frac{1}{50\text{Hz}} = 0.02\text{sn} = 20\text{ms}$

