ELEC 302 Lab 3

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Question 1. From the prelab, we found that to achieve the target values, $R_c = 200\Omega$ and $R_B = 43k\Omega$. After putting these resistors in the circuit, the desired parameters were measured using the digital multimeter and can be seen in table 1. To get the currents, the voltages across R_B and R_C were measured then divided by their measured resistance values.

Table 1: Measured values for Question 1.

Parameter	Value
I_B	99.3μA
I_C	16.5mA
V_{CE}	1.75V

From these values, we can get a value for β by dividing the currents: $\beta = \frac{I_C}{I_B} = 166.2$. See figure **??** for the circuit diagram with the resistor parameters used.

Figure 1: Circuit diagram for question 3. Mostly taken from the lab manual given it's the same circuit with the actual resistances used.

Question 2.

$$I_B = \frac{I_C}{\beta} = 30.1\mu\text{A}$$

$$V_E = 470 \cdot \frac{\beta+1}{\beta}I_C = 2.364\text{V}$$

$$10 = 2 \cdot 2.364 + R \cdot \frac{0.005}{166.2} \implies R = 129k\Omega.$$

Used $R = 130k\Omega$, $R_C = 1k\Omega$

For the values: $V_{R_C} = 5.14V \implies I_C = 5.14\text{mA}$. $V_{R_E} = 2.44\text{V} \implies I_E = 5.19\text{mA}$. $V_{R_1} = 6.93\text{V}, V_{R_2} = 3.14\text{V} \implies I_B = 29.15\mu\text{A}, V_C = 4.94$

Question 3.