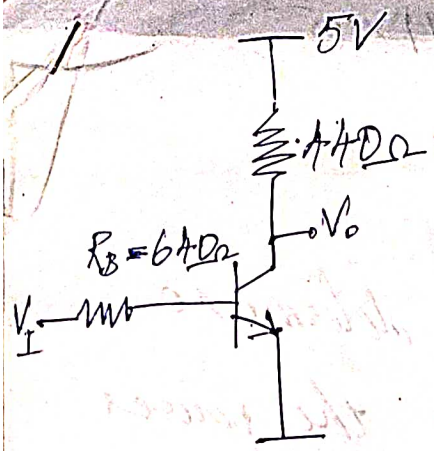
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For the circuit shown assume that $V_{BE(on)} = 0.7V$ and $V_{CE(sat)} = 0.2V$ and $\beta = 50$. Determine $V_o$, $I_B$, and $I_C$ for

a) $V_I = 0.2V$

b) $V_I = 3.6V$

Also calculate the power dissipated for the two conditions.

a) When $V_I = 0.2V$

$$I_B = \frac{V_I - 0.7}{64\,k\Omega} = 0\mu A$$

$$I_C = \beta I_B = 0mA$$

$$P = I_B V_{BE(on)} + I_C V_{CE(sat)} = 0W$$

b) When $V_I = 3.6V$

$$I_B = \frac{3.6 - 0.7}{64\,k\Omega} = 45.3mA$$

$$V_{CE} = V_{CC} - I_C R_C$$

$$= 5 - 50 \times 45.3125 \times 10^{-3} \times 440$$

$$= -94.6875 \times$$

$$V_{CE} = V_{CE(sat)} = 0.2V$$

$$0.2 = 5 - I_C R_C$$

$$I_C = \frac{5 - 0.2}{440} = 10.91mA$$

$$P = 4.53\times10^{-3}\times0.7 + 0.2\times10.91\times10^{-3}$$

$$= 5.353\,mW.$$

* For the same transistor circuit determine $V_I$ such that $V_{BE} = 0$. Calculate the power dissipated in such conditions.

For the base and collector to remain at the same potential we need

$$V_{CE} = V_{BE(on)} = 0.7V$$

$$I_C = \frac{V_{CC} - V_{CE}}{440} = \frac{5 - 0.7}{440}$$

$$= 9.773\,mA$$

$$I_B = \frac{I_C}{\beta} = 0.1955\,mA$$

$$V_I = I_B R_B + V_{BE(on)} = 0.825V$$

$$P = I_B V_{BE(on)} + I_C V_{CE} = 6.9777\,mW$$