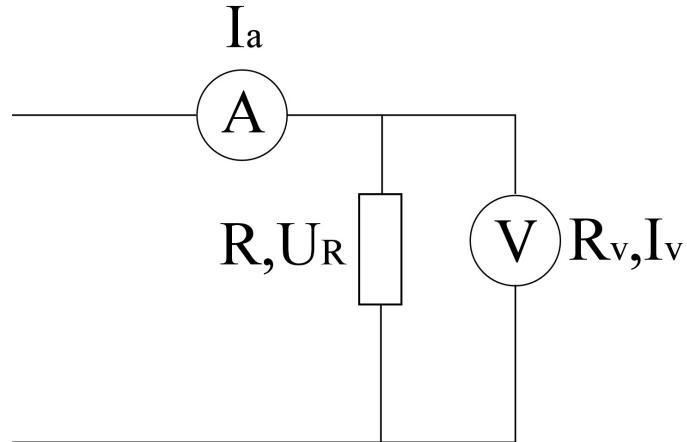


Question 13624



$$U_v = 24 \text{ V}, I_a = 4 \text{ mA}, R_v = 20 \text{ k}\Omega$$

a) The resistor value can be approximately calculated as $R' = \frac{U_v}{I_a} = 6000 \Omega = 6 \text{ k}\Omega$

b) The true value of resistor is $R = \frac{U_R}{I_R}$. Since resistor and voltmeter are connected in parallel,

$$I_a = I_v + I_R, U_R = U_v, \text{ and } R = \frac{U_R}{I_R} = \frac{U_v}{I_a - I_v} = \frac{U_v}{I_a - \frac{U_v}{R_v}} = \frac{U_v R_v}{I_a (R_v - \frac{U_v}{I_a})} = \frac{R' R_v}{R_v - R'} \approx 8571.43 \Omega$$

$$\text{c) The percentage error } k = \frac{\Delta R}{R} \cdot 100\% = \frac{R - R'}{R} \cdot 100\% = \frac{8571.43 \Omega - 6000 \Omega}{8571.43 \Omega} \cdot 100\% = 30\%$$