Quiz 5

Phys 296: Summer, 2015

1. We know that V = IR. Calculate the current in the circuit shown below.(5pt)

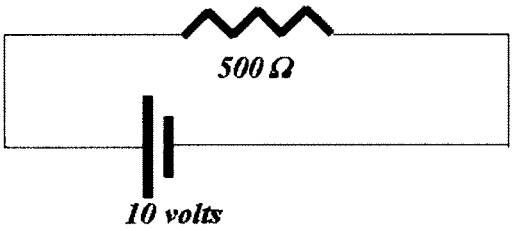


Figure 1

$V = IR$

$I = \frac{V}{R}$ $I = 20\,mA$

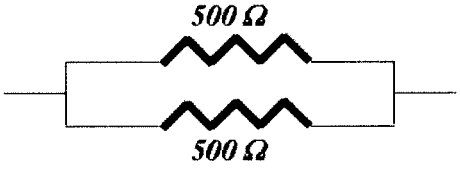
2. Calculate the equivalent resistance for the combinations of resistors shown below (5pt).

Figure 2(a)

$1000\,\Omega$

$R_{eq} = R_1 + R_2$

Figure 2(b)



$250\,\Omega$

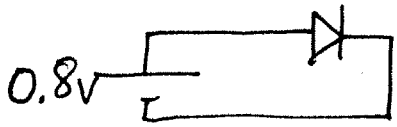
$\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2}$

3. The temperature coefficient of resistance for a conducting wire is 0.002 per Celsius degree. The electric resistance of the wire is 200 Ω at 25°C. Calculate the resistance at 0°C. Show derivation. (5pt)

$(\alpha = 0.002)$ $R(T) = R_0(1 + \alpha T)$ $R(25^\circ) = 200\,\Omega$

$R_0 = \frac{R(T)}{1 + \alpha T} = 190.48\,\Omega$ $R(0^\circ) = R_0$

4. We know that for a diode $I = I_0\left(exp\left(\frac{qV}{k_bT}\right) - 1\right)$ Calculate the current through the diode in the following circuit. (5pt)



$\frac{q}{k_bT} = 1$ $I_0 = 1\,\mu A$

$V = 0.8V$

$I = 1\mu A\left(e^V - 1\right) = 1.225 \times 10^{-6}\,A$

$= 1.225\,\mu A$