

68. (Second problem of **Cluster**)

(a) We use Eq. 27-16 to compute the resistances in SI units:

$$\begin{aligned}R_C &= \rho_C \frac{L_C}{\pi r_C^2} = (2 \times 10^{-6}) \frac{1}{\pi (0.0005)^2} = 2.5 \, \Omega \\R_D &= \rho_D \frac{L_D}{\pi r_D^2} = (1 \times 10^{-6}) \frac{1}{\pi (0.00025)^2} = 5.1 \, \Omega .\end{aligned}$$

The voltages follow from Ohm's law:

$$\begin{aligned}|V_1 - V_2| = V_C &= iR_C = 5.1 \, \text{V} \\|V_2 - V_3| = V_D &= iR_D = 10 \, \text{V} .\end{aligned}$$

(b) See solution for part (a).

(c) and (d) The power is calculated from Eq. 27-22:

$$P = i^2 R = \begin{cases} 10 \, \text{W} & \text{for } R = R_C \\ 20 \, \text{W} & \text{for } R = R_D \end{cases}$$