Ch27 (Homework)
Current Score : – / 18 **Due :** Monday, August 27 2018 02:24 PM CDT

---

1. –/2 pointsSerPSE9 27.P.006.

A copper wire has a circular cross section with a radius of 1.50 mm.

(a) If the wire carries a current of 3.60 A, find the drift speed of the electrons in the wire. (Assume the density of charge carriers (electrons) in a copper wire is $n = 8.46 \times 10^{28}$ electrons/m^3.)

[ ] m/s

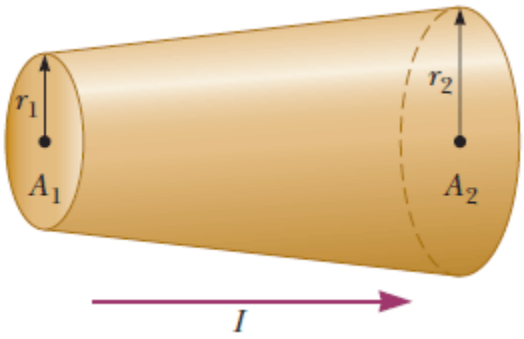
(b) All other things being equal, what happens to the drift speed in wires made of metal having a larger number of conduction electrons per atom than copper? Explain.

This answer has not been graded yet.

Need Help? Read It

2. –/6 pointsSerPSE9 27.P.008.WI.

The figure below represents a section of a circular conductor of nonuniform diameter carrying a current of I = 5.60 A. The radius of cross-section A_1 is r_1 = 0.260 cm.



(a) What is the magnitude of the current density across A_1?

[ ] A/m^2

The radius r_2 at A_2 is larger than the radius r_1 at A_1.

(b) Is the current at A_2 larger, smaller, or the same?

- The current is larger.
- The current is smaller.
- The current is the same.

(c) Is the current density at A_2 larger, smaller, or the same?

- The current density is larger.
- The current density is smaller.
- The current density is the same.

Assume A_2 = 3A_1.

(d) Specify the radius at A_2.

[ ] mm

(e) Specify the current at A_2.

[ ] A

(f) Specify the current density at A_2.

[ ] A/m^2

Need Help? Read It Watch It

3. –/1 pointsSerPSE9 27.P.015.MI.FB.

A wire 50.0 m long and 2.00 mm in diameter is connected to a source with a potential difference of 9.11 V, and the current is found to be 2.60 A. Assume a temperature of 20.0°C and, using this table, identify the metal out of which the wire is made.

- copper
- gold
- iron
- aluminum
- tungsten
- platinum
- lead
- silver

Need Help? Read It Master It

4. –/1 pointsSerPSE9 27.P.018.

Tungsten and gold wires of equal length are found to have the same resistance. What is the ratio of their radii?

$\frac{r_W}{r_{Au}} =$ [ ]

Need Help? Read It

5. –/1 pointsSerPSE9 27.P.026.

A certain lightbulb has a tungsten filament with a resistance of 20.9 Ω when at 20.0°C and 147 Ω when hot. Assume the resistivity of tungsten varies linearly with temperature even over the large temperature range involved here. Find the temperature of the hot filament.

[ ] °C

Need Help? Read It

6. –/2 pointsSerPSE9 27.P.032.

An engineer needs a resistor with a zero overall temperature coefficient of resistance at 20.0°C. She designs a pair of circular cylinders, one of carbon and one of Nichrome as shown in the figure below. The device must have an overall resistance of $R_1 + R_2 = 14.0\ \Omega$ independent of temperature and a uniform radius of $r = 1.10$ mm. Ignore thermal expansion of the cylinders and assume both are always at the same temperature.

(a) Can she meet the design goal with this method?

- Yes
- No

(b) If so, state what you can determine about the lengths ℓ_1 and ℓ_2 of each segment. If not, explain.

This answer has not been graded yet.

Need Help? Read It

7. –/1 pointsSerPSE9 27.P.037.

In a hydroelectric installation, a turbine delivers 1500 hp to a generator, which in turn transfers 80.0% of the mechanical energy out by electrical transmission. Under these conditions, what current does the generator deliver at a terminal potential difference of 2020 V?

$I =$ _____ A

Need Help? Read It

8. –/2 pointsSerPSE9 27.P.039.

A certain waffle iron is rated at 1.04 kW when connected to a 120-V source.

(a) What current does the waffle iron carry?

[ ] A

(b) What is its resistance?

[ ] Ω

Need Help? Read It

9. –/1 pointsSerPSE9 27.P.042.MI.

A well-insulated electric water heater warms 131 kg of water from 20.0° C to 51.0° C in 27.0 min. Find the resistance of its heating element, which is connected across a 240-V potential difference.

[ ] Ω

Need Help? Read It Master It

10. –/1 pointsSerPSE9 27.P.048.

An 11.0-W energy-efficient fluorescent lightbulb is designed to produce the same illumination as a conventional 40.0-W incandescent lightbulb. Assuming a cost of $0.114/kWh for energy from the electric company, how much money does the user of the energy-efficient bulb save during 130 h of use? (Give your answer to the nearest cent.)

$ [ ]

Need Help? Read It