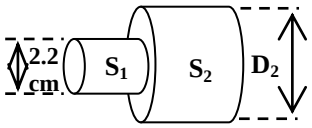
**KFUPM – Physics Department**

# PHYS102 – Chapter 26 (Instructor: Dr. Al–Shukri)

**Q1.** Two wires, as shown in the **Figure**, are made of same material. If the current density through segment $S_1$ is $J_1$= 6400 A/m$^2$ and the current density through segment $S_2$ is $J_2$= 1239 A/m$^2$, then the diameter $D_2$ of segment $S_2$ is:




**a. 5.0 cm** b. 4.0 cm c. 5.5 cm d. 6.5 cm e. 3.5 cm

**Q2.** Wires A and B are made from same material. Wire A has twice the diameter and half the length of wire B. If the resistance of wire A is 20 Ω, the resistance of wire B is:

**a. 160 Ω** b. 100 Ω c. 60 Ω d. 260 Ω e. 300 Ω

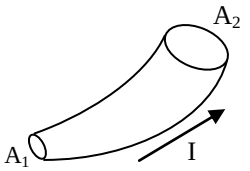
**Q3.** A 10 V battery is applied across a 15 W device. How much charge goes through the device in 4.0 hours?

**a. 2.2×10$^4$ C** b. 1.0×10$^4$ C c. 1.5×10$^5$ C
d. 4.0×10$^3$ C e. 1.7×10$^6$ C

**Q4.** A coffee maker, which draws 12.0 A of current, has been left on for 8.0 min. What is the net number of electrons that have passed through the coffee maker?

**a. 3.6×10$^{22}$** b. 6.0×10$^{22}$ c. 1.0×10$^{22}$
d. 5.7×10$^{22}$ e. 2.0×10$^{22}$

**Q5.** The **Figure** represents a section of a circular conductor of non-uniform diameter carrying a current of 10.0 A. The cross-sectional area $A_1$ has a radius of 0.400 cm. If the cross-sectional area $A_2$ has a radius twice of that of cross-sectional area $A_1$, then what is the current density at $A_2$?




**a. 4.97 A/cm$^2$** b. 5.80 A/cm$^2$ c. 2.31 A/cm$^2$
d. 7.01 A/cm$^2$ e. 1.97 A/cm$^2$

**Q6.** What would be the uniform cross-sectional area of a wire made out of 1.50 g of a metal having a resistance of 0.600 Ω, and all of the metal was used to make the wire? Take the density of the metal to be 8.92 g/cm$^3$ and resistivity1.69×10$^{-8}$ Ω-m.

**a. 6.88×10$^{-8}$ m$^2$** b. 4.73×10$^{-8}$ m$^2$ c. 2.22×10$^{-8}$ m$^2$
d. 5.92×10$^{-8}$ m$^2$ e. 9.93×10$^{-8}$ m$^2$

**Q7.** A light bulb is rated at 0.40 A and 3.0 V. At 20°C, the bulb filament has a resistance of 2.0 Ω. If the filament is made of tungsten, what is the temperature of the filament when bulb is on? The temperature coefficient of resistivity for tungsten is 4.5×10$^{-3}$ K$^{-1}$.

**a. 630 °C** b. 900 °C c. 340 °C d. 500 °C e. 450 °C

**Q8.** A current of 0.300 A is passed through a lamp (light bulb) for 2.00 minutes using a 6.00 V power supply. The energy dissipated by this lamp during the 2.00 minutes is:

**a. 216 J** b. 12.0 J c. 20.5 J d. 36.0 J e. 1.85 J

**Q9.** A certain wire has resistance R. Another wire, of the same material, has half the length and half the diameter of the first wire. The resistance of the second wire is:

**a. 2R** b. R/2 c. R d. R/4 e. 4 R

**Q10.** A certain resistor dissipates 0.500 W when connected to a 3.00 V potential difference. When connected to a 1.00 V potential difference, this resistor will dissipate:

**a. 0.0556 W** b. 0.500 W c. 0.167 W
d. 1.50 W e. 3.00 W

**Q11.** How much would the temperature of a copper wire have to be increased to raise its resistance by 20% over the value it had at 20 oC? The temperature coefficient of resistivity of copper is 0.0040 (Co)−1. Neglect any change in length or cross sectional area due to the change in temperature.

**a. 50 Co** b. 300 Co c. 80 Co d. 260 Co e. 75 Co

**Q12.** Two light bulbs operate from a 120-V voltage source. Bulb A has a power rating of 25.0 W and bulb B has a power rating of 100 W. Which of the following statements is CORRECT?

**a. Resistance of A is larger than resistance of B.**
b. Resistance of A is smaller than resistance of B.
c. The current through A is higher than the current through B.
d. The resistances of the two bulbs are the same.
e. The currents through the two bulbs are the same.

**Q13.** A 10-ohm resistor has a constant current. If 1200 C of charge flow through it in 4 minutes what is the value of the current?

**a. 5.0 A** b. 3.0 A c. 11 A d. 15 A e. 20 A

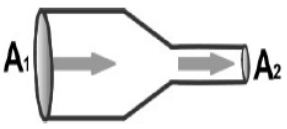
**Q14.** Two cylindrical resistors $R_1$ and $R_2$ are made from the same material and have the same length. When connected across the same battery, $R_1$ dissipates twice as much power as $R_2$. he ratio of diameter of resistor $R_1$ to that of $R_2$ is:

a. $\sqrt{2}$ b. 2 c. $3/\sqrt{2}$ d. ½ e. $2/\sqrt{2}$

**Q15.** A carbon resistor has a resistance of 18 Ω at a temperature of 20 °C. What is its resistance at a temperature of 120 °C? (The temperature coefficient of resistivity for carbon is -5.0×10$^{-4}$ /C°.)

**a. 17 Ω** b. 22 Ω c. 11 Ω d. 32 Ω e. 10 Ω

**Q16.** Electric charges flow through a wire shaped as shown in Fig. 5. The cross-sectional areas are $A_1$= 4 mm$^2$ and $A_2$ = 1 mm$^2$ respectively. What is the drift speed of the electrons in the narrow section of the wire if their speed is 0.08 m/s in the wider region?




**a. 0.32 m/s** b. 0.02 m/s c. 0.04 m/s
d. 0.16 m/s e. 0.08 m/s