

AP Physics C Assignment Complete Answers – Current and Circuits

b. The bulb is nonohmic as shown by the fact that its resistance increased significantly as the current was increased and its temperature increased.

c. The increase in temperature is the cause of increased resistance as it affects the condition of the atoms through which electrons must travel.

8. a. The filament can carry only so much current before it will essentially melt at a weak point. If the current is great enough the filament breaks.

b. Because resistance increases with temperature, the current through the bulb is least when the temperature is greatest and vice versa.

c. At the instant a bult is turned on, the filament of the bulb is at a relatively cool room temperature and therefore has a minimum amount of resistance. Accordingly the initial current through the bulb is greater than the amount of current that occurs at a period of time later once the temperature of the filament has increased to its "operating level".

9. a. 0.11 Ω

b. 0.11 mm

10. a. To double the resistance of a resistor the length of the cylinder should be doubled. This is because resistance of a cylinder is directly proportional to its length.

b. Doubling the diameter would cause resistance do drop to one fourth its original value. Resistance is inversely proportional to cross-sectional area. Doubling the diameter causes the area to quadruble.

11. a. 8.02 Ω/km

b. 2.41 V

- 12. Al dia. = 1.26 time Cu
- 13. a. $9.96\times 10^5~\Omega^{-1}m^{-1}$
 - b. $1.00 \times 10^{-6} \,\Omega m$
 - c. nichrome

$14 - 2.8 \times 105 \text{ A}/m^2$
14. a. 3.6×10^{-10} A/III-
b. 4.0×10^{-5} m/s
c. 1 <u>0</u> h
d. 9.1 mV
15. a. 0.084 V/m
b. 4.8 A, 0.25 V
c. $3.6 \times 10^{-4} \text{ m/s}$
16. a. 0.0167 Ω
b. 0.0063 V/m
c. $3.7 \times 10^5 \text{ A/m}^2$
17. a. 3.0 kW
b. 4500 J
c. 380 C
18 a 0 8 A
h 0.2 ns
10 a 3 6 MI
17. a. 5.0 WJ
0.50 KC
$\begin{array}{c} \mathbf{C} \cdot \mathbf{\delta} \mathbf{A} \\ 20 10 1 \mathbf{W} \end{array}$
20. a. 18 KW
b. 24 A
21. a. 0.33 A
b. 18 Ω
c. 3.6 h
d. 4300 C
e. 26 kJ