

Chapter 26 (Current and Resistance)

- 1- At 20 degree C, a 100-W light bulb has a resistance of 12 ohms. To increase the resistance of the light bulb to 48 ohms, the temperature of the filament should be: [Assume the temperature coefficient of resistivity of the filament is constant and $= 0.006$ (degree C)⁻¹]. (A: 520 degree C)
- 2- If 4.7×10^{16} electrons pass a particular point in a wire every minute, what is the current in the wire? (A: 1.3×10^{-4} A)
- 3- An electric device, which heats water by immersing a resistance wire in the water, generates 153 J of heat per second when an electric potential difference of 12 V is placed across its ends. What is the resistance of the heater wire? (A: 0.94 Ohms)
- 4- A 20% increase in the resistance of a copper wire was noticed when its temperature was raised above room temperature. Find the final temperature of the wire if the temperature coefficient of resistivity for copper is $4.0 \times 10^{-3}/\text{K}$. [Assume the room temperature = 290 K]. (A: 340 K)
- 5- A potential difference of 9.0 V is applied across the length of a cylindrical conductor with radius 2.0 mm. Calculate the current density if the conductor has a resistance of 90 ohms. (A: 8.0×10^3 A/m²)
- 6- A current of 5.0 A exists in a 10 ohms resistor for 5.0 min. How many electrons pass through any cross section of the resistor in this time? (A: 9.4×10^{21})
- 7- A nichrome wire is 1 m long and 1×10^{-6} m² in cross-sectional area. When connected to a potential difference of 2 V, a current of 4 A exists in the wire. The resistivity of this nichrome is: (A: 5×10^{-7} Ω m)
- 8- An unknown resistor dissipates 0.5 W when connected to a 3 V potential difference. When connected to a 1 V potential difference, this resistor will dissipate: (A: 0.056 W)
- 9- The mechanical equivalent of heat is 1 cal = 4.18 J. The specific heat of water is 1 cal/g·K. An electric immersion water heater, rated at 400 W, should heat a liter of water from 10°C to 30°C in about: (A: 3.5 min)
- 10 - A current of 0.3 A is passed through a lamp for 2 minutes using a 6 V power supply. The energy dissipated by this lamp during the 2 minutes is: (A: 216 J)