Chapter 27

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)$^{-1}$] [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? [$1.3*10^{-4}$ 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? [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*10** (-3) /K. [Assume the room temperature = 290 K] [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. [8.0*10**3 A/m**2]

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? [9.4*10**21]

7- A nichrome wire is 1 m long and 1×10^{-6} m^2 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: [$5 \times 10^{-7} \; \Omega \cdot m$]

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: [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: [3.5 min]

10- 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? [0.94 Ohms]

11- 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: [216 J]