Old-Examination Questions Chapter 26

T062

Q18.: If a wire is stretched uniformly to **n**-times its original length, it's resistance changes by a factor of: (n^2)

Q19.: The potential difference across the ends of a wire is doubled in magnitude. If Ohm's law is obeyed, which one of the following statements concerning the resistance of the wire is true? (The resistance is not changed)

Q20.: A 40-W and a 60-W light bulbs are designed for use with the same voltage. What is the ratio of the resistance of the 60-W bulb to the resistance of the 40-W bulb? (0.67)

T061:

Q#19. A 100 W bulb is designed to operate with a line voltage of 120-V. If the line voltage decreases and the bulb consumes only 90 W, find the final voltage in the line. Assuming the resistance of the bulb is constant. (114 V)

Q#20. A heater of unknown resistance is plugged into a 120-V line. The charge passing through it in one hour is 4800 C. What is the resistance of the heater? (90 Ω)

T051:

Q#18. If 1200 C of charge flows through a 10-ohm resistor in 4 minutes, what is the value of the voltage across the resistor?(50 V).

Q#19. Two wires are made from different materials and carry the same uniform current. The current density in both is the same only if:(their radii are the same).

Q#20. In a simple circuit a voltage of 5 V is applied across a 10 Ohm resistance. The energy dissipated in the resistor in 2 minutes is**:** (300 J).

T042:

Q#19: A 500 W electric heater is designed to operate from a 120-V power supply. The line voltage decreases and the heater takes only 459 W. Find the voltage drop in the line voltage (Assuming the resistance is constant) (5 Volts.)

Q#20: What diameter must a copper wire have if its resistance is to be the same as that of an equal length of an aluminum wire with 3.26 mm diameter? [Resistivity of aluminum = 2.75×10^{-8} Ω.m; Resistivity of copper = 1.69×10^{-8} Ω.m; (2.6 mm.)

T-041:

Q#1 The resistivity of nichrome wire is 1.0×10^{-6} Ω.m. Calculate the length of wire needed for a 1200 watt electric heater that is connected across a 120 V potential difference. [The wire's radius is 0.40 mm] (6.0 m.)

Q#2: A heating coil is immersed in a 0.2 kg of cold water. The coil is connected to a 12 V supply and a current of 5 A flows for 140 seconds. Calculate the temperature increase of the water. [Specific heat of water is 4200 J/(kg*K)] (10 K.)

Q#3: Figure 7 shows three cylindrical copper conductors along with their face areas and length. Rank them according to the current through them, greatest first, when the same potential difference V is placed across their lengths. (1,3 and 2.)

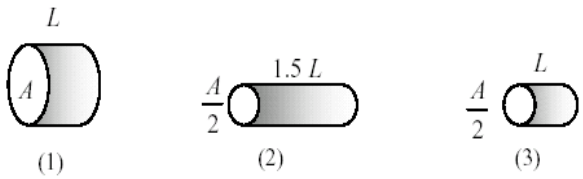

Figure (7)

T-032:

Q#1: 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)

Q#2: 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)

Q#3: 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})

Q#5: A 6-V battery supplies a total of 48 W to two identical light bulbs connected in parallel. The resistance (in ohm) of each bulb is (1.5)

Final-T031:

Q#1: A cylindrical wire of radius R = 2.0 mm has a uniform current density J = 2.0×10^{5} A/m^2. What is the current through the portion of the wire between radial distances R/3 and R/2? (see figure 1) (0.35 A)

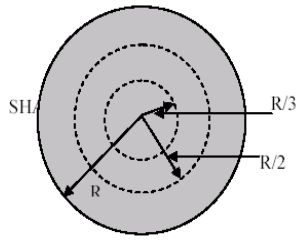

Figure 1

Q#2: A heater element of resistance 10**3 Ohm is constructed to operate at 110 V. How much thermal energy is produced in one hour by the heater? (4.4×10^{4} J.)

T-012:

Q#1: A copper wire "1" has a length L1 and diameter d1. Another copper wire "2" has a length L2 and diameter d2. At constant temperature, the second conductor has smaller resistance if: (Ans: d2 > d1 and L2 < L1.)

Q#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.)

Q#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 Ω)