27-05

Question 718 0.45-37%

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) 5.0*10**3 A/m**2.
(b) 2.3*10**7 A/m**2.
(c) 6.0*10**3 A/m**2.
(d) 2.0*10**3 A/m**2.
(e) 8.0*10**3 A/m**2.

27-05

Question 719 0.42-19%

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) 6.1*10**23
(b) 7.8*10**21
(c) 9.4*10**21
(d) 1.2*10**21
(e) 3.3*10**22

27-05

Question 720 0.33-18%

If 5.00*10**21 electrons pass through a 20.0-ohm resistor in 10.0 minutes, what is the potential difference across the resistor?

(a) 26.7 V
(b) 32.3 V
(c) 21.4 V
(d) 54.1 V
(e) 37.4 V

27-7 Power in Electric Circuits

27-07

Question 721

The filaments of two tungsten bulbs A and B are made with wires of the same length. At 110 Volts, the power dissipated from A and B are 400 W and 100 W, respectively. Ignore the variation of resistance with respect to temperature. The ratio of the diameter of filament A to the diameter of filament B is

(a) 4:1.
(b) 1:1.
(c) 1:4.
(d) 1:2.
(e) 2:1.

27-07

Question 722 0.51-63%

How many electrons pass, in 10 minutes, through a light bulb rated at 30 W when it is operated at 120 V?

(a) 7.8*10**20 electrons
(b) 6.5*10**20 electrons
(c) 7.8*10**21 electrons
(d) 9.4*10**20 electrons
(e) 2.2*10**21 electrons

27-07

Question 723
In one hour, how many electrons pass between the terminals of a 12-V car battery when a 96 watts headlight is used?
(a) 2.8*10**23 electrons
(b) 2.6*10**19 electrons
(c) 5.0*10**19 electrons
(d) 1.8*10**23 electrons
(e) 6.6*10**22 electrons

27-07

Question 724
An electric device, which heats water by immersing a resistance wire in the water, generates 300 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) 0.58 Ohms
(b) 2.1 Ohms
(c) 0.94 Ohms
(d) 0.48 Ohms
(e) 0.81 Ohms

27-07

Question 725 0.28-39%
A light bulb is rated at 30 W and operates at 120 V. How much charge passes through this bulb in 1 minute?
(a) 12 Coulombs
(b) 120 Coulombs
(c) 15 Coulombs
(d) 7.0 Coulombs
(e) 19 Coulombs

27-07

Question 726
In one hour, how many electrons pass between the terminals of a 12-V car battery when a 96 watts headlight is used?
(a) 2.8*10**23 electrons.
(b) 6.6*10**22 electrons.
(c) 1.8*10**23 electrons.
(d) 2.6*10**19 electrons.
(e) 5.0*10**19 electrons.

27-07

Question 727
A resistance operated at 110 Volts has a power output of 100 Watt. What is the percentage increase of the power if the voltage increase to 121 Volts. (Assume that the resistance stays constant.)
(a) 0.9%.
(b) 21%.
(c) 11%.
(d) 25%.
(e) 3.7%.

27-07

Question 728
If 110 Volts is applied to a wire, the current density is 1.5*10**6 A/m**2. If the resitivity of the wire is 48.2*10**(-8) Ohm.m, the length of the wire is:
(a) 19 m.
(b) 38 m.
(c) 152 m.
(d) 76 m.
(e) 254 m.

27-07

Question 729
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) 0.58 Ohms
(b) 2.10 Ohms
(c) 0.94 Ohms
(d) 0.48 Ohms
(e) 0.81 Ohms

27-07
0.20-22%

Question 730
At T = 20 degrees-C, the length of a wire is 10 m, and its cross sectional area is 0.50 mm**2. A potential difference of 1.0 V is maintained across the ends of the wire. The resistance of the wire changes by 0.30 ohms for a temperature change of 50 Celsius degrees. what is the temperature coefficient of resistivity of the wire ? At T = 20 degrees, the resistivity is 5.0*10**(-6) ohm*m.

(a) 6.0*10**(-4) degrees**(-1)
(b) 15*10**(-3) degrees**(-1)
(c) 15*10**(-4) degrees**(-1)
(d) 6.0*10**(-5) degrees**(-1)
(e) 15*10**(-5) degrees**(-1)

27-07
0.31-42%

Question 731
A current of 0.300 A is passed through a lamp for 2.00 minutes using a 6.00-V battery. The energy dissipated by the lamp during the 2.00 minutes is:
(a) 36.0 J
(b) 216 J
(c) 12.0 J
(d) 1.80 J
(e) 20.0 J

27-07
0.43-72%

Question 732
A copper wire of cross sectional area 3.00*10**(-6) m**2 and length 4.00 m has a current of 2.25 A uniformly distributed across that area. How much electric energy is converted to thermal energy in 10.0 minutes ? [The resistivity of copper is 1.68*10**(-8) ohm*m]
(a) 30.2 J
(b) 68.0 J
(c) 21.7 J
(d) 0.50 J
(e) 13.6 J

27-07
Question 733 0.52-44%
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?
(a) 6.2*10**5 J.
(b) 2.2*10**7 J.
(c) 1.9*10**5 J.
(d) 5.1*10**2 J.
(e) 4.4*10**4 J.

27-07
Question 734 0.52-47%
An unknown resistor dissipates 0.50 W when connected to a 3.0 V potential difference. How much will this resistor dissipate when connected to a 1.0 V potential difference? (Assume that the value of the resistance does not change).
(a) 0.056 W
(b) 1.5 W
(c) 0.50 W
(d) 6.0 W
(e) 0.17 W

27-07
Question 735 0.56-29%
A potential difference (V) is applied across a cylindrical metallic wire of radius r and length L. Both V and L are doubled, but r is halved. Which of the following statements is CORRECT?
(a) The power dissipated will increase by a factor of 8.
(b) The power dissipated will increase by a factor of 4.
(c) The power dissipated will decrease by a factor of 16.
(d) The power dissipated will decrease by a factor of 2.
(e) The power dissipated will increase by a factor of 2.

27-07
Question 736 0.29-73%
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)]
(a) 12 K.
(b) 10 K.
(c) 30 K.
(d) 5 K.
(e) 15 K.

27-07
Question 737 0.59-52%
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).
(a) 10 Volts.
(b) 5 Volts.
(c) 2 Volts.
(d) 15 Volts.
(e) 3 Volts.

27-07
0.45-23%

Question 738

A 1200-W heater is used to heat 2.0 kg of water from 30 degrees Celsius to 80 degrees Celsius. What is the minimum time in which this can be done? [specific heat of water = 4.181 kJ/(kg*K)]

(a) 418 s.
(b) 60 s.
(c) 696 s.
(d) 348 s.
(e) 120 s.