PHYS 2326 University Physics II – Class number

HOMEWORK- SET #1
CHAPTERS: 27,28,29

(DUE JULY 22, 2013)

Ch. 27 .==========

1. A rod of 2.0-m length and a square (2.0 mm × 2.0 mm) cross section is made of a material with a resistivity of $6.0 \times 10^{-8}\ \Omega \cdot m$. If a potential difference of 0.50 V is placed across the ends of the rod, at what rate is heat generated in the rod?

   a. 3.0 W
   b. 5.3 W
   c. 8.3 W
   d. 1.3 W
   e. 17 W

2. How much energy is dissipated as heat during a two-minute time interval by a 1.5-kΩ resistor which has a constant 20-V potential difference across its leads?

   a. 58 J
   b. 46 J
   c. 32 J
   d. 72 J
   e. 16 J

3. A rod (length = 80 cm) with a rectangular cross section (1.5 mm × 2.0 mm) has a resistance of 0.20 Ω. What is the resistivity of the material used to make the rod?

   a. $6.0 \times 10^{-7}\ \Omega \cdot \text{m}$
   b. $3.8 \times 10^{-7}\ \Omega \cdot \text{m}$
   c. $7.5 \times 10^{-7}\ \Omega \cdot \text{m}$
   d. $3.0 \times 10^{-7}\ \Omega \cdot \text{m}$
   e. $4.8 \times 10^{-7}\ \Omega \cdot \text{m}$

4. The temperature coefficient of resistivity of iron is $5.0 \times 10^{-3}/°\text{C}$; that of carbon is $-0.50 \times 10^{-3}/°\text{C}$. When an iron wire and a carbon rod, each having the same 10 Ω resistance at 20 °C, are cooled from that temperature to −80 °C, the new ratio of the resistance of the carbon rod to the resistance of the iron wire at the lower temperature is

   a. -0.10.
   b. +1.9.
   c. +2.1.
   d. -10.
   e. +10.

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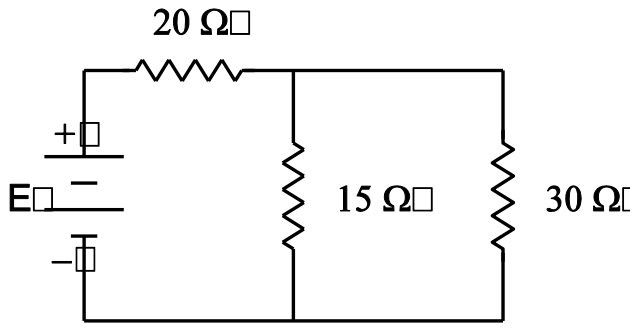
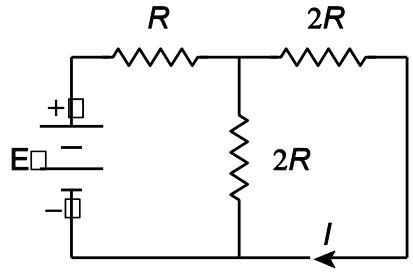
5. What is the current in the 15-Ω resistor when E = 9.0 V (E is ℰ) ?



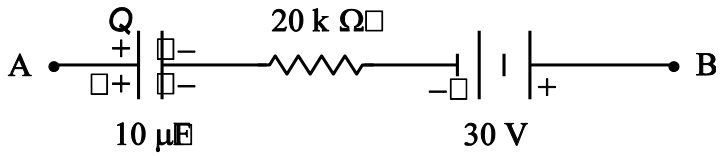
a. 0.20 A
b. 0.30 A
c. 0.10 A
d. 0.26 A
e. 0.60 A

6. Determine E (E is ℰ) when I = 0.50 A and R = 12 Ω.



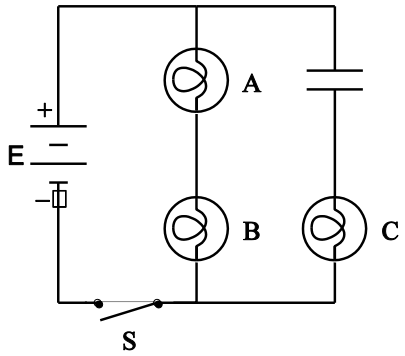
a. 12 V
b. 24 V
c. 30 V
d. 15 V
e. 6.0 V

7. If Q = 400 μC and the potential difference $V_A - V_B$ = –10 V in the circuit segment shown below, what is the current in the resistor?



a. 1.0 mA right to left
b. 1.0 mA left to right
c. 3.5 mA right to left
d. 3.5 mA left to right
e. None of the above

8. The circuit below contains three light bulbs and a capacitor. The emf E = 110V. At the instant the switch S is closed, which light bulb is brightest?



a. A
b. B
c. C
d. A and B
e. All three are equally bright.

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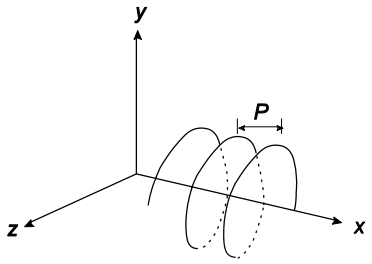
9. A particle (mass = 2.0 mg, charge = –6.0 μC) moves in the positive direction along the x axis with a velocity of 3.0 km/s. It enters a magnetic field of (2.0**i** + 3.0**j** + 4.0**k**) mT. What is the acceleration of the particle?

   a. (36**j** – 27**k**) m/s^2
   b. (–36**j** + 27**k**) m/s^2
   c. (–24**j** + 18**k**) m/s^2
   d. (24**j** – 18**k**) m/s^2
   e. (24**j** – 27**k**) m/s^2

10. A 2.0-m wire carries a current of 15 A directed along the positive x axis in a region where the magnetic field is uniform and given by B = (30**i** – 40**j**) mT. What is the resulting magnetic force on the wire?

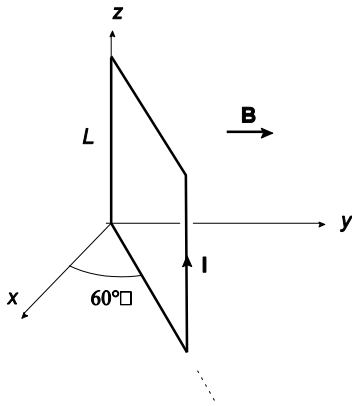
   a. (+1.2 **k**) N
   b. (–1.2 **k**) N
   c. (–1.5 **k**) N
   d. (+1.5 **k**) N
   e. (+0.90 **k**) N

11. A uniform magnetic field of 0.50 T is directed along the positive x axis. A proton moving with a speed of 60 km/s enters this field. The helical path followed by the proton shown has a pitch of 5.0 mm. Determine the angle between the magnetic field and the velocity of the proton.



a. 39°
b. 51°
c. 44°
d. 34°
e. 71°

12. A square loop (L = 0.20 m) consists of 50 closely wrapped turns, each carrying a current of 0.50 A. The loop is oriented as shown in a uniform magnetic field of 0.40 T directed in the positive y direction. What is the magnitude of the torque on the loop?



a. 0.21 N · m
b. 0.20 N · m
c. 0.35 N · m
d. 0.12 N · m
e. 1.73 N · m