Last updated: October 15, 2008

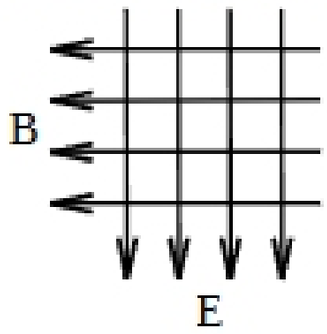
PHY 2054 Discussion – Fall '08

Practice Exam Problems (Chapter 19)

1. Electrical charges and magnetic poles have many similarities, but one difference is: (Magnetic Poles)
   a. opposite magnetic poles repel. b. one magnetic pole cannot create magnetic poles in other materials. c. a magnetic pole cannot be isolated. d. magnetic poles do not produce magnetic fields.

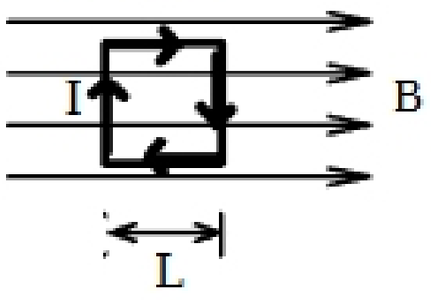
2. The dip angle is: (Earth's magnetic Field) a. another term for magnetic declination. b. a measure of the tendency for a compass to point south. c. close to or at zero near the equator. d. close to or at zero just north of Hudson Bay

3. An electron moves through a region of crossed electric and magnetic fields. The electric field E = 2 000 V/m and is directed straight down. The magnetic field B = 0.80 T and is directed to the left. For what velocity v of the electron into the paper will the electric force exactly cancel the magnetic force? (Magnetic Force) a. 2 500 m/s b. 4 000 m/s c. 8 000 m/s d. 8 000 m/s



4. If a proton is released at the equator and falls toward the Earth under the influence of gravity, the magnetic force on the proton will be toward the: (Right-Hand Rule) a. north b. south c. east d. west

5. There is a current *I* flowing in a clockwise direction in a square loop of wire that is in the plane of the paper. If the magnetic field B is toward the right, and if each side of the loop has length L, then the net magnetic force acting on the loop is: (Magnetic Force on a Current Loop) a. $2ILB$ b. ILB c. IBL^2 d. zero



(Problems 5 & 6)

6. There is a current *I* flowing in a clockwise direction in a square loop of wire that is in the he plane of the paper. If the magnetic field B is toward the right, and if each side of the loop has length L, then the net magnetic torque acting on the loop is: (Torque on a Current Loop) a. $2ILB$ b. ILB c. IBL^2 d.

zero

7. A circular coil (radius = 0.40 m) has 160 turns and is in a uniform magnetic field. If the orientation of the coil is varied through all possible positions, the maximum torque on the coil by magnetic forces is 0.16 Nm when the current in the coil is 4.0 mA. What is the magnitude of the magnetic field? (Torque on a Coil) a.0.37 T b. 1.6 T c. 0.50 T d. 1.2 T

8. A proton moves in a circular orbit perpendicular to a uniform magnetic field of 0.75 T. Find the time for the proton to make one complete circular orbit. (Motion of a Charge in a Magnetic Field) a. 4.3×10^{-8} s b. 8.7×10^{-8} s c. 4.9×10^{-7} s d. 9.8×10^{-7} s

9. Two long parallel wires 20 cm apart carry currents of 5.0 A and 8.0 A in the same direction. Is there any point between the two wires where the magnetic field is zero? (Magnetic Field of a Straight Wire) a. yes, midway between the sires b. yes, 12 cm from the 5-A wire c. yes, 7.7 cm from the 5-A wire d. no

10. Two parallel wires each of 0.50 m length, separated by 5.0×10^{-3} m and carrying 3.0 A in opposite directions, will experience what type and magnitude of mutual force? (Magnetic Force between two Parallel Wires) a. attractive, 0.06×10^{-4} N b. repulsive, 0.60×10^{-4} N c. attractive, 1.8×10^{-4} N d. repulsive, 1.8×10^{-4} N

11. Two insulated current-carrying wires of equal length are arranged in the lab so that Wire A carries a current northward and Wire B carries a current eastward, the wires crossing at their midpoints separated only by their insulation. Which of the following statements are true? (Right Hand Rules) a. The net force on Wire B is southward. b. The net force on Wire A is westward. c. There are no forces in this situation. d. There are forces, but the net force on each wire is zero.

12. A superconducting solenoid is to be designed to generate a magnetic field of 5.00 T. If the solenoid winding has 1 000 turns/m, what is the required current? (Magnetic Field in a Solenoid) a. 1 000 A b. 1 990 A c. 3 980 A d. 5 000 A

13. When an electromagnet has an iron core inserted, what happens to the strength of the magnet? (Electromagnets) a. It increases. b. It remains the same. c. It decreases. Since it depends on the metal used in the wires of the electromagnet, any of the above.

Answers: 1-c 2-c 3-a 4-c 5-d 6-c 7-c 8-b 9-c 10-d 11-d 12-c 13-a