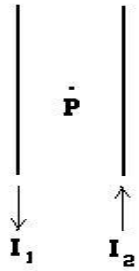
Physics 113 Exam II Name _____
March 21, 2007

Encode your **name** (last name, first name) and the **test number** shown above, on the scan sheets provided, leaving a space between your last and first name. Select the **best answer** for each of the questions below and encode your choice on the scan sheet. There is an equation sheet attached to this exam which you may tear off and keep (if you wish).

1. Point P is midway between two long, straight, parallel wires that run north-south in a horizontal plane. The distance between the wires is 1.0 cm. Wire-1 carries a current of 1.2 A towards the south, while wire-2 carries a current of 1.2 A towards the north. What is the magnitude of the magnetic field at point P?



   a.) zero c.) 9.6×10^{-5}T e.) 4.8×10^{-2}T
   b.) 4.8×10^{-5}T d.) 1.44×10^{-5}T

2. What is the direction of the magnetic field at point P above?
   a.) north c.) east e.) up (from the page).
   b.) south d.) west f.) down (into the page).

3. A proton is moving with a speed of 2.56×10^{3} m/s straight east at point P in the above problem. What direction will the force be on the proton?
   a.) south c.) west e.) down (into the page).
   b.) north d.) up (from the page).

4. What is the magnitude of the force on the proton of the above problem?
   a.) zero c.) 3.94×10^{-20}N e.)1.97×10^{-17}N
   b.)1.97×10^{-20}N d.) 5.91×10^{-20}N

5. Find the force per length on wire-2 of the above problem
   a.) 2.88×10^{-5} N/m to right d.) 2.88×10^{-3} N/m to left
   b.) 2.88×10^{-5} N/m to left e.) none of these values are correct.
   c.) 2.88×10^{-3} N/m to right

6. A wire runs east-west in the presence of a horizontal magnetic field to the north and carries a current of 0.5 A. If the weight of the wire is 0.2 N/m (that is Newtons per meter). How strong must the magnetic field be to "float" the wire?
   a.) 0.1 T c.) 0.3 T e.) 0.5 T
   b.) 0.2 T d.) 0.4 T

7. In what direction must the current of the above problem be so that the wire "floats?"
   a.) south c.) west e.) down (towards ground).
   b.) east d.) up (towards sky).

8. At the equator, the magnetic field points straight north. Suppose an electron is moving straight north at the equator. What direction is the magnetic force on the electron?

a.) no force c.) west e.)down
b.) east d.) up

9. Suppose a charge is moving with a non-zero velocity in a region where the magnitudes of both the electric field ***E*** and the magnetic field ***B*** are non-zero. What conditions must exist between the vectors ***E***, ***B***, and ***v***, so that the force on the charge is zero?

a.) E must be parallel to B and perpendicular to v
b.) E must be perpendicular to B and anti-parallel to v
c.) E must be parallel to v and perpendicular to B.
d.) E and B must all be parallel with each other.
e.) E, B, and v must all be perpendicular to one another.

10. Suppose you have a gold ring on your finger of radius 1.0 cm. You orient this ring so that the magnetic flux due to the earth (approximately 5.0×10^{-5} T) through the ring is maximum. What will the magnetic flux through this ring be?

a.) 1.57×10^{-6} Tm^2 d.) 6.38×10^{-6} Tm^2
b.) 1.57×10^{-8} Tm^2 e.) 4.87×10^{-6} Tm^2
c.) 6.38×10^{3} Tm^2

11. You turn the ring (from the problem above) so that the flux through it is zero in 0.1 s. The emf induced in the ring is

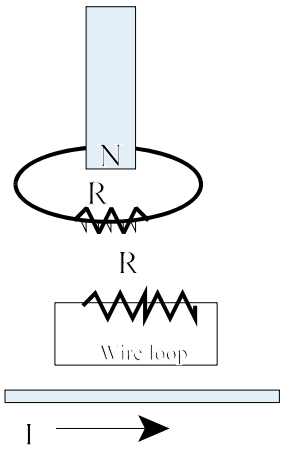
a.) 1.57×10^{-7} volts d.) 6.38×10^{-5} volts
b.) 1.57×10^{-9} volts e.) 4.87×10^{-5} volts
c.) 6.38×10^{2} volts

12. How quickly must you turn the ring (find Δt) as for the problem above, if the current in the ring (assume a resistance of 0.001 Ω) is 0.5 mA (that is 0.0005A)?

a.) 3.4×10^{-6} s d.) 8.99×10^{-3} s
b.) 1.68×10^{-3} s e.) 4.87×10^{-3} s
c.) 0.03 s

13. A bar magnet is held above the center of a wire loop in a horizontal plane as shown at the right. What is the direction of the current through the resistor if the magnet is pulled away from the loop?

a.) left to right
b.) right to left
c.) no current



14. If the current in the wire at the right is increasing, what direction will the current move through the resistor?

a.) left to right
b.) right to left
c.) no current

15. A 12.4 μC particle with a mass of 2.80 10^{-5} kg moves perpendicular to a 1.01 T magnetic field in a circular path of radius 27.0 m. How fast is the particle moving?

a.) 3.6 x 10^{9} m/s
b.) 6.28 x 10^{9} m/s
c.) 4.71 x 10^{-3} m/s
d.) 12.1 m/s
e.) 47.2 m/s

16. For problem # 15, above, How long will it take the particle to complete one orbit?

a.) 4.71 x 10^{-8} s
b.) 2.70 x10^{-8} s
c.) 3.60 x 10^{-4} s
d.) 12.1 s
e.) 14 s

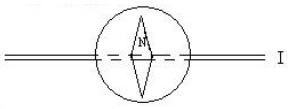
17. Experiments have shown that thought processes in the brain can be affected if the parietal lobe is exposed to a magnetic field with a strength of 1.0 T. How much current must a long, straight wire carry if it is to produce a 1.0 T magnetic field at a distance of 0.25 m?

a.) 125 A
b.) 4.9 x 10^{4} A
c.) 1.25 x 10^{6} A
d.) 3.44 x 10^{5} A
e.) 5,648 A

18. Approximately, what is the strength of the earth's magnetic field in Brookings, South Dakota?

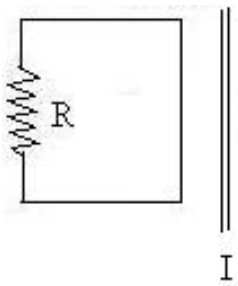
a.) 5.6 x 10^{4} Gauss
b.) 5.6 x 10^{-4} Gauss
c.) 6 x 10^{+3} Gauss
d.) 0.5 Gauss
e.) 27.6 Gauss

19. A wire is placed under a clear sheet of plastic as shown in the figure, with the current flowing towards the right. On top of the sheet, above the wire is a compass. What direction will the compass point if the current is turned on with the current moving to the right?



a.) up
b.) right
c.) down
d.) left
e.) at an angle down and to the right

20. The figure shows a circuit containing a resistor *R* and a straight wire through which current is traveling up. If the current I is increasing, what direction will the current travel through the resistor R?



a.) down
b.) up
c.) zero
d.) can't tell as it depends upon R
e.) up, but only if I is large enough