**Chapter 30. Sources of the Magnetic Fields**

St. ID: , Name:

1. In Niels Bohr’s 1913 model of the hydrogen atom, an electron circles the proton at a distance of 5.29**╳**10-11 m with a speed of 2.19**╳**106 m/s. Compute the magnitude of the magnetic field this motion produces at the location of the proton.

Ans: 12.5 T

1. Determine the magnetic field (in terms of *I*, *a*, and *d*) at the origin due to the current loop in Figure P29.9. The loop extends to infinity above the figure.

Ans:

**Figure P29.9**

1. A long, cylindrical conductor of radius *R* carries a current *I* as shown in Figure P29.22. The current density *J*, however, is not uniform over the cross section of the conductor but rather is a function of the radius according to *J* = *br*, where *b* is a constant. Find an expression for the magnetic field magnitude *B* (a) at a distance *r*1 >*R* and (b) at a distance *r*2 >*R*, measured from the center of the conductor.

Ans: (a) inside (b) outisde

**Figure P29.22**

1. Consider the hemispherical closed surface in Figure P29.27. The hemisphere is in a uniform magnetic field that makes an angleθwith the vertical. Calculate the magnetic flux through the flat surface S1 and (b) the hemispherical surface S2.

Ans: (a) (ΦB)flat = -BπR2cosθ (b) (ΦB)curved =BπR2cosθ

**Figure P29.27**