

Physics 24 Problem Set 7

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due Monday, February 27

Please make your work neat, clear, and easy to follow. It is hard to grade sloppy work accurately. Generally, make a clear diagram, and label quantities. Derive symbolic answers, and then plug in numbers after a symbolic answer is available.

1. A current of 250 mA flows in an infinitely long straight wire, of negligible cross-sectional area.
 - (a) Express the current in the wire in esu/second.
 - (b) Determine the magnetic field 1 cm from the wire in gauss, using Equation (3) on page 208 of your text.
 - (c) Determine the magnetic field 1 cm from the wire in tesla, using SI/MKS units, using Equation (3') on page 211 of your text.
 - (d) One esu of charge is moving at a speed of $v = 2 \times 10^{10}$ cm/s, parallel to the wire, but 1 cm away. What force does the charge feel?
 - (e) Repeat the last part, but do the problem using all SI/MKS units.
 - (f) A second wire, infinitely long, is placed parallel to the first, 1 cm away. Its current flows in the direction opposite to the first, but has the same magnitude. Evaluate the force on 10 cm of this wire, using all Gaussian/CGS units.
 - (g) Repeat the last part, using SI/MKS units.
 2. Purcell, Problem 6.1
 3. Purcell, Problem 6.2
 4. Purcell, Problem 6.3
 5. Purcell, Problem 6.5
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