General Physics - E&M (PHY 1308) Lecture Notes

Homework011

SteveSekula, 8 November 2010 (created 8 November 2010)

no tags

Homework 11

Expectations for the quality of your handed-in homework are available at http://www.physics.smu.edu/sekula/phy1308/HomeworkPolicy.pdf. Failure to meet these guidelines will result in loss of points as detailed in that document. This assignment covers material from Wolfson Chapter 26 and 27.

The total assignment is worth 80 points.

This homework is due by 5pm on Monday, November 15 (place in my mailbox in Fondren Science 102)

Reading Assignment:

Chapter 27.3-27.6

Required Problems from Wolfson and Sekula

These are **required problems that are part of the official homework assignment.**

- CH27-20 (10 Points)
- CH27-22 (10 Points)
- CH27-40 (20 Points)
- CH27-60 (20 Points)

SS-17: Energy Stored in the Large Hadron Collider (20 Points)

Each magnet in the Large Hadron Collider presently contains a magnetic field with a strength of $3.0\mathrm{T}$. There are exactly 1232 of these magnets, and each one has a volume of about $12.0\mathrm{m}^3$.

- **Part (a)**: what is the energy density in the magnetic field of each magnet?
- **Part (b)**: what is the total energy stored in all of the magnets in the LHC?
- **Part (c)**: Extra Credit (10 Points): If the LHC magnets are operating 24 hours a day for 10 months each year, how does this compare to the electrical power consumption of a city like Dallas? (Hint: convert the energy consumption to "kiloWatt-hours", a standard unit of power measurement in cities).

Optional Warm-Up Problems from Wolfson

These are not required but are meant to help you warm up to the problems that are required. They are odd numbered, and solutions to the odd-numbered problems are available in the back of the book and fully detailed in the student solution manual.

- CH27-21
- CH27-23
- CH27-31