

Physics & Astronomy

Lecture Course Report (2013/14 session)

Course Title: *Electricity and Magnetism section only*

Module: PHY101

Lecturer(s): Dr C N Booth

General Comments:

Performance was disappointing. Though the compulsory question was done better, answers to the other questions were often poor. The instructions in the questions were ignored and there was a general lack of explanations. Vectors were frequently ignored, and whole sections of questions were left blank. Mathematical manipulations (solving simultaneous equations, setting up integrals) were particularly poor.

Exam performance:

Qu. 1 Compulsory short answers. (Average mark 5.8 from 111 attempts.)

- (a) Coulomb's Law: mainly good answers, but several people added magnitudes of forces rather than components, or "cancelled" forces that acted in different directions.
- (b) Gauss's law: poorly defined. Few people talked about closed surfaces, or specified that the relevant charge was that enclosed within the surface.
- (c) Capacitance: mostly done well, though several people did not know the capacitance of parallel plates, or the effect of the dielectric.
- (d) RC discharge: mostly done well, but several people used the formula for charging, rather than discharge.
- (e) Internal resistance: mostly good answers, but some people thought the external voltage was greater than the EMF!
- (f) Temperature coefficient of resistivity: the main error was that people forgot that the coefficient gives the *fractional* change in resistivity per degree.
- (g) Application of temperature coefficient of resistivity: most people got the correct value, but many gave no units or the wrong units.
- (h) Proton in electric field: many correct answers, but some people used force and acceleration rather than energy balance, which was a more complicated method.
- (i) Power and resistance: mostly correct answers.

Qu. 2 Kirchhoff's rules and Drude model: Most people correctly (though imprecisely) wrote down K's rules and then applied them to the simple circuit, but few managed to solve the simultaneous equations to determine I . Many people either ignored the section on the Drude model, or just stated that conductivity "depended on" the parameters given in the question! Several confused resistivity and conductivity. (Average mark 4.6 from 56 attempts.)

Qu. 3 Electrostatic potential, field from potential: The question was done very badly. Several people could not write down the potential due to a point charge. Many did not set up the integral correctly, and fudged the limits to get the given expression. Although the question was expressed in terms of a , b and x , most people used r and L , without defining these symbols – many treated constant a as a variable. Most people ignored the instruction to find E from the expression for V so got no marks for that section. Others said $E = V/d$ (instead of $E = -dV/db$). (Average mark 4.5 from 54 attempts.)

Overall section average: 51.5%