

Physics & Astronomy

Lecture Course Report (2014/15 session)

Course Title: *Electricity section only*

Module: PHY102

Lecturer(s): Dr C N Booth

General Comments:

Performance was better than previous years. The compulsory question was done quite well, as was question 2 (which was probably too easy). Question 3 was very unpopular, and generally not done well. A criticism of most scripts was that very little explanation was given for the working.

Exam performance:

Qu. 1 Compulsory short answers. (Average mark 12.1/20 from 152 attempts.)

- (a) Coulomb's Law: mainly good answers, but many people either did not give the direction or got it wrong. Some ignored the stated units for length.
- (b) Capacitor network: generally done well, but several people produced dimensionally meaningless answers such as " $2C + 1/C$ ".
- (c) Electric dipole: many good answers, but a significant number did not give a direction or got it wrong. Some defined the torque in an electric field instead.
- (d) Definition of electric field: the commonest mistake was not to give a definition, but to state it was a region of space.
- (e) Force on dipole and its energy: Most gave the correct expression for the energy but did not realise the net force was zero.
- (f) Charging capacitor: the main error was to quote the formula for a discharging capacitor.
- (g) Field between parallel plates: many people got the correct answer by an indirect route, first finding the capacitance. A surprising number had no idea what a square centimetre was! Too many used formulae for field and potential due to point charges. Those who found the final velocity of the proton frequently treated this as an average value.

Qu. 2 Resistivity, EMF and internal resistance, temperature coefficient: Most calculated resistance from dimensions correctly, though several confused radius and diameter. The calculation of battery parameters was done well, though some did not use the correct resistance of the parallel resistors. The part asking for an explanation in words was done extremely badly – a very vague statement was often followed by an equation. (The mark was given *only* for the words.) However though almost no-one could define temperature coefficient, almost everyone could use it – but some gave no units or incorrect ones. (Average mark 14.2/20 from 126 attempts.)

Qu. 3 Gauss's law, electric field, field from potential: Though most gave an equation for Gauss's law few defined the symbols and no-one talked about the use of symmetry in determining the appropriate surface. The field due to a cylindrical charge distribution was generally found correctly but with no explanation. Most people just wrote an equation, with no explanation or definitions, to answer how ΔV was found from E . Almost no-one got the limits of the integrals correct when determining $V(r)$. (Average mark 9.1/20 from 26 attempts.)

Overall section average: 63.7%