Examination Feedback for EEE220 – Electric & Magnetic Fields
Autumn Semester 2005-06

In general performance on this paper was lower than usual. A large number of students failed to demonstrate that they had learned even the very basics of field theory. Those that did have an understanding of the course threw away a lot of marks unnecessarily by forgetting units, making errors in their calculations, and not reading the questions carefully enough. Also of concern were the number of students who wrote pages of equations without a word of explanation or any diagrams to show what they were doing.

Q1

(a) good diagrams but very poor explanations; (b)(i) the majority of students failed to remember that the electric field inside a perfect conductor is zero. Students were also confused by the meaning of R, and many gave their answers as a vector, not as a magnitude as was asked for; (b)(ii) a common error here was students not checking the validity of their answers - the quadratic equation will give two answers, only one of which is valid; (b)(iii) this part was particularly poorly done with many students not realising that they needed to use superposition of the potentials.

Q2

(a)(i) the majority of students did not state how the form of the field can be deduced from the symmetry of the problem; (a)(ii) very few students recognised that the shortest distance to the wire was not to the point stated in the question; (b)(i) no real problems; (b)(ii) despite this proof being in the notes, many students failed to recall it, a large number of which tried, wrongly, to use the equation for the capacitance of two parallel plates; (b)(iii) the final part was done well in the main.

Q3

(a) this proof was straight out of the notes and was generally well done by those who attempted it. The only common mistake was forgetting the unit vector when performing the cross-product; (b) no real problems here; (c) most students wrongly ignored the field produced by the infinite but broken wire at the bottom, and just calculated the field due to the three shorter wires.

Q4

(a) this part was very badly done even though it was straight from the notes; (b)(i) the main problem here was a confusion between n (turns per unit length) and N (total number of turns); (b)(ii) besides the confusion between n and N again, the most common mistake was failing to correctly calculate the cross-sectional area of the solenoid; (c)(i) very well done by most; (c)(ii) this part was the least well done of the paper. Most students missed the point of this question and suggested that the "problem" was that the magnetic field would cease when the battery was disconnected, and suggested adding capacitors. Whilst the field certainly would reduce to zero, this is no more of a "problem" than the light going out when you switch it off at the wall!