**EE1-05 Energy Conversion. Comments on students’ answers (2018)**

Question 1

1. Marks were typically lost for not explaining why field lines are orthogonal to equipotential lines.
2. Marks were lost for incorrect formulation of the integral.
3. Capacitance does not depend on charge.
4. Marks were typically lost for postulating an expression for the energy and not deriving it.
5. A common error was to have a factor of 8 in the denominator of the final expression. This came from incorrectly using the expression from the formula sheet and counting each pair of charges only once.
6. Marks were lost for listing consequences of assumptions instead of assumptions themselves. Examples of consequences are: conductor surface is equipotential, no charge in the conductor, charge can be only on the surface. Also, charge neutrality is not an assumption. Using Ohm’s law is self-contradictory.

Question 2

1. A correct way to answer this question alternative to the model answer is to use energy conservation. A typical mistake was to say that v = L/t. Marks were also lost for errors in integrals.
2. This was an open-ended question, allowing answers different from the model one. However, the example of touch screen is inapplicable since in does not rely on parallel-plate capacitors as specified in the question.
3. Some students drew and explained the major hysteresis loop. This was not asked, and no marks were awarded.

Question 3

1. Full marks were awarded to students proving current conservation (from Ampere’s law).
2. Marks were typically lost for not showing that the fields of segments 2 and 3 cancel each other out.