

## Report on Minor Option S6 History of Electromagnetism 2007

Tuesday 12 June 2007, 9.30 a.m. – 11.00 a.m.

Fourteen candidates took the examination

### General Remarks

The number of candidates equals the largest previous numbers (2004). This was easily the best group. More handed trial essays than is usual. Only a few based their answers only on my class notes. The rest were more enterprising, reading texts from the reading list or from the internet.

Also many wrote essay plans before writing their examination essays. The standard of the narrative and analysis was quite high. The quality of the prose was quite good. The take-up of questions was broader than last year. The Michelson-Morley question was very popular this year.

### Remarks on specific questions

*1. The 19<sup>th</sup> century Atlantic telegraph had to face enormous theoretical, experimental, engineering, management, and investment difficulties before it became successful. Discuss how Faraday and William Thomson influenced this world of a rapidly growing technology.*

This was, again, most popular question, 11 candidates taking it. Again, the quality was not high. Only two of the fourteen candidates scored an A grade in this question

*Question 2. Faraday invented his own non-mathematical terminology, concepts and instrumentation for electromagnetism. Describe some of its key concepts. Was it easily absorbed into the prevailing French tradition of mathematical physics, or was it necessary to translate it, and reconfigure it, in an entirely different way?*

I was pleased that six candidates answered this question which is conceptually difficult. Four scored an A grade

*Question 3 (a) William Thomson described Maxwell's work on electromagnetism as *ignotum per ignotius*. Why was Maxwell driven to incorporate unfounded analogies, intuitive concepts, and unreal models in his attempt to transform classical mechanics into something approaching modern electromagnetism?*

This was the most difficult question in the examination. Only two answered it, and scored the highest grades.

*Question 3 (b) Describe and discuss a selection of some of the critical technological, experimental and theoretical developments in the study of the discharge of electricity through gases in the 19<sup>th</sup> century that led to the discovery of the electron.*

I was surprised to so few answered this question, since it was largely experimental

*Question 4. Was the Michelson and Morley experiment crucial to the discovery of special relativity? Support your argument by describing reactions to the experiment in late 19<sup>th</sup> and early 20<sup>th</sup> century*

This was the second most popular question. Seven answered it, three scored A grades.