# Answering Essay Questions in Physics

These notes have been prepared by the Teaching Committee in the Department of Physics to give you some general advice on answering *essay* or *brief notes* questions in Physics exams. Of course there is no single right way to answer this type of question, but we try to give some idea of the sort of qualities the examiners are likely to be looking for.

In most exams from Part IB onwards you are obliged to write some essays. Scientific writing is an important practical skill for any physicist. Whether you end up as a theoretical physicist, or an experimentalist, or working in some other field entirely, you will almost invariably end up having to write papers or reports explaining what you have done. There is no point in doing a brilliant piece of work if you cannot explain its significance to others. We therefore regard descriptive questions as an significant part of the exams, which complement the problem solving aspects, providing a different way of testing your understanding of the subject.

Descriptive questions appear in several guises in the exams. The typical forms are:

- **Essays.** You may asked to write a single essay on a given subject. You may well be given some concrete guidance on the areas which the essay is expected to touch on, by some phrase like *"Your answer should include a discussion of xxx, yyy, zzz"*.

- **Brief notes.** You are asked to write two or three shorter accounts of separate subjects with some element of choice. These are often used to examine parts of courses which don't readily lend themselves to problems.

- **Other descriptive questions.** Occasionally you might encounter a question like *"Discuss how you would design an experiment to measure xxx, and outline the ways you would minimise systematic errors..."*.

- **Bookwork in problem questions.** Problem questions frequently start with a piece of *bookwork*: either a standard derivation, or a brief discussion of some relevant topic(s).

The essay or brief notes questions are often "safe" questions in the sense that you should not get very low marks on such questions.

In all of these descriptive questions you can, and indeed usually should, use equations and diagrams as appropriate to explain the physics. However, don't include detailed mathematical derivations unless you are asked to – it's better to sketch the basic method with the aid of a few equations.

It is often helpful to use one or two examples to illustrate your ideas. When appropriate, it is often good to include some quantitative information as well, to

show that you have some appreciation of the magnitudes of the things you are writing about.

Read the question carefully before you start, and make sure that your answer addresses all the points touched on in the question. Clarity and good organisation of material are more important than literary style.

In a *Brief Notes* question it is acceptable to use note form, or bulleted lists, if you think it aids clarity. In contrast, an *essay* should be largely written in the form of connected prose, structured in paragraphs.

When answering an *essay* question, start by making an essay plan, i.e. short notes of the points that you want to make. This should help you to structure and balance your answer. Include it with your answer if you wish. Then write the essay in full and check that you have included all the points.

In all cases, try to be critical and include relevant material; don't just put down everything you can remember indiscriminately. And don't be repetitive - you won't get any extra marks for saying the same thing twice.

**What are the examiners looking for?**

- In marking a *brief notes* question, the examiners will usually work from a marking scheme consisting of a list of points they are expecting you to include. That doesn't necessarily mean that you have to cover every one of the examiners' points in order to achieve full marks, and the examiners will certainly give credit if you make relevant points which they hadn't expected. You will need to include a reasonable number of different and relevant points in order to get full credit. There *may* in addition be a few marks assigned for the general impression of competence and coherence which your answer gives. The same remarks generally apply to the *bookwork* parts of problem questions.

- In a longer *essay*-type question, the examiners will likewise have a list of relevant points which they are expecting you to include, and for which they will allocate marks. However, in this case there is also likely to be a significant fraction of marks (typically 25%) available for good presentation and organisation of material. So you are likely to lose some marks if you just answer in note form. Good English can help here, but clarity and the organisation of the material are the most important elements.

In general the examiners are more concerned about judging whether you *understand* the basic physics, rather than testing detailed knowledge, though you still need to cover a reasonable amount of relevant material. In an essay or brief notes question they will be less impressed by a parrot-like regurgitation of the lecturer's notes than by an answer in which you have organised the material well in your own way.

*Physics Teaching Committee November 2008* **(DRW)**