Type-setting University Examinations in Computer Science using LaTeX

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1 Introduction

This document describes two LaTeX2e document classes, UoYClosedExam and UoYOpenExam, that support the typesetting of University of York examination papers. It assumes that you are relatively familiar with LaTeX in its latest incarnation (LaTeX 2_ε).

The examination paper is set in the University style (source of information: the Departmental Assessment team).

The UoYClosedExam class also helps with the management of model answers. These are typed *inline* with the questions, but appear at the end of the paper, if at all (see Section 6). Additionally the UoYClosedExam class reports to the log file the difference between the number of marks allotted for a question and the sum of the number of marks declared for each part within a question (a positive number means not enough marks allocated in the parts; a negative number means too many marks allocated in the parts). This difference is not meaningful for questions with no sub-parts.

2 Front matter

The class options for closed papers are given in Table 1. As KOMA-Script options are passed through, font size, for example can be changed from the KOMA-Script default of 11pt by an option such as "fontsize=16".

The front matter in both classes is controlled by declarations that appear in the preamble. The declarations are listed in Table 2, together with the classes for which they are appropriate. They are all compulsory (except for \Sectioned and \Resit), and TEX will halt with a suitable error message if they are ommitted. The front matter for a closed examination is printed on a page by itself; the front matter for an open examination is printed on the top half of the first page.

A degree list should be of the form:

```
\Degrees{BSc Examination}
\Degrees{BA and BEng Examinations}
\Degrees{BSc, MEng and MSc Examinations}
```

The part should be quoted as "\Part{Ia}", "\Part{IIb}", and so on.

"\Sectioned" is omitted if the paper is not split into sections. If it is included, then a list of the sections is included, together with the rubric:

"Answer each Section in a **separate** answer booklet."

To get the list of sections, the file will have to be processed twice, in the usual LATEX fashion for tables of contents, and so on. (See the "\section" command, Section 3.)

Durations should be quoted with their units: for example

"\Duration{three hours}".

The "\Rubric{...}" declaration is for any further miscellaneous instructions. The argument may contain paragraphs breaks.

3 Sections

Sections, if there are any, are introduced with the command:

\section{*name*}{*rubric for section*}

The section label is generated automatically by LATEX, and can be the target of a \label{...} declaration. If model answers are being generated the section label, name and rubric are repeated with the model answers (see Section 6).

Option	Effect
answers	produce answers; watermarks the whole document
noanswers	does not produce answers; no watermark
final	The final version
draft	Adds "DRAFT" and date to the header
KOMA-Script option	passed to the underlying document class, scrartcl

Table 1: Class options for UoYClosedExam

Declaration	Class
\Maccode{*MAC code*}	Both
\Examyear{*Year*}	Both
\Title{*Title of paper*}	Closed
\Duration{*Time*}	Closed
\Rubric{*Text*}	Closed
\Sectioned	Closed
\Resit	Closed
\Courses{*-separated list of courses*}	Open
\Degrees{*Degree list*}	Open
\Module{*Name*}	Open
\Part{*Examination part*}	Open
\Issue{*Time and date of issue*}	Open
\Due{*Time and date due back*}	Open
\Setter{*Name(s) of setters*}	Open

Table 2: Declarations for the front matter

The "\Sectioned" declaration should be given if there are any sections in the examination (see Section 2).

The rubric may be empty, and may contain paragraph breaks. It may also contain the command "\SeparateAnswerBook" which generates the text:

> "You must answer this section in a **separate** booklet."

4 Questions

Support is provided for two sorts of questions: ordinary, long questions, and questions composed of a choice of short, independent parts (the latter being a historical curiosity?). The texts of the two types of questions are typed in exactly the same way, although the output is formatted slightly differently.

The question number can be the target of a \label{...} declaration.

If model answers are being produced, then, in both cases, the question number, number of marks and rubric are printed with the model answers (se Section 6). A watermark "ANSWERS" is added to *every* page; this is at the request of the current Chair BoE, to prevent a PDF with answers being sent for printing.

4.1 Ordinary questions

Ordinary questions are typeset using an evironment "question":

```
\begin{question}{marks}{rubric}
text of question
\end{question}
```

The number of marks should be given as just a number, for example:

> "\begin{question}{20}...".

The rubric may be empty, and may contain paragraph breaks.

Any sub-parts are numbered using lower case roman numerals.

5 Texts of questions

Question bodies can either be straight text (perhaps for an essay question) or a series of parts. Parts are numbered by lower case roman numerals.

Each part has the form:

\part *text of part*

or

\part[*mark for part*] *text of part*

If model answers are being produced, then the part number (and mark, if given) are copied to the model answers (see Section 6). The *mark for part* must be a number.

The part number can be the target of a \label{...} declaration. Any normal LaTeX commands can be included in "*text of part*".

Two special environments for use within the *text of part* are options and sequence. These are for a choice of optional and sequence of compulsory subparts, respectively. Each optional part should be worth the same number of marks, and this should be stated in the immediately preceeding rubric. The format of of a series of options is:

\begin{options}
\opt *text of optional part*
\opt *text of optional part*
\opt *text of optional part*
...
\end{options}

If model answers are being produced, then the option number is copied to the model answers (see Section 6). The option number can be the target of a \label{...} declaration.

The format of sequence is similar:

\begin{sequence}
\bit{*mark for compulsory part*} *text of compulsory part*
\bit{*mark for compulsory part*} *text of compulsory part*
\bit{*mark for compulsory part*} *text of compulsoryl part*
...
\end{sequence}

If model answers are being produced, then the bit number and marks are copied to the model answers (see Section 6). The bit number can be the target of a \label{...} declaration.

6 Model answers

The printing of model answers is controlled by a pair of class options: answers and noanswers. The default is noanswers. Option answers generates model answers for the examination, and places them at the end of the text. The model answers contain all the Section, Question and Part headings, including marks and rubrics. The model answers also contain any comments placed in the main body of text. The purpose of this is to keep the source text for the questions and answers tightly bound together.

Comments for inclusion in the model answers can be included in two ways. There is an "\ans{*text*}" declaration, for short comments[1] and an answer environment for long comments[2] They may be used as follows:

```
...What is 2+3?\ans{5}

...What is 2+3?\ans{2+3=5}

...What is 2+3?\ans{A trick question, by convention 2+3=6 in this
module.}

...Give the quicksort algorithm in Ada.
\begin{answer}
    Ada code and other comments.
\end{answer}
```

Floats (constructs such the LaTeX environments figure and table) and footnotes are not supported in the model answers.

[1] "Short" means that it must not include a paragraph break.

[2] "Long" means that it may include paragraph breaks.

7 Rough and final copy

A pair of class options are provided to help version control. The default option is final, and this should be used for the final production run of the paper.

For rough versions of the paper, the option rough should be given. This adds a message to the front of the paper, and to each page's header declaring that it is a draft, and the date on which the draft was processed by LaTeX.

8 Miscellaneous matters

According to regulations, if a question is broken over an odd page the foot should contain the text "Continued.", otherwise an odd foot should contain the text "Turn over.". The UoYExamination class tries to manage this, but does not always succeed. In cases when it does not, one of the two following declarations should be given to force the right message to appear. The declaration should be placed next to text which is known to appear on the page with the incorrect message:

Declaration	Message produced
\TurnOver	Turn over.
\Continued	Continued.