LATEX

Subject code : 18BMA655 class : III B.Sc. Mathematics

Introduction

LATEX is a comprehensive set of markup commands used with the powerful typesetting program TEX for the preparation of a wide variety of documents, from scientific articles, reports, to complex books.

Contents of a LATEX Source file

Every LATEX file contains a preamble and a body.

The preamble ends with \begin{document}. Everything that follows this command is interpreted as body. It consists of the actual text mixed with markup commands. The body ends with the command \end{document}.

The general syntax of a LATEX file is as follows:

```
\documentclass[options]{class}
\begin{document}
Text mixed with additional commands of
                        local effect
\end{document}
```

A minimal LATEX file named hi.tex contains the following lines

```
\documentclass{article}
\begin{document}
  Hi!
\end{document}
```

Text, Symbols and commands

The text is to be the input to a Latex processing run is written to a source file with a name ending in .tex, the file name extension.

2.1 Command names and arguments

There are three types of command names

- the single characters # $ & ~ _ ^ % { } all have special meanings.
- the backslash character \ plus a single non-letter character; for example \$ to print the $ sign; all the special characters listed above have a corresponding two-character command to print them literally;
- the backslash character \ plus a sequence of letters, ending with the first non-letter; for example \large to switch to a larger typeface.

Command names are case sensitive, so \large, \Large and \LARGE are distinct commands.

Environments

An environment is initiated with the command

\begin{name} and is terminated by

\end{name}

For ex: \begin{quote}
text1 \small text2 \bf series text3
\end{quote}

In the example, this applies to the three texts text1, text2 and text3. After text1 comes the command \small, which has the effect of setting the next text in a smaller typeface. After text2, there is an additional command \bfseries to switch to bold face type. Both these commands only remain in effect up to the \end{quote}.

Declarations

A declaration is a command that changes the values or meanings of certain parameters or commands without printing any text.

Some declarations have associated arguments \setlength which assigns a value of a length parameter.

Some declarations are global, their effects are not limited to the current environment. Some declaration are

\newcounter \pagenumbering \newlength
\thispagestyle \newsavebox \setcounter \addtocounter

Lengths

Fixed Lengths

Lengths consist of a decimal number with a possible sign in front (+ or −) followed by a dimensional unit. The units are

cm, mm, in, pt, bp, pc – pica (1pc=12pt)
dd – didot point (1157dd=1238pt), cc – cicero (1cc=12dd)
em – a font specific size, the width of the capital M
ex – another font related size, the height of the letter x

Decimal numbers in TEX and LATEX may be written in either English or European manner, with a period or a comma: both 12.5cm and 12,5cm are permitted.

To change the line width to be 12.5 cm the command is

\setlength{\textwidth}{12.5cm}

Rubber lengths: Some parameters expect a rubber length.

Ex

\setlength{\parskip}{1ex plus 0.5ex minus 0.2ex}

means: the extra line spacing between paragraphs, called \parskip, is to be the height of the x in the current font, but it may be increased to 1.5 or reduced to 0.8 times that size.

\fill is the special rubber length. this has the length 0 but can be stretched to any size.

Special characters

Spaces

The space or blank character has some properties different from those of normal characters.

* one blank is the same as a thousand, only the first one counts;
* blanks at the begining of an input line are ignored;
* blanks terminating a command name are removed
* the end of a line is treated as a blank.

Quotation marks

The quotation marks found on the typewriter " are not used in book printing.

Single quotes are produced with ` and ', while double quotes are made by typing the respective character twice `` for " and '' for ".

Hyphens and dashes

In book printing, - comes in various lengths -, –, —. The smallest of these, the hyphen, is used for compound words such as father-in-law;
the middle sized one, is used in ranges of number, for example pages 33–39;
and the largest, is used as punctuations- what is normally called the dash.
A fourth type of dash is the minus sign −, which is entered in math mode as $-$.

Printing command characters

The characters # , $, ~ _ ^ % { } are interpreted as commands. To print them as text, give a command consisting of \ plus that character.

$ = \$, & = \& , % = \% , # = \# , _ = _

{ = \{ , } = \} .

The special characters §, †, ‡, ¶, © and £

The special characters do not exist on the computer keyboard. They can be generated by special commands

§ = \S , † = \dag , ‡ = \ddag , ¶ = \P , © = \copyright

£ = \pounds .

Accents : In non-English languages there is a multiplicity of diacritical marks or accents.

ò = \`{o} , ó = \'{o} , ô = \^{o} , ö = \"{o} , õ = \~{o} ,

ȯ = \.{o} , ŏ = \u{o} , ō = \={o} , o̧ = \c{o} , ọ = \d{o}

o̲ = \b{o}

The euro symbol

The euro symbol € (or €) can be produced by using additional fonts and contributed packages.

The package textcomp must be loaded in the preamble with

\usepackage{textcomp}

which defines many commands including \texteuro to print the symbol €.

It is better to issue

\textsf{\texteuro} to produce €.

This table summarizes the above packages:

Package	Command	Fonts	Notes
textcomp	\texteuro	Text Companion	Non standard Symbol
eurosym	\euro	Eurosym	Sans serif, variable
europs	\EUR \EUROfc	PostScript	Varies with font family Invariable, official
eurosans	\euro	PostScript	Sans serif, variable

Ligatures

In book printing, certain combinations of letters are not printed as individuals but as a single symbol, a so called ligature.

Ligatures may be broken, by inserting \/ between the letters.

The date: the current date can be placed at any point in the text with the command \today. The standard form for the date is the American style of month, day, year.