Hour 6

Listing and Tabbing Texts

Important matters in a document are usually listed point-wise, either for concise presentation or for making them prominent. Similarly, texts may also need to be tabbed in different columns along the width of a page.

6.1 Listing Texts

There are three listing environments, namely **enumerate**, **itemize**, and **description**. The **enumerate** environment creates a numbered list and the **itemize** environment creates an unnumbered list, while the **description** environment is used to generate a list with user-defined labels. In any of these environments, each individual item is written through an **\item** command, i.e., an item is preceded by an **\item** command. An **\item** command prints an item on a new line/paragraph, and two items are separated by a predefined vertical gap, which can be controlled locally by assigning a suitable value to the **\itemsep** command inside an environment, e.g., **\setlength{\itemsep}{0mm}** for eliminating the vertical gap, while **\setlength{\itemsep}{10mm}** for maintaining a vertical gap of 10 mm.

6.1.1 Numbered Listing Through the enumerate Environment

The **enumerate** environment produces a numbered list of items, where the items are numbered by Arabic numerals as shown in Table 6.1. It is also possible to write

Table 6.1 Numbered listing through the **enumerate** environment

LaTeX input	Output

`Some states of India are listed below:`
`\begin{enumerate}`
`\item Assam`
`\item Punjab`
`\item Rajasthan.`
`\end{enumerate}`
	Some states of India are listed below:
	1. Assam
	2. Punjab
	3. Rajasthan.

D. Datta, *LaTeX in 24 Hours: A Practical Guide for Scientific Writing*,
DOI 10.1007/978-3-319-47831-9_6

an **enumerate** environment inside another **enumerate** environment, in which case the inner environment will belong to an **\item** of the outer environment. A maximum of four **enumerate** environments can be nested one inside another for producing a hierarchy of items[1]. Such an example is shown in Table 6.2, which also shows how

Table 6.2 Nested numbered listing through the **enumerate** environment

LaTeX input	Output

`Some Asian countries and ... listed below:`
`\begin{enumerate}`
`\item India\label{item:Ind}`
`\begin{enumerate}`
`\item Assam\label{item:Ass}`
`\begin{enumerate}`
`\item Sonitpur\label{item:Sonit}`
`\begin{enumerate}`
`\item Tezpur\label{item:Tez}`
`\item Dhekiajuli`
`\item Balipara`
`\end{enumerate}`
`\item Kamrup`
`\item Cachar`
`\end{enumerate}`
`\item Bihar`
`\item Punjab`
`\end{enumerate}`
`\item Sri Lanka`
`\end{enumerate}`
`Place~\ref{item:Tez} ... district~\ref{item:Sonit} in state~\ref{item:Ass} of country~\ref{item:Ind}.`
	Some Asian countries and their various places are listed below:
	1. India
	(a) Assam
	i. Sonitpur
	A. Tezpur
	B. Dhekiajuli
	C. Balipara
	ii. Kamrup
	iii. Cachar
	(b) Bihar
	(c) Punjab
	2. Sri Lanka
	Place 1(a)iA belongs to district 1(a)i in state 1a of country 1.

an enumerated item can be labeled and referred through the **\label{}** and **\ref{}** commands, respectively (blank spaces preceding inner lines in the LaTeX input are kept only for easy understanding of a loop, otherwise they do not have any sense in LaTeX). The default numbering styles in the nested four listings under the **enumerate** environment are `1.,2.,...`; `(a),(b),...`; `i.,ii.,...` and `A.,B.,...` respectively, while their referring styles are `1,2,...`; `1a,1b,...`; `1(a)i,1(a)ii,...` and `1(a)iA,1(a)iB,...` respectively.

6.1.1.1 Changing the Numbering Style I*

The default numbering styles in the nested **enumerate** environment can be altered by redefining **\labelenumi**, **\labelenumii**, **\labelenumiii**, and **\labelenumiv**, where **\labelenumi** governs the numbering style in the first **enumerate** environment, **\labelenumii** in the second **enumerate** environment, and so on. Similarly, their default referring styles can be altered by redefining **\theenumi**, **\theenumii**, **\theenumiii**, and **\theenumiv**, respectively. The example of Table 6.2 is reproduced in Table 6.3 on the following page by altering the default numbering and referring styles, where the differences between the two patterns are self-explanatory. The fields **enumi**, **enumii**, **enumiii**, and **enumiv** are, respectively, the counters of the items in four nested

[1] A maximum of four **enumerate** environments can be nested for producing a hierarchy of items.

Table 6.3 Altering styles of numbered listing under the **enumerate** environment

LaTeX input	Output
\documentclass[11pt,a4paper]{article} % \renewcommand{\labelenumi}{\arabic{enumi}.} \renewcommand{\labelenumii}{(\Alph{enumii})} \renewcommand{\labelenumiii}{(\alph{enumiii})} \renewcommand{\labelenumiv}{(\roman{enumiv})} \renewcommand{\theenumi}{\arabic{enumi}} \renewcommand{\theenumii}{(\Alph{enumii})} \renewcommand{\theenumiii}{(\alph{enumiii})} \renewcommand{\theenumiv}{(\roman{enumiv})} % \begin{document} Some Asian countries and ... listed below: \begin{enumerate} \item India\label{item:Ind} \begin{enumerate} \item Assam\label{item:Ass} \begin{enumerate} \item Sonitpur\label{item:Sonit} \begin{enumerate} \item Tezpur\label{item:Tez} \item Dhekiajuli \item Balipara \end{enumerate} \item Kamrup \item Cachar \end{enumerate} \item Bihar \item Punjab \end{enumerate} \item Sri Lanka \end{enumerate} Place~\ref{item:Tez} ... district~\ref{item:Sonit} in state~\ref{item:Ass} of country~\ref{item:Ind}. \end{document}	Some Asian countries and their various places are listed below: 1. India (A) Assam (a) Sonitpur (i) Tezpur (ii) Dhekiajuli (iii) Balipara (b) Kamrup (c) Cachar (B) Bihar (C) Punjab 2. Sri Lanka Town 1(A)(a)(i) belongs to district 1(A)(a) in state 1(A) of country 1.

enumerate environments, while **\arabic{enumi}.**, **(\Alph{enumii})**, **(\alph{enumiii})**, and **(\roman{enumiv})** are the numbering styles of those items.

6.1.1.2 Changing the Numbering Style II*

In many cases some fixed texts may need to be included in the numbering of a set of listed items, e.g., `Exercise`, `Question`, `Note`, etc. Such texts can be included in the redefinitions of the **\labelenumi**, **\labelenumii**, **\labelenumiii** and **\labelenumiv** commands. However, even if the numbering style of the items is changed by including some fixed texts, they will still be referred by their serial numbers only, i.e., without the included fixed texts. Table 6.4 on the next page shows an example where the serial numbers of the items in the first **enumerate** environment are preceded by (`Q.`).

Table 6.4 Numbered listing under the **enumerate** environment mixed with global fixed texts

LaTeX input

```
\documentclass[11pt,a4paper]{article}
\renewcommand{\labelenumi}{Q.\theenumi}
%
\begin{document}
The following questions ...\\ Answer Q.\ref{must} and any two from the rest.
\begin{enumerate}
\item Whether the following statements are true or false?\label{must}
    \begin{enumerate}
    \item Water is composed of oxygen and hydrogen.
    \item Scientific symbol of iron is Hg.
    \item The value of the gravitational acceleration is 10.
    \end{enumerate}
\item What is photosynthesis?
\item What do you mean by magnetism?
\item State the Newton's law of motion.
\end{enumerate}
\end{document}
```

Output

The following questions are from General Science:
Answer Q.1 and any two from the rest.

Q.1. Whether the following statements are true or false?

(a) Water is composed of oxygen and hydrogen.

(b) Scientific symbol of iron is Hg.

(c) The value of the gravitational acceleration is 10.

Q.2. What is photosynthesis?

Q.3. What do you mean by magnetism?

Q.4. State the Newton's law of motion.

If the **\labelenumi**, **\labelenumii**, **\labelenumiii** and **\labelenumiv** commands are redefined in the preamble of a document, their effects will be global. To get different local effects in different **enumerate** environments, the commands should be redefined repeatedly before starting every **enumerate** environment. However, it may not always be convenient to redefine the commands every time, particularly when two or more environments are nested one inside another. Such drawbacks can be overcome through the **enumerate** package, which redefines the **enumerate** environment with an optional argument for specifying its numbering style[2], e.g., **\begin{enumerate}**`[Note 1]` for numbering the items of the environment as `Note 1`, `Note 2`, etc. The tokens **1**, **i**, **I**, **a** and **A** are reserved for indicating a numbering style. If any of these five tokens appears in the fixed texts of the optional field, it is to be protected by writing it in **{}**. For example, the letter '`a`' of '`Lemma`' is to be protected by writing it as **{a}** (i.e., `[Lemm{a}1]`), otherwise it would be treated as a counter instead of just a fixed letter. Although the numbering styles of the items are changed by including some fixed texts, here also the items are referred by their serial numbers only, i.e., without the included fixed texts. Table 6.5 on the following page shows a document that contains multiple **enumerate** environments with different numbering styles.

[2]Numbering styles of items of the **enumerate** environment can be changed, including the addition of some fixed texts, either redefining **\labelenumi**, **\labelenumii**, **\labelenumiii** and **\labelenumiv**, or including an optional argument to the environment as defined in the **enumerate** package.

Table 6.5 Numbered listing under the **enumerate** environment mixed with local fixed texts

LaTeX input	Output
\documentclass[11pt,a4paper]{article} \usepackage{enumerate} % \begin{document} \begin{center}{\bf EXAMPLES}\end{center} \begin{enumerate}[{\bf Ex{a}mple 1:}] \item Show that... \item Prove that...\label{item:ex_gr} \item What would be... \end{enumerate} % \begin{center}{\bf PROBLEMS}\end{center} \begin{enumerate}[{\bf Problem (a):}] \item Prove that...\label{item:pr_gr} \item Show that... \item What would be... \end{enumerate} % The problem~(\ref{item:pr_gr}) is just an extension of the example~\ref{item:ex_gr}. \end{document}	**EXAMPLES** **Example 1:** Show that… **Example 2:** Prove that… **Example 3:** What would be… **PROBLEMS** **Problem (a):** Prove that… **Problem (b):** Show that… **Problem (c):** What would be… The problem (a) is just an extension of the example 2.

6.1.2 *Unnumbered Listing Through the itemize Environment*

An unnumbered list is produced through the **itemize** environment, an example of which is shown in Table 6.6. Unlike in a numbered list, an item of an unnumbered

Table 6.6 Unnumbered listing through the **itemize** environment

LaTeX input	Output
\begin{itemize} \item Assam \item Bihar \item Punjab \item Rajasthan. \end{itemize}	• Assam • Bihar • Punjab • Rajasthan.

list cannot be referred even if it is labeled by a reference key. This is because the item does not have any serial number to refer it. Like the **enumerate** environment, a maximum of four **itemize** environments can be nested one inside another. This is shown in Table 6.7 on the following page, which is the reproduction of the example of Table 6.2 in the **itemize** environments. The default markings of the items in the four nested **itemize** environments are bullet, hyphen, asterisk and dot, respectively.

As in the case of the **enumerate** environment, the default markings in the **itemize** environment can also be altered by redefining the **\labelitemi**, **\labelitemii**, **\labelitemiii** and **\labelitemiv** commands[3]. Table 6.8 on the next page shows an example where the default markings in two nested **itemize** environments are replaced by the symbols ★ and ▷, respectively. As mentioned in §6.1.1.2 on page 51, if **\labelitemi**, **\labelitemii**,

[3] Marking styles of items of the **itemize** environment can be changed by redefining the **\labelitemi**, **\labelitemii**, **\labelitemiii** and **\labelitemiv** commands.

Table 6.7 Nested unnumbered listing through the itemize environment

LaTeX input	Output

`Some Asian countries and ... are listed below:`
`\begin{itemize}`
`\item India`
`\begin{itemize}`
`\item Assam`
`\begin{itemize}`
`\item Sonitpur`
`\begin{itemize}`
`\item Tezpur`
`\item Dhekiajuli`
`\item Balipara`
`\end{itemize}`
`\item Kamrup`
`\item Cachar`
`\end{itemize}`
`\item Bihar`
`\item Punjab`
`\end{itemize}`
`\item Sri Lanka`
`\end{itemize}`
	Some Asian countries and their various places are listed below:
	• India
	– Assam
	∗ Sonitpur
	· Tezpur
	· Dhekiajuli
	· Balipara
	∗ Kamrup
	∗ Cachar
	– Bihar
	– Punjab
	• Sri Lanka

Table 6.8 Altering styles of unnumbered listing under the itemize environment

LaTeX input	Output

`\renewcommand{\labelitemi}{$\bigstar$}`
`\renewcommand{\labelitemii}{$\Rightarrow$}`
...
`\begin{itemize}`
`\item India`
`\begin{itemize}`
`\item Assam`
`\item Bihar`
`\item Punjab`
`\end{itemize}`
`\item Sri Lanka`
`\end{itemize}`
	★ India
	⇒ Assam
	⇒ Bihar
	⇒ Punjab
	★ Sri Lanka

etc., are redefined in the preamble of a document, their effects will be global. On the other hand, if they are redefined somewhere inside the document environment, their effects will be local only to those itemize environments that follow these redefinitions.

6.1.3 *Listing with User-Defined Labels Through the description Environment*

The description environment facilitates to prepare a list of items with user-defined labels. Like the itemize environment, the description environment also does not have any counter, for which its items can not be referred by any serial number. An item in

the description environment is labeled through an optional argument to the \item command, e.g., \item[(a)] will label its item by **(a)** (labeling of items under the enumerate or itemize environment can also be changed in this way by providing an optional argument to the \item command). Table 6.9 shows an application of the description

Table 6.9 Listing with user-defined labels through the description environment

LaTeX input	Output
\begin{description} \item[(a)] Assam \item[(b)] Bihar \item[(c)] Punjab \item[(d)] Rajasthan. \end{description}	**(a)** Assam **(b)** Bihar **(c)** Punjab **(d)** Rajasthan.

environment, where its items are labeled by **(a)**, **(b)**, etc. The optional argument of \item[] can be anything, like (a), (b), (i), (ii), or Rule, Action, etc., which is printed in boldface fonts. The font style of labeling can be changed by redefining the \descriptionlabel command[4], e.g., the \renewcommand{\descriptionlabel}[1]{\textit{#1}} command will print the labels in italic fonts (the effect will be global if redefined in the preamble, otherwise local only to the following description environments if redefined inside the document environment). Like the enumerate and itemize environments, the description environments can also be nested one inside another.

Since items in the description environment are labeled by providing label-names in [] after the \item command, [] in the starting of an item, if any, is to be protected by writing in {} as {[]}, e.g., '\item[Q.1] {[Delhi/Mumbai]} is the capital of India' for producing 'Q.1 [Delhi/Mumbai] is the capital of India'.

6.1.4 Nesting Different Listing Environments

It is discussed in §6.1.1–6.1.3 that two or more of each of the enumerate, itemize and description environments can be nested one inside another. Nesting of different listing environments is also possible for producing a hierarchy of items. Table 6.10 on the next page shows an enumerate environment nested separately with another enumerate, an itemize, and a description environments. By default the items of the main enumerate environment are numbered by 1, 2 and 3, respectively. Since the first nested environment is another enumerate environment, its items are numbered by (a), (b) and (c), respectively, i.e., by the second level of numbering in the nested enumerate environments (refer §6.1.1 for detail). However, since different environments are nested in the second case (an itemize environment inside an enumerate environment), the items of the itemize environment are labeled by its first level of labeling, i.e., by bullet marks. On the other hand, as usual the items of the description

[4]The font style of item labeling in the description environment can be changed by redefining the \descriptionlabel command.

Table 6.10 Nested different listing environments

LaTeX input	Output
\begin{enumerate} \item SI System \begin{enumerate} \item Metre \item Newton \item Second \end{enumerate} \item MKS System \begin{itemize} \item Metre \item Kilogram \item Second \end{itemize} \item FPS System \begin{description} \item[(i)] Foot \item[(ii)] Pound \item[(iii)] Second \end{description} \end{enumerate}	1. SI System (a) Metre (b) Newton (c) Second 2. MKS System • Metre • Kilogram • Second 3. FPS System **(i)** Foot **(ii)** Pound **(iii)** Second

environment in the third case are labeled by the supplied texts of `(i)`, `(ii)` and `(iii)`, respectively. These default patterns of labeling can also be altered as discussed in §6.1.1–6.1.3.

*6.1.5 Indentation of Listed Items**

Notice in Tables 6.1, 6.2, 6.3 and 6.7 that the listed items are printed with a predefined indentation on the left side. Sometime space becomes precious seeking to reduce that indentation, which can be done as follows:

- ▷ The size of item indentation in the **enumerate** and **itemize** environments can be adjusted locally by assigning a suitable value to the **leftmargin** option defined in the **enumitem** package. It is to be done at the starting of an environment, e.g., as **\begin{enumerate}[leftmargin=**`4`**mm]** or **\begin{itemize}[leftmargin=**`4`**mm]** for adjusting the indentation to 4 mm.
- ▷ However, the **enumitem** package conflicts with the **enumerate** package, which redefines the **enumerate** environment to take an optional argument for specifying the numbering style of items as explained in §6.1.1.2 on page 51. Accordingly, if both the provisions (changing numbering style and adjusting indentation) are essential in the same document, an alternative for adjusting item indentation in the **enumerate** environment would be to specify the numbering style (not necessarily to change anything) by incorporating **\hspace{}** with a suitable value, e.g., **\begin{enumerate}[\hspace{**`0`**mm}**`1.`**]** for numbering in Arabic numerals without any indentation, or **\begin{enumerate}[\hspace{**`0`**mm}**`(a)`**]** for the same job but numbering by lowercase alphabets in a pair of parentheses.

6.2 Tabbing Texts Through the tabbing Environment

The tabbing environment is used for aligning texts in different columns. The \= command is used, usually in the first row, to generate a new column by ending the current column. The \> command moves the control to the next column in the subsequent rows. Each row is terminated by a line break command \\ to go to the next row (the last row is not required to be terminated by \\). Table 6.11 shows a simple two-column

Table 6.11 Tabbing texts in different columns through the tabbing environment

LaTeX input	Output
\begin{tabbing} Potato \= 12.00\\ Rice \> 20.00\\ Oil \> 60.00\\ Sugar \> 23.00 \end{tabbing}	Potato 12.00 Rice 20.00 Oil 60.00 Sugar 23.00

example of tabbing through the tabbing environment. The two columns are generated in the first row by a \= command (one \= command separates two columns) and the row is terminated by \\. The remaining rows are inserted in the same way, but replacing \= with \>.

6.2.1 Adjusting Column Width in the tabbing Environment

The width of a column is fixed based on the length of the entry in the column in that row in which it is generated. If the width is not sufficient to accommodate the entry of that column in any subsequent row, the \hspace{} or \hspace*{} command can be used in the column generating row to increase the width of the column. This is shown in Table 6.12, where the width of the first column is increased by 0.5 cm using

Table 6.12 Adjusting tabbing column width in the tabbing environment through the \hspace{} command

LaTeX input	Output
\begin{tabbing} Breadth (b)\hspace{0.5cm} \= = 3.00\\ Depth (d) \> = 2.00\\ Height (h) \> = 4.00\\ Volume (V) \> = bdh \= = 24.00\\ Base Area (A) \> = bd \> = 6.00\\ \end{tabbing}	Breadth (b) = 3.00 Depth (d) = 2.00 Height (h) = 4.00 Volume (V) = bdh = 24.00 Base Area (A) = bd = 6.00

\hspace{0.5cm} in the first row. Without the additional space created by \hspace{}, the width of the column would not be sufficient to accommodate the entry of that column in the last row. Note that all the columns in a tabbing environment are not required to be generated in the first row itself. In Table 6.12, originally two columns are generated in the first row. The necessity of another (the third) column is felt in the fourth row, and hence it is generated there by splitting the second column into two by using a \= command. This column could be generated in the first row also,

by adjusting its width through a \hspace{} command. In that case, the third column had to be left blank till the fourth row.

Another option for creating columns of required widths and number is to use the \kill command. In that case, all the columns are generated in the first row itself, where the entry of a column is the widest entry which appears later in that column. Finally, the row is ended by the \kill command, instead of the line breaking command \\, instructing not to print the row but just to generate the columns. As an example of using the \kill command, the list of Table 6.12 is reproduced in Table 6.13.

Table 6.13 Adjusting tabbing column width in the tabbing environment using the \kill command

LaTeX input	Output
\begin{tabbing} Base area (A) \= = 4.00 \= = 24.00\kill Breadth (b) \> = 3.00\\ Depth (d) \> = 2.00\\ Height (h) \> = 4.00\\ Volume (V) \> = bdh \> = 24.00\\ Base Area (A) \> = bd \> = 6.00\\ \end{tabbing}	Breadth (b) = 3.00 Depth (d) = 2.00 Height (h) = 4.00 Volume (V) = bdh = 24.00 Base Area (A) = bd = 6.00

6.2.2 *Adjusting Alignment of Columns in the tabbing Environment**

By default the entry of a column in the tabbing environment is left aligned. Provision is there for right-aligning the last entry, for which the last entry is to be preceded by the \` command. Moreover, the \' command can be used between two pieces of texts of the entry of a column, in which case the first piece of texts is printed right aligned in the previous column. The applications of both the \` and \' commands are shown in Table 6.14.

Table 6.14 Aligning tabbing texts in the tabbing environment using \` and \'

LaTeX input	Output
\begin{tabbing} Longest \= Longest \= Longest\kill a \> b \> c\\ a \> b \> \`c\\ \> a\'b \> c\\ a \> b \> c\\ \end{tabbing}	a b c a b c a b c a b c

Note that \`, \' and \= cannot be used in the tabbing environment for producing accents (refer Table A.1 on page 247 for detail) as they bear different meanings in this environment. Instead of those, \a`, \a' and \a= are to be used, e.g., the \a`{o}, \a'{o}, and \a={o} commands in a tabbing environment will generate the accents ò, ó, and ō, respectively, which are the same with those usually produced by the \`{o}, \'{o} and \={o} commands, respectively.