

Alva's Institute of Engineering & Technology, Moodbidri

(Affiliated to VTU, Belagavi, Accredited by AICTE, New Delhi)

Department of Information Science and Engineering



A Laboratory Manual of

Technical Writing Using LATEX(BCSL456D)

Semester: 4

Prepared by:

Mr. Mounesh A

Assistant Professor

Department of IS&E

AIET, Moodbidri

Technical Writing using LaTeX		Semester	4
Course Code	BCSL456D	CIE Marks	50
Teaching Hours/Week (L: T:P: S)	0:0:2:0	SEE Marks	50
Credits	01	Exam Hours	02
Examination type (SEE)	Practical		
Course objectives: <ul style="list-style-type: none">• To introduce the basic syntax and semantics of the LaTeX scripting language• To understand the presentation of tables and figures in the document• To illustrate the LaTeX syntax to represent the theorems and mathematical equations• To make use of the libraries (Tikz, algorithm) to design the diagram and algorithms in the document			
SLNO	Experiments		
1	Develop a LaTeX script to create a simple document that consists of 2 sections [Section1, Section2], and a paragraph with dummy text in each section.And also include header[title of document]and footer[institute name, page number] in the document.		
2	Develop a LaTeX script to create a document that displays the sample Abstract/Summary		
3	Develop a LaTeX script to create a simple title page of the VTU project Report [Use suitable Logos and text formatting]		
4	Develop a LaTeX script to create the Certificate Page of the Report [Use suitable commands to leave the blank spaces for user entry]		
5	Develop a LaTeX script to create a document that contains the following table with proper labels.		
6	Develop a LaTeX script to include the side-by-side graphics/pictures/figures in the document by using the subgraph concept		
7	<div>Develop a LaTeX script to create a document that consists of the following two mathematical equations</div> <div><div>$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$= \frac{-2 \pm \sqrt{2^2 - 4*(1)*(-8)}}{2*1}$$= \frac{-2 \pm \sqrt{4+32}}{2}$</div><div>$\varphi_{\sigma}^{\lambda} A_t = \sum_{\pi \in C_t} \text{sgn}(\pi) \varphi_{\sigma}^{\lambda} \varphi_{\pi}^{\lambda}$$= \sum_{\tau \in C_{\sigma t}} \text{sgn}(\sigma^{-1} \tau \sigma) \varphi_{\sigma}^{\lambda} \varphi_{\sigma^{-1} \tau \sigma}^{\lambda}$$= A_{\sigma t} \varphi_{\sigma}^{\lambda}$</div></div>		
8	Develop a LaTeX script to demonstrate the presentation of Numbered theorems, definitions, corollaries, and lemmas in the document		
9	Develop a LaTeX script to create a document that consists of two paragraphs with a minimum of 10 citations in it and display the reference in the section		

10	Develop a LaTeX script to design a simple tree diagram or hierarchical structure in the document with appropriate labels using the Tikz library
11	Develop a LaTeX script to present an algorithm in the document using algorithm/algorithmic/algorithm2e library
12	Develop a LaTeX script to create a simple report and article by using suitable commands and formats of user choice.
Course outcomes (Course Skill Set): At the end of the course, the student will be able to: <ul style="list-style-type: none"> · Apply basic LaTeX command to develop simple document · Develop LaTeX script to present the tables and figures in the document · Illustrate LaTeX script to present theorems and mathematical equations in the document · Develop programs to generate the complete report with citations and a bibliography · Illustrate the use of Tikz and algorithm libraries to design graphics and algorithms in the document 	
Suggested Learning Resources: <ul style="list-style-type: none"> · BOOK: A Short Introduction to LaTeX BY FIRUZAKARMALI(AIBARA), A book for beginners, 2019 · BOOK: Formatting Information: A Beginner's Introduction to Typesetting with LaTeX, BY PETER FLYNN, Comprehensive TeX Archive Network (2005) · LaTeX TUTORIAL: [https://latex-tutorial.com/tutorials/] · LaTeX TUTORIAL: [https://www.javatpoint.com/latex] 	

Program-1:

Develop a LaTeX script to create a simple document that consists of 2 sections [Section1, Section2], and a paragraph with dummy text in each section. And also include header [title of document] and footer [institute name, page number] in the document.

Points To Remember:

The three most commonly used standard document-classes in LaTeX include: article, report and book. A number of global options allows customization of certain elements of the document by the author. Different document-classes might have different default settings. The following post illustrates available options with figures, provides alternatives and highlights the default option for each document-class.

To change the default behavior, the option is provided as an optional parameter to the documentclass command.

```
\documentclass[option1, option2, etc.]{article}
```

- Font size (**10pt, 11pt, 12pt**)
- Paper size and format (**a4paper, letterpaper, etc.**)
- Draft mode (**draft**)
- Multiple columns (**onecolumn, twocolumn**)
- Formula-specific options (**fleqn and leqno**)
- Landscape print mode (**landscape**)
- Single- and double-sided documents (**oneside, twoside**)
- Titlepage behavior (**notitlepage, titlepage**)
- Chapter opening page (**openright, openany**)

Font size

LaTeX knows three standard font sizes:

- 10pt (default)
- 11pt
- 12pt

Paper size and format

Different regions of the world use different standard physical paper sizes. Available are:

- a4paper (default)
- letterpaper (default in some distributions)
- a5paper
- b5paper

- `executivepaper`
- `legalpaper`

Program-1:

```
\documentclass[12pt,a4paper]{article}

\usepackage[left=2cm,right=2cm,top=2cm,bottom=2cm]{geometry}

\usepackage{fancyhdr}

\begin{document}

% Set the page style to "fancy"...

\pagestyle{fancy}

\title{Introduction to Latex}

\fancyhf{} % clear existing header/footer entries

% We don't need to specify the O coordinate

\fancyhead{} % clear all header fields

\fancyhead[R]{Basics of Latex}

\fancyfoot{} % clear all footer fields

\fancyfoot[LO,CE]{Alva's Institute of Engineering and Technology}

\fancyfoot[R]{\thepage}

\maketitle

\section{What is Latex?}

Introduction

LaTeX is a document typesetting system

Pronounced either "Lay-tech" or "Lah-tech"

Used to produce high-quality technical/scientific documents
```

such as articles, books, theses, technical reports etc.

Stable, Platform independent - Windows, Linux, Mac OS

We can concentrate purely on typing the contents of the document; formatting will be taken care by the LaTeX

Free of cost!

LaTeX is a document preparation system for high-quality typesetting

`\section{Why Latex is Important?}`

Used to produce high-quality technical/scientific documents

such as articles, books, theses, technical reports etc.

`\section{What is the Free Software Movement?}`

The free software movement campaigns to win for the users of computing the freedom that comes from free software. Free software puts its users in control of their own computing. Non-free software puts its users under the power of the software's developer.

`\\`

`\section{What is Free Software?}`

`\textbf{Free software means the users have the freedom to run, copy, distribute, study, change and improve the software.}`

Free software is a matter of liberty, not price. To understand the concept, you should think of "free" as in "free speech," not as in "free beer". More precisely, free software means users of a program have the four essential freedoms:

`\begin{itemize}`

`\item` The freedom to run the program as you wish, for any purpose (freedom 0).

`\item` The freedom to study how the program works, and change it so it does your computing as you wish (freedom 1). Access to the source code is a precondition for this.

`\item` The freedom to redistribute copies so you can help others (freedom 2).

\item The freedom to distribute copies of your modified versions to others (freedom 3).
By doing this you can give the whole community a chance to benefit from your changes.
Access to the source code is a precondition for this.

Developments in technology and network use have made these freedoms even more important now than they were in 1983. Nowadays the free software movement goes far beyond developing the GNU system.

\end{itemize}

\end{document}

Program-2:

Develop a LaTeX script to create a document that displays the sample Abstract/Summary

Points to remember:**1. `\usepackage[utf8]{inputenc}`:**

inputenc can be used to tell LaTeX about the input encoding of your document (the input encoding controls how characters are saved by your computer). In the olden days LaTeX only really supported ASCII input, then support for 8bit encodings was added via inputenc. Nowadays UTF-8 is the de facto standard for most documents, so many people used `\usepackage[utf8]{inputenc}`. Because UTF-8 is a de facto standard, the LaTeX team decided to make it the LaTeX default encoding.

Encoding

Overleaf uses the UTF-8 encoding for all text files. UTF-8 is the most widely used character encoding on the web today. You can use it to represent any unicode character, which includes an enormous variety of letters, numbers and symbols, including Greek letters and letters with accents.

UTF-8 supersedes many older encodings, such as latin1, latin9, which are often found in LaTeX files and templates. TeX and LaTeX predate UTF-8 by several decades, so LaTeX support for UTF-8 is somewhat inconsistent and depends on which TeX engine you are using.

2. `\usepackage{amsmath}`

The amsmath package is a LATEX package that provides miscellaneous enhancements for improving the information structure and printed output of documents that contain mathematical formulas.

The amsmath package provides a handful of options for displaying equations. You can choose the layout that better suits your document, even if the equations are really long, or if you have to include several equations in the same line.

- The **amsmath** part is an extension package for LaTeX that provides various features to facilitate writing math formulas and to improve the typographical quality of their output.
- The **amscls** part contains AMS "document class" files (amsart, amsbook and amsproc.cls) and a theorem package (amsthm.sty) that can be used independently. These provide the setup necessary to give a LaTeX document the general structure and appearance of an AMS article or book.

Let's start with a basic example:

```
\begin{equation} \label{eq1}
\begin{split}
A &= \frac{\pi r^2}{2} \\
&= \frac{1}{2} \pi r^2
\end{split}
\end{equation}
```

The following graphic shows the output produced by the LaTeX code:

$$\begin{aligned} A &= \frac{\pi r^2}{2} \\ &= \frac{1}{2} \pi r^2 \end{aligned} \quad (1)$$

Writing a single equation

To display a single equation, as mentioned in the introduction, you have to use the `equation*` or `equation` environment, depending on whether you want the equation to be numbered or not.

```
\begin{equation} \label{eu_eqn}
e^{\pi i} + 1 = 0
\end{equation}
```

The beautiful equation `\ref{eu_eqn}` is known as the Euler equation.

he following graphic shows the output produced by the LaTeX code:

$$e^{\pi i} + 1 = 0 \quad (1)$$

The beautiful equation 1 is known as the Euler equation

Displaying long equations

For equations longer than a line use the `multline` environment. Insert a double backslash to set a point for the equation to be broken. The first part will be aligned to the left and the second part will be displayed in the next line and aligned to the right.

Again, the use of an asterisk `*` in the environment name determines whether the equation is numbered or not.

```
\begin{multline*}
```

```
p(x) = 3x^6 + 14x^5y + 590x^4y^2 + 19x^3y^3\\
- 12x^2y^4 - 12xy^5 + 2y^6 - a^3b^3
\end{multline*}
```

The following graphic shows the output produced by the LaTeX code:

$$p(x) = 3x^6 + 14x^5y + 590x^4y^2 + 19x^3y^3 \\ - 12x^2y^4 - 12xy^5 + 2y^6 - a^3b^3$$

3. `\usepackage{amsfonts}`


An extended set of fonts for use in mathematics, including: extra mathematical symbols; blackboard bold letters (uppercase only); fraktur letters; subscript sizes of bold math italic and bold Greek letters; subscript sizes of large symbols such as sum and product; added sizes of the Computer Modern small caps font; cyrillic fonts (from the University of Washington); Euler mathematical fonts. All fonts are provided as Adobe Type 1 files, and all except the Euler fonts are provided as METAFONT source.

4. `\usepackage{amssymb}`

Loads lots of extra symbols.

amssymb provides an extended symbol collection. For example, after loading amssymb you have the following additional binary relation symbols: `\barwedge`, `\boxdot`, `\boxminus`, `\boxplus`, `\boxtimes`, `\Cap`, `\Cup` (and many more), the arrow `\leadsto`, and some other symbols such as `\Box` and `\Diamond`. Another useful feature is the `\mathbb` command to produce blackboard bold characters

5. `\usepackage{lipsum}`

 `lipsum` is a package made to avoid typing a lot of dummy text in examples. So the only purpose of command `\lipsum` is to add such dummy text

Sometimes a problem may only occur at a certain place or after a certain point, in which case you may need to create some dummy text to pad out your example. If so, the lipsum package is a useful tool. This provides the command `\lipsum` which has an optional argument that specifies the paragraph or the range of paragraphs to typeset.

6. `\usepackage{geometry}`

You can change the page layout with intuitive parameters. For instance, if you want to set a margin to 2cm from each edge of the paper, you can type just `\usepackage[margin=2cm]{geometry}`. The page layout can be changed in the middle of the document with `\newgeometry` command.

Abstract. This package provides a flexible and easy interface to page dimensions. You can change the page layout with intuitive parameters.

7. `\thispagestyle{plain}`

LaTeX predefines four page styles for standard classes:

- empty Both header and footer are empty.
- plain The header is empty; the footer contains the page number.
- headings The footer is empty; the header contains information determined by the class (based on sectional units) and the page number.
- myheadings It is similar to headings but the user controls the information in the header

8. `\textbf`

Simple text formatting helps to highlight important concepts within a document and make it more readable. Using italics, bold or underlined words can change the perception of the reader.

`\textbf` - Used to produce text-mode material in boldface within a mathematical expression.

9. `\vspace`

`\vspace` command inserting more space than specified. In LaTeX, the `\vspace` command is used to insert **vertical space** between elements within a document.

Program 2:

```
\documentclass[10pt,a4paper]{article}
\usepackage[utf8]{inputenc}
\usepackage{amsmath}
\usepackage{amsfonts}
\usepackage{amssymb}
\usepackage[left=3cm,right=3cm,top=2cm,bottom=2cm]{geometry}
%\usepackage{lipsum}

\begin{document}
\thispagestyle{plain}

\begin{center}
\Large
\textbf{Thesis Title}

\vspace{0.4cm}
\large
Thesis Subtitle
\end{center}
\end{document}
```

```

\vspace{0.4cm}
\textbf{Author Name}

\vspace{0.9cm}
\textbf{Abstract}
\end{center}
%\lipsum[1]

```

News has become an important medium for everyone to stay aware and updated with the latest happenings in the world. It is important to note that in recent times with the rise in social media the amount of fake news has surged to dangerous levels. Fake news causes a lot of economic and social problems. It also gets difficult to trace back the source of fake news and hold someone accountable in order to curb it down. It is important to have a mechanism which evicts out fake news and contains only authentic news.

Fake news causes a lot of economic and social problems. It also gets difficult to trace back the source of fake news and hold someone accountable in order to curb it down. It is important to have a mechanism which evicts out fake news and contains only authentic news. With digitization, there has been a drastic increase in the usage of some of the popular social media sites such as Twitter, Facebook, Yahoo, YouTube as a medium of spreading news. There is very little check on the spreading of fake news. Accountability, in terms of how authentic the news is, is very less.

Our project aims to create a platform that runs on a blockchain network. News based media will be shared across this network. The origin of data and every user interaction will be recorded and get updated in the decentralized ledger and since it is in the blockchain, it remains immutable and nearly immune to any cyber threat.

The platform will be highly intuitive and interactive for users to browse through different sections of news. Users can view articles, blogs, headlines and other news-based content. Users can also push their own content on the network. The platform also allows the users to manually rate a piece of news based on its authenticity.

```

\end{document}.

```

Program-3:

Develop a LaTeX script to create a simple title page of the VTU project Report [Use suitable Logos and text formatting]

Points to Remember:

Large:

If the accommodation specifies a font larger than 12pt, use the standard type size commands to increase the size of the font. These commands are case sensitive, so `\large`, `\Large`, and `\LARGE` all result in different font sizes. Change the font size of a piece of text using these commands, from the largest to the smallest: `\Huge`, `\huge`, `\LARGE`, `\Large`, `\large`, `\normalsize`, `\small`, `\footnotesize`, `\scriptsize`, and `\tiny`. Set the font size of the whole document by adding an option to the `\documentclass` command.

`\bfseries`:

`\bfseries` is a switching command, i.e., it doesn't take an argument. If you input `{\bfseries This is meant to be bolded}` you'll get what you want.

`\noindent`

When used at the beginning of the paragraph, it suppresses the paragraph indentation. It has no effect when used in the middle of a paragraph.

`\includegraphics`

Figures or images are inserted in LaTeX using the figure environment `{figure}`. Including images in your LaTeX document requires adding: `\usepackage{graphicx}` to the beginning/preamble of your document. `\includegraphics{ }` command tells LaTeX to insert the image.

PROGRAM-3:

```
\documentclass{article}
\usepackage{graphicx} % Required for inserting images

\begin{document}

\begin{center}
  \Large \bfseries{Review paper on Operating Systems}
\end{center}

\begin{center}
  \vspace*{1.2cm}
  \noindent \textbf{2nd YEAR VTU PROJECT}
```

`\noindent \textbf{BE IN CSE(IoT)}`
`\vspace*{1.2cm}`

`\noindent \textbf{By}`

`\vspace{0.4cm}`

`\noindent \textbf{SUMAN} - 4AL22IC001`

`\noindent \textbf{RAMESH} - 4AL22IC002`

`\noindent \textbf{GANESH} - 4AL22IC003`

`\vspace*{1.2cm}`

`\noindent \textbf{Supervised}`

`\noindent \textbf{By}`

`\vspace{0.4cm}`

`\noindent \textbf{Dr.Rajesh}`

`\noindent Associate Professor`

`AIET, ISE, Moodbidri`

`\vspace{2.5cm}`

`\includegraphics[width=5cm]{a2.png}`

`\vspace{1cm}`

`Department of Information Science and Engineering`

`Alva's Institute of Engineering and Technology, Moodbidri`

`\end{center}`

`\end{document}`

Or Program-3:

```

\documentclass{article}
\usepackage{graphicx} % Required for inserting images
\usepackage[left=3cm,right=3cm,top=2cm,bottom=2cm]{geometry}
\begin{document}

\begin{center}
  \LARGE \bfseries{Alva's Institute of Engineering and Technology, Moodbidri}

  \begin{small}
    (an affiliated to VTU Belagavi and accredited by AICTE, Newdelhi)

    \vspace{1cm}
    \includegraphics[width=2cm]{vtu_logo.jpg}
    \end{small}
    \vspace{1cm}

    \Large \bfseries{Research Topics on Operating Systems}
  \end{center}

  \begin{center}
    \vspace*{1.2cm}
    % \begin{small}
    \noindent \textbf{A project report submitted to \\\Visvesvaraya Technological}
    University. Belgaum, Karnataka }}\\
    \textit{in the partial fulfillment of the requirements for the award of degree of} \\\

    \begin{normalsize}
      \textbf{\textit{Bachelor of Engineering }}} \\\
      in \\\
      \textbf{\textit{Computer Science and Engineering}}} \\\
      by \\\
    \end{normalsize}

    \begin{tabular}{ccc}
      \textbf{Student-1 }& \& \textbf{4AL22IS001}\\
      \textbf{Student-2 }& \& \textbf{4AL22IS002}\\
      \textbf{Student-3 }& \& \textbf{4AL22IS003}\\
      \textbf{Student-4 }& \& \textbf{4AL22IS004}\\
    \end{tabular}
  \end{center}

```

\vfill

{\normalsize under the guidance of}\\
\Large{\textbf{Mr.Mounesh A}}\\
Assistant Professor\\
AIET,ISE,Moodbidri\\

% \vspace{1cm}
\includegraphics[width=5cm]{a2.png}

%\vspace{1cm}
Department of Information Science and Engineering\\
Alva's Institute of Engineering and Technology, Moodbidri
\end{center}
\end{document}

Program-4:

Develop a LaTeX script to create the Certificate Page of the Report [Use suitable commands to leave the blank spaces for user entry]

Points to Remember:

\bfseries:

I want to use the "runin" & bfseries style for section and subsection titles using rmarkdown in both pdf and html, where "runin" means the section or subsection titles and the text are on the same line, and bfseries means using the bold black font-style for the titles. The \bfseries command switches on bold text, which is useful for defining formatting, e.g. when using the listings package. \mathbf{ ... } will make Roman letters inside of it bold: to bold other characters, there are several different options discussed in this question. \bf is deprecated.

\Huge:

In the following example, {\huge huge font size} declares that the text inside the braces must be formatted in a huge font size.

\begin{table}[h!]:

H Places the float at precisely the location in the LATEX code. Requires the float package. This is somewhat equivalent to **h!**. Float specifiers are written in the square brackets whenever we use a float such as a figure or a table, i.e. the H in \begin{table}[H]. The H float specifier comes as part of the float package. It tells the compiler to place the table at that exact location in the page, instead of moving it to somewhere else.

\begin{tabular}:

Tables can be created using **tabular** environment. \begin{tabular}[pos]{cols} table content \end{tabular}. The tabular environment is the basic environment for creating a table. We can think of a table as an array with separate cells where we need to individually define each cell. On the right is the code for a basic table with some of the information above.

tabular* adjusts the space between text of adjacent columns to get a given table width, tabularx leaves this intercolumn space fixed, instead adjusts the text width within the "X" columns for same purpose. The \begin{tabular} command must be followed by a string of characters enclosed within braces which specifies the format of the table

\footnotesize:

Third smallest of 10 typefaces available. This is the default size for footnotes. See also Typefaces, Sizes.

\hfill:

whereas \hspace*{\fill}, is a LaTeX macro, which leaves a space equal to a 1fill. The \hfill fill command produces a rubber length which can stretch or shrink horizontally. It will be filled with spaces.

Program-4:

```

\documentclass{article}
\usepackage{graphicx} % Required for inserting images
\usepackage[left=3cm,right=3cm,top=2cm,bottom=2cm]{geometry}
\begin{document}

\begin{center}
\LARGE \bfseries{Department of Computer Science and Engineering}
\LARGE \bfseries{Alva's Institute of Engineering and Technology, Moodbidri}

\begin{small}
(an affiliated to VTU Belagavi and accredited by AICTE, Newdelhi)

\vspace{1cm}
\includegraphics[width=2cm]{m1.jpg}
\includegraphics[width=2cm]{a1.png}
\end{small}
\vspace{0.5cm}

\Huge{Certificate}
\vspace{1cm}
\begin{large}

This is to certify that the Project Report entitled
\textbf{"Introduction to Operating Systems"}
is a bonafide work carried out by
\textbf{Student-1(4AL22CS001)},
\textbf{Student-2(4AL22CS002)},
\textbf{Student-3(4AL22CS002)}
and \textbf{Student-4(4AL22CS004)}
in the partial fulfillment of the requirement for the award of the degree of Bachelor of
Engineering in Computer Science and Engineering, Visvesvaraya Technological University,
Belagavi during the year 20XX-XX. It is certified that all corrections/suggestions
indicated for the internal assessment have been incorporated in the report.The project
report has been approved as it satisfies the academic requirements in respect of project
work prescribed for the Bachelor of Engineering Degree.

\end{large}
\vspace{1cm}

\begin{table}[h!]

```

```

\centering
\begin{tabular}{cccccccc}
.....&&&&&&&&.....\\
\textbf{{\footnotesize Guide}} &&&&&&&&\textbf{{\footnotesize Coordinator}}\\
\textbf{Prof.Mounesh A}&&&&&&&&\textbf{Dr. Pradip V} \\
\textbf{{\footnotesize Asst. Professor}} &&&&&&&&\textbf{{\footnotesize
Professor}}\\
\textbf{{\footnotesize Dept of ISE, AIET}} &&&&&&&&\textbf{{\footnotesize Dept of
ISE, AIET}}\\
\\
\\
.....&&&&&&&&.....\\
\textbf{Dr. Sudheer Shetty} &&&&&&&&\textbf{Dr.Peter Fernandes} \\
\textbf{{\footnotesize Professor and Head}} &&&&&&&&\textbf{{\footnotesize
Principal}} \\
\textbf{{\footnotesize Dept of ISE, AIET}} &&&&&&&&\textbf{{\footnotesize AIET,
Moodbidri}}\\

\end{tabular}

\end{table}
\begin{normalsize}

\vfill
Name of the Examiners \hfill      Signature with Date
\end{normalsize}
\begin{normalsize}

%\end{normalsize}
\begin{enumerate}
\item Prof.
\item Prof.
\end{enumerate}
\end{normalsize}

\end{center}
\end{document}

```

Program 5:

Develop a LaTeX script to create a document that contains the following table with proper labels.

S.No	USN	Student Name	Marks		
			Subject1	Subject2	Subject3
1	4XX22XX001	Name 1	89	60	90
2	4XX22XX002	Name 2	78	45	98
3	4XX22XX003	Name 3	67	55	59

Points to Remember:**`\usepackage{multirow}`:**

The package has a lot of flexibility, including an option for specifying an entry at the “natural” width of its text. The package is distributed with the bigdelim and bigstrut packages, which can be used to advantage with `\multirow` cells. To do this, we can effectively split the row up into three subrows. However, there is only one Mark, so we want the name 'Mark' to take up all three subrows. We use the command `\multirow{3}{*}{Mark}`. This tells the compiler to have Mark take up all three subrows.

`\begin{tabular}`:

Tables can be created using tabular environment. `\begin{tabular}[pos]{cols} table content \end{tabular}`. The `\begin{tabular}` command must be followed by a string of characters enclosed within braces which specifies the format of the table

`\hline`:

The `\hline` command will draw a horizontal line the width of the table. It's most commonly used to draw a line at the top, bottom, and between the rows of the table. The `\hline` command will draw a horizontal line the width of the table. It's most commonly used to draw a line at the top, bottom, and between the rows of the table.

Two successive `\hline` commands leave a space between the lines; this space does not contain the vertical lines specified by | characters in the col argument of the `\begin{tabular}{col}` command.

To place a line at the bottom of a table, the `\hline` command must follow a `\` (line break) command after the last table entry. This final line break command should be present only in this circumstance.

Program-5:

```
\documentclass[10pt,a4paper]{article}
\usepackage[utf8]{inputenc}
\usepackage{amsmath}
\usepackage{amsfonts}
\usepackage{amssymb}
\usepackage[left=2cm,right=2cm,top=2cm,bottom=2cm]{geometry}
\usepackage{multirow}
\begin{document}

\begin{center}
\begin{Large}
\textbf{Table Demo}
\end{Large}
\end{center}

\section*{Marks Table}

\begin{tabular}{|c|c|c|c|c|c|}
\hline
\multirow{2}{*}{S.No} & \multirow{2}{*}{USN} & \multirow{2}{*}{Student Name} & & \multicolumn{2}{|c|}{Marks} \\
\cline{4-6}
& & & & Subject1 & Subject2 & Subject3 \\
\hline
1 & 4XX22XX001 & Name 1 & 88 & 77 & 97 \\
\hline
2 & 4XX22XX002 & Name 2 & 74 & 78 & 66 \\
\hline
3 & 4XX22XX003 & Name 3 & 88 & 82 & 79 \\
\hline
\end{tabular}

\end{document}
```

Program-6:

Develop a LaTeX script to include the side-by-side graphics/pictures/figures in the document by using the subgraph concept.

Points to Remember:

`\usepackage{caption}`:

Package caption[4] provides the command `\captionof{<type>}{<caption text>}` that lets you typeset a caption without a floating environment. You have the full and absolute control about the placement of your figures and captions. It's really easy, just add the `\caption{Some caption}` and inside the braces write the text to be shown. The placement of the caption depends on where you place the command; if it's above the `\includegraphics` then the caption will be on top of it, if it's below then the caption will also be set below the figure.

`\usepackage{subcaption}`:

`{subcaption}` is a package for typesetting captions of {subfloats}. subcaption is a package for typesetting captions of subfloats. The package provides a means of using facilities analogous to those of the caption package, when writing captions for subfigures and the like. The package is distributed with caption. Sources. /macros/latex/contrib/caption.

`\begin{figure}[h]`:

The optional argument to the figure environment tells LaTeX where you'd like it to appear, if possible; the options are h meaning "here", t (at the top of a page), b (at the bottom of a page) and p (on a page without any text). Float specifiers are written in the square brackets whenever we use a float such as a figure or a table, i.e. the H in `\begin{figure}[H]`. The H float specifier comes as part of the float package. It tells the compiler to place the figure at that exact location in the page, instead of moving it to somewhere else.

Program-6:

```
\documentclass[10pt,a4paper]{article}
\usepackage[utf8]{inputenc}
\usepackage{amsmath}
\usepackage{amsfonts}
\usepackage{amssymb}
\usepackage{caption}
\usepackage{subcaption}
\usepackage{graphicx}
\usepackage[left=2cm,right=2cm,top=2cm,bottom=2cm]{geometry}
\begin{document}
```

```
\section*{Subfigure Demo}
```

```
\begin{figure}[h]
  \centering
  \begin{subfigure}[b]{0.3\textwidth}
    \centering
    \includegraphics[width=\textwidth]{y=x.jpg}
    \caption{$y=x$}
    \label{fig:y equals x}
  \end{subfigure}
  \hfill
  \begin{subfigure}[b]{0.3\textwidth}
    \centering
    \includegraphics[width=\textwidth]{y=3 sin X.png}
    \caption{$y=3\sin x$}
    \label{fig:three sin x}
  \end{subfigure}
  \hfill
  \begin{subfigure}[b]{0.3\textwidth}
    \centering
    \includegraphics[width=\textwidth]{y=5dividedX.jpg}
    \caption{$y=5/x$}
    \label{fig:five over x}
  \end{subfigure}
  \caption{Three simple graphs arranged side-by-side}
  \label{fig:three graphs}
\end{figure}

\end{document}
```

Program-7:

Develop a LaTeX script to create a document that consists of the following two mathematical equation.

$$\begin{aligned}
 x &= \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \\
 &= \frac{-2 \pm \sqrt{2^2 - 4 \cdot (1) \cdot (-8)}}{2 \cdot 1} \\
 &= \frac{-2 \pm \sqrt{4 + 32}}{2}
 \end{aligned}
 \qquad
 \begin{aligned}
 \varphi_{\sigma}^{\lambda} A_t &= \sum_{\pi \in C_t} \text{sgn}(\pi) \varphi_{\sigma}^{\lambda} \varphi_{\pi}^{\lambda} \\
 &= \sum_{\tau \in C_{\sigma t}} \text{sgn}(\sigma^{-1} \tau \sigma) \varphi_{\sigma}^{\lambda} \varphi_{\sigma^{-1} \tau \sigma}^{\lambda} \\
 &= A_{\sigma t} \varphi_{\sigma}^{\lambda}
 \end{aligned}$$

Points to Remember:

`\usepackage{amsmath,nccmath}`:

The package adds some mathematical commands from `ncclatex`, tidies up some AMS-LATEX facilities and extends others.

The package adds some mathematical commands from `ncclatex`, tidies up some AMS-LaTeX facilities and extends others. This package is part of the `ncctools` bundle.

multi-line equation will be located in the center but left margin or left indent will be equal to all.

And `&` symbol will play an important role in adjusting left Indent. See the syntax below, how `&` symbols are used

`fleqn` is a powerful environment for left alignment of equations with respect to the page that is present in `nccmath` package.

Add indent or left margin with `fleqn` environment

As you can see from the above output, there is no indent or left margin by default with Equation.

You can add it manually. For this, optional options have to be added to the environment. of which length will be passed as argument. Can use variable length instead of fixed length. Like `\parindent`, `\linewidth` etc.

`\begin{fleqn}`:

`fleqn` : flush left equations.

Edit. The `flalign` (flush align) environment provided by AMS-LaTeX allows one to align multi-line equations.

Formula-specific options

- `fleqn`: left-alignment of formulas
- `leqno`: labels formulas on the left-hand side instead of right

These are two independent options manipulating the alignment and label position of formulas.

Program-7:

```
\documentclass[10pt,a4paper]{article}
\usepackage[utf8]{inputenc}
\usepackage{amsmath,nccmath}
\usepackage{amsfonts}
\usepackage{amssymb}
\usepackage[left=2cm,right=2cm,top=2cm,bottom=2cm]{geometry}
\begin{document}
```

```
\begin{center}
\Large{\textbf{Equations in \LaTeX}}
\end{center}
```

```
\section*{Equation 1}
```

```
%\begin{eqnarray}
%x = \frac{-b \pm \sqrt{b^2-4ac}}{2a} \\
%= \frac{-2 \pm \sqrt{2^2-4*(1)*(-8)}}{2*1}
%\end{eqnarray}
```

```
\begin{fleqn}
\[
x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}
\]
```

```
\[
= \frac{-2 \pm \sqrt{2^2-4*(1)*(-8)}}{2*1}
\]
```

```
\[
= \frac{-2 \pm \sqrt{4+32}}{2}
\]
```

`\end{fleqn}`

`\section*{Equation 2}`

`\begin{fleqn}`

`\[`

`\varphi^{\lambda}_{\sigma}A_t = \sum_{\pi \in C_t}`

`sgn(\pi)\varphi^{\lambda}_{\sigma}\varphi^{\lambda}_{\pi}`

`\]`

`\[`

`= \sum_{\tau \in C_{\sigma t}} \operatorname{sgn}(\sigma^{-1}`

`\tau\sigma)\varphi^{\lambda}_{\sigma}\varphi^{\lambda}_{\sigma^{-1}\tau\sigma}`

`\]`

`\[`

`= A_{\sigma t} \varphi^{\lambda}_{\sigma}`

`\]`

`\end{fleqn}`

`\end{document}`

Program-8:

Develop a LaTeX script to demonstrate the presentation of Numbered theorems, definitions, corollaries, and lemmas in the document.

Points to Remember:

`\usepackage[english]{babel}`:

Babel. The babel package presented in the introduction allows the use of characters from a range of languages and also translates some elements within the document. babel also automatically activates the appropriate hyphenation rules for the language you choose.

Hyphenation

LaTeX was written for use with English, and so there are very few language-specific issues facing authors in English. The main one is hyphenation: UK and US traditions are different. LaTeX starts out using US English patterns, but you can switch to UK ones using babel.

`\usepackage{amsthm}`:

The package facilitates the kind of theorem setup typically needed in American Mathematical Society publications. The amsthm package provides an enhanced version of LATEX's `\newtheorem` command for defining theorem-like environments. It can be useful to have an unnumbered theorem-like environment to add remarks, comments or examples to a mathematical document. The amsmath package is a LATEX package that provides miscellaneous enhancements for improving the information structure and printed output of documents that contain mathematical formulas. Provides a proof environment and extensions for the `\newtheorem` command.

`\newtheorem`:

provides a simple way to typeset the statements of Theorems, Lemmas, Conjectures and so on. For each such type of statement appearing in your text, you create an environment using the `\newtheorem` command. For example, `\newtheorem{prop}{Proposition}` sets up an environment named prop for typesetting Propositions.

provides a simple way to typeset the statements of Theorems, Lemmas, Conjectures and so on. For each such type of statement appearing in your text, you create an environment using the `\newtheorem` command. For example,

`\newtheorem{prop}{Proposition}`

There is no formal distinction between a lemma and a theorem, only one of intention (see Theorem terminology). However, a lemma can be considered a minor result whose sole purpose is to help prove a more substantial theorem – a step in the direction of proof.

`\theoremstyle`:

The command `\theoremstyle{ }` sets the styling for the numbered environment defined right below it.

`\newtheorem;`

The `\newtheorem` command is used to create environments for mathematical theorems, definitions etc. that will be formatted and numbered in a consistent style.

`\label{pythagorean};`

So the Pythagorean theorem states the area h^2 of the square drawn on the hypotenuse is equal to the area a^2 of the square drawn on side a plus the area b^2 of the square drawn on side b . The Pythagorean Theorem is the common geometric fact that the sum of the squares of the lengths of the two legs of a right triangle equals the square of the length of hypotenuse. This theorem is central to the computation of distances on a plane or in three-dimensional space, which are explored in the next module

PROGRAM-8

```
\documentclass{article}
\usepackage[english]{babel}
\usepackage{amsthm}

\newtheorem{theorem}{Theorem}[section]
\newtheorem{corollary}{Corollary}[theorem]
\newtheorem{lemma}[theorem]{Lemma}

\theoremstyle{definition}
\newtheorem{definition}{Definition}[section]

\begin{document}
\section{Numbered theorems, definitions, corollaries and lemmas}
Theorems can easily be defined:

\begin{theorem}
Let  $f$  be a function whose derivative exists in every point, then  $f$  is
a continuous function.
\end{theorem}

\begin{theorem}[Pythagorean theorem]
\label{pythagorean}
This is a theorem about right triangles and can be summarised in the next
equation

$$x^2 + y^2 = z^2$$

\end{theorem}
```

`\end{theorem}`

And a consequence of theorem `\ref{pythagorean}` is the statement in the next corollary.

`\begin{corollary}`

There's no right rectangle whose sides measure 3cm, 4cm, and 6cm.

`\end{corollary}`

You can reference theorems such as `\ref{pythagorean}` when a label is assigned.

`\begin{lemma}`

Given two line segments whose lengths are `\(a\)` and `\(b\)` respectively there is a real number `\(r\)` such that `\(b=ra\)`.

`\end{lemma}`

`\begin{definition}[Absolute value function]`

The absolute value function can be specified as a two-part definition as follows: `\`

`$`

`|x| =`

`\left\{`

`\begin{array}{ll}`

`x & \mbox{if } x \geq 0 \`

`-x & \mbox{if } x < 0`

`\end{array}`

`\right.`

`$`

`\end{definition}`

`\end{document}`

Program-9:

Develop a LaTeX script to create a document that consists of two paragraphs with a minimum of 10 citations in it and display the reference in the section.

Points to Remember:

For including references we need to first create a **ref.bib** file in the proper BibTeX format. which is as shown below. Depending on the kind of reference you have to maintain the structure as shown in example.

Ref.bib

```
@ARTICLE{oilindustry,
author={Ngoenriang, Napat and Turner, Stephen John and Niyato, Dusit and
Supittayapornpong, Sucha},
journal={IEEE Internet of Things Journal},
title={Joint UAV-Placement and Data Delivery in Aerial Inspection under Uncertainties},
year={2021},
volume={},
number={},
pages={1-1},
doi={10.1109/JIOT.2021.3113713}}
```

```
@ARTICLE{uavservice,
author={Qu, Yuben and Dai, Haipeng and Wang, Haichao and Dong, Chao and Wu, Fan and
Guo, Song and Wu, Qihui}, journal={IEEE Journal on Selected Areas in Communications},
title={Service Provisioning for UAV-Enabled Mobile Edge Computing},
year={2021},
volume={39},
number={11},
pages={3287-3305},
doi={10.1109/JSAC.2021.3088660}
}
```

```
@misc{cplex,
author = {IBM},
title = {IBM CPLEX Optimizer},
howpublished = "\url{https://www.ibm.com/in-en/analytics/cplex-optimizer}",
year = {2021},
note = "[Online; accessed 3-Feb-2022]"
}
```

```
@misc{rsome,
  author = {NSU},
  title = {RSOME},
  howpublished = "\url{https://xiongpengnus.github.io/rsome/}",
  year = {2021},
  note = "[Online; accessed 3-Feb-2022]"
}
```

```
@INPROCEEDINGS{hardtoshare,
  author={He, Ting and Khamfroush, Hana and Wang, Shiqiang and La Porta, Tom and Stein, Sebastian},
  booktitle={IEEE 38th International Conference on Distributed Computing Systems (ICDCS)},
  title={It's Hard to Share: Joint Service Placement and Request Scheduling in Edge Clouds with Sharable and Non-Sharable Resources},
  year={2018},
  volume={},
  number={},
  pages={365-375},
  doi={10.1109/ICDCS.2018.00044}
}
```

```
@INPROCEEDINGS{multicell,
  author={Poularakis, Konstantinos and Llorca, Jaime and Tulino, Antonia M. and Taylor, Ian and Tassiulas, Leandros},
  booktitle={IEEE Conference on Computer Communications (INFOCOM)},
  title={Joint Service Placement and Request Routing in Multi-cell Mobile Edge Computing Networks},
  year={2019},
  volume={},
  number={},
  pages={10-18},
  doi={10.1109/INFOCOM.2019.8737385}
}
```

```
@ARTICLE{bandwidth,
  author={Poularakis, Konstantinos and Llorca, Jaime and Tulino, Antonia M. and Taylor, Ian},
  journal={IEEE/ACM Transactions on Networking},
  title={Service Placement and Request Routing in MEC Networks With Storage, Computation, and Communication Constraints},
  year={2020},
  volume={28},
```

```

number={3},
pages={1047-1060},
doi={10.1109/TNET.2020.2980175}
}

```

```

@INPROCEEDINGS{dataintensive,
  author={Farhadi, Vajiheh and Mehmeti, Fidan and He, Ting and Porta, Tom La and
Khamfroush, Hana and Wang, Shiqiang and Chan, Kevin S},
  booktitle={IEEE Conference on Computer Communications(INFOCOM)},
  title={Service Placement and Request Scheduling for Data-intensive Applications in Edge
Clouds},
  year={2019},
  volume={},
  number={},
  pages={1279-1287},
  doi={10.1109/INFOCOM.2019.8737368}
}

```

```

@ARTICLE{resource,
author={Ahmed, Shakil and Chowdhury, Mostafa Zaman and Sabuj, Saifur Rahman and
Alam, Md Imtiajul and Jang, Yeong Min}, journal={IEEE Access}, title={Energy-Efficient
UAV Relaying Robust Resource Allocation in Uncertain Adversarial Networks},
year={2021}, volume={9}, number={}, pages={59920-59934},
doi={10.1109/ACCESS.2021.3073015}}

```

```

@ARTICLE{resource2, author={Yang, Zhaohui and Pan, Cunhua and Wang, Kezhi and Shikh-
Bahaei, Mohammad}, journal={IEEE Transactions on Wireless Communications},
title={Energy Efficient Resource Allocation in UAV-Enabled Mobile Edge Computing
Networks}, year={2019}, volume={18}, number={9}, pages={4576-4589},
doi={10.1109/TWC.2019.2927313}}

```

```

@ARTICLE{offload, author={Apostolopoulos, Pavlos Athanasios and Fragkos, Georgios and
Tsiropoulou, Eirini Eleni and Papavassiliou, Symeon}, journal={IEEE Transactions on Mobile
Computing}, title={Data Offloading in UAV-assisted Multi-access Edge Computing
Systems under Resource Uncertainty}, year={2021}, volume={}, number={}, pages={1-1},
doi={10.1109/TMC.2021.3069911}}

```

```

@INPROCEEDINGS{offload2, author={Zhou, Fuhui and Wu, Yongpeng and Sun, Haijian
and Chu, Zheng}, booktitle={2018 IEEE International Conference on Communications
(ICC)}, title={UAV-Enabled Mobile Edge Computing: Offloading Optimization and

```


Trajectory Design}, year={2018}, volume={}, number={}, pages={1-6},
doi={10.1109/ICC.2018.8422277}}

@ARTICLE{trajectory, author={Wang, Kai and Zhang, Xiao and Duan, Lingjie and Tie, Jun},
journal={IEEE Transactions on Mobile Computing}, title={Multi-UAV Cooperative
Trajectory for Servicing Dynamic Demands and Charging Battery}, year={2021},
volume={}, number={}, pages={1-1}, doi={10.1109/TMC.2021.3110299}}

@article{edgeuncertainty,
author = {Xu, Xiaolong and Cao, Hao and Geng, Qingfan and Liu, Xihua and Dai, Fei and
Wang, Chuanjian},
title = {Dynamic resource provisioning for workflow scheduling under uncertainty in edge
computing environment},
journal = {Concurrency and Computation: Practice and Experience},
volume = {n/a},
number = {n/a},
pages = {e5674},
keywords = {edge computing, SDN, uncertainty, workflow scheduling},
doi = {https://doi.org/10.1002/cpe.5674}
}

@ARTICLE{edgeuav, author={Qu, Yuben and Dai, Haipeng and Wang, Haichao and Dong,
Chao and Wu, Fan and Guo, Song and Wu, Qihui}, journal={IEEE Journal on Selected Areas
in Communications}, title={Service Provisioning for UAV-Enabled Mobile Edge Computing},
year={2021}, volume={39}, number={11}, pages={3287-3305},
doi={10.1109/JSAC.2021.3088660}}

@inproceedings{mobility,
title={UAV 3D Mobility Model Oriented to Dynamic and Uncertain Environment},
author={Na Wang and Nan Di and Fei Dai and Fangxin Liu},
booktitle={ICA3PP},
year={2018}
}

@ARTICLE{robust, author={Li, Bo and He, Qiang and Cui, Guangming and Xia, Xiaoyu and
Chen, Feifei and Jin, Hai and Yang, Yun}, journal={IEEE Transactions on Services
Computing}, title={READ: Robustness-oriented Edge Application Deployment in Edge
Computing Environment}, year={2020}, volume={}, number={}, pages={1-1},
doi={10.1109/TSC.2020.3015316}}

Next we will write the .tex file **main.tex** which includes paragraphs and wherever
citations/references are needed use the /cite tag with the appropriate reference identifier.

Main.tex

```
\documentclass{article}
\usepackage{graphicx} % Required for inserting images
```

```
\begin{document}
```

```
\begin{center}
  \Large{\textbf{References Demo}}
\end{center}
```

```
\section{Introduction}
%\section{Related Work}
```

For disaster management, uncertainty handling is the main key problem. But, in Joint Service deployment and Requests Allocation~(JSR) domain, research work mainly uses the approaches such as deterministic optimization \cite{hardtoshare, multicell, bandwidth}, Lyapunov optimization \cite{dataintensive}, stochastic optimization, replication of services to achieve high reliability, and forecasting of user requests using machine learning without considering uncertainty. In deterministic optimization \cite{edgeuav}, request demand is known before the run. However, in online optimization, time is divided into slots and performs optimization per slot basis, which does not consider uncertain demand. Even if we used any probability distribution to model demand, it does not provide the correct model/pattern to define the uncertain data \cite{edgeuncertainty}. Using a replication approach to achieve high availability also incurs extra resource cost \cite{robust}. Using the forecasting method also, we can not predict the impact of uncertain events on the requests, which may lead to under-provisioning/over-provisioning resources to process the required tasks \cite{rsome}.

```
\section{Experiment Setup and Performance Parameters}
```

To demonstrate the efficiency of the proposed approaches, we will simulate the scenario for an urban site affected by any natural calamity \cite{oilindustry}. To implement optimization models, we will use the IBM Cplex Optimizer tool \cite{cplex}.

```
\bibliographystyle{IEEEtran}
\bibliography{ref}
\end{document}
```

Program-10:

Develop a LaTeX script to design a simple tree diagram or hierarchical structure in the document with appropriate labels using the Tikz library.

Points to Remember:

`\usepackage{tikz}`:

TikZ is a LaTeX package that **allows you to create high quality diagrams**—and often quite complex ones too. In this first post we'll start with the basics, showing how to draw simple shapes, with subsequent posts introducing some of the interesting things you can do using the tikz package.

TikZ is probably the most complex and powerful tool to create graphic elements in LATEX. Starting with a simple example, this article introduces some basic concepts: drawing lines, dots, curves, circles, rectangles etc.

PROGRAM-10

```
\documentclass{article}
\usepackage{tikz}

\begin{document}

\begin{center}
\Large{\textbf{Hierarchy of Linux distributions}}
\end{center}

\begin{figure}[h]
\centering

\begin{tikzpicture} [every node/.style = {shape=rectangle, rounded corners, draw,
align=center}]
\path [draw,thick,-]
node (root)[red] {GNU/Linux}
[sibling distance=45mm, level distance=25mm]
child {node [cyan] {Debian}
[sibling distance=25mm, level distance=25mm]
child { node [cyan] {Ubuntu} }
child { node [cyan] {Linux Mint} }
% child { node {Elementary} }
}
child {node [magenta] {RedHat}}
```

```

[sibling distance=25mm, level distance=25mm]
  child { node [magenta] {Fedora} }
  child { node [magenta] {OpenSuse} }
}
child {node [blue] {Arch}
  [sibling distance=25mm, level distance=25mm]
  child { node [blue]{Manjaro} }
  child { node [blue]{EndeavourOS} }
};

\end{tikzpicture}
\caption{GNU/Linux Operating System Family}
\end{figure}

\pagebreak

\begin{center}
\Large{\textbf{SUV Cars}}

\end{center}

\begin{figure}[h]
\centering

\begin{tikzpicture} [every node/.style = {shape=rectangle, rounded corners, draw,
align=center}]
\path [draw,thick,-]
  [grow=-45]
  node (root)[red] {SUV}
  [sibling distance=45mm, level distance=25mm]

  child {node [cyan] {Tata}
  [sibling distance=25mm, level distance=25mm]
  child { node [cyan] {Nexon} }
  child { node [cyan] {Punch} }
%   child { node {Elementary} }
  }
  child {node [magenta] {Volkswagen}
  [sibling distance=25mm, level distance=25mm]
  child { node [magenta] {Taigun} }
  child { node [magenta] {Virtus} }

```

```

}
child {node [blue] {Maruti}
      [sibling distance=25mm, level distance=25mm]
      child { node [blue]{Brezza} }
      child { node [blue]{Vitara} }
};

\end{tikzpicture}
\caption{Car Brands Hierarchy}
\end{figure}

\end{document}

```

Program-11:

Develop a LaTeX script to present an algorithm in the document using algorithm/algorithmic/algorithm2e library.

Points to Remember:**`\usepackage{algorithm2e}`:**

Algorithm2e is an environment for writing algorithms in LATEX2e. An algorithm is defined as a floating object like figures. It provides macros that allow you to create different sorts of key words, thus a set of predefined key words is given. You can also change the typography of the keywords.

`\SetKwComment{Comment}`:

`\SetKwComment{Comment}{start}{end}` defines a macro `\Comment{text comment}` which writes text comment between start and end. In LaTeX, you can use the % (percent sign) to comment out a line of text in your source code. If you'd like to include comments that appear in the PDF of your project, you can use the todonotes package.

`\SetAlgoLined`:

`\SetAlgoLined` prints vertical lines between bloc start-end keywords as begin, end. `\SetAlgoLongEnd` acts like long end option.

PROGRAM-11:

```
\documentclass[10pt,a4paper]{article}
\usepackage[utf8]{inputenc}
\usepackage{amsmath}
\usepackage{amsfonts}
\usepackage{amssymb}
\usepackage{algorithm2e}
\usepackage[left=2cm,right=2cm,top=2cm,bottom=2cm]{geometry}
\begin{document}

\section*{Floyd's Algorithm}
Algorithm to find solution to All-Pairs Shortest-Paths Problem

\SetKwComment{Comment}{// }{ }

\vspace{1cm}
\begin{algorithm}[H]
\caption{Floyd(W [1..n, 1..n])}
```

```

\SetAlgoLined
\ DontPrintSemicolon
\ KwIn{The weight matrix  $W$  of a graph having vertices  $[1..n]$ }
\ KwOut{The distance matrix  $D$  of the shortest paths' lengths between every pair of
vertices  $[1..n]$ }
 $D$   $\gets$   $W$  \Comment*[r]{initially copy the weight matrix into distance
matrix}
\For{ $k$  \gets 1 to  $n$ }{
  \For{ $i$  \gets 1 to  $n$ }{
    \For{ $j$  \gets 1 to  $n$ }{
       $D[i,j]$   $\gets$   $\min\{\lbrace D[i,j], D[i,k] + D[k,j]\}$ 
    }
  }
}
\Return{ $D$ };

\end{algorithm}
\end{document}

```

Program-12:

Develop a LaTeX script to create a simple report and article by using suitable commands and formats of user choice.

```
\documentclass[6pt,a4paper]{report}
\usepackage[utf8]{inputenc}
\usepackage{amsmath}
\usepackage{amsfonts}
\usepackage{amssymb}
\usepackage{graphicx}
\usepackage[left=3cm,right=3cm,top=2cm,bottom=2cm]{geometry}
\author{Lekhaka}
\title{Varadhi}
\begin{document}

\maketitle
\chapter{Free Software}
\section*{What is Free Software?}
"\textbf{Free software}" means software that respects users' freedom and community.
Roughly, it means that \textbf{the users have the freedom to run, copy, distribute, study,
change and improve the software}. Thus, "free software" is a matter of liberty, not price.
To understand the concept, you should think of "\textit{free}" as in "\textit{free
speech}," not as in "\textit{free beer}." We sometimes call it "\textbf{libre software},"
borrowing the French or Spanish word for "free" as in freedom, to show we do not mean
the software is gratis.

You may have paid money to get copies of a free program, or you may have obtained copies
at no charge. But regardless of how you got your copies, you always have the freedom to
copy and change the software, even to sell copies.

We campaign for these freedoms because everyone deserves them. With these freedoms,
the users (both individually and collectively) control the program and what it does for
them. When users don't control the program, we call it a "\textit{nonfree}" or
"\textit{proprietary}" program. The nonfree program controls the users, and the
developer controls the program; this makes the program an instrument of unjust power.

"\emph{Open source}" is something different: it has a very different philosophy based on
different values. Its practical definition is different too, but nearly all open source
programs are in fact free.

\section*{The Free Software Definition}
```


The free software definition presents the criteria for whether a particular software program qualifies as free software. \\

`\textbf{The four essential freedoms}` `\\`

A program is free software if the program's users have the four essential freedoms:

- `\\`
- `\begin{itemize}`
- `\item` The freedom to run the program as you wish, for any purpose (freedom 0).
 - `\item` The freedom to study how the program works, and change it so it does your computing as you wish (freedom 1). Access to the source code is a precondition for this.
 - `\item` The freedom to redistribute copies so you can help others (freedom 2).
 - `\item` The freedom to distribute copies of your modified versions to others (freedom 3).

`\end{itemize}`

By doing this you can give the whole community a chance to benefit from your changes. Access to the source code is a precondition for this. \\

A program is free software if it gives users adequately all of these freedoms. Otherwise, it is nonfree. While we can distinguish various nonfree distribution schemes in terms of how far they fall short of being free, we consider them all equally unethical.

`\chapter{Listing Environment}`

`\begin{small}`

`\section*{Unordered lists}`

`\subsection*{Groceries List}`

`\begin{itemize}`

- `\item` Eggs
- `\item` Milk
- `\item` Biscuits
- `\item` Rice

`\end{itemize}`

`\subsection*{Football Teams}`

`\begin{itemize}`

- `\item` English Premier League
- `\begin{itemize}`

```

\item Manchester United
\item Liverpool
\end{itemize}

```

```

\item La Liga
\begin{itemize}
\item Barcelona
\item Real Madrid
\end{itemize}

```

```

\item Bundesliga
\begin{itemize}
\item Bayern Munich
\item Borussia Dortmund
\end{itemize}
\end{itemize}

```

```

\section*{Ordered lists}
\subsection*{ICC WTC Rankings}
\begin{enumerate}
\item India
\item Australia
\item New Zealand
\end{enumerate}

```

```

\subsection*{Countries ranked by Market Cap}
\begin{enumerate}
\item Asia
\begin{enumerate}
\item China
\item Japan
\item India
\end{enumerate}
\end{enumerate}

```

```

\item Europe
\begin{enumerate}
\item United Kingdom
\item France
\item Germany
\end{enumerate}

```

```

\end{enumerate}

```

`\end{small}`

`\end{document}`