TECHNICAL WRITING USING LATEX

(Effective from the academic year 2023 -2024))

SEMESTER - IV

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: This course (18CSL48) will enable students to:

- 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

SL.NO	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.

<table>
<tr><td></td><td>
<table>
<tr><th rowspan="2">S.No</th><th rowspan="2">USN</th><th rowspan="2">Student Name</th><th colspan="3">Marks</th></tr>
<tr><th>Subject1</th><th>Subject2</th><th>Subject3</th></tr>
<tr><td>1</td><td>4XX22XX001</td><td>Name 1</td><td>89</td><td>60</td><td>90</td></tr>
<tr><td>2</td><td>4XX22XX002</td><td>Name 2</td><td>78</td><td>45</td><td>98</td></tr>
<tr><td>3</td><td>4XX22XX003</td><td>Name 3</td><td>67</td><td>55</td><td>59</td></tr>
</table>
</td></tr>
<tr><td>6</td><td>Develop a LaTeX script to include the side-by-side graphics/pictures/figures in the document by using the subgraph concept</td></tr>
<tr><td>7</td><td>Develop a LaTeX script to create a document that consists of the following two mathematical equations
$$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$$
$$= \frac{-2 \pm \sqrt{2^2-4*(1)*(-8)}}{2*1}$$
$$= \frac{-2 \pm \sqrt{4+32}}{2}$$
$$\varphi_\sigma^\lambda A_t = \sum_{\pi \in C_t} \operatorname{sgn}(\pi) \varphi_\sigma^\lambda \varphi_\pi^\lambda$$
$$= \sum_{\tau \in C_{\sigma t}} \operatorname{sgn}(\sigma^{-1}\tau\sigma) \varphi_\sigma^\lambda \varphi_{\sigma^{-1}\tau\sigma}^\lambda$$
$$= A_{\sigma t} \varphi_\sigma^\lambda$$</td></tr>
<tr><td>8</td><td>Develop a LaTeX script to demonstrate the presentation of Numbered theorems, definitions, corollaries, and lemmas in the document</td></tr>
<tr><td>9</td><td>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</td></tr>
<tr><td>10</td><td>Develop a LaTeX script to design a simple tree diagram or hierarchical structure in the document with appropriate labels using the Tikz library</td></tr>
<tr><td>11</td><td>Develop a LaTeX script to present an algorithm in the document using algorithm/algorithmic/algorithm2e library</td></tr>
<tr><td>12</td><td>Develop a LaTeX script to create a simple report and article by using suitable commands and formats of user choice.</td></tr>
</table>

LATEX

The Latex is a high-quality typesetting system, used for the documentation of scientific and technical documents. It is widely used in **academia** for the communication and the publication of scientific papers popularly in fields such as economics, sociology, mathematics, chemistry, physics, engineering, etc. It also handles the formatting layout of different structures. The name is stylized as **LATEX**.

The Latex is the markup language used for the typesetting of the technical documents. To learn Latex, you must have a great idea of MS Word and the way or method in which you want to design your document. It also needs an understanding of mathematics and related commands.

LaTeX is pronounced as '***lah-tech***' or '***lay-tech***.' which is distributed under the LPPL (Latex Project Public License). It is based on TEX, a typesetting language designed for science and math. Both **LATEX** and **TEX** contain a variety of font styles, such as serif, typewriter, and a set of mathematical functions. It is an open-source and powerful document preparation system. It is high-quality typesetting, which can be used for any publishing. It is often used for scientific publications and medium to large technical documents. It is not a word processor or any word document, but it is an efficient way for the publishers and the authors to organize their materials. It gives a unique appearance to the system. It saves the time for designing as well as the efforts used for the documents.

The **Latex system** handles the layout and formatting of the structures using familiar concepts of the section, table, figure, chapter, etc. It follows the philosophy of separate presentation, i.e., separating the writing contents and the visual appearance so that the authors can focus more on the content rather than its appearance. It is named as the standard for the communication and publication of the technical or scientific documents.

Features of Latex

- Latex is a markup language and free license software. It includes a set of built-in commands.
- It is a mode of mathematical and special symbols.
- LaTeX is generally distributed along with plain **TEX**, i.e., it provides a set of macros for TEX to interpret. The other macros for TEX are Plain TEX, GNU Texinfo, etc.

- LaTeX is not compatible with the GNU (General Public License). It is available on most of the operating systems like UNIX, BSD, Linux, Windows, DOS, etc

FILE TYPES

The file sizes of the Latex are generally smaller than the Word document files. The default extension used is **.tex**, which we can edit with notepad or Simpletext editor. The Latex file contains the text as well as the commands for writing the text and equations for the formatting of the document.

MiKTeX is widely used for the implementation of Latex. For UNIX, you can download the Latex itself. The **OzTeXT** is used on the Macintosh (family of PC's manufactured and sold by Apple Inc.).

When LaTeX processes a file like abc.tex, it creates file abc.dvi, which stands for **DeVice Independent**. The '**.dvi**' is the older format than **.pdf**, which can be handled by many devices. Each platform in a computer has its program and files that can view **.dvi**, but you cannot send it to the printer. Most of the printers accept PostScript (**.ps**). In PC, you can open this file on PC with **YAP** (Yet Another Priewer) to print it. With the OzTeXT, you can directly print any file. But for UNIX, you have to first convert the .dvi file into the .ps file. The conversion in UNIX can be possible by using the programs such as dvips and then can send the file or data to the printer after the conversion.

LATEX EDITORS

Latex Editors are applications to write the Latex code and allow a user to edit and publish the paper in Latex. Below are some commonly used Latex Editors:

- **Texmaker:** It is the most popular editor and has the settings of spell checking and layout settings through the 'Quick Start' window. It is an open-source, multi-platform Latex editor with a built-in PDF Viewer. To get started, its **configuration window** allows the user to set the settings accordingly. The warnings and errors are also displayed with the corresponding line number, which makes the task easy for users.
- **TeXnicCentre:** It is primarily used for the Windows Operating System. It is free and open-source software and uses MikTex. It is used to navigate Latex documents and has a

powerful GUI editor. To create complex formulas and the documentation part of the scientists, it has pre-defined Latex snippets, which makes this task easy.

- **LyX:** It has some modern and unique features. It is available for systems like Windows, Linux, and macOS. With the use of its advanced scripts, you can also create a structured novel or script. The unique feature of LyX is its **automatic index creation**, which is only available in LyX. You can even drag-drop equations and can edit them using its advanced mathematical tools.
- **Texstudio:** It is based on the Texmaker and further adds support and features to it. These features include frequency count analysis, Document Word count, and more. It is quite popular among academia. It has more than 1000 Mathematical formulas and other key features like code folding, syntax highlighting, auto-corrections, structure viewing, and spell-checking.
- **TeXworks:** It also supports many features like auto-completion, Unicode support, and auto-correction. It is considered as one of the best editors because of its robust built-in Pdf viewer, interaction with external editors, and insertion of graphics. It also has a built-in PDF Viewer like other editors discussed above, but also possess an auto-synchronization feature.

The online Latex editors are:

- **Papeeria:** The features of an online Latex editor can be achieved by using its web-based UI and a **massive library of templates**. These templates include journals, articles, scientific magazines, etc. It also allows collaboration on the Latex document. It can be directly accessed from your web browser.
- **Authorea:** It has a collaboration and template feature. It also supports many file formats like Latex, HTML, etc. It is considered as the best web-based editor which possesses features like insertion of images, tables, auto-creation, ready-to-use templates, document revision history, etc.
- **Overleaf:** It covers **hundreds of templates** ranging from lab reports to formal letters. The feature which brings transparency to the editing work is its **real-time collaboration**. It has features, which make your documentation easier. As you enter the text, the Overleaf offers the real-time preview feature, which makes authors and editors familiar with the tool.

Some of the editors used for the Linux are:

- ✓ **Gummi:** It is considered as the basic editor used by the starters as it does not contain many excellent options and tools. It is based on the GTK+ toolkit. It lets you highlight the syntax, supports exporting the documents to PDF format, and helps with fundamental error checking functionalities.
- ✓ **TeXpen:** It is also a simple tool, as the above mentioned. It has the feature of auto-completion. It is considered as the most accessible tool of Latex. It also helps to improve the impressions and correct the grammar mistakes in the document.
- ✓ **Kile:** It is more just than an editor. Kile is available for Linux, as well as for Windows. It is an IDE tool like Eclipse, which provides complete access to work on projects and documents. It also has the feature of insert citations, organization of documents, auto-completion of commands, etc.

LATEX SYMBOLS

The Latex symbols are widely used in different subjects over hundreds of categories. For every symbol, which is used either in mathematics or other subjects, a corresponding command is used. This topic will give you a detail idea and explanation of the symbols, and in which way, all the symbols can be used.

With the use of standard text, you can use any symbol. This method not only saves the efforts or time but also gives the convenience to focus more on the content without wasting much time on finding the symbols and then proceeding with the content.

Below is the list of the commands divided into the particular categories. The essential commands used all over are:

- ❖ \ it is called backslash, used as the starting command. The line following it gets printed.
- ❖ **{}** it is called curly brackets, which is used to group and separate commands from its surroundings and must appear in pairs.
- ❖ \\ terminates a line.
- ❖ * it also terminates the line, but disallows the page break.
- ❖ **[]** it is used to write the optional parameters that can be passed to a command to change its behavior.
- ❖ **%** the Latex ignores the rest of the line or commands after %.

Experiment No 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.

Notes on the commands used

- \fancyhead{}: clears the settings for the headers
- \fancyfoot{}: clears the settings for the footers
- \fancyhead[RO,LE]{\textbf{ First Program using LaTex }: uses the header locations RO (RightOdd) and LE (LeftEven) to place the content \textbf{ First Program using LaTex }
- \fancyfoot[LE,RO]{\thepage}: uses the footer locations LE (LeftEven) and RO (RightOdd) to place the page number output by \thepage
- \fancyfoot[LO,CE]{ Dept of ISE,MyCEM }: uses the footer locations LO (LeftOdd) and CE (CentreEven) to place the content Dept of ISE MyCEM
- \fancyfoot[CO,RE]{ Dept of CSE MyCEM }: uses the footer locations CO (CentreOdd) and RE (RightEven) to place the content Dept of CSE MyCEM

Program:

```
\documentclass{article}
% Packages
\usepackage{fancyhdr} % For header and footer
\usepackage{lipsum} % For dummy text
% Header and footer settings
\pagestyle{fancy}
\fancyhf{}
\rfoot{\thepage}
\lhead{\textit{First Program using LaTex}}
\lfoot{\textit{ Dept of CSE/ISE,MyCEM }}
    % Document
\begin{document}
    \section{Section 1}
    \lipsum[1] % Dummy text
```

```
\section{Section 2}

\lipsum[2] % Dummy text

\end{document}
```

Sample Output

1 Section 1

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetuer id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

2 Section 2

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

Experiment No 2

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

Notes on the commands used

- **\usepackage{lipsum}:**lipsum is a package that inserts dummy text into a document
- **\title:** Title of the Documents
- **\author:** Author Name of the Documents
- **\vspace:** Vertical Space of the paragraphs

Program

```
\documentclass{article}
\usepackage{lipsum}

\title{Sample Abstract/Summary}
\author{Your Name}
\date{}

\begin{document}
    \maketitle
    \section*{Abstract}
    \lipsum[1]
    \vspace{0.5cm}
    \lipsum[3]
\end{document}
```

Sample Output

Sample Abstract/Summary

Harsha Kumar H S/Santhosh B R

Jun 6 2024

Abstract

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetuer id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum. Nulla malesuada porttitor diam. Donec felis erat, congue non, volutpat at, tincidunt tristique, libero. Vivamus viverra fermentum felis. Donec nonummy pellentesque ante. Phasellus adipiscing semper elit. Proin fermentum massa ac quam. Sed diam turpis, molestie vitae, placerat a, molestie nec, leo. Maecenas lacinia. Nam ipsum ligula, eleifend at, accumsan nec, suscipit a, ipsum. Morbi blandit ligula feugiat magna. Nunc eleifend consequat lorem. Sed lacinia nulla vitae enim. Pellentesque tincidunt purus vel magna. Integer non enim. Praesent euismod nunc eu purus. Donec bibendum quam in tellus. Nullam cursus pulvinar lectus. Donec et mi. Nam vulputate metus eu enim. Vestibulum pellentesque felis eu massa.

Experiment No 3

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

Program:

```
\documentclass[12pt, a4paper]{report} % Document class with font size 12pt and paper size A4
\usepackage{graphicx} % Package to include images
\usepackage{xcolor}
\usepackage{geometry} % Package to customize page layout
\geometry{a4paper, total={170mm, 257mm}, left=20mm, right=20mm, top=30mm,
bottom=30mm} % Customizing page margins
\thispagestyle{empty} % Suppressing page numbers for the title page


\begin{document}
        \begin{titlepage} % Starting the title page environment
                \begin{center} % Centering content
                % University Details
        \textbf{\textcolor{magenta}{\large \textit{VISVESVARAYA TECHNOLOGICAL
UNIVERSITY}}}\\
        {\normalsize Jnana Sangama, Belgaum-590018}\\
        \vspace{0.2in}
        \includegraphics[scale=0.3]{vtu.jpg}\\
        \vspace{0.3in}
                        % Title and Project Details
        \textbf{\textcolor{red}{A PROJECT REPORT}} \\
        ON \\
                \vspace{0.2in}
        \textbf{{\large "Create Report Format Using LaTeX"}}\\
                \vspace{0.1in}
        {\small Submitted in partial fulfillment of the requirements for the Fifth Semester
degree of Bachelor of Engineering in Computer Science Engineering of Visvesvaraya
Technological  University, Belagavi}\\
        \vspace{0.1in}
\textbf{BACHELOR OF ENGINEERING\\IN\\COMPUTER SCIENCE AND ENGINEERING}\\
        \vspace{0.2in}
```

```
% Student Details
\textbf{{Submitted by}}\\
\vspace{0.08in}

\begin{tabular}{ll}
\textbf{1MO22CS017} & \textbf{STUDENT -1}\\
\textbf{1MO22CS015} & \textbf{STUDENT -2}\\
\textbf{1MO22CS005} & \textbf{STUDENT -3}\\
\textbf{1MO22CS015} & \textbf{STUDENT -4}\\
\end{tabular}


\vspace{0.2in}
% Guide Details
\textbf{\textcolor{blue}{Under The Guidance of}}\\
Prof.HarshaKumar H S/Prof Santhosh B R\\
Asst. Professor Department of CSE/ISE\\

\vspace{0.2in}
% College Details
\includegraphics[scale=0.4]{Mycem.png}\\
\vspace{0.01in}

{\small DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING}\\
\vspace{0.1in}
\textbf{MYSORE COLLEGE OF ENGINEERING AND MANAGEMENT}\\
{\small1072, T Narsipura Road, Near Big Banyan Tree, Chikkahalli, Mysuru, Karnataka 570028}\\
\vspace{0.1in}
{\small 2024-2025}\\
\end{center} % Ending the center environment
\end{titlepage} % Ending the title page environment
\end{document}
```

Sample Output

VISVESVARAYA TECHNOLOGICAL UNIVERSITY

Jnana Sangama, Belgaum-590018

A PROJECT REPORT

ON

"Create Report Format Using LaTeX"

Submitted in partial fulfillment of the requirements for the Fifth Semester degree of Bachelor of Engineering in Computer Science Engineering of Visvesvaraya Technological University, Belagavi

BACHELOR OF ENGINEERING
IN
COMPUTER SCIENCE AND ENGINEERING

Submitted by

1MO22CS017 STUDENT -1
1MO22CS015 STUDENT -2
1MO22CS005 STUDENT -3
1MO22CS015 STUDENT -4

Under The Guidance of

Prof.HarshaKumar H S/Prof Santhosh B R
Asst. Professor Department of CSE/ISE

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

MYSORE COLLEGE OF ENGINEERING AND MANAGEMENT

1072, T Narsipura Road, Near Big Banyan Tree, Chikkahalli, Mysuru, Karnataka 570028

2024-2025

Experiment No 4

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

Program:

```
\documentclass[12pt, a4paper]{report}
\usepackage{graphicx}
\usepackage{geometry}
\geometry{a4paper, total={170mm, 257mm}, left=20mm, right=20mm, top=20mm,
bottom=20mm}
\thispagestyle{empty}

\begin{document}
        \begin{titlepage}
                \begin{center}
                \textbf{{\large VISVESVARAYA TECHNOLOGICAL UNIVERSITY}}\\
                        {\normalsize Jnana Sangama, Belgaum-590018}\\
                        \vspace{0.3in}
                        \includegraphics[scale=0.1]{vtu-logo.png}\\
                        \vspace{0.3in}
                        \textbf{\large CERTIFICATE}\\
                        \vspace{0.3in}
                        This is to certify that \\
                        \vspace{0.2in}
                        {\textbf{\underline{ABHI K}}}\\
                        \vspace{0.2in}
                        bearing University Seat Number \\
                        \vspace{0.2in}
                        {\textbf{\underline{4MO22CS001}}}\\
                        \vspace{0.2in}
                        has satisfactorily completed the project work entitled\\
                        \vspace{0.2in}
                        {\textbf{\underline{RESUME BUILDER WEB APPLICATION}}}\\
                        \vspace{0.2in}

        towards the partial fulfillment of the requirements for the award of the degree of\\
                        \vspace{0.2in}
                        \textbf{BACHELOR OF ENGINEERING\\IN\\COMPUTER
SCIENCE AND ENGINEERING}\\
                        \vspace{0.5in}
                        \hspace{1.7cm}\textbf{Guide} \hspace{2.8in} \textbf{Head of the
Department}\\
                        \vspace{0.2in}
                        \underline{\hspace{6cm}} \hspace{1.5in} \underline{\hspace{6cm}}\\
                        \vspace{0.1in}
                        \hspace{0.6cm}\textbf{(SANTHOSH B R)} \hspace{2in}
\textbf{(HARSHA KUMAR H S)}\\
                        \vspace{0.1in}
                        \textbf{(Assistant Professor)} \hspace{2.2in} \textbf{(Assistant
Professor)}\\
                        \vspace{0.1in}
```

```
                \textbf{(Department of CSE)} \hspace{2.1in} \textbf{(Department of
CSE)}\\
                \vspace{0.3in}
                \textbf{[Mysore College Of Engineering and Management]}\\
                \vspace{0.1in}
                \textbf{[Mysore]}\\
                \vspace{0.1in}
                \textbf{[AUGUST 2023-24]} % Replace with current month and year
            \end{center}
        \end{titlepage}
\end{document}
```

Sample Output:

VISVESVARAYA TECHNOLOGICAL UNIVERSITY
Jnana Sangama, Belgaum-590018

CERTIFICATE

This is to certify that

_____

(Name of the student)

bearing University Seat Number

_____

has satisfactorily completed the project work entitled

_____

(Title of the project)

towards the partial fulfillment of the requirements for the award of the degree of

BACHELOR OF ENGINEERING
IN
COMPUTER SCIENCE AND ENGINEERING

Guide	Head of the Department
_____	_____
(Guide's Name)	(HOD's Name)
(Guide's Designation)	(HOD's Designation)
(Department of CSE)	(Department of CSE)

[College Name]
[Location]
[Month Year]

Experiment No 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

Program:

```
\documentclass{article}
\usepackage{array, booktabs, multicol, multirow} % Load necessary packages
\renewcommand{\arraystretch}{1.8} % Adjust vertical spacing in tables

\begin{document}
        \centering
        \textbf{\Large{Student Details and Marks}} % Title
        \vspace{0.1in}

        \begin{table}[h]
                \centering
                \begin{tabular}{|c|c|c|c|c|c|} % Define table with 6 columns,
all centered
                        \hline
                        \multirow{2}{*}{\textbf{S.No}} &
\multirow{2}{*}{\textbf{USN}} & \multirow{2}{*}{\textbf{Student Name}} &
\multicolumn{3}{c|}{\textbf{Marks}} \\ % Multirow for headers spanning 2 rows,
Multicolumn for header "Marks" spanning 3 columns
                        \cline{4-6} % Horizontal line from column 4 to 6
                        & & & \textbf{ADA} & \textbf{Microcontroller} &
\textbf{DBMS} \\ % Sub-headers for marks
                        \hline
                        \multicolumn{1}{|c|}{1} &
\multicolumn{1}{c|}{4MO22CS001} & \multicolumn{1}{c|}{ABHISHEK K S } & 89 & 60
& 90 \\ % Data rows
                        \hline
                        \multicolumn{1}{|c|}{2} &
\multicolumn{1}{c|}{4MO22CS002} & \multicolumn{1}{c|}{ADITHYA SHETTY H D} & 78
& 45 & 98 \\
                        \hline
                        \multicolumn{1}{|c|}{3} &
\multicolumn{1}{c|}{4MO22CS003} & \multicolumn{1}{c|}{AMRUTHA VARSHINI H N} &
67 & 55 & 59 \\
                        \hline
                \end{tabular}
        \end{table}

\end{document}
```

Sample Output:

Student Details and Marks

S.No	USN	Student Name	Marks		
			Subject1	Subject2	Subject3
1	4XX22XX01	Name 1	89	60	90
2	4XX22XX02	Name 2	78	45	98
3	4XX22XX03	Name 3	67	55	59

Experiment No 6

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

Program:

```
\documentclass{article}
\usepackage{graphicx}  % Required for including images
\usepackage{subcaption}  % Required for subfigures

\begin{document}

        \begin{figure}
                \centering
                \begin{subfigure}{0.48\linewidth}  % Subfigure environment for
the first image
                        \includegraphics[width=\linewidth]{NATURE1.jpg}  %
Include image1.jpg
                        \caption{Nature1}  % Caption for the first image
                        \label{fig:subfig1}  % Label for referencing the first
image
                \end{subfigure}
                \hfill  % Add horizontal space between subfigures
                \begin{subfigure}{0.48\linewidth}  % Subfigure environment for
the second image
                        \includegraphics[width=\linewidth]{NATURE2.jpg}  %
Include image2.png
                        \caption{Nature2}  % Caption for the second image
                        \label{fig:subfig2}  % Label for referencing the second
image
                \end{subfigure}
                \caption{Nature}  % Overall caption for the figure
                \label{fig:subfigures}  % Label for referencing the entire
figure
        \end{figure}

\end{document}
```

Sample Output:

(a) Nature1 (b) Nature2

Figure 1: Nature

Experiment 7

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

$$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$$

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

$$= \frac{-2 \pm \sqrt{4+32}}{2}$$

$$\varphi_\sigma^\lambda A_t = \sum_{\pi \in C_t} \operatorname{sgn}(\pi) \varphi_\sigma^\lambda \varphi_\pi^\lambda$$

$$= \sum_{\tau \in C_{\sigma t}} \operatorname{sgn}(\sigma^{-1}\tau\sigma) \varphi_\sigma^\lambda \varphi_{\sigma^{-1}\tau\sigma}^\lambda$$

$$= A_{\sigma t} \varphi_\sigma^\lambda$$

Program:

```
\documentclass{article}
\usepackage{amsmath} % Required for mathematical environments and commands

\begin{document}

\section*{Equations Set 1} % Section header for the first set of equations

\begin{align} % Begin the align environment for multiple equations
x &= -b \pm \sqrt{\sqrt[4]{b^2 - 4ac}} \notag \\ % First equation with \notag
to suppress numbering
x &= \frac{-b \pm \sqrt{22 - 4 \cdot 1 \cdot (-8)}}{2 \cdot 1} = \frac{-b \pm
\sqrt{\sqrt{4 + 32}}}{2} = \frac{-b \pm \sqrt{2}}{2} \notag % Second equation
with \notag to suppress numbering
\end{align} % End the align environment

\section*{Equations Set 2} % Section header for the second set of equations

\begin{align} % Begin the align environment for multiple equations
\varphi_{\sigma}^{\lambda} \cdot A_{t} &= \sum_{\pi \in C_{t}} \text{sgn}(\pi)
\cdot \varphi_{\sigma}^{\lambda} \cdot \varphi_{\pi}^{\lambda} \notag \\ %
First equation with \notag to suppress numbering
&= \sum_{\tau \in C_{\sigma}^{t}} \text{sgn}(\sigma^{-1} \tau \sigma)
\varphi_{\sigma}^{\lambda} \varphi_{\sigma^{-1} \tau \sigma}^{\lambda} \notag
\\ % Second equation with \notag to suppress numbering
&= A_{\sigma}^{t} \varphi_{\sigma}^{\lambda} \notag % Third equation with
\notag to suppress numbering
\end{align} % End the align environment

\end{document}
```

Sample Output:

Equations Set 1

$$x = -b \pm \sqrt{\sqrt[4]{b^2 - 4ac}}$$

$$x = \frac{-b \pm \sqrt{22 - 4 \cdot 1 \cdot (-8)}}{2 \cdot 1} = \frac{-b \pm \sqrt{\sqrt{4 + 32}}}{2} = \frac{-b \pm \sqrt{2}}{2}$$

Equations Set 2

$$\begin{aligned} \varphi_\sigma^\lambda \cdot A_t &= \sum_{\pi \in C_t} \operatorname{sgn}(\pi) \cdot \varphi_\sigma^\lambda \cdot \varphi_\pi^\lambda \\ &= \sum_{\tau \in C_\sigma^t} \operatorname{sgn}(\sigma^{-1}\tau\sigma) \varphi_\sigma^\lambda \varphi_{\sigma^{-1}\tau\sigma}^\lambda \\ &= A_\sigma^t \varphi_\sigma^\lambda \end{aligned}$$

Experiment 8

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

Program:

```
\documentclass{article}
\usepackage{amsthm}

% Define theorem-like environments
\newtheorem{theorem}{Theorem}[section] % Theorems numbered within sections
\newtheorem{definition}[theorem]{Definition} % Definitions share numbering with theorems
\newtheorem{corollary}[theorem]{Corollary} % Corollaries share numbering with theorems
\newtheorem{lemma}[theorem]{Lemma} % Lemmas share numbering with theorems

\begin{document}

        \section{Introduction}
        \begin{theorem}
          This is a theorem.
        \end{theorem}

        \begin{definition}
          This is a definition.
        \end{definition}

        \begin{corollary}
          This is a corollary.
        \end{corollary}

        \begin{lemma}
          This is a lemma.
        \end{lemma}

        \section{Another Section}
        \begin{theorem}
          Another theorem.
        \end{theorem}

\end{document}
```

Sample Output:

1 Introduction

Theorem 1.1. *This is a theorem.*

Definition 1.2. *This is a definition.*

Corollary 1.3. *This is a corollary.*

Lemma 1.4. *This is a lemma.*

2 Another Section

Theorem 2.1. *Another theorem.*

Experiment 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.

Program:

```
\documentclass{article}
\usepackage{cite}
\usepackage{lipsum}

\begin{document}

        \title{Sample Document with Citations}
        \author{SANTHOSH B R}
        \date{15/07/2024}
        \maketitle

        \section{Emerging Powers in International Politics}
          \lipsum[1]


        \section{Atomic Force Microscopy, a Powerful Tool in Microbiology}
      \lipsum[2]

        \bibliographystyle{plain}
        \bibliography{references}
        \begin{center}
 \textbf {\large{REFERENCES}}\\
  \end{center}
```


[1]. Surbhi Saraswat, Vishal Agarwal, Hari Prabhat Gupta, Rahul Mishra, Ashish Gupta, and Tanima Dutta. "Challenges and solutions in Software Defined Networking: 141 (2019) 23-58.(https://doi.org/10.1016/j.jnca.2019.04.020).\\

[2]. Zhao, D.; Zhu, M.; Xu, M. Supporting One Big AP illusion in enterprise WLAN an SDN-based solution. In Proceedings of the 2014 Sixth International Conference on Wireless Communications and Signal Processing (WCSP), Hefei, China, 23–25 October (2014).\\

[3]. A. K. Paul, A. Tachibana and T. Hasegawa, "NEXT: New enhanced available bandwidth measurement technique, algorithm and evaluation," 2014 IEEE 25th Annual International Symposium on Personal, Indoor, and Mobile Radio Communication (PIMRC), 2014, pp. 443-447, doi: 10.1109/PIMRC.\\2014.7136206.\\

[4]. A. A. Abbasi, A. Abbasi, S. Shamshirband, A. T. Chronopoulos, V. Persico and A. Pescapè, "Software-Defined Cloud Computing: A Systematic Review on Latest Trends and Developments," in IEEE Access, vol. 7, pp. 93294-93314, 2019, doi:10.1109/ACCESS.2019.2927822.\\

[5]. W. Tian, M. Du, X. Ji, G. Liu, Y. Dai and Z. Han, "Honeypot Detection StrategyAgainst Advanced Persistent Threats in Industrial Internet of Things: A ProspectTheoretic Game," in IEEE Internet of Things Journal, vol. 8, no. 24, pp. 17372-17381, 15Dec.15, 2021, doi: 10.1109/JIOT.2021.\\3080527.\\

[6]. A.P.Thangamuthu, B.Chithra, "BANDWIDTH EFFICIENT COOPERATIVE AND ENERGY BASED AUTHENTICATION FOR WIRELESS SENSOR NETWORK", in International Research Journal of Engineering and Technology (IRJET), Volume: 02 Issue: 09 | Dec-2015.\\

[7]. Arockia Panimalar.S, Rubasri.K, Sruthi.K, Rakshitha.K.R, "Wireless Sensor Network - An Outlook", in International Research Journal of Engineering and Technology (IRJET),Volume: 04 Issue: 09 | Sep -2017.\\

[8]. Nikhil S. Hage, Mrs.S.Kayalvizhi, "Efficient Data Gathering with Compressive Sensing in Wireless SensorNetworks" in International Research Journal of Engineering and Technology (IRJET), Volume: 03 Issue: 01 | Jan 2016.\\

[9]. Ayers, J. (2009), "Financing Urban Adaptation", in Bicknell, J., Dodman, D. and Satterthwaite, D.,Adapting Cities to Climate Change. London: Earthscan.\\

[10]. Harmeling, S. (2008), "Adaptation under the UNFCCC – The Road from Bonn to Poznan 2008". Bonn:German Watch (pre-edit version 1.0, August).

\end{document}

Sample Output:

Sample Document with Citations

SANTHOSH B R

15/07/2024

1 Emerging Powers in International Politics

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetuer id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

2 Atomic Force Microscopy, a Powerful Tool in Microbiology

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

REFERENCES

[1]. Surbhi Saraswat, Vishal Agarwal, Hari Prabhat Gupta, Rahul Mishra, Ashish Gupta, and Tanima Dutta. "Challenges and solutions in Software Defined Networking: 141 (2019) 23-58.(https://doi.org/10.1016/j.jnca.2019.04.020).

[2]. Zhao, D.; Zhu, M.; Xu, M. Supporting One Big AP illusion in enterprise WLAN an SDN-based solution. In Proceedings of the 2014 Sixth International

Conference on Wireless Communications and Signal Processing (WCSP), Hefei, China, 23–25 October (2014).

[3]. A. K. Paul, A. Tachibana and T. Hasegawa, "NEXT: New enhanced available bandwidth measurement technique, algorithm and evaluation," 2014 IEEE 25th Annual International Symposium on Personal, Indoor, and Mobile Radio Communication (PIMRC), 2014, pp. 443-447, doi: 10.1109/PIMRC.2014.7136206.

[4]. A. A. Abbasi, A. Abbasi, S. Shamshirband, A. T. Chronopoulos, V. Persico and A. Pescapè, "Software-Defined Cloud Computing: A Systematic Review on Latest Trends and Developments," in IEEE Access, vol. 7, pp. 93294-93314, 2019, doi:10.1109/ACCESS.2019.2927822.

[5]. W. Tian, M. Du, X. Ji, G. Liu, Y. Dai and Z. Han, "Honeypot Detection StrategyAgainst Advanced Persistent Threats in Industrial Internet of Things: A ProspectTheoretic Game," in IEEE Internet of Things Journal, vol. 8, no. 24, pp. 17372-17381, 15Dec.15, 2021, doi: 10.1109/JIOT.2021.3080527.

[6]. A.P.Thangamuthu, B.Chithra, "BANDWIDTH EFFICIENT COOPERATIVE AND ENERGY BASED AUTHENTICATION FOR WIRELESS SENSOR NETWORK", in International Research Journal of Engineering and Technology (IRJET), Volume: 02 Issue: 09 — Dec-2015.

[7]. Arockia Panimalar.S, Rubasri.K, Sruthi.K, Rakshitha.K.R, "Wireless Sensor Network - An Outlook", in International Research Journal of Engineering and Technology (IRJET),Volume: 04 Issue: 09 — Sep -2017.

[8]. Nikhil S. Hage, Mrs.S.Kayalvizhi, "Efficient Data Gathering with Compressive Sensing in Wireless SensorNetworks" in International Research Journal of Engineering and Technology (IRJET), Volume: 03 Issue: 01 — Jan 2016.

[9]. Ayers, J. (2009), "Financing Urban Adaptation", in Bicknell, J., Dodman, D. and Satterthwaite, D.,Adapting Cities to Climate Change. London: Earthscan.

[10]. Harmeling, S. (2008), "Adaptation under the UNFCCC – The Road from Bonn to Poznan 2008". Bonn:German Watch (pre-edit version 1.0, August).

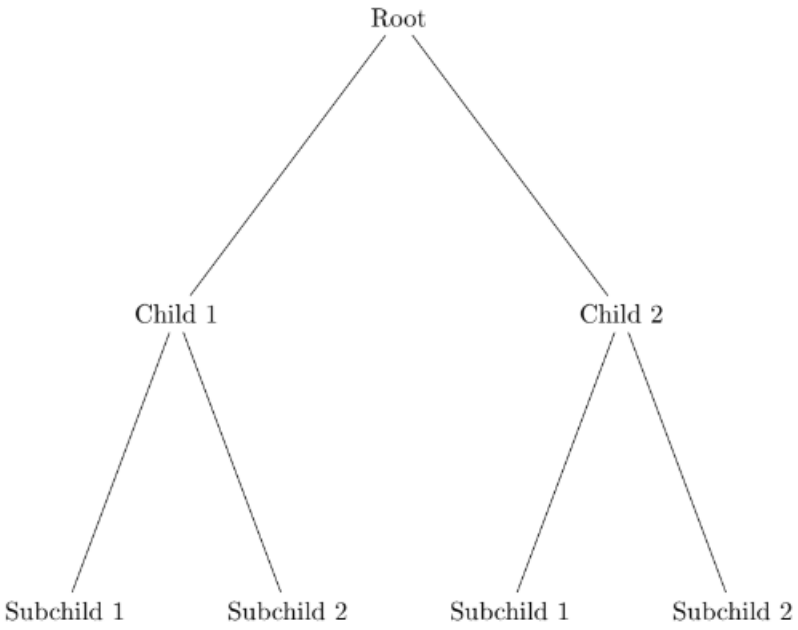
Experiment 10

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

Program:

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

\begin{document}
	\centering

	% Define styles for nodes
	\tikzstyle{level 1}=[level distance=4cm, sibling distance=6cm]
	\tikzstyle{level 2}=[level distance=4cm, sibling distance=3cm]

	% Begin TikZ picture
	\begin{tikzpicture}[grow=down, sloped]
		% Root node
		\node {Root}
		% First child
		child {
			node {Child 1} % First child node
			child {
				node {Subchild 1} % Subchild node
			}
			child {
				node {Subchild 2} % Subchild node
			}
		}
		% Second child
		child {
			node {Child 2} % Second child node
			child {
				node {Subchild 1} % Subchild node
			}
			child {
				node {Subchild 2} % Subchild node
			}
		};
	\end{tikzpicture}

\end{document}
```

Sample Output:



Experiment 11

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

Program:

```
\documentclass{article}
\usepackage{algorithm}
\usepackage{algpseudocode}

\begin{document}

    \begin{algorithm}
        \caption{Bubble Sort}
        \begin{algorithmic}[1]
            \Procedure{BubbleSort}{$A, n$}
            \For{$i \gets 0$ to $n-1$}
            \For{$j \gets 0$ to $n-1-i$}
            \If{$A[j] > A[j+1]$}
            \State Swap $A[j]$ and $A[j+1]$
            \EndIf
            \EndFor
            \EndFor
            \EndProcedure
        \end{algorithmic}
    \end{algorithm}

\end{document}
```

Sample Output:

Algorithm 1 Bubble Sort

```
1: procedure BubbleSort(A, n)
2:     for i ← 0 to n − 1 do
3:         for j ← 0 to n − 1 − i do
4:             if A[j] > A[j + 1] then
5:                 Swap A[j] and A[j + 1]
6:             end if
7:         end for
8:     end for
9: end procedure
```

Experiment 12

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

Program:

```
\title{Simple Report}
\author{SANTHOSH B R}
\date{13/07/2024}

\documentclass{report}
\usepackage{lipsum}

\title{Simple Report}
\author{SANTHOSH B R}
\date{13/07/2024}

\begin{document}

        \maketitle

        \tableofcontents

        \chapter{Introduction}
        \lipsum[1]

        \chapter{Methods}
        \lipsum[2]

        \chapter{Results}
        \lipsum[3]

        \chapter{Discussion}
        \lipsum[4]

        \chapter{Conclusion}
        \lipsum[5]

\end{document}
```

Sample Output:

Simple Report

SANTHOSH B R

12/07/2024

Contents

Chapter 1

Introduction

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetuer id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

Chapter 2

Methods

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

Chapter 3

Results

Nulla malesuada porttitor diam. Donec felis erat, congue non, volutpat at, tincidunt tristique, libero. Vivamus viverra fermentum felis. Donec nonummy pellentesque ante. Phasellus adipiscing semper elit. Proin fermentum massa ac quam. Sed diam turpis, molestie vitae, placerat a, molestie nec, leo. Maecenas lacinia. Nam ipsum ligula, eleifend at, accumsan nec, suscipit a, ipsum. Morbi blandit ligula feugiat magna. Nunc eleifend consequat lorem. Sed lacinia nulla vitae enim. Pellentesque tincidunt purus vel magna. Integer non enim. Praesent euismod nunc eu purus. Donec bibendum quam in tellus. Nullam cursus pulvinar lectus. Donec et mi. Nam vulputate metus eu enim. Vestibulum pellentesque felis eu massa.

Chapter 4

Discussion

Quisque ullamcorper placerat ipsum. Cras nibh. Morbi vel justo vitae lacus tincidunt ultrices. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. In hac habitasse platea dictumst. Integer tempus convallis augue. Etiam facilisis. Nunc elementum fermentum wisi. Aenean placerat. Ut imperdiet, enim sed gravida sollicitudin, felis odio placerat quam, ac pulvinar elit purus eget enim. Nunc vitae tortor. Proin tempus nibh sit amet nisl. Vivamus quis tortor vitae risus porta vehicula.

Chapter 5

Conclusion

Fusce mauris. Vestibulum luctus nibh at lectus. Sed bibendum, nulla a faucibus semper, leo velit ultricies tellus, ac venenatis arcu wisi vel nisl. Vestibulum diam. Aliquam pellentesque, augue quis sagittis posuere, turpis lacus congue quam, in hendrerit risus eros eget felis. Maecenas eget erat in sapien mattis porttitor. Vestibulum porttitor. Nulla facilisi. Sed a turpis eu lacus commodo facilisis. Morbi fringilla, wisi in dignissim interdum, justo lectus sagittis dui, et vehicula libero dui cursus dui. Mauris tempor ligula sed lacus. Duis cursus enim ut augue. Cras ac magna. Cras nulla. Nulla egestas. Curabitur a leo. Quisque egestas wisi eget nunc. Nam feugiat lacus vel est. Curabitur consectetuer.