Program No: 01

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.

```
\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{M.M Engineering College}}  % Document

\begin{document}

    \section{Section 1}

    \lipsum[1] % Dummy text

    \section{Section 2}

    \lipsum[2] % Dummy text

\end{document}
```

Program No: 02

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

```
\documentclass{article}
\usepackage{lipsum}  \title{Sample Abstract/Summary}
\author{}
\date{}  \begin{document}
        \maketitle
        \section*{Abstract}
        \lipsum[1]
        \vspace{0.5cm}
        \lipsum[3]
\end{document}
```

Program No: 03

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

```
\documentclass[12pt, a4paper]{report} % Document class with font size 12pt and paper size A4

\usepackage{graphicx} % Package to include images

\usepackage{geometry} % Package to customize page layout

\geometry{a4paper, total={170mm, 257mm}, left=20mm, right=20mm, top=20mm, bottom=20mm} % 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{{\large VISVESVARAYA TECHNOLOGICAL UNIVERSITY}}\\

            {\normalsize Jnana Sangama, Belgaum-590018}\\

            \vspace{0.3in}

            \includegraphics[scale=0.4]{vtu-logo.png}\\

            \vspace{0.3in}

            % Title and Project Details

            \textbf{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
Submitted by\\
\vspace{0.08in}
\begin{tabular}{ll}
    \textbf{2MM21CS017} & \textbf{Braham Kumar Sah}\\
    \textbf{2MM21AI015} & \textbf{Shoaib Akhtar}\\
    \textbf{2MM21CS005} & \textbf{Aman Kumar}\\
    \textbf{2MM21CS015} & \textbf{Bikash Kumar Singh}\\
\end{tabular}
\vspace{0.2in}
% Guide Details
\textbf{Under the Guidance of}\\
Mrs. Swati P\\
Asst. Professor Department of CSE\\
\vspace{0.2in}
% College Details
\includegraphics[scale=0.25]{mmec.png}\\
\vspace{0.01in}
{\small DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING}\\
\vspace{0.1in}
\textbf{MM ENGINEERING COLLEGE}\\
{\small Approved by AICTE, New Delhi, Affiliated to VTU, Belagavi, R. S. No.104 Village, Halbhavi Camp, Belagavi, Karnataka 591113}\\
\vspace{0.1in}
{\small 2023-2024}\\
    \end{center} % Ending the center environment
\end{titlepage} % Ending the title page environment
\end{document}
```

Program No: 04

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

```
\documentclass[12pt, a4paper]{report}
\usepackage{graphicx}
\usepackage{geometry}
\geometry{a4paper, total={170mm, 257mm}, left=20mm, right=20mm, top=10mm, bottom=10mm}
\thispagestyle{empty}  \begin{document}
    \begin{titlepage}
        \begin{center}
            \textbf{{\large VISVESVARAYA TECHNOLOGICAL UNIVERSITY}}\\
            {\normalsize Jnana Sangama, Belgaum-590018}\\
            \vspace{0.5in}
            \includegraphics[scale=0.4]{vtu-logo.png}\\
            \vspace{0.5in}
            \textbf{CERTIFICATE}\\
            \vspace{0.3in}
            This is to certify that \\
            \vspace{0.2in}
            \underline{\hspace{10cm}}\\
            \vspace{0.2in}
            (Name of the student)\\
            \vspace{0.2in}
            bearing University Seat Number \\
            \vspace{0.2in}
            \underline{\hspace{10cm}}\\
            \vspace{0.2in}
            has satisfactorily completed the project work entitled \\
            \vspace{0.2in}
            \underline{\hspace{10cm}}\\
            \vspace{0.2in}
```

```
(Title of the project)\\
\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}
\textbf{Guide} \hspace{3.5in} \textbf{Head of the Department}\\
\vspace{0.3in}
\underline{\hspace{6cm}} \hspace{1.5in} \underline{\hspace{6cm}}\\
\vspace{0.1in}
\textbf{(Guide's Name)} \hspace{2.7in} \textbf{(HOD's Name)}\\
\vspace{0.1in}
\textbf{(Guide's Designation)} \hspace{2in} \textbf{(HOD's Designation)}\\
\vspace{0.1in}
\textbf{(Department of CSE)} \hspace{2.1in} \textbf{(Department of CSE)}\\
\vspace{0.1in}
\textbf{[College Name]}\\
\vspace{0.1in}
\textbf{[Location]}\\
\vspace{0.1in}
\textbf{[Month Year]} % Replace with current month and year
    \end{center}
  \end{titlepage}
\end{document}
```

Program No: 05

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

```
\documentclass{article}
\usepackage{array, booktabs, multicol, multirow} % Load necessary packages
\renewcommand{\arraystretch}{1.2} % 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|} % 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{Subject1} & \textbf{Subject2} & \textbf{Subject3} \\ % Sub-headers for marks

			\hline

\multicolumn{1}{|c|}{1} & \multicolumn{1}{c|}{2MM22CS001} & \multicolumn{1}{c|}{Akshay} & 89 & 60 & 90 \\ % Data rows

			\hline

\multicolumn{1}{|c|}{2} & \multicolumn{1}{c|}{2MM22CS002} & \multicolumn{1}{c|}{Prashant} & 78 & 45 & 98 \\

			\hline

\multicolumn{1}{|c|}{3} & \multicolumn{1}{c|}{2MM22CS003} & \multicolumn{1}{c|}{Vivek} & 67 & 55 & 59 \\

\hline

		\end{tabular}

	\end{table}

\end{document}
```

Program No: 06

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

```
\documentclass{article}
\usepackage{graphicx} % Required for including images
\usepackage{subcaption} % Required for subfigures
\begin{document}
    \begin{figure}
        \centering
        \begin{subfigure}{0.46\linewidth} % Subfigure environment for the first image
            \includegraphics[width=\linewidth]{image1.png} % Include image1.jpg
            \caption{Caption for image 1} % Caption for the first image
            \label{fig:subfig1} % Label for referencing the first image
        \end{subfigure}
        \hfill % Add horizontal space between subfigures
        \begin{subfigure}{0.44\linewidth} % Subfigure environment for the second image
            \includegraphics[width=\linewidth]{image2.png} % Include image2.png
            \caption{Caption for image 2} % Caption for the second image
            \label{fig:subfig2} % Label for referencing the second image
        \end{subfigure}
        \caption{Combined caption for both images} % Overall caption for the figure
        \label{fig:subfigures} % Label for referencing the entire figure
    \end{figure}
\end{document}
```

Program No: 07

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

$$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$$
$$= \frac{-2 \pm \sqrt{2^2-4*(1)*(-8)}}{2*1}$$
$$= \frac{-2 \pm \sqrt{4+32}}{2}$$

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

```
\documentclass{article}
\usepackage{amsmath}
\begin{document}
\section*{Equations Set 1}
\begin{align}
x &= frac{-b \pm \sqrt{{b^2 - 4ac}}}{2a} \notag \\
x &= \frac{-b \pm \sqrt{22 - 4 \cdot 1 \cdot (-8)}}{2 \cdot 1} = \frac{-b \pm \sqrt{{4 +
32}}}{2} = \frac{-b \pm \sqrt{2}}{2} \notag
\end{align}
\section*{Equations Set 2}
\begin{align}
\varphi_{\sigma}^{\lambda} \cdot A_{t} &= \sum_{\pi \in C_{t}} \text{sgn}(\pi) \cdot
\varphi_{\sigma}^{\lambda} \cdot \varphi_{\pi}^{\lambda} \notag \\
&= \sum_{\tau \in C_{\sigma}^{t}} \text{sgn}(\sigma^{-1} \tau \sigma)
\varphi_{\sigma}^{\lambda} \varphi_{\sigma^{-1} \tau \sigma}^{\lambda} \notag \\
&= A_{\sigma}^{t} \varphi_{\sigma}^{\lambda} \
\end{align}
\end{document}
```

Program No: 08

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

```
\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}
```

Program No: 09

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.

Program9.tex

```
\documentclass{article}

\usepackage{cite}  \begin{document}

    \title{Sample Document with Citations}

    \author{}

    \date{}

    \maketitle

    \section{Emerging Powers in International Politics}

    he 21st century is marked by an increased attention to the appeal and positive image of a country as instruments of influence in the international arena\cite{bohomolov2012ghost}. There has appeared the concept of soft power, whose author, U.S\cite{sergunin2015understanding}. political scientist Joseph Nye described it as “the ability to get what you want through attraction rather than coercion or payments\cite{hill2006moscow}.” A nation’s image secures attractiveness and trust in a country, playing a crucial role as the key soft power component\cite{kiseleva2015russia}. Therefore, the efforts of states along this line relate not so much to the sphere of culture and information as to geopolitics\cite{kosachev2012spsecific}.

    \section{Atomic Force Microscopy, a Powerful Tool in Microbiology}

    Understanding the functions of microbial cell surfaces requires knowledge of their structural and physical properties\cite{dufrene2002atomic}. Electron microscopy has long been recognized as a key technique in microbiology to elucidate cell surface ultra structure\cite{engel1999atomic}. An exciting achievement has been the development of cryotechniques which allow high-resolution imaging of cell structures in conditions close to the native state\cite{franz2008atomic}. Yet direct observation in aqueous solution remained impossible.Because of the small size of microorganisms, the physical properties of their surfaces have been difficult to study\cite{marrese2017atomic}. Quantitative and qualitative information on physical properties can be obtained by electron microscopy techniques, X-ray photoelectron spectroscopy, infrared spectroscopy, contact angle, and electrophoretic mobility measurements\cite{altman2015noncontact}.

    \bibliographystyle{plain}

    \bibliography{references}

\end{document}
```

References.bib

@article{kosachev2012spsecific,
title={The specifics of Russian soft power},
author={Kosachev, Konstantin},
journal={Russia in Global Affairs},
volume={7},
number={3},
pages={1--11},
year={2012},
publisher={Фонд исследований мировой политики}
} @article{sergunin2015understanding,
title={Understanding Russia's soft power strategy},
author={Sergunin, Alexander and Karabeshkin, Leonid},
journal={Politics},
volume={35},
number={3-4},
pages={347--363},
year={2015},
publisher={SAGE Publications Sage UK: London, England}
} @article{kiseleva2015russia,
title={Russia's soft power discourse: identity, status and the attraction of power},
author={Kiseleva, Yulia},
journal={Politics},
volume={35},
number={3-4},
pages={316--329},
year={2015},
publisher={SAGE Publications Sage UK: London, England}
} @book{bohomolov2012ghost,
title={A ghost in the mirror: Russian soft power in Ukraine},

author={Bohomolov, Oleksandr and Lytvynenko, Oleksandr Valeri{\u\i}}ovych},
year={2012},
publisher={Chatham House London}
} @article{hill2006moscow,
title={Moscow discovers soft power},
author={Hill, Fiona},
journal={Current History},
volume={105},
number={693},
pages={341--347},
year={2006},
publisher={University of California Press}
} @article{dufrene2002atomic,
title={Atomic force microscopy, a powerful tool in microbiology},
author={Dufr{\^e}ne, Yves F},
journal={Journal of bacteriology},
volume={184},
number={19},
pages={5205--5213},
year={2002},
publisher={Am Soc Microbiol}
} @article{engel1999atomic,
title={Atomic force microscopy: a powerful tool to observe biomolecules at work},
author={Engel, Andreas and Lyubchenko, Yuri and M{\"u}ller, Daniel},
journal={Trends in cell biology},
volume={9},
number={2},
pages={77--80},
year={1999},
publisher={Elsevier}

} @article{franz2008atomic,
title={Atomic force microscopy: a versatile tool for studying cell morphology, adhesion and mechanics},
author={Franz, CM and Puech, P-H},
journal={Cellular and Molecular Bioengineering},
volume={1},
pages={289--300},
year={2008},
publisher={Springer}
} @article{marrese2017atomic,
title={Atomic force microscopy: a powerful tool to address scaffold design in tissue engineering},
author={Marrese, Marica and Guarino, Vincenzo and Ambrosio, Luigi},
journal={Journal of functional biomaterials},
volume={8},
number={1},
pages={7},
year={2017},
publisher={MDPI}
} @article{altman2015noncontact,
title={Noncontact atomic force microscopy: an emerging tool for fundamental catalysis research},
author={Altman, Eric I and Baykara, Mehmet Z and Schwarz, Udo D},
journal={Accounts of Chemical Research},
volume={48},
number={9},
pages={2640--2648},
year={2015},
publisher={ACS Publications}
}

Program No: 10

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

```
\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}
```

Program No: 11

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

```
\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}
```

Program No: 12

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

```
\documentclass{report}  \title{Simple Report}

\author{}

\date{}  \begin{document}

        \maketitle

        \tableofcontents

        \chapter{Introduction}

        This is the introduction.

        \chapter{Methods}

        This is the methods section.

        \chapter{Results}

        This is the results section.

        \chapter{Discussion}

        This is the discussion section.

        \chapter{Conclusion}

        This is the conclusion.

\end{document}
```