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.

```
\documentclass{article}

\usepackage{authoraftertitle}

\usepackage{fancyhdr}

\fancyhead{}

\fancyhead[L]{left header}

\fancyhead[R]{right header \quad \thepage}

\fancyfoot{}

\fancypagestyle{plain}{

\fancyhead{}

\fancyhead[C]{Trust Modeling for Recommendation}

\fancyfoot{}

\fancyfoot[C]{MSEC, Bangalore}

\fancyfoot[R]{\thepage}

}

\pagestyle{fancy}

\title{Explicit and Implicit Trust Modeling for Recommendation}

\begin{document}

\maketitle

\section{Introduction}

Recommendation has become an indispensable part of software systems, particularly e-commerce and online streaming applications such as Spotify (spotify.com) and Netflix (netflix.com), alleviating the load of search for users in a vast item collection and positively affecting the perception of the users about the applications through improved user experience.

\section{Literature Review}

Trust-aware recommendation is a challenging research problem and there is a variety of solutions that focus on the use of the trust information to improve the accuracy of recommendations, particularly alleviating cold start and rating data sparsity problems.

\end{document}
```

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

```
\documentclass{article}
\usepackage{ragged2e}
\title{\textbf{Abstract}}
\vspace{-8ex}
\date{}
\begin{document}
\maketitle
\thispagestyle{empty}
\justify{Whenever multi-sense or non-
domain specificity arises in a query it is
difficult to deliver exact or approximate
results to users for that query in
considerable time limit. }
\vspace{1mm}
\justify{The proposed model formulates
semantically inferred path algebra for a
query and performs the path mapping }
\vspace{1mm}
\justify{The content similarity function is used to
associate the categorical values to weighted attributes to
evaluate
overall content similarity.}
\justify{\textbf{Keywords:} Path algebra, Twig, APG,
Architectural clues, Content similarity.}
\end{document}
```

Program-03: Develop a LaTeX script to create a simple title page of the VTU project Report [Use suitable Logos and text formatting]

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

\usepackage{graphicx}
\usepackage{xcolor}
\begin{document}
\thispagestyle{empty}
\pagenumbering{roman}
\setcounter{page}{1}
\begin{center}
\textbf{\large Social Internet of Things}
\end{center}
\vspace{18mm}
\begin{center}
\begin{small}
A Project Report\\
Submitted for the Award of the Degree\\
of\\
Bachelor of Engineering\\
in\\
Information Science and Engineering\\
by\\
\vspace{.5cm}
\textbf{Komalavalli P}\\
IV SEM\\
\vspace{.3cm}
Under the guidance of\\
\vspace{.5cm}
\textbf{Mr. Rahul}\\
Associate Professor\\
MS Engineering College, Bangaluru\\
Visvesvaraya Technological University, Belgavi.\\
\end{small}
\vspace{10mm}
\centerline{\includegraphics[scale=.2]{vtul.png}}
\vspace{10mm}
Department of Information Science and Engineering\\
MS Engineering College, Bangaluru,\\Visvesvaraya Technological University, Belgavi.\\
\color{white}jg\color{black}\\
February 2025\\
\end{center}
\end{document}
```

Program-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[a4paper, 12pt]{report}

\usepackage{graphicx}
\usepackage{ragged2e}
\usepackage{xcolor}
\begin{document}


\thispagestyle{empty}
\pagenumbering{roman}
\setcounter{page}{1}
\begin{center}
\textbf{\large Visvesvarya Technological University}\newline
\textbf{\small JnanaSangama BELAGAVI - 590018}
\newline
\newline
\centerline{\includegraphics[scale=.1]{vtul.png}}
\newline
\newline
\textbf{\small DEPARTMENT OF INFORMATION SCIENCE AND ENGINEERING}
\newline
\newline
\textbf{\large CERTIFICATE}
\end{center}
\vspace{5mm}
\justify{This is to certify that Mr. Basvaraju K N bearing USN:1ME23IS008 is a bonafide
student of Bachelor of Engineering course of the Department of information
Science and Engineering, VTU, Belgavi, affiliated to Visvesvaray Technological
University, Belagavi. Project report on "Context-based Diversication of Search
Engines" is prepared by him under the guidance of Dr. Haneefa Shafi in partial
fulfillment of the requirements for the award of the degree of Bachelor of Engineering
of Visvesvaray Technological University, Belagavi, Karnataka.}
\newline
\newline
\newline
..... \hspace{16mm} .....\hspace{16mm}.....
\newline
\newline
Dr. Haneefa Shafi \hspace{16mm} Dr. Sangeetha P \hspace{14mm} Dr. Kuriyan M
A
\newline
\newline
```

Signature of Guide \hspace{13mm} Signature of HoD \hspace{11mm} Signature of Principal

\begin{center}

\vspace{10mm}

\textbf{\small EXTERNAL EXAMINER}

\end{center}

\vspace{5mm}

Name of Examiners \hspace{60mm} Signature with date

\newline

\newline

1.

\newline

\newline

2.

\end{document}

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

```
\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|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|}{4XX22XX01} & \
multicolumn{1}{c|}{Name 1} & 89 & 60 & 90 \\ % Data rows
            \hline
            \multicolumn{1}{|c|}{2} & \multicolumn{1}{c|}{4XX22XX02} & \
multicolumn{1}{c|}{Name 2} & 78 & 45 & 98 \\
            \hline
            \multicolumn{1}{|c|}{3} & \multicolumn{1}{c|}{4XX22XX03} & \
multicolumn{1}{c|}{Name 3} & 67 & 55 & 59 \\
            \hline
        \end{tabular}
    \end{table}    |||   \end{document}
```

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}{0.46\linewidth}  % Subfigure environment for the first image

            \includegraphics[width=\linewidth]{image1.jpg}  % 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}
```

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

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}
```

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}
```

(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.

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


\begin{document}
\title{A Social Relationships Based Service Recommendation System For SIoT Devices}
\author{}
\date{}
\maketitle
\section{Introduction}
\par The Internet of Things or IoT is a network of interconnected heterogeneous devices, objects, and machines that are uniquely identifiable which provide data transferability without the need for human-to-computer or human-to-human interaction. Based on the recent statistics released by Gartner \cite{omale2018gartner} shows that the number of connected devices in use in 2019 is 14.2 billion, and this number is expected to increase to 25 billion by 2025. IoT devices became a vital part of our daily lives. The applications of IoT have expanded to many areas such as consumer, commercial and industrial domains \cite{vongsingthong2014internet}. With this expansion, IoT applications in the consumer side have effectively settled on smart home, smart health care, and wearable devices scenarios.


\par The social structure of SIoT is inspired by Fiske's theory \cite{fiske1992four} which presents the social relationships between humans. Fiske studied the nature of human relationships and established a relational model of social interactions. }.


\bibliographystyle{ieeetr}
\bibliography{references.bib}
\end{document}
```

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}
```

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}
```

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

Program:

```
\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}
```