LATEX: AN EFFECTIVE OPEN SOURCE SOFTWARE FOR MATHEMATICAL LEARNING

NARENDRA.V.H[1]

Assistant Professor of Mathematics
Government First Grade College
Holalkere- 577526, Chitradurga - Dist.,
Karnataka-State, India

Abstract:

Nowadays Latex leads to many challenges to learn Mathematics and has been proved to be a very essential tool for the development of projects, texts, articles and thesis. So it's easy to get started, in writing a article, thesis, resume and prepared power point presentation work compare to Ms-word. However, software can be used to help students and teachers to develop Mathematical ideas from complex to simple way. Above mentioned software is easy to use, multipurpose system of program for symbolic manipulation of mathematical expressions in Computer Algebra System. It has its own inbuilt programming language designed for symbolic as well as arbitrary-precision numerical computations. The methods and approaches in simple way to write, learn and teach Mathematics are allow students and teachers to experiment and build models help to explain Mathematical ideas and concepts through software like laTex. This paper enlightens basic concepts and how to write mathematics programmes in laboratory, also modify and accept or reject conjectures as they are thinking about different Mathematical concepts. LaTeX makes it very simple to handle equations, figures, bibliographies, indexes, etc., and with this software focus on the content of the document and let the program handle how the output is formatted and preserved it.

Keywords: Technology, Mathematics, Software and Hardware etc.

Introduction:

The role of laTex has a long history in Mathematics education. So it is best choice to write their works in well organized form than MS-Word and also help readers to grub their work easily.

As we know that the role of software in studying Mathematics is not a new issue, since human beings always has been finding solutions to avoid time consuming routine work. From long time, the role of Mathematics was

restricted to purely all academic domain. But at present, the role of pure Mathematics was not limited to purely academic domain.

Research shows that LaTex can supply support to writing program in higher order problems of critical thinking, analysis, and scientific inquiry. Technology can be useful to the extent which focuses student thinking in ways that are relevant, not extraneous. For most of the students subject of Mathematics is a complex and also difficult. Most of the students' tendency is to consider the Mathematics subject as one which is hard, thus, leads to lack of interest in the topics being discussed.

It is great challenge for teachers and students to find out the solutions, in especially at different levels of study, where in a good writing program habit and a firm grasp of basic concepts should be write their work through latex. The Mathematical software very high precision numeric results by using exact fractions, arbitrary precision integers, variable precision floating graphs and variable precision floating point numbers. The use of symbolic computation allows solving many mathematical problems in an accurate manner.

History of Tex and LaTex

Tex is a typesetting program defining basic font description and various symbols.

➢ Written by Donald Knuth in 1978.
➢ LaTex is a complete documentation preparation system.
➢ A collection of macros to to create articles and books with ease.
➢ With ability handle mathematics, bibliographies etc.
➢ Created by Leslie Lamport in 1980
➢ LaTex is a complete Document Preparation Package.
➢ Supports many language scripts including many European languages such as German, Spanish etc.
➢ And Indian languages Devanaagari, Kannada, Tamil, etc...
➢ Supports complicated mathematical symbols and equations.
➢ Very friendly with scientific community.
➢ not a WYSWYG program

LaTeX

LaTeX, is free open source **s**oftware and its computer programming language used for typesetting technical documents.

Why you want to learn LaTeX?

• It's large technical documents and also generating powerful control documents.

• Minimizes the drudgery of formatting, numbering, and referencing.

• Encourages you to focus on the content rather than the appearance (which it takes care of very well).

• Takes a littleeffort to get up to speed, but saves hours of tweaking the layout.

- LaTeX is free & runs very quickly even on large documents and also runs on many platforms.

- Excellent for figures, tables, citations…

- LaTeX automatically generates table of contents, lists of figures, lists of tables, index, glossaries and bibliography.

- LaTeX is the best tool available for mathematical layout.

Font size:

\tiny \scriptsize \footnotesize

 \small \normalsize

\large \Large

\LARGE \huge

\Huge

How to start?

- Options → font size, paper size, columns, etc.,

- Class name → article, book, IEEEtrans, etc.,

- Body → your document content with LaTeX commands or statement to make document beautifully.

Arrays:

\begin{array}[options]{column space}

first row specification\\

Second row specification\\

:

last row specification

\end{array}

LaTeX Basics:

1. LaTeX on Windows using TeXworks:

Article writing

\document class [12pt, a4paper] {article}

\usepackage [hmargin=4.5cm, vmargin=4.5cm] {geometry}

\begin{document}

\section{This is the first session}

Respected sir, its working.

\end{document}

2. Report Writing Book:

\document class [12pt, a5paper] {report}

\usepackage [hmargin=2.5cm, vmargin=2.5cm] {geometry}

\title{Introduction to Report Writing}

\author{Narendra V.H.}

\date{\today\\First edition on June-2015}

\begin{document}

\maketitle

\tableofcontents

\chapter{First Chapter}

\section{This is the first session}

Text corresponding to this section goes here.

Some preliminary Sentencescould go first, before the subsections start.

\chapter{Second Chapter}

\section{Inserted section}

\subsection{First subsection in first section}

Hello world!

\subsubsection{First subsubsection}

Low level text, some more text.

\end{document}

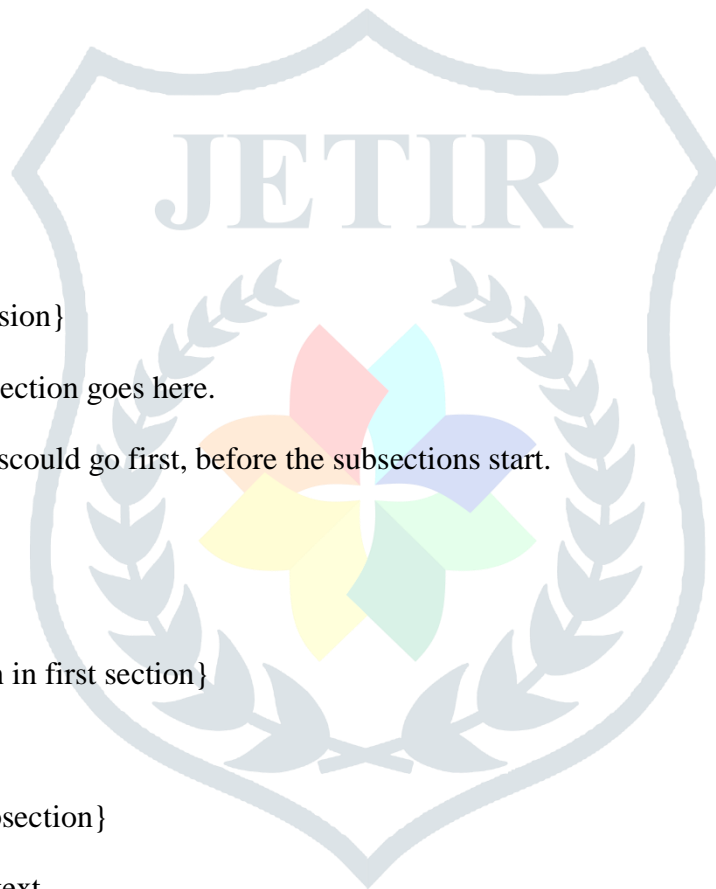## 3. Letter Writing:

\documentclass[12pt]{letter}

\address{Narendra V.H \\

Department of Mathematics \\

Govt. First Grade College\\

Holakere\\

narendravh@gmail.com}

\date{12Dec2020}

\signature {Narendravh}

\begin{document}

\begin{letter}

{\\Coordinator, One Week FDP on Scilab and LaTeX\\HRDC}

\opening{Dr Lata Chanchlani}

We want to thank you for launching the HRDC with an outlay of Rs. 4,600 crore (\\$ 1Billion), to improve the levels of education in India. Weare delighted by its excellent features:

\begin{enumerate}

\item Rs. 1,800 crore has been reserved for content generation and the rest to establish good connectivity in all 20,000 Colleges and 200 universities.

\item Support for all good proposals, including those from Private colleges.

\item all products funded by this mission will be deliveredas open source.

\item Web based support through www.sakshat.ac.in.

\end{enumerate}

We pledge our support for popularizing this mission and for its Success. Regards.

\closing{Yours sincerely,}

\cc{Principal\\ Govt.First Grade College, Holalkere}

\end{letter}

\end{document}

 4. Mathematical Typesetting: In mathematical type setting we easily type mathematical symbols, subscripts, superscripts and matrices typing technique in Latex software. It helped lot for us to make documents of mathematics symbols and equations.

Maths typing

\document class [12pt, a5paper] {article}

\usepackage{amsmath}

\usepackage[hmargin=4.5cm,

vmargin=3cm] {geometry}

\title{Tutorial on Mathematical Typesetting}

\author {Narendra V.H. \\ GFGC Holalkere}

\date{10 June 2020}

\setlength\parindent{0pt}

\begin{document}

\maketitle

α, β, γ, δ\\

αa\\

$\alpha \ a$\\

$\alpha \quad a$\\

product of $\alpha $ and a is

αa\\

-α\\

$-\alpha$\\

$\frac ab$\\

$\frac {ab} {cd}$\\

x_a\\

x^3\\

A=
$\begin{pmatrix}

a & b & c\\

d & e & f\\

\end{pmatrix}$

B=
$\begin{pmatrix}

p & q & r\\

s & t & u\\

\end{pmatrix}$

\end{document}

5. Equations: Mathematical equations numbering and references

\documentclass[12pt]{article}

\usepackage{amsmath}

\usepackage{cclicenses}

\title{Tutorial on writing equations}

\author{Narendra V.H \\Assistant Professor of Mathematics\\narendravh @gmail.com}

\date{\today}

\begin{document}

\maketitle

\newpage

We will demonstrate the creation of equation with some samples. Let us startwith the model of an inverted pedulum:

\begin{align}

\frac d{dt}

\begin{bmatrix}

0 & 0 & 1 & 0 \\

0 & 0 & 0 & 1 \\

0 & \gamma & 0 &0 \\

0 & \alpha & 0 & 0 \\

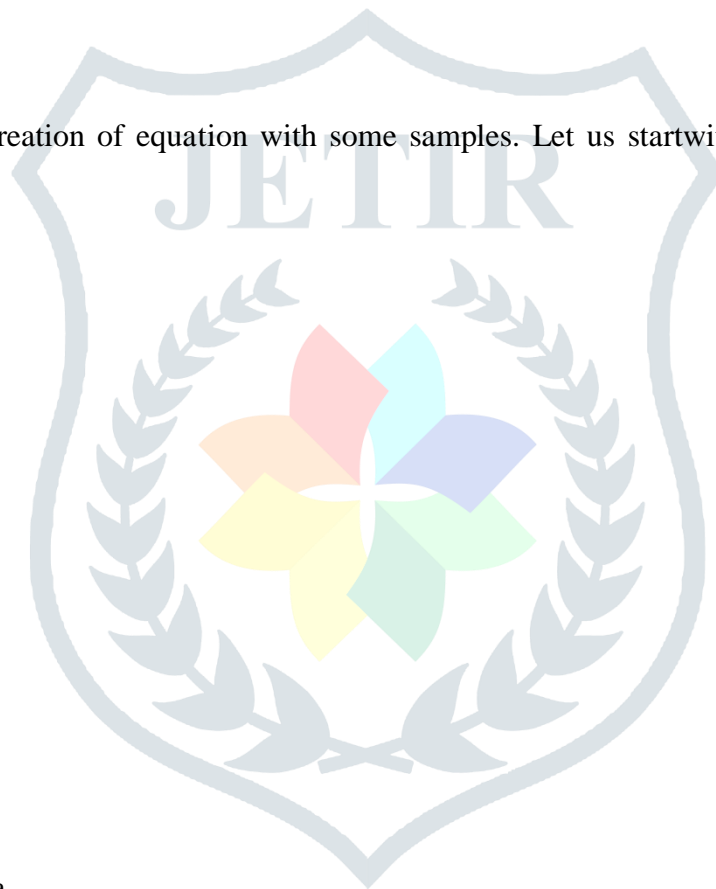\end{bmatrix}+

\begin{bmatrix}

0 & \\0 & \\-\delta & \\-\beta

\end{bmatrix}

\Delta\mu

\intertext{We want to apply the above controller to the following equation :}

u(t) & = K \left[e(t)+\tau_d\frac{de(t)}{dt} \right] \label{100}

\end{align}

\end{document}

6. Numbering Equations: Mathematical equations how to type and align , assigning numbers and changing the references while adding equations and remove numbers are learnt perfect with this Article.

7. Tables and Figures: Table construction

\documentclass[12pt]{article}

\usepackage{cclicenses}

\title{Tutorial on Tables and Figures}

\author{Narendra V.H \\ narendravh@gmail.com \\ \byncsa}

\date{\today}

\begin{document}

\maketitle

\listoftables

\newpage

Mango, jackfruit and banana are native fruits to India. As a matter of fact, the word Mango comes from similar words in Tamil andMalayalam. There is a mention of these three fruits in the ancient

Tamil literature: these are known as the three fruits in Tamil.

\vspace{2ex}

The cost of table shown in table \ref{tab:fruits}

According to archeological findings, jackfruit has been cultivated in India for over three thousand years.

Jackfruit is grown in South and Southeast Asia too. It is thenational fruit of Bangladesh and Indonesia. It is also grown inseveral other tropical areas, such as, central and eastern Africa,

Islands of the West Indies, Brazil and Surinam.

\begin{table}

\centering

\caption{Cost of fruits in India}

\label{tab:fruits}

\vspace{3ex}

\begin{tabular}{||l|c|c|c|c|r|}\hline

\multicolumn 2 {||c|}{Fruit details} &

\multicolumn 3 {c|}{Cost calculations} \\ \hline

Fruit & Type & No. of units & cost/unit & cost (Rs.) \\ \hline

Mango & Malgoa & 18 & 50 & \\ \cline{2-4}

& Alfonso & 2 & 300 & 1,500 \\ \hline

Jackfruit & Kolli Hills & 10 & 50 & 500\\ \hline

Banana & Green & 10 & 20 & 200\\ \hline

\multicolumn 4{||r|}{Total cost (Rs.)} & 2,200 \\ \hline

\end{tabular}

\end{table}

\begin{figure}

\end{figure}

\end{document}

8. Output Formats:

- .dvi   - Device Independent

- .ps   - Post Script

- .pdf   - PDF

- .rtf   -Rich Text Format

- .html -HTML

- .xml   -XML

Advantages of LaTex.

➢ Minimizes the drudgery of formatting, numbering, and referencing.

➢ LaTeX is free and runs very quickly even on large documents and also run on many platforms.

➢ Excellent for figures, tables, citations

➢ LaTeX is the best tool available for mathematical layout.

➢ It is the standard for scientific documents

➢ consistent look, correct numbering, ease of organization

➢ Meaning based structuring (rather than appearance)

➢ Knowledgeable and helpful user group

➢ Create HTML files with math and other complex symbols

➢ Its FREE!

➢ Platform independent
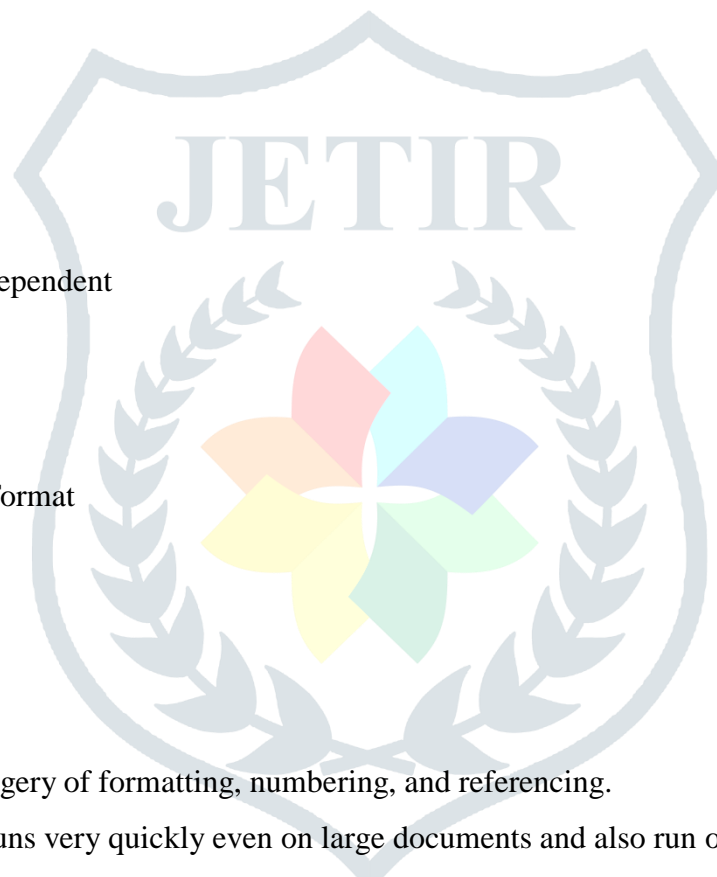
Disadvantages of LaTex

➢   Hard to write disorganized documents

➢   One needs to go through "learning curve"

➢   Customizing is tedious.

➢   More moving parts: You need Latex compiler (Miktex), an editor (WinEdt, Texnic), a document previewer (like ghost view, adobe reader), and maybe a few other programs (ghost script).

➢   Difficult to remember commands

➢   Preview delay: There is a delay in seeing the document from the editor to the previewer

➢   Syntax errors: It is rare (almost impossible) to create a document without errors. Especially in the beginning you will spend a lot of time making corrections or just figuring out the error.

➢   Adding new font: Not as easy to add new font?

Conclusion: latex is free Open Source software and it is a better choice to write mathematical programmes, typesetting, footnotes, bibliographic, images, captions, tables, graphs, cross-references power point presentation and else, because it features with a reliable. Microsoft Word also has some or less such similar features but Latex is doing this all in flexible, intelligent, and aesthetically in pleasing manner. Finally Latex is a scientific and dynamic text formatting tool and is also more stable and also optimal for master of PhD thesis.

Reference:

[1]. LaTex and Friend by by M.R.C. van Dongen

[2].LATEX for Beginners -Workbook Edition 5, March 2014

     (Document Reference: 3722-2014)

[3]. https://www.sharelatex.com/learn

[4]. http://www.andy-roberts.net/writing/latex/benefits

[5].https://www.sharelatex.com?r=29a94bae&rm=d&rs=b

[6].Kaput, J. J., (1992) Technology and mathematics education. In D. A. Grouws ed. Handbook of Research on Mathematics Teaching and Learning. Macmillan, (pp. 515- 556)

[7].Majewski M., Szabo F., (2001), Integrating MuPAD into Teaching of Mathematics,Technology in Mathematics Teaching, Proceeding of ICTMT5 in Klagenfurt.