PROJECT TITLE HERE: LaTeX CLASS PROJECT

REPORT SUBMITTED TO IIT TIRUPATI

submitted in partial fulfilment of the requirements

for the degree of

BACHELOR OF TECHNOLOGY

in

MATHEMATICS

by

FIRST AUTHOR NAME	**ROLL NUMBER**
SECOND AUTHOR NAME	**ROLL NUMBER**
THIRD AUTHOR NAME	**ROLL NUMBER**

Supervisor(s)

First Supervisor

Second Supervisor

भारतीय प्रौद्योगिकी संस्थान तिरुपति

TIRUPATI

DEPARTMENT OF MATHEMATICS

INDIAN INSTITUTE OF TECHNOLOGY TIRUPATI

MONTH YEAR

DECLARATION

I declare that this written submission represents my ideas in my own words and where others' ideas or words have been included, I have adequately cited and referenced the original sources. I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission. I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

Place: Tirupati
Date: 19-05-2019

Signature
Name of the first Student
Roll Number

Note: If more than one authors mentioned in the cover page, modify each 'I' by 'we' and then include remaining author's name at the bottom of the page. Signature of each author in this page is must.

BONA FIDE CERTIFICATE

This is to certify that the thesis titled **PROJECT TITLE HERE: LaTeX CLASS PROJECT REPORT SUBMITTED TO IIT TIRUPATI** , submitted by **Author(s)**, to the Indian Institute of Technology, Tirupati, for the award of the degree of **Bachelor of Technology**, is a bona fide record of the research work done by him under our supervision. The contents of this thesis, in full or in parts, have not been submitted to any other Institute or University for the award of any degree or diploma.

Place: Tirupati
Date: 19-05-2019

Professor Name here
Guide
Assistant Professor
Department of Mechanical Engineering
IIT Tirupati - 517501

Note: If supervised by more than one professor, professor's name must be included and all supervisors' signature is must.

ACKNOWLEDGEMENTS

Thanks to all those who helped you during your thesis and research work.

ABSTRACT

KEYWORDS: LaTeX; Thesis; Style files; Format.

A LaTeX class along with a simple template thesis are provided here. These can be used to easily write a thesis suitable for submission at IIT-Tirupati. The class provides options to format BTech thesis. It also allows one to write a synopsis using the same class file. Also provided is a BIBTeX style file that formats all bibliography entries as per the IIT Tirupati format. The 500 word abstract shall highlight the important features of the thesis/dissertation/report and shall correspond to the electronic version to be submitted to the Library for inclusion in the website. The Abstract in the thesis, however, shall have two more parts, namely, the layout of the thesis giving a brief chapter wise description of the work and the key words.

The formatting is as (as far as the author is aware) per the current institute guidelines.

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ABBREVIATIONS

The research scholar/ student must take utmost care in the use of technical abbreviations. For example, gms stands for gram meter second not grams. Grams should be abbreviated as g. Abbreviations should be listed in alphabetical orders as shown below.

IITTP	Indian Institute of Technology, Tirupati
OS	Operating System
PhD	Doctor of Philosophy

NOTATION

The research scholar/student must explain the meaning of special symbols and notations used in the thesis. Define English symbols, Greek symbols and then miscellaneous symbols Some examples are listed here.

ρ	density, $\frac{m}{kg^3}$
r	Radius, m
θ	Angle between x and y in degrees
v	velocity of the object

CHAPTER 1

INTRODUCTION

1.1 Preamble

While utmost attention must be paid to the content of the thesis/dissertation/report (hereinafter called the **'thesis'**), which is being submitted in partial fulfilment of the requirements of the respective degree, it is imperative that a standard format be prescribed. The same format shall also be followed in preparation of the final soft copies to be submitted to the Library in future.

1.2 Organisation of the Thesis

This thesis shall be presented in a number of chapters, starting with Introduction and ending with Summary and Conclusions. Each of the other chapters will have a precise title reflecting the contents of the chapter. A chapter can be subdivided into sections, subsections and subsubsection so as to present the content discretely and with due emphasis. When the work comprises two or more mutually independent investigations, the thesis may be divided into two or more parts, each with an appropriate title. However, the numbering of chapters will be continuous right through, for example Part 1 may comprise Chapters 25, Part Two, Chapters 69, etc.,

1.3 Guidelines to prepare the thesis

1.4 Front Page Contents

- The certificate should be updated with your title, name, guide, etc on the FrontContents/certificate.
- Abstract should be updated on the FrontContents/abstract.
- Glossary should be updated on the FrontContents/glossary.

- Abbreviations should be updated on the FrontContents/abbreviations.
- Notation should be updated on the FrontContents/Notation.

1.4.1 Cover Page

- In the cover page provide a suitable title for your project
- If the project was done by a single student you have to include the following in the BTechThesis.tex file

```
\firstauthor{First Author Name}
\firstrollnumber{Roll Number}
```

- If the project was done by a multiple students (maximum three students are allowed) you should include the following in the BTechThesis.tex file

```
\firstauthor{First Author Name}
\firstrollnumber{Roll Number}
\secondauthor{Second Author Name}
\secondrollnumber{Roll Number}
\thirdauthor{Third Author Name}
\thirdrollnumber{Roll Number}
```

- If the number of supervisors is one, then include the following

```
\supervisors{First Supervisor}
```

- If the number of supervisors is more than one, then include the following

```
\supervisors{First Supervisor \\
Second Supervisor}
```

1.4.2 Declaration

In the Declaration certificate, type your name and roll number at the place where name of the student and roll number respectively. If there are more than one students, replace 'I' by 'we' and include all students name at the bottom. Each student should sign the project report. The changes should be made in the dedication.tex file.

1.4.3 Bona fide Certificate

In the Bona fide certifcate, you have to type your title (be warned that title at the front page and the title at the bona fide certificate should match). Include all author names. If more than one supervisors, include their names and get their signatures.

1.5 Chapters and Pictures

All Chapters should be saved under the Chapters directory and all images in eps format should be saved in the Pictures directory. Whenever you have added a new chapter insert the following line in the BTechThesis.tex file. `\include{Chatpers/ChatperX}` Each chapter shall begin on a fresh page. Chapter can be divided into Sections, subsections, subsubsections using `\section{title}`, `\subsection{title}`, and `\subsubsection{title}`

1.5.1 Introduction Chapter

The title of Chapter 1 shall be Introduction. It shall justify and highlight the problem posed, define the topic and explain the aim and scope of the work presented in the thesis. It may also highlight the significant contributions from the investigation.

1.6 Usage of this LaTeX Template

This document provides a simple template of how the provided `iittpdiss.cls` LaTeX class is to be used. Also provided are several useful tips to do various things that might be of use when you write your thesis.

Before reading any further please note that you are strongly advised against changing any of the formatting options used in the class provided in this directory, unless you are absolutely sure that it does not violate the IITTP formatting guidelines. *Please do not change the margins or the spacing.* If you do change the formatting you are on your own **(don't blame academics or anyone if you need to reprint your entire thesis)**. In the case that you do change the formatting despite these warnings, the least I ask is that you do not redistribute your style files to your friends (or enemies).

It is also a good idea to take a quick look at the formatting guidelines. Your office or advisor should have a copy. If they don't, pester them, they really should have the formatting guidelines readily available somewhere.

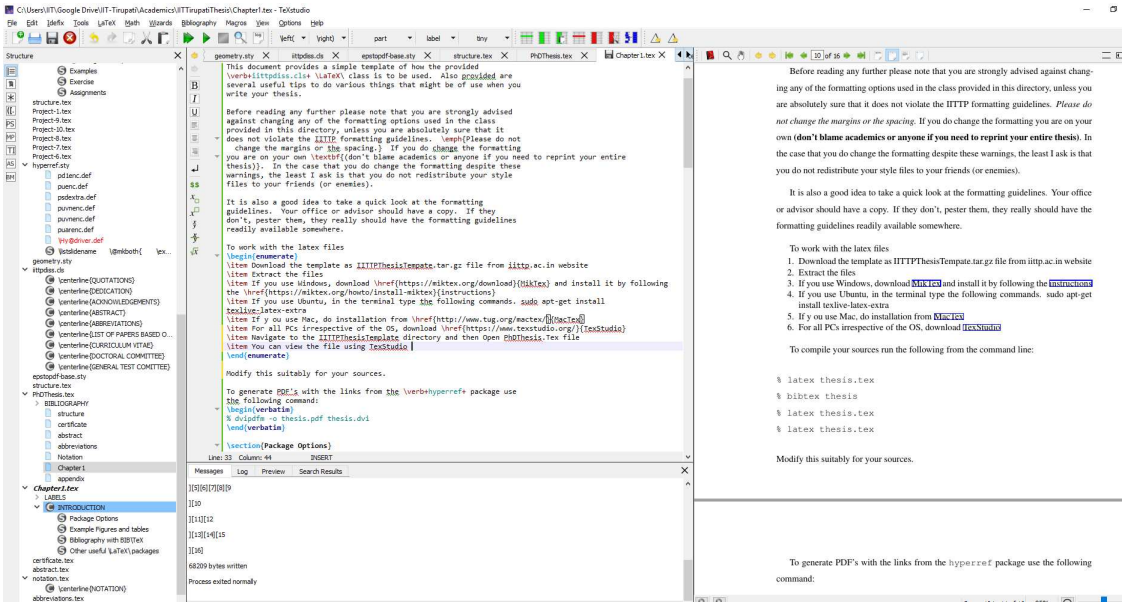

Figure 1.1: Sample TexStudio images

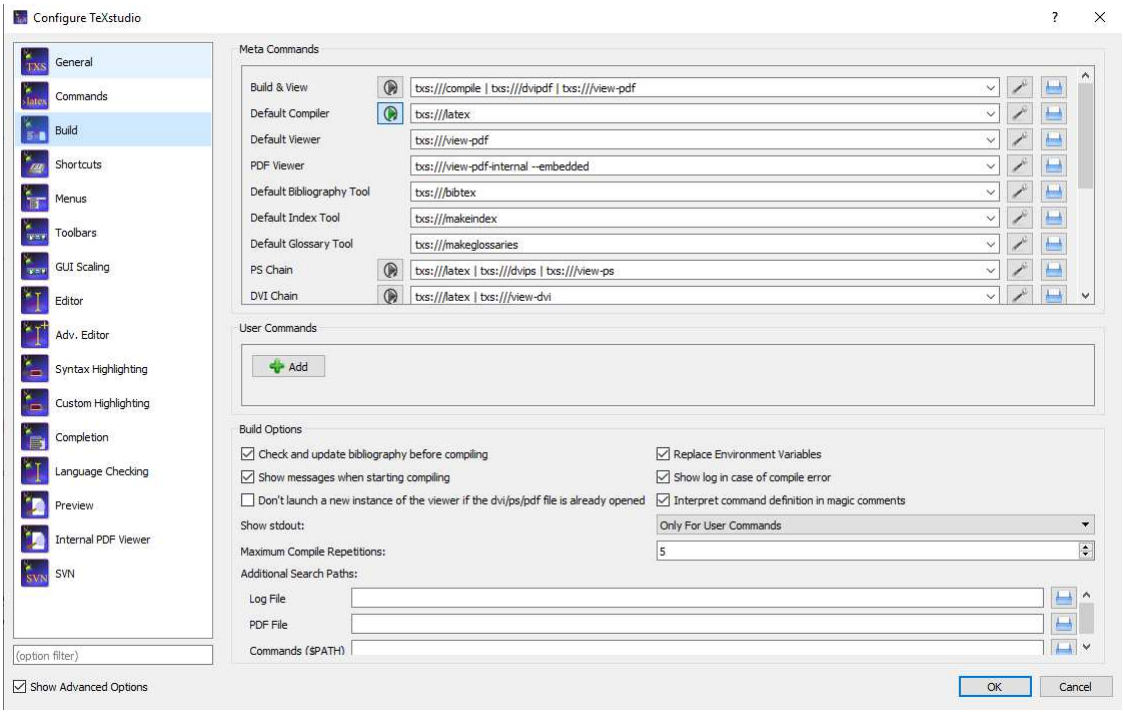

Figure 1.2: Configure TexStudio and change the build and view

To work with the latex files

1. Download the template as IITTPThesisTempate.tar.gz file from iittp.ac.in website
2. Extract the files
3. If you use Windows, download MikTex and install it by following the instructions
4. If you use Ubuntu, in the terminal type the following commands. sudo apt-get install texlive-latex-extra
5. If y ou use Mac, do installation from MacTex
6. For all PCs irrespective of the OS, download TexStudio
7. Navigate to the IITTPThesisTemplate directory and then Open BTechThesis.Tex file
8. You can view the file using TexStudio as shown in Fig. 1.1.
9. In TexStudio click options menu and then select configure TexStudio.
10. In configure dialog box, select build and modify the build & view as txs:///compile | txs:///dvipdf | txs:///view-pdf (see Fig. 1.2.)

Note: If you are using any other GUI to compile latex, please ensure that you go through above procedures, that is, latex $\rightarrow$ dvi $\rightarrow$ ps $\rightarrow$ pdf. You must follow this procedure in order to get high quality image pictures in your pdf. Never use pdflatex or xelatex or any other latex.

1.7 Package Options

Use this thesis as a basic template to format your thesis. The `iittpdiss` class can be used by simply using something like this:

```
\documentclass[BTech]{iittpdiss}
```

The title page formatting really depends on how large or small your thesis title is. Consequently it might require some hand tuning. Edit your version of `iittpdiss.cls` suitably to do this. I recommend that this be done once your title is final.

Once again the title page may require some small amount of fine tuning. This is again easily done by editing the class file.

This sample file uses the `hyperref` package that makes all labels and references clickable in both the generated DVI and PDF files. These are very useful when reading the document online and do not affect the output when the files are printed. In order to insert a weblink, use

```
\href{URL}{Text}
```

This is once again useful when reading the document online where a reader can click and view the respective link.

1.8 Example Figures and tables

As far as possible tables and figures should be presented in portrait style. Fig. 1.3 shows a simple figure for illustration along with a long caption. Also, it shows including two figures side by side. Note that use Fig. for citing. Never use Figure. The formatting of the caption text is automatically single spaced and indented. It is recommended to use 300dpi images. Also, always figures must be converted from png or jpg to eps format. When you includegraphics in latex, eps must be placed.

All figures and graphs should be drawn in black ink with sharp line and adequate contrast between different plots if more than one plot is present in the same graph. Figures should follow immediately after they are referred to for the first time in the text.

Splitting of graphs, for including figures on a page, should be avoided. When there are many plots in a single graph or figure, the lettering, labeling or numbering of each plot for its identification should be of size such that even after size reduction in thesis, the identification should be clearly legible.

After your thesis viva, you should submit the same thesis in A5 format, therefore, create the figures in such a way that image quality is not affected.

Use colour photos only if they are necessary. Remember that the thesis may have to be photocopied. In case colour photos are used, all copies of thesis must contain only colour photos.

Photos should be printed in glossy paper, and should be mounted with white casein (e.g Elmer's glue), glue stick dry mounting tissue or any good adhesive. Do not use rubber cement or cello tape.

Each photo should be numbered and referred to as figure. Photos tiles should be similar to those provided for figures.

Drawings which are larger than A4 size are not encouraged. However, if some

engineering drawing is required, it should be suitably folded to A4 size in the thesis Take care to reduce the sizes when the final A5 form (if required) of the thesis is prepared.

Each drawing should be number and referred to as a figure. Drawing titles should be similar to those provided to figures

Figure 1.3: Two IITTP logos in a row. This is also an illustration of a very long figure caption that wraps around two two lines. Notice that the caption is single-spaced.

Table 1.1 shows a sample table with the caption placed correctly. The caption for this should always be placed before the table as shown in the example.

Table 1.1: A sample table with a table caption placed appropriately. This caption is also very long and is single-spaced. Also notice how the text is aligned. The student strength of IIT Tirupati is shown in figure

Year	Boys	Girls	Total
2015	86	19	105
2016	98	20	118
2017	96	17	113
2018	140	25	165
Total	420	81	501

1.9 Definitions, Equations and Theorems

When definitions should be included in your thesis, for example, mathematics thesis, the following should be included.

```
\begin{definition}
content...
\end{definition}
```

Definition 1.9.1. *A real valued function which maps any connected set to a connected set is known as a Darboux function*

When equations are included in your thesis, it should show the chapter number and equation number of the following format

$$\rho \frac{\partial T}{\partial t} = \nabla^2 T + Q_r \tag{1.1}$$

$$\begin{aligned} \Delta \vec{u} &= f \text{ in } \Omega & (1.2)\\ \frac{\partial \vec{u}}{\partial x} &= g \text{ on } \partial\Omega & (1.3) \end{aligned}$$

Theorem, lemma, corollary and proposition should follow the same setup like this.

Lemma 1.9.1. *If F is a Darboux function which is continuous on an uncountable set then there is a continuous, non-constant g such that $F+g$ is Darboux.*

Lemma 1.9.2. *If $F:\mathbb{R}\to\mathbb{R}$ is a Darboux function which is continuous at only countably many points then there is a non-constant, continuous function f such that $F+f$ is Darboux.*

Theorem 1.9.3. *If F is a Darboux function then there is a non-constant continuous function g such that $F+g$ is Darboux.*

Proof: Either F is continuous on an uncountable set or it is not. If it is, use Lemma 1.9.1, and if it is not use Lemma 1.9.2 □

To denote end of the proof, add the box using `\hfill\qed\\`

Corollary 1.9.4. *Sum of two continuous function is always Darboux*

If you have any examples to be illustrated, follow these guidelines

Example 1.1. *$f(x)=\sin(x), g(x)=\cos(x), h(x)=exp(x)*x^2$ are Darboux functions*

1.9.1 Equations and Math Symbols

Equations should be set in a separate mode. For details on getting various types of aligned equations, consult the AMS-LATEX documentation `amsldoc.pdf`. For simple equations you should use

```
\begin{equation}
content...
\end{equation}
```

For example,

$$\rho \frac{\partial T}{\partial t} = \nabla^2 T + Q_r \tag{1.4}$$

When you have multiple equations which requires alignment, then use

```
\begin{eqnarray}
content...
\end{eqnarray}
```

When you use multiple equations, they should be aligned properly as follows. It is usually the = sign across which the alignment is done. The point of alignment for each equation is specified using the ampersand symbol

$$\Delta \vec{u} = f \text{ in } \Omega \tag{1.5}$$

$$\frac{\partial \vec{u}}{\partial x} = g \text{ on } \partial\Omega \tag{1.6}$$

Mathematical symbols or variables must always put inside $$, whenever they appear outside math environments such as equation, gather, align, eqnarray etc. The variable "ex" must be written as x instead of x.

1.10 Algorithm and Pseudocode

When there are algorithm, pseudocode or coding involved in your thesis, follow these templates When you would like to insert a code snippet, please follow the follow-

Algorithm 1: Bisection Algorithm

Input: x_l, x_u

Output: x_r

1 Check the condition $f(x_l)f(x_u) < 0$;
2 Estimate the root $x_r = \frac{x_l + x_u}{2}$;
3 Make the following evaluations to determine in which subinterval the root lies:;
4 If $f(x_l)f(x_r) < 0$, the root lies in the lower subinterval, set $x_u = x_r$, go to step 2;
5 If $f(x_l)f(x_r) < 0$, the root lies in the upper subinterval, set $x_l = x_r$, go to step 2;
6 If $f(x_l)f(x_r) = 0$, the root is x_r,terminate the computation;

Pseudocode 2: Newton-Raphson Method: Find $g(x) = f'(x)$

```
1  Function NewtonRaphson(x_0, M, ε, δ)
2      for i = 1, 2, ..., M do
3          x_1 = x_0 − f(x_0)/g(x_0)
4          if x_1 ≠ 0 then
5              ε_a ← |(x_1 − x_0)/x_1| × 100
6          Display i, x_1, x_0, ε_a
7          if |ε_a| < δ or |f(x_1)| < ε then
8              break the for loop
9          else
10             x_0 = x_1
```

ing template, if you have matlab code, then modify the language from C to Matlab in `\lstset` in the `structure.tex`file

```
#include <stdio.h>
int factorial(int x)
{
  if(x>1)
    return x*factorial(x-1);
  else
    return 1;
}
```

1.11 Bibliography with BIBTEX

1.11.1 References

This should follow the Appendices, if any, otherwise the Summary and Conclusions chapter. The candidates shall follow the style of citation and style of listing in one of the standard journals in the subject area consistently throughout his/her thesis, for example, IEEE in the Department of Electrical Engineering, Materials Transactions in Department of Metallurgical Engineering and Materials Science and ASME Journals in the department of Mechanical Engineering. However, the names of all the authors along with their initials and the full title of the article/monogram/book etc. have to be given in addition to the journals/ publishers, volume, number, pages(s)and year of publication. Citation from websites should include the names(s) of author(s) (including the initials), full title of the article, website reference and when last accessed. Reference to personal communications, similarly, shall include the author, title of the communication (if any) and date of receipt.

1.11.2 How to use BIBTEX

The bibliographic entries are to be kept in a file named `<something>.bib`. In this sample report we call it as `refs.bib`. This file must be included without the `.bib` extension in the BTechThesis.tex file as: `\bibliography{mylit}`. Open the file `refs.bib` to see the format in which the entries are written. This is written in the BibTEXformat. Most of the bibliographic web pages (Scopus, ISI Web) and software (EndNote, etc) allow you to export bibliographic entries in the BibTEXformat. When you write your literature survey, you may cite many articles, thesis, reports and so on. BibTEXis an easy way to include your references

I strongly recommend that you use BIBTEX to automatically generate your bibliography. It makes managing your references much easier. It is an excellent way to organize your references and reuse them. You can use one set of entries for your references and cite them in your thesis, papers and reports. If you haven't used it anytime before please invest some time learning how to use it.

I've included a simple example BIBTEX file along in this directory called `refs.bib`. The `iittpdiss.cls` class package which is used in this thesis and for the synopsis uses the `natbib` package to format the references along with a customized bibliography style provided as the `iittp.bst` file in the directory containing `thesis.tex`. Documentation for the `natbib` package should be available in your distribution of LATEX. Basically, to cite the author along with the author name and year use `\cite{key}` where `key` is the citation key for your bibliography entry. You can also use `\citet{key}` to get the same effect. To make the citation without the author name in the main text but inside the parenthesis use `\citep{key}`. The following paragraph shows how citations can be used in text effectively.

More information on BIBTEX and LATEX is available in the book by Kottwitz (2014). There are many references (Kottwitz, 2014; Kopka and Daly, 2003) that explain how to use BIBTEX. Read the `natbib` package documentation for more details on how to cite things differently.

Here are other references for example. Gollapudi *et al.* (2017) presents an aspect oriented approach to renarrate web contents. Radhakrishnan *et al.* (2017) illustrates a journal article with multiple authors. More details of using LATEX and Mathematics (wikibook, 2019) is available and is cited here to show how to cite something that is best identified with a URL. If there are any error related to bibliography, deleting the .bbl file and recompiling could sort out.

1.12 Other Packages and Back Contents

- Appendix should be updated on the BackContents/appendix.

1.13 Thesis Format

1.13.1 Quality

The thesis shall be printed/xeroxed on white bond paper, whiteness 95weight 70 gram or more per square meter.

1.13.2 Size

The size of the paper shall be standard A4; height 297 mm, width 210 mm.

1.14 Binding

The evaluation copies of the thesis/dissertation/report may be spiral bound or soft bound. The final hard bound copies to be submitted after the vivavoce examination will be accepted during the submission of thesis/dissertation/report with the following colour specification:

B. Tech/M.Sc Project Report	Brown
M. Tech/Dissertation	Grey
Ph. D Thesis	White

1.15 Don't

- There should not be any hanging text outside the border
- There should not be any hanging equations beyond the border
- Figures should not be without description
- If your figure has axes, mention each specific axis representation including its unit
- There should not be any hanging tables
- There should not be any confusion between hyphen, minus sign and dashes.
- In display math mode, never use $$ ... $$, instead use \[...\]

This document has been typeset using the `iittpdiss.cls` typesetting system developed by Dr. Panchatcharam Mariappan, Assistant Professor, Department of Mathematics, IIT Tirupati - 517 501.

For any suggestion query:

Email: panch.m@iittp.ac.in

CHAPTER 2

Literature Review

This shall normally form Chapter 2 and shall present a critical appraisal of the previous work published in the literature pertaining to the topic of the investigation. The extent and emphasis of the chapter shall depend on the nature of the investigation.

2.1 Objectives and Scope of the Project

CHAPTER 3

Suitable Title

3.1 About this Chapter

The reporting on the investigation shall be presented in one or more chapters with appropriate chapter titles. One of the suitable title is Materials and Methods

- Mathematical formulation of your work should be presented in this chapter
- Due importance shall be given to experimental setups, procedures adopted, techniques developed, methodologies developed and adopted.
- While important derivations/formulae should normally be presented in the text of these chapters, extensive and long treatments, copious details and tedious information, detailed results in tabular and graphical forms may be presented in Appendices. Representative data in table and figures may, however, be included in appropriate chapters.
- Figures and tables should be presented immediately following their first mention in the text. Short tables and figures (say, less than half the writing area of the page) should be presented within the text, while large table and figures may be presented on separate pages. Guidelines for including figures and tables can be found at this section 1.8
- Equations should form separate lines with appropriate paragraph separation above and below the equation line, with equation numbers flushed to the right. Refer the following section 1.9 for including equations and definitions, theorem if any.

3.2 Mathematical Formulation

3.3 Experimental Setup

3.4 Materials Used

3.5 Procedure, Techniques and Methodologies,etc

CHAPTER 4

Results and Discussions

This shall form the penultimate chapter of the thesis and shall include a thorough evaluation of the investigation carried out and bring out the contributions from the study. The discussion shall logically lead to inferences and conclusions as well as scope for possible further future work. If you have any tables, please refer the following section 1.8

CHAPTER 5

Summary

This will be the final chapter of the thesis. A brief report of the work carried out shall form the first part of the Chapter. Conclusions derived from the logical analysis presented in the Results and Discussions Chapter shall be presented and clearly enumerated, each point stated separately. Scope for future work should be stated lucidly in the last part of the chapter. A brief report or synopsis of work conclusions and scope for future work.

APPENDIX A

A SAMPLE APPENDIX

Just put in text as you would into any chapter with sections and whatnot. Thats the end of it. Detailed information,lengthy derivations, raw experimental observations etc. are to be presented in the separate appendices, which shall be numbered in Roman Capitals (e.g. “Appendix IV”). Since reference can be drawn to published/unpublished literature in the appendices these should precede the “ References” section.

REFERENCES

1. **Gollapudi, S.**, **S. Chimalakonda**, **V. Choppella**, and **Y. B. Reddy**, An aspect oriented approach for renarrating web content. *In Proceedings of the 10th Innovations In Software Engineering Conference*. 2017.

2. **Kopka, H.** and **P. W. Daly**, *Guide to LaTeX*. Addison-Wesley Professional, 2003.

3. **Kottwitz, S.**, *LaTeX Beginner's Guide*. Packt Publishing, 2014.

4. **Radhakrishnan, M.**, **S. Rajesh**, and **S. Agarwal** (2017). Some fixed point theorems on non-convex sets. *Applied General Topology*, **18**(2), 377–390.

5. **wikibook** (2019). Latex. URL https://en.wikibooks.org/wiki/LaTeX/Mathematics.