GUIDELINES FOR M.TECH PROJECT WORK REPORT PREPARATION

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GUIDELINES FOR M.TECH PROJECT WOR REPORT PREPARATION

Project work is an important component and provides the students with the opportunity to design, undertake or conduct an independent research or study related to their post graduate course.

Upon completion of the project, student should be able to identify and describe the problem and scope of project clearly, collect, analyze and present data into meaningful information using relevant tools, select, plan and execute a proper methodology in problem solving, work independently and ethically, present the results in written and oral format effectively and identify basic entrepreneurship skills in project management.

PROJECT WORK COURSE OBJECTIVES

This course will expose students:

I. Identify the problem in the area of interest through a thorough literature survey.
II. Foster innovation in the design of products, processes, or systems based on the identified problem.
III. Conduct a feasibility study through creative thinking and requirement analysis to find viable solutions to respective domain specific engineering problems.

PROJECT WORK COURSE OUTCOMES:

By the end of the course, students are able to show competence in the following areas:

CO1	:	Identify and define a relevant and significant problem or challenge in the relevant field.
CO2	:	Formulate research methodologies for the innovative and creative solutions.
CO3	:	Analyze data to generate valuable insights and derive conclusions through systematic deduction.
CO4	:	Plan and execute tasks utilizing available resources within timelines, following ethical professional and financial norms.
CO5	:	Organize and communicate technical and scientific findings effectively in written reports, oral presentation, and visual aids.
CO6	:	Evaluate an extensive independent investigation culminating in the creation of a research thesis on contemporary challenges.

PREAMBLE

The aim of this document is to present the basic guidelines on how a report should be constructed for M.Tech project. Any student must confer to the rules and guidelines that have been laid out in the following sections while writing their final report. It must also be kept in mind that the soft copy of the report that any student prepares will also have to be submitted in the institute library for future reference.

1. PLAGIARISM

Standardization, readability, conformance to ethical norms, and durability are the four overriding criteria for an acceptable form of a report. The permissible similarity index is <= 10%. If the similarity index is >10%, the candidate have to modify the document and reduce the similarity level (<=10%) and submit for plagiarism checking once again. The requisition for plagiarism checking is given in **Appendix-1**.

It is mandatory to check project report using anti plagiarism tool TURNITIN which is available in R & D Centre before submission of the same. Also, they have to enclose a copy of the plagiarism report in the project report.

2. NUMBER OF COPIES TO BE SUBMITTED

Each student can have one hard copy of the project report. Students should submit two hard copies to Dean of Planning, Monitoring and Continuous Studies (PMCS) and a soft copy with necessary enclosures are to be uploaded to CMS portal on or before the specified date. The PMCS should send one hard copy to the department Head and one copy may be retained in the office of Dean.

3. ORGANIZATION OF THE PROJECT REPORT

This project report 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 sub subsection so as to present the content discretely and with due emphasis.

Tables and figures in a chapter should be placed in the immediate vicinity of the reference where they are cited. Footnotes should be used sparingly. They should be typed single space and placed directly underneath in the very same page, which refers to the material they annotate.

3.1 Introduction

The title of **Chapter 1** shall be Introduction. Usually longer than an abstract, and provides the following:

- Background to the topic;
- Brief review of current knowledge;
- Indicates gap in knowledge, states aim of research and how it fits into the gap;
- Can include need of the study, statement of problem, objectives of the study, scope of the study, methodology, source of data and hypotheses; highlight the significant contributions from the investigation;
- Can include an outline of the following chapters.

3.2 Review of Literature

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. It is an evaluation of previous research on research topic, where it shows that there is a gap in the knowledge that the research will attempt to fill. The key word here is evaluation.

3.3 Methodology (Report on the present investigation)

Often the easiest part of the thesis to write. Outlines which method/s you have used to get your results; Why the research was done using a particular approach? why that particular method was most appropriate for your study? What specific details of techniques and tests used? Where data / samples were gathered?

The reporting on the investigation shall be presented in one or more chapters (Chapter 3 and/or Chapter 4) with appropriate chapter titles. Due importance shall be given to experimental setups, procedures adopted, techniques developed, methodologies developed and adopted.

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.

Equations should form separate lines with appropriate paragraph separation above and below the equation line, with equation numbers flushed to the right.

3.4 Analysis and Interpretation

Briefly restate the purpose of research study analysis. Explain what is the aim to achieve through this section. Summarize the methods that are used to collect and analyze the data. This provides context for the findings.

3.4.1. Data Presentation

- **Quantitative Data**: Present the raw data collected through surveys, experiments, financial records, or other quantitative methods. Use tables, graphs, and charts for clarity.
- **Qualitative Data**: Summarize key themes from interviews, focus groups, or open-ended survey responses. Use quotes to illustrate points.

3.4.2. Descriptive Analysis

- **Summary Statistics**: Provide mean, median, mode, standard deviation, and other relevant statistics for quantitative data.
- **Frequency Distribution**: Show how often different values occur in the dataset. Use histograms or bar charts.

3.4.3. Inferential Analysis

- **Hypothesis Testing**: Describe the tests conducted (e.g., t-tests, ANOVA, chi-square tests) and present the results. State whether the results support or reject the hypotheses.
- **Correlation and Regression**: Discuss any relationships between variables, using correlation coefficients or regression analysis. Explain the significance of these relationships.

3.4.4. Interpretation of Results

- **Key Findings**: Highlight the most important results from the study analysis. Explain what these findings mean in the context of research questions.
- **Comparison with Literature**: Compare the findings with existing research or theories. Discuss any similarities or differences and potential reasons for these.
- **Practical Implications**: Explain the practical implications of the findings for businesses, policymakers, or other stakeholders. How can they use this information?
- **Theoretical Implications**: Discuss the theoretical implications. How do the findings contribute to the body of knowledge in study field?

3.5 Conclusions

This will be the final chapter of the project report. This is where the emphasize the research aims/objectives have been achieved. 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 analysis and interpretation chapter shall be presented and clearly enumerated, each point stated separately.

Conclusions can include Future Scope for future work should be stated clearly in the last part of the chapter.

3.6 Appendix

Detailed information, such as raw survey data, complete interview transcripts, detailed financial calculations, and supplementary charts, should be presented in separate appendices. Each appendix shall be numbered in Roman numerals (e.g., Appendix I, Appendix II) and titled

appropriately. These appendices and their titles should be listed in the Table of Contents. Section and sub-section headings, equations, figures, and tables within each appendix should be labeled as I.1, II.2, etc., corresponding to their order of appearance.

3.7 References

When writing an essay, report, dissertation, or any other form of academic writing, inevitably build on the thoughts and ideas of other writers, researchers, or practitioners. It is essential to acknowledge debt to these sources by including references to, and full details of, the data, research, and ideas that have used in the research work.

Referencing the work allows the reader:

- To distinguish own ideas and findings from those have drawn from the work of others;
- To follow up in more detail on the ideas or facts that have referred to.

Referencing is a crucial part of academic writing. Its major purposes are to discourage plagiarism and to give credit to the scholars and researchers who have contributed to the growth of knowledge.

There are several referencing styles used throughout the academic world, each with its own conventions. Two widely used styles are Harvard and APA (American Psychological Association) or IEEE (Institute of Electrical and Electronics Engineers) Referencing style. M.Tech students are encouraged to use any of these styles.

3.7.1 How to reference using the IEEE style

IEEE (Institute of Electrical and Electronics Engineers) Referencing style is an extensively acknowledged format of citation in technical fields.

- Number all the references.
- **Use a chronological bibliography**.

  Each listed reference in the bibliography must be cited in the text of the report. The references should be numbered serially in the order of their occurrence in the text and their numbers should be indicated within square brackets for e.g. [3].
  If you have made a reference to a sequence of entries, hyphen (-) is used instead of comma for e.g. [5]- [8].

  If you cite the same source again in your document, use the same number that you have used previously for the source in your work.

  If you have supported your argument by more than one source, you need to mention each in your in-text citation in the form of numeric digit each enclosed in square brackets and separated by a comma (,). The citation appears as follows: [3], [4], [6], [8]

- For a book give the name(s) of author(s), title of book, location: publisher, year of publication, edition, chapter number, and page numbers.

  Example:

  [13] Chen W.K., "Linear Networks and Systems," Belmont, CA: Wadsworth, 1993, pp. 123-35.

[23] Jones, C.D., A.B. Smith, and E.F. Roberts, "Efficient Real-Time Fine- Grained Concurrency," New Delhi: Tata McGraw-Hill, 1994, 2nd Ed., Ch. 3, pp. 145- 147.

[25] Pretty, G. W., "A first Course in Atmospheric Radiation," West Indies: Sundog Publishing, 2nd Ed, 2005, pp. 167-287.

- For a journal/conference paper, give the name(s) of authors, "title of paper," name of journal / conference, volume and issue number (for journal), page numbers, and month and year of publication.

Example (Journal):

[1] G. Pevere G, "Infrared Nation," *The International Journal of Infrared Design*, vol. 33, pp. 56-99, Jan. 1979.

[2] M. Ito *et al*., "Application of amorphous oxide TFT to electrophoretic display," *J. Non-Crystal Solids*, vol. 354, no. 19, pp. 2777–2782, Feb. 2008.

[3] M. M. Chiampi and L. L. Zilberti, "Induction of electric field in human bodies moving near MRI: An efficient BEM computational procedure," *IEEE Trans. Biomedical Engineering*, vol. 58, pp. 2787–2793, Oct. 2011.

Example (Conference):

[4] D. Caratelli, M. C. Viganó, G. Toso, and P. Angeletti, "Analytical placement technique for sparse arrays," ESA Antenna Workshop, Noordwijk, The Netherlands, Oct. 5–8, 2010.

[5] J. G. Kreifeldt, "An analysis of surface-detected EMG as an amplitude- modulated noise," International Conference on Medicine and Biological Engineering, Chicago, IL, USA, Nov. 9–12, 1989.

- For a World Wide Web page, give the author or company's name and the URL. http://www.le.ac.uk/committees/deans/codecode.html

3.7.2 How to reference using the 'author, date' system

In the 'author, date' system (often referred to as the 'Harvard' system) very brief details of the source from which a discussion point or piece of factual information is drawn are included in the text. Full details of the source are then given in a reference list or bibliography at the end of the text. This allows the writer to fully acknowledge her/his sources, without significantly interrupting the flow of the writing.

In-text citations

As the name suggests, the citation in the text normally includes the name(s) (surname only) of the author(s) and the date of the publication. This information is usually included in brackets at the most appropriate point in the text.

- One author: (Miller 1991) or Miller (1991)
- Two authors: (Miller and Smith 1994) or Miller and Smith (1994)
- Three authors or more: (Miller et al. 1995) or Miller et al. (1995)

Reference lists / bibliographies

When using the 'author, date' system, the brief references included in the text must be followed up with full publication details, usually as an **alphabetical** reference list or bibliography at the end of thesis.

The examples given below are used to indicate the main principles.

Books & eBooks		
Material Type	**In-Text Example**	**Reference List Example**
Book: single author	(Holt, 1997) or Holt (1997)	Holt, D.H. 1997. *Management principles and practices.* Sydney: Prentice-Hall.
Book: 2 or 3 authors	(McCarthy, William & Pascale, 1997)	McCarthy, E.J., William, D.P. & Pascale, G.Q. 1997. *Basic marketing.* Sydney: Irwin.
Book: more than 3 authors	(Bond et al., 1996)	Bond, W.R., Smith, J.T., Brown, K.L. & George, M. 1996. *Management of small firms*. Sydney: McGraw-Hill.
Journal Articles		
CMO article	(Jennings, 1997)	Jennings, P. 1997. The performance and competitive advantage of small firms: a management perspective. *International Small Business Journal*, 15(2): 63-75. Available from: The University of Western Australia Library Course Materials Online. [1 September 2004].
Journal article: print	(Conley & Galeson, 1998)	Conley, T.G. & Galeson, D.W. 1998. Nativity and wealth in mid-nineteenth century cities. *Journal of Economic History*, 58(2): 468-493.
Journal article: electronic database	(Liveris, 2011)	Liveris, A. 2011. Ethics as a strategy. *Leadership Excellence*, 28(2): 17-18. Available from: ProQuest. [23 June 2011].
Journal article: online only	(Segon & Booth, 2011)	Segon, M. & Booth, C. 2011. Bribery: what do Australian managers know and what do they do? *Journal of Business Systems, Governance and Ethics*, 6(3): 15-29. Available from: http://www.jbsge.vu.edu.au/issues/vol06no3/Segon_&_Booth.pdf. [20 October 2014].
Internet / Websites		
Website	(Australian Securities Exchange, 2009)	Australian Securities Exchange. 2009. *Market Information*. Available from: http://www.asx.com.au/professionals/market_information/index.htm. [5 July 2009].
Web based image / table / figure	(The Lunar Interior, 2000)	*The Lunar Interior*. 2000. Available from: http://www.planetscapes.com/solar/browse/moon/moonint.jpg. [28 November 2000].
MOOCs Video	(Forsey & May, 2013)	Forsey, M. & May, V. 2013. *Discussion with Dr Vanessa May*, video file in Developing the Sociological Imagination on UWA class2go, Semester 1, 2013, University of Western Australia. Available from: https://www.class2go.uwa.edu.au/DevSocImag/Summer2013/videos.dvm. [30 May 2013].

3.8 Acknowledgements

The acknowledgments by the candidate shall follow the citation of literature, signed by him/her, with date.

4. PROJECT REPORT FORMAT

Paper quality	Printed on white bond paper, whiteness 95% or above, weight 70 gram or more per square meter.
Paper Size	The standard A 4; height 29.7 cm, width 21 cm. The standard Letter size; height 28 cm (11 inches), wide 21.5 cm (8½ inch).
Manuscript Preparation	**Word** and **LaTeX**
Language	Either **British** or **American** English. Check for consistent **spelling** of names, terms, and abbreviations, including in tables and figure captions.
Size of Project Report	The maximum number of pages of the Report should be preferably between 40-70 pages of typed matter reckoned from the first page of Chapter 1 to the last page.
Type Setting, Font, Text Processing and Printing	• Printed employing LaserJet or Inkjet printer. • Standard font shall be **Times New Roman** of 12 pts. with 1.5 line spacing. • In no case should it be less than 11-point. • The font size of materials within a table or a figure can be 11 point.
Margins	A margin of 3.75 cm (1½ inch) is to be given on the binding edge while on the other sides it is to be 2.5 cm (1 inch).
Line Spacing	The line spacing in the main text must be between one-and-a-half.
Binding	The report submitted for examination has to be softbound and printed on both sides.
Cover Page Color and Lettering	Cover Page - White Lettering: AE – Blue; CSE – Navy Blue; ECE – Orange; EEE – Purple; ME – Brown; CE – Maroon.
Justification	• The text should be fully justified. • The text in the tables should be left justified.
Pagination	• The page numbering, starting from acknowledgements and till the beginning of the introductory chapter, should be printed in small Roman numbers, i.e, i, ii, iii, iv... • The page number of the first page of each chapter should not be printed (but must be accounted for). • All page numbers from the second page of each chapter should be printed using Arabic numerals, i.e. 2, 3, 4, 5... • All printed page numbers should be located at the bottom centre of the page.
Chapters	• Each chapter shall begin on a fresh page (odd number page in case of double-sided printing) with an additional top margin of about 75mm. • Use only Arabic numerals. • Chapter number (in Hindu Arabic) and title shall be printed at the center of the line in 6mm font size (18pt) in bold face using both upper and lower case (all capitals or small capitals shall not be used). • A vertical gap of about 25mm shall be left between the Chapter number and Chapter title lines and between chapter title line and the first paragraph.
Sections and Subsections	• A chapter can be divided into Sections, Subsections and Sub subsections so as to present different concepts separately. Sections and subsections can be numbered using decimal points, e.g. 2.2 for the second section in Chapter 2 and 2.3.4 for the fourth Subsection in third Section of Chapter 2.

	• Chapters, Sections and Subsections shall be included in the contents with page numbers flushed to the right. Further subsections need not be numbered or included in the contents. • The Section and Sub Section titles along with their numbers in 5 and 4mm (16 and 14 pt.) fonts, respectively, in bold face shall be flushed to the left (not centered) with 15mm space above and below these lines. • In further subdivisions character size of 3 and 3.5 with bold face, small caps, all caps and italics may be used for the titles flushed left or centered. These shall not feature in the contents.
Special Text	Italics / Superscript / Subscript / Special symbols, etc., as per necessity. Special text may include footnotes, endnotes, physical or chemical symbols, mathematical notations, etc.
Paragraph format	• Vertical space between paragraphs shall be about 2.5 line spacing or Use 6 pts before & 6 pts after paragraphs. • The first line of each paragraph should normally be indented by five characters or 12mm. • May however, choose not to indent if (s) he has provided sufficient paragraph separation.
	• A paragraph should normally comprise more than one line. • A single line of a paragraph shall not be left at the top or bottom of a page that is, no windows or orphans should be left. The word at the right end of the first line of a page or paragraph should, as far as possible, not be hyphenated.
Table / Figure Format	• Small size table and figures (less than half of writing area of a page) should be incorporated within the text, while larger ones may be presented on separate pages. • Table and figures shall be numbered chapter wise. For example, the fourth figure in chapter 5 will bear the number Figure 5.4. Table number and title will be placed above the table while the figure number and caption will be located below the figure. • Reference for Table and Figures reproduced from elsewhere shall be cited in the last and separate line in the table and figure caption, e.g. (after McGregor [12]). • Use single spacing in explanatory notes for tables and figures. The text in the tables should be left justified.
Equation(s) / Formula	Use only Hindu–Arabic numerals with single decimal. Equation numbers should be right justified using normal print. Format: (< Chapter number >. < Equation serial number >). Example: Y = X2 + 2X + Z (1.1) Z = X3 + 4Y (1.2)

5. ARRANGEMENT OF CONTENTS:

The sequence in which the project report material should be arranged and bound should be as follows:

5.1. Synopsis Contains:

- The synopsis should have minimum pages of 3 and should not exceed 5.
- The first page carries the Name of the student, Registration number and title of the dissertation.

1. Cover Page	2. Inside cover page
3. Declaration	4. Certificate and/or Certificate from external guide (if any)

5. Approval Sheet	6. Acknowledgements
7. Abstract	8. Table of contents
9. List of tables	9. List of figures
10. Abbreviations, symbols and nomenclature (if any)	11. Chapters
12. Appendices	13. References
14. List of papers published, based on the report (if any)	

5.2. Main Project contents:

TABLE OF CONTENTS

CHAPTER NO. PARTICULARS PAGE NO.

- Declaration
- Certificate
- Acknowledgements
- Abstract
- List of Tables
- List of Figures
- List of Graphs
- List of Abbreviations

I Introduction
- 1.1 Introduction about Topic
- 1.2 Need for the study
- 1.3 Statement of the problem
- 1.4 Objectives of the study
- 1.5 Scope of the study
- 1.6 Methodology
  - 1.6.1 Research design (depends upon topic)
  - 1.6.2 Hypothesis of the study
  - 1.6.3 Details of the population
  - 1.6.4 Sampling process
  - 1.6.5 Sampling methods
- 1.7 Sources of data
- 1.8 Data collection method
- 1.9 Statistical tools for the study
- 1.10 Limitations of the study

II Review of Literature
- 2.1 Introduction – Review of literature
- 2.2 Research gap
- 2.3 Conclusion

III Methodology

IV Data analysis and interpretation

V Findings, Suggestions, Conclusion and Future research work

Bibliography (MLA format)

Appendences
1. Questionnaire/data collection, balance sheet etc...

6. PREPARATION FORMAT

6.1 **Cover Page & Title Page:** A specimen copy of the Cover page & Title page of the project report are given in **Sample Page 1 & 2** respectively.

6.2 **Inside cover page:** Same as cover page given in **Sample Page 2**.

6.3 **Declaration:** Declaration to be given for the work done by the student as per the format in **Sample Page 3**.

6.4 Certificate of external guide (if applicable)

6.5 **Certificate:** The Bonafide Certificate shall be in One and a half line spacing using Font 'Times New Roman' and Font Size 12, as per the format in **Sample Page 4**.

6.6 **Approval Sheet:** The Approval Sheets are to be included only in the hard bound copies. A sample copy of the Approval Sheet as per the format in **Sample Page 5**.

6.7 **Acknowledgement:** It should be brief and should not exceed one page when typed one and a half spacing. See **Sample Page 6**.

6.8 **Abstract:** Abstract should be a one-page synopsis of the project work, typed in one and half spacing, Font Style Times New Roman and Font Size 12. See **Sample Page 7** Write this last. It is an overview of your whole project, and is between 200 - 300 words. The abstract shall highlight the important features of the project report and shall correspond to the electronic version to be submitted in CMS portal for inclusion in the website.

The Abstract in the project report, however, shall have two more parts, namely, the layout of the project report giving a brief chapter wise description of the work and the key words (max 6 keywords).

6.9 **Table of Contents:** The table of contents should list all material following it. The title page, Certificate and Declaration will not find a place among the items listed in the Table of Contents. The page numbers for the abstract, list of tables, list of figures and list of symbols should be in lower case Roman letters. One and a half spacing should be adopted for typing the matter under this head. A specimen copy of the Table of Contents of the project report is given in See **Sample Page 8**.

6.10 **List of Tables:** The list should use exactly the same captions as they appear above the tables in the text. One and a half spacing should be adopted for typing the matter under this head. See **Sample Page 9**.

6.11 **List of Figures:** The list should use exactly the same captions as they appear below the figures in the text. One and a half spacing should be adopted for typing the matter under this head. See **Sample Page 10**.

6.12 **Abbreviation Notation, Symbols and Nomenclature:** A complete and comprehensive list of all abbreviations, notations and nomenclature including Greek alphabets with subscripts and superscripts shall be provided after the list of tables and figures. (As far as possible, generally accepted symbols and notation should be used). One and a half spacing should be adopted for typing the matter under this head. See **Sample Page 11 and 12.**

6.13 **List of References:** The listing of references should be typed 4 spaces below the heading "REFERENCES" in alphabetical order in single spacing left–justified. The reference material should be listed in the alphabetical order of the first author. See **Sample Page 13**.

6.14 **List of papers published based on the report: See Sample Page 14.**

7. PROJECT WORK PRESENTATION

The below format is a very basic design showing you how to make a Power Point presentation (15-20 slides) in your project work:

- First PPT should include Project Title, your name (if you have a partner in the project, add it too). Include the names of the supervisor - (1 slide).
- Introduction - (1 slide).
- Statement of the problem: Define the research problem and explain the purpose – (1 slide).
- Significance of the research: Address the importance of the problem identified to a wide beneficiary from the study and how that specific audience will benefit from its findings. – (1 slide).
- Literature review: Outline the most relevant readings and theories which pertain to the project topic – (1 slide).
- Data collection: Sources of data used and its availability – (1 slide).
- Methodology: Include the research questions, hypotheses, participants, materials, and procedures. Explain how the student plans to meet the objectives of the research – (2-3 slides).
- Analysis and interpretation: Slides should reflect graphs, tables or charts that demonstrate critical elements of the research findings or outcomes. Presenters sometimes include their hypotheses and the corresponding results or analysis – (3-5 slides).
- Conclusion (1 slide).
- Recommendations for future study and Limitations of the study: "If I had to do this study again, in what way would it differ? Would another approach affect outcomes, and if so, how?" What changes and further work do you recommend? – (1 slide).
- List of Publications - (1 slide).

Sample Page 1

THE TITLE OF THE REPORT ON THE COVER PAGE SHALL LOOK LIKE THIS LINE

(The title is in Times New Roman Font with 16-point size, bold, one and a half line spacing)

T. Hareshwar Rao
Roll Number
(Candidate's name in Times New Roman Font, 14-point size in Bold Italics)

Sample Page 2

THE TITLE OF THE REPORT ON THE COVER PAGE SHALL LOOK LIKE THIS LINE

(The title is in Times New Roman Font with 16-point size, bold, one and a half line spacing)

A Project report submitted
in partial fulfillment of the requirement for the degree of
(4 lines gap) (Times New Roman, 12-point size, Bold, Italics and Centered)

(1 line gap)
Master of Technology
in
Computer Science and Engineering
(no gap) (Times New Roman, 14-point size, Bold, (Centered)

by
(1 line gap) (Times New Roman, 12-point size, Italic, (Centered)

Name of the student
Roll Number
(1 line gap) (Times New Roman, 14-point size, Bold, (Centered)

(1 line gap) (Image size: 3.11 cm x 2.89 cm, color, Centered)

Department of Master of Business Administration
(1 line gap) (Times New Roman, 14-point size, Bold, Centered)

INSTITUTE OF AERONAUTICAL ENGINEERING

(no gap) (Ariel, 18-point size, Bold, Centered)
(Autonomous)
Dundigal – 500 043, Hyderabad, Telangana
(1 line gap) (Times New Roman, 14-point size, Bold, Centered)

December, 2023
(1 line gap) (Times New Roman, 14-point size, Bold, Centered)

Sample Page 3

DECLARATION

(Times New Roman, 14-point size, Bold, Centered)

I certify that

a. The work contained in this report is original and has been done by me under the guidance of my supervisor(s).

b. The work has not been submitted to any other Institute for any degree or diploma.

c. I have followed the guidelines provided by the Institute in preparing the report.

d. I have conformed to the norms and guidelines given in the Ethical Code of Conduct of the Institute.

e. Whenever I have used materials (data, theoretical analysis, figures, and text) from other sources, I have given due credit to them by citing them in the text of the report and giving their details in the references. Further, I have taken permission from the copyright owners of the sources, whenever necessary.

Place: **Signature of the Student**

Date: **Roll Number**

Sample Page 4

CERTIFICATE
(Times New Roman, 14 Bold, Regular)

This is to certify that the project report entitled **Title (14 Bold)** submitted by **Mr./Ms. Name of the student (12 Bold)** to the Institute of Aeronautical Engineering, Hyderabad in partial fulfillment of the requirements for the award of the Degree of **Master of Business Administration (12 Regular)** is a bonafide record of work carried out by him/her under my/our guidance and supervision. The contents of this report, in full or in parts, have not been submitted to any other Institute for the award of any Degree. **(12 Regular, 1.5 line spacing)**.

Signature of Supervisor **Head of the Department**

Date:

Sample Page 5

APPROVAL SHEET

(Times New Roman, 14 Bold, Regular)

This project report entitled **(Title)** by **(Name of the student)** is approved for the award of the Degree Bachelor of Technology in **Branch (12 Regular).**

Examiner **Supervisor**

PRINCIPAL

Date:

Place:

Sample Page 6

ACKNOWLEDGEMENT

(Times New Roman, 14 Bold, Regular)

One page maximum. **Times New Roman and Font Size 12**

Sample Page 7

ABSTRACT

Keywords: Keywords: Economic order quantity; Thermodynamics; Entropy cost; Price dependent demand; Constant commodity flow; Supply chain coordination

Ever since its introduction in the second decade of the past century, the economic order quantity (EOQ) model has been the subject of extensive investigations and extensions by academicians. Although the EOQ formula has been widely used and accepted by many industries, some practitioners have questioned its practical application. Accounting for holding and order/setup costs, as has traditionally been the case for the economic order quantity, can distort the scenario. There are hidden costs not accounted for when modelling inventory systems. This paper postulates that some of these costs, which we refer to as the entropy costs, may be estimated using the principles of thermodynamics. Firstly, a new mathematical model is developed and considered as an enhancement to the EOQ model. Secondly, the developed model is investigated in a two-level (supplier– retailer) supply chain coordination context. Numerical examples are presented and results discussed……...
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Sample Page 8

CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF SYMBOLS

h	Capillary rise in cm
θ	Contact angle
r	Radius of capillary tube
V	Volume
P	Density
υ	Kinematic viscosity

LIST OF ABBREVIATIONS

ATDC	After Top Dead Center
BDC	Bottom Dead Center
BTDC	Before Top Dead Center
CA	Crank Angle
CAD	Computer Aided Design
CCS	Combined Charging System
CFD	Computational Fluid Dynamics
CO	Carbon Monoxide
CTC	Characteristic–Time Combustion
DI	Direct Injection
DME	Dimethyl Ether
DNS	Direct Numerical Simulations
EGR	Exhaust Gas Re- Circulation

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1. Paul, B and V. Ganesan, "Effect of spiral manifold configuration on in cylinder air motion and turbulence in DI Diesel engine", Journal of Engineering Application of Computational Fluid Mechanics, 2020. (Communicated).

II PRESENTATIONS IN INTERNATIONAL CONFERENCES

1. Paul, B and V. Ganesan, "Study of air motion inside the cylinder of a DI diesel engine with spiral intake port," 14th International Conference of Indian Society of Mechanical Engineers in the Knowledge Age, New Delhi, December 2019.

2. Paul, B and V. Ganesan, "Effect of manifold configuration in turbulence inside the cylinder of a direct injection diesel Engine by CFD Simulation," Third BSMEASME International Conference on Thermal Engineering, Dhaka, Bangladesh, December 2019.

II PRESENTATIONS IN NATIONAL CONFERENCES

1. Paul, B and V. Ganesan, "CFD Analysis of the effect of port configurations on air motion inside the cylinder of a DI diesel engine," 19th National Conference on IC Engine Combustion, The Combustion Institute, Chidambaram, India, December 2019.

Appendix 1

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