GUIDELINES

THESIS WRITING

FOR MASTER PROGRAM

Directorate of Postgraduate Program and Academic Development
Institut Teknologi Sepuluh Nopember
2021

GUIDELINES OF THESIS WRITING

1. BACKGROUND

Thesis is a scientific work written to fulfill one of requirements for completing the Master Program at Institut Teknologi Sepuluh Nopember Surabaya. The written thesis must follow excellent and precise standards of writing according to scientific convention.

In 1997, ITS Postgraduate Program has published a guidebook in thesis writing and thesis proposal writing. However, with the aim to improve the quality of thesis writing, thus, a manual of standard thesis writing is compiled as a refinement of the previous guidebook. This guideline is compiled to elaborate more comprehensively on the thesis writing standard as mentioned in 2020 Postgraduate Program Quality Standards.

2. THESIS PROPOSAL AND THESIS FORMAT

2.1 Thesis Proposal Format

1. Thesis proposal is written in Indonesian well and correctly. In this writing, writers are not supposed to use first person pronoun.
2. Thesis proposal is typed and then copied on 80 grams A4 sized paper. The font used is Times Roman, size 12-normal. Do use ink that does not fade easily.

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3. The text must use 1.5 spacing between lines. It should be written on both sides of the paper. The front side of the page is always the odd number, and the back side page is even number.
4. The text layout is presented in Appendix 1, with the description as shown in Point 5 below.
5. The text is typed with page margins according to the following spacing provisions:
    a. Margin from top edge of paper = 3.5 cm
    b. Margin from bottom edge of paper = 3 cm
    c. Margin from left edge of paper = 4 cm (odd page)
    d. Margin from right edge of paper = 3 cm (odd page)
    e. Margin from left edge of paper = 3 cm (even page)
    f. Margin from right edge of paper = 4 cm (even page)
6. The writing of CHAPTER 1, CHAPTER 2, and so on should start from the top margin using font 14. The title of the chapter is commenced after 1.5 space (one press of the Enter button) from the title of CHAPTER 1, CHAPTER 2, …, etc. The articles of the chapter and its title should be typed using capital letters for all alphabetic letters with font 14. Numbers indicating the chapters must be typed in Arabic numerals (1, 2, 3, …, etc.). The first sentence (if not being started with a sub chapter) or sub chapter starts after 3 spaces (by pressing of the

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Enter button twice) from the title of the chapter and from the left margin (for the title of sub chapter) or by pressing of tab button once (1.5 cm) for the beginning of the sentence. The title of sub-chapter is typed using title case (only the first letter of every word which is capitalized, while others use lower case, and all conjunctions need to use lower case). The first sentence in sub-chapter starts at 1.5 space after the title of sub-chapter and by pressing the Tab button once. The title of following sub-chapter commences after 3 spaces from the last line from the previous sub chapters. The sample of chapter and sub chapter writing can be seen in Appendix 2.

7. The first sentence in a paragraph should be typed by pressing the Tab button once and no margin should be given between paragraphs.
8. The beginning of the chapter should be type on a new page and commence on the odd numbered pages. If a chapter ends on the odd numbered pages, thus, the even numbered pages should be left blank.
9. The pages numbering is completed as follow: all sectins prior to the texts (prior to Chapter 1), starting from the authorization sheet, are numbered with lowercase Roman numerals positioned at the bottom-center of the page. The text sections (Chapter 1, onwards including the bibliography and appendices) are numbered with Arabic numerals placed at the bottom-center of the page.

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10. All figures and tables must be clear/not blurry/ blurry. The size of the letters in figures and tables should be easily readable by the normal eye. Figures and tables are placed in the center of the page (centered).
11. The number and title of the tables are placed in the left side above the table. The table's number is adjusted to the location of the table in the chapter, for example, Table 2.3 Concentration of Pollutants in *Kali Mas* River on 18 April 2006. At the bottom of the table, information is given about the sources of information listed in the table, whether the information is from certain libraries, observations, or results of calculations. Table titles are written in title case except for conjunctions and prepositions using single spacing. The table is also made using single spacing. The outermost side of the table must not exceed the left and right margins. The landscape format also conforms to these guidelines. An example of the table presentation is shown in Appendix 3.
12. The number and title of the image/figure are written on the left side below the image. The number of the figure is adjusted to the location of the image/figure in the chapter, for example: Figure 4.1 Graph of Relationship Between Population Growth and Ecological Load Decrease (Sugriwo, 2006). The source of the image/figure is listed directly at the end of the title. The title of the image/figure is written in the title case, except for conjunctions and prepositions using single spacing. The outermost side of the image must not

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exceed the left and right margins. The landscape format conforms to these guidelines. An example of the figure/image presentation is shown in Appendix 3.

13. Writing tables and figures in sentences that refer to a table or figure must begin with a capital letter. For example: According to Table 2.3 and Figure 2.1.
14. The table title or the top border of the image/figure starts after 3 spaces from the last line of previous section/paragraph. The sentence right below a table or the figure's title commences after 3 spaces (two taps of the Enter button) from the bottom edge of the table or the title of figure (see examples in Appendix 3). One point five spacing (a tap of Tab button) is given between the title of the table or the figure and the table or figure itself.
15. All formulas are written using the equation editor (or mathtype). Formula writing begins at the left border, aligned with the sentence directly above it, with 1.5 (one and a half) spaces from the sentence above and below it. The numbering of formula is adjusted to the chapter number where the formula is located and is written at the right end of the line (aligned right). The size of fonts and symbols in the formula is in accordance with the existing defaults as presented in Table 1 below.

Table 1 Fonts and Symbols Sizes in Formula

Type	Size (pt)
Full	12
Subscript/Supercript	7

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Sub-Subscript/Supercript	5
Symbol	18
Sub-symbol	12

An example of writing a formula is as follows:

$$Cov_{YY}(x_i, x_j) = \sigma_Y^2 \exp\left(-\frac{d_{ij}}{l_Y}\right), \qquad (3.2)$$

with:

σ_y^2 = variance of hydraulic conductivity logarithm

l_y = correlation scale of hydraulic conductivity,

d_{ij} = distance between point x_i and x_j,

xi, xj = point locations on study domain separated with distance dij.

Enlarging the view of the formula by dragging the corner of the created formula is not allowed.

16. Thesis proposal is bounded by using white Manila paper for the front cover. The writing on the front cover is printed in black with ITS logo in blue. An example of the front cover layout of the thesis is explained in Sub-Chapter 2.2.
17. Abstract Writing.

    The abstract of thesis proposal is written in both Indonesian and English on the different pages respectively. The format of abstract writing will be explained below:

    a. The title of the thesis is typed on the top margin border, centered, in font 14, bold, and in single spacing.

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b. The name of student, supervisor, and co-supervisor (if any) should be written after 2 spaces under the title, printed in normal font and centered. The margin between those three names is a single space.
c. Abstract article is written in 2 spaces away from the word “ABSTRACT”, centered, in font 14, bold, and using the capital letters or upper case.
d. The word “ABSTRACT” is written 2 spaces away after the name of the supervisor and co-supervisor (if any)
e. Single spacing is applied between the lines in the abstract article.
f. Every paragraph in this abstract is started with single tap of the Tab button (1.5 cm) from the left margin using a justified alignment
g. The maximum word is 350 words.
h. Keywords must be typed 3 spaces margin below the last line of the abstract, with the minimal 3 words, and maximal 5 words. Keywords are chosen from the significant terms from the specific main terminology in the thesis proposal. Their writings are orderly typed according to the alphabetical order from those keywords. A keyword may consist of more than a word.

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i. These items need to be written up in an abstract: Background, Problem, and methodology of thesis plan implementation.

An example of the abstract from thesis proposal can be seen in Appendix 4.

2.2 Thesis Format

1. Thesis format refers to the format of thesis proposal mentioned in Sub-Chapter 2.1.
2. Thesis is bounded using soft cover. The colors of the front cover and its letters on the front cover follow the color used by each faculty as follow:
    a. F.SCIENTICS: Front cover in the color of Salmon, letters in White
    b. F.INDSYS: Front cover in the color of Fire Brick, letters in White
    c. F.ELECTICS: Front cover in the color of Gold, letters in Black
    d. F.CIVPLAN: Front cover in the color of Nero Black, letters in White
    e. F.MARTECH: Front cover in the color of Summer Sky, letters in Black
    f. F.CREABIZ: Front cover in the color of Indigo, letters in Black

    The samples of front cover colors along with their color codes are presented in Appendix 5. The front cover is

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made using *doff* paper (not *glossy* paper). The logo of ITS is printed in Blue using the white base. Front cover samples can be seen in Appendix 6A to 6C.

3. The size of letters, numbers, symbols, notations in writing, formulas / equations, tables, and figures must be large enough to be read clearly when the thesis is reduced to a microfilm.
4. Footnotes, if needed, are written using single spacing at the bottom of the page. The font size used for footnotes is 10. These footnotes are placed 3 spaces below the bottom line of the main report.

3 GUIDELINES OF THESIS PROPOSAL WRITING

3.1 General Information

The guidelines of thesis proposal writing are a guideline for master program students in ITS in preparing their thesis proposal. Besides that, this guideline is also a manual for the supervisors, examiner, and the management of postgraduate study programs in all majors in ITS in guiding the students in compiling the thesis proposal and checking the thesis proposals prepared by the students prior to their thesis proposal approvals. All matters related to the thesis proposal preparation are detailed in the below items:

1. Thesis proposal can be prepared by the students after completing ≥ 25% of their total credits with cumulative GPA above 2.5 without having any Grade D or E.

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2. Thesis proposal must be presented on an open seminar (thesis proposal seminar). The proposal presentation is a forum intended to refine the thesis proposal and as a forum of thesis proposal examination. This seminar needs to be attended by:
   a. One or two supervisors (supervisor and co-supervisor)
   b. Two or more examiners (all appointed examiners)
   c. Postgraduate students who have similar expertise fields
   d. Other interested parties
3. The grading from the examiner team on the presentation is:
   a. The proposal is approved, or
   b. The proposal is approved with revision, or
   c. The proposal is not approved, and the seminar needs to be retaken.
4. Any suggestion of revision given by the examiners which includes the supervisor, are stipulated in the minutes of the thesis proposal seminar mentioning the duration of revision with a maximum period of one month. Besides that, all members of the examiner team and the related student must fill out the attendance form on the sheet provided.

   On that provided sheet, all members of the examiner team must also write an evaluation of the seminar proposal for

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the student. All suggestions for improvement of the thesis proposal must be accommodated in the thesis proposal and this improvement must be consulted with both examiners and supervisors. If the revisions have been made and approved by each of the examiners of the thesis proposal seminar, then the thesis proposal is bounded. The supervisor, co-supervisor (if any), and all examiners write down their signatures and full names along with their academic titles on the validation sheet. Examples of assessment sheets, minutes, and approval of thesis proposals are presented in Appendix 7.

5. The period of proposal revision is 30 (thirty) calendar days from the date of the seminar. If by this time limit the student still has not submitted the revised proposal, then the thesis proposal is declared invalid, and the related student retake the thesis proposal seminar.
6. Proposals which are not approved can be resubmitted after being revised and the related student must present the proposal again.
7. The approved thesis proposals are submitted in these details:
    a. One copy to the Director of the ITS Postgraduate Program.
    b. One copy to the Study Program Coordinator.
    c. One copy to each supervisor.

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8. Copies of the minutes of the thesis proposal seminar, attendance list, and test scores for the thesis proposal are submitted to the Director of the Postgraduate Program and the Dean of the Faculty in which the related student is enrolled for further processing.

3.2 Contents of Thesis Proposal

1. Elements of thesis proposal

   Elements of thesis proposal consist of:

   a. Research title
   b. Authorization Sheet
   c. Abstract
   d. List of content
   e. Body text (chapters) which contain of: Chapter 1: introduction including a background, problem formulation, objectives, and research benefits; Chapter 2: literature and reviews theoretical foundation; Chapter 3: research methods
   f. Plan and schedule of research and thesis writing
   g. Bibliography
   h. Appendices

2. Title page and authorization page

   a. The first page of thesis proposal is called the title page. Its content and format are similar to the front cover. No page number is put in the title page. A sample of title page can be seen in Appendix 8A to 8C.

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b. The authorization page is located after the title page and before the abstract.

3. Title of thesis proposal

The title of the thesis proposal should contain a brief and clear description of the research topic that will be made. The title includes, among others: what the study about, the purpose of problem solving, the method used, and the scope of the discussion. The maximum word in the title is 20 words.

4. Abstract

Abstract is a short and concise summary of the thesis. The abstract is aimed to help the reader to quickly get an overview of the (scientific) writing. In the abstract, any citations from other authors should not be included. The detail of the abstract writing is as follows:

The abstract of the thesis proposal contains the motivation, problem formulation, objectives, approach/method, and expected outcomes of the study, with the following explanation (see Appendix 4):

i. Motivation

Motivation describes the significance in performing this study. This part consists of:

(i) The significance of this study

(ii) Level of the existing difficulties

(iii) The upcoming impacts if the research is successfully applied

iii. Problem formulation

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Problem formulation explains the problem which will be solved. Besides, it includes the scope of the approach, whether generally or specifically.

iv. Approach/methods

The approach/methods exhibit on how the problem is solved, whether using simulations, analytical models, prototypes, or actual data analysis.

v. Expected outcomes

If possible, any expected results of the upcoming research/study can be listed. In general, a thesis proposal does not need to include these results.

5. Body text of thesis proposal

The body text of the thesis proposal usually (tentatively) contains of these elements:

a. Introduction
b. Background
c. Problem formulation
d. Research objectives and benefits
e. Hypothesis (if any)
f. Literature reviews and theoretical foundation
g. Research methods
h. Research plan and schedules

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Those elements are prepared as follows:

i. Introduction

ii. The research/study is carried out to answer the curiosity of researchers in expressing a concept/hypothesis/symptom or its application for a particular purpose. For this reason, the introduction needs to contain the motivation that drives the research/study, or a description of the justification related to the importance of the research/study subject. Using this introduction, the author invites the reader to know in general the context or background of the research, problem formulation, research objectives, and the benefits of research initiated or accompanied by the main theoretical basis or initial study. It should be noted that science and technology research can be completed in the form of qualitative/ quantitative or experimental, literature review, or development work (project). The sections described below highlight the results of experimental research and may be modified according to the form of the research conducted.

iii. Background

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Background presents the context of the research, the research objectives, and the motivation behind this research. This section will explain about the terns on how the topic will be carried out.

The background contains initial studies or various relevant and recent main theories that are combined narrowing to a unique problem which is then compiled in the form of problem formulation. Usually, this section begins by outlining both theoretical and practical gaps between expectations and reality.

iv. Problem formulation

In this sub-chapter, the problems to be solved are formulated in a clear, sharp, and focused manner. This section contains descriptions/ statements or various main topics that will be explored in this research. The definition, assumptions, and scope of the research/study can also be explained in this section. The formulation of the problem mentions the main focuses of the research including various questions that will be answered in the research, thus the description of what will be revealed in the research needs to be clearly explained. All questions asked need to be

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supported by the underlying reasons obtained from the initial study or the main theory.

v. Research objectives and benefits

In this section, the purpose of the research/ study and its targets to be achieved are stated briefly and clearly in accordance with the problems that have been formulated. Research/study can aim to explore, describe, explain, prove, or apply a concept/ hypothesis/phenomenon, or make a prototype. It is also necessary to include the benefits/special uses/expected benefits of the results of this research/study. There are times when the benefits of research are not explicitly stated.

vi. Hypothesis (if any)

A hypothesis is a summary of various theoretical conclusions based on a literature review as a temporary (tentative) answer to a theoretically proposed problem which is considered the most likely and successful to be found or observed. Not all research requires a hypothesis, especially exploratory (digging/deepening) and descriptive research. Most scientific and technological research is exploratory; thus, hypothesis part is not

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necessary. Preparation of a good hypothesis can help giving direction to the research path to be taken/carried out. If the hypothesis is not applied, the researcher still must explain what the final results are to be achieved or in which direction the research is based on the chosen theoretical basis.

vii. Literature reviews and theoretical foundation

In this section, theories, findings, and previous research materials obtained from various references that serve as the basis for conducting this proposed research are discussed. Only things that are relevant to the subject/topic/state of the art studied are described. The literature review is a short comprehensive summary of all related material contained in various references. This section can be a display of discussion or debate between libraries. In addition, it can also explain the techniques/rules/equipment or technology that will and/or will/have been used in carrying out research that will be/is being carried out. The written description is directed to develop a framework for the approach or concept applied in the research. The material submitted should be from the

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latest and original references, for example from journal papers.

Meanwhile, a theoretical foundation is all the theories that are taken/chosen based on a literature review which is the background of the research problem/study that will be/is being carried out. The theoretical foundation will also be used as a guide for doing further research. It can be in the form of a qualitative description or a mathematical model/equation. If several theories are discussed, it is necessary to state which theory is prioritized.

All references used/cited must be listed in the bibliography. In text citation, the author's last name and the year of publication/publication must be listed after the citation in small brackets (last name, year of publication/publication) [Harvard system], for example (Siregar, 2006). If the author of the article quoted is more than 2 persons, then, only the name of the first author is written, then continued with writing *et al*. But in the bibliography the names of all the authors of the article must be written, not only the names of the first authors plus the writings *et al*. In direct quotations (quoting exactly as written

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by other authors), if only one sentence is quoted, then the quoted sentence must be put in quotation marks at the beginning and end of the sentence. If the direct quote is more than one sentence, then the quote is written indented by tapping the Tab button once (1.5 cm) from the left and right using a single space. An example of a direct quote is given in Appendix 9.

viii. Research method

This section describes the design, method, or approach that will be used in answering research problems to achieve the research objectives, as well as the stages of the research in detail, briefly and clearly. Descriptions may include research parameters, models used, research designs, techniques/methods of data collection and analysis, research stages, observation techniques (if done), as well as theories supporting the implementation of research. If the interview technique is used in data collection, a list of questions or questionnaires is attached in the appendix. This section can be supplemented with a flow chart of the research steps or other images needed to clarify the research/study method.

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The research method also includes a schedule of research activities in the form of a bar-chart, starting from the preparation stage of research implementation to the thesis writing stage.

6. Bibliography

The bibliography is a list of references from all types of references such as books, journal papers, articles, dissertations, theses, handouts, laboratory manuals, and other scientific works cited in writing a thesis proposal. All references listed in the bibliography must be referenced in the thesis. References are listed in alphabetical order by the first letter of the first author's last/family name and year of publication (latest written first). If the same author has several articles/papers referred to, then the order of the articles is based on the year of publication. If in the same year, more than one article from the same author is published, then the lowercase letters a, b, …, and so on are written after the year. It should be noted that at least 30% of the total literatures in the literature review is derived from relevant scientific journal articles. The procedure for writing a bibliography is as follows:

a. Journal article

i. First author's last/family name, first/first name, second author's last/family name, first/first name, and the name of the next author. All authors' names

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must be written here. First/surname can be written in full or only initials.

ii. The year of publication/publication is written in brackets.

iii. The title of the article/paper is printed in upright letters with the title case between quotation marks.

iv. Journal title is in italic style.

v. The volume number of the journal.

vi. Journal number.

vii. The page number of the article in the journal.

viii. Between one thing and another is separated by a comma, and at the end of a reference is given a period.

ix. If the reference is written in more than one line, then the second and subsequent lines are written indented 1 cm inward. The distance from one reference to the next is a single space.

Example:

Neuman, S.P. (1980a), "A Statistical Approach to the Inverse Problem of Aquifer Hydrology, Improved Solution Method and Added Perspective", *Water Resources Research*, Vol. 16, No. 2, p. 331-346.

Neupauer, R.M. dan Wilson, J.L. (2001), "Adjoint-Derived Location and Travel Time Probabilities for a

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Multidimensional Groundwater System", *Water Resources Research*, Vol. 38, No. 6, p. 1657-1668.

Notes:

The addition of the letter "a" after the year to indicate how to write a reference if an author writes more than one article in the same year. For the next literature (the same author in the same year) the letters "b", "c", and so on are added.

b. Books

i. The author's name and year of publication are the same as Article a.i and a.ii above

ii. The title of the book is type in italic with the title case.

iii. Volume number of the book (if any).

iv. Publishing edition.

v. Publisher name.

vi. City in which it was published.

Example:

Todd, K.D dan Mays, LW, (2005), *Groundwater Hydrology*, 3rd edition, John Wiley & Sons, Inc., New York.

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c. Article/paper in a book written/summarized by the editor.

i. Author's name, year of publication, and article title/paper is typed similar as Article a.i, a.ii, and a.iii above.

ii. The title of the book, preceded by the word "in" is type in italic.

iii. Volume number of the book (if any).

iv. Publishing edition.

v. Editor's name, preceded by ed. or eds. when it has more than one editor.

vi. Publisher name.

vii. City in which it was published.

viii. The page number of the article in the book.

Example:

Hall, J.E. (1992), "Treatment and Use of Sewage Sludge", in *the Treatment and Handling of Wastes*, eds. Bradshaw, A.D., Southwood, R., dan Warner, F., Chapman and Hall, London, p. 63-82.

d. Articles/papers in proceedings (a collection of papers from a seminar/conference).

i. Author's name, year of publication, and article title/paper is the same as Article a.i, a.ii, and a.iii above.

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ii. The word “proceedings” are followed by the name of the conference and the conference number (first, second, third, and so on), in italic.
iii. Editor's name, preceded by ed. or eds. when more than one editor.
iv. Organizer of seminars / conferences.
v. City in which the seminar/conference is held.
vi. Page number of the article/paper in the proceedings.

Example:

Neuman, S.P. (1980), “Adjoint-State Finite Element Equations for Parameter Estimation”, *Proceedings of Third International Conference on Finite Elements in Water Resources*, Eds: Wang, S. Y. et al., University of Mississippi, Mississippi, p. 189-215.

e. Project (student’s final project)
   i. The author's name and year of publication are the same as Article a.i and a.ii above.
   ii. Project title is typed in italic.
   iii. Project type.
   iv. College/university name.
   v. City in which the university/college is located.

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Example:

Cox, M.J.M. (1994), *Improvement of a Hang-Glider's Stall Characteristics*, Mechanical Engineering Project, School of Engineering, The University of Middletown, Middletown.

f. Thesis and dissertation
   i. The author's name and year of publication are the same as Article a.i and a.ii above.
   ii. Thesis/dissertation title is type in italic.
   iii. The word Ph.D./Master "thesis" or "dissertation" is typed not in italic (printed in upright letters).
   iv. College name.
   v. The city where the college is located.

Example:

Mardyanto, M.A. (2004), *A Solution to an Inverse Problem of Groundwater Flow Using Stochastic Finite Element Method*, Ph.D. Thesis, University of Ottawa, Ottawa.

g. Engineering Standard
   i. The author's name and year of publication are the same as Article a.i and a.ii above.
   ii. The title of engineering standard is typed in italic.
   iii. Name of publisher
   iv. City in which it was published.

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Example:

ACI Committee 318 (1989), *Building Code Requirements for Reinforced Concrete and Commentary*, American Concrete Institute, Detroit.

h. Official document from Governments/world organization
   i. The author's name and year of publication are the same as Article a.i and a.ii above.
   ii. The title of documents is typed in italic.
   iii. Volume or number (if any)
   iv. Name of publisher
   v. City in which it was published.

Example:

World Health Organization (1976), *Manual of the Statistical Classification of Diseases, Injury, and causes of Death: Based on the Recommendations of the 9th Revision Conference, 1975 and Adopted by the 29th World Health Assembly*, Vol. 1, WHO, Geneva.

i. Personal Communication

   Personal communication is not allowed to be in the reference list.

j. Course materials/Handouts.

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i. The author's name and year of publication are the same as Article a.i and a.ii above.
ii. The title of the topic should be printed in italic.
iii. The word “lecture handouts” or “course materials” and the name of the course should be printed with the upright letter.
iv. The name of college/university
v. The city in which the university/college is located.

Example:

Seidel, R. (1996), *Robotics*, Lecture handout: Engineering and Society, the University of Middletown, Middletown.

k. Laboratory Manual
   i. The author's name and year of publication are the same as Article a.i and a.ii above.
   ii. The title of the laboratory activity or practice should be printed in italic.
   iii. The word “laboratory manual” should be printed with the upright letter.
   iv. The name of college/university
   v. The city in which the university/college is located

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Example:

Hermana, J., Tangahu, B.V., and Samodra, A. (2003), *Analytical Method of Environmental Pollutant,* Laboratory Manual, Department of Environmental Engineering FTSP-ITS, Surabaya.

l. Article/paper from internet

Until recently, there is not any convention on the writing of bibliography from internet sources yet. However, it will be wise if those materials are not used in any scientific work. An example of bibliography from internet sources is presented below.

Example:

Internet News Group Comp. Compression (1995), *Frequently Asked Question Part I, Subject (17): What is the State of Fractal Image Compression?*, Entry from Mair, P. mair@Zariski.harvard.edu.

7. Others

All matters relating to the preparation of a thesis proposal that have not been regulated in this manual, it is recommended to follow the procedures from other guidelines (books) similar to this book. Other things which are sometimes needed in writing a thesis or dissertation to provide a good flow (convenient flow) are:

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a. Research assumptions, containing the basic assumptions of research foundation; can be in the form of substance or research method.

b. Research boundaries, contain all the variables studied or the conditions surrounding the research. By presenting this section, the reader can respond appropriately to the research report presented.

c. A collection of terms will help readers understand the meaning of the terms used in writing. These term sets can also be grouped together with symbol sets/lists.

4. THESIS WRITING GUIDELINES

4.1 General Information

1. Thesis is a scientific work written to fulfill one of the requirements to complete postgraduate study at strata 2 (master's program).
2. Thesis is a scientific report on the results of research/studies, observations, or investigations carried out by master students at the Postgraduate Program of Institut Teknologi Sepuluh Nopember, Surabaya.
3. As a written scientific work, thesis is prepared by following the rules of scientific writing. Research/study for thesis writing is conducted after the thesis proposal is approved by the supervisor and examiner team. Publication of research/study results from a thesis can generally be done if the

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implementation of the thesis has reached more than 50%. Publication can be done at a national seminar or journal.

4. In writing a thesis, students are guided by one or more supervisors, with the following responsibilities:
    a. Students are responsible for all aspects related to the preparation of the thesis and publication of the research/study (thesis), including:
        i. Content and material (substance).
        ii. Organization and format.
        iii. Editorial work.
        iv. Language.
        v. Bibliography.
        vi. Typing and presentation of various images.
        vii. Maintaining the quality and validity of the data, logic, and rationality used in writing.
        viii. Preparation of a manuscript for publication purposes where the material is taken from part or all parts of the thesis.
    b. The supervising lecturer/supervisor (supervising committee) is responsible for:
        i. Examine, correct, and direct the material (substance) and methodology used in the research/study for the writing process of a thesis.
        ii. Examine, correct, and direct the organization, content, and format of a thesis.

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iii. Reviewing the quality of the data, logic, and rationality of the thesis.
iv. Conduct a thorough evaluation on the completion of the thesis and the fulfillment of the existing criteria.
v. Provide encouragement and guide students who are mentored to prepare manuscripts for scientific publications (at a seminar or journal).
vi. Maintain the quality, the originality and avoid any possibility of plagiarism in the thesis.

5. The thesis completion period is one semester or one year (calendar days) from the date of thesis proposal approval. Within a maximum period of one year, the thesis must have been defended in front of a team of examiners. If this time limit is exceeded, the related student must change the title of his/her thesis and repeat the thesis submission procedure as described in Chapter 1.
6. The only parties who may attend the closed thesis examination are the lecturers who examine the thesis. It is strongly recommended that the thesis examiners are the same examiners as in the thesis proposal seminar. The chairperson of thesis examination session is appointed from the supervisor team or member of the examiner team. The examiners will give their assessment on the final thesis evaluation form as presented in the Appendix 10. Furthermore, the results of the

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thesis examination are written on the thesis examination minutes. An example of thesis examination minutes is available in Appendix 10.

7. The duration of thesis revision is 3 (three) months from the date of the thesis examination. If by this time limit the student still has not submitted the related thesis, then the thesis is declared void and the related student must prepare another thesis with a new title.

4.2 Thesis contents

1. Elements of thesis

   Thesis elements consist of:

   a. Research title
   b. Authorization sheet
   c. Abstract
   d. List of contents
   e. List of figures (if any)
   f. List of tables (if any)
   g. List of notation/symbols (if any)
   h. Body text (chapters) which consists of: Chapter 1: Introduction containing background, problem formulation, research objectives and benefits; Chapter 2: Literature review and theoretical foundation; Chapter 3: Research methods; Chapter 4: Findings and Discussion; Chapter 5: Conclusion
   i. Bibliography

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j. Appendices (if any)

k. Author biography

2. Title page and authorization sheet

   The title page and authorization sheet are the same as those described in Sub-Chapter 3.2 Article 2. The sample of title page is the same as that presented in Appendix 8A to 8C. A sample of a thesis authorization sheet is presented in the Appendix 10.

3. Thesis Title

   Things related to thesis have been explained in Sub-Chapter 3.2 Article 3. Thesis title may not exactly match what has been stated in the thesis proposal if there are changes or additions which are fundamental in the research process. But substantially the research on the thesis must be the same, even though not identical, to what has been described in the thesis proposal.

4. Abstract

   Thesis abstract basically has the same format of thesis proposal abstract, as explained in Sub-Chapter 3.2 Article 4, but the results and conclusions of the research obtained must be added to the thesis abstract. In the conclusion part of the abstract, writer must avoid writing which shows doubt. In the thesis, in addition to the abstract written in Indonesian, the abstract must also be written in English. A sample of thesis abstracts written in Indonesian and English are presented respectively in Appendix 11.

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5. Body text

Basically, the body text of the thesis has the same body text of the thesis proposal, except that in the thesis there is an additional chapter on research results and discussion. Besides that, all parts of the thesis body text must be written in more detail and in depth than what has been written in the thesis proposal, because at the time of writing the thesis, the literature review and research have been carried out in more depth. The body text of the thesis includes, but is not limited to, the following:

a. Introduction.
b. Background.
c. Problem Formulation.
d. Research objectives and benefits.
e. Hypothesis (if any).
f. Literature review and theoretical basis.
g. Research method.
h. Research results and discussion.
i. Conclusions and recommendations.

All the sections are written arranged in the following items:

i. Point a to g above should be written in same manners as what has been explained in Sub-Chapter 3.2 Article 5.
ii. Research results and discussion.

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At the beginning of this section, it is necessary to give an introduction that contains the things to be carried out along with the analysis used in completing the research. Furthermore, in detail and step by step manner, the research objectives are discussed and analyzed in detail and sharp, applying the methods which have been given in the research methodology, until a research result is obtained. This analysis and discussion were carried out to all the goals that have been set on the research objectives.

iii. Conclusions and recommendations.

(i) Conclusion.

In this sub-chapter, the research or thesis conclusions are written. Conclusions must be written based on the results of research, discussion, and findings that have been written in the previous chapter which, of course, is adjusted to the objectives of the research or thesis. Do not conclude something that is not in the discussion which has been made. Conclusions are made briefly, clearly, and orderly as possible as based on the research objectives (as written in the research objectives sub-chapter).

(ii) Suggestions (optional)

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In this sub-chapter the suggestions proposed by the author are written. In this case, there are two types of suggestions:

a) Suggestions for further research / further studies.

   This type of advice is given to theses which are research and modeling. This suggestion contains various things that have not been done, or have not been completed, or various things which are a continuation of the research that has been carried out in this thesis. Suggestions made must be based on the discussion and conclusions that have been made. Do not suggest anything beyond the scope of the discussion and conclusions drawn.

b) Suggestions on system improvements discussed in the thesis/practical implications. This type of advice is given to the thesis which is a case study. This suggestion contains various issues that must be done to improve the system which has been discussed in the sub-chapter of discussion and conclusion. The advice given must be reasonable and

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possible to do/apply. This suggestion is, of course, based on the findings obtained in the discussion and concluded in the part of conclusion. Do not give any suggestions that are different/deviate from what has been discussed and concluded in the discussion and conclusion sub-chapters.

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Appendices (Thesis Writing Guidelines)

1. Script layout
2. Sample of chapter and sub-chapter
3. Sample of tables and figures presentation
4. Sample of an abstract of thesis proposal in Indonesian
5. Front covers' colors and its codes
6. Sample of thesis front cover
7. Sample of grading sheet, minutes, and thesis proposal authorization sheet
8. Sample of thesis inside cover
9. Sample of more than a sentence direct quotation
10. Sample of grading sheet, minutes, and thesis authorization sheet
11. Samples of thesis abstract

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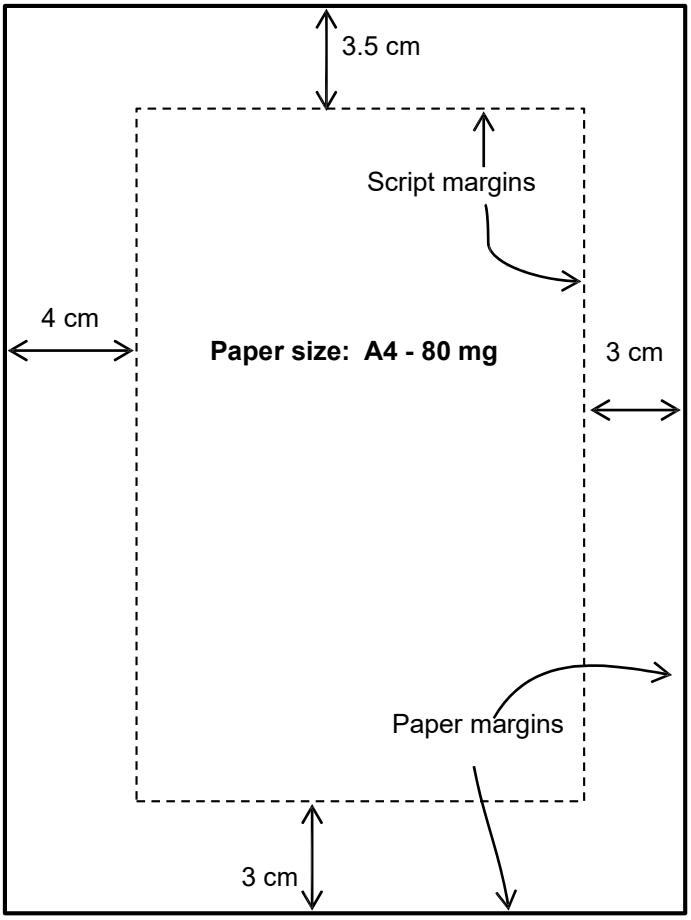
Appendix 1A

Script layout for odd numbered page



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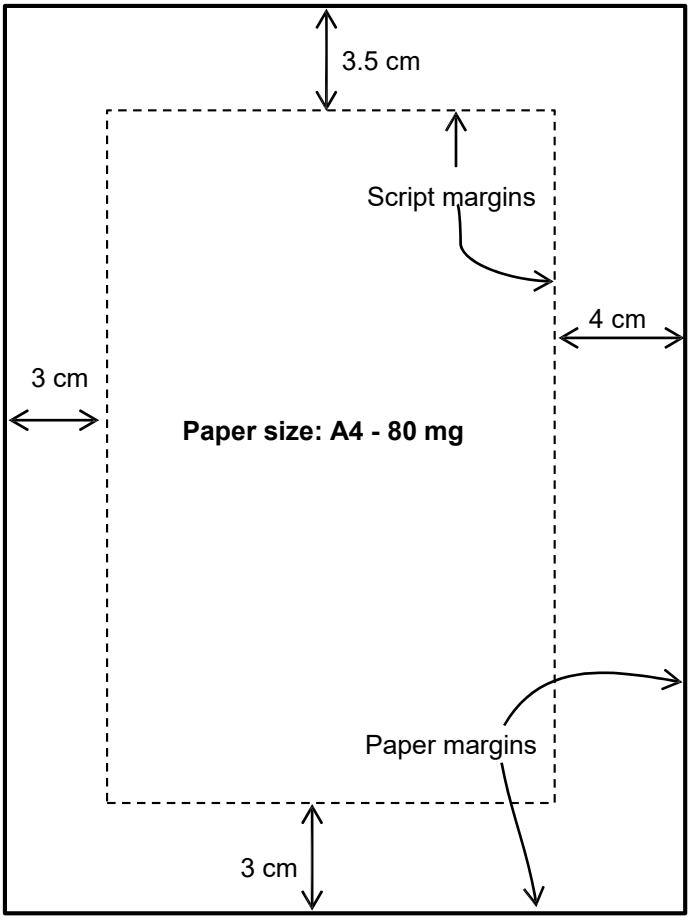
Appendix 1B

Script layout for odd numbered page



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Appendix 2

Sample of chapter and sub-chapter writing

CHAPTER 2
LITERATUR REVIEW

2.1 Groundwater Flow Models

In groundwater flow studies, it is usually difficult or even impossible to determine the response of an aquifer to future activities by conducting laboratory research or field experiments. Instead, groundwater flow models, which represent groundwater flow systems or processes (Bear, 1979; Konikow and Bredehoef, 1992; Kitanidis, 1997), can be made to predict groundwater flow behavior in an aquifer.

Groundwater flow models can be categorized as physical models (porous media models, analog models, analog electronic models), and mathematical models (Todd, 1980). In the physical model, a small-scale model is assumed to represent the actual field conditions or processes. In the mathematical model, the actual field conditions are expressed by mathematical equations. In mathematical modeling, a computer program is usually required to solve flow problems, especially when dealing with complex and broad domains. Physical and mathematical models may be able to simulate groundwater flow in a particular domain; but the actual conditions in the field and the flow process are usually simplified in both types of models (Bear, 1979).

Furthermore, mathematical models have several advantages. (1) This model can cover the complex conditions of the aquifer system. This complexity stems from heterogeneity and anisotropy of hydraulic conductivity, irregularities in the geometric shape of the aquifer, different types of boundary conditions, and variability of

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discharge/recharge to and from the aquifer. (2) The model is easy to calibrate, i.e. one can vary the values of several parameters so that the response of the modeled aquifer (groundwater level or hydraulic head) is the same as the actual response. Therefore, engineers generally use this mathematical model.

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Appendix 3.A

Sample of Table Presentation.

Table 3.4 Typical Value of Liquid Limit, Plastic Limit and Activities from Several Clay Minerals

Minerals	Liquid Limit, LL	Plastic Limit, PL	Activity, A
Kaolinite	35 – 100	20 - 40	0.3 –0.5
Illite	60 - 120	35 - 60	0.5 -1.2
Montmorillonite	100 - 900	50 - 100	1.5 – 7.0
Halloysite (hydrated)	50 - 70	40 - 60	0.1 – 0.2
Halloysite (dehydrated)	40 - 55	30 - 45	0.4 – 0.6
Attapulgite	150 - 250	100 - 125	0.4 – 1.3
Allophane	200 - 250	120 - 150	0.4 – 1.3

Source: Das, 2002

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Appendix 3.B

Sample of figure presentation.

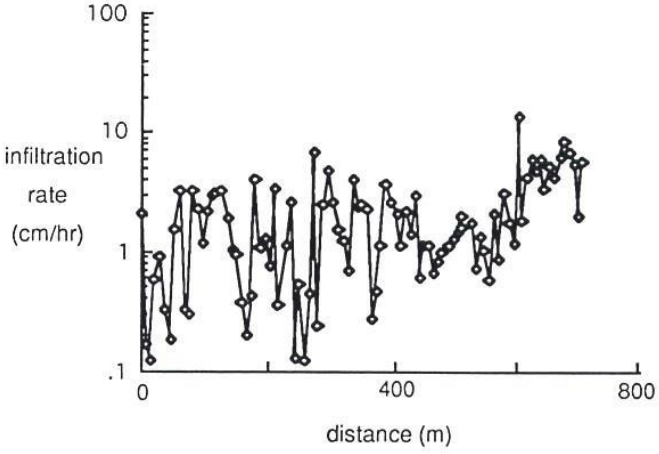

Figure 1.2 Alluvial ground surface infiltration rates observed at 25-ft intervals at the Rio Grande near Socorro, New Mexico (Gelhar, 1993; data retrieved from Gelhar et al., 1983)

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Appendix 4

Sample of thesis proposal abstract in Indonesian

INFILTRASI AIR HUJAN DAN KEGEMPAAN TERINDUKSI LERENG STABILITAS PADA TANAH SISA MENGGUNAKAN RESISTIVITAS DAN PENGUKURAN MICROTREMOR

Mahasiswa Nama	: Dwa Desa Warnana
Mahasiswa ID	: 3107 301 202
Pembimbing	: Dr. Ir. Ria A. A. Soemitro, M.Eng
Co-Supervisor	: Dr. Ir. Widya Utama, DEA.

ABSTRAK

Penggunaan metode resistivitas dan mikrotremor dalam investigasi kestabilan lereng berkembang sangat pesat dalam beberapa tahun terakhir. Keuntungan dari kedua metode tersebut adalah memberikan informasi tentang struktur internal dari tanah dengan penyelidikan non destruktif. Berdasarkan fenomena konduksi tanah, variasi spasial dan temporal dari kandungan air dan heterogenitas bawah permukaan dapat dievaluasi dari pengukuran resistivitas. Respon tanah terhadap *ground motion* dan efek tapak lokal dapat dievaluasi dari pengukuran microtremor. Meskipun begitu, hanya evaluasi bawah permukaan secara kualitatif yag dapat diperoleh dari kedua metode tersebut. Penilaian kestabilan lereng secara kuantitatif akibat hujan dan kegempaan dengan penerapan dari kedua metode dalam penelitian merupakan keterbaharuan penting yang diberikan dalam penelitian ini.

Penelitian ini bertujuan untuk mengkaji stabilitas lereng pada tanah residual di Desa Kemuning Lor Arjasa, Jember dan Desa Sumber Aji, Batu Malang akibat pengaruh infiltrasi air hujan dan seismisitas (kegempaan) dengan menggunakan pengukuran resistivitas dan mikrotremor. Pengukuran dilakukan pada musim kemarau dan hujan. Pengukuran parameter geoteknik dan resistivitas skala laboratorium juga telah dilakukan. Hasil pengolahan resistivitas telah diverifikasi dengan hasil pengukuran geoteknik dan

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analisa skala laboratorium untuk mendapatkan interpretasi kuantitatif dengan pendekatan petrofisika. Pengukuran Microtremor dilakukan untuk lebih memahami respon tanah akibat kegempaan. Dari perandingan spectrum H / V maka periode natural dan puncak amplitudo tanah dapat ditentukan dan kestabilan lereng berdasarkan indeks kerentanan tanah dan shear strain dapat ditentukan pula.

Pengaruh kandungan air, kohesi, berat volume tanah, dan sudut geser terhadap resistivitas telah diselidiki. Untuk kandungan air (wc) kurang dari 25%, resistivitas tanah menurun sangat tajam. Penurunan nilai resisitivitas ini sensitif terhadap berat volume tanah kering dan kandungan mineral lempung setempat yang akhirnya berpengaruh terhadap korelasi antara resistivitas dan parameter tanah lainnya. Di lain pihak, penurunan resistivitas tanah hampir linear untuk kandungan air (wc) lebih besar dari 25%.

Persamaan empiris perhitungan angka keamanan (SF) berdasarkan interaksi antara resistivitas dengan infiltrasi air hujan dan sudut kemiringan setempat telah dibangun dan diaplikasikan terhadap hasil pengukuran monitoring tomografi resistivitas di masing – masing lokasi penelitian. Dari hasil perhitungan tersebut ditemukan kondisi kritis di lereng Jember pada musim hujan.

Peta sebaran puncak HVSR dan frekuensi natural tanah telah dibuat dan dibandingkan. Telah ditemukan bahwa frekuensi natural hasil pengukuran mikrotremor dapat dijadikan acuan sebagai frekuensi natural tanah setempat. Stabilitas lereng akibat gempa telah dikaji dengan menggunakan perhitungan indeks kerentanan tanah dan shear strain dari pengukuran mikrotremor. Stabilitas lereng akibat gempa pada musim hujan ditemukan lebih rentan daripada di musim kemarau.

Kata kunci: kestabilan lereng, faktor keamanan, kandungan air, kegempaan, resistivitas, Mikrotremor, Kemuning Lor Arjasa - Jember, Sumber Aji - Batu Malang

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Appendix 5

The colors of front covers and its codes

NO.	NAME OF FACULTY (IND)	NAME OF FACULTY (ENG)	COLOR	COLOR CODES
1	Sains dan Analitika Data	*Science and Data Analytics*	Salem	R: 15 G: 129 B: 64 C: 87 M: 24 Y: 100 K: 13 HEX: #0F8140
2	Teknologi Industri dan Rekayasa Sistem	*Industrial Technology and Systems Engineering*	Fire Brick	R: 179 G: 30 B: 35 C: 18 M: 100 Y: 100 K: 14 HEX: #b31e23
3	Teknologi Elektro dan Informatika Cerdas	*Intelligent Electrical and Informatics Technology*	Gold	R: 255 G: 215 B: 0 C: 1 M: 13 Y: 100 K: 0 HEX: #FFD700
4	Teknik Sipil, Perencanaan dan Kebumian	*Civil, Planning, and Geo Engineering*	Nero Black	R: 35 G: 31 B: 32 C: 0 M: 0 Y: 0 K: 100 HEX: #231F20
5	Teknologi Kelautan	*Marine Technology*	Summer Sky	R: 39 G: 175 B: 229 C: 69 M: 12 Y: 0 K: 0 HEX: #26AEE4
6	Desain Kreatif dan Bisnis Digital	*Creative Design and Digital Business*	Indigo	R: 75 G: 0 B: 130 C: 85 M: 100 Y: 11 K: 8 HEX: #4b0082
7	Sekolah Interdisiplin Manajemen Teknologi	*School of Interdisciplinary Management and Technology*	Very Dark Blue	R: 10 G: 16 B: 25 C: 62 M: 38 Y: 0 K: 75 HEX: #192841

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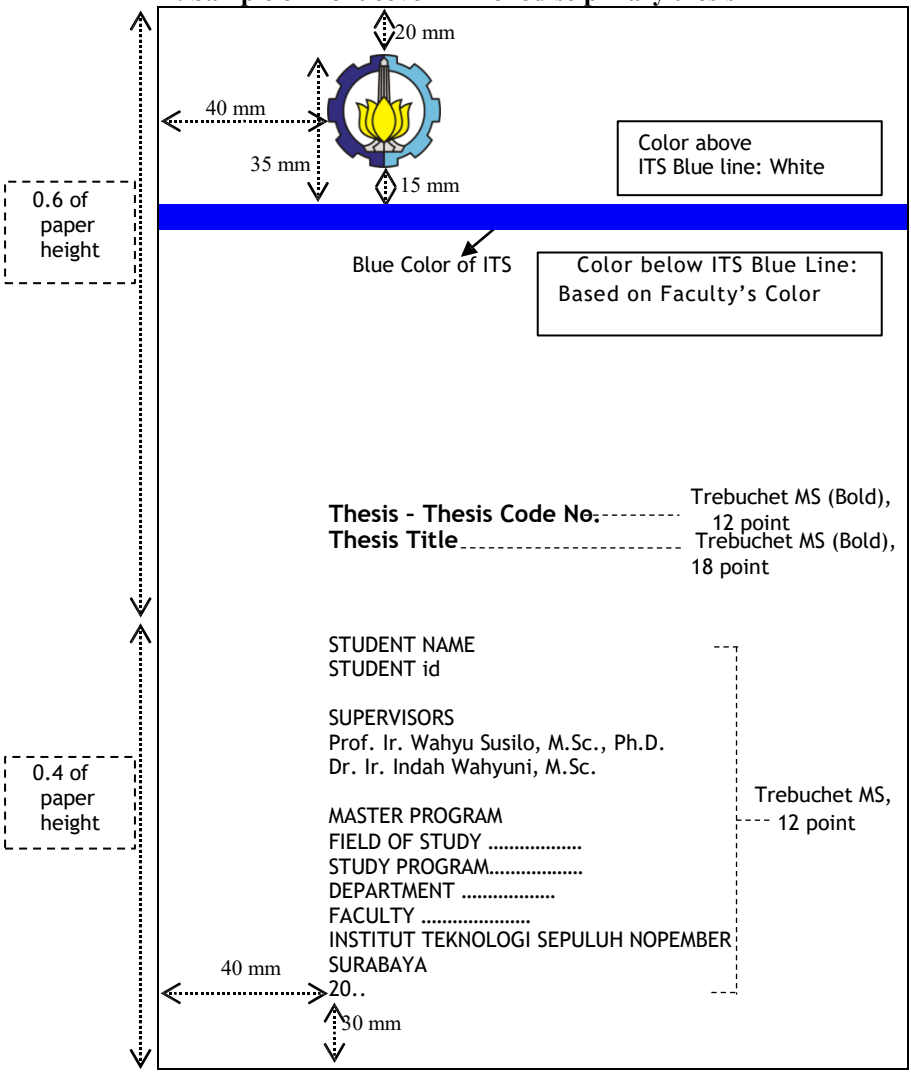
Appendix 6A

A. Sample of front cover in monodisciplinary thesis



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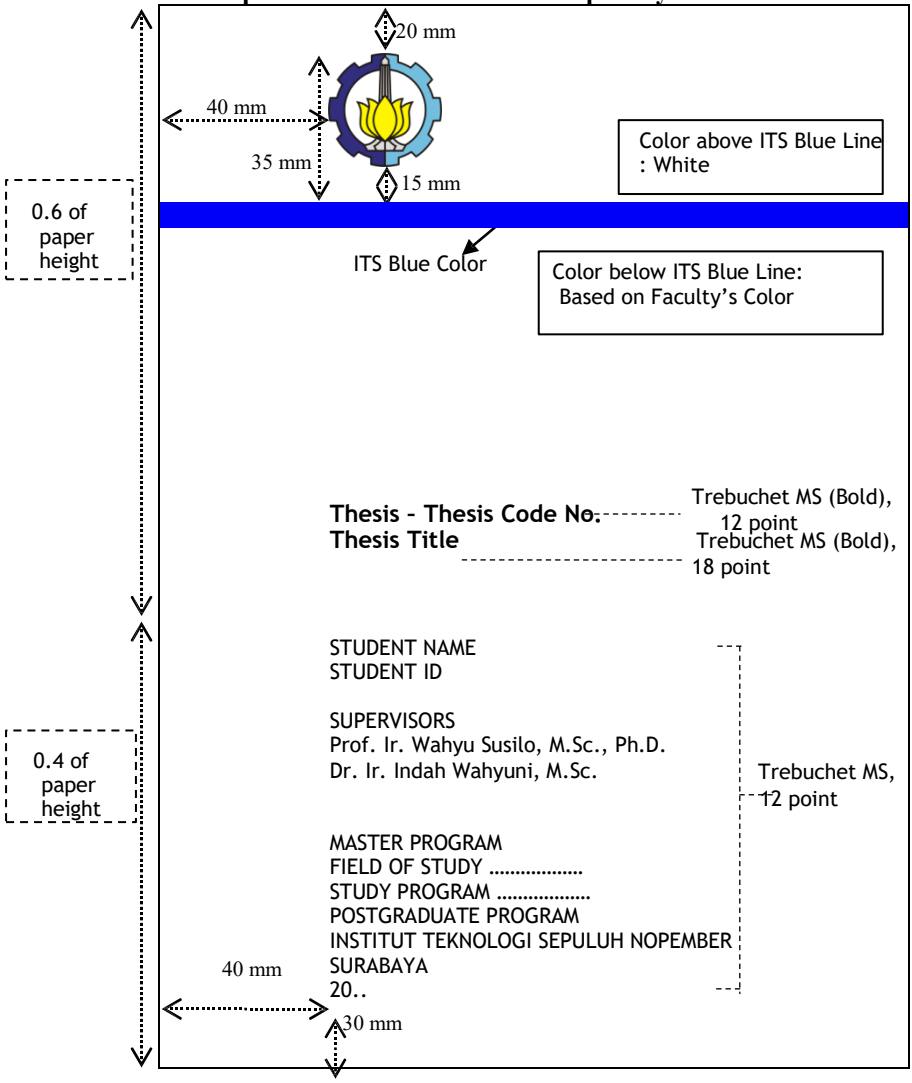
Appendix 6B

C. Sample of front cover in multidisciplinary thesis



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Appendix 7A

Sample of thesis proposal seminar grading sheet and attendance list

DEPARTMENT OF NATIONAL EDUCATION
INSTITUT TEKNOLOGI SEPULUH NOPEMBER SURABAYA
POSTGRADUATE PROGRAM

ATTENDANCE LIST AND GRADE OF THESIS PROPOSAL SEMINAR

Seminar Title : ……..
Student Name : ……
Student ID : ……..
Study Program : ……..
Field of Study : ……
Signature :

No	Name of Examiner	Position	Signature	Grade (numeric)
		Chair, Member, Member, Member		

Surabaya, ……

Average grade: …. (numeric)
…. (alphabetical)

Chair of Seminar,

Acknowledged by:
Head of Study Program,

…… ……

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Appendix 7B
Sample of Minutes from Thesis Proposal Seminar

DEPARTMENT OF NATIONAL EDUCATION
INSTITUT TEKNOLOGI SEPULUH NOPEMBER
SURABAYA POSTGRADUATE PROGRAM

MINUTES
THESIS PROPOSAL
SEMINAR

On

Day, Date : …….

Time : ..…….

Venue : ……....

a Thesis Proposal Seminar has been conducted with details below

Title : …….
…….

Student Name : ……..

Student ID : ……..……

Study Program : …….

Study Field : …….

with following result:

1. Approved
2. Approved with revision/improvement (period of revision:…. days)
3. Not approved or retaking the Seminar

Revision/Improvement which must be done is: (if necessary, can be written in the separated sheets)

Name of Examiners	Signature	Chairman,
1……..……	……	
2…….	……	……..…
3…….	……	Head of Study Program
4…….	……	
5…….	……	……..……

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Notes: made in 4 copies

1. Director of Postgraduate Program – ITS
2. head of Study Program
3. Supervisor(s)
4. Related student

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Appendix 7C

Sample of Authorization Sheet for Thesis Proposal Seminar

THESIS PROPOSAL

AUTHORIZATION SHEET

Title :…….

Name of Student :……..…….

Student ID :……

Has been defended on:

Day :…….

Date :…….

Venue :…….……

Acknowledged/ approved by:

Examiners:	Supervisor Candidates:
1…….....	1……..
NIP:	NIP:
2…….....	2…….
NIP:	NIP:
3……...	
NIP:	

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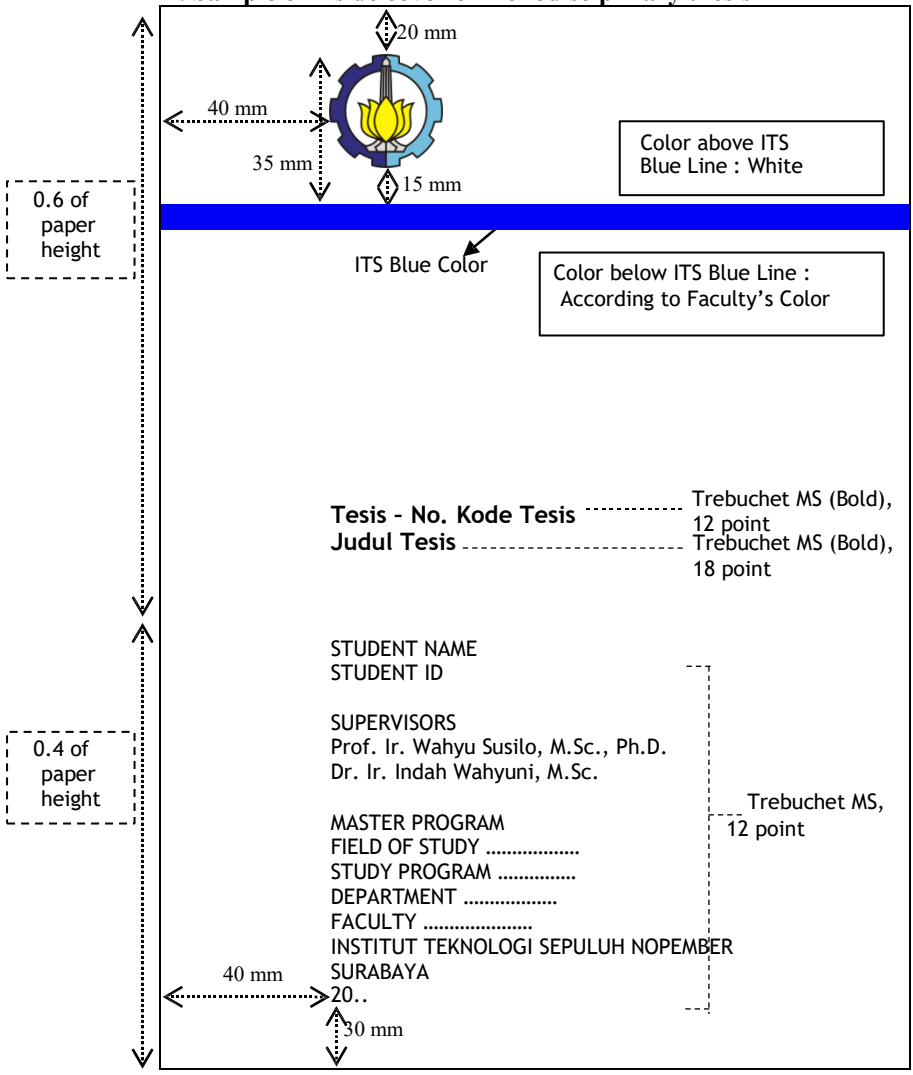
Appendix 8A

A. Sample of inside cover of monodisciplinary thesis



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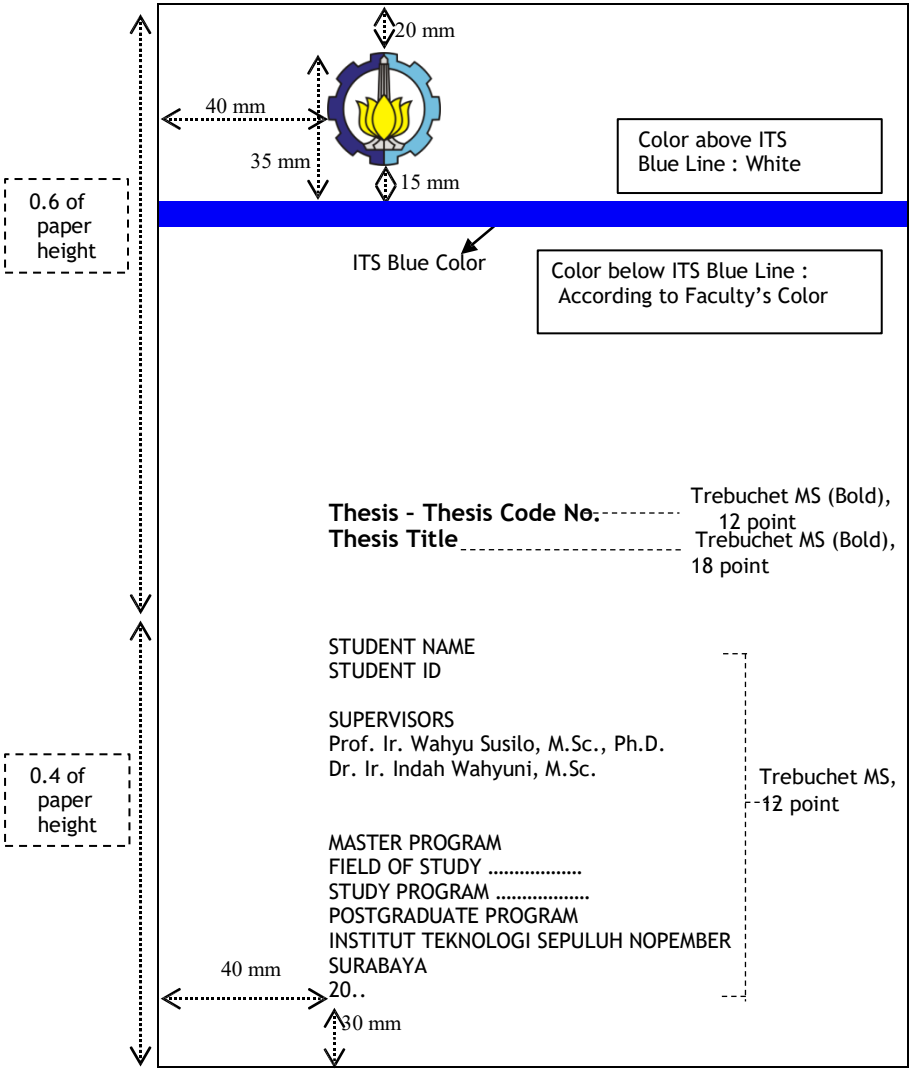
Appendix 8B

C. Sample of inside cover of multidisciplinary thesis



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Appendix 9

Sample of direct quotation if quoted more than a sentence (typed indented for each tab from left and right)

The general steps for solving the stochastic inverse problem quoted from Sun and Yeh (1992) are as follows:

a. Use the mean and variance measurements of log K sample as the initial estimation of the μ_y and σ_y statistical parameters.
b. Use only the measurement results of log K to estimate μ_y, σ_y^2, and l_y statistical parameters by using MLE and making log K fields by applying kriging.
c. Use all the statistical parameters obtained in the last step as an initial estimate and apply the measurement results of the log K and hydraulic head to solve the stochastic inverse problem.

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Appendix 10.A

Sample of Final Examination Evaluation Form (Recapitulation)

DEPARTMENT OF NATIONAL EDUCATION
INSTITUT TEKNOLOGI SEPULUH NOPEMBER SURABAYA
POSTGRADUATE PROGRAM

GRADING SHEET
THESIS EXAMINATION

Thesis Title : ……..……
……...……..……
Student Name :
……..…… Student ID
: ……...……..……
Field of Study :
…….
Study Program : Postgraduate Program
…..…..…… Faculty/Department :
…… Signature :

I. GRADE FROM EXAMINERS (approximately between 40 - 60%)

	Examiner I	Examiner II	Examiner III	Examiner IV	Examiner V	Average
Materi (80%)						
Sikap / Presentasi (20%)						
Total Grade						

Notes: Supervisors also act as examiner

II. GRADE FROM SUPERVISOR (approximately between 40 - 60%)

	Supervisors	Grade
	Supervisor I	
	Supervisor II	

Average Grade : ……. (numeric)
: ……...(alphabetical)

Surabaya, ……

Acknowledged by:
Head of Study Program,

……

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Appendix 10.B

Sample of Evaluation Form of Final Thesis Examination for each Examiner

DEPARTMENT OF NATIONAL EDUCATION
INSTITUT TEKNOLOGI SEPULUH NOPEMBER SURABAYA
POSTGRADUATE PROGRAM

GRADING SHEET
THESIS
EXAMINATION

Thesis Title : ……
……
Student Name : ……
Student ID : ……
Field of Study : ……
Study Program : Pascasarjana ……
Faculty/Department : ……

Name of Examiner	Grade

Surabaya, ……

Examiner,

……

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Appendix 10.C

Sample of Thesis Examination Minutes

DEPARTMENT OF NATIONAL EDUCATION
INSTITUT TEKNOLOGI SEPULUH NOPEMBER SURABAYA
POSTGRADUATE PROGRAM

MINUTES
THESIS EXAMINATION

On

Day, Date : ……...
Time : …….
Tempat : ……..…….

A thesis examination has been conducted with following details

Title : ……..……
……..
Student Name : ……..
Student ID : ……..…….
Study Program : ……..…….
Field of Study : ……..…….

With following results:

1. Approved
2. Approved with revision
3. Not approved and must retake

Revision/Improvement which has to be done is: (if necessary, can be written in the separated sheets)

Name of Examiner	Signature	Chairman,
1. …….....	.....……....	
		.....…….
2. …….....	……....……....	
		Acknowledged by:
3. …….....	…….....	Head of Study Program,
4. ……...	…….	
5. ……...	…….	.....…….

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Notes: made in 4 copies

1. Director of Postgraduate Program – ITS
2. head of Study Program
3. Supervisor(s)
4. Related student

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Appendix 10.D

Sample of Thesis Authorization Sheet

Thesis is written to fulfill one of the requirements in obtaining the degree in
Magister Manajemen Teknologi (M.MT)
in
Institut Teknologi Sepuluh Nopember

by:

Student ID ----------

Date of Examination:……
Graduation Period: ……..

Approved by:

1. **Nama of Supervisor** **(Supervisor I)**
   NIP:

2. **Name of Supervisor** **(Supervisor II)**
   NIP:

3. **Name of Examiner** **(Examiner I)**
   NIP:

4. **Name of Examiner** **(Examiner)**
   NIP:

5. **Name of Examiner** **(Examiner)**
   NIP:

Director of Post Graduate Program

Full Name
NIP.

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Appendix 11.A

Sample of Thesis Abstract in Indonesian

KINERJA KOMPOS PRODUKSI UDPK BRATANG SEBAGAI MEDIA PENUKAR ION UNTUK MEREDUKSI LOGAM BERAT Cu DALAM AIR LIMBAH BUATAN

Nama mahasiswa : Ervin Nurhayati
NRP : 3304201016
Pembimbing : Ir. Joni Hermana, M.Sc.ES, Ph.D.

ABSTRAK

Kurangnya motivasi dalam kegiatan pengomposan salah satunya adalah karena rendahnya nilai jual dan sempitnya pasar untuk produksi kompos. Pemanfaatan kompos sebagai media penukar ion diharapkan dapat meningkatkan nilai jual kompos sekaligus untuk memberikan alternatif pengolahan logam berat, khususnya Cu, yang murah. Kemampuan kompos untuk menukar ion berasal dari kandungan materi humus pada kompos yang mempunyai kapasitas tukar kation (KTK). Grup fungsi yang berperan adalah grup karboksil (-COOH) sehingga bisa dikategorikan sebagai resin asam lemah. Penelitian ini bertujuan untuk mengkaji kinerja kompos produksi UDPK Bratang sebagai media penukar ion untuk mereduksi Cu dalam air limbah buatan.

KTK teoritis diukur dengan metode titrasi pH dan a*mmonium replacement*. Kompos dibagi menjadi tiga kategori berdasarkan ukuran partikelnya. Untuk mengetahui pengaruh pH dan konsentrasi awal Cu terhadap efisiensi penyisihan Cu dilakukan percobaan *batch* dengan variasi pH 2-10 serta konsentrasi Cu 2-10 mg / lt. Percobaan dilanjutkan dengan percobaan kontinyu untuk mendapatkan kapasitas operasi kolom penukar ion, kondisi kesetimbangan (x / m), serta model adsorbsi isotermisnya.

Kompos dengan ukuran partikel ≤ 0,425 m (lolos ayakan no. 40) mempunyai KTK teoritis terbesar yaitu 1,6 meq / g, jika

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diukur dengan titrasi pH, dan 15,89 meq / 100g, jika diukur dengan a*mmonium replacement*. pH optimum didapat sekitar 6 dan 10.

Konsentrasi awal Cu yang akan disisihkan antara 2 mg / l sampai 10 mg / l, yang digunakan dalam penelitian ini, tidak menunjukkan pengaruh signifikan terhadap efisiensi penyisihan. Pada percobaan kontinyu didapatkan kapasitas operasi kolom penukar ion sebesar 249,129 meq / l, kesetimbangan dicapai pada perbandingan 2,9 mg Cu / g media kompos, dan model adsorbsi isotermis mengikuti persamaan Freundlich sebagai berikut:

$$\frac{x}{m} = X = 0{,}029Ce^{1,\,2019}$$

Kata kunci: Cu, kompos, kapasitas tukar kation, logam berat, media pernukaran ion

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Appendix 11.B

Sample of Thesis Abstract in English

POWER FACTOR CORRECTION OF THE 3 PHASE AC-DC CONVERTER USING SINGLE SWITCHING

By : Edi Purwanto
Student Identity Number : 3300601009
Supervisor : Prof. Dr. Ir. Soebagio

ABSTRACT

An ac-dc converter (which is used diode or thyristor) has a sinusoidal input voltage waveform and non-sinusoidal current input waveform. The current produces harmonics and causes low power factor. Improvement of the power factor can be done by using a force commutation with a single switching system. The scheme of this method uses combination of 3-phase diode rectifier with an ac-dc chopper boost type. The chopper boost type is used to simplify the scheme of this power factor correction. The frequency switching is chosen such that the frequency much higher than the power line one. It causes the current phase angle nearly the same with the voltage phase one and the low order of the input current harmonics will be eliminated. As a result, there would be appeared that the high frequency harmonics close to the switching frequency. By using hogh frequency filter at the input line, the harmonic would also be eliminated. This method will increase the value of the power factor of the line from 0.5981 to 0.96813 and harmonic content reduces from 132.2 % to 4.28 % at a duty cycle of 0.5. At a duty cycle of 0.7, the power factor increases to 0.9872 and the harmonic content reduces to 2.5 %.

Key words: ac-dc converter, chopper boost type, force commutation, 3-phase diode rectifier

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Directorate Postgraduate Program and Academic Development
Institut Teknologi Sepuluh Nopember
2021