



# **KALASALINGAM**

## **ACADEMY OF RESEARCH AND EDUCATION**

### **(DEEMED TO BE UNIVERSITY)**



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## **Office of Research and Development**

### **GUIDELINES FOR THE PREPARATION OF THESIS**

#### **GENERAL**

The manual is intended to provide broad guidelines to the research scholars in the preparation of the Thesis. In general, the Thesis shall report, in an organized and scholarly fashion, an account of original research work of the research scholar leading to the discovery of new facts or techniques or correlation of facts already known (analytical, experimental, hardware oriented, etc.). Thesis shall demonstrate a quality as to make a definite contribution to the advancement of knowledge and the research scholar's ability to undertake sustained research and present the findings in an appropriate manner with actual accomplishments of the work.

#### **Instruction**

The scholars are expected to read carefully the instructions given in the sequel and meticulously follow them in the preparation of the Thesis. Non-compliance with any of these instructions may lead to the rejection of the Thesis submitted.

#### **1. SIZE OF THESIS**

The size of the Thesis should not exceed 300 pages of typed matter reckoned from the first page of chapter 1 to the last page of Appendix.

#### **2. ARRANGEMENT OF THE CONTENTS OF THE THESIS**

Thesis material should be arranged and bound as **per the following schedule:**

1. Cover Page and Title page (as shown in Annexure II)
2. Declaration Certificate (as shown in Annexure III)
3. Bonafide Certificate (as shown in Annexure IV)
4. Abstract
5. Acknowledgement
6. Table of Contents (as shown in Annexure V)
7. List of Tables
8. List of Figures
9. List of Symbols and Abbreviations (as shown in Annexure VI)
10. Chapters
11. Appendices
12. References
13. List of Publications
14. Curriculum Vitae

The Tables and Figures should be included at appropriate places in the text of the Thesis.

### 3. PAGE DIMENSIONS AND MARGIN

Standard A4 size (297 mm x 210 mm) paper may be used for preparing the copies. The dimensions of the final bound Thesis (3 copies) report should be 290 mm x 205 mm. Thesis should be bound with black calico cloth and using flexible cover of thick white art paper. The final Thesis (at the time of submission) should have the following page margins:

Top edge	:	1.88` to 1.377`
Bottom edge	:	0.98` to 1.18`
Left side	:	1.377` to 1.57`
Right side	:	0.787` to 0.98`

The Thesis should be prepared on good quality Executive Bond paper. Tables and Figures should conform to the margin specifications.

### 4. MANUSCRIPT PREPARATION

The headings of all items from 2 to 12 listed in [section 2](#) should be typed in capital letters without punctuation and centered 50 mm below the top of the edge. The text should commence 4 spaces below this heading. The page numbering for all items from 1 to 8 should be done using lower case Roman numerals and the pages thereafter should be numbered using Arabic numerals

**4.1 Cover Page & Title Page:** A specimen copy of the Cover page and Title page for the Thesis is given in Annexure II.

**4.2 Declaration Certificate:** The Declaration Certificate shall be typed in double line spacing using Font Style Times New Roman and Font Size 13 as per the format shown in Annexure III. The certificate shall carry the scholar signature followed by the **Scholar name**

**4.3 Bonafide Certificate:** The Bonafide Certificate shall be typed in double line spacing Font Style Times New Roman and Font Size 13 as per the format shown in Annexure IV.

The certificate shall carry the Supervisor's signature followed by the **Supervisor's name, academic designation** (not any other responsibilities of administrative nature), **department and full address of the institution** where the Supervisor has guided the

research scholar. The term ‘SUPERVISOR’ must be typed in capital letters between the Supervisor’s name and academic designation. Signature of the Joint Supervisor with the details specified as above should be included wherever it is applicable.

- 4.4 Abstract :** Abstract should be an essay type of narration not exceeding four pages outlining the research problem, methodology used for tackling it and a summary of the findings. This shall be typed in double line spacing using Font Style Times New Roman and Font Size 13.
- 4.5 Acknowledgement :** It should be brief and should not exceed one page when typed in double spacing. The scholar’s signature shall be made at the bottom right end above his/her name typed in capitals.
- 4.6 Table of Contents :** The Table of contents should list all captions following it as well as any caption which precedes it. The title page, Bonafide Certificate and Acknowledgement will not find a place among the items listed in the Table of Contents. One and a half spacing should be adopted for typing the matter under this head. A specimen copy of the Table of Contents for the Thesis is given in Annexure V.
- 4.7 List of Table :** 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.
- 4.8 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.
- 4.9 List of Symbols and Abbreviations :** One and a half spacing should be adopted for typing the mater under this head. Standard symbols, abbreviations, etc, should be used. The list should be arranged alphabetically with respect to the contents on the right side as shown in Annexure VI.
- 4.10 Chapters :** The chapters may be broadly divided into 3 parts (i) Introductory chapter, (ii) Chapters developing the main theme of the Thesis (iii) Results, Discussion and Conclusion. The main text shall be divided into several chapters and each chapter may be further divided into several divisions and sub-divisions.
- Each chapter should be given an appropriate title.
  - 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.

**4.11 Appendices:** Appendices are provided to give supplementary information, which if included in the main text may serve as a distraction and cloud the central theme under discussion.

- Appendices should be numbered using Arabic numerals, e.g. Appendix 1, Appendix 2, etc.
- Appendices, Tables and references appearing in appendices should be numbered and referred to at appropriate places just as in the case of chapters.
- Appendices shall carry the title of the work reported and the same title shall be included in the Table of Contents page.
- The list of publications (those already published/accepted for publication in Journals and papers presented in Conferences/Symposia) made by research scholar during the period of research, shall be brought in the Appendix titled, as List of Publications and the same shall be reported in the Table of Contents.

**4.12 List of References:** Any works of other researchers, if used either directly or indirectly, the origin of the material thus referred to at appropriate places in the Thesis should be indicated. The author's publications during the period of research should not be included in the references and can be separately mentioned as in 5.10. A paper, a monograph or a book may be designated by the name of the first author followed by the year of publication, placed inside brackets at the appropriate places in the Thesis. The citation may assume any one of the following forms.

### **Examples of Citation**

A control strategy based on non linear feedback linearization method which is employed at the voltage control block of the SVC controller is discussed in Rivas et al. [1]. Changaroon et al. [2] proposed a neural network based methodology for controlling Chang [3] proposed based on linear quadratic control (LQR) algorithm to improve the damping ratio when generator speed is given as input signal to the SVC controller.

The listing should be typed 4 spaces below the heading "REFERENCES" in single spacing. The reference material should be **listed in the citation order** of the first author. The name of the author/authors should be immediately followed by the other details and year. A typical illustrative list given below relates to the citation example quoted above.

## REFERENCES

1. D. Rivas, L. Morán, J.W. Dixon and J.R. Espinoza, Improving Passive Filter Compensation Performance with Active Techniques, *IEEE Transactions on Industrial Electronics*, **50** (1) (2003), 161- 470.
2. B. Changaroon, S.C. Srivastava, D. Thukaram and S. Chirarattananon, Neural Network Based Power System Damping Controller for SVC, *IEE Proceedings-Generation, Transmission and Distribution*, **146** (4) (1999), 370 – 376.
3. C.S. Chang, Q.Z. Yu, A.C. Liew, and S. Elangovan, *Genetic Algorithm Tuning of Fuzzy SVC for Damping Power System Inter-Area Oscillations*, Proceedings of the 4th International Conference on Advances in Power System Control, Operation and Management, APSCOM-97, (1997), 509-514.
4. G. Amos, *MATLAB An Introduction with Applications*, John Wiley & Sons, Inc, U.K, (2004).

**4.13 Curriculum Vitae:** A vitae restricted to one page in double spacing containing the salient potentialities of the author shall be made at the end of the Thesis.

**4.14 Tables and Figures:** “Table” means tabulated numerical data in the body of the Thesis as well as in the appendices. All other non-verbal material used in the body of the Thesis and appendices such as charts, graphs, maps, photographs and diagrams may be designated as Figures.

- A Table or Figure including caption should be accommodated within the prescribed margin limits and appear on the page following the page where their first reference is made.
- Tables and Figures on half pages or less in length may appear on the same page along with the text. However, they should be separated from the text both above and below by triple spacing.
- All Tables and Figures should be prepared on the same paper or material used for the preparation of the rest of the Thesis.
- Two or more small Tables or Figures may be grouped if necessary in a single page.
- Wherever possible, the photograph(s) shall be reproduced on a full sheet of photographic paper or colour Xerox.
- More than one photograph can be included in a page.
- Samples of Fabric, Leather, etc., if absolutely necessary may be attached evenly in a page and fixed/pasted suitably and should be treated as Figures.

## 5. TYPING INSTRUCTIONS

**5.1 General:** This section includes additional information for final typing of the Thesis. The impressions on the typed/Xeroxed/printed copies should be black in colour.

A sub-heading at the bottom of a page must have atleast two full lines below it or else it should be carried over to the next page.

The last word of any page should not be split using a hyphen. One and a half spacing should be used for typing the general text. The general text shall be typed in Font Style Times New Roman and Font Size 13. Single spacing should be used for typing:

- (i) Long Tables
- (ii) Long quotations
- (iii) Foot notes
- (iv) Multiline captions
- (v) References

All quotations exceeding one line should be typed in an indented space – the indentation being 15 mm from either side of the margin.

**5.2 Chapters:** The format for typing Chapter headings, Division headings and Sub-division headings are explained by the following illustrative examples.

Chapter heading	:	CHAPTER 1
		INTRODUCTION
Division heading	:	1.1 OUTLINE OF THESIS
Sub-division heading	:	1.1.1 Literature Review
		1.1.1.1 Synthetic aperture
		Radars on satellites

The word CHAPTER without punctuation should be centered 50 mm down from the top of the page. Two spaces below, the title of the chapter should be typed centrally in capital letters. The text should commence 4 spaces below this title, the first letter of the text starting 20 mm inside from the left hand margin.

The division and sub-division captions along with their numberings should be left justified. The typed material directly below division or sub-division heading should commence 2 spaces below it and should be offset 20 mm from the left hand margin. Within a division or sub-division paragraphs are permitted. Even paragraph should commence 3 spaces below the last line of the preceding paragraph, the first letter in the paragraph being offset from the left hand margin by 20 mm.

## **6. NUMBERING INSTRUCTIONS**

**6.1 Page Numbering:** All page numbers (whether it be in Roman or Arabic numbers) should be typed without punctuation on the upper right hand corner 20 mm from the top with the last digit in line with the right hand margin. The preliminary pages of the Thesis (such as Title page, Acknowledgement, Table of Contents, etc.) should be numbered in lower case Roman numerals. The title page will be numbered as (i) but this should not be typed. The page immediately following the title page shall be numbered as (ii) and it should appear at the top right hand corner as already specified. Pages of main text, starting with Chapter 1 should be consecutively numbered using Arabic numerals.

**6.2 Numbering of Chapters, Divisions and Sub-Divisions:** The numbering of chapters, divisions and sub-divisions should be done using Arabic numerals only and further decimal notation should be used for numbering the divisions and sub-divisions within a chapter. For example sub-division 4 under division 3 belonging to chapter 2 should be numbered as 2.3.4. The caption for the sub-division should immediately follow the number assigned to it.

Every chapter beginning with the first chapter should be serially numbered using Arabic numerals. Appendices, included if any, should also be numbered in an identical manner starting with Appendix 1.

**6.3 Numbering of Tables and Figures:** Tables and Figures appearing anywhere in the Thesis should bear appropriate numbers. The rule for assigning such numbers is illustrated by an example. Thus, if a Figure in Chapter 3, happens to be the fourth then assign 3.4 to that Figure. Identical rules apply for Tables except that the word Figure is replaced by the word Table. If Figures (or Tables) appear in appendices then Figure 3 in Appendix 2 will be designated as Figure A 2.3. If a table to be continued into the next page this may be done, but no line should be drawn underneath an unfinished Table.

**6.4 Numbering of Equations:** Equations appearing in each Chapter or Appendix should be numbered serially, the numbering should commence afresh for each Chapter or Appendix. Thus for example, an equation appearing in Chapter 4, if it happens to be the eighth equation in that Chapter should be numbered as (4.8) thus:

$$\left[ \frac{\partial}{\partial x} \left[ \frac{p^2}{h} \right] + \frac{\partial}{\partial y} \left[ \frac{pq}{h} \right] = -gh \frac{\partial n}{\partial x} - k \frac{\sqrt{p^2 + q^2}}{h^2} p + \frac{1}{p_w} \left[ \frac{\partial}{\partial x} (h\tau_{xx}) + \frac{\partial}{\partial y} (h\tau_{xy}) \right] \right] \quad (4.8)$$

While referring to this equation in the body of the Thesis it should be referred to as Equation (4.8)

## 7. BINDING SPECIFICATIONS

- Thesis (3 copies) should be bound with black calico cloth and using flexible cover of thick white art paper. The cover should be printed in black letters and the text for printing should be identical to what has been prescribed for the title page.
- The Fourth and Fifth copies of the Thesis should be reduced to A5 size with printing in black letters on both sides with hard bound binding in white colour and submitted after the Viva-Voce examination duly certified by the Supervisor and joint Supervisor. If applicable, with his/her signature that all the corrections / modifications suggested by the examiners have been incorporated in the Thesis. The fourth and fifth copies of the Thesis in A5 size should contain the Certificate (as applicable) given in Annexure VII and a Xerox copy of the minutes of the Oral Examination Board. These two items should be placed in between the Title page and Bonafide Certificate.
- Soft copy of the Thesis in CD form (2 Nos) should be submitted for University archives.



**ANNEXURE II**

**A typical Specimen of Cover Page and Title Page**

<Font Style Times New Roman>

**DESIGN AND FABRICATION OF CURRENT  
CONTROLLED SHUNT ACTIVE POWER FILTER  
FOR HARMONIC REDUCTION**

<Font Size 18> <bold><1.5 line spacing>

**A THESIS**

<Font Size 14> <bold>

Submitted by

<Font Size 14> <Italic>

**RAVICHANDRAN C**

**(Reg. No. 201307201)**

<Font Size 16> <bold>

*in partial fulfillment for the award of the degree*

*of*

<Font Size 14> <Italic> <1.5 line spacing>

**DOCTOR OF PHILOSOPHY**

<Font Size 16>



**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

<Font Size 12> <bold>

**SCHOOL OF ELECTRONICS AND ELECTRICAL TECHNOLOGY**

<Font Size 13> <bold>

**KALASALINGAM ACADEMY OF RESEARCH AND EDUCATION**

<Font Size 14> <1.5 line spacing> <bold>

(DEEMED TO BE UNIVERSITY) <Font Size 12>

**ANAND NAGAR, KRISHNANKOIL – 626 126**

**TAMIL NADU, INDIA**

<Font Size 14> <1.5 line spacing> <bold>

**JANUARY 2018**

<Font Size 13> <bold>

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SCHOOL OF ELECTRONICS AND ELECTRICAL TECHNOLOGY  
KALASALINGAM ACADEMY OF RESEARCH AND EDUCATION**

**(DEEMED TO BE UNIVERSITY)  
ANAND NAGAR, KRISHNANKOIL – 626 126**

**TAMIL NADU, INDIA**

**JANUARY 2018**

## ANNEXURE III

### A typical Specimen of Bonafide Certificate

<Font Style Times New Roman>

KALASALINGAM ACADEMY OF RESEARCH AND  
EDUCATION  
(Deemed to be University)  
ANAND NAGAR, KRISHNANKOIL 626 126

<Font Size 16> <bold>

#### DECLARATION

<Font Size 14> <bold>

<Font Size 13>

I hereby declare that the thesis entitled “ \_\_\_\_\_ ”  
submitted by me for the Degree of Doctor of Philosophy in Department of  
\_\_\_\_\_ is the result of my original and independent research work carried out  
under the guidance of \_\_\_\_\_  
Kalasalingam University, Anand Nagar, Krishnankoil and it has not been submitted  
for the award of any degree, diploma, associateship, fellowship of any University or  
Institution.

<<Signature of the Candidate >>

<<Name>>

## ANNEXURE IV

### A typical Specimen of Bonafide Certificate

<Font Style Times New Roman>

KALASALINGAM ACADEMY OF RESEARCH AND  
EDUCATION

(Deemed to be University)  
ANAND NAGAR, KRISHNANKOIL 626 126

<Font Size 16> <bold>

### BONAFIDE CERTIFICATE

<Font Size 14> <bold>

<Font Size 13>

Certified that this Thesis title “**DESIGN AND FABRICATION OF CURRENT CONTROLLED SHUNT ACTIVE POWER FILTER FOR HARMONIC REDUCTION**” is the bonafide work of **Mr. C. RAVICHANDRAN**, who carried out the research under my supervision. Certified further, that to the best of my knowledge the work reported herein does not form part of any other thesis or dissertation on the basis of which a degree or award was conferred on an earlier occasion on this or any other scholar.

<<Signature of the Joint Supervisor>>

<<Name>>

**JOINT SUPERVISOR**

<<Designation & Address>>

(If applicable)

<<Signature of the Supervisor>>

<<Name>>

**SUPERVISOR**

<<Designation & Address>>

## ANNEXURE V

### A typical Specimen of Table of Contents

<Font Style Times New Roman Font Size 13>

#### TABLE OF CONTENTS

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## ANNEXURE VI

### LIST OF SYMBOLS AND ABBREVIATIONS

ADC	-	Analog to Digital converter
ANN	-	Artificial Neural Network
ARMAX	-	Auto Regressive with Moving Average eXogenous inputs
ARX	-	Auto Regressive with eXogenous inputs
BGA	-	Binary-coded GA
CC	-	Cohen Coon
CSTR	-	Continuous Stirred Tank Reactor
CT	-	Computing Time
DAC	-	Digital to Analog Converter
DSP	-	Digital Signal Processor
EGA	-	Enhanced Genetic Algorithm
EP	-	Evolutionary Programming
ES	-	Evolution Strategies
FL	-	Fuzzy Logic
GA	-	Genetic Algorithm
GCSO	-	Gene Cross-Swap Operator
GIO	-	Gene Inverse Operator
H	-	High
IAE	-	Integral of Absolute value of Error
IMC	-	Internal Model Control
ISE	-	Integral Square Error
ITAE	-	Integral Time weighted Absolute Error
ITSE	-	Integral Time Square Error
L	-	Low
LTI	-	Linear Time Invariant
M	-	Medium
MH	-	Medium High
ML	-	Medium Low
MRAC	-	Model Reference Adaptive control
MSE	-	Mean Square Error
NARMAX	-	Non-linear Auto Regressive Moving Average with Exogenous inputs
NARX	-	Non-linear Auto Regressive with exogenous inputs
OE	-	Output Error

OS	-	Over Shoot
PI	-	Proportional Integral
PID	-	Proportional Integral Derivative
PT	-	Peak Time
RGA	-	Real-coded Genetic Algorithm
RT	-	Rise Time
SFL	-	Sugeno Fuzzy Logic
SGA	-	Simple Genetic Algorithm
SP	-	Set Point
ST	-	Setting Time
STR	-	Self Tuning Regulator
VH	-	Very High
VL	-	Very Low
ZN	-	Ziegler-Nichols



## SYMBOLS

$f_a$	-	Acid flow rate
$G(kt_s)$	-	Actual Output
$q$	-	Amount of biomass produced
$X$	-	Cell concentration
$Y_{x/s}$	-	Cell mass yield
$X_a$	-	Concentration of the acid solution
$X_b$	-	Concentration of basic solution
$C_a$	-	Concentration of the influent stream
$C_b$	-	Concentration of the titrating stream
$X_j$	-	Continuous variable
$\xi$	-	Damping ratio
$Y_j$	-	Decimal-coded value of the binary string
$K_d$	-	Derivative gain
$Y_d$	-	Desired output
$D$	-	Dilution rate

**ANNEXURE VII**

**CERTIFICATE**

1. This is to certify that no corrections/suggestions were pointed out by the Indian/Foreign Examiner(s) in the Thesis titled  
.....” submitted by Mr./Ms  
.....

**(OR)**

2. This is to certify that all corrections and suggestions pointed out by the Indian/Foreign Examiner(s) are incorporated in the Thesis titled  
“.....” submitted by  
Mr./Ms.....

JOINT SUPERVISOR  
(If applicable)

SUPERVISOR

Place:

Date: