

GUIDELINES FOR PREPARATION OF THE THESIS

FOR

Doctor of Philosophy (Ph. D.)/Master of Technology (M.Tech.)



NETAJI SUBHAS UNIVERSITY OF TECHNOLOGY

(Formerly Netaji Subhas Institute of Technology)

Azad Hind Fauj Marg, Sector-3, Dwarka, New Delhi-110078

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GUIDELINES FOR PREPARING THE THESIS

1. GENERAL

Netaji Subhas University of Technology (NSUT), a State University established under the Govt. of NCT of Delhi Act 06 of 2018, has evolved through two name changes [first with the name Delhi Institute of Technology (DIT) in the year 1983 and the second Netaji Subhas Institute of Technology (NSIT) in the year 1997], each reflecting a new institutional mission with a strong commitment to excellence in teaching and research. Although the University is very young, having only been established in 2018, it prides itself on its high-end research, actively following UGC-mandated norms as well as internationally acknowledged standards. The University offers its Doctoral students advanced research training, expert supervision to support progression till the final submission of thesis, and top-quality research facilities. The objectives of the research, in general, encompass the discovery of new fact sort techniques or correlation off acts already known, through analytical or experimental approach or both, while demonstrating a quality potential as to make a definite contribution to the advancement of knowledge useful to the society and the scholar's ability to undertake sustained research in future. Accordingly, a thesis being a documented manifestation of the above objectives, shall report, in an organized and scholarly fashion, an account of the original research work of the scholar and present the findings in an appropriate manner with actual accomplishment of the work plainly stated and honestly appraised

The purpose of this manual is to provide broad guidelines to the Ph.D./M. Tech Candidates for the preparation of the thesis. It lists the general and specific requirements governing the thesis preparation including guidelines for structuring the contents. The candidates are advised to have thoroughly gone through the up-to-date Ph.D. or M. Tech Ordinances, and other relevant announcements brought out from time to time by the University. Further, for style, structure and presentation of a very special type of work specific to a particular field, the scholar may refer to additional style manuals or reference guides and to the published literature in their respective fields of study.

2. ARRANGEMENT OF THE CONTENTS OF THESIS

The sequence in which the thesis contents should be arranged and bound should be as follows:

1. Cover Pages and Title Page
2. Bonafide Certificate
3. Abstract
4. Acknowledgement
5. List of Contents
6. List of Tables
7. List of Figure

8. List of Symbols, Abbreviations and Nomenclature
9. Chapters 1, 2...
10. Reference
11. Appendices
12. List of Publications (out of the candidate's present work)
13. Curriculum Vitae (of the candidate)

The tables and figures shall be introduced at the appropriate places.

3. MANUSCRIPT PREPARATION

3.1 Page Dimensions, Margins and Quality

- The page dimensions of the final copies of the thesis should be 290mmx205mm. Standard A4 size (297mmx210mm) paper may be used for preparing the copies. It should have the following page margins:

Top edge	:	30 to 35 mm
Bottom edge	:	25 to 30mm
Left side	:	35 to 40mm
Right side	:	20 to 25 mm

- The thesis should be prepared on good quality white paper preferably not lower than 80gsm.
- Tables and figures should be prepared on good quality paper preferably not lower than 80gsm. Tables and figures should conform to the margin specifications. Large size figures should be photographically or otherwise reduced to the appropriate size before insertion.

3.2 Cover Page/Title Page

A specimen of the cover/title page is given in the Annexure I. It carries.

- (a) The TITLE of the thesis (Times New Roman, font size 20, bold, single line spacing, all characters uppercase except the symbols and numerals if used in the title of the thesis; centered within the specified margin of the page).

**TITLE OF THESIS TITLE OF THESIS TITLE OF
THESIS TITLE OF THESIS**

- (b) The phrase (Times New Roman, font size 14, bold, each line in the Title/Sentence mode, single line spacing, centered within the specified margin of the page).

**Thesis Submitted
in Partial Fulfillment of the Requirements for the
Degree of**

- (c) The name of the degree (Times New Roman, font size 20, bold, the whole line in upper case, centered within the specified margin of the page).

**DOCTOR OF PHILOSOPHY
or MASTER OF TECHNOLOGY**

Note: In case of M. Tech. (not applicable to PhD degree), after a gap of 16-18 Times New Roman pts, it will be followed by

In
Field of Specialization

Where

In (Times New Roman, font size 14, bold, both the characters lowercase, centered within the specified margin of the page).

Field of Specialization (Times New Roman, font size 16, bold, in Title mode, centered within the specified margin of the page).

(d) By (Times New Roman, font size 14, bold, both the characters lower case, centered within the specified margin of the page).

by

(e) NAME OF STUDENT (Times New Roman, font size 16, bold, full name as enrolled, all characters in Title mode case, centered within the specified margin of the page).

Name of the Student

(f) (Enrollment Number) (Times New Roman, font size 12, bold, and all numerals within a pair of small parenthesis, under neath the name of candidate and centered within the specified margin of the page).

(Enrollment no. xxxxxxxxxx)

(g) Phrase of supervision (Times New Roman, font size 12, bold, line in the Title mode, centered within the specified margin of the page).

Under the Supervision of

(h) NAME(S) OF SUPERVISOR (Times New Roman, font size 14, full name in title mode prefixed by Prof. or Dr. centered within the specified margin of the page, separated symmetrically in case of two supervisors, use then nextline in case of three supervisors; brief one-line mention of the names of the institution of the supervisors).

_____ (*Name*) _____ (*Middle Name*) _____ (*Surname*)
Name of the Institution/University/Organization

(i) University logo (size=25-30 mm dia)

(j) Phrase for the name of faculty (Times New Roman, 12/14pts., bold, full name of the University faculty in title mode, centered within the specified margin of the page).

To the
Faculty of (Name of the Faculty)

For example,

Faculty of Electrical and Mechanical Engineering

- (k) Name of the University (Times New Roman, font size 16/14, bold, full name, all characters uppercase/Title mode, centered within the specified margin of the page).

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- (i) Month, Year (Times New Roman, font size 14, bold, full name of the month in title mode, comma, 4-digit year in Arabic, all centered within the specified margin of the page).

3.3 Bonafide Certificate of Supervision

The Bonafide Certificate of Supervision of the thesis by the supervisor(s) shall be in double line spacing using Times New Roman font size 12, as per the format shown in **Annexure II**. The heading **CERTIFICATE** Times New Roman font size 14 bold in the center should start about 60mm -70mm from the top of the page.

The certificate shall carry the supervisor's signature in original and shall be 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 research scholar.

In case of two supervisors, the details about the signature, names, etc. mentioned above shall be centered symmetrically within the specified margin of the page. In case of three supervisors, the details of the third supervisor will appear in the centre underneath the first two.

The place and date of signature (left justified) common for all the supervisors will appear below the signature(s) of the supervisor(s).

3.4 Abstract

Abstract should be an essay type of narration not exceeding four pages outlining the search problem, the methodology used, a summary of the findings, possible applications of the research, and suggestions/directions for future research. The abstract should not contain cross citations. It should be typed single line spacing, in Times New Roman with font size 12 within the specified margin of the page. It should begin with the heading as the title of the thesis in title mode centered (bold), the name of candidate (next line) centered, and then 'ABSTRACT' with font size 14, bold and centered. The text of abstract should begin thereafter.

3.5 Acknowledgements (optional)

Acknowledgements shall be brief and should not exceed one page when typed in single spacing Times New Roman with font size 12 within the specified margin of the page. It should begin with title **ACKNOWLEDGEMENTS** Times New Roman with font size 14 bold as heading placed in centre. The signature of the candidate shall be made at the bottom right end above his./her name typed in title case.

3.6 Contents

The contents should list all the contents following this section. The preceding section like the Certificate and Acknowledgements will not find a place amongst the items listed in the Contents, but the page numbers in lowercase Roman letters shall be accounted for them. The title **CONTENTS** in Times New Roman with size 14 bold a shading is placed in centre. One and a half spacing should be adopted for typing the contents in a manner shown in specimen copy of the **CONTENTS** as given in **Annexure III**.

3.7 List of Tables

The list of tables should use exactly the same numbers and captions as they appear above the tables in the text. See sections 3.14 and 5.3 for the style of titling, numbering and placing of tables. Single spacing in Time New Roman with size 12 should be used.

3.8 List of Figures

The list of figures should use exactly the same numbers and captions as they appear below the figures in the text. See section 3.14 and 5.3 for the style of titling, numbering and placing of figures. Single spacing in Time New Roman with size 12 should be used.

3.9 List of Symbols, Abbreviations and Nomenclature

Single spacing in Time New Roman with size 12 should be used typing the matter under this head. As far as possible, standard and popularly used symbols, abbreviations etc. should be adopted.

3.10 Chapter

Chapters of a thesis may be broadly divided into 3 parts (i) introduction, literature survey and Identification of problem and issues (ii) statement, formulation and presentation of the problem, solution approach (iii) findings, results, discussion, implementation and conclusions, and directions for future research.

- Each part may be suitably divided into several chapters, and a chapter may be further divided into several sections and sub-sections, sub-sub-sections.
- Each chapter should be given an appropriate title.
- Tables and figures in a chapter should be typed in title mode in single space in Times New Roman with font size 12. The titles of tables should be placed directly above the table where as the titles of figures should be placed directly underneath the figure in the very same page which refers to the contents they annotate.
- Foot notes 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.

3.11 Tables and figures :

By the word Table is meant the presentation of tabulated numerical as well as non-Numerical data in the body of the thesis and also 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 proper representation of a table or a figure and its placement immensely adds to the ability to comprehend the work. Here are few suggestive guidelines in this regard which, of course, in no way substitute the ingenuity and creativity of an author.

- A table or figure including its caption should be accommodated within the prescribed margin limits and should appear on the page where its reference is made or on the page following the page in case it is not possible to place it on the same page.
- Table and figures on half or less in length should necessarily appear on the same page along with the text. However, they should be separated from the text both above and below by double spacing.

- All tables and figures should be prepared on the same paper or material used for the preparation of their thesis.
- Captions of table/figures may use characters, numerals or symbols in the title mode.
- Two or more small tables or figures may be grouped if necessary on a single page.
- Wherever possible, the entire color photographs(s) may be reproduced on a full sheet of photographic paper. More than one photograph can be included on 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.

3.12 Citation of References in the Thesis

Any work of other researchers used either directly or indirectly used in the research must be indicated at appropriate places in the thesis. It could be a journal paper, a paper in conference proceedings, a monograph, a personal communication, or a book; in physical or electronic form.

There are several standards for referencing. A candidate may choose one of his/ her choice with the consent of the thesis supervisor(s) and should be consistent throughout. A simple and commonly approach is suggested here.

A reference (other than a book or monograph) should be mentioned at the appropriate places in the text of the thesis by the last name of the first author followed by the year of publication placed inside a pair of parentheses.

- (i) An improved algorithm has been adopted in literature by Jhaand Shanker (2009)
- (ii) The issue of FMS scheduling along with balancing has been discussed by Kumar and Shanker (2000a) while the interaction amongst the objectives has been extensively investigated by Kumar and Shanker(200b) and Stickeret al (1984).

In case of a bookora monograph, however, the name/of author should be followed by the year within the pair of parentheses. For example,

Chopra and Meindl (2003) have dealt at length the analysis and design of supply chain.

For the references having two authors, the last names of the two authors in the order of appearance can be used while for more than two authors, generally the last name of the first author followed by et al and then the year within parentheses is used.

3.13 Listing of References in the REFERENCE section

The listing of references should be typed in alphabetical order of the first author's name in single spacing starting 4 spaces below the heading **REFERENCES** in Times New Roman with font size 14 bold. The name/ soft he authors/authors should be immediately followed by the year and other details. The references should be serially numbered, separated by single space. The papers (in journal or proceedings) should be in sentence mode followed by the name of journal (in italics), vol. issue, and page (from-to) while the book titles should be in title mode in italics followed by the place and publishers. E- resources should have their proper URL. A typical illustrative list given relates to the citation examples quoted above.

For typing the references, Times New Roman with font size 11 is recommended.

Jha, J.K. and Shanker, K., 2009. A single-vendor single-buy reproduction-inventory model with controllable lead time and service level constraint for decaying items. *International Journal of Production Research*, Vol.47, Issue24, pp. 6875–6898.

Chopra, S. and Meindl, P., 2003. *Supply Chain Management: Strategy, Planning, and Operation*. New Jersey, Prentice Hall.

Kumar Neeraj and Shanker Kripa, 2000a, A theory of balancing mechanism for comparing the effectiveness of imbalance measures in FMS loading, Proceedings of the Special International Conference on Production Research (ICPR)2000, Bangkok, August 2-4, 2000, pp 133-139.

Kumar Neeraj and Shanker Kripa, 2000b, Interaction among FMS loading objectives: a parabolic relationship between workload balance and machine utilization, Proceedings of the Special International Conference on Production Research (ICPR)2000, Bangkok, August 2-4, 2000, pp 234-239.

Snyder, L.V, 2004. *Lehigh University*. [Online](1.3) Available at: <http://www.lehigh.edu/~lvs2/download/vrpsolver.html> [accessed 17 December 2008].

3.14 Appendices

Appendices in a thesis are provided to give supplementary information, which if included in the main text may serve as a distraction and could tend to dilute theme under discussion.

- Each appendix must find its reference in the main body of the thesis.
- Appendices shall carry the title of the contents reported and the same title shall be made in the contents page also.
- Appendices should be numbered using Roman numeral in uppercase, e.g. Appendix-I, Appendix-II, etc.
- Figures, tables, equations and references appearing in appendices should be numbered locally to an appendix e.g. II.1, II.2, and III.5 etc and should be referred to appropriate places just as in the case of chapter.

3.15 List of Publications of the Candidate

The list of publications made by research scholar during the period of research and pertaining to the thesis submitted for the degree should be listed in chronological order in the order of international refereed journals, national refereed journals, proceedings of the conferences, in the same style as followed in providing the list of references (section 3.13). These publications, wherever relevant should be referred to in the main body of the thesis.

3.16 Curriculum Vitae

A vitae mentioning the salient achievements and potentialities of the candidate shall be made at the end of the thesis starting 4 spaces below the heading **Curriculum Vitae** (in Times New Roman with font size 14 bold) and shall be made in **three** paragraphs in single spacing using Times New Roman using 12 size, and shall be restricted to a single page.

4. TYPING INSTRUCTIONS

4.1 General

- This section includes additional information for final typing of the thesis. Some Information given earlier under 'Manuscript Preparation' shall also be referred to.
- The impression on the typed/ duplicated/ printed copies should be black in color.
- Certain symbols characters or markings not found in a standard word processor may be hand written using Indian ink or a stylus pen (incase stencil sheets are used). Corrections, interlineations and crossing out of letters or words are not permitted in any of the copies of the thesis intended for submission. Erasures, if made, should be neatly carried out in all copies.
- A sub-heading at the bottom of a page must have at least 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.
- Single spacing should be used for typing the general text. The general text shall be typed in font Style Times New Roman and Font Size 12.
 - Single spacing should also be used for typing:
 - Long Tables
 - Long quotations
 - Foot notes
 - Multilane captions
 - References
- All quotations exceeding one line should be typed in an indented space -the indentation being 15mm from either margin.

4.2 Chapters, Sections, Sub-sections, and Paragraphs

The format for typing Chapter headings, Section headings and sub-section headings are explained through the following illustrative examples.

Chapter Heading	:	Chapter 1 Introduction
Section	:	1.1 Outline of Thesis
Sub Section Heading	:	1.1.2 Literature Review

The word **CHAPTER (no.)** without punctuation should be centered 50mm down from the top of the page. Two spaces below, the title of the chapter should be typed centrally in upper case (capital letters) **TITLE OF THE CHAPTER.** The text should commence 4 spaces below this title, the first letter of the text starting 20mm, inside from the left hand margin.

The section or sub-section headings preceded by their numberings should be left-justified. The typed material directly below section or sub-section headings should commence 2 spaces below it and should be offset 20mm from the left hand margin. The text can be divided over paragraphs with in a section or sub-section. Each paragraph should commerce 2 spaces below the last line of the preceding paragraph, the first letter in the paragraph being indented from the left hand margin by 20mm.

5. NUMBERING INSTRUCTIONS

5.1 Page Numbering

The preliminary pages of the thesis (such as Title page, Acknowledgement, Table of Contents etc.) should be numbered in lower case Roman numerals e.g.(i), (ii), (iii),..... The Title page, however, will be treated numbered as (i) but this will not be typed. The page immediately following the title page shall be numbered and (ii) it should appear at the bottom center of the page, and soon. Pages of the main text, starting with Chapter-1 should be consecutively numbered using Arabic numerals e.g.1,2,...All page numbers (whether Roman or Arabic) should be typed without punctuation in the center of the page 20mm above from the bottom.

5.2 Numbering of Chapters, Sections and Sub-sections

The numbering of Chapters, sections and sub-sections should be done using Arabic numerals only and further decimal notation should be used for numbering the section and sub-sections within a chapter. For examples sub-section 4 under section 3 of chapter 2 should be numbered as 2.3.4. The heading for a section or a sub-section should immediately follow in the same line after the number with a single space in between.

Appendices and their sections and sub-sections should be numbered in an identical manner using uppercase Roman e.g. I, II, starting with Appendix-I.

5.3 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 through an example. If a figure in Chapter 3 happens to be the fourth then Fig.3.4 is assigned 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, for example the third figure in Appendix-II will be designated as Fig.3. If a table is to be continued in to the next page, then a line should be drawn underneath an unfinished table and the phrase continued on page no... placed on the right side and under lined should be typed just below the line. The top line of the table continued on the next page should, for example read Table2.1 (continued) placed centrally and underlined.

While referring to a figure or table in the body of the thesis it should be referred to as Fig. 3.4, Table 2.1, Table-II.6, and so on.

5.4 Numbering of Equations

Equations appearing in each Chapter or Appendix should be numbered serially, the numbering commencing a fresh for each Chapter or Appendix. For example, the eighth equation in Chapter 2 should be numbered as (2.8) thus:

$$f_c = k \left[\frac{V_c}{V_c + V_w + V_a} \right]^2$$

While referring to this equation in the body of the thesis it should be referred to as Eqn.

6 THESIS SUBMISSION AND BINDING SPECIFICATIONS

6.1 Preparation of Research Summary

After the completion of the research work and preparation of the draft thesis, a research summary is to be prepared in close contact with the thesis supervisor(s). It should begin with the title of the thesis (in Times New Roman with size 14 bold, centered), a single space gap, Like the thesis, the Research followed by the name and enrollment of the candidate (in Times New Roman with size 12 bold, centered) and then a single space gap followed by the title **Research Summary** (in Times New Roman with size 12 bold, centered). After a gap of space, the text should begin on the same page (there is no need for a title page).

Summary may be broadly divided in to 3 parts (i) introduction, literature survey and identification of problem and issues (ii) statement, formulation and presentation of the problem, solution approach (iii) findings, results, discussion, implementation and conclusions, and directions for future research. It should be typed single line spacing, in Times New Roman with size 12 within the specified margin of the page. The total number of typed pages should not exceed 10. The use of tables, figures, equations should be absolutely minimum unless they are extremely essential. Only the essential references should appear in the text. Sections and subsections (not exactly the same as used in the main thesis) may be used to enhance their adability. Only minimal essential part of appendices and reference list should be included as part of the Research Summary.

6.2 Submission for Evaluation

After the successful completion of viva voce examination and with approval of the viva Voce board

- (a) The candidate should finalize the thesis and research summary should be prepared as per guidelines provided in this manual. In case of any problems, the supervisor(s) should be contacted.
- (b) The candidate should fill the checklist and sign the Certificate of Thesis Submission for Evaluation (**Annexure-IV**). The Certificate should be signed and submitted in duplicate. One copy after stamping by the concerned University official with due entries will be returned to the candidate.
- (c) For evaluation purposes, a candidate for **Ph D degree** is required to submit
 - (i) four copies of Research Summary
 - (ii) Four hard copies of the thesis printed on both sides and spiral bound using flexible cover of thick white art paper. The cover page should be printed as per specifications for the title page (**Annexure-I**).
 - (iii) A CD with exactly identical contents in pdf format. The Candidate should ensure that the CD can be opened on any system.
- (d) For evaluation purposes, a candidate for **M.Tech. degree** is required to submit.
 - (i) Three hard copies of the thesis printed on both sides and spiral bound using flexible cover of thick white art paper. The cover page should be printed as per specifications for the title page (**Annexure-I**).
 - (ii) A CD with exactly identical contents in pdf format. The candidate should ensure that the CD can be opened on any system.

6.3 Final Submission

Incorporating all the suggestions made during the evaluation process by the internal and external examiners and the suggestions emerging during *viva voce* examinations including modifications in the title of the thesis.

Following should then be submitted:

- (a) Certificate of Final Thesis Submission (**Annexure V**) signed by the candidate and the supervisor(s) certifying that all the corrections suggested by the examiners have been incorporated, the thesis has been prepared as per guidelines, due credit to other researchers have been appropriately accorded and no part of the thesis is copied from any other source.
- (b) The final thesis should be printed on both sides on good quality white paper not less than 80gsm and hard bound as per specifications given in **Annexure-VI**. The cover page should be printed as per specifications for the title page (**Annexure-I**) except that it will include month and year of final submission.
- (c) **Colour Code:** The color code for the thesis will be as follows :
 - (i) **M.Tech.**-bound with hard cover not less than 120gsm with printed in **blue** color. The side back of the thesis should also carry the title, name of candidate and month and year of final submission.
 - (ii) **Ph. D.** –with impressions embossed in Permanent **Maroon color**. The side back of the thesis should also carry the title, name of candidate and month and year of final submission.
- (d) For electronic repository of the University, a CD with exactly identical contents as the final thesis in pdf format should also be submitted. The candidate should ensure that the CD can be opened on any system. The CD should carry the name, enrollment number and programme of the candidate.
- (e) **Number of copies** (incorporating all corrections including viva-voce examination)
 - Ph.D.:** Two copies printed on both sides and hard bound as per University specifications, plus a CD with thesis contents in pdf format.
 - M.Tech:** To copies printed on both sides and hard bound as per University specifications plus a CD with thesis contents in pdf format.

Note: The candidate must submit the required certificates at the time of both the submissions (a) for evaluation and (b) final after viva voce examination for provisional degree certificate.

7. SIZE OF THESIS

There is no rigid restriction on the size of the thesis. However, for Ph.D. it should not generally exceed 300 pages of the typed matter beginning from the first page of Chapter to the last page of the last Appendix. Similarly, for M.Tech., it should be around 125.

8. REFERENCES

For knowing more about the styles and presentation, the following few references may be of interest:

- (a) Michaelson, H.B. How to Write Publish Engineering Papers and Reports. Oryx Press Phoenix.
- (b) Turner, R.P. Technical Report Writing. Rinehart Press, San Francisco.
- (c) Turk, C. and Krikman, J. Effective writing: Improving Scientific, Technical and Business Communication. E & FN Spon, London.
- (d) Campbell, W.G., Ballou, S.V. and Slade, C. Formand Style: Theses, Reports, Term Papers. Houghton Mifflin Co., Boston.
- (e) MLA Style Manual and Guide to Scholarly Publishing. Modern Language Association, New York.
- (f) Sternberg, D. How to Complete and Survive a Doctoral Dissertation. St. Martin's Griffin, New York.
- (g) Day, R.A. and Gastel, B. How to Write and Publish a Scientific Paper. Greenwood Press, Westport.
- (h) Booth, W.C., Colomb, G.G. and Williams, J.M. The Craft of Research. The University of Chicago Press, Chicago.

**TITLE OF THESIS TITAL OF THESIS
TITLE OF THESIS TITLE OF THESIS**

**A Thesis Submitted
In Partial Fulfillment of the Requirements
for the Degree of**

**DOCTOR OF PHILOSOPHY
by**

**NAME OF STUDENT
(Enrollment No.)**

**Under the Supervision of
Dr NAME OF SUPERVISOR
Institution**



**To the
FACULTY OF
NETAJI SUBHAS UNIVERSITY OF TECHNOLOGY
(Formerly Netaji Subhas Institute of Technology)
Azad Hind Fauj Marg, Sector-3, Dwarka, New Delhi-110078**

Month, Year

CERTIFICATE

Certified that **Name of student** (enrollment no.....) has carried out their search work presented in this thesis entitled **“Title of Thesis.....”** for the award of **Doctor of Philosophy/Master of Technology**(print only that is applicable) from Netaji Subhas University of Technology, New Delhi, under my/our (print only that is applicable) supervision. The thesis embodies results of original work, and studies are carried out by the student himself/herself (print only that is applicable)and the contents of the thesis do not form the basis for the award of any other degree to the candidate or to anybody else from this or any other University/Institution.

Signature

(Name of Supervisor)

(Designation)

(Address)

Signature

(Name of Supervisor)

(Designation)

(Address)

Date:

Note: In case of only one supervisor, the sole supervisor will sign on there right side and the details on the left will not be printed. In case of three supervisors, the third one along with his/her name, designation, address will sign in the centre of the page under neath the details of soft het wood her supervisors. The date, however, will be common to all.



ANNEXURE-III

CONTENTS

Title	Page No.
Certificate	ii
Abstract	iii
Acknowledgements	vi
Dedication (optional)	vii
List of Tables	viii
List of Figures	xv
List of Symbols and Abbreviations	xxiii
 CHAPTER 1: INTRODUCTION	 1-58
1.1. GENERAL	1
1.2.	2
1.2.1	12
1.2.2	19
1.2.2.1	25
1.2.2.2	29
1.2.2.3	33
1.3.	45
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 CHAPTER 2: LITERATURE REVIEW	 59-100
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2.2.	75
2.3.	100



ANNEXURE-IV

NETAJI SUBHAS UNIVERSITY OF TECHNOLOGY
(Formerly Netaji Subhas Institute of Technology)
Azad Hind Fauj Marg, Sector-3, Dwarka, New Delhi-110078

CERTIFICATE OF THESIS SUBMISSION FOR EVALUATION
(Submit in Duplicate)

1. Name:
2. Enrollment No.:
3. Thesis title:.....
.....
.....
4. Degree for which the thesis is submitted:.....
5. Faculty of the University to which the thesis is submitted:
.....
6. Thesis Preparation Guide was referred to for preparing the thesis. YES ☐ NO ☐
7. Specifications regarding thesis format have been closely followed. YES ☐ NO ☐
8. The contents of the thesis have been organized based on the guidelines YES ☐ NO ☐
9. The thesis has been prepared without resorting to plagiarism. YES ☐ NO ☐
10. All sources used have been cited appropriately. YES ☐ NO ☐
11. The thesis has not been submitted elsewhere for a degree. YES ☐ NO ☐
12. All the corrections have been incorporated. YES ☐ NO ☐
13. Submitted 2 hard bound copies plus one CD. YES ☐ NO ☐

(Signature of Candidate)

Name(s):

Enrollment No:



ANNEXURE-V

NETAJI SUBHAS UNIVERSITY OF TECHNOLOGY
(Formerly Netaji Subhas Institute of Technology)
Azad Hind Fauj Marg, Sector-3, Dwarka, New Delhi-110078

CERTIFICATE OF FINAL THESIS SUBMISSION

(To be submitted in duplicate)

1. Name:
2. Enrollment No:
3. Thesis title:
.....
.....
4. Degree for which the thesis is submitted:
5. Faculty(of the University to which the thesis is submitted)
.....
6. Thesis Preparation Guide was referred to for preparing the thesis. YES ☐ NO ☐
7. Specifications regarding thesis format have been closely followed. YES ☐ NO ☐
8. The contents of the thesis have been organized based on the guidelines. YES ☐ NO ☐
9. The thesis has been prepared without resorting to plagiarism. YES ☐ NO ☐
10. All sources used have been cited appropriately. YES ☐ NO ☐
11. The thesis has not been submitted elsewhere for a degree. YES ☐ NO ☐
12. All the correction has been incorporated. YES ☐ NO ☐
13. Submitted 2 hard bound copies plus one CD. YES ☐ NO ☐


(Signature(s) of the Supervisor(s))


Name(s):

(Signature of Candidate)

Name:

Enrollment No:

<p>M.Tech. Thesis</p>	<p>TITLE OF THESIS TITLE OF THESIS TITLE OF THESIS</p>	
<p>Title of Thesis Title of Thesis Title of Thesis</p>	<p>A Thesis Submitted In Partial Fulfillment of the Requirements for the Degree of</p> <p>MASTER OF TECHNOLOGY in FIELD OF SPECIALIZATION</p> <p>by NAME OF STUDENT (Enrollment No.)</p> <p>Under the Supervision of Dr Name of Supervisor Institution</p>	
<p>Name of the Candidate</p>	<p></p> <p>to the FACULTY OF.....</p> <p>NETAJI SUBHAS UNIVERSITY OF TECHNOLOGY (Formerly Netaji Subhas Institute of Technology) Azad Hind Fauj Marg, Sector-3, Dwarka, New Delhi-110078</p>	
<p>Month Year</p>	<p>Month, Year</p>	

<p>Ph. D Thesis</p>	<p>TITLE OF THESIS TITLE OF THESIS TITLE OF THESIS TITLE OF THESIS TITLE OF THESIS</p> <p>A Thesis Submitted In Partial Fulfillment of the Requirements for the Degree of</p> <p>DOCTOR OF PHILOSOPHY</p> <p>by</p> <p>NAME OF STUDENT (Enrollment No.)</p> <p>Under the Supervision of Dr Name of Supervisor Institute</p> <div></div> <p>to the</p> <p>FACULTY OF.....</p> <p>NETAJI SUBHAS UNIVERSITY OF TECHNOLOGY (Formerly Netaji Subhas Institute of Technology) Azad Hind Fauj Marg, Sector-3, Dwarka, New Delhi-110078</p> <p>Month, Year</p>	
<p>Title of Thesis Title of Thesis Title of Thesis Title of Thesis Title of Thesis</p>		
<p>Name of the Candidate</p>		
<p>Month Year</p>		