



Propelling Punjab to A Prosperous Knowledge Society.....

PH.D. REGULATIONS

PUNJAB TECHNICAL UNIVERSITY

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TABLE OF CONTENTS

S. No.	TOPIC	PAGE NO.
I.	Eligibility	02
II.	Residency Conditions	02
III.	Procedure for Registration	
	(a) Application for Enrolment	02
	(b) Entrance Test for Enrolment	03
	(c) Selection Criteria for Enrolment	03
	(d) Appointment of Supervisor	03
	(e) Request for Change of Supervisor	04
IV.	Guidelines for Candidates, selected for Admission to Ph.D. Programme	05
V.	Topic Modification	07
VI.	General Requirements during the period of Registration	07
VII.	Period required for submission of Thesis and Extension in Period	07
VIII.	Submission of Thesis	
	(a) Pre-submission	08
	(b) Submission of Expert Panel for Thesis Evaluation	08
	(c) Thesis Submission	08
IX.	Evaluation of Thesis	10
X.	Viva-Voce Examination	11
XI.	Award of Degree	11
XII.	Supply of Reports	12
XIII.	Preparation of Synopsis	13
XIV.	Format for Thesis	14
XV.	Candidate's Declaration	25

I. ELIGIBILITY

- a) A candidate seeking enrolment must satisfy the following academic criteria:
Masters degree in the concerned/allied subject with 60% marks at Masters Level or CGPA of 6.75 on 10 points scale or equivalent
or
M.Phil./M.Litt. Degree with B+ Grade or equivalent in case of applied sciences.
- b) Internal Candidate shall be defined as full time member of the faculty or research fellow of any department of Punjab Technical University (PTU) Jalandhar or any college/ institute affiliated to PTU.
- c) An External Candidate shall be defined as an employee of public sector undertaking, a Government department, or Research/Development or a Private industry or an educational institution not affiliated to but recognized by PTU Jalandhar as centers of research. Such candidates shall produce a certificate from the Head of the organization mentioning that he/she would be allowed to spend a minimum of 6 months of residency at place of his/her registration (i.e., any institute affiliated to PTU).
- d) However, degree will be awarded in the concerned subject (Engineering, Management, Pharmacy, Architecture, Life Sciences, Basic and Applied Sciences).

II. RESIDENCY CONDITIONS:

All research scholars are required to spend at least 6 months for consultation and research work in the department, wherever registered. The certificate in this regards, by the Supervisor, counter-signed by the Head of the Institute, is to be submitted to Dean (Research) PTU.

III. PROCEDURE FOR REGISTRATION**(a) APPLICATION FOR ENROLMENT:**

A candidate wishing to enroll for the Ph.D. Degree shall fill the prescribed application form and submit the same along with a fee of Rs.1000/- to the Dean Academics, Punjab Technical University. The Application should be duly verified by the Head of the Institute. Applications for enrollment shall be entertained by the university throughout the year.

b) ENTRANCE TEST FOR ENROLMENT:

- i. The entrance test for admission to Ph.D. programme will be conducted once a year in the month of December. The exact date of the examination will be notified through PTU's website. No separate advertisement will be given for the Test Date. The applications received till one month before the date of test shall be entertained for that session.
- ii. Separate question papers will be set for candidates of different disciplines of Engineering/Architecture/Pharmacy/Management/Sciences.
- iii. The question paper will be objective type and of 90 minutes duration. The minimum qualifying percentage is 40.
- iv. Course contents for the test will be based on the fundamental and subjective aspects of the concerned discipline.
- v. Candidates, who have already cleared UGC/CSIR Exam/SLET/GATE will be exempted from entrance test and preference will be given to them for admission. The inter-se merit of such candidates will be determined by their score in UGC/CSIR Exam/SLET/GATE.

c) SELECTION CRITERIA FOR ENROLMENT:

The inter-se merit of candidates appeared in test will be made on the basis of merit calculated as per the following criteria:

Weightage to marks in Master's/M. Phil programme	: 40%
Weightage to marks in entrance test	: 40%
Weightage to interview	: 20%

At the time of interview candidates are expected to discuss their research interest / area with interview board. Only the predetermined number of students, based upon the available recognized research supervisors (with concerned specialization/research interest) will be selected for admission to Ph.D. and the list of successful candidates shall be released.

d) APPOINTMENT OF SUPERVISOR

The successful candidates are required to contact the available recognized research supervisors (with concerned specialization/research interest) from within the PTU (this includes teachers in the colleges affiliated to the PTU). Subsequently, the allocation of supervisor shall be approved by the university, based upon the written request (on prescribed format) of the candidate endorsed by the supervisor. If necessary, Co-supervisor may be appointed from within the same Department or of a different Department of the University or outside the University. However, a

written justification for having a Co-supervisor should accompany the application duly recommended by the supervisor. Only such expert may be proposed as Supervisor or Co-supervisor, who is holding a Ph.D. or equivalent degree or research work equivalent to Ph.D. as per the University equivalence rules and not below the rank of Assistant Professor.

The maximum number of candidates, those can be registered for enrollment to Ph.D. Degree under a Supervisor/Co-supervisor is as follows:

Assistant Professor	:	4
Associate Professor	:	6
Professor	:	8

The upper limit of number of candidates includes all full-time and part-time research scholars, put together under a Supervisor or Co-supervisor. A certificate in this regard shall be given by the Supervisor/Co-supervisor (on prescribed format). While calculating the number of candidates, in case of combined supervision, the load should be equally divided among the supervisors, e.g. in case of two supervisors allotted to a candidate, the load of each supervisor shall be 0.5.

Provided further that no relative of the candidate such as wife, husband, son, daughter, sister, brother, wife's or husband's brother and sister, brother's son and daughter, sister's son and daughter, first cousin, nephew, grand-son, grand-daughter, or such other person as may be deemed a close relation by the Vice-Chancellor, shall not be appointed as Supervisor/Co-Supervisor. A certificate to this effect will be given by the Supervisor/Co-supervisor along with the application for enrolment.

e) **REQUEST FOR CHANGE OF THE SUPERVISOR**

Such requests can be entertained only:

- i. In case the Supervisor has left the service of the University or its affiliated institute.
- ii. In case of extreme hardship, where it becomes almost impossible for a candidate to work with the existing Supervisor, in that case the matter may be placed before the committee constituted by Dean Research.
- iii. The change of Supervisor shall be allowed during the first two years after registration. No change will be allowed after that period.
- iv. If the supervisor proceeds on long leave for three or more than three years, he/she may not be allowed to act as Supervisor. However, Ph.D. scholars, who are already registered

prior to proceeding on long leave, may be allowed to continue provided an administrative supervisor is also appointed to facilitate the work of the candidate.

IV. GUIDELINES for CANDIDATES SELECTED for ADMISSION TO Ph.D. PROGRAMME

Candidate shall fill the prescribed application form for registration and submit the same along with a fee of Rs.10,000/- and “Form Fee” as applicable, to the University through the Head of Institution for provisional registration. The candidate shall also submit one-page (maximum) report on the research area, in which he/she intends to work for his/her Ph.D. degree. Based upon this report, the candidate shall be advised to take up course work. Candidate shall complete the prescribed course work at the allocated regional centre/affiliated institution of university for a minimum period of one semester as per the scheme of examination of Ph.D. programme by paying the prescribed fee, for the course work, as applicable to master’s courses, at the allocated regional centre. One of the courses shall be on research methodology (which may include quantitative methods and computer applications) which is compulsory to all the candidates and the second subject shall be recommended by the committee of Supervisor, Chairman BOS or senior member of BOS and the Dean Research or his Nominee (Min. Professor Level). The courses should be of post graduation level as per the PTU nomenclature. The course should be completed by the candidate within coming two consecutive semesters, after provisional registration and the student must obtained ‘A’ grade or 65% marks in the allotted course work.

On successful completion of course work, the candidate will submit the synopsis of the proposed work, within a period of eighteen months of his/her provisional registration, through the supervisor, to the university. If he/she does not submit the synopsis within this period, his/her temporary registration shall stand cancelled. However, the candidate with prior permission of Dean Research may apply afresh along with a registration fee of Rs 10,000/- again within twenty four months from the date of first provisional registration to the university through the supervisor. No further extension shall be given and the provisional registration shall deem to be cancelled.

All those, who are registering for Ph.D. shall have to pay an Annual fee of Rs. 5,000/- by 31st March every year. Late fee for delayed payment of annual fee shall be Rs.100/- per month. Thesis submission/evaluation charges shall be Rs. 15,000/- at the time of submission. Late fee

with regard to submission of Annual Progress Report shall be Rs.1000, whereas Rs 5,000/- shall be charged for Topic Modification.

The candidate will submit 8 copies of the synopsis giving brief outlines of about 7 – 8 pages, indicating the purpose/objective of the research, brief review of literature, general approach and/or research methodology to be used, tentative plan of work/chapter scheme, bibliography / references etc.

A Research Degree Committee (RDC) consisting of the following will complete all the formalities of the research work of the candidate, from synopsis evaluation till final submission including yearly evaluation of candidate performance:

- (i) Dean Research or Nominee (Chairman)
- (ii) Supervisor/supervisors
- (iii) Two External Experts

(List of minimum six external experts, *with complete address, contact numbers and e-mail IDs*, to be submitted by the Supervisor, out of which, the Vice Chancellor shall appoint two examiners.)

Copies of the synopsis for registration for Ph.D. Degree will be provided to the above said committee members at least one month in advance to the date of RDC meeting or date of presentation of seminar. It is understood that all the deficiencies/improvements to be made in the synopsis will be settled in the meetings of RDC. The quorum for holding the synopsis evaluation will be three members (Supervisor and any two members from the remaining three).

In the seminar/ presentation:

- (i) The candidate shall be required to present a seminar pertaining to Registration on the topic of his/her study in the presence of RDC, to which other members of the university /affiliated colleges may also be invited.
- (ii) The RDC, while recommending registration of the candidate for consideration shall send a detailed note about the suitability of the research topic as well as the methodology proposed by the candidate.

The note shall include the names of the members of RDC present at the meeting, the discussions hold and its final outcome.

If the RDC approves the synopsis and registration to the Ph.D., his/her provisional registration will be considered as confirmed. In case the RDC does not approve the topic or suggests some modifications in the title, field of work, research methodology etc. the case

will be referred to Dean Research along with reasons and justifications. In such case the candidate may avail one more opportunity with prior permission of Dean Research to resubmit the synopsis, after duly incorporation of suggestions made by the RDC, within six months. In case synopsis is rejected second time, the candidate will have the option to apply for a fresh registration on new topic.

(iii) Letter of confirmed registration will be issued by the university to the candidate.

V. TOPIC MODIFICATION

A candidate may within one year of his/her registration modify the scheme of his/her research work with the approval of the RDC. Provided that the RDC allows modifications to be made such that the modifications proposed did not involve any major change in the original scheme and scope of the subject.

VI. GENERAL REQUIREMENTS DURING THE PERIOD OF REGISTRATION

A candidate will have to submit annual progress report, which shall be submitted to the Office of the Dean Research through the supervisor latest by 31st March of every year. The report will include all the progress aspects, such as surveys, tours, publications, research work etc. The supervisor of the candidate shall endorse the progress of the candidate. If a candidate is registered between 1st December and 31st March of a year he/she need not submit annual report by or before 31st March of that year. However, all the other candidates shall be required to submit their annual progress report by 31st March every year. In case of non-receipt of a progress report or irregular reports the matter shall be put before research Degree committee (RDC) for cancellation of registration.

VII. PERIOD REQUIRED FOR SUBMISSION OF THESIS AND EXTENSION IN PERIOD

The minimum period required for submission of thesis is two and half years and maximum period is five years and for this purpose, the period shall be counted from the date of issue of enrollment letter. However, after five years, a candidate may seek extension for sixth year by paying a fee of Rs 10,000/- and for the seventh year by paying a fee of Rs 15,000. No extension shall be allowed further. Registration of candidates, who fail to submit their thesis within the

stipulated period as mentioned above or who fail to apply for grant of extension would automatically stand cancelled.

VIII. SUBMISSION OF THESIS

- (a) **Pre-Submission:** If a candidate wants to submit Ph.D. thesis, he/she should inform the office of Dean Research through a letter forwarded by his/her supervisor mentioning that he/she intends to submit his/her thesis. For that he/she will also submit five copies of extended abstract of the thesis for pre-submission evaluation.

The candidate will give a pre-submission seminar before submission of Thesis. Annual progress report needs not to be submitted, once the candidate successfully accomplished his/her pre-submission seminar, however, he/she shall produce rough draft of thesis at the time of presentation. The presentations shall be organized by the university. All these presentation shall be carried out by the already constituted Research Degree Committee (RDC).

A report including the copy of the presentation and recommendation of the committee will be sent to the Dean Research for further action.

- (b) **Submission of Expert Panel for Thesis Evaluation:** Immediately after the approval of the expert committee for the submission of Thesis, Supervisor would submit a panel of minimum eight examiners, accompanied by four copies of long abstract of the thesis and list of the major references. In the panel at least half of the examiners will be from within the India and rest half from abroad. Panel should include the full particulars containing designation, area of specialization, Email ID, Complete Address, Contact number etc. of examiners, required to obtain the prior consent for the evaluation of the thesis, along with four copies of long abstract of thesis and the list of major references. The supervisor should preferably recommend only those examiners, whose research work is referred by candidate in his/her research work under evaluation.

- (c) **Thesis Submission:** A candidate must submit the Ph.D. thesis within three months from the date of presentation of pre-submission seminar. In case of non-submission of thesis within the stipulated period, the candidate can seek extension of further three months from the Dean Research with a late fee of Rs. 1000/- .

- (i) Thesis presented by the candidate must be a part of original research work characterized either by the discovery of new facts or by fresh interpretation of facts

or theories or should consist of applied work, such as developing and fabricating special instruments or apparatus and should show the candidate's capacity for critical examination and judgment and for lucid presentation.

- (ii) The candidate will not be permitted to submit his/her thesis for the degree unless his/her supervisor is satisfied that the thesis presented is worthy of consideration for the award of the Ph.D. degree.
- (iii) The candidate may incorporate in his/her thesis, the contents of any work, which he/she may have published on the subject and shall inform the examiners, if he/she has done so; but he/she shall not submit his/her thesis on any work, for which a degree has already been conferred on him/her by this or any other University. The candidate may, however, incorporate in his Ph.D. thesis, any work from his/her M.Phil./M.Litt. dissertation with due reference to the thesis and acknowledgement to the Supervisor, provided the work has been carried out at this University.
Provided that in case the work was done through collaboration, a certificate duly signed by all collaborators and countersigned by the supervisor concerned, to the effect that none of the collaborators has made or will make use of the joint work (published/unpublished) incorporated in this thesis for the award of any degree/diploma of any University/Institution, shall be furnished along with the thesis. Also, he/she has to submit No Objection Certificate (NOC) from the collaborating organization.
- (iv) At the time of submission of thesis, a candidate will produce evidence of having published two research papers (relating to the research topic on which he/she has been registered for Ph.D. Degree and the academic work included in the thesis) in refereed Journals, with at least one Journal having impact factor equal to or more than one.
- (v) At the time of submission of thesis, the candidate will give a certificate on the prescribed form that there is no plagiarism/word to word copy of matter from any other script or document in the present thesis.
- (vi) Along with five copies of thesis, candidate is required to submit a soft copy (in MS word and pdf format) in the form of CD for keeping in the University Library. The same may be submitted to UGC to put on Inflibnet.

IX EVALUATION OF THESIS

The Vice-Chancellor will appoint two examiners from already submitted panel of examiners for Thesis Evaluation and at least one of them would be from abroad.

The persons recommended for the evaluation of the thesis should invariably be Professor or of equivalent rank. The examiner will be free to seek clarifications on any matter from candidate's supervisor or the co-supervisor through Dean Research. The Dean Research will ensure the secrecy of examiner's identity.

The examiner will state in his/her report:

- (a) Whether he recommends the award of the degree to the candidate without any changes.
- (b) Thesis is acceptable, subject to the satisfactory answer to the queries raised by the examiner during the final viva-voce examination.
- (c) Whether he/she recommends re-submission of the thesis after revision. In case an examiner recommends revision of the thesis, he/she will also indicate the nature of changes.
- (d) Whether he/she recommends rejection of thesis.

In the event of an examiner making recommendations for revision/modification of the thesis, the candidate shall be free to defend his/her point of view through the Dean Academics, if so desires. However, if the examiner is not satisfied with the candidate's defense, the candidate shall be required to carry out necessary revision/modification as finally suggested by the examiner, before his/her case is processed further. It may be added that one examiner can recommend revision of thesis only once. If a second revision is recommended by the same external examiner, then it will be treated as rejection of thesis.

The candidate, who is required to resubmit the thesis, must do so within one year from the date of receipt of comments of the examiner to him/her by the University, irrespective of his/her submission of defense unless extension is specially given by the Vice-Chancellor. A resubmitted thesis will be examined by the examiner, who has recommended re-submission unless he/she himself is unable to do so or declines to do so.

In the event of one of the examiners recommending the award of the degree and the second examiner recommending rejection of the thesis; on the recommendation of the Vice-Chancellor, the thesis shall be referred to a third examiner to be appointed by the Vice-Chancellor from out of the original panel of examiners. The third examiner shall not be informed of the recommendations of the two examiners. The recommendations of those two examiners who

submit similar recommendations shall be final. This procedure shall also be followed if the examiner, who has suggested modification rejects the revised thesis.

Each examiner shall be given three month's time for the evaluation of thesis. In case report from him/her is not received, he/she may be reminded telegraphically or through e-mail. After the period of three months, if no report is received, the next examiner may be appointed. The first examiner will be requested to send the thesis back to University. If in due course, the report is received from the first examiner, the report will not be considered.

X. VIVA-VOCE EXAMINATION

The candidate is required to appear in an open house viva-voce examination, which shall be compulsory for all the candidates. This will normally be conducted at PTU by one of the two external examiners, who have evaluated the thesis. The Dean Research/Nominee and the Supervisor of the candidate will be associated with the conduct of the viva-voce to be arranged by the university. There will be a presentation by the candidate before the following committee:

1. Dean Research or Nominee
2. Supervisor/supervisors of the candidate
3. One external examiner, who has evaluated the thesis.

The quorum for holding the viva-voce examination will be three members.

In case an external examiner communicates that he/she is unable to conduct a viva-voce, the Vice-Chancellor will appoint an examiner and a copy of the thesis will be sent to the 3rd Examiner.

In case report(s) of the examiner(s) of the thesis are not favorable, the viva-voce examination of the candidate shall not be conducted.

The report about the performance of the candidate in the viva-voce examination shall be recorded by the external examiner(s) only.

XI. AWARD OF DEGREE

- (a) If the two examiners of the thesis have recommended the award of the degree and the viva-voce examiner is satisfied himself/herself on the basis of performance of the candidate in the oral examination that the candidate has written the thesis himself may recommend the award of the degree.

- (b) The result of Ph.D. degree of a candidate be deemed to have been notified by Dean Academics and Controller of Examination shall publish the result.

XII. SUPPLY OF REPORTS

The reports of the examiners may be supplied to the candidate and to the Supervisor after declaration of the result.

PREPARATION OF SYNOPSIS

1. Excluding Cover Page, the length of a thesis' synopsis should be 6-8 pages including tables and figures in place. Synopsis should be on A4 size paper with 1.5 line spacing. Eight hard copies and a soft copy on CD in word and .pdf format of the synopsis are required to be submitted.
2. Title/Cover Page.
3. Introduction (should not exceed three pages including Figs.): The Engineering/ Technological/ Scientific/ Used/Social relevance or importance of the research work should be reported.
4. Brief Literature survey (should not exceed two pages)
5. Problem formulation (should not exceed one page): Need and significance of proposed research work. The details of the following should be mentioned briefly, clearly and sufficiently
 - a. Research problem
 - b. Research Methodologies
6. Objectives (should not exceed one page): The objectives and scope of the research work should be clearly mentioned. The conceptual, analytical, experimental and methodological details within which the research has been carried out should be well defined. The future scope should also be mentioned for further research.
7. Methodology/ Planning of work (should not exceed one page)
8. Facilities required for proposed work
9. Proposed Place of work
10. Signature of candidate
11. Duly signed by supervisor

FORMAT FOR THESIS

1. The thesis must represent a coherent body of original work by the student. It must display a scholarly approach and thorough knowledge of the subject.
2. Plagiarism in any form is completely unacceptable.

3.1 General Guidelines

- a) **Language:** English.
- b) **Style:** A style appropriate to the subject matter should be followed consistently. American or British spelling is acceptable, but one form must be used consistently throughout the thesis.
- c) **Paper:** A4 size, portrait (vertical) orientation. The thesis must be printed on good quality white paper (20-40 lb. bond) on both side of the paper with all the figures and tables in line with the text. In a way, the thesis shall look like a book. Oversize or undersize pages (e.g., maps) can be included but should not be bound into the thesis—they may be placed in a pocket at the back of the thesis.
- d) **Margins:** For copying and binding purposes, the margins of every page of thesis must be kept within the following:

Top: 1” Right: 1”

Bottom: 1” Left 1.5”

To insure that margins are correct:

Header = 1.3”

Footer = 1.1”

All manuscript materials must fit within these margin requirements (including tables, headers and footers, figures, graphs and page numbers). When full-page prints of photographs are desired, the image area of the print must conform to the same margins as the text.

- e) **Font:** For the main body of the text, a standard, easily legible, 12-point Times New Roman font is preferred. Footnotes can be 10 or 12-point font. The thesis must be printed in black ink; printing should be laser printer or letter quality. The title of your thesis must be in Title Case or ALL CAPS. The title of all entries in the Table of Contents must be in Title Case.
- f) **Page Numbers:** All pages must be numbered in sequence. There must be no missing, blank, or duplicate pages. Specific page number formats, where applicable, are indicated below. Minimum font size is 10-point and must be consistent throughout the text. Chapter 1 must start on page 1.
- g) **Line Spacing:** 1.5
- h) **Order of Items in Entire Thesis:** The following order of items is common to both Standard and Publication thesis formats. Please note which items are optional.

Preliminary Pages (numbered with lower case Roman numerals):

Title Page
Certificates
Abstract
Dedication Page (optional)
Acknowledgements
Table of Contents
List of Figures
List of Tables
List of publications from the thesis
List of Abbreviations and Symbols Used (optional)
Glossary (optional)

Main Pages (numbered with Arabic numerals):

Body of Text – divided into chapters

Final Pages (continuation of Arabic numerals):

Endnotes (optional)

Bibliography/References

Appendices (optional)* (*Final Entry in Table of Contents*)

Author's Bio-Data

3.2 Preliminary Pages

- a) **Page Numbers:** The page numbers in the preliminary material are to be in lower case Roman numerals, centered at the bottom of the page, except for the title page, which is not numbered.
- b) **Title Page:** This must be in standard format. There is no page number written on this page, but it is considered to be page one (i).
- c) **Certificates** (page ii): This must be in standard format. The original copy must bear original signatures.
- d) **Dedication Page** (if applicable): The content and format of this page are up to the student.
- e) **Table of Contents:** For clarity, use 12 point font. For the ordering of items in the Table of Contents, please see section 3.1.h (above). All chapter titles, headings and subheadings should appear in the Table of Contents. Insert the word “Chapter” in front of chapter numbers in the table of contents and in the main body of text. Chapter 1 should be entitled Introduction, for example, ‘Chapter 1: Introduction’ and the last chapter entitled Conclusions (or Discussion). Line spacing of 1.5 should be maintained between entries. Text within the titles must not hang over the Table of Content’s page numbers; the ‘column’ of page numbers must be free of any text from the titles. Right align page numbers. Each appendix (if applicable) should be listed separately in the Table of Contents.

- g) **List of Tables and List of Figures** (if applicable): line spacing of 1.5 should be maintained between entries. Text within the titles must not hang over the page numbers; the ‘column’ of page numbers must be free of any text from the titles. The lists should include any material inserted in a back pocket. When listing the Tables and Figures make sure that text within the titles must not hang over the page numbers; the ‘column’ of page numbers must be free of any text from the titles. . Figures and Tables must be numbered separately. For example: “Figure 1. Database contexts”, “Table 1. Input data”. Figure captions are to be *below* the figures. Table titles are to be *above* the tables. Do not put the figures and tables at the end of the document. A figure/table should appear at or near the place where it is referred to in the text for the first time.
- h) **Abstract:** This part of the thesis will be the most widely published and most read because it will be published in Dissertation Abstracts International. It is best written towards the end, but not at the very last minute because you will probably need several drafts. It should be a distillation of the thesis: a concise description of the problem(s) addressed and your method of solving it/them, your results and conclusions. An abstract must be self-contained. Usually they do not contain references. When a reference is necessary, its details should be included in the text of the abstract. The number of words may be limited to 2000 not exceeding four pages of spacing 1.5 and font type Times New Roman with size 12.
- i) **List of Abbreviations and Symbols Used** (if applicable).
- j) **Glossary** (if applicable).
- k) **Acknowledgements** (if applicable): The author of the thesis can acknowledge the help and guidance received from different persons in this section. Any financial support received from funding agencies in the preparation of the thesis should definitely stated here.

3.3 Main Pages (Body of Text) – Standard format

- a) **General:** The thesis should be organized as chapters, and should follow the general guidelines and order of items listed in section 3.1. Chapter 1 must start on page 1 with subsequent chapters should start from the right hand side page as we open the thesis.

- b) **Page Numbers:** All pages must be numbered in sequence. Minimum font size is 10-point. It is normal practice for the page numbers in the main body of the text to appear in bottom centre, although lower right or the upper right corners are also acceptable. Page numbers must be at least 0.5 inches (1.3 cm) from the bottom of the page and centered.
- c) **Line Spacing:** 1.5, except where indicated otherwise. Short sections (e.g., quotations, equations, footnotes) may require more or less than this.
- d) **Chapter Titles, Headings, and Sub-headings:** All chapter titles, headings, and sub-headings must appear in the table of contents. For each level of title or heading, consistent format in font size and style, numbering or lettering, and placement should be maintained throughout the thesis text. Each chapter should begin on a new page. Chapter title should be Arial, 16 point Boldface Uppercase.

First-order headings: Times 14-point boldface, upper case, flush left, with one blank line before, and one blank line after. Use a period (“.”) after the heading number, not a colon.

Second-order headings: As in this heading, they should be Times 14-point boldface, initially capitalized, flush left, with one blank line before, and one after.

Third-order headings: Third-order headings, as in this paragraph, are discouraged. However, if you must use them, use 12-point Times, initially capitalized, flush left, preceded by one blank line, followed by a period and your text on the same line.

e) **Tables and Figures:**

- **General:** The content, placement, and format of figures and tables are determined by discipline practice. Sources of any figures or tables not original to the thesis must be cited. Lettering in tables and figures should be legible at the scale of reproduction in the thesis. Figures may be in colour or grey-scale, as appropriate to the subject matter.
Figure and table should be embedded in the text.
- **Captions:** Captions may be directly placed above the table and below the figure. Captions can be in sentence form, without capitalizing all major words and should be self contained in all respects.

- **Page Setup:** Figures, tables, and captions may be embedded in the text or appear on separate pages as appropriate. Landscape or portrait orientation is acceptable, although the page itself must appear in portrait (vertical) orientation. Margin width and page number placement should be consistent with the rest of text.
 - **Numbering:** All figures and tables are to be listed at the beginning of the thesis except those appearing in the appendices. Numbering or lettering style (if any) should be in accordance with discipline practice, and consistent throughout the thesis.
 - **Other:** Oversize tables, charts, maps, or diagrams are to be inserted into a back inside pocket; these should be included in the list of illustrations or tables.
- f) **Header:** Header may be placed at the top of the page and formatting should be consistent throughout the thesis.

3.4. Final Pages (Endnotes/References/Appendices)

- a) **Endnotes:** If used, must be placed before the Bibliography and Appendix.
- b) **References/Reference List:** All cited references must be listed at the end of the thesis. The thesis must contain a complete reference list or bibliography, citing all the literature and other sources referred to in the thesis and appendices, including websites. Format and placement of reference citations should be consistent throughout the thesis, and should conform to a scholarly style consistent with discipline practice. References in the text should be written this way:
- Active citation: 'Johansen (1982)'. Example: "as discussed in Johansen (1982)".
 - Passive citation: '(Johansen, 1982)'. Example: "as discussed in the literature (Johansen, 1982)".

Reference to journal articles and papers in serial publications should include:

- last name of each author followed by their initials
- year of publication
- full title of the cited article in quotes, title capitalization
- full name of the publication in which it appears
- volume number (if any) in boldface (Do not include the abbreviation, "Vol.")
- issue number (if any) in parentheses (Do not include the abbreviation, "No.")
- inclusive page numbers of the cited article (include "pp.")

Reference to textbooks and monographs should include:

- last name of each author followed by their initials
- year of publication
- full title of the publication in italics
- publisher
- city of publication
- inclusive page numbers of the work being cited (include "pp.")
- chapter number (if any) at the end of the citation following the abbreviation, "Chap."

Reference to individual conference papers, papers in compiled conference proceedings, or any other collection of works by numerous authors should include:

- last name of each author followed by their initials
- year of publication
- full title of the cited paper in quotes, title capitalization
- individual paper number (if any)
- full title of the publication in italics
- initials followed by last name of editors (if any), followed by the abbreviation, "eds."
- publisher
- city of publication
- volume number (if any) in boldface if a single number, include, "Vol." if part of larger identifier (e.g., "PVP-Vol. 254")
- inclusive page numbers of the work being cited (include "pp.")

Reference to theses and technical reports should include:

- last name of each author followed by their initials
- year of publication
- full title in quotes, title capitalization
- report number (if any)
- publisher or institution name, city

Online References

- Name of Author
- Name of Article
- Name of website
- Date of Access of Website

Sample References:

- [1] Ning, X., and Lovell, M. R., (2002), “On the Sliding Friction Characteristics of Unidirectional Continuous FRP Composites,” ASME J. Tribol., 124(1), pp. 5-13.
- [2] Barnes, M., (2001), “Stresses in Solenoids,” J. Appl. Phys., 48(5), pp. 2000–2008.
- [3] Jones, J., (2000), Contact Mechanics, Cambridge University Press, Cambridge, UK, Chap. 6.
- [4] Lee, Y., Korpela, S. A., and Horne, R. N., (1982), “Structure of Multi-Cellular Natural Convection in a Tall Vertical Annulus,” Proc. 7th International Heat Transfer Conference, U. Grigul et al., eds., Hemisphere, Washington, DC, 2, pp. 221–226.
- [5] Watson, D. W., (1997), “Thermodynamic Analysis,” ASME Paper No. 97-GT-288.
- [6] Tung, C. Y., (1982), “Evaporative Heat Transfer in the Contact Line of a Mixture,” Ph.D. thesis, Rensselaer Polytechnic Institute, Troy, NY.
- [7] Smith, R., (2002), “Conformal Lubricated Contact of Cylindrical Surfaces Involved in a Non-Steady Motion,” from web site <http://www.cas.phys.unm.edu/rsmith/homepage.html> accessed on 12/08/2007.

c) **Appendices:** Each appendix should be listed separately in the Table of Contents.

- **General:** Appendices may include data tables, source codes, analytical procedures, survey forms, or any other supplementary material approved by the supervisory committee. Content and format should be in accordance with discipline practice.
- **Copyright Permission:** Where a thesis includes copyrighted material (e.g., publications), copyright permission letters should be included as a separate appendix. Reprints may be included in the appendices, provided copyright permission is obtained.

d) **Pagination:** Pages should be numbered in sequence with the rest of the thesis.

e) **Line Spacing:** spacing between entries should be 1.5. Individual reference entries must not be split over two pages.

f) **Font Size:** Font size for both endnotes and cited references should be consistent with the rest of the thesis text. Other details of format (italics, punctuation, etc.) should be compatible with discipline practice and should be consistent through the entire list.

3.5. Supplementary Material (Included in Thesis)

- a) **Electronic supplements:** read-only CD/DVD-ROM (in hard case) labeled with student name, thesis title, institution, and date, for back pocket of the thesis, written description of electronic supplements (if any), oversize pages for back pocket.
- b) **Copyright agreement letters** (if applicable – to be included in an appendix)

3.7. Electronic Formats

- a) **General:** candidates may include supplementary material in electronic format. A CD-ROM or DVD-ROM (read-only) containing this material should be submitted in a hard case and will go in the back pocket of the thesis. A description of the supplementary material, including file names, formats, and a brief description of the contents, should be included as an appendix in the paper copy of the thesis and as a "read-me" file on the CD/DVD-ROM.

b) **Labeling:** The CD/DVD-ROM must include both electronic and physical labels that list the thesis title, author, institution, and date.

3.8 The thesis shall be hard bound with cover page in **maroon background and golden text** color. The name of the candidate, degree (specifying the specialization), year of submission, name of the University including college name shall be printed in black on the cover.

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**A
THESIS
SUBMITTED TO**



**PUNJAB TECHNICAL UNIVERSITY
JALANDHAR (INDIA)**

**IN FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF**

**DOCTOR OF PHILOSOPHY
IN**

**By
Name of Candidate
Regd. No. –**

**Department of.....
Name of Institution/College
Year**

CANDIDATE'S DECLARATION

I hereby certify that the work which is being presented in the thesis, entitled "-----" in fulfillment of the requirements for the award of the degree of Doctor of Philosophy in Faculty of Engineering and submitted in Punjab Technical University, Jalandhar is an authentic record of my own work carried out during a period from Jan., 2004 to Oct., 2006 under the supervision of Dr. _____ and Dr. _____.

The matter embodied in this thesis has not been submitted by me for the award of any other degree of this or any other University/Institute.

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This is to certify that the above statement made by the candidate is correct to the best of our knowledge.

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The Ph.D. Viva-Voice examination of _____ Research Scholar, has been held on _____

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