

**Regulations
For
Doctor of Philosophy
R 2015**

(As per the UGC Regulations 2016)



**ANNA UNIVERSITY
CHENNAI 600 025**

CONTENTS

		Page
	DEFINITIONS AND NOMENCLATURE	iii
1	GENERAL ELIGIBILITY	1
2	EDUCATIONAL QUALIFICATIONS	1
3	Ph.D. PROGRAMME	2
4	PLACE OF RESEARCH	5
5	MODE OF SELECTION	6
6	ADMISSION	7
7	SUPERVISOR RECOGNITION	7
8	CHANGE OF SUPERVISOR	9
9	NUMBER OF SCHOLARS	11
10	DURATION OF THE PROGRAMME	11
11	EXTENSION OF MAXIMUM DURATION	12
12	DOCTORAL COMMITTEE	13
13	PROGRAMME STRUCTURE	14
14	RESEARCH OUTSIDE THE UNIVERSITY	16
15	MONITORING THE PROGRESS OF THE SCHOLARS	17
16	CANCELLATION OF REGISTRATION	18
17	SUBMISSION OF SYNOPSIS	19
18	SUBMISSION OF THESIS	20
19	THESIS EVALUATION	21
20	ORAL EXAMINATION	22
21	AWARD OF Ph.D. DEGREE	24
22	PUBLICATION OF THESIS	24
23	THE ACT OF PLAGIARISM	24
24	POWER TO MODIFY	25
25	RESEARCH CONDUCT RULES	26
	GUIDELINES FOR PREPARATION OF SYNOPSIS	29
	Annexure I	31
	GUIDELINES FOR PREPARATION OF THESIS	33
	Annexure II	43
	Annexure III	45
	Annexure IV	46
	Annexure V	47
	Annexure VI	48

ANNA UNIVERSITY

REGULATIONS FOR DOCTOR OF PHILOSOPHY

R 2015

DEFINITIONS AND NOMENCLATURE

In the Regulations, unless the context otherwise requires,

- i. "University" means Anna University, Chennai 600 025.
- ii. "Research Board" means the Board duly constituted by the Vice-Chancellor of the University to oversee the academic research activities of the University.
- iii. "Programme" means Doctoral Programme leading to the award of Ph.D. in Engineering / Technology / Science and Humanities / Management Sciences, etc.
- iv. "Chairperson" means Head of the Faculty.
- v. "Supervisor" means any faculty member of the University or outside the University who has been recognized by the University to guide the research scholars.
- vi. "Joint Supervisor" means a recognized Supervisor to guide the scholars in interdisciplinary research that require more than one expert or to take care of the administrative and research responsibilities of the scholar, if the Supervisor retires from service.
- vii. "Head of the Department" means Head of the Department of the Supervisor.
- viii. "Place of research" for the scholars shall be the Department where the Supervisor is working.
- ix. "Doctoral Committee" means a Committee constituted by the University for each scholar to monitor the progress of his/her research work.
- x. "Scholar" means any candidate admitted by the University either under Full-time or Part-time category for pursuing research for the award of Ph.D. degree of the University.

- xi. “Specialization” means the discipline of the Post Graduate Degree Programme such as Environmental Engineering, Applied Electronics, Physics, etc.
- xii. “Course work” means a theory subject of PG programme that is prescribed by the Doctoral Committee for the scholar to undergo as a part of the programme requirement.
- xiii. “Special Elective” means any theory subject/laboratory/field work specific to the area of research designed by the Supervisor, recommended by the Doctoral Committee and approved in the Board of Study and Academic Council.
- xiv. “Publication” means full length research articles reporting new research findings in respective fields comprise of presentations on new concepts, the development of innovative methods that include figures, tables and references; the results of which have a general impact and contribute to the advancement of the particular field, and are always peer reviewed.

1. GENERAL ELIGIBILITY

- 1.1 Master's Degree of the University or any other qualification recognized as equivalent thereto in the fields of study notified from time to time by the University. Specific educational qualifications are given in Clause 2.
- 1.2 Bachelor's Degree in Engineering/Technology of the University or any other qualification recognized as equivalent thereto in the fields of study with a minimum of 15 years of R&D experience in National Research Laboratories / Public sector undertakings and with minimum of three publications in referred impact factor journals or two international patents in the last five years.
- 1.3 A minimum of 55% marks or CGPA of 5.5 on a 10 point scale in the qualifying examination. In case of SC/ST/ differently –Abled candidates, 50% marks or CGPA of 5.0 on a 10 point scale.
- 1.4 The Clause 1.3 does not apply, if the qualifying degree is M.S. (By Research) of the University or recognized as equivalent.

2. EDUCATIONAL QUALIFICATIONS

Programme		Qualification for Admission
(i)	Ph.D. Degree in Engineering/Technology	M.E. / M.Tech. / M.S. (By Research) in the relevant branch of Engineering or Technology
(ii)	Ph.D. Degree in Science and Humanities	M.Sc. / M.S. (By Research) in the relevant branch of Science and Humanities / M.C.A/ M.A. (English/ Communication/ Mass Communication/ Journalism/ Media Arts)
(iii)	Ph.D. Degree in Management Sciences	MBA / Post Graduate Diploma in Business Management or Administration awarded by Indian Institute of Management (IIM) / M.S. (By Research) in Management Sciences
(iv)	Ph.D. Degree in Architecture and Planning	M.Arch. / M.Plan. / M.S. (By Research) in Architecture and Planning

3. Ph.D. PROGRAMME

Two categories of Ph.D. programme available are: Full-time and Part-time. Candidates who satisfy the eligibility criteria as in Clauses 1 & 2 are eligible to apply for Ph.D. Programme.

3.1 Full-time Ph.D. Programme

3.1.1 Candidates under Full-time shall do research work in the University and shall be available during the working hours for curricular, co-curricular and related activities.

3.1.2 Candidates working in the projects undertaken from State / Central / Quasi Government and totally funded projects in the University Departments / University Colleges / Colleges affiliated to the University. If the Principal Coordinator / Investigator of such projects are recognized Supervisor of the University, the scholar shall register for research programme under such Supervisor only. The scholar should be appointed in a project sanctioned by a funding agency/organization atleast for a period of two years. Part employments in different spells or in different projects are not permitted. The Department/ Centre where the project is undertaken should be a recognized research centre of the University.

3.1.3 Candidates in employment, who want to pursue Full-time study, should be sponsored by their employer and should avail leave for the minimum duration of the programme (Clause 10) and should get formally relieved from their duty to join the research programme.

3.1.4 Candidates who are sponsored by AICTE under Quality Improvement Programme for teachers of Engineering Colleges and who satisfy the eligibility conditions shall apply for Full-time category only, in the Specializations as notified in the AICTE guidelines.

3.1.5 Candidates who are selected at National level Fellowship programmes or by any recognized bodies and who satisfy the eligibility conditions as per the regulations shall apply for Full-time category in the respective Specialization.

3.1.6 Foreign Nationals sponsored by the Government of India on any exchange programme and who satisfy the eligibility conditions as per the regulations shall apply for Full-time category in the respective Specialization.

3.2 **Part-time Ph.D. Programme**

The following categories of candidates are eligible to apply under Part-time programme:

3.2.1 Full-time teachers of University Departments / University Colleges / Colleges affiliated to the University and Government /Government aided/Self-financing Polytechnic Colleges within Tamil Nadu.

3.2.2 Candidates working in Industrial Units / R&D Departments / National Laboratories / Units of Government / Quasi Government or any other research laboratories which are recognized by the University to do research with the University and sponsored by the respective employer.

RESEARCH DEPARTMENT REGOGNITION:

3.2.3 For Institute Recognition, to do research with Anna University, following are the eligible organizations:

- i. Departments of Engineering Colleges affiliated to the University
- ii. Industrial Units /R&D Departments / National Laboratories / Units of Government / Quasi Government.

Note: All Departments of Government/ Government Aided Engineering Colleges/ University Colleges are considered as recognized research departments

Norms for Research Department Recognition:

1. The Engineering College or Organizations shall be of minimum 5 years standing.
2. The Engineering College shall offer P.G. programme in the concerned Department with a minimum of 2 years standing (with the exception of Mathematics/ Physics/ Chemistry/ Humanities Departments).

3. At least two faculty members with Ph.D. degree in the core/allied specialization. Each faculty member should be a recognized Supervisor of this University and having a minimum of one year working experience in the concerned Department of the same Institute / College.
4. Engineering College while applying research centre recognition for three departments under the interdisciplinary category, the number of Ph.D. holders working in such departments may be considered with a minimum of 5 in total for recognizing each department as a research centre by a single Inspection Committee. If they apply for any two departments at a time, a minimum of 3 Ph.D. holders are required. Each faculty member should be a recognized Supervisor of this University and having a minimum of one year working experience in the concerned Department of the same Institute / College.
5. Sufficient infrastructure facilities in the relevant area of research.

A satisfactory assessment report by the Inspection Committee on the availability and suitability of infrastructure facilities for research shall be recommended for a period of Three years (Five years for R&D centres of State/National R&D laboratories) by the respective Chairperson. If the respective chairperson is not satisfied with the report submitted by Inspection Committee as such, the concerned Chairperson along with the Director (Research) shall visit the Institute & recommend / not recommend and the same may be approved by the Vice-Chancellor. Institute Recognition should be renewed periodically fulfilling the norms specified by the University to continue as a recognized research Department/R&D centre. In extraordinary circumstances a committee will be deputed by the Vice-Chancellor to inspect the research centre for renewal.

Norms for Research Department Renewal:

1. The Engineering College shall continue to offer P.G. programme in the concerned Department (with the exception of Mathematics/ Physics/ Chemistry/ Humanities Departments).
2. At least two faculty members with Ph.D. degree in the core/allied specialization. Each faculty member should be a recognized Supervisor of this University and having a minimum of one year research guidance in the concerned Department of the same Institute / College.
3. Payment of Renewal fee as applicable.

Note (i): The categories of eligible candidates mentioned in Clause 3.2.1 working in the University Departments / University Colleges / Government Engineering Colleges are classified as Part-time (Internal). The nomenclature shall continue for the above scholars till they are in service in the above Institutions.

Note (ii): Teachers of affiliated colleges and Polytechnic in Clause 3.2.1 and candidates as mentioned in Clause 3.2.2 are classified as Part-time (External). The nomenclature shall continue for the above scholars till they are in research.

3.3 Change of Category

- 3.3.1 The change of category shall be approved by the Director (Research) **only once in the tenure**, subject to submission of necessary documents along with the recommendation of the Supervisor and Head of the Department /Director of the Centre of the Supervisor. Change of category more than once may be considered only under extraordinary circumstances, if deemed fit reasons. In case of change of category from Full-time to Part-time or Vice-Versa, the minimum period shall be accounted as whichever is high.

4. PLACE OF RESEARCH

The place(s) of research in respect of Full-time/Part-time programme are as under:

4.1 Full-time Programme

- 4.1.1 The Full-time programme shall be undertaken in the University Departments / Government Engineering Colleges and approved research departments of the Colleges affiliated to the University.
- 4.1.2 The place of research for the project scholars mentioned in Clause 3.1.2 shall be the Department / Institution where the project is undertaken.
- 4.1.3 Full-time scholars shall necessarily sign in the attendance register on all working days at the respective place of research.

4.2 Part-time Programme

- 4.2.1 The place of research for teachers of Colleges affiliated to the University (as specified in Clause 3.2.1) shall be the College where the Supervisor is working.
- 4.2.2 The place of research for the scholars working as per Clause 3.2.2 shall be the Department where the Supervisor is working. The facilities in Industrial Units / R&D Departments / Laboratories / Units of Government / Quasi Government / Recognized research laboratories shall also be availed for research.

5. MODE OF SELECTION

- 5.1 The candidates desirous of registering for Ph.D. Programme shall apply in the prescribed application form downloaded from the University website, fill-in all the necessary details and submit through proper channel wherever applicable, before the due date as indicated in the notification issued from time to time. Normally the University shall issue notification for Ph.D. admission twice in a year.
- 5.2 Incomplete applications in any respect shall be summarily rejected without any intimation to the candidate.
- 5.3 The applications of the eligible candidates shall be processed by Committees constituted by the Director (Research) for the purpose of selection. The composition of such Committees

shall be decided by the Director (Research) with the approval of Vice-Chancellor, taking into account the number and nature of applications received.

- 5.4 The Centre for Research shall screen the applications as per the eligibility norms, and the Centre for Entrance Examinations shall be responsible for the conduct of test for eligible candidates. A minimum mark will be fixed by the Research Board for selection based on the performance in the Entrance test, Qualifying exam and Interview and the successful candidates shall be short listed.

6. ADMISSION

- 6.1 The Faculty of the candidate for the admission of Ph.D. programme shall normally be based on the PG qualification. The Research Board constituted by the Vice-Chancellor shall approve and recommend the short listed candidates for admission to the doctoral programme in the appropriate specialization, after giving due consideration to the interdisciplinary fields of research, if any, and the Faculty in which the candidate shall be registered.
- 6.2 Selected candidates shall be provisionally registered for Ph.D. programme with the approval of the Vice-Chancellor either in January or July session as decided by the candidate.
- 6.3 The date of provisional registration shall be normally 1st January or 1st July of the year in which the candidate is admitted.
- 6.4 The scholar, Supervisor, Doctoral Committee members and Examiners shall not be relatives to each other.

7. SUPERVISOR RECOGNITION

- 7.1 The applicant should possess Ph.D. degree in the relevant area of research in which he/she proposes to guide the scholar. The applicant shall submit the proof for Ph.D. degree

recognition from UGC, if the Ph.D. degree is obtained from University other than State or Central University/Institutions.

- 7.2 The applicant for Supervisor recognition shall be working Full-time faculty in the University Departments / University Colleges / Colleges affiliated to the University / Full time Scientists of National Laboratories of Government of India located within the Tamil Nadu.
- 7.3 The applicant shall have atleast five publications to his/her credit in the **List of Journals** (as given in the website) for the regular Professor of the University/Affiliated Engineering College and at least two research publications to his/her credit in the **List of Journals** (as given in the Website) for regular Associate Professor /Assistant Professor of the University/Affiliated Engineering College in the relevant field. Applicant shall be the first/second author (in case if his/her Student/ Supervisor is the first author) /corresponding author in the publications. If self-plagiarism / plagiarism is ascertained in the publications by the concerned Chairperson, such publication(s) shall not be considered for processing of Supervisor recognition application. The application for supervisor recognition may be considered based on the publication and experience of the applicant under extraordinary conditions with the approval of the Vice-Chancellor.
- 7.4 Recognition as Supervisor for guiding research work shall be accorded by the Vice-Chancellor based on the recommendation of the Chairperson of the Faculty in sequence to the Research Board.
- 7.4.1 Supervisors working in the non – recognized research Departments of Engineering Colleges/ Architecture Schools situated within Tamil Nadu shall function only as **Joint Supervisor**.
- 7.4.2 Supervisors working in recognized Nationalized Laboratories situated within Tamil Nadu shall also function as Supervisor. However, for such supervisors, a recognized supervisor from University Departments or from affiliated Engineering Colleges as Joint Supervisor is mandatory.

- 7.4.3 For interdisciplinary research that requires more than one expert, the Joint Supervisor from other Departments/Institutions shall be approved by the Director (Research) based on the request of the Supervisor and the recommendation of the Head of the Department of the Supervisor.
- 7.5 A Supervisor shall entertain fresh registration of scholars under him/her upto Two years prior to his/her superannuation or leaves service, and a Joint Supervisor is mandatory in such cases.
- 7.6 Contact of Thesis examiners by the Supervisor/Joint Supervisor after the submission of Synopsis/Thesis of his/her scholar in connection with the evaluation report shall lead to the withdrawal of his/her supervisorship for a period of three years and he/she shall be debarred from guiding the scholars for any research programme in the University till such period.
- 7.7 Any violation of Ph.D. regulations by the Supervisor/Joint Supervisor shall lead to the withdrawal of his/her supervisorship either permanently or for a maximum period of five years and he/she shall be debarred from guiding the scholars for any research programme in the University till such period, with the approval of Vice-Chancellor.

8. CHANGE OF SUPERVISOR

- 8.1 When a Supervisor of a scholar happens to be away from the University Departments / Engineering Colleges/ National Laboratories for more than six months and upto one year, he/she shall continue to guide the scholar, but a Supervisor-in-charge shall be nominated by the Director (Research) based on the request of the Supervisor and / or the recommendation of the Head of the Department of the Supervisor. The Supervisor-in-charge shall act maximum upto one year until Supervisor returns. Under extraordinary circumstances, if the Supervisor of a scholar happens to be away from the department for more than one year, either the supervisor-in-charge may be nominated as the Supervisor or an alternate

supervisor shall be nominated by the Director (Research) based on the request of the Supervisor-in-Charge and the recommendation of the Head of the Department.

- 8.2 When a Supervisor of a scholar happens to be away from the University for more than one year, an alternate Supervisor shall be nominated by the Director (Research) based on the request of the Supervisor and / or the recommendation of the Head of the Department of the Supervisor.
- 8.3 The Supervisor who retires from service shall continue to guide a scholar already registered under him/her provided the provisional registration of the scholar is confirmed, upto a maximum period of one year from the date of his/her retirement on his/her written request. If the scholar has not submitted the thesis within one year, a Joint Supervisor shall be nominated by the Director (Research) based on the request of the Supervisor and/or the recommendation of the Head of the Department of the Supervisor.
- 8.4 When a Supervisor migrates to other University / non-recognized department of the University, such Supervisors shall be permitted to guide the scholars already registered under him/her provided their provisional registration is confirmed, otherwise an alternate Supervisor shall be nominated by the Director (Research) based on the request of the Supervisor and / or the recommendation of the Head of the Department of the Supervisor. However a Joint Supervisor shall be nominated by the Director (Research) based on the request of the Supervisor and / or the recommendation of the Head of the Department of the Supervisor to take care of the administrative and research responsibilities of the scholar.
- 8.5 If the Institution in which the scholar works becomes Private University or the scholar migrates to other University, such scholar shall be permitted to continue the research work in the University and to submit the Thesis under the same Supervisor with the approval from the Director (Research), provided his/her provisional registration is confirmed and his/her minimum duration of the programme is completed.

- 8.6 If the Institution(s) affiliated to the University becomes Private University, then the recognized Supervisors working in such institutions shall be permitted to guide the scholars, if their provisional registration is confirmed. Such Supervisors cannot be permitted to take additional scholars. However a Joint Supervisor shall be nominated by the Director (Research) based on the request of the Head of the Department of the Supervisor to take care of the administrative and research responsibilities of the scholar.
- 8.7 Change of Supervisor for a research scholar shall be possible on valid reasons with the consent of both the present and proposed Supervisors. In case, the scholar requests for change of Supervisor without the consent of the Supervisor, the request shall be considered **based on the recommendation of the Committee** constituted by the Vice-Chancellor. If change of Supervisor is approved, the scholar has to work for a minimum of one year with the new Supervisor and **Synopsis shall be accepted only when the scholar has published atleast one journal publication (as applicable) with new Supervisor.**

9. NUMBER OF SCHOLARS

- 9.1 The Professor who is a Supervisor shall guide only a maximum of **11** (Ph.D./M.S. (By Research) put together) scholars as Supervisor/Joint Supervisor at any time. The Associate Professor who is a Supervisor shall guide only a maximum of **8** scholars and an Assistant Professor shall guide only a maximum of **5** scholars as Supervisor/Joint Supervisor at any time. Additional scholars, if any under extraordinary circumstances, shall be decided on the merit of the cases, with prior approval of the Vice-Chancellor.

10. DURATION OF THE PROGRAMME

- 10.1 The duration of the programme and the time for submission of Thesis are counted from the date of provisional registration vide Clause 6.3.

- 10.2 The minimum duration of the programme in Engineering, Technology, Architecture and Planning, Agriculture, Medicine and allied programmes for **Full-time/Part-time** shall be **two/three years** respectively.
- 10.3 The minimum duration of the programme in Science & Humanities for **Full-time/Part-time** shall be **three/four** years respectively. However, for M.Phil. Degree holders, the minimum duration shall be reduced by one year, if the M.Phil. Degree relates to the field of research of the programme.
- 10.4 The minimum duration of the programme in Management Science for Full-time/Part-time shall be as in Clauses 10.2 / 10.3 for scholars with Engineering and Technology / Science and Humanities background respectively.
- 10.5 If a Full-time scholar completes his/her minimum duration of the programme as in Clauses 10.2, 10.3 and 10.4, he/she shall be permitted to change the category, if necessary, with prior approval from the Director (Research) subject to submission of necessary documents along with the recommendation of the Doctoral Committee.
- 10.6 The Director (Research) shall permit, if deemed fit for reasons, break of study for the scholar under extraordinary circumstances such as medical grounds and other compelling reasons which warrants his/her absence to the programme. However, the break of study period shall not be counted for the minimum duration of the programme.
- 10.7 Break of study to scholars shall be granted upto a maximum period of **two years not exceeding one year at a time**. Such request with the recommendation of the Supervisor and Head of the Department should reach the Director (Research) prior to availing the break of study. If prior permission is not sought and obtained, it will be considered as a case of discontinuation and action will be taken to cancel the registration of such scholars. Break of study period shall be counted for the maximum duration of the programme (Clause 10.8). The scholar should remit the semester fees during the break of study period.
- 10.8 The maximum duration for the programme shall be **six** years.

11. EXTENSION OF MAXIMUM DURATION

- 11.1 Scholars who do not submit the thesis within the maximum duration of the programme (six years) shall apply for extension of time three months before the completion of six years recommended by the Supervisor. In such cases, a maximum grace period of one year, beyond the normal maximum period of six years shall be granted by the Director (Research) to enable the scholar to submit the Thesis. However, the final six months grace period shall be granted by the Vice-Chancellor only if the scholars submit the **synopsis** and apply for extension with the recommendation of the Supervisor, atleast one month prior to the expiry of the previous extension. Penalty fees as prescribed from time to time shall be paid beyond the maximum duration.
- 11.2 If the scholar fails to submit the Thesis within the extended period of two years, the registration shall be cancelled and the name be removed from the rolls.

12. DOCTORAL COMMITTEE

- 12.1 There shall be a Doctoral Committee for every scholar to monitor the progress of research work.
- 12.2 For every scholar, the Supervisor shall furnish 2 panels of 3 each with doctoral qualification in the field of proposed research, from the faculty members of (a) University and Colleges affiliated to the University (b) other Universities / experts from R&D Departments / National Laboratories or any other research laboratories, from which two experts, one from each panel will be nominated as Doctoral Committee members preferably within the state by the concerned Faculty Chairperson.
- 12.3 The Supervisor of the scholar shall be the convener of the Doctoral Committee.
- 12.4 The Joint Supervisor, if applicable, shall also be a member.

12.5 The Head of the Department /Director of the Centre shall forward the Doctoral Committee minutes to the Director (Research). However, the meetings of Doctoral Committee should be informed to the Director (Research) with a copy to Head of the Department /Director of the Centre well in advance.

12.6 The Director (Research) shall permit, if deemed fit reasons, Change of Doctoral Committee member for the scholar based on the request of the supervisor under extraordinary circumstances such as

- I. In the case of change of Supervisor.
- II. Topic of research changed before confirmation of the Provisional Registration.
- III. Doctoral Committee member is away from the place of work for more than 2 years.
- IV. Doctoral Committee member passed away.
- V. Member not responding to attend Doctoral Committee meetings.

In all the above cases or any other compelling reasons, the Chairperson of the Faculty shall nominate an alternate Doctoral Committee member from the panel furnished by the Supervisor.

13. PROGRAMME STRUCTURE

13.1 Course Work

13.1.1 The Doctoral Committee of a scholar shall meet within three weeks from the date of communication of his/her provisional registration to prescribe the course works.

13.1.2 A **minimum of four course works** of 12 Credits relevant to the area of research and offered under any approved PG programme of the University shall be recommended by the Doctoral Committee. But the scholars shall not have undergone such course works in their PG programme /M.S. (By Research).

- 13.1.3 Only course works registered after the first Doctoral Committee meeting shall be counted towards this requirement. Any course work already passed by the scholar prior to provisional registration shall not be counted for this purpose.
- 13.1.4 The scholar shall attend classes along with PG students and will be evaluated in the same relative grading scale of the course work.
- 13.1.5 No change in the course works prescribed shall be made without the approval of the Doctoral Committee.
- 13.1.6 The prescribed course works shall normally be completed within two years from the date of provisional registration for both Full-time and Part-time scholars. If the scholar fails to complete the confirmation of provisional registration beyond three years after his/her registration for the Ph.D. programme, the registration of the scholar shall stand cancelled.
- 13.1.7 Regularly offered PG electives shall not be taken as Special Elective and the scholar shall wait to undertake such course work when it is offered to the PG students in the Department.
- 13.1.8. If any course work, specific to the area of research has to be newly designed, then such course work shall be formulated as a Special Elective to be covered in not less than 45 contact periods of instruction and the course work syllabus shall be designed by the Supervisor, recommended by the Doctoral Committee and shall be approved in the Board of Study of the Concerned Faculty and Academic Council. These course works shall be of PG level. A scholar shall be permitted to undertake only **one such Special Elective**. If any approved Elective not offered to PG students and attended by less than 5 research scholars, such course work shall be considered only as Special Elective.
- 13.1.9. In the case of Special Elective, details of contact classes shall be maintained in the attendance register. The evaluation pattern for internal assessment will be similar to that of PG courses and end semester examination shall be conducted. However, for awarding grades, the absolute grading scale shall be followed.

13.1.10. Scholars with M.Phil. Degree in the Faculty of Science and Humanities have been exempted two course works provided the M.Phil. Degree is related to the proposed Ph.D. research work and if duly recommended by the Doctoral Committee. The other two course works shall be regular and not special elective. M.Phil. Degree obtained through Distance/ Correspondence/ Open University System are not considerable for exemption of two course works.

13.1.11. The scholars shall secure a **CGPA of 6.5 in the course works** in order to become eligible for comprehension examination. The scholar who fails to secure a CGPA of 6.5, he/she shall undertake one more course work relevant to the area of research offered under any approved PG programme of the University with the recommendation of the Doctoral Committee or rewrite the examination from any one of the course works (other than the Special Elective) undertaken, to improve the CGPA to 6.5 (Best four course works shall be considered, if additional course work is undertaken). A pass in the Comprehensive Examination is required for provisional confirmation of Ph.D. registration.

13.2 Comprehensive Examination

13.2.1 On the successful completion of the prescribed course works, as evidenced by the grade sheet issued by the Controller of Examinations, the Doctoral Committee shall conduct a Comprehensive (written and oral) Examination for every scholar to test the background knowledge of the scholar in the area of specialization. The Comprehensive Examination shall cover the topics in the specialization and allied areas. The result of this examination and the results of the course works shall be detailed in the minutes of the Doctoral Committee and forwarded to the Director (Research), for confirmation of the provisional registration and to proceed further with his/her research work, within two months from the date of the Comprehensive Examination held.

13.2.2 If the performance of the scholar is not approved by the Doctoral Committee based on the results of Comprehension Examination, a grace period of six months shall be given and then

at the end of which the scholar shall be re-examined. If found fit, the scholar is provisionally confirmed and is permitted to proceed with his/her research work. Otherwise the provisional registration granted to the scholar shall be cancelled.

14. RESEARCH OUTSIDE THE UNIVERSITY

- 14.1 During the course of the Programme, for reasons stated by the Supervisor and forwarded by the Head of the Department, a scholar shall be permitted by the Director (Research) to spend upto one year in an Institution or in a project approved for the purpose, outside the University for carrying out research related to his/her area.
- 14.2 The scholars shall be permitted to do research outside the University on related fellowship programmes for a period upto one year, with prior approval from the Director (Research).
- 14.3 Under valid reasons, a scholar shall be permitted to continue his/her research outside the University upto six months beyond one year, with prior approval from the Vice-Chancellor.
- 14.4 The scholars who carried out research outside the University shall submit the Synopsis only after a minimum period of one month on his/her return.
- 14.5 The registration of a scholar continuing his/her research outside the University beyond the approved period shall stand cancelled automatically.

15. MONITORING THE PROGRESS OF THE SCHOLAR

- 15.1 Commencing from the date of provisional registration till the submission of thesis, all research scholars shall submit the progress report and registration renewal form in the prescribed format duly signed by the Supervisor and Head of the Department of the Supervisor atleast three weeks before the end of every semester, without which the scholars shall not be permitted to pay the semester fee.

- 15.2 One Seminar presentation shall be given by the scholar before the confirmation of the provisional registration and another presentation prior to the submission of synopsis. Both Seminars shall be open to faculty members and research scholars.
- 15.3 After the confirmation of provisional registration, the progress made by the research scholars shall be reviewed by the Doctoral Committee once a year.
- 15.4 Full-time research scholars shall sign the attendance register in the Department of the Supervisor on all working days. They are eligible for a total of 15 days leave every semester and a maximum of 30 days in a calendar year, which they shall avail after obtaining permission from the Supervisor and Head of the Department. However, those scholars who are availing financial assistance from funding agency shall be governed by the rules of the respective agency.

16. CANCELLATION OF REGISTRATION

- 16.1 The registration of a scholar who has not submitted his/her thesis before the end of the maximum duration including the extension period for the programme as in Clause 11.1 shall stand cancelled automatically.
- 16.2 The registration is liable for cancellation administratively by the Director (Research), if
- i. The scholar has not paid the semester fees within the stipulated time.
 - ii. Two consecutive six month progress reports are not submitted or not satisfactory.
 - iii. If the scholar fails to complete the confirmation of provisional registration beyond three years after his/her registration for the Ph.D. programme
 - iv. The performance is not satisfactory to the Doctoral Committee and accordingly recommended for cancellation.
 - v. Prior permission is not obtained for break of study from the Director (Research).
 - vi. The scholar wishes to withdraw the programme and requests to cancel his/her registration.
 - vii. Extension of time (beyond six years) not obtained as in Clause 11.2.
 - viii. Submission of Thesis beyond six months from the date of approval of Synopsis by the Doctoral Committee.
 - ix. Submission of revised thesis incorporating the suggestions of any examiner beyond six months
 - x. The act of plagiarism involved in the journal publication/Thesis.
 - xi. Contact of Thesis examiners by the scholar regarding Thesis evaluation.
 - xii. Any violation of the rules and regulations of Ph.D. Programme.
- 16.3 In all the above cancellation cases, the fees paid by the scholar shall not be refunded.

17. SUBMISSION OF SYNOPSIS

- 17.1 The scholar shall be permitted to submit the Synopsis only after obtaining the confirmation of provisional registration and completion of the minimum duration of the programme applicable to the scholar. However, a scholar shall be permitted to submit the Synopsis (after obtaining confirmation) three months prior to the completion of his/her minimum duration, provided the scholar has published two research articles (and the journal concerned) in referred impact factor journals in the field of specialization as first author or second author, if the Supervisor is first author, based on his/her research work and specifically recommended by the Doctoral Committee. Publications of the scholars where a PG student is a corresponding author shall not be considered for processing of his/her Synopsis.
- 17.2 The Synopsis shall be accepted only when the scholar has published atleast one research article (in the journal concerned) after joining the programme in a referred impact factor journal in the field of specialization as first author or second author, if the Supervisor is first author or one patent granted based on his/her research work. Publications of the scholars where a PG student is a corresponding author shall not be considered for processing of his/her Synopsis. The scholar shall not publish research articles with similar contents in part or full in more than one journal, which would result in Self Plagiarism.
- 17.3 The scholar shall submit a copy of the Synopsis of his/her research work prepared in accordance with the format and specification prescribed, to the Doctoral Committee through the Supervisor and Joint Supervisor, if applicable.
- 17.4 If the Doctoral Committee approves the research work reported in the Synopsis and fulfils Clause 15.2, it shall forward one copy of the approved Synopsis to the Director (Research) along with a panel of atleast eight examiners who are experts in the field of research of the scholar, four from India (other than Tamil Nadu except, experts from National

Laboratories/IIT/NIT) and four from abroad, along with their publication details in the last five years. No two experts shall be from the same Institution.

18. SUBMISSION OF THESIS

- 18.1 The Thesis shall report, in an organized and scholarly fashion, an account of original research work of the scholar leading to the discovery of new facts or techniques or correlation of facts already known (analytical, experimental, hardware oriented, etc.) and demonstrating a quality contribution to the advancement of knowledge as well as the scholar's ability to undertake sustained research.
- 18.2 Thesis shall be prepared in accordance with the format and specification prescribed. One copy of thesis in PDF format (to be uploaded) and a hard copy shall be submitted only after the acceptance of Synopsis and within three months from the date of approval of the Synopsis by the Doctoral Committee along with one hard copy of the abstract of the Thesis each in English and Tamil (in about 400 words). Under extraordinary circumstances, submission of Thesis shall be permitted upto a maximum period of six months, with prior approval from the Director (Research). In such cases, the late fee shall be paid as applicable.
- 18.3 The Thesis shall include a Certificate from the scholar, Supervisor and Joint Supervisor, if applicable, as prescribed, to the effect that the Thesis is a record of original research work carried out by the scholar and the work reported in the thesis is not copied from other sources/ not submitted elsewhere for a degree or diploma.
- 18.4 The Thesis shall be scrutinized to assess the overall layout, contents and the quality of presentation of the Thesis. The deviation, if any, shall be rectified by the scholar in consultation with the Supervisor and the same shall be approved by the Director (Research) and three copies of the corrected thesis shall be submitted. Soft copy of the thesis, abstract of the Thesis in English and Tamil shall be uploaded in the University website.

18.5 Fees shall be paid by the scholars for every semester during the notified period till the submission of the Thesis. Any other fees as applicable shall be paid as notified from time to time.

19. THESIS EVALUATION

19.1 The Thesis shall be referred to two examiners (one from India and another from abroad) nominated by the Vice-Chancellor from the panel of examiners recommended by the Doctoral Committee. The Vice-Chancellor if deems it necessary may also nominate the examiners from outside the panel.

19.2 The Director (Research) shall take appropriate steps to receive the reports from the examiners as quickly as possible.

19.3 The examiners shall send his/her willingness to evaluate the Thesis within 15 days from the date of receipt of the Synopsis.

19.4 The examiners shall send his/her evaluation report in the prescribed format within two months from the date of receipt of the Thesis.

19.5 The examiner shall include in his/her report an overall assessment placing the Thesis in any one of the following categories.

19.5.1 Recommend the acceptance of the Thesis in the present form and further based on the standard attained, classify the work as HIGHLY COMMENDED/ COMMENDED.

19.5.2 Recommend the acceptance of the Thesis. However, the scholar shall incorporate the corrections indicated in the detailed report and place the corrected copy to the Oral Examination Board but the corrected Thesis need not be sent to the examiner.

19.5.3 Defer the recommendation at this stage and the scholar shall incorporate the suggested modifications in the Thesis and the corrected Thesis along with the scholar's clarifications shall be sent to the respective examiner.

19.5.4 Reject the Thesis for the reasons set out in the detailed report.

- 19.5.5 The examiner shall also enclose a detailed report in about 200 to 300 words, indicating the standard attained in the case of 19.5.1, the nature of revision in the case of 19.5.2 & 19.5.3 and specific reasons in the case of 19.5.4.
- 19.6 If both the examiners recommended for the award of the degree, Thesis shall be provisionally accepted. Any minor revision, modification, etc., suggested by the examiners shall be carried out before the Oral Examination Board.
- 19.6.1 If any examiner recommends resubmission of the thesis after revision as per Clause 19.5.3, the scholar shall be permitted to revise and resubmit the Thesis within six months, failing which the revised thesis shall not be accepted and his/her registration shall stand cancelled. The revised Thesis shall be referred to the same examiner for his/her final recommendation on the Thesis which shall be only either for recommendation for the award or for rejection.
- 19.6.2 If one examiner recommends the award of the degree while the other recommends rejection, then the Thesis shall be referred to the third examiner to be nominated by the Vice-Chancellor as in Clause 19.1. If two of the three examiners recommend the award, the Thesis shall be provisionally accepted. If two of the examiners recommend rejection, the Thesis shall be rejected and the registration of the scholar shall stand cancelled.
- 19.6.3 If both the examiners recommend rejection, the Thesis shall be rejected and the registration of the scholar shall stand cancelled.
- 19.7 In case, the examiner does not insist to send the Thesis back to him/her, the Thesis shall be referred to the Doctoral Committee to ascertain the corrections carried out in the Thesis as suggested by the examiners.
- 19.8 Individual cases not covered by the above Clauses shall be referred to the Vice-Chancellor. If deemed fit, the Vice-Chancellor shall refer to the Research Board which in turn shall refer to the Syndicate, for necessary action.

20. ORAL EXAMINATION

20.1 On receipt of the evaluation reports, the Doctoral Committee shall meet **within three months** and recommend a panel of three experts (Other than the Parent Institution) from different recognized institutions within India, along with their publication details in the last five years for constitution of an Oral Examination Board. No two experts shall be from the same Institution. The Vice-Chancellor nominates one member from the panel of experts recommended by the Doctoral Committee. The Vice-Chancellor, if deems it necessary shall nominate a member from outside the panel.

20.2 The Oral Examination Board shall be constituted by the Vice-Chancellor as follows:

a. Indian Examiner of the Thesis or an expert from the panel (in the absence of the former)	Member
b. An expert from a recognized institution from the panel	Member
c. Joint Supervisor of the scholar, if applicable	Member
d. Supervisor of the scholar	Convener

20.3 The Oral examination shall be conducted **within three months** as “Open Defence Type” Examination. The Oral examination should not be conducted on **Saturday, Sunday and public holidays**. The circular for the same shall be communicated to the Director (Research) /faculty members/research scholars/other departments/ other Institutions, atleast one week prior to the Viva – Voce Examination. A minimum of ten members excluding Oral Examination Board members shall be present for the Viva-Voce Examination.

20.4 Viva-Voce Examination shall be held at the place of work of the Supervisor. If the Supervisor migrates to other University or non-recognized Organization/Department of the University or College not affiliated to the University, then the Viva-Voce Examination shall be held in the Department of the Supervisor when the scholar had provisionally registered for the programme.

- 20.5 If the Oral Examination Board reports the performance of the scholar as “not satisfactory” then he/she may opt to reappear for the Oral Examination at a later date (not later than six months from the date of the first Oral Examination). On the second occasion, the Oral Examination Board shall include one more expert nominated by the Vice-Chancellor.
- 20.6 If the performance of the scholar in the Oral Examination in the second occasion also reported to be “not satisfactory”, the Vice-Chancellor, if deems it necessary, shall refer the remarks of the Oral Examination Board, along with the Thesis and comments of the Examiners, to a Committee constituted for this purpose and the decision of the Vice-Chancellor shall be final.
- 20.7 On satisfactory completion of the Viva-Voce Examination, the scholar shall submit the corrected Thesis in A5 size in accordance with the format and specification prescribed, duly certified by the Supervisor and Joint Supervisor, if applicable, that all the corrections have been incorporated in the Thesis as suggested by the examiners. Soft copy of the thesis should be uploaded in the University website.

21. AWARD OF Ph.D. DEGREE

If the report of the Oral Examination Board is SATISFACTORY, the scholar shall be awarded Ph.D. Degree under the Faculty of Civil Engineering/ Mechanical Engineering/ Electrical Engineering/ Information and Communication Engineering/ Technology/ Architecture and Planning/ Science and Humanities/ Management Sciences, with the approval of the Syndicate.

22. PUBLICATION OF THESIS

Papers arising out of the Thesis may be published by the scholar and the Supervisor. However the Thesis as a whole shall be published by the scholar and Supervisor after the award of the degree only with the approval of the University.

23. THE ACT OF PLAGIARISM

- 23.1 In the case of scholars who have committed the act of plagiarism in the Thesis/journal publication, his/her Thesis/degree shall be forfeited and his/her research registration shall be cancelled and also he/she shall be debarred to register for any other programme in the University.
- 23.2 For the abetment of above such action, the recognition of his/her Supervisorship shall be withdrawn for a period of five years and he/she shall be debarred from guiding the scholars for any research programme in the University till such period.
- 23.3 If any scholar has committed an act of self plagiarism in the publications and ascertained by the Committee constituted by the Vice-Chancellor, such work shall not be allowed in his/her thesis and the scholar shall be fined upto Rs.50000/- with a warning to the Supervisor. The Synopsis / Thesis of such scholar shall be accepted only based on a new publication in a referred journal (as applicable). If plagiarism is detected in the Publications / Thesis of any other scholar under the same supervisor, the recognition of his/her Supervisorship shall be withdrawn for a period of five years and he/she shall be debarred from guiding the scholars for any research programme in the University till such period.

24. POWER TO MODIFY

Notwithstanding all that has been stated above, the Syndicate has the right to modify any of the above regulation from time to time.

Note: The scholar shall be governed by the regulations as in force from time to time. The Supervisors and scholars are requested to visit the University website “<https://cfr.annauniv.edu>” for updates and announcements periodically.

RESEARCH CONDUCT RULES

- 1.1 Research Ethics:
 - 1.1.1 All individuals conducting research in connection with the University should incorporate appropriate consideration of ethical issues into the design and management of projects.
 - 1.1.2 Research involving interaction with environmental issues, human subjects or communities should be informed by context specific ethical practice. Scholars must respect the human rights and dignities of all those involved in any inquiry project and must appropriately address questions of consent, power relations, deception, confidentiality and privacy. In particular, scholars must address a range of complex issues around developing and maintaining respectful and ethical relationships with research partners based on mutual respect for academic traditions and institutional circumstances. Information and/or complaints regarding the above issues, shall be referred to the committee constituted by the Vice-Chancellor for necessary action.
- 1.2 At the time of admission, each scholar must give an undertaking that he/she abide by the regulations.
- 1.3 Misconduct in research:
 - 1.3.1 Falsification, fabrication, or dishonesty in creating or reporting laboratory results, research results, and/or any other assignments; Sexual harassment of other scholars; Contacting the examiner about thesis evaluation are the mode for misconduct.
 - 1.3.2 Submitting plagiarized work for an academic requirement. Plagiarism means representation of another's work or ideas as one's own; it includes the unacknowledged word-for-word use and/or paraphrasing of another person's work, and/or the inappropriate unacknowledged use of another person's ideas.

- 1.3.3 Submitting substantially the same work to satisfy requirements for one course or academic requirement that has been submitted in satisfaction of requirements for another course or academic requirement without permission of the instructor of the course for which the work is being submitted or supervising authority for the academic requirement.
- 1.3.4 All complaints related to research activities or any matters relating to differences among scholars or complaints about the supervisor or seeking of any information related to research shall be addressed to the Director (Research). Only in the absence of any response, alternate measures shall be sought.
- 1.4 Any scholar exhibiting misconduct, their registration will be cancelled. Such a scholar will not be eligible for readmission to any of the courses of this University. Further, if such scholar receives any fellowship from the University, it will be withdrawn and the fellowship has to be refunded from the date of the last award. Vice-Chancellor shall be the ultimate authority in imposing disciplinary actions against the scholars for acts of prohibited behaviour.
- 1.5 Right to Appeal
- 1.5.1 The scholar/scholars aggrieved by the action of any authority of the University can appeal to the Director (Research) and any scholar aggrieved by the action of the Director (Research) can appeal to the Registrar and then to Vice-Chancellor. The decision of the Vice-Chancellor shall be final and binding on the scholars.
- 1.5.2 The scholar shall seek legal remedy about any matter with prior notice and only after their representations to the higher authorities have been negative.
- 1.6 If Supervisors are found to indulge in any of following acts, based on the severity of the complaint, the supervisorship will be cancelled for a specific duration and disciplinary action will be taken.

- i. Exploiting the services of the scholar for completing the academic tasks assigned to an individual.
 - ii. Any act of financial extortion or forceful expenditure burden put on the scholar.
 - iii. Any act of sexual abuse or abuse by spoken words, phone calls, short message service (sms) through mobile, emails, posts, public insult leading to the discomfort to the scholar.
- 1.7 For Supervisors under suspension/ undergoing any disciplinary proceedings of the University, Supervisor-in-charge should be nominated by the Director (Research) based on the request of the Supervisor and / or the recommendation of the Head of the Department of the Supervisor. The Supervisor-in-charge shall function upto one year or till Supervisor resumes duty. However if the supervisor continues under suspension/ undergoing any disciplinary proceedings of the University for more than one year alternate supervisor shall be nominated by the Director (Research) based on the request of the Supervisor-in-Charge and the recommendation of the Head of the Department.

GUIDELINES FOR THE PREPARATION OF SYNOPSIS

Synopsis should outline the research problem, the methodology used for tackling it and the summary of the findings. **The size of Synopsis should not exceed 15 pages of typed matter reckoned from the first page to the last page including the List of Publications.**

The sequence in which the Synopsis should be arranged is as follows with References and List of Publications in separate pages:

1. Cover Page and Title page (as shown in the Annexure I)
2. Text divided into suitable Headings (numbered consecutively)
3. References (not more than 15)
4. List of Publications (those published/accepted for publication in Journals and papers presented in Conferences/Symposia). Mention Impact Factor of the Journal (if applicable).

Standard A4 size (297mm x 210mm) bond paper may be used for preparing the copies. The Synopsis should have the following page margins:

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

The Synopsis should be prepared on good quality white paper preferably not lower than 80GSM. One and a half line 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. One or two Tables/Figures may be included at appropriate places in the text and they should conform to the margin specifications. All page numbers (Arabic numbers) should be typed without punctuation on the upper right hand corner 20 mm from top with the last digit in line with the right hand margin. Synopsis 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.

REFERENCES

1. Journal Article : with Single Author

Waldron, S 2008, 'Generalized Welch bound equality sequences are tight frames', IEEE Transactions on Information Theory, vol. 49, no. 9, pp. 2307-2309.

2. Journal Article : with Two Authors

Conley, TG & Galeson, DW 1998, 'Nativity and wealth in mid-nineteenth century cities', Journal of Economic History, vol. 58, no. 2, pp. 468-493.

3. Journal Article : with more than two Authors

Alishahi, K, Marvasti, F, Aref, VA & Pad, P 2009, 'Bounds on the sum capacity of synchronous binary CDMA channels', Journal of Chemical Education, vol. 55, no. 8, pp. 3577-3593.

4. Books

Holt, DH 1997, Management Principles and Practices, Prentice-Hall, Sydney.

5. E-book

Aghion, P & Durlauf, S (eds.) 2005, Handbook of Economic Growth, Elsevier, Amsterdam. Available from: Elsevier books. [4 November 2004].

6. Conference Proceeding Paper with editors

Riley, D 1992, 'Industrial relations in Australian education', in Contemporary Australasian industrial relations: proceedings of the sixth AIRAANZ conference, ed. D. Blackmur, AIRAANZ, Sydney, pp. 124-140.

7. Conference Proceeding Paper without editors

Fan, W, Gordon, MD & Pathak, R 2000, 'Personalization of search engine services for effective retrieval and knowledge management', Proceedings of the twenty-first international conference on information systems, pp. 20-34.

8. Website

Australian Securities Exchange 2009, Market Information. Available from: <http://www.asx.com.au/professionals/market_information/index.htm>. [5 July 2009].

9. Patent

Cookson, AH 1985, Particle trap for compressed gas insulated transmission systems, US Patent 4554399.

10. Thesis: Unpublished

Hos, JP 2005, Mechanochemically synthesized nanomaterials for intermediate temperature solid oxide fuel cell membranes. Ph.D. thesis, University of Western Australia.

11. Newspaper: Print

Ionesco, J 2001, 'Federal election: new Chip in politics', The Advertiser 23 October, p. 10.

ANNEXURE I

A typical Specimen of Cover Page and Title Page

**VIBRATION AND THERMAL ANALYSIS OF
6/4 POLE SWITCHED RELUCTANCE MOTOR**

 <1.5 line spacing>

A SYNOPSIS

Submitted by

 <Italic>

SAROJA MUTHUSAMY N T

in partial fulfillment of the requirements for the degree of

 <Italic> <1.5 line spacing>

DOCTOR OF PHILOSOPHY



FACULTY OF ELECTRICAL ENGINEERING

ANNA UNIVERSITY

CHENNAI 600 025

<1.5 line spacing>

JANUARY 2015

VIBRATION AND THERMAL ANALYSIS OF 6/4 POLE SWITCHED RELUCTANCE MOTOR

A SYNOPSIS

Submitted by

SAROJA MUTHUSAMY N T

in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY



FACULTY OF ELECTRICAL ENGINEERING

ANNA UNIVERSITY

CHENNAI 600 025

JANUARY 2015

GUIDELINES FOR THE PREPARATION OF THESIS

The scholars are expected to read carefully the Guidelines 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. 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.

2. SIZE OF THESIS

The size of the Thesis shall be normally between 100 and 400 pages of typed matter reckoned from the first page of Chapter 1 to the last page of the thesis excluding reference section.

3. ARRANGEMENT OF THE CONTENTS OF THE THESIS

The sequence in which the Thesis material should be arranged and bound is as follows:

1. Cover Page and Title page (as shown in Annexure II)
2. Certificate (as shown in Annexure III)
3. Abstract
4. Acknowledgement
5. Table of Contents (as shown in Annexure IV)
6. List of Tables
7. List of Figures
8. List of Symbols and Abbreviations (as shown in Annexure V)
9. Chapters
10. Appendices

11. References

12. List of Publications

The Tables and Figures should be included subsequently after referring them in the text of the Thesis. **The thesis from Chapters should be printed on both sides.**

4. PAGE DIMENSIONS AND MARGIN

Standard A4 Size (297 mm x 210 mm) bond 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.

The final Thesis (at the time of submission) should have the following page margins:

Top edge	:	30 to 35 mm
Bottom edge	:	25 to 30 mm
Left side	:	35 to 40 mm
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 conform to the margin specifications. Large size Figures should be photographically or otherwise reduced to the appropriate size before insertion.

5. MANUSCRIPT PREPARATION

In the preparation of the manuscript, care should be taken to ensure that all textual matter is typewritten to the extent possible in the same format as may be required for the final Thesis. Hence some of the information required for the final typing of the Thesis is also included in this section.

The headings of all items from 2 to 12 listed in section 3 should be typed in capital letters without punctuation and centered 50 mm below the top of the page. 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.

5.1 Cover Page & Title Page - A specimen copy of the Cover page and Title page for the Thesis is given in Annexure II.

- 5.2 Certificate** - The 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 Supervisor's signature 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 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.
- 5.3 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 one and a half line spacing using Font Style Times New Roman and Font Size 13.
- 5.4 Acknowledgement** – It should be brief and should not exceed one page when typed in one and a half line spacing. The scholar's signature shall be made at the bottom right end above his/her name typed in capitals.
- 5.5 Table of Contents** - The Table of contents should list all captions following it as well as any caption which precedes it. The title page, Certificate and Acknowledgment will not find a place among the items listed in the Table of Contents but the page numbers of which are in lower case Roman letters. One and a half line spacing should be adopted for typing the matter under this head. A specimen copy of the Table Contents for the Thesis is given in Annexure IV.
- 5.6 List of Table** - The list should use exactly the same captions as they appear above the Tables in the text. One and a half line spacing should be adopted for typing the matter under this head.
- 5.7 List of Figures** - The list should use exactly the same captions as they appear below the Figures in the text. One and a half line spacing should be adopted for typing the matter under this head.

- 5.8 List of Symbols and Abbreviations** - One and a half line spacing should be adopted for typing the matter 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 V.**
- 5.9 Chapters** - The chapters may be broadly divided into 3 parts (i) Introductory chapter, (ii) Chapters developing the main theme of the Thesis and (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.
- 5.10 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.
- 5.11 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.

How to cite

- The structure of a citation is the author's surname and year of publication.
- Single author is cited as "Jones (2001)".
- Two authors are cited using "&" (Deane & Jones 1991) or Smith *et. al.* (1992)
- More than two authors are cited using "*et. al.*" (Smith *et al.* 1992) or Smith *et. al.* (1992).
- In case the information being discussed has been written in several different sources then cite them all in one set of brackets in chronological order of publication (Midgley 1994; Smith 1994; Philip 2002).
- If an author published several papers in 2005, the year of the first publication (in the alphabetic order of the references) is cited and referenced as 2005a, the second as 2005b and so on.
- A citation is placed wherever appropriate in or after the sentence. If it is at the end of a sentence, it is placed before the full stop.
- Complete citations and Source shall be provided in alphabetical order in reference section.
- All citations shall be in the same font as the main text.
- All figures and charts etc., taken from other sources shall be cited beneath within brackets, author name, source followed by, year in Times New Roman, Normal, font-size: 11 points, as "(Source: Jones, *et al.* 2001)". If it is sourced from Web pages the citation style shall be as "(Source: www.abc.com)" and the complete URL shall be given in the reference section.

Examples of Citation

- (i) An improved algorithm has been adopted in the literature (Waldron 2008).
- (ii) Conley & Galeson (1998) have dealt at length this principle.
- (iii) The problem of mechanical manipulators has been studied by Alishahi et al (2009)

The listing should be typed 4 spaces below the heading "REFERENCES" in single spacing. The reference material should be listed in the alphabetical 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. Journal Article : with Single Author

Waldron, S 2008, 'Generalized Welch bound equality sequences are tight frames', IEEE Transactions on Information Theory, vol. 49, no. 9, pp. 2307-2309.

2. Journal Article : with Two Authors

Conley, TG & Galeson, DW 1998, 'Nativity and wealth in mid-nineteenth century cities', Journal of Economic History, vol. 58, no. 2, pp. 468-493.

3. Journal Article : with more than two Authors

Alishahi, K, Marvasti, F, Aref, VA & Pad, P 2009, 'Bounds on the sum capacity of synchronous binary CDMA channels', Journal of Chemical Education, vol. 55, no. 8, pp. 3577-3593.

4. Books

Holt, DH 1997, Management Principles and Practices, Prentice-Hall, Sydney.

5. E-book

Aghion, P & Durlauf, S (eds.) 2005, Handbook of Economic Growth, Elsevier, Amsterdam. Available from: Elsevier books. [4 November 2004].

6. Conference Proceeding Paper with editors

Riley, D 1992, 'Industrial relations in Australian education', in Contemporary Australasian industrial relations: proceedings of the sixth AIRAANZ conference, ed. D. Blackmur, AIRAANZ, Sydney, pp. 124-140.

7. Conference Proceeding Paper without editors

Fan, W, Gordon, MD & Pathak, R 2000, 'Personalization of search engine services for effective retrieval and knowledge management', Proceedings of the twenty-first international conference on information systems, pp. 20-34.

8. Website

Australian Securities Exchange 2009, Market Information. Available from: <http://www.asx.com.au/professionals/market_information/index.htm>. [5 July 2009].

9. Patent

Cookson, AH 1985, Particle trap for compressed gas insulated transmission systems, US Patent 4554399.

10. Thesis: Unpublished

Hos, JP 2005, Mechanochemically synthesized nanomaterials for intermediate temperature solid oxide fuel cell membranes. Ph.D. thesis, University of Western Australia.

11. Newspaper: Print

Ionesco, J 2001, 'Federal election: new Chip in politics', The Advertiser 23 October, p. 10.

5.12 List of Publications - 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 reported in the Table of Contents. Mention Impact Factor of the Journal (if applicable).

5.13 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 page 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 standard A4 size paper.
- 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.

6. TYPING INSTRUCTIONS

6.1 General

This section includes additional information for final typing of the Thesis. The impressions on the typed/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 line 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.

6.2 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.

7. NUMBERING INSTRUCTIONS

7.1 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.

7.2 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.

7.3 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, with unfinished Table, continued into the next page, with title Table 2.1 (continued) placed centrally.

7.4 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:

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

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

8. BINDING SPECIFICATIONS

- Thesis (3 copies) side pinning/stitching, covered with wrapper printed on 300 gsm white art card and outer side gloss laminated, adhesive binding. 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 copy 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 copy of the Thesis in A5 size should contain the Certificate (as applicable) given in Annexure VI and a photo copy of the minutes of the Oral Examination Board. These two items should be placed in between the Title page and Certificate.

ANNEXURE II

A typical Specimen of Cover Page and Title Page

**VIBRATION AND THERMAL ANALYSIS OF
6/4 POLE SWITCHED RELUCTANCE MOTOR**

 <1.5 line spacing>

A THESIS

Submitted by

 <Italic>

SAROJA MUTHUSAMY N T

in partial fulfillment of the requirements for the degree of

 <Italic> <1.5 line spacing>

DOCTOR OF PHILOSOPHY



FACULTY OF ELECTRICAL ENGINEERING

ANNA UNIVERSITY

CHENNAI 600 025

<1.5 line spacing>

JANUARY 2015

**VIBRATION AND THERMAL ANALYSIS OF
6/4 POLE SWITCHED RELUCTANCE MOTOR**

A THESIS

Submitted by

SAROJA MUTHUSAMY N T

in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY



FACULTY OF ELECTRICAL ENGINEERING

ANNA UNIVERSITY

CHENNAI 600 025

JANUARY 2015

ANNEXURE III

A typical Specimen of Certificate

ANNA UNIVERSITY

CHENNAI 600 025

<1.5 line spacing>

CERTIFICATE

The research work embodied in the present Thesis entitled **“VIBRATION AND THERMAL ANALYSIS OF 6/4 POLE SWITCHED RELUCTANCE MOTOR”** has been carried out in the <<Name of the Department>>, <<Name of the College>>, <<Place>>. The work reported herein is original and 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 or to any other scholar.

I understand the University's policy on plagiarism and declare that the thesis and publications are my own work, except where specifically acknowledged and has not been copied from other sources or been previously submitted for award or assessment.

<<Signature of the Scholar>>

<<Name>>

Counter signed by

<<Signature of the Joint Supervisor>>

<<Name>>

JOINT SUPERVISOR (If applicable)

<<Designation & Address >>

<<Signature of the Supervisor>>

<<Name>>

SUPERVISOR

<<Designation & Address >>

ANNEXURE IV

A typical Specimen of Table of Contents

TABLE OF CONTENTS

CHAPTER NO.	TITLE	PAGE NO.
	ABSTRACT	iii
	LIST OF TABLES	xvi
	LIST OF FIGURES	xviii
	LIST OF SYMBOLS AND ABBREVIATIONS	xxvii
1	INTRODUCTION	1
	1.1 GENERAL	1
	1.2 OBJECTIVES OF THE RESEARCH	3
	1.3 LITERATURE REVIEW	4
	1.3.1 Aircraft Landing Operations	6
	1.3.2 Flight Control System	19
	1.3.3 Intelligent Control Design Techniques	29
2	DEVELOPMENT OF NON-LINEAR SIX DEGREES-OF-FREEDOM AIRCRAFT MODEL	45
	2.1 GENERAL	45
	2.2 BUILDING AN AIRCRAFT	54
	2.2.1 Configuration Script	54
	2.2.1.1 Aerodynamic section	58
	2.2.1.2 Propeller section design	60
	2.2.1.3 Engine section comparison	63
	2.2.1.4 Inertia section	66

ANNEXURE V

LIST OF SYMBOLS AND ABBREVIATIONS

ω	-	Absolute frequency
HOA	-	Acetic acid
Al	-	Aluminum
ASTM	-	American standard testing mesh
CaCO ₃	-	Calcium carbonate
CIA	-	Chemical index of alteration
ρ	-	Density of the fluid
θ	-	Direction of wave propagation
EF	-	Enrichment factor
ω_p	-	Frequency of the peak
Ω	-	Frequency of the waves
FP	-	First percentile
γ	-	Gamma
g	-	Gram
HCl	-	Hydrochloric acid
Fe ₂ O ₃	-	Iron oxide
MgO	-	Magnesium oxide
θ_m	-	Mean wave direction
mg	-	Milligram
HNO ₃	-	Nitric acid
OC	-	Organic carbon
ppm	-	Parts per million
K ₂ Cr ₂ O ₇	-	Potassium dichromate
ϕ	-	Potential function
SEM	-	Scanning electron microscope
Ag ₂ SO ₄	-	Silver sulphate
τ	-	Time lag between samples
ζ	-	Vertical displacement

ANNEXURE VI

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:

CONTACT DETAILS

The Director

Centre for Research

Anna University

Chennai 600 025.

Phone: 91-44-22357366/22350361

Fax : 91-44-22201213

Email : dirresearch@annauniv.edu / dirresearch@gmail.com

For clarifications/problems of research scholars contact:

helpdeskcfrcr@annauniv.edu