

SMU REGULATIONS FOR RESEARCH PROGRAMME  
LEADING TO AWARD OF Ph.D. DEGREE

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(Effective from batch of October 2019)

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# SIKKIM MANIPAL UNIVERSITY

## Regulations for Research Programme Leading to Award of Ph.D. Degree

### 1. INTRODUCTION

SIKKIM MANIPAL UNIVERSITY (SMU) offers Ph.D. programmes in engineering, basic sciences, management, humanities & social sciences, medical and allied health sciences.

SMU follows the standards and procedural guidelines for Ph.D. programme prescribed by University Grants Commission (UGC) prescribed time to time. SMU, further, believes in reinforcing these regulations to produce quality Ph.D.

### 2. DEFINITIONS AND NOMENCLATURES

- 2.1. "Department Research Committee (DRC)" consists of Head of the Department as the Chairperson, Department Research Coordinator, minimum of two senior faculty members of the Department, minimum of two faculty members of other Departments and all research Supervisor / Co- Supervisor(s) as special invitees.
- 2.2. "Institute Research Committee (IRC)" consists of Head of the Institution as the Chairperson, Head of the Institute Research Unit as coordinator, minimum of four / senior faculty members of the Institute, Chairperson of DRC, an external expert depending on the research proposal and research Supervisor / Co- Supervisor(s) as special invitees.
- 2.3. "University Research Committee (URC)" consists of Vice Chancellor as the Chairperson, Registrar as Coordinator, Head of the Institutes and Head of the Institute Research Units. Deputy Controller of Examination of respective institutes and research Supervisor / Co- Supervisor(s) as the special invitees and any other invitee subject to approval of the Chairperson, URC.
- 2.4. "Department Research Unit", under the supervision of faculty research coordinator, is responsible for all research related matters of the Department. Enrolment for Ph.D. scholars, regular progress assessment from registration till the scholar stands eligible for thesis submission are the part and parcel role of this unit.

- 2.5. "Institute Research Unit", under the supervision of Head of the Research Unit of the Institute along with the faculty associates, is responsible for all research related matters of the Institute and works in close coordination with Department Research Unit. This unit also assesses the research protocol / proposal of fresh Ph.D. candidates and subsequently assesses the pre submission of thesis.
- 2.6. "University Research Unit", under the Chairmanship of Vice Chancellor and supervision of Registrar along with faculty and staff associates, is responsible for overall monitoring and execution of all research related activities and policies.

### **3. ELIGIBILITY FOR ADMISSION**

A candidate seeking admission to the Ph.D. Programme of SMU should:

- 3.1. Have a Master's degree of this University (including M. Phil) or its equivalent of another recognized University or Institute with a minimum of 55% marks. The degree should be relevant to the department to which he/she applied for Ph.D. In case of candidates holding a qualifying degree from Foreign Universities, registration for the Ph.D. will be confirmed after determination of equivalence by the relevant University body.
- 3.2. A relaxation of 5% of marks, from 55% to 50%, or an equivalent relaxation of grade, may be allowed for those belonging to SC/ST/OBC (non-creamy layer)/Differently-abled and other categories of candidates as per the direction of the UGC from time to time, or for those who had obtained their Master's degree prior to 19th September, 1991. The eligibility marks of 55% (or an equivalent grade in a point scale wherever grading system is followed) and the relaxation of 5% to the categories mentioned above are permissible based only on the qualifying marks *without including the grace mark procedures*.
- 3.3. In exceptional cases, a candidate with undergraduate degree having high first class with relevant experience commensurate to his proposed research and experience equivalent to a post graduate degree in the relevant field may be considered for registration on the special recommendation of the University Research Committee (URC). Such candidates will be required to complete minimum of 24 credits as course work compared to 12 credits for those with postgraduate qualifications.

- 3.4. Candidates possessing a Degree considered equivalent to M.Phil. Degree of an Indian Institution, from a Foreign Educational Institution accredited by an Assessment and Accreditation Agency which is approved, recognized or authorized by an authority, established or incorporated under a law in its home country or any other statutory authority in that country for the purpose of assessing, accrediting or assuring quality and standards of educational institutions, shall be eligible for admission.
- 3.5. Foreign students will be required to produce clearance from the Government of India/relevant authorities, for being considered eligible and are holding research visa.

NOTE: The eligibility criteria prescribed in this section are the absolute minimum.

#### **4. ENTRANCE TEST**

- 4.1. University holds Ph.D. entrance test twice a year in the month of May / December. Examination schedule with available vacancies and areas of research are advertised in national / local print and digital media well in advance. Application and information shall also be available in the University website (*www.smu.edu.in*).
- 4.2. Appearing and clearing of entrance test is only one of the prerequisites for admission.
- 4.3. Candidates who qualify UGC-NET (including JRF)/UGC-CSIR NET (including JRF)/SLET/GATE/teacher fellowship holder are exempted from appearing in SMU Ph.D. Entrance Test. However, they shall appear for interview / presentation scheduled by the Department / Institute.
- 4.4. Pattern of Ph.D. entrance test question paper comprises of two papers, Research Methodology and subject / specialization specific. Each paper will be of 50 marks with 1½ hour duration. Question paper shall carry 10 marks of MCQ type (10 questions of 1 mark each) and 40 marks of subjective type questions (5 questions of 10 marks each out of which candidate needs to attempt 4 questions).
- 4.5. Candidates scoring F grade in Entrance Test will not be eligible for enrolment.
- 4.6. Validity of the examination score is for one year from the date of declaration of result.
- 4.7. Candidates shall report to the Department Research Unit immediately after the declaration of result for the enrolment process.

## 5. CATEGORIES OF Ph.D. CANDIDATES

There shall be three categories of Ph.D. candidates:

- (a) **Full Time candidates:** All candidates who pursue full time research in this University shall belong to this category.
- (b) **Part Time (Internal) candidates:** All candidates employed in SMU who pursue part time research in this University shall belong to this category.
- (c) **Part Time (External) candidates:** Candidate admitted under this category shall be working in research organization, government department, academic Institute or industry and shall be sponsored for pursuing Ph.D. programme in this University. This organization / academic institute / industry should facilitate research.

### 5.1 Full Time Candidate

- 5.1.1. Admission for full time candidate is open throughout the year and based on the recommendation of DRC/IRC such candidate may be granted provisional registration till he/she clears the SMU Ph.D. Entrance Test.
- 5.1.2. Candidate admitted under this scheme will work full time towards their Ph.D. research and will not take any other assignment till the submission of final thesis. The Department concerned shall maintain the regular attendance of such candidates.
- 5.1.3. Application for full time candidature is open throughout the year. Such candidates, except the candidates eligible for exemption, shall appear in Ph.D. entrance test whenever scheduled in that calendar year.
- 5.1.4. Depending on the availability, full time candidate will be provided with the University fellowship, charge free accommodation with nominal electricity and water charge for the period of three years from the date of registration or provisional registration *whichever is earlier*.
- 5.1.5. Full time candidate is eligible for 30 days of vacation and 15 days of casual leave in an academic year (August to July). Special casual leave of 15 days is permissible for attending conference / workshop / symposium / training programmes, etc. The women candidates may be provided Maternity Leave/Child Care Leave once in the entire duration of Ph.D. for up to 240 days.

5.1.6. Candidate admitted under full time category will be allowed for conversion of his / her candidature to part time only after completion of two years from the date of confirmed registration subject to the approval of Department / Institute Research Committee.

## **5.2 Part Time (Internal) Candidate**

5.2.1. The candidate should furnish a “No Objection Certificate” from the Head of the Department concerned for applying for Ph.D. programme.

5.2.2 Subsequently, candidate should furnish “Sponsorship and No Objection Certificate” from the proposed Supervisor / Co- Supervisor.

## **5.3 Part Time (External) Candidate**

5.3.1 Supervisor of part time candidate shall be the faculty member of one of the units of SMU. Co- Supervisor(s) may *preferably* be from the organization / academic institute / industry where he / she is working.

5.3.2 The candidate should furnish a “sponsorship and No Objection Certificate” from his / her parent organization / academic institute / industry.

5.3.3 The candidate shall meet the mandatory residential requirement of six months.

5.3.4 Candidate admitted under this part time category will be allowed for conversion of his / her candidature to full time within six months from the day of his / her provisional or confirmed registration, *whichever is earlier*.

## **6. ADMISSION PROCEDURE**

6.1. Based on the advertisement of number of available seats in the various specializations under different disciplines, candidates desirous of pursuing Ph.D. degree shall submit the application online / offline to the University / Institute Research Unit by the prescribed date. The application form and the necessary details shall be made available in the Sikkim Manipal University website ([www.smu.edu.in](http://www.smu.edu.in)).



- 6.2. List of eligible candidates will be displayed in the University website and candidate shall report to the Office of the Deputy Controller of Examination (Medical) / University Research Unit prior or on the day of examination for the hall ticket / admit card.
- 6.3. Candidates who clear the entrance test shall approach the Department Research Unit *with no delay* to discuss their research interest / area, identification of research Supervisor, formulation of research proposal in prescribed format etc.
- 6.4. Candidate shall present his/her research proposal (refer Appendix - B) before the Department and Institute Research Committee on a scheduled date. Refer Appendix –A for layout of write-up.
- 6.5. Successful candidates shall be provisionally registered by the Institute Research Committee.
- 6.6. Based on the recommendation of the Institute Research Committee, the University Research Committee confirms the registration of the candidate. However, the effective date of registration will be the date of his / her provisional registration.

NOTE: Registered scholars must meet the six months mandatory residential requirement at the campus where they are registered.

## **7. SUPERVISORS AND CO- SUPERVISORS**

### **7.1. Eligibility**

- 7.1.1 Supervisor or Co- Supervisor(s) intending to enroll shall apply to the Institute Research Unit with all requisites. List of eligible Supervisor or Co-Supervisor(s) along with all requisites shall be sent to University Research Unit for approval of Vice Chancellor.
- 7.1.2 For Engineering, Management, Social Sciences, Basic Sciences, Physiotherapy, Nursing, Hospital Administration:  
The Supervisor should be a full time faculty member on the payroll of SMU and have a Ph.D. from a recognized University/Institute and should possess two years post Ph.D. experience. A person or the faculty member with post Ph.D. experience of *less than two year* is eligible to register as Co- Supervisor only.

### 7.1.3 For Medical Sciences:

Five years teaching experience after Post Graduation/Ph.D. from a recognized University/College to become eligible for Supervisor and three years of teaching experience after Post Graduation/Ph.D. from a recognized University/College for Co- Supervisor.

7.1.4 Preferably the Co- Supervisor should possess Ph.D. However, Co- Supervisor may also be eligible with degree from a recognized University/Institute or postgraduate with adequate experience/academic work comparable to Ph.D.

7.1.5 Post Ph.D. publications of five for Professor and two for Associate Professor / Assistant Professor are *preferable* for being eligible for research supervision. Same number of publications are *preferable* from Professor, Associate Professor and Assistant Professor from medical sciences.

7.1.6 *In areas/disciplines where there is no or only a limited number of indexed journals, the university may relax the above condition for recognition of a faculty as Research Supervisor with reasons recorded in writing.*

7.1.7 The external Supervisors are not allowed. However, Co- Supervisor(s) can be allowed in inter-disciplinary areas from other departments of the same institute or from other related institutions / organisations with the approval of the Vice Chancellor.

## 7.2 **Allotment**

7.2.1 Allocation of Supervisor / Co- Supervisor(s) shall be decided by the Department Research Committee depending upon the number of scholar under the Supervisor / Co- Supervisor(s) and nature of the research topic.

7.2.2 When a Supervisor of a candidate happens to be away from the University, for more than six months, he/she may continue to guide the candidate, but a Supervisor belonging to the same faculty of the University shall be officially nominated as a Co- Supervisor by the Department Research Committee and forwarded through proper channel to the Vice Chancellor for approval.

7.2.3 If the Supervisor leaves the University, a new Supervisor belonging to the same faculty of the University, officially nominated by the Department Research Committee will be appointed as the Supervisor. However, the previous

Supervisor, if he / she wishes, may continue as Co- Supervisor with his / her changed affiliation.

7.2.4 The Supervisor and Co- Supervisor(s) shall not be closely related to the candidate.

7.2.5 Approved Supervisors / Co- Supervisor(s) shall normally not register more than two candidates in one calendar year. Also, the total number of Ph.D. candidates permissible to be registered with a Supervisor / Co- Supervisor at any point of time is as shown in table below.

Professor	Not more than 8 scholars at a time
Associate Professor	Not more than 6 scholars at a time
Assistant Professor	Not more than 4 scholars at a time

## **8. RELOCATION / TRANSFER OF RESEARCH WORK**

8.1. In case of relocation of an Ph.D. woman scholar due to marriage or otherwise, the research data shall be allowed to be transferred to the University to which the scholar intends to relocate provided all the other conditions in these regulations are followed in letter and spirit and the research work does not pertain to the project secured by the parent institution/ Supervisor from any funding agency. The scholar will however give due credit to the parent Supervisor and the institution for the part of research already done.

8.2. Transfer of research work from any other universities to Sikkim Manipal University is not permitted.

## **9. RESEARCH COMMITTEE AND ITS FUNCTIONS**

Following are the Research Committees constituted as approved by the Vice Chancellor

### **9.1. Department Research Committee (DRC)**

9.1.1. Every department offering Ph.D. programme shall have the Department Research Committee. The committee consists of

- (a) Head of the Department as Chairperson,
- (b) Department Research Coordinator as Member Secretary / Convener,
- (c) External Expert(s) depending upon the research proposals,

- (d) Minimum two external member from other Departments,
- (e) Minimum two senior faculty members of the Department, and
- (f) All Supervisors and Co- Supervisors as special invitees

9.1.2. The committee shall have the following responsibilities:

- (a) To review the research proposal and finalize the topic of research
- (b) To allocate Supervisor and Co- Supervisor(s)
- (c) To decide the course work for candidate
- (d) To periodically review and assist the progress of the research work of the research scholar
- (e) To recommend the final submission of thesis by the candidate on his / her request after completion of all requisites as laid in the regulations
- (f) All other research related activities of the Department

## **9.2 Institute Research Committee (IRC)**

Constituent units under Sikkim Manipal University offering Ph.D. programme shall have the Institute Research Committee. The committee comprises of

- (a) Head of the Institution as Chairperson,
- (b) Head of the Institute Research Unit as Member Secretary / Convener
- (c) Head of the Institute Academic Unit,
- (d) Chairperson of DRC
- (e) Representative from University (*during final Ph.D. viva-voce*)

Institute Research Committee deliberates on the recommendation of the Department Research Committee (DRC) on fresh research proposal, pre submission of the thesis and any other research related matters of the Institute.

## **9.3 University Research Committee (URC)**

This committee is the apex committee that governs all research related activities in all its constituent units. The committee comprises of

- (a) Vice Chancellor as the Chairperson

- (b) Registrar as the Member Secretary
- (c) Head of the Institutions
- (d) Head of the Institute Research Unit
- (e) Two nominees of Vice Chancellor
- (f) Deputy Controller(s) of Examination as special invitees
- (g) Supervisors and Co- Supervisors as special invitees
- (h) Any other invitee with approval of the Chairperson

University Research Committee deliberates and confirms the recommendations of Institute Research Committee. URC is also responsible for monitoring all research related activities of the University.

#### **10. (a) COURSE WORK**

All candidates admitted to the Ph.D. programme shall be required to complete the course work prescribed by the Research Committee during the initial six month or within a year.

- (a) The research scholars should successfully complete a minimum of 14 credits prescribed by the DRC / IRC and approved by the concerned Boards of Studies.
- (b) Recommended course work, as per 14 credits, must include
  - (a) A course on “Research Methodology” - 4 credits (16 weeks)
  - (b) A course on “Research and Publication Ethics” – 2 credits (8 weeks)
  - (c) Research related theory subject – 4 credits (16 weeks)
  - (d) Additional research related theory subject – 4 credits (8 weeks), OR,
    - Two research related seminars – 2 credits each, OR,
    - Two research related workshop (minimum of 7 days duration each) – 2 credits each, OR,
    - One seminar and one workshop of 2 credits each and to be evaluated by DRC.
- (c) For candidate with undergraduate degree, minimum of 24 credits of course work must be prescribed.
- (d) Complete list of course work as mentioned below must be furnished to the URC by the IRC.

Name of the candidate	Provisional Registration Number	Course Work	Subject Code	Month of Completion	Teacher

- (e) Candidates already holding M. Phil. degree and admitted to the Ph.D. programme, or those who have already completed the course work in M.Phil *may be* exempted by the Department from the Ph.D. course work provided his / her Ph.D. thesis title and M. Phil dissertations are related. However, DRC has the final authority on course work for M. Phil candidates.

#### 10. (b) COURSE WORK EXAMINATION

(a) Course work of 4 credits carry 100 marks each (50 for internal assessment and 50 marks for semester examination). “Research and Publication Ethics” of 2 credits carry 50 marks (25 marks for internal assessment and 50 marks for semester examination). Seminar and workshop carry 2 credits (of 50 marks) each.

(b) The question paper pattern for all course work examination shall be: -

(i) **For 100 Marks Paper.**

1. Subjective Question: Answer 8 out of 10 – Marks: (8x10=80).
2. MCQ: Answer all - Marks: (20x1=20)

(ii) **For 50 Marks Paper.**

1. Subjective Question: Answer 4 out of 5 – Marks: (4x10=40).
2. MCQ: Answer all - Marks: (10x1=10)

(c) The minimum pass marks of course work of 4 credits and 2 credits are 35 and 18 respectively.

(d) Duration of examination of course work of 4 credits will be 3 hours and 2 credits will be 1½ hours.

(e) After successful completion of course work, course completion certificate / consolidated marksheet shall be issued from the Office of the Deputy Controller of Examination.

- (f) Evaluation of seminar and workshop must be done by DRC and marks/grades to be forwarded to the Office of the Deputy Controller of Examination.

## **11. MONITORING THE PROGRESS OF CANDIDATES**

- 11.1 A research scholar must submit six month progress report *in a prescribed format* in Appendix – C duly signed by the Supervisor / Co- Supervisor to DRC at the time of annual registration.
- 11.2 DRC shall schedule and assess the progress presentation by the candidates. In case, the progress of the research scholar is unsatisfactory, the Supervisor shall record the reasons for the same and suggest corrective measures. If the research scholar fails to implement these corrective measures, the Supervisor may recommend to the DRC / IRC with specific reasons for cancellation of the registration of the research scholar.
- 11.3 Candidate must have presented at least six satisfactory semesterly /six monthly progress (without break) before he / she becomes eligible for pre submission of thesis.
- 11.4 Candidate missing two consecutive progress presentations or more than two semesterly / six monthly progress shall lead to the cancellation of registration and may apply for re-registration.
- 11.5 Candidate availing break from progress presentation due to reasons like maternity leave (for women) / genuine grounds as approved by Chairman / Chairperson, his / her minimum eligible period for pre submission of thesis will not be before three years (post his / her date of registration) years *plus the availed break period*.

## **12. ANNUAL REGISTRATION**

DRC must process the annual registration of the candidate every January with following documents in the prescribed format (refer Appendix - G):

- (a) Recent Ph.D. progress report in prescribed format with status of the course work (refer Appendix – C).
- (b) Recent fee payment receipt

Details of annual registration must reach the University Research Unit through the IR

### 13. DURATION OF Ph.D.

- 13.1 The duration of the Ph.D. programme for full time and part time candidate shall be minimum of three years (provided the candidate shows regular semesterly / six monthly progress) and maximum of five years from the date of provisional registration *whichever is earlier*.
- 13.2 After completion of minimum duration of Ph.D. and fulfilling all mandatory requirements, the Department Research Committee approves the pre submission of thesis *on the request by the candidate and the Supervisor*.
- 13.3 Under extraordinary circumstances, if the candidate fails to submit the thesis within the maximum period, further extension of the period for a maximum of one year (for full time candidates) and two years (for part time candidates) may be granted by the Vice Chancellor, on the recommendations of the Department Research Committee and the Institute Research Committee.
- 13.4 After the expiry of the maximum period including the extension granted, a candidate will be permitted to re-register as per the following regulations:

<b>Re-Registration</b>	<b>Regulating Research Work</b>
Under the same Supervisor and same area of research	Same DRC shall regulate the research work. Course work completed previously may hold valid.
Under different Supervisor and same area of research	New DRC shall regulate the research work. However, validity of course work completed previously to be assessed.
Under different / same Supervisor and different area of research	DRC to regulate the research work as fresh Ph.D. candidate

- 13.5 The women candidates and Persons with Disability (more than 40% disability) may be allowed a relaxation of two years for Ph.D. in the maximum duration. In addition, the women candidates may be provided Maternity Leave/Child Care Leave once for up to 240 days.



#### 14. CANCELLATION OF REGISTRATION

Ph.D. registration will be cancelled on following grounds if:

- (a) DRC finds the progress not satisfactory,
- (b) Candidates misses two consecutive progress / more than two progress assessments during the course of Ph.D.
- (c) Candidate who is unable to submit his / her thesis by the end of the prescribed / extended period as provided in the University regulation.

Post cancellation, candidate may apply for re-registration.

#### 15. ELIGIBILITY OF PRE SUBMISSION OF THESIS

The Department Research Committee shall accept the request of pre submission of thesis (refer Appendix – E) only after satisfactory and regular progress of Ph.D. work, fulfillment of required criteria (*as listed below*) and completing minimum period of Ph.D. programme:

- (a) Minimum of two research journal publications
  - One in SCI (for engineering and basic sciences) / SSCI (for management / humanities & social sciences) / Pubmed (for health sciences)
  - One in SCOPUS / Web of Sciences
- (b) Two conference presentations *in person with proceedings* in reputed International conferences/seminars, before pre submission of the Ph.D. work to the Department Research Committee.

#### 16. PRE SUBMISSION OF THESIS

16.1 The research scholar shall submit **six copies** of Ph.D. pre submission thesis (refer Appendix – E) to IRC and make a pre submission presentation of thesis to the Department Research Committee and the Institute Research Committee on a scheduled date.

16.2 The presentation may be open to all faculty members and research students, for getting feedback and comments, which may be suitably incorporated into the thesis under the advice of the Supervisor.

16.3 After the approval of the research work by the Institute Research Committee, the Supervisor shall forward following items to University Research Unit:

(a) **Three** hard copies of the spiral bind thesis in prescribed format (refer Appendix – E) with its electronic copy *in pdf* in the format

01_title.pdf	Title Page
02_certificate.pdf	Certificate
03_abstract.pdf	Abstract
04_declaration.pdf	Declaration
05_plagiarism.pdf	Plagiarism Verification Certificate
06_acknowledgement	Acknowledgement
07_content.pdf	Content/ Index Page
08_list_of_tables.pdf	List of Tables
09_list_of_figures.pdf	List of Figures
10_abbreviations.pdf	Abbreviations
11_notations.pdf	Notations
12_chapter1.pdf	First Chapter
13_chapter2.pdf	Second Chapter
14_chapter.....	Chapter.....
15_conclusion	Conclusion
16_summary	Summary
17_bibliography	Bibliography

(b) Ph.D. pre submission synopsis of around 21 pages also in a prescribed format (refer Appendix – D(b)) with its electronic copy *in pdf*, and

(c) A panel of at least six names (three from India, outside the State of the University campus and three from abroad) as examiners for adjudication of the Ph.D. thesis and a panel of three Indian examiners for the viva - voce examination.

(d) Forwarding note for pre submission Ph.D. Thesis (refer Appendix –D(a)).

16.4 Plagiarism check of the thesis shall be as per the plagiarism software TURNITIN / URKUND and declaration certificate shall be endorsed by the Supervisor (refer Annexure – VIII).

## 17. FINAL SUBMISSION OF THESIS & THESIS ADJUDICATION

- 17.1 A week ahead of the day of thesis viva - voce, the research scholar shall submit **six hard bind copies** of the thesis in prescribed format (refer Appendix- E) to the Head of the Institute Research Unit. Under no circumstances, the submission of thesis shall be delayed except under special circumstances, where an extension of three months may be granted by the Vice Chancellor on recommendation of the Institute Research Committee.
- 17.2 The colour to be used in Ph.D. thesis cover should be Maroon and Gold colour to be used for lettering on the same. A4 (210 mm × 297 mm) bond unruled paper (90 GSM) to be used and both sides of the paper to be used for all typed / printed matter.
- 17.3 Post viva - voce examination, IRC shall forward following documents to the University Research Unit;
- (a) One hard bind copy of the thesis
  - (b) e-thesis (*in pdf*) in the format as quoted in 17.3 (a).
  - (c) IRC report on Ph.D. viva - voce examination
  - (d) Scholar approval form (refer Appendix-F)
- 17.4 The Ph.D. thesis submitted by a research scholar shall be evaluated by at least two external examiners nominated by the Vice Chancellor who are not in employment of the University, of whom one examiner should be from outside the country and another examiner from outside the state (where the University campus is located). The Vice Chancellor, if he deems it necessary, may also nominate examiners from outside the panel.
- 17.5 In the case of undue delay in receiving the report from the examiner, the thesis shall be referred to the second examiner selected by the Vice Chancellor, after waiting for three months and ensuring that the first examiner is not going to respond within a reasonable period of time.
- 17.6 The examiner shall include in his report an overall assessment placing the thesis in one of the following categories:
- (a) Recommended for the award of the degree of Doctor of Philosophy:  
Commended / highly commended.

- (b) Recommended that the candidate revises the thesis as suggested in the report and the revised thesis be referred to the Supervisor for verification.
- (c) Recommended that the candidate revises the thesis as suggested in the report and the revised thesis be sent to the examiner for reevaluation.
- (d) Not recommended.
- (e) The examiner shall enclose a report, indicating the standard attained in case (a), the nature of revision in case (b) or (c) and the reasons for rejection in case (d).

17.7 On receipt of the reports from the examiners, the following procedure shall be adopted:

- (a) If all the examiners recommend the award of the degree, the thesis shall be provisionally accepted. Any minor revision, modification, etc., suggested by the examiners shall be carried out. Thesis with incorporation of minor revision / modification and a separate addendum on the revision / modification made shall be submitted to the Institute Research Unit before the viva - voce examination.
- (b) If any examiner recommends major modifications and revision of the thesis, the candidate shall be permitted to revise and resubmit the thesis and the addendum (as quoted in clause 18.7 (a) above), within 3 months with the approval of the Institute Research Committee. The revised thesis shall be referred to the same examiner for offering his/her final recommendation on the thesis. In such a case the examiner should offer his/her comments for the second time either as recommended for the award or rejection.
- (c) If one external examiner recommends the award of the degree while the other recommends rejection, then the thesis shall be referred to a third examiner to be nominated by the Vice Chancellor. If the third examiner recommends the award, the thesis shall be provisionally accepted. Otherwise, the thesis shall be rejected and the registration of the candidate cancelled.
- (d) If both the external examiners recommend rejection, the thesis shall be rejected and the registration of the candidate be cancelled.
- (e) When the commendation of the examiner on the revised thesis is not as stipulated or in the case of any dispute, the Vice Chancellor, if he deems it

necessary, shall refer the thesis and the comments to a committee constituted by the Vice Chancellor for this purpose.

## **18. DEFENSE OF THESIS / VIVA - VOCE EXAMINATION**

- 18.1. The open viva-voce of the research scholar to defend the thesis shall be conducted by a board of examiners to be constituted by the Vice Chancellor. Only if the evaluation reports of the external examiner on the thesis are satisfactory and include a specific recommendation for conducting the viva-voce examination.
- 18.2. The open *viva-voce* examination shall be conducted as “Open defense type” examination with the following board:
  - (a) External examiner of the thesis or if the examiner of the thesis is not available, a member from the panel of Indian examiners already recommended by the Supervisor
  - (b) Supervisor of the candidate as internal examiner
  - (c) The Head of the Institute Research Unit will be the Convener of Ph.D. viva - voce board
  - (d) Members of the IRC and DRC
- 18.3. If the performance of the candidate in the Ph.D. viva - voce as reported by the Ph.D. viva - voce board to be NOT SATISFACTORY, the candidate may opt to reappear for the Ph.D. viva - voce at a later date (not later than six months from the date of the first Oral Examination). On the second occasion, the Ph.D. viva - voce board shall include one more examiner nominated by the Vice Chancellor.
- 18.4. If the performance of the candidate in the Ph.D. viva - voce on the second occasion also is reported to be NOT SATISFACTORY, the Vice Chancellor, if he deems it necessary, shall refer the remarks of the Ph.D. viva - voce board, along with the thesis and comments of the examiners, to a committee constituted by the Vice Chancellor for this purpose and decide. The decision of the Vice Chancellor shall be final.
- 18.5. Entire process of evaluation of Ph.D. thesis shall be completed within a period of six months from the date of submission of the thesis.

## **19. AWARD OF Ph.D. DEGREE**

- 19.1. Candidate will be issued provisional Ph.D. degree certificate after the successful Ph.D. viva - voce examination.
- 19.2. His / Her confirmation on the award Ph.D. degree shall be based on the approval of the Academic Senate and with the ratification of the Governing Council of the University.

## **20. PUBLICATION OF THESIS**

- 20.1. After the viva - voce examination, the candidate shall submit an electronic copy (in pdf) of the thesis along with the required number of hard bind copies for UNIVERSITY ARCHIVES and scholar approval form (refer Appendix – F).
- 20.2. The University shall submit an electronic copy of the Ph.D. thesis to the INFLIBNET, for hosting the same so as to make it accessible to all Institutions/Colleges.
- 20.3. Papers arising out of the thesis may be published by the candidate. However, the thesis as a whole shall not be published by the candidate *without the specific approval of the University*.

## **21. PLAGIARISM**

- 21.1. Candidate and Supervisor / Co- Supervisor must be aware and abide by the policy on 'Promotion of Academic Integrity and Prevention of Plagiarism in Sikkim Manipal University (SMU)'
- 21.2. In the case of research scholars who have copied, as confirmed by a committee, a research work/ dissertation/thesis of Ph.D. degrees his/her thesis shall be rejected and his/her research registration shall be terminated and also he/she shall be debarred from registering for any other programme in this University. Supervisor / Co- Supervisor associated shall also be liable for action based on the recommendation of the committee.

## **22. CHANGE OF REGULATIONS**

With approval from University Research Committee (URC) and subsequent ratification in the Academic Senate, the University may revise, amend or change the regulations from time to time.

## 23. FEE STRUCTURE

23.1. Fee to be paid yearly by the scholar

Candidature	Annual Fee	One Time Registration Fee	Course Work
Full Time	Rs.30,000	Rs.10,000	Rs.1000 per subject inclusive of seminar
Part Time (Internal)	Rs.30,000	Rs.10,000	Rs. 1000 per subject inclusive of seminar
Part Time (External)	Rs.40,000	Rs.10,000	Rs.1000 per subject inclusive of seminar

23.2. Annual fees including library fees for the first year will be paid on the date of registration and subsequently, during the annual registration every year. *Fee shall be regularly paid annually till the submission of thesis at the Institute.*

23.3. Hall ticket / Admit card for course work examination will be issued after the payment of course work examination fee.

23.4. Candidate shall pay Rs.10,000/- as the Ph.D. defense fee at the time of Ph.D. viva - voce.

*NOTE: The quantum of fees will be decided by the University from time to time.*

## LAYOUT FOR WRITE-UP

### 1. Layout

The following presents a framework for a thesis. The information is offered as a general guideline. Candidate should always consult their advisor for additional guidelines. In particular, the layout of project reports can be different depending on the type and scope of the project. *Note that each chapter should start on a new page.*

- 1.1. *Introduction*: background; statement of the problem; definition of terms; purpose of the study; theoretical basis; contributions of the study; organization of the remainder of the study (chapter number, title and in short what it deals with).
- 1.2. *Literature Review*: chronological, categorical or related theoretical viewpoints related to topic.
- 1.3. *Proposed Solution/Methodology*: research design or approach (quantitative, qualitative or algorithmic); experimental detail or methodology, population and / or sample; collection and tabulation of data; and data analysis procedures.
- 1.4. *Solution Validation, Analysis of the Data, Results, and Discussion*: presentation and discussion of the findings, including limitations.
- 1.5. *Conclusions, Recommendations*: summarizes the entire research effort; addresses the initial purpose of the study (stated in the introduction); stresses the importance of the work accomplished; leaves a final impression on the reader. It can also include suggestions for further work.
- 1.6. *Bibliography/References*: references should acknowledge any work done by someone other than the author. The reference should also include work performed by the author if presented or published at an earlier date. References should adopt one of the standard international styles; the American Psychological Association style for references and citation is recommended.



**1.7. Appendices:** material too detailed or lengthy for inclusion in the body of the study (e.g. questionnaires, maps). Appendices may also contain information that might clarify the thesis but is routine in nature or indirectly related to the thesis. Raw data and examples of calculation could be incorporated.

## **2. Style and Form**

**2.1. Paper:** Use A4 (210 mm X 297 mm) bond unruled paper (90 GS) for all copies submitted. Use both side of the page for all printed/typed matter.

**2.2. Printing:** A high-quality laser printer should be used for the final copy.

**2.3. Headings:** In disciplines where section numbering is normally used, the following guidelines apply:

(a) **Chapter number:** Use only Arabic numerals should be centered on the top of the page using Times New Roman 14, bold and lower case with 'C' capital e.g., **Chapter 1**.

(b) **Chapter Heading:** Times New Roman 14, bold and all capital.

(c) **Section Heading:** Use only Arabic numerals, Times New Roman 12, bold and lower case with leading capitals, only first letter in each word to be capital.

(d) **Subsection Heading:** Use only Arabic numerals, Times New Roman 12, bold and lower case with leading capitals, only first letter in each word to be capital. The style of Section Heading and Subsection Heading some way may be different, one may be italic.

**2.4 Text Font:** Acceptable fonts generated by word processing programs restricted to: Times New Roman 12. Bold and italics should not be used excessively in the text. Furthermore, colored text should not be used.

**2.5 Special Text:** Italics/ Superscript/ Subscript/Special Symbols etc., as per necessity. Special text may include footnotes, endnotes, physical or chemical symbols, mathematical, notations, etc., whenever these are required.

**2.6 Justification:** The text should be fully justified. Hyphenation should be avoided as far as possible. Text corresponding to be bullets, and listings should be

indented. Quotation from other research work must be indented on the left and right, if they are longer than two lines. Shorter quotation can be included as a part of the regular text. Quotation may be in *Italic font*.

**2.7 References:** Single spacing for each entry and double spacing between entries or 1.5 spacing uniformly.

**2.8 Spacing:** Double spacing is required for the text. Only footnotes, long quotations, bibliography entries (double space between entries or 1.5 spacing throughout), table captions, and similar special material may be single spaced.

All paragraphs in the thesis should be left justified completely from the first line to the last line.

**2.9 Margins:** Left 1.25"; top 1.00", bottom 0.67", and right, 1.25". Please note that the bottom of page number should be 17.0 mm above the bottom edge of the numbered pages.

**2.10 Page Numbering:** Every page in the Thesis, except the Thesis title page, must be accounted for. The page numbering starting from acknowledgement and till the beginning of the introductory Chapter, should be printed in small Times New Roman number i.e. i, ii, iii,.....

The page number of all the first page of the each chapter should not be printed (but must be accounted for). All page numbers from the second page of each chapter should be printed using Arabic numerals i.e. 1, 2, 3, .....

All printed page numbers should be located at the bottom centre of the page, 17 mm (2/3") from the bottom edge, using normal print.

**2.11 Tables and Figures:** Figures and tables should be inserted at the appropriate place in the text. Figures must have numbers and captions under the figures. Tables have their titles and numbers above. All figures should be drawn in black ink with sharp lines and adequate contrast between different plots if more than one plot is present in the same graph. Figures and tables should follow immediately after they are referred to for the first time in the text. Splitting of paragraphs, for including tables/figures on a page should be avoided. The last

line of the title of the any table should be 10 mm to 15 mm above the top-most horizontal line of the table, whereas in figures the first line of the tittle for figures, graphs, drawing and photo should be between 10 mm to 15 mm below the bottom and they should be centered with respect to the table/ figure. The title must be in the same font as the regular text and should be single spaced. The title format is given below:

### Table Example:

Table<blank> <Chapter number> <serial number> <left indent> <table title>.

Example of a small table which is sought to be placed within the text:

The content of the table will be within the surrounding double line (which indicates the top-most, left-most, right-most, and bottom-most boundaries of the table.)
---------------------------------------------------------------------------------------------------------------------------------------------------------------------

### Figures Example:

Fig.<blank> <Chapter number> <serial number> <left indent> <figure title>.

Wherever a table/figure exceeds one page present the full title of the table/figure on the first page and in the following pages provided the table number and state “(contd.)” after it.

Wherever explanatory notes are used for clarification any information presented inside the table, print them after leaving **single space** immediately below the table. All the tables/figures in landscape format must be placed such that their top portions are near binding of the thesis and their bottom portions near the outer edge.

When there are many plots in a single graph or figure, the lettering, labelling or numbering of each plot for its for its identification should be of a size such that even after size reduction in the thesis, the identification should be clearly legible.

**Drawings:** Drawing which is larger than A4 size are not encouraged. Any material which cannot be typed or computer generated should be drawn with permanent black ink in neat and heavy lines. Photographs of drawings are acceptable. Xerox

reproductions of drawings are acceptable if they are of high contrast. Drawing should be numbered and referred to as a figure. Drawing titles should be similar to those provided for figures.

**2.12 Photographs:** Use colour photographs only if necessary. Remember that the thesis may have to be photocopied. In case colour photographs are used, all copies of the thesis must contain only colour photos. Photos should be printed on glossy paper, and should be mounted with glue. Do not use rubber cement or tape. High-clarity Xerox copies of photographs are also acceptable. However, high-quality scanned e-images can also be inserted into the thesis text. Each photo should be numbered and referred to as a figure. Photos titles should be similar to those provided for figures.

**2.13 Footnotes:** In disciplines where footnotes are normally used, they should appear at the bottom of the same page as their reference. Footnotes should be numbered in Arabic numerals. The footnote reference is superscripted and the explanation at the bottom of the page begins with the footnote reference number. Footnotes should have a smaller font size as the text.

**2.14 CDs and DVDs:** Identify with title, name of student, and date.

**2.15 Computer Software:** Describe in separate section in prefatory pages (e.g., list of figures and tables). If applicable, state requirements for the use of the software (e.g., hardware, screen resolution type) and any other information necessary for proper viewing of the software.

**2.16 Oversized Material:** Oversize foldout pages may be included, though ample margins for binding must be included. Leave oversize page unfolded. The bindery will fold and insert them. All pages must appropriately numbered if found in the text.

**FORMAT FOR RESEARCH PROPOSAL**

1. Title/Cover page as per (Annexure –I)
2. Particulars of Supervisor / Co- Supervisor (Annexure – II)
3. Certificate from Supervisor /Co- Supervisor as per (Annexure –III)
4. Contents (refer Annexure – X)
5. Introduction: To include brief description of the research area selected, its significance and motivation for research in the selected area.
6. Brief review of the Literature
7. Problem definition and Scope of Research : Limitations and Delimitations
8. Research Posers /Hypothesis
9. Methodology/Design (Methods & Procedures)
  - (i) Statement of the Research Problem
  - (ii) Approach (Experimental or Research survey)
  - (iii) Sampling technique, size and selection
  - (iv) Data collection & collation methods
  - (v) Analysis and Interpretation of data. (Specify the procedures & technique you will use)
  - (vi) Anticipated Results: (Based on the related and previously conducted research in the area, what do you predict that the result of your expectations, surveys etc. will yield in terms of data and its implications to academic, industry and other organisation.
9. Year wise plan of work
10. Reference (refer Annexure – XVI)
11. One page bio-data of the researcher

**TITLE OF THE PROPOSAL**

*Research Proposal*

*Submitted by*

**Name**

**Designation**

**Department**

**Organization**

*Under the Supervision of*

Name of the Supervisor

Designation, Department, Address



**SMU** SIKKIM  
MANIPAL  
UNIVERSITY

*Established under Govt. of Sikkim, Act 9 of 1995, recognized under 2(f) of the UGC Act, 1956*

MONTH & YEAR

**Particulars of Supervisor /Co- Supervisor for Ph.D. Registration Scheme**

1. Name of Proposed Supervisor /Co- Supervisor :
2. Academic Qualification :
3. Affiliated Institution :
4. Number of Journal (National) Publication :
5. Number of Journal (International) Publication :
6. Number of Conference (National) Proceeding :
7. Number of Conference (International) Proceeding :
8. Number of Patent (National / International) Accepted :
9. Number of External Research Project Funded :
10. Number of Consultancy Obtained :
11. Number of Ph.D. students presently under me (As Supervisor):
12. Number of Ph.D. students presently under me (As Co- Supervisor):
13. Number of Ph.D. supervised :

Signature & Name of the Supervisor with stamp

Date:

**Certificate of Supervisor / Co- Supervisor**

This is to state that Mr/Ms. \_\_\_\_\_ has been selected for Ph.D. programme in the Department of \_\_\_\_\_ under the full time/part time (internal / external) Ph.D. Programme of SMU;

- (a) I agree to be his/ her Supervisor /Co- Supervisor and shall extend all possible facilities to enable him/her to carry out his/her research programme towards the submission of thesis.
- (b) I and my research scholar are fully aware of all regulations laid in the SMU Ph.D. Regulations and will be abided in true spirit.
- (c) Any publications / patents made out of this Ph.D. work will be **with my full awareness.**
- (d) I/We will fully aware of the University policy on 'Promotion of Academic Integrity and Prevention of Plagiarism in Sikkim Manipal University (SMU)'.

Date:

Signature of Supervisor /Co- Supervisor



## SIKKIM MANIPAL UNIVERSITY, TADONG, GANGTOK, SIKKIM

## SEMESTERLY / SIX MONTHLY PROGRESS REPORT OF Ph.D. SCHOLARS

## PART A: TO BE FILLED BY THE STUDENT (ALL COLUMNS TO BE FILLED)

1. Registration No. \_\_\_\_\_
2. Name of the Scholar \_\_\_\_\_  
Contact no \_\_\_\_\_  
E-mail ID \_\_\_\_\_
3. Name of the Department \_\_\_\_\_
4. Status \_\_\_\_\_ Full Time/Part Time (Please  $\checkmark$  the relevant)
5. Date of Joining \_\_\_\_\_
6. Topic of Research \_\_\_\_\_
7. Name (s) of Supervisor(s) \_\_\_\_\_

Sl. No.	Name(s)	Designation	Department
1.			
2.			
3.			

8. Summary of the projected work of the last review:
9. Status of current work:
10. Status of experimental/Theoretical/Modeling work  
(Attach duly signed progress report on a separate sheet)
11. Publications:

Sl. No.	Title of the paper	Authors	Journal/ Proceedings	Vol. and page nos.	National/ International

12. Any other information:

Date:

Signature of the Scholar

**PART B: RECOMMENDATIONS OF SUPERVISOR(S) (Please tick the relevant column)**

1. My /our recommendations are given on the enclosed sheet.
2. Certified that the student continues to fulfill the requirements prescribed for Part – time/Sponsored Student(Applicable only in case of part-time and sponsored student)

3. Performance is Satisfactory.

OR

Performance is Unsatisfactory.

OR

Termination of Registration is recommended because of \_\_\_\_\_  
\_\_\_\_\_

4. Registration beyond 5 years is recommended on account of \_\_\_\_\_  
\_\_\_\_\_

Date:

Signature of Supervisor(s)

**Recommended by the Chairman, DRC:**

Date:

Signature of the Chairman, DRC

**IMPORTANT NOTE:**

1. *Part A of this form is to be filled in by the candidate before the review by the respective DRC.*
2. *On the basis of the review of the DRC, Supervisor(s) will give their confidential report about the progress, countersigned by the Chairman, DRC.*
3. *Chairman of the respective DRC will send the Part A & B of this form duly filled in to the Head, IRC confidentially.*
4. *Head, IRC shall forward the filled form (Part - A and B) to Chairman, URC with a copy to the scholar.*

**FORWARDING NOTE FOR PRE SUBMISSION OF Ph.D. THESIS**

Name of the Scholar	
Registration Number	
Registration Date	
Type of Registration (put $\sqrt{\quad}$ )	Part Time (Internal / External) Full Time
Title of Thesis	
Mandatory Residential Period	

<b>Details of Prescribed Course Work</b>			
Course Title	Subject Code	Completed on	Grade obtained
Signature of Dy Controller of Examination			

<b>Details of Six Monthly Progress Assessment</b>	
Date	Report on Assessment
Signature of Chairman / Chairperson, DRC	

<b>Details of Publications</b>				
Title of Publication	Published in	Indexed in	Date of Publication	Authors

**Remarks by Supervisor**

The pre submission details with all information have been seen and verified by me. All criteria as per the SMU Ph.D. Regulations have been duly abided and information furnished above on research publications are true to my knowledge.

Date: \_\_\_\_\_ Name and signature of the Supervisor

**Remarks by Head of the Institute Research Unit**

All research publications mentioned above have been verified by the Institute Research Unit and are found as per the University norms.

Date: \_\_\_\_\_ Name and signature of the Head of the Institute Research Unit

**Remarks by DRC**

The pre submission presentation has been successfully made by the candidate. All information furnished above are found correct.

Date: \_\_\_\_\_ Name and signature of Chairman / Chairperson, DRC

**Remarks by IRC**

The pre submission presentation has been successfully made by the candidate. IRC recommends and forwards the thesis to the URC.

Date: \_\_\_\_\_ Name and signature of Chairman / Chairperson, IRC

**FORMAT FOR Ph.D. PRE SUBMISSION SYNOPSIS (Approx. 20 pages)**

1. Title/Cover page as per University format. (Annexure –IV)
2. Declaration and Certificate as per University format. (Annexure – V, VII & VIII)
3. Introduction ( Background, Description/Definition, Research propositions, Motivation for research, Organisation of thesis to highlight chapters of the thesis)
4. Literature survey (**Short**)(Including summary of each of past works, **the research gap/limitation of past works** and proposed improvements)
5. Objectives (Limitations & Delimitations, research posers, propositions and research hypotheses)
6. Methodology/Experimental setup (flow chart may be given)
7. Significant Contributions
8. References (**Short**) (refer Annexure – XVI)
9. Appendices/Annexures (**if required**) (refer Annexure – XVII)
10. List of Publications from Research

## FORMAT OF PRE SUBMISSION THESIS & FINAL THESIS

### Thesis Arrangement

Assemble the thesis/project report in this order:

1.	Title/Cover page as per University format. (Annexure –IV)	
	Inside Cover Page	Front side: Same as cover page
		Reverse Side: Copyright on left side of reverse
		inside cover page
		© Sikkim Manipal University, Sikkim- 20.....
	All rights reserved.	
2.	Certificate	Should be exactly as shown in (Annexure-V)
3.	Abstract	A concise summary of the essential information of the work being presented, namely scope of study, purpose and results. The reference- free single spaced abstract should not exceed two pages (Annexure – VI)
4.	Declaration	Annexure - VII
5.	Plagiarism Verification Certificate	Annexure VIII
6.	Acknowledgement	Annexure IX
7.	Content / Index page	Includes all the subsections of each chapter and the list of appendices and annexures (if applicable) and page numbers Annexure (X)
8.	List of Tables / Figures / Abbreviations/ Notations	Refer Annexure XI-XIV
11.	Chapters	Thesis text; Introduction, Literature survey, methodology ....., conclusion. Layout is described in Annexure - XV
12.	Conclusion	
13.	Summary	
14.	Bibliography	Refer Annexure - XVI

**TITLE**

A Thesis submitted to the Sikkim Manipal University

For the Award of

Doctor of Philosophy

In

[Department Name]

BY

[Your Name]

SUPERVISOR

[Name of the Supervisor]

CO- SUPERVISOR

[Name of the Co- Supervisor]

Department of Studies in [Department Name]



**SMU** SIKKIM  
MANIPAL  
UNIVERSITY

*Established under Govt. of Sikkim, Act 9 of 1995, recognized under 2(f) of the UGC Act, 1956*

MONTH & YEAR

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All rights reserved.



**CERTIFICATE**

*[In official letter head]*

I / We certify that [Name of the Scholar] has prepared his/her thesis entitled [Title of the Thesis], for the award of Ph.D. degree of the [Name of the University], under my/our guidance. He / She has carried out the work at the Department of [Name of the Department], [University Name].

The results contained in this thesis have not been submitted, in part or full, to any other university or Institute for the award of any degree or diploma.

I/We, Dr ----- certify and attest that the work done by my/our Ph.D. student Mr/Ms-----is original and vouch that there is no plagiarism. The work has not been submitted for the award of any other degree/diploma of the same University / Institution where the work was carried out, or to any other University / Institution.

[Name & Sign of the Supervisor]

[Name & Sign of the Co- Supervisor]

[Department Name], [University Name]

[Department Name], [University Name]

[University Address]

[University Address]

Place:

Date:

**ABSTRACT**

**Keywords:** River Morphology, RS and GIS, Depth Elevation Model (DEM), Strahler's stream order, Artificial Neural Network (ANN), Bayesian, Shape-from-Shading (SFS), Rainfall runoff.

The Information Extraction System (IES) plays a vital role in extracting and processing the morphometric parameters from Reference maps and Satellite data in studying the morphological changes of the rivers using Remote Sensing and Geographical Information System (RS and GIS) techniques. It includes the selection, retrieval and storage of information in a GIS database from Reference maps and Satellite imageries for further processing and analysis for arriving at useful conclusions. The parameters taken into consideration in the present study are stream orders, drainage patterns, contour lines, Depth Elevation Models (DEM) and rainfall runoff.....

**DECLARATION BY THE SCHOLAR**

I declare that the thesis entitled [Title of the Thesis] has been prepared by me under the guidance of [Name of the Supervisor and Co- Supervisor], Professor of [Department Name], [University Name]. No part of this thesis has formed the basis for the award of any degree or fellowship previously.

I have not committed plagiarism in any of the forms described in the 'Promotion of Academic Integrity and Prevention of Plagiarism in Sikkim Manipal University (SMU)'. I have documented all methods, data and processes truthfully and I have not manipulated any data.

I have mentioned all persons who were significant facilitators of the work.

The work has been screened electronically for plagiarism.

Signature

Name of the Scholar

Registration Number

University Address

Place:

Date:

**(The certificate must be on the respective Institute's Letter Head)**

**Annexure - VIII**

**PLAGIARISM VERIFICATION CERTIFICATE**

- 1. Title of the Thesis:**
- 2. Total Pages:**
- 3. Name of the Scholar:**
- 4. Department:**
- 5. Name of the Supervisor:**
- 6. Exclusion for Plagiarism check (e.g: Index, Bibliography, Literature Survey, etc.,)**
  - a.**
  - b.**
  - c.**
- 7. Software used:**
- 8. Similarity index:**

**Date:**

**Checked by:**

**Signature of Scholar**

**Signature of Supervisor**

**(Sample)**

**ACKNOWLEDGMENT (OPTIONAL)**

I would like to express my sincere gratitude and appreciation to my Supervisor ....., for guiding me throughout all my research technically and methodologically.

I would like to express my sincere gratitude and thanks to my Co- Supervisor ..... for guiding me with his patience and sound intelligence. I would like to express my sincere gratitude ....., for constant encouragement and motivation.

I would also like to thank Sikkim Manipal University and the members of all Resaerch Committees, Sikkim Manipal Institute of Technology / Sikkim Manipal Institute of Medical Science, for allowing me to carry out research work.

**Name with Signature**

[Reg. No. 20081008]

Department of .....

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**LIST OF ABBREVIATIONS**

<b>ALSM</b>	Airborne Laser Swath Mapping
<b>AMC</b>	Antecedent Moisture Condition
<b>ANN</b>	Artificial Neural Networks
<b>AOI</b>	Area of Interest
<b>BP</b>	Back Propagation
<b>CMA</b>	Cumulative Moving Average
<b>CN</b>	Curve Number
<b>DEM</b>	Digital Elevation Model / Depth Elevation Model
<b>DFS</b>	Depth First Search
<b>DTD</b>	Digital Terrain Data
<b>DTM</b>	Digital Terrain Model
<b>EC</b>	Evolutionary Computation
<b>EMR</b>	Electro Magnetic Radiation
<b>GA</b>	Genetic Algorithm
<b>GCP</b>	Ground Control Points
<b>GGVF</b>	Generalized Gradient Vector Flow
<b>GIS</b>	Geographic Information System
<b>GVF</b>	Gradient Vector Flow
<b>HBV</b>	Hydrologiska Byråns Vattenbalansavdelning
<b>HMT</b>	Hit-or-Miss Transformation
<b>HSV</b>	Hue-Saturation-Value

**Notation**

$\eta$	Angle in degree
$\varphi$	Average gradient direction
$O(.)$	Big-Oh Notation
$\backslash$	Difference operator
$\delta$	Dilation operator
$\varepsilon$	Erosion operator
$\mu$	Lagrangian Multiplier
$\sigma_s$	Light source slant
$\tau_s$	Light source tilt
$\theta$	Surface tilt
$\Theta$	Thickening operator
$\ominus$	Thinning operator

**Chapter 1**

**1. CHAPTER HEADING**

**1.1. Section Heading**

**1.1.1. Subsection Heading**

**Chapter 2**

**2. CHAPTER HEADING**

**2.1. Section Heading**

**2.1.1. Subsection Heading:**

:

:

:

**Chapter 9**

**Summary and Conclusion**

9.1 Summary

9.2 Limitations and Scope for further studies

**Bibliography or References:**

The following format may be used for the Bibliography / References:

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Author, A. A., & Author, B. B. (Year of publication). Title of article. *Title of Journal, volume number, page range.*

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**APPENDIX -I**

List of papers communicated/accepted/published/presented

**APPENDIX -II**

Copies of acknowledgment/acceptance letter in case the papers are communicated/accepted

**APPENDIX -IV**

Any other data, material used during the research to be put as an appendix

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