CENTRAL AGRICULTURAL UNIVERSITY, IMPHAL, MANIPUR

SELF STUDY REPORT FOR THE

M. Tech. in

SOIL AND WATER CONSERVATION ENGINEERING,

COLLEGE OF AGRICULTURAL ENGINEERING AND POST HARVEST TECHNOLOGY, RANIPOOL, GANGTOK

2015-16 to 2019-20

SUBMITTED TO

Indian Council of Agricultural Research,
Krishi Bhavan, New Delhi.

SUBMITTED BY

Central Agricultural University,
Imphal, Manipur- 795004

PREFACE

Soil and water are two important natural resources and the basic needs for agricultural production. During the last century it has been observed that the pressure of increasing population has led to degradation of these natural resources. In other words, increase in agricultural production to feed the increasing population is only possible if their sufficient fertile land and water are available for farming. In India, out of 328 million hectares of geographical area, 68 million hectares are critically degraded while 107 million hectares are severely eroded. That's why soil and water should be given first priority from the conservation point of view and appropriate methods should be used to ensure their sustainability and future availability.

Water conservation is the use and management of water for the good of all users. Water is abundant throughout the earth, yet only three percent of all water is fresh water, and less than seven-tenths of freshwater is usable. Much of the usable water is utilized for irrigation. Detailed analysis will show that in about fifteen years, about two-thirds of the worldôs population will be living in some sort of water shortage. Water is used in nearly every aspect of life. There are multiple domestic, industrial and agricultural uses. Water conservation is rapidly becoming a hot topic, yet many people do not realize the importance of soil conservation.

To produce world class soil and water engineer professionals who are equipped to meet the demands of global outfit, have analytical abilities and entrepreneurship for making career of self-employment and as contributors to livelihood and food/nutritional security, College of Agricultural Engineering and Post Harvest Technology (CAEPHT) was established by CAU in the year 2006 to address the issue of shortage of trained manpower (human resource) in the disciplines of agricultural engineering and post-harvest technology besides other issues, pertaining to natural resource management, farm mechanization, post-harvest technology, processing & value addition, utilization of renewable sources of energy, creation of agro-industries etc. in the region. The Govt. of Sikkim, through the Department of Food Security and Agricultural Development (FSADD) transferred the land of its Marchak Farm, Ranipool, East Sikkim to CAU, Imphal. Dr. N.L. Maurya, the then Director of Instruction, CAU, Imphal was appointed by university as Officer on Special Duty for establishment of CAEPHT and after his assuming this new assignment on May 20, 2006, the college started functioning with the admission of first batch of students in B. Tech. Agricultural Engineering programme. Prof. P.P. Dabral, is presently the Dean of the college since 2017 till date. CAEPHT is one of the

constituent colleges which is functioning under the Central Agricultural University, Imphal, Manipur. The college offers undergraduate, postgraduate and Ph.D. courses and has the admission capacity of 43 students from seven north eastern states and 10 ICAR seats for undergraduate students, 21 students for Masters programme in five departments and 4 students for Ph.D. degree programme in three department of the college annually. Students of this college have excelled not only in curriculum but also in extracurricular activities and national level competitive examinations and the college is making continuous efforts to improve the quality of education offered here. The ICAR has introduced the procedure of accreditation, which help in assessing facilities available to impart the quality education offered by the college. The college was accredited by ICAR Peer Review committee for a period of **five years**. After accreditation, the financial support of ICAR and Central Government has greatly facilitated the growth and developmental activities of the college to a greater extent, as a result the quality of education has improved. Since the college is due for further accreditation, the present report provides all the necessary information about the college activities performed during **last six years**.

The departmental (College) level and University Level Task Force and Steering Committee has been gratefully acknowledged for their help, guidance and suggestions given in preparing the report. The departmental college level Steering Committee and Task Force have done a great job in compiling information and bringing out this report to be submitted to Accreditation Board of ICAR. My heartfelt thanks to all those who are involved in preparation of this report.

CAEPHT, Ranipool — Dean

January, 2021 — (P.P. Dabral)

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6.4 Self-Study Report for M. Tech. (Agri Engg) with Specialization in Soil and Water Conservation Engineering at CAEPHT, RANIPOOL, SIKKIM.

6.4.1 Brief History of the Degree Programme

College of Agricultural Engineering & Post Harvest Technology, Ranipool was established during the year 2006 under the administration of Central Agricultural University, Imphal) to address the issue of shortage of trained manpower (human resource) in the disciplines of agricultural engineering and post-harvest technology besides other issues, pertaining to natural resource management, farm mechanization, post-harvest technology, processing & value addition, utilization of renewable sources of energy, creation of agro-industries etc. in the region.

The Department of Soil and Water Engineering (SWE) started offering M Tech (Agri Engg) with specialization in Soil and Water Engineering during the academic year 2015-16, later the degree name changed to M. Tech with specialization in Soil and Water Conservation Engineering (SWCE) with the bifurcation of Irrigation and Drainage (IDE) Engineering department from the previous SWE department in the academic year 2016-17. The activity of the department includes the areas of soil and water conservation, irrigation water management, hydrology, watershed management, ground water hydrology, irrigation systems and pumps and GIS and remote sensing.

SWCE department gives exposures about different techniques for rain water harvesting, soil conservation, water conservation, degraded land reclamation, water quality analysis and modelling, remote sensing and GIS, waste water management, watershed management, etc.

The Department of Soil and Water Conservation Engineering is mainly engaged in teaching to under graduate and post graduate and Ph.D. students. It offers various courses of PG like Watershed Hydrology, and GIS and Remote Sensing for Land & Water Resource Management, open channel hydraulics, Water quality and pollution control, Soil and Water Conservation Structures, etc. to the PG students.

The faculty of the department is actively engaged in academic, research as well as extension activities based on local and future needs of the farmers, field engineers and entrepreneurs. The department has completed various Extra Mural Research Project and Intra Mural Research Project. Presently the faculty of the department is handling 2 Extra Mural Research Project of which one is ongoing and another is awaiting sanction. In addition, the department is also handling the AICRP on PET in the department. To date, 6 students have completed post- graduation from the department and 11 students are presently undergoing their M Tech (Agri Engg) with specialization in Soil and Water Conservation Engineering in the

department.

SWCE department is having Soil Water Conservation & Soil Mechanics Lab, Remote Sensing & GIS Lab, Surveying and Levelling Laboratory, Strength of Materials Lab, Applied Mechanics Lab and AICRP on PET Lab to provide practical knowledge to the students and also to demonstrate and organize training to farmers and field engineers, entrepreneurs etc. Many farmers, women and local peoples, NGO and others often visit the department to gain knowledge of different soil and water engineering aspects.

Statistics of Master's degree programme (2015-16 to 2019-20)

Year of Admission	Admitted			Dropped			Passed			Degree award during the year	Remarks
	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total		
2015-16	3		3	-	-	-	3	-	3	2017-18	
2016-17	-	1	1	-	-	-		1	1	2018-2019	
2017-18	2	-	2	-	-	-	2	-	2	2019-2020	
2018-19	3	2	5	-	-	-				2020-2021	Yet to complete
2019-2020	1	1	2	-	-	-				2021-2022	Yet to complete
2020-2021	3	2	5	-	1	1				2022-23	Yet to complete
Total	12	6	18		1	1	5	1	6		

Award of CAU, GOI & ICAR authorities' Scholarships

M.Tech.(SWCE)	Scholarship Type			
	University Scholarship (CAU)	ICAR scholarship(NTS)	SC/ST Fellow Ship	GOI Scholarship (SC+ST)
2015-16	3			
2016-17		1		
2017-18		2		
2018-19	3	2		
2019-20	2			
2020-21	1	3		
TOTAL	9	8		

6.4.2. FACULTY STRENGTH

Faculty Strength (Cadre-wise)

Designation / Cadre	2015			2016			2017			2018			2019			2020			2021		
	S	F	V	S	F	V	S	F	V	S	F	V	S	F	V	S	F	V	S	F	V
Professor	1	0	1	1	0	1	1	0	1	1	0	1	1	1	0	1	1	0	1	1	0
Associate	4	4	0	4	4	0	2	2	0	2	2	0	2	1	1	2	1	1	2	1	1

Professor																					
Assistant Professor	5	4	1	5	4	1	3	2	1	3	2	1	3	2	1	3	2	1	3	2	1
Total	10	8	2	10	8	2	6	4	2	6	4	2	6	4	2	6	4	2	6	4	2
Contractual	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						

S-Sanctioned, F-Filled, V-Vacant

* SWE department was bifurcated into Soil and Water Conservation Engg. (SWCE) and Irrigation & Drainage Engg. (IDE) department from 2017 onwards.

Faculty Strength

Department	Sanctioned Faculty			Faculty in place			Vacant position			Recommended by ICAR			Deviation from ICAR recommendation		
	Prof.	Assoc. Prof.	Asst. Prof.	Prof.	Assoc. Prof.	Asst. Prof.	Prof.	Assoc. Prof.	Asst. Prof.	Prof.	Assoc. Prof.	Asst. Prof.	Prof.	Assoc. Prof.	Asst. Prof.
SWCE	1	2	3	1	1	2	0	1	1	**1**	**2**	**3**	**0**	**0**	**0**
Total	1	2	3	1	1	2	0	1	1	1	2	3	0	0	0

6.4.3. TECHNICAL AND SUPPORTING STAFF

Sl. No.	POST	2020-21				
		Sanctioned	Filled	Vacant	Recommended by CAU	Diversion from recommendation (Sanctioned)
1.	Lab. Assistant		0			
2.	Messenger(MTS)		3			
3.	Lab Labour					
	Total		3			

6.4.4. CLASSROOMS AND LABORATORIES:

Classrooms

Sl. No.	Class room No.	Area (sq. m)	Seating capacity	Other facilities (LCD, Projectors, Computers, Smart board etc.)
1.	PG classroom 1	16.00	8	Whiteboard
2.	PG classroom 2	10.00	8	Whiteboard, LCD, Projector, Computers

Laboratory

The Soil and Water Conservation Engineering department has 7 laboratories to carry out

UG/ PG practical as well as PG research. All the laboratories are well equipped with all facilities to carry out research.

Sl. No.	Name of the laboratory	Area (sq.m)	Seating capacity
1.	Remote Sensing & GIS Lab	39.00	25
2.	Strength of Materials Lab.	81.00	30
3.	Soil Water Conservation & Soil Mechanics Lab (2 lab)	135.00	25
4.	Applied Mechanics Lab.	105.00	25
5.	Engineering Drawing Lab	58.50	28
6.	AICRP on PET Lab	40.32	15
7.	Surveying and Levelling Laboratory	16.00	8

Major equipments

SI. No	Particulars	No.
1.	Hookôs Law	4
2.	Young Modulus Apparatus	4
3.	Worm & Worm Wheel	4
4.	Link Polygon Apparatus	4
5.	Joint of Roof Truss on Wheels	4
6.	Law of Moment Apparatus	4
7.	Law of Conservation of Mass Apparatus	4
8.	Drainage & Seepage Tank	1
9.	Anemometer	1
10.	Constant Temperature Water Bath	1
11.	Rain Gauge (Self Recording)	1
12.	Rain Gauge (Non Recording)	1
13.	Stage level recorder	1
14.	Unconfined Compression Tester	1
15.	Planimeter	2
16.	Theodolite	3
17.	Arc GIS	2
18.	Geometica Software	5
19.	GPS	1
20.	Fatique Testing Machine	1
21.	Hardness test machine	1
22.	Universal testing machine	1
23.	ERDAS	1
24.	Plotter	1

Average Number of Students in Theory and Practical Classes

Postgraduate students are less in number and are grouped into one theory batch and

one practical batch.

Sl. No.	Name of the department	Theory Batch	Practical Batch
1.	Soil and Water Conservation Engineering	Full strength	Full strength

6.4.5. CONDUCT OF PRACTICAL AND HANDS-ON-TRAINING

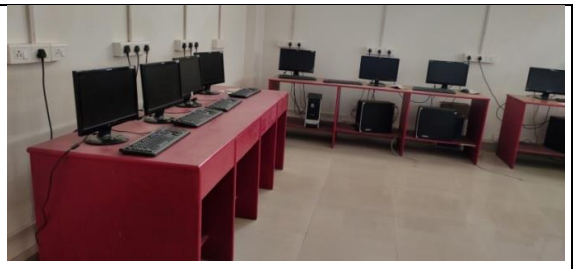
Course curriculum for master degree programme has been designed with special emphasis on novel areas of soil and water conservation engineering. Further as a part of their course curriculum, the PG students are taken to exposure visits to different research institutes, progressive farmersô field, private industries and state government agencies. Industry/ Institute Trainings as a part of their course curriculum is mandatory for the students. Several exposure visits organized by department is also contributing for better understanding of the subject and to enrich their practical knowledge.

Practical Credit details

Sl.No.	Discipline	Number of credits for practical	Per cent of time spent	
			In laboratory	In field*
1.	Watershed Hydrology	1	40	60
2.	Design of Farm Irrigation Systems	1	60	40
3.	Agricultural Drainage Systems	1	60	40
4.	Soil and Water Conservation Engineering	1	40	60
5.	GIS and Remote Sensing for Land & Water Resource Management	1	80	20
6.	Dams and Reservoir Operations	1	60	40
7.	Water Quality and Pollution Control	1	60	40

Glimpses of Practical's and exposure visits

Labs. under Dept. of SWCE:-	

	
Remote Sensing & GIS Lab. (39 m^2)	Remote Sensing & GIS Lab. (39 m^2)
	
Strength of Materials Lab. (81 m^2)	Strength of Materials Lab. (81 m^2)
	
Soil Water Conservation & Soil Mechanics Lab. (135 m^2)	Soil Water Conservation & Soil Mechanics Lab. (135 m^2)
	
Applied Mechanics Lab. (105 m^2)	Applied Mechanics Lab. (105 m^2)

	
Engineering Drawing Lab. (58.5 m^2)	Engineering Drawing Lab. (58.5 m^2)
	
AICRP on PET Lab. (40.32 m^2)	
Labs. under Dept. of IDE:-	
	
Irrigation, Drainage & Fluid Mechanics Lab. (225 m^2)	Irrigation, Drainage & Fluid Mechanics Lab. (225 m^2)
	
Soil & Water Quality Lab. (40.32 m^2)	Final year B.Tech. students (AE) constructing low cost polyhouse.

Demonstration of protected cultivation of capsicum and vertical farming of strawberry in soilless media on May 28th, 2019 to students of B.Sc. (Hort.), Sikkim University.

Student using data logger inside polyhouse

Students harvesting of tomatoes after completion of training

One day off-campus training Programme on Low cost Greenhouse Technology at Soureni, Assam Lingzey East Sikkim on 26 December, 2017

Local area MLA intereact with farmers inside the newly inaugrated NVP

His Excellency, Shri. Ganga Prasad ji (Governor of Sikkim) interacting with participants of the 90 days Skill Development Training Programme and Course Directors at the construction site of Hi-tech polyhouse at Vanvashi Kalyan Ashram, Ranipool, Sikkim.

Solar dryer under construction in Soureni Assam Lingzey, East Sikkim

6.4.6. SUPERVISION OF STUDENTS IN PG PROGRAMME

Sl. No.	Year	Department	No. of PG recognized teachers		Student to teacher ratio		
				Total	M.Tech.	Total (PG students)	
1.	**2015-16**	**Soil and Water Conservation Engineering**	06	06	03	03	1:2
2.	**2016-17**		04	04	01	01	1:4
3.	**2017-18**		04	04	02	02	1:2
4.	**2018-19**		04	04	05	05	5:4
5.	**2019-20**		04	04	02	02	1:2
6.	**2020-21**		04	04	04	04	1:1

6.4.7. FEEDBACK OF STAKEHOLDERS (STUDENTS, PARENTS, INDUSTRIES, EMPLOYERS, FARMERS ETC.)

Sl. No.	Feed back	Action taken
2017-18		
Farmers :		
1.	Exposure visit to PG students to sub-watersheds units/ progressive/ awardee farmersô fields to enrich the practical knowledge on implementation of SAUôs/ICAR Institutes/farmers innovative technologies.	Exposure visits for PG students are being made to the sub-watersheds units/ progressive/awardee farmersô fields.
2.	Polyhouse inaugurated on 23rd Dec., 2017 during celebration of the "Kisan Diwas" to commemorate the birthday of Former PM of India, Shri. Choudhary Charan Singh and handed over to the family of farmer Shri. Mitralal Sharma, Ward No 1. Assam Lingzey, East Sikkim.	The programme was attended by almost 25 farmers of the ward Assam Lingzey.
2018-19		

3.	Two days awareness programme on ñSkill development on greenhouse technology including solar technology and micro-irrigation systemsò during July 28-29, 2018	The awareness programme was organized by AICRP-PET at CAEPHT, Ranipool. Around 30 farmers attended the programme.
2019-20		
1.	B. Sc. (Hort.) students from Department of Horticulture, Sikkim University visited AICRP-PET Research farm for the exposure of the students in Protected Cultivation and team of AICRP-PET demonstrated the protected cultivation of capsicum, onion cultivation under low tunnel and vertical farming of strawberry in soilless media on May 28th, 2019.	The students (22 in nos) was attended by the department of SWCE and AICRP-PET, Ranipool.
2.	Installation and demonstration of solar dryers requested by a famer Sovya Diyali from Soureni, East Sikkim.	19 * 11 square feet solar dryers were installed at the resident of the farmer under SCSP scheme. The farmers adopted the dryer for drying cardamom, ginger, broom grass, meat etc.
3.	Exposure to construction of low cost polyhouse by final year students	As a part of their experiential learning programme, B.Tech Final year AE students were exposed to the construction and full time harvesting of crops

6.4.8. STUDENT INTAKE AND ATTRITION IN THE PROGRAMME FOR LAST FIVE YEARS

Year wise information on sanctioned strength, actual intake and attrition during the last five years of the Degree Programme are furnished in the tabular form. This attrition is due to students getting regular jobs in their respective state government etc.

M Tech (Agri Engg) with specialization in Soil and Water Conservation Engineering in the department.

The student discontinued their degree programme due to appointment in State govt. jobs.

Year	Departments	Sanctioned seats	Actual intake	Attrition	Attrition Percentage
2015-16	**Soil and Water Conservation Engineering**	5	3	0	0
2016-17		5	1	0	0
2017-18		5	2	0	0
2018-19		5	5	0	0
2019-20		5	2	0	0
2020-21		5	5	1	20

6.4.9. ICT APPLICATION IN CURRICULA DELIVERY

ICT enabled teaching-learning encompasses a variety of techniques, tools, content and resources aimed at improving the quality are a variety of options available to the teacher and students to utilize various ICT tools at CAEPHT, Ranipool for effective teaching and learning. Teachers participate in selection and critical evaluation of digital content and resources. They are also encouraged to develop their own digital resources, sharing them with colleagues and students through the digital repositories. For this each individual staff allotted with high configured computer system and connected with high speed Internet facilities for sharing digital contents. During the time of corona pandemic, the classes were conducted totally via online mode using Google meet, zoom etc.

Below Mentioned ICT facilities are well established in the college during the period of 2015-16 to 2020-21. Detailed ICT Lab facilities are listed below:

S.No.	Name of Lab	Equipment	Usage
1.	ICT Enabled Class Rooms	1 PG Class rooms with Computer Systems and LCD Projectors	For educational video, PPT, conferencing , teaching and learning
2.	PG ï R & GIS Computer Lab	10 Computers Systems	For working with different watershed, rainfall-runoff simulation

3.	ICT Enabled Seminar Hall	High Speed Internet Line connectivity, camera	For online interaction with University key officials by students and staff, online interaction with different subject experts in different streams

Different ICT Software's Used at CAEPHT, SWCE department

S. No	ICT Application	Usage
1.	Arc GIS software	ArcGIS is a geographical information system (GIS) software that allows handling and analyzing geographic information by visualizing geographical statistics through layer building maps like climate data or trade flows.
2.	ERDAS	image processing software package that allows users to process both geospatial and other imagery as well as vector data. Erdas can also handle hyperspectral imagery and LiDAR from various sensors. Erdas also offers a 3D viewing module (VirtualGIS) and a vector module for modeling.
3.	Geometica Software	a complete and integrated desktop **software** that features tools for remote sensing, digital photogrammetry, geospatial analysis, map production, mosaicking and more.
4.	Surface Water Modelling	SMS (surface-water modeling system) is a comprehensive environment for one, two, and three dimensional hydrodynamic modeling.
5.	Watershed Modelling System	A proprietary water modelling software application used to develop watershed computer simulations. The software provides tools to automate various basic and advanced delineations, calculations, and modeling processes.
6	Ansys Academic Mechanical	The software is being used by the masterôs students in the design of a greenhouse.

6.4.10. The information pertaining to 6.4.1 to 6.4.9 has been provided for PG programme *i.e.,* Ph.D. (Agricultural Engineering) in Soil and Water Conservation Engineering of College of Agricultural Engg & PHT, CAU, Ranipool Gangtok Sikkim, Sikkim is correctly.

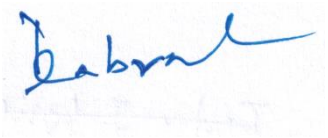
6.4.11. Since the accreditation of Programmes is related to the All India Admission from ICAR and also having weightage for College accreditation, therefore the data presented in the section 6.4 is liable to the verification at any stage.

6.4.12

CERTIFICATE

I the Dean, P. P. Dabral, College of Agricultural Engineering & Post Harvest Technology, Ranipool, Sikkim, hereby certify that the information contained is furnished as per the records available in the college and degree awarding university.

Date:



(P. P. Dabral)

Dean