

CENTRAL AGRICULTURAL UNIVERSITY
IMPHAL
MANIPUR



SELF STUDY REPORT FOR THE
M. Tech. in
IRRIGATION AND DRAINAGE 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

Irrigation is an ancient art. It is as old as human civilization itself. With the advancement of knowledge in engineering it has developed into a science and technology relating to the management of water efficiently and economically. Water is a major input in agriculture. The success of scientific farming depends on the proper use of water for cultivating a crop, whether it is irrigated or rain-fed farm land. Since in India monsoon rains are in most places erratic, it becomes undependable to carry out rain-fed farming. Therefore, it is essential that the available surface and groundwater potentials in the country are properly utilized on scientific lines. The technology of water use in agriculture is not new to India. Our rulers in the past have given the due importance to harness the water and use it for agriculture. But the science based agricultural technology has been developing very fast and this out of necessity to meet the growing needs of the exploding population. Arable land being limited, we have to find ways and means for more efficiently and economically utilizing the available water resources for irrigation.

The available irrigation system in India should be improved and the use of water for raising crops at the farmers' level will have to be substantially altered. While the farmers know that irrigation is essential for crop production, they are mostly unaware that in several cases excess water is harmful. The need for providing adequate drainage facilities in our crop fields is not fully understood not only by the farming community, but also by a large section of the agricultural technologists. There is a need for undertaking extensive and intensive studies to bring out the ill-effects of irregular and excess irrigation to every one of our important annual and perennial crop plants. Also, the ways and means of minimizing the loss in conveyance and transit of irrigation water and to bring down the cost of providing the lining to channels and bunds for reducing the loss are to be worked out. It is understood that the available water in our irrigation system in the country if properly utilized would help in increasing the command area at least by 50% if not more. This would add substantially to our agricultural economy. As we are aware that a major portion of the usable water is utilized for irrigation. Projection based on the present status of water resources show that in the coming one to two decades, about two-thirds of the world's population will face the shortage of water. One of the five essential elements of life, water, is now the every body's business.

The production of competent Irrigation and Drainage Engineers 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 besides other issues, pertaining to natural resource management, farm mechanization, post-harvest technology, 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 Guava Farm at Marchak, 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 (a constituent college of the Central Agricultural University, Imphal, Manipur). The college started functioning on May 20, 2006 with the admission of first batch of students in B. Tech. (Agricultural Engineering) program. Since December 2017, Prof. P.P. Dabral is the Dean of the college. 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 Mastersø program in five departments and 3 students for Ph.D. degree program in three departments 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 the **last six years**.

The departmental (College) level and University Level Task Force and Steering Committee have 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 the preparation of this report.

CAEPHT, Ranipool
January, 2021

Dean
(P P Dabral)

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6.4 Self-Study Report for M. Tech. (Agril. Engg.) With Specialization in Irrigation and Drainage Engineering at CAEPHT, RANIPOOL, SIKKIM.

6.4.1 Brief History of the Degree Program

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, 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. (Agril. 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 **Irrigation and Drainage Engineering (IDE)** with the bifurcation of Soil and Water Conservation Engineering (SWCE) department from the previous SWE department in the academic year 2016-17. The activity of the department includes the areas of irrigation water management, drainage engineering, ground water hydrology, well hydraulics, irrigation systems and pumps and GIS and remote sensing.

The Department of Irrigation and Drainage Engineering is mainly engaged in teaching to under graduate and post graduate and Ph.D. students. It offers various courses of PG like Open Channel Flow, Design of Farm Irrigation Systems, Groundwater Engineering, Agricultural Drainage Systems, Water Quality and Pollution Control, and Design of Pumps for Irrigation and Drainage 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 faculty of the department has completed **5 Extra Mural Research Projects** (4 as PI and 1 as Co-PI) and **9 Intra Mural Research Project** (7 as PI and 2 as Co-PI). Presently the faculty of the department is handling **1 Extra Mural Research Project**. To date, **2** students have completed post-graduation from the department and **3** students are presently undergoing their M Tech (Agril. Engg.) with specialization in Irrigation and Drainage

Engineering in the department.

Irrigation and Drainage Department has four laboratories namely Fluid Mechanics, Pump Engineering, Irrigation and Drainage, and Soil and Water Quality. Other than these laboratories, the department also conduct field experiments on terraces (in the college) and on the river bed (flowing at the periphery of the college).

Statistics of Master's degree program (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		
Department of Soil and Water Engineering (2015-2016)											
2015-16	3		3	-	-	-	3	-	3	2017-2018	Two students belong to IDE faculty
Department of Irrigation and Drainage Engineering (Started 2016-2017)											
2019-2020		1	1	-	-	-				2020-2021	Yet to complete
2020-2021	1	1	2	-	-	-				2022-2023	Yet to complete
Total	4	2	6		-	-	3	-	3		

Award of CAU, GOI & ICAR authorities' Scholarships

	Scholarship Type			
	University Scholarship (CAU)	ICAR scholarship (NTS)	SC/ST Fellowship	GOI Scholarship (SC+ST)
M. Tech.(SWE)				
2015-16	3			
M. Tech. (IDE)				
2019-20	1			
2020-21	2			
TOTAL	6			

6.4.2. FACULTY STRENGTH

Faculty Strength (Cadre-wise)

Designation / Cadre	Department of SWE						Department of IDE														
	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			
Professor	1	0	1	1	0	1	No Sanctioned Post of Professor after bifurcation of department														

(Direct Selection)																					
Professor (CAS)			One Professor under CAS																		
Associate Professor	4	4	0	4	4	0	2	2	0	2	2	0	2	2	0	2	2	0	2	2	0
Assistant Professor	5	4	1	5	4	1	2	1	1	2	1	1	2	2	0	2	2	0	2	2	0
Total	10	8	2	10	8	2	4	3	1	4	3	1	4	4	0	4	4	0	4	4	0
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.
IDE	-	2	2	1*	1	2	-	-	-	<u>1</u>	<u>2</u>	<u>3</u>	<u>1</u>	<u>0</u>	<u>1</u>
Total	1	2	3	1	1	2	-	-	-	1	2	3	1	0	1

* Promoted under CAS

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 Labor		-			
	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	10.00	5	Black Board
2.	PG classroom 2	10.00	5	White Board
3.	PG classroom 3		4	Computer room

Laboratory

The Irrigation and Drainage Engineering department has 4 laboratories to carry out UG/ PG practical as well as PG research. Three laboratories are up to mark and the fourth one is under development stage.

Sl. No.	Name of the laboratory	Area (sq. m)	Seating capacity
1.	Fluid Mechanics Lab	112.50	25
2.	Irrigation and Drainage Lab.	56.00	25
3.	Pump Engineering Lab.	56.00	25
4.	Soil and Water Quality Lab.	55.00	25
5.	Computer Lab	9.00	5
Field Laboratories			
6.	Field demonstration facility for gravity fed micro irrigation system on terraces	700.00	Any strength
7.	Rooftop rainwater harvesting system for low cost poly-house with drip irrigation system.	40.00	Any strength
8.	River bed of the 0.68 km long river flowing at the periphery of the college campus	2040.00	Any strength

Major equipments

Sl. No	Particulars	No.
1.	Hot Air Oven	2
2.	Sieve shaker	2
3.	Tensiometers	10
4.	Hydrocyclone filter	1
5.	Rain gun	1
6.	Core cutters	2
7.	Canopy analyser (Make Kaizen, Imperial, India)	1
8.	Hand Held GPS (Orgeon 650 Garmin)	1
9.	Automatic Weather Station (Model- WS 501, Make OTT Hydromet, Germany)	1
10.	Turbidity meter	1
11.	High sensitivity thermometer	1

12.	Escherichia Coli counting set up (including hot water bath, vacuum pump, flasks, Petri dishes, Kovac's indole agent, Coliform agar, and coli detects)	1 set
13.	Francis Turbine	1
14.	Hydraulic Bench	1
15.	Pelton Wheel Turbine	1
16.	Centrifugal Pump Test Set up	1
17.	Determination of Bernoulli's Theorem	1
18.	Darcy's Apparatus	1
19.	Friction in Pipeline	1
20.	Flow through Mouthpiece	1
21.	Flow through Orifice	1
22.	Reciprocating Pump Test Set-up	1
23.	Flow Over Notch Apparatus	1
24.	Gear Pump Test Set up	1
25.	Hydraulic Rig Ram (closed circuit)	1
26.	Jet Pump Test Rig	1
27.	Measurement of Irrigation Water	1
28.	Manometer and Pressure Gauge	1
29.	Open Channel Apparatus(closed circuit)	1
30.	Reciprocating Pump Test Set up	1
31.	Reynolds Apparatus	1
32.	Set up for Pipe in Series	1
33.	Set up for Pipe in Parallel	1
34.	Set up for equivalent Length of Pipe	1
35.	Tilting Hydraulic Flume	1
36.	Mono Block Single Phase Pump	1
37.	Kirloskar Pump	1
38.	Impeller (1220, KDS 5212, Bronze, Sp3L)	1
39.	Flash Pump/Tube Well Pump	1
40.	Gear Pump	1
41.	Portable Turbidity Meter	1
42.	Electrical Conductivity Meter	1
43.	Double Ring Infiltrometer	1
44.	Ph Meter	1
45.	Moisture Boxes	1
46.	Cut Section of Centrifugal Pump, Submersible Pump and Turbine Pump	1
47.	Positive Placement Pump (Hand Pump)	1
48.	Water Level Meter	1
49.	Pump Testing Rig	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.	Irrigation and Drainage Engineering	Full strength	Full strength

6.4.5. CONDUCT OF PRACTICAL AND HANDS-ON-TRAINING

Course curriculum for master degree program has been designed with special emphasis on novel areas of Irrigation and Drainage engineering. Further as a part of their course curriculum, the PG students are taken to exposure visits to different research institutes, progressive farmers' field, private industries and state government agencies. Industry/ Institute Trainings as a part of their course curriculum are 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

S. No.	Discipline	Number of credits for practical	Per cent of time spent	
			In laboratory	In field
1.	Open channel flow	1	40	60
2.	Design of Farm Irrigation Systems	1	40	60
3.	Agricultural Drainage Systems	1	40	60
4.	Groundwater Engineering	1	40	60
5.	Design of Pumps for irrigation and Drainage	1	80	20
6.	Water Quality and Pollution Control	1	60	40

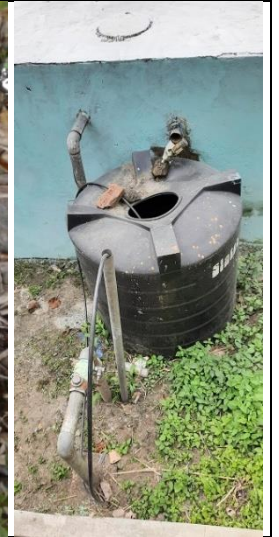
Glimpses of Practical's in Laboratories and fields



Soil and Water Quality Laboratory



Fluid Mechanics Laboratory



Irrigation and Drainage Laboratory (Pumping systems)



Pump Engineering Laboratory



Field experiments

6.4.6. SUPERVISION OF STUDENTS IN PG PROGRAM

S. No.	Year	Department	No. of PG recognized teachers		Student to teacher ratio		
				Total	M. Tech.	Total (PG students)	
1.	2015-16	Soil and Water Engineering#	06	06	03	03	1:2
2.	2019-20	Irrigation and Drainage Engineering	04	04	02	01	1:2
3.	2020-21		04	04	02	02	1:2

During 2015-16, two students were guided by the faculty of Soil and Water Engineering later on shifted to bifurcated department of Irrigation and Drainage Engineering

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

S. No.	Feed back	Action taken
Farmers :		
1.	There was a feedback from the farmers of the Manipur that because of the turbidity of the water, the filters of the drip irrigation system get choked frequently and becomes out of service.	The department has taken an IRP and proposed one horizontal flow filter that can be fabricated with the locally available material and reduces the turbidity level of natural stream and unlined pond water to considerable extent so that it could not interfere with the irrigation system.
2.	Cost free running of irrigation system	The department has standardized the gravity-fed irrigation system.

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 Program 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 Irrigation and Drainage Engineering in the department.

Year	Departments	Sanctioned seats	Actual intake	Attrition	Attrition Percentage
2015-16	Soil and Water Engineering	5	3#	0	0
2019-20	Irrigation and Drainage Engineering	3	1	0	0
2020-21		3	2	0	0

During 2015-16, two students were guided by the faculty of Soil and Water Engineering later on shifted to bifurcated department of Irrigation and Drainage Engineering

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.	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

6.4.10. The information pertaining to 6.4.1 to 6.4.9 has been provided for PG programme *i.e.*, M.Tech. (Agricultural Engineering) in Renewable Energy Engineering of College of Agricultural Engg & PHT, CAU, Ranipool Gangtok Sikkim, Sikkim is correctly.

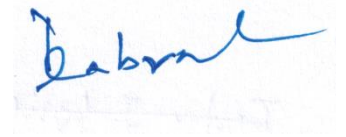
6.4.11. Since the accreditation of Programmes is related to the All India Admission from ICAR and also having weightage for College accreditation, therefore the data presented in the section 6.4 is liable to the verification at any stage.

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