COLLEGE OF AGRICULTURAL ENGINEERING AND POST HARVEST TECHNOLOGY

CENTRAL AGRICULTURAL UNIVERSITY

RANIPOOL,

GANGTOK-737135 (SIKKIM)

SELF STUDY REPORT

(Year: 2015-16 to 2019-20)

For

Degree Programme of B. Tech. (Agricultural Engineering)

Submitted to

NATIONAL AGRICULTURAL EDUCATION ACCREDITATION BOARD

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6.4. Self-Study Report for the Degree Programme, College of Agricultural Engineering and Post Harvest Technology, Ranipool, Gangtok, Sikkim,

For the college offering degree programme as per recommendations of 5thDeanôsCommittees of ICAR/VCI/BSMA

6.4.1. Brief History of the Degree Programme:

The College of Agricultural Engineering and Post Harvest Technology (CAEPHT) was established on 20th May, 2006 as one of the constituent colleges of Central Agricultural University, Imphal, Manipur. It is situated at Ranipool, Gangtok on National Highway 10 connecting Siliguri in West Bengal to Gangtok, the capital of Sikkim State. The campus of college is spread over an area of 7.71 ha. The total campus is located in mostly hilly terrain and sloppy and valley land at an altitude of approximately 914.4 m. (3000 ft.) above the mean sea level. Two rivers, namely Rani-Khola and Basuk-Khola, touch the college boundary towards the east side while the national highway NH- 10 is towards the west side of college campus. The college building, situated in the terraces and valleys and surrounded by rivers, provide an ideal atmosphere for academic and research activities.

The CAEPHT, Ranipool, Gangtok, Sikkim imparts education in different branches of Agricultural Engineering. The College started its first academic programme i.e., 4-year B. Tech. (Agricultural Engineering) programme from academic session 2006-07 with intake capacity of 20 students. Afterwards, a new degree programme was initiated as B.Tech in Food Process Engineering during 2010 with with intake capacity of 19 students. As per the ICAR Policy, this Degree Programme was renamed as B.Tech in Food Technology during 2012 and this programme is running since then.

The course curriculum and syllabi of both the degree programme are based on the model academic regulations and syllabi as proposed by the 5th Dean Committee of Indian Council of Agricultural Research (ICAR), New Delhi. While designing curriculum, outmost care has been taken to consider the global development in Science & Technology to equip graduates to meet new challenges thrown open as a result of economic globalization and climate changes and preparing farmers for emerging opportunities at national and international level.

At present 10+2+4 pattern which comprises Student READY programme (in summer break after semester IV: Skill Development Training-I for 05 weeks; in summer break after

semester VI Skill Development Training-I for 05 weeks; in semester VII: Industrial attachment of 10 weeks, on campus Experience Learning for 10 weeks; in semester VIII: Project planning and Report Writing) is offered from the academic year 2016-17.

College started offering M.Tech.(FMPE) programme from 2013 in the department of FMPE and Process and Food Engineering with an intake capacity of 3 students. In 2015-2016 the M Tech programme has been introduced in the department of Soil and Water Engineering. In the year 2017-18 the nomenclature of both the programmes has been changed to M.Tech. Soil and Water Conservation Engineering and M.Tech. Processing and Food Engineering. In the year 2016-17 the department of FMPE started PhD programme with an intake capacity of 2 followed by the department of PFE and SWCE with intake capacity of 1 in each department in the year 2017-18. From A.Y. 2019-20 two more M. Tech Programmes were started in Irrigation & Drainage Engineering and Renewable Energy Engineering.

Mandate of the Institution

The College of Agricultural Engg & PHT, Ranipool Gangtok Sikkim is a unique campus under the Central Agricultural University, Imphal with complete integration of all the three functions viz.; teaching, research and extension. The college has the mandate to develop, strengthen and promote the understanding, knowledge and skills to improve profitability and utilization in the field of agricultural engineering, not only in Sikkim but also in the entire North-Eastern Region. The college shall also endeavor to establish linkages with other scientific institutions of ICAR, other zonal and national bodies in the field of its domain located in the region and outside the region. The mission and major objectives of the college are:

Mission

To train technical manpower, pursue high quality and high impact research, design and development of sustainable technologies/equipment related to agricultural engineering and disseminate the developed technology to the farmers' field/ agro- industries of NEH region of India.

Vision

In accordance with the vision of CAU, Imphal the vision of CAEPHT is to produce world class 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.

Objectives

- To establish and develop excellent academic facilities for offering undergraduate and postgraduate education in discipline of agricultural engineering and post-harvest technology, appropriate to various states of NEH region in particular and country in general.
- To impart quality education so as to produce globally competitive graduates and post graduates in areas of agricultural engineering and post-harvest technology including inter disciplinary area so that confident and capable human resource, suitable for working as scientists, academics, managers, entrepreneurs etc., could be developed.
- To establish specialized research laboratories fitted with state of art machineries equipment and instruments for taking up basic and applied research by the scientists/teachers and post-graduate students and experiential learning facilities including pilot plants for ôhands ï on trainingô of undergraduate students.
- To develop and demonstrate modern and mechanized farming system appropriate to NEH states which may help the farmers to improves their productivity and profitability while preserving and improving the environment.
- To develop need based improved agro-technologies and equipment for NEH region for household and on farm operations, post-harvest management and utilization of renewable sources of energy.

Accomplishments:

Performance of the students during 2010 to 2020 is given in Table 1.

Table 1: Database of Pass out students (UG) 2010-2020

Year	No. of Student	Student undergo higher studies	Employment status

		State University/ National Institute	International Institute	State Department	Banking / Private Company / University	UPSC	Central Govt /ARS /Asst Professor	Entrepreneurs	Unemployed
2010	16 (AE)	04 (AE)	02 (AE)	08			01		
2011	18 (AE)	03 (AE)		09			04 (ARS) 01 (Asst. Prof.)		
2012	24 (AE)	07 (AE)	1 (AE)	04	07		02 (ARS) 01 (Asst. Prof.)		
2013	26 (AE)	08 (AE)	-	08	05				
2014	31 (AE)	08 (AE)		04	10				
2015	17 (AE)	01 (AE)		06	01				
2016	29 (AE)	07 (AE)		03	01				
2017	26 (AE)	12 (AE)		-					
2018	22 (AE)	13 (AE)		-					
2019	26 (AE)	18 (AE)	01 (AE)	-					
2020	37 (AE)	24 (AE)		-			01 (AE)		

6.4.2. Faculty strength

Table: 2. Faculty strength sanctioned, vacant and recommended by ICAR

Sl. No.	Sanction Faculty	Faculty Sanctioned	Faculty in Place	Vacant Position	Faculty recommended By ICAR/UGC/VCI/Other regulatory bodies
1.	Professor	4	2	2	**07**(# 1 professor as DEAN)
2.	Associate Professor	11	6*	5	**13**
3.	Assistant Professor	30	25	5	**24**
4.	MTTC/VTC Faculty	5	5	0	**NA**
Total		**50**	**38**	**12**	**45**
	***3 promoted as Professor under CAS**				

Table: 3. Department wise Faculty strength

Sl. No.	Department	Professor	Faculty recommended By ICAR	Associate Professor	Faculty recommended By ICAR	Assistant Professor	Faculty recommended By ICAR
1.	Farm Machinery and Power Engineering	02	01	-	2	04	3
2.	Processing and Food Engineering	01*	01	01	2	03	3
3.	Soil and Water Conservation Engineering	01	01	01	2	02	3
4.	Irrigation and Drainage Engineering	01	01	01	2	02	3
5.	Renewable Energy Engineering	01	01	-	2	03	3
6.	Basic Engineering and Applied Science	-	01	-	3	11	9
Total		06	07 (# 1 professor as DEAN)	03	13	25	24

***Contractual**

Table: 4. Faculty strength of Multi Technology Testing Center and Vocational Training Centre (MTTC &VTC)

Sl. No.	Department	Professor	Associate Professor	Assistant Professor
1.	Agronomy	-	-	01
2.	Plant Protection	-	-	01
3.	Horticulture	-	-	01
4.	Plant Breeding Genetics	-	-	01
5.	Extension Education	-	-	01
Total		-	-	05

6.4.3. Technical and Supporting Staff

Table: 5. Strength of Technical & Supporting Staff: Available posts and actual filled

Sl. No.	Name of the Post	No. of Post	Actual Filled	Vacancy
A. Dean office				
1.	Sr. Stenographer	01	00	01
2.	Computer Operator	01	01	00
3.	MTS	02	02	00
B.	**Establishment**			
1.	Asstt. Registrar(Estt.)	01	00	01
2.	Head Assistant	01	01	00
3.	Assistant	01	01	00
4.	UDC	01	00	01
5.	MTS	01	01	00
C.	**Store and Purchase**			
1.	UDC	02	01	01
2.	MTS	01	01	00
D.	**Account Section**			
1.	Assistant Comptroller	01	00	01
2.	Accountant	02	01	01
3.	Account Assistant/ Cashier	02	02	00
4.	UDC	01	01	00
5.	LDC	01	01	00
5.	MTS	01	01	00

F.	**Academic Section**			
1.	Assistant Registrar (Acsad)	01	00	01
2.	UDC	02	01	01
3.	MTS	01	01	00
G.	**Engineering Section/ Estate section**			
1.	Assistant Engineer(Civil)/ Assistant estate officer- Civil	01	01	00
2.	Junior Engineer- Civil	01	01	00
3.	Junior Engineer- Electrical	01	00	01
4.	UDC	01	01	00
5.	Electrician	01	01	00
6.	Carpenter	01	01	00
7.	Plumber	01	01	00
8.	MTS	01	01	00
H.	**Transport Section**			
1.	Driver	05	04	01
2.	Handyman(MTS)	02	02	00
I.	**Library Staff**			
1.	Librarian	01	00	01
2.	Sr. Library Assistant	01	01	00
3.	Library Asstt.	01	01	00
4.	MTS	03	03	00
J.	**Students Welfare**			
1.	Student Welfare Officer	01	**00**	**01**
K.	**Hostel Staff**			
1.	Cook (MTS)	03	03	00
L.	**Technical Staff**			
1.	Field-cum-Lab assistant	17	11	06
2.	Horticulture Assistant	01	01	00
3.	Livestock Assistant /Farm Assistant	05	04	01
M.	**Medical Unit**			

1.	Medical Officer	01	01	00
2.	Compounder	01	01	00
3.	Female Health Worker	02	02	00
4.	Male Health Worker	01	01	00
N.	**Security**			
1.	Security Guard	02	02	00
2.	Chawkidar(MTS)	02	02	00
O.	**MTTC/VTC**			
1.	Account Assistants	02	02	00
	ATTIC			
1.	MTS	01	01	00
	Guest House			
1.	MTS	01	01	00
	FMPE			
	UDC	01	01	00
P.	**MTS(Multi-tasking staff) in various departments**	21	21	00
Total		**107**	**88**	**19**

6.4.4. Classrooms and Laboratories:

07 well-equipped classrooms for UG and 03 well-equipped classrooms for PG are made available with this college. There are 02 smart class rooms also for UG and PG Students. These are well equipped with audio-visual aids for effective teaching. Different department of this college also have well-equipped laboratories for conducting practical classes of the students. Since the laboratories are equipped with most of the instruments, it also enables staff of this college to carry out research.

Table: 6. Class room available

Class Room	Smart class room/interactive Board
UG 7 Nos.	Having Projector facility with Desktop
PG - 05 Nos.	--
English Lab (UG) .=01 nos.	Having Projector facility with

	Desktop
Smart Class Room (UG & PG) =-02	Having smartboard and interactive board
Total = 15	

Table: 7. Number of laboratories available

Sl. No.	Section	No. of laboratories available for UG
1.	Farm Machinery	01
2.	Farm Power	01
3.	Ergonomics and Safety	01
4.	Soil Dynamics	01
5.	Farm Machinery Testing	01
6.	Thermodynamics and Heat Engine	01
7.	Theory of Machine	01
8.	Workshop	01
9.	Renewable Energy	01
10.	Renewable Energy Field Lab 1	01
11.	Renewable Energy Field Lab 2	01
12.	Surveying Lab	01
13.	Engineering Mechanics Lab	01
14.	Soil and water Conservation & Soil Mechanics Lab	01
15.	Strength of Material Lab	01
16.	Remote Sensing and GIS lab	01
17.	Engineering Drawing	01
18.	Fluid Mechanics & Irrigation Drainage Engg.	01
19.	Soil & Water Quality	01
20.	Food Engineering Laboratory	01

21.	Process Engineering Laboratory	01
22.	Agricultural Structures & Environmental Control Engineering Laboratory	01
23.	Food Analytics Laboratory	01
24.	Pilot Plant	07
25.	Farmersô Produce processing ï cum ï Skill Development Center	01
26.	Biochemistry and Microbiology Laboratory	01
27.	Electrical, Electronics and Instrumentation Laboratory	01
28.	Computer Laboratory	01
29.	Physics Laboratory	01

Table: 8. Department/Section wise Functional Laboratories available

Sl. No.	Department/Section	Area (Sq. m.)	Remarks
1.	***Farm Machinery and Power Engineering***		
	08 Laboratories	90 m^2 128 m^2 135 m^2 160 m^2 40 m^2 34 m^2 34 m^2 323 m^2	Equipped with all necessary instruments & lab infrastructure with basins, water, electricity, sitting arrangements *etc*.
2.	***Soil and Water Conservation Engineering***		
2.	06 Laboratories	39 m^2 81 m^2 135 m^2 105 m^2 58.5 m^2	Equipped with all necessary instruments & lab infrastructure with basins, water, electricity, sitting arrangements etc.
3.	***Irrigation and Drainage Engineering***		
	02 Laboratories	225 m^2 40.32 m^2	Equipped with all necessary instruments & lab infrastructure with basins, water, electricity, sitting arrangements *etc*.
4.	***Processing and Food Engineering***		
	06 Laboratory	228.28 m^2 92.77 m^2	Equipped with all necessary instruments & lab infrastructure with basins, water, electricity, sitting arrangements *etc*.

		80.71 m^2 93.24 m^2 124.03 201.51 m^2	Equipment for processing of horticultural produces.
5.	***Renewable Energy Engineering***		
	01 Laboratory 02 Field Laboratories	140 m^2 75 m^2 each	Equipped with all necessary instruments & lab infrastructure with basins, water, electricity, sitting arrangements *etc*
6.	***Basic Engineering and Applied Sciences***		
	03 Laboratory	225 m^2 133.48 m^2 53.4 m^2	Equipped with all necessary instruments & lab infrastructure with basins, water, electricity, sitting arrangements *etc*

a) **Lists major Equipment:**

The laboratories are well equipped to conduct the practical/hands on training to the students with instruments, laboratory tables, basins, irrigation facilities, electrical and ventilations, adequate wooden furniture etc. The lists of instruments/ equipments available in the laboratories are furnished below:

Table 9. Department wise list of instruments and equipment

S. No.	Department	Equipments
1.	**Department of Farm Machinery and Power Engineering**	**Farm Machinery Laboratory** **Area: 90 m^2** 1. Multi Crop Thresher 2. Self-Propelled Vertical Conveyor reaper 3. T/D inclined plate planter 4. Pedal cum power operated cleaner and grader 5. Rigid tyne cultivator 6. Spring loaded cultivator 7. Tractor mounted offset disc harrow 8. Tractor mounted disc plough 9. Tractor mounted M.B.plough 10. Modular inclined plate planter 11. Tractor mounted raised bed planter 12. Tractor mounted seed cum fertilizer drill 13. Multi crop plot thresher 14. Semi axial flow thresher (SAF 750) 15. Auger digger 16. Power tiller operated seed cum fertilizer drill

		17. Manual seed cum fertilizer drill 18. manual groundnut decorticators 19. Manual rice trans planters 20. Pre-germinated paddy seeder (4 rows) 21. Manual hand tools and equipments like wheel hand hoe, Hand Ridger, Grubber weeder, Serrated sickle, Naveen Dibbler, hand maize sheller etc. 22. knapsack prayers 23. Rocking sprayer 24. Hand rotary duster 25. foot sprayer 26. Ganesh sprayer 27. Parth Hand Sprayer 28. Hand compression sprayer 29. Motorized knapsack mist blower cum dusterr 30. Pedal operated thresher 31. Power operated wire-loop thresher with winnower 32. Small power paddy thresher (hold-on type) 33. Small power paddy thresher (Axial Flow type) 34. Animal drawn patella harrow 35. Animal drawn patella puddler 36. Animal drawn three row seed drill 37. Animal drawn 3 row seed cum fertilizer drill 38. Animal drawn 2 row mustard drill 39. Animal drawn lug wheel puddler 40. Animal drawn ground nut digger 41. Mini power maize sheller 42. Mini power chaff shredder 43. Manual and motor operated chaff cutter **2. Farm Power Laboratory** **Area: 128 m^2** 1. Single cylinder two stroke petrol engine 2. Single cylinder 4 stroke diesel engine 3. Tractors (Mahindra B 275, New Holland) 4. Power tillers (12 hp, 6.5 hp, 5.5 hp) 5. Tractor Working Cut Model 6. Diesel fuel supply system model 7. Clutch system model 8. Brake System model 9. Stearing mechanism of tractor model 10. Cut model of 2 stroke Diesel engine 11. Cut model of 4 stroke Diesel engine 12. Actual cut model of single cylinder 2-stroke engine 13. Cross section of cylinder block

		14. Components of engine (crank shaft, piston, connecting rod, rocker shaft, valve, valve spring guide etc.) **3. Ergonomics And Safety Laboratory** **Area: 135 m^2** 1. Integrated Composite anthropometer (ICA) 2. computerized electric ergometer 3. Computerized human energy measurement system with telemetry (K4B2) 4. Polar heart rate monitor 5. Strength measurement setup 6. Novatech load cell 7. Sphygmo manometer 8. Stethoscope 9. Thermometer (digital) 10. Digital Camera **4.Soil Dynamics Laboratory** **Area: 160 m^2** 1. Automated soil bin with sensors and digital control panel 2. Dynamometer 3. Motorized sieve shaker 4. IS Sieve set for soil analysis 5. soil analysis kit 6. Proving ring cone penetrometer **5. Farm Machinery Testing Laboratory** **Area: 40 m^2** 1. Digital tachometer 2. digital soil moisture meter 3. Digital thermometer 4. Digital anemometer/barometer/humidity sensor 5. Digital weighing balance 6. Digital vibration and noise meter 7. Digital soil penetrometer 8. Digital energy logger 9. Spray patternator testing rig 10. Mini tractor (Kubota 21 hp) 11. Rotavator for small tractor **6. Thermodynamics and Heat Engine Laboratory** **Area: 17 m^2** 1. Multi-cylinder petrol engine test rig with electric dynamometer 2. Twin cylinder diesel engine test rig with electric dynamometer 3. Two stroke petrol engine test rig with rope brake

		dynamometer 4. Single stage air compressor test rig 5. Lancashire Boiler model 6. Cochran Boiler model 7. Cornish Boiler model 8. Vertical water tube boiler model 9. Locomotive Boiler model 10. Babcock & Wilcox Boiler Model 11. Model of steam engine 12. Boiler mountings and accessories model (Blow off cock, stop valve, feed check valve, economiser, pressure gauge, water gauge, fusible plug, dead weight safety valve, spring loaded safety valve) 7. **Theory of Machine Laboratory** **Area: 17 m^2** 1. Universal Governor Apparatus 2. Cam Analysis Apparatus 3. Motorized Gyroscope 4. Static & Dynamic Balancing Apparatus 5. Coriollis component of acceleration apparatus 6. Epicycle Gear train apparatus **8. College Workshop** **Area: 323 m^2** 1. HMT Lathe machine (05 Nos) 2. wood working lathe machine 3. Power hacksaw machine 4. Radial drill machine 5. Overhead crank shearing machine 6. Hydraulic press 7. Arc welding machine (2 Nos) 8. MIG welding machine 9. TIG welding machine 10. Gas welding setup 11. Pipe bending machine 12. Sheet rolling machine 13. Pedestal grinder machine 14. Chop saw machine 15. Work tables with bench vices 16. Carburizing furnace 17. Painting oven 18. Sheet sheering machine 19. Milling machine 20. Shaper machine 21. Smithy furnace with envils and swedge block

2.	**Department of Soil and Water Conservation Engineering**	**A. Surveying Laboratory** 1. Metric Chain (20 m) 2. Metric Chain (30m) 3. Field Book 4. Optical Square 5. Plum Bob 6. Plane Table Set 7. Ranging Rod 8. Steel Scale 9. Steel Tape (5m) 10. Cloth Tape (30m) 11. Metallic Tape (30m) 12. Abney Level 13. Automatic Level (Manual) 14. Arrows 15. Cross Staff & its Rod 16. Levelling Staff(5m) 17. Offset Rod 18. Plum Bob 19. Planimeter 20. Prismatic Compass with Stand 21. Ranging Rod (3m) 22. 20.Theodolite 23. Drop Arrows 24. Ghat Tracer with Stand 25. Plane Table Set with Stand 26. Ranging Rod (big) 27. Ranging Rod 28. Ranging Rod (small) 29. Meter Roll (measuring tape 3 m) 30. Meter Roll (measuring tape 30m) 31. Levelling Staff (6m, 3 parts) 32. Dumpy Level with Stand 33. Guntur Chain 34. Revenue Chain 35. Engineer Chain 36. Line Ranger 37. Pedometer 38. Prime Square 39. Steel Band 40. Tangent Clinometer 41. Wooden Peg **Engineering Mechanics Laboratory**

		1. Bar-Pendulum & Compound Pendulum 2. 2.Bar of Beam Apparatus 3. Bending Moment Apparatus 4. Bell Crank Lever 5. Compound Lever (Ambo/Usha) 6. Crank Compound Lever 7. Friction Side Apparatus 8. Hookôs Law 9. Young Modulus Apparatus 10. Worm & Worm Wheel 11. Link Polygon Apparatus 12. Joint of Roof Truss on Wheels 13. Law of Moment Apparatus 14. Law of Conservation of Mass Apparatus 15. Mechanism Model 16. Moment Disc Apparatus 17. Moment of Inertia of Fly Wheel Apparatus 18. Polygon of Forces Apparatus 19. Parallel Force Apparatus 20. Pulley Sets 21. 21.Parallelogram Law of Forces 22. Regidity of Wire Apparatus 23. Rope & Drive Belt Experiment Apparatus 24. Second Law of Motion Apparatus 25. Shear Leg Apparatus 26. Screw Jack Experiment 27. Stress in Beam Apparatus 28. Triangle Law of Forces 29. Torison Apparatus 30. Universal Force Table 31. Western Differential Pulley 32. Wheel & Wheel Axles **Soil Mechanics Laboratory** 1. Drainage and Seepage Tank 2. Canopy Analyser 3. Automatic Sediment Analyser 4. Neutron Probe 5. Moisture Meter 6. Hydro Metrological Data Acquisition 7. Laser Leaf Areameter 8. Portable Turbidity Meter 9. Triaxial Cell Test 10. Anemometer 11. Barometer

		12. Constant Temperature Water Bath 13. Consolidated Apparatus (single gang) 14. Coshocton Wheel Silt Sampler 30cm 15. Determination of Grain Size Analysis 16. Hydrometer 17. Core Cuter 18. Cone Penetrometer & Plastic Limit 19. Vicat Apparatus 20. Hook Gauge & Point Guage 21. National Brand ôHô Flume 22. Laboratory Permeability Apparatus 23. Liquid Limit Apparatus 24. Model of Chute Spillway, Drop Inlet & Drop Spillway 25. Moisture Box 26. Rain Gauge (Self Recording) 27. Rain Gauge (Non Recording) 28. Soil Infiltrometer 29. Soil Grinder 30. Self Recording Rain Gauge 31. Stage Level Recorder 32. Standard Proctor 33. Shrinkage Limit 34. Top Pan Balance 35. Unconfined Compression Tester 36. Rapid Moisturemeter 37. Water Level, Meta Mini Water Level 38. Weighing Pan Top 39. Well Water/Level Meter 40. Shear Apparatus 41. Wet & Dry Bulb Temperature 42. Microprocessor Based Automatic Sampler **Strength of Material Laboratory** 1. Fatigue Testing Machine 2. Hardness Test Machine 3. Universal Testing Machine **Remote Sensing and GIS Laboratory** 1. Arc GIS 2. Plotter 3. ERDAS 4. Geometica Software 5. Scanner 6. Surface Water Modelling 7. Watershed Modelling System 8. GPS 9. Computers-10 nos.

3.	**Department of Irrigation and Drainage Engineering**	1. Francis Turbine 2. Hydraulic Bench 3. Pelton Wheel Turbine 4. Centrifugal Pump Test Set up 5. Determination of Bernoulliôs Theorem 6. Darcyôs Apparatus 7. Friction in Pipeline 8. Flow through Mouthpiece 9. Flow through Orifice 10. Reciprocating Pump Test Set-up 11. Flow Over Notch Apparatus 12. Gear Pump Test Set up 13. Hydraulic Rig Ram (closed circuit) 14. Jet Pump Test Rig 15. Measurement of Irrigation Water 16. Manometer and Pressure Guage 17. Open Channel Apparatus(closed circuit) 18. Reciprocating Pump Test Set up 19. Reynolds Apparatus 20. Set up for Pipe in Series 21. Set up for Pipe in Parallel 22. Set up for equivalent Length of Pipe 23. Tilting Hydraulic Flume 24. Mono Block Single Phase Pump 25. Kiloskar Pump 26. 26. Impeller (1220 , KDS 5212, Bronze, Sp3L) 27. Flash Pump/Tube Well Pump 28. Ger Pump 29. Portable Turbity Meter 30. Oven 31. Electrical Conductivity Meter 32. Double Ring Infiltrometer 33. Ph Meter 34. Moisture Boxes 35. Augers 36. Sieve Shaker 37. Cut Section of Centrifugal Pump, Submersible Pump and Turbine Pump 38. Positive Placement Pump (Hand Pump) 39. Water Level Meter 40. Pump Testing Rig
4.	**Department of Processing and**	**Food Engineering laboratory** **Area-** 228.28m^2

	Food Engineering	1. Steam Distillation set up 2. Fruit pulper 3. Feed mixer (planatory mixer, planatory mixer (vacuum jacketed), planatory mixer (heating jacketed), double cone mixer, Blender SVB, Cube Mixer, Lab Kneader, Powder Mixer, Agitator, Drum Hoop Mixer-SDHM, Lab mass mixer SLMM, horizontal main drive SHMD-A.C., Universal Gear) 4. Spice processing plant a. Ginger /Turmeric peeler cum polisher b. Garlic Bulb Breaking Machine c. Garlic Clove Flaking Machine 5. Coconut tree climber 6. Coconut dehusker 7. Pasta Extruder 8. Essential Oil distillation Unit i. Solid Liquid Extraction unit ii. Steam Distillation Set up 9. c)Simple batch distillation unit 10. Refrigerated centrifuge with Micro processor 11. Rotary vacuum filter & Leaf Filter 12. Refrigerated centrifuge CPR 24 13. Plate heat exchanger 14. Usha make Gerber Centrifuge 15. Usha make centrifuge separator 16. Vegetable Blancher 17. Vacuum Tray Dryer 18. General cycle refrigeration trainer 19. Heat transfer through lagged pipe apparatus 20. Heat transfer through composite walls apparatus 21. Mechanical heat pump trainer 22. Plate type heat exchanger 23. Recirculation type air conditioning trainer 24. Stefan Boltzmann apparatus 25. Thermal conductivity of insulating slabs by guarded hot plate method 26. Thermal conductivity of insulating powder 27. Micrometer Precise Thickness **Process Engineering laboratory** **Area-** 92.77m^2 1. Weighing balance 2. Shrink Wrapping Machine 3. Hand wrapper

		4. Foot Sealer 5. Aspirator Cyclone Separator 6. Automatic Foam Fill Seal Packaging Machine 7. Rubber Roll Sheller 8. Rice Whitener/Polisher 9. Indented Cylinder Grader/ Separator 10. Vibratory Screen Grader 11. Freeze Dryer 12. Laboratory Spray Dryer 13. Cream Separator 14. Freeze Drier 15. Vacuum Packaging Machine 16. Steam Jacketed cooking kettle 17. Butter churn 18. Vacuum oven 19. Vacuum Tray Dryer 20. Laboratory Pasteurizer 21. Shrink Packaging Machine Model-CP-2030 22. Laboratory homogenizer 23. Micro Pulveriser (hammer mill) 24. Feed and Fodder crusher 25. Feed Block Formation Machine 26. Food Extruder 27. Fruit and Vegetable Juice and paste Processing Plant 28. Automatic form fill seal packaging machine 29. Boerner conical divider 30. Bucket elevator 31. Multipurpose grain mill 32. Super critical fluid extraction unit 33. Foot Sealer 34. Fermenter 35. Hand sealer 36. Hand wrapper 37. Electronics Grain Moisture Meter 38. Angle of Repose **Agricultural Structures & Environmental Control Laboratory Engineering laboratory** **Area-** 80.71 m^2 1. Digital Humidity Sensor and Indicator 2. Hot Air Oven 3. Electronic weighing balance (2.2kg) 4. Electronic weighing balance ZSP-350 (300g) 5. Digital balance model ï (A-224) make Contech Capacity-220gm

		6. Digital Precision Electronic Balance 7. Apparatus for thermal conductivity of insulating powder 8. Convection apparatus (natural) 9. Convection apparatus (forced) 10. Concentric tube heat exchanger (finned tube type) 11. Concentric tube heat exchanger (plain tube type) 12. Emissivity measurement apparatus 13. Digital humidity Sensor and indicator 14. Digital temperature meter **Food Analytics laboratory** **Area-**93.24 m^2 1. Electronics Socs Plus Automatic Three Place Solvent Extraction Apparatus (Soxlet) 2. Microscope-Ex-21 set Binocular Brand-OLYMPUS 3. Viscometer 4. Usha Make Centrifuge Separator 5. 5. Usha Make Gerber Centrifuge (2nos) 6. Water Activity Meter 7. Auto Clave 1 set2òX20ò 8. Digital Satorious Infra-red Moisture Meter 9. pH meter 10. Samsung Freeze with stand 11. Water Purification System 12. Milk analyzer Master Clasic 13. Oxygen and CO2 Headspace Gas analyzer plus Flexible packaging kit 14. Microwave oven 15. Water Bath 16. Food texture analyzer 17. Rapid visco analyzer 18. BOD Incubator with shaker 19. Automatic Fibre Extraction system 20. Digital Refractrometer PAL 21. Laminar Flow **Pilot Plant** **Area-** 248.06 m^2 1. Fruit and Vegetable Plant 2. Milk Processing Plant 3. Multi stage evaporator with aroma recovery system 4. Cottage scale soya paneer plant 5. Seed processing plant 6. Modern rice mill (0.5 t/h capacity) 7. Mini Dal Mill

		Farmers' Produce processing – cum – Skill Development Center 1. Drier machine for Ginger, Cardamom, Chillies 2. Ginger Washing Machine 3. Vegetable Cutting Machine 4. Ginger Processing Machine (Complete Unit) 5. Turmeric Grinder 6. Potato Slicer 7. Vegetable Washing Machine 8. Complete unit of Potato Chips Machine 9. Complete Unit of Biscuits Making Machine 10. Complete Unit of Noodle Making Machine 11. Ginger Paste and Powder Making Machine
5.	**Department of Renewable Energy Engineering**	1. Agni-star Gasifier 2. Air Quality Meter 3. Air Quality Monitor with Laptop 4. Aluminium Pots 5. Bio-gas Analyzer 6. Biogas Lamp 7. Biomass Cookstove i. Natural Draft biomass cookstove ii. Forced Draft biomass cookstove 8. Bomb-Calorimeter 9. Box-type Solar Cooker 10. Cloud and Pour Point Apparatus 11. Cookstoves with Air Insulation 12. Data logger 13. Digital Anemometer 14. Digital Balance (15 kg) 15. Digital Lux meter 16. 16.Digital Multimeter 17. Digital PH meter 18. Digital Stop watch 19. Digital Tachometer 20. Digital Temperature Indicator 21. Digital Thermo-hygrometer 22. Digital Thermometer Non-contact type 23. Digital Wood moisture meter 24. Direct Type Solar Dryer 25. Double distillation Apparatus

		26. Electric air blower 27. Electric weighing balance 28. Gas flow meter 29. Glass thermometer 30. Glass water distillation 31. Hand operated briquetting machine 32. High Precision balance 33. Hot Air oven 34. Hot wire Anemometer 35. IDB Gasifier stove (Ceramic) 36. IDB Gasifier Stove (Smokeless) 37. Improved downdraft biomass combustion device 38. Indirect type solar cabinet dryer 39. Lux meter 40. Mixed mode type solar dryer 41. Muffle furnace 42. Multichannel digital temp. indicator 43. Orsat Apparatus 44. Parabolic Dish Solar Cooker 45. pH meter 46. Pressure Gauge 47. Pyranometer 48. Ried Vapor Pressure Test apparatus 49. Shakti-Surahi Biomethanation plant 50. Small scale box type biochar kiln 51. Solar Concentrator Training Kit 52. Solar Cooker Box type 53. Solar Lantern 54. Solar Power Photovoltaic training Kit 55. Solar Refrigerator 56. Solar Still 57. Solar Street light system 58. Solar water pumping system 59. Sound level meter 60. SPV Home lighting System 61. Sunshine Recorder 62. Test setup for thermosiphon system type solar water heater 63. Thermocouple base thermometer with display unit 64. Turbine type flow meter 65. Water bath shaker 66. Weighing balance 67. Wood moisture meter
6.	**Department of**	**Biochemistry/Microbiology/ Agriculture Laboratory**

	Basic Engineering and Applied Sciences	**Area**: **225m^2** 1. Analytical balance 2. Block digestion system 3. Colony counter 4. Vortex mixer 5. Chlorophyll meter 6. Refrigerated circulator 7. High speed refrigerated centrifuge 8. Ultra quartz distillatory 9. Flame photometer 10. Hot plate 11. Hot air oven 12. Microcentrifuge 13. 13.Magnetic stirrer 14. Rotary vacuum flask 15. Rotary shaker 16. Spectrophotometer UV/Vis Double Beam 17. Viscometer 18. Water bath shaker 19. Microwave oven 20. Bacteriological Incubator 21. Chromatographic oven 22. Monocular microscope 23. Compound microscope 24. Horizontal electrophoresis unit 25. Autoclave 26. BOD incubator 27. Water distillation plant 28. Quartz double distillation unit 29. Kjeldahl distillation and digestion unit 30. pH meter 31. Conductivity meter 32. Polarimeter 33. Refrigerator **Electrical, Electronics and Instrumentation Laboratory** **Area: 133.48 m ^{2}** i) Electrical Laboratory 1. Cut section of DC motor 2. Cut section of single phase AC motor 3. Cut section of 3 phase AC motor 4. Single phase transformer of 1 KVA rating 5. Single phase Variac (0-260 Volt) 6. DOL,Star Delta,Auto Transformer starter 7. DC machine with motor generator set.(for OCC of motor)

		8. AC split phase motor 1 HP 9. 3 phase squirrel cage induction motor with ponney brake (1 HP) 10. 3 phase induction motor with ponney brake (2.2kW) 11. Single phase Induction motor to study the effect of capacitor 12. 3 phase induction motor ï generator set for load test of induction motor 13. DC series motor with ponney brake for load test of dc series motor 14. DC shunt motor(1 HP) for speed control 15. Control Panel board consisting of Under voltage and Earth fault relay. 16. KCL,KVL trainer kit box 17. 3 phase control panel 18. 3 phase variac 19. 3 phase loading rheostat(10kVA,400 V) 20. Resistive load (220 V,6.5A) 21. LPF trainer 22. BPF trainer 23. K type(BRF) trainer 24. M derived filter 25. R-C,L-C trainer kit 26. Network theorem kit 27. DC regulated power supply (50V,5A) 28. Wattmeter single phase 29. Wattmeter 3-phase 30. House wiring exercise table ii) Electronics & Instrumentation Laboratory 31. Advance Trainer kit 32. CRO 33. Quadruple DC power supply 34. Analog cum Digital trainer kit 35. Rectifier trainer 36. Transistor trainer kit 37. Clipper & Clamper kit 38. Zener diode trainer kit 39. Digital to analog converter 40. 8-bit multiplying D to A converter 41. LVDT Bourdon tube trainer 42. LVDT inbuilt 4 kHz oscillator power supply. 43. Load cell Demonstrator 44. DC permanent magnet motor set for position control system

		45. Function generator **Computer Laboratory** **Area: 52.2 m ^{2}** 1. HP Desktop 406 GT Mt with 18.5"TFT 2. HCL Infinity Global Server Line 17òTFT 3. HP 8300MT Desktop 4. HP DC 7900 Desktop 17òTFT 5. External HDD 1 TB 6. Multimeter 7. D-link Wireless AC750 Dual band 8. Office Pro plus SNLG OLP NL Acd me (79P-05537) 9. win Pro-10 SNLG Upgrd OLPNL Acdme(FQC-09512) 10. Win Server (AL 2012 SNLG OLP NL Acdme DVLCAL(F18-04271|) 11. Win Server Std2012 SNLG OLP NL Acdme 2 Pro C(F73-06272) 12. 10 KVA Single online UPS, 12V 100AH, 16 Nos Excide Battery 13. 10 KVA Numeric online UPS with 12AHS Battery 14. 1 KVA UPS Microteck 15. DES 1024 D-Link 24 Port 16. 8 Port Switch TP Link 17. 24 Port Switch D-Link 18. Orpat Wall Fan 19. Battery Stand 20. HP LJ P1007 21. HP Printer LJP1606 22. HP Desktop Dx2280 with 15òTFT 23. Hardware Firewall 300ING, 3 years subscription 24. HP Scanner 7800 25. HP Scanjet G3010 Photot Scanner 26. 10 KVA Numeric online UPS with 12AHS Battery 27. 8 Port10/100 switch D-Link 28. Wireless AC750 Dual Band Router 29. Net WL Business Access Point 30. Netdbi Patch Panel Directional Antenna 31. Net WL Business Access 32. Net 8 Port SW/4 POE 33. Oth Spare Part 34. Net 9DBI Omni Antenna 35. Lightening/ Surge Arrestor **Physics Laboratory** **Area 95 m^2**

		1. Apparatus to study dielectric constant 2. Apparatus to measure the value of specific charge (e/m) for electrons by helical method 3. Apparatus for determination of ultrasonic wave velocity in liquid medium 4. Apparatus for the study of Electro-magnetic induction (e.m.f Vs velocity) 5. Apparatus to determine low resistance (Carey-Foster method) 6. Apparatus to study variation of thermo e.m.f. of a copper constantan thermocouple with the temperature. 7. Apparatus for study of LCR circuit 8. Apparatus for determination of co-efficient of viscosity by Stokeôs law 9. Inerfaceable function generator and arbitrary waveform generator-1 10. Apparatus to find the frequency of a.c supply using electrical vibrator. 11. Apparatus for determination of energy band gap in semiconductor using p-n junction diode 12. Apparatus for finding energy band gap by four probe method 13. Apparatus for obtaining hysteresis curve(B-H curve) and determination of related magnetic quantities 14. Apparatus to study the variation of magnetic field with distance along the axis of a current carrying circular coil. 15. Apparatus for finding numerical aperture of an optical fiber 16. Apparatus to study fiber optic analog link 17. Apparatus to study fiber optic digital link 18. Digital Multimeter system -1 set (Two Nos.) 19. Digital storage Oscilloscope 20. Drill machine 21. Dual trace oscilloscope Make: Scientific25 MHz 22. Quadruple output d.c power supply Make: Microtech Industries 23. Digital multimeter Make: Metravi Model: 451 24. Function generator 25. Ammeter 0-500mA DC 26. Ammeter0-500mA AC 27. Rheostat 85 Ý, 2A 28. Rheostat 350 Ý, 2A 29. Voltmeter 0-30V DC

(d) Farm facilities, workshops and other instructional units:

Farm facilities

Table: 10. Farm facilities, workshops and other instructional units

Sl. No.	Name of the Department	Farm Area (ha)	Irrigated / No irrigated (ha)	Crops grown
1	Irrigation and Drainage Engineering	0.07	Irrigated	Cauliflower, Broccoli, Coriander,
2	Soil and Water Conservation Engineering (under AICRP On PET)	0.01 (under 4 green houses)	Irrigated	Cauliflower, Broccoli, Tomato, Onion, Garlic, Capsicum,
3	Renewable Energy Engineering	0.004	Irrigated	Tomato
4	Farm section	0.004	Irrigated	Flowers

Poly house and Shade nets

Table: 11. Poly house and Shade nets available area wise and crop details

Sl. No.	particulars	Total available numbers	Area (m^2)	Crops grown
1	Polyhouse	07 (4 in AICRP PET, 1 in IDE, 1 in REE,1 under Farm section)	30 sq. m. to 120 sq. m	vegetable crops
2	Shadenet	02 under AICRP PET	10 sq. m.	Seedlings

Facilities available in farm section:

Table 12. available Facilities to farm section

Sl. No.	Facility	Remarks
1	10hp motor	For supply and water pumping
2	Drip irrigation systems	For irrigation of land and polyhouses
3	Solar water pumping system with farm pond source	For supply and water pumping from farm pond and tanks
4	Water supply tanks	Water storage and supply

Diary Plant, water storage ponds, Farm equipment and Meteorological units:

Table 13. List of available facilities under Diary Plant, water storage ponds, Farm equipment and Meteorological units

Sl. No.	Particulars	Details	Remarks/ Area
1	Dairy Plant		
2	Vermicomposting	1 No.	For production of organic compost to field supply
3	Farm Equipment	Hand tools	Used by farm sections for farming and maintenance of campus
		Grass cutters	
		Utilize equipments from FMPE department	
4	Farm ponds/water tanks	1 farm pond SPV powered water pumping unit	For supply and water pumping from farm pond and tanks
		Water Tank ï 2 Nos	Water storage and supply
5	Meteorological units	1 full-fledged Weather monitoring station (In Collaboration with ISRO)	Recording of weather conditions
6	Misc.	Pilot Plant for Milk Processing including Dairy Technology Lab, chiller unit, spray dryer unit & milk reception unit etc.	201.51 m^2
		Pilot Plant for Fruits and Vegetable including Cottage scale soya paneer plant	124.03 m^2
		Multi stage evaporator with aroma recovery system	20.9 m^2
		Shed for Feed and Fodder crusher and seed processing unit etc	119.66 m^2
		Mini Rice Mill	148.65m^2
		Farmer's Produce Processing cum Skill Development Centre	Area 265.26 m^2) (consisting of Ginger & Turmeric Processing Plant – Area 72 m^2, Unit of Minimal Processing of Fruits and Vegetable– Area 17.84m^2, Bakery unit– Area 23.78m^2, Noodles unit– Area17.84 m^2, Potato Chips unit –Area

			17.84 m^2, store–Area 25.65 m^2, kitchen –Area 17.84 m^2, class room–Area 27.87 m^2, training hall –Area 44.6 m^2)

Farm Workshop cum Vehicle shed

Table 14. Details of Farm workshop, Implement shed and vehicle shed

Facility	Particulars	Remarks
Farm Workshop	1	The workshop of college is used for fabrication and repairing of farm tools and equipment
Implement shed	1	Farm implements are placed in the Farm Machinery department passage and used by farm section on need basis.
Vehicle shed	0	As such vehicle shed is not available. Vehicles are parked on free space available near college workshop and parking space allotted for various vehicles.

(f) Theory and practical batches for the Degree Programme: The number of intake students is manageable due to limited number of seats.

Table 15: Average number of students in theory and practical classes

Sl. No.	Name of the degree programme	Batch of student in theory	Batch of student in practical
1.	B. Tech. (Ag. Engg.)	Full strength	2 batches of equal strength

The class rooms and laboratories are sufficient to meet course curricula requirement of the degree programme.

6.4.5. Conduct of Practical and Hands-On-Training:

The College of Agricultural Engineering and Post Harvest Technology is equipped well with different laboratories and equipments specified as per 5th Dean Syllabus and mentioned in 6.4.4. The conduction of practical courses for Undergraduate, Post-Graduate and Ph.D. is carried out through actual on-field and laboratory experimentation as per credits allotted to the specified courses and hands on training. Practical and Hands on training are carried out as per the syllabus of 5th DEAN committee. The Student Ready Programme for B. Tech (Agricultural Engineering) is performed as per the guidelines provided by the ICAR.

The practical of courses for B. Tech (Agricultural Engineering) is carried out in the laboratories and fields fully equipped with desired instrumentation and facilities. Student

practical are conducted as per batches divided based on strength of admitted candidates and as per academic schedule. Students are allowed to perform practical after proper demonstration and skill presentation with precautionary measures. The laboratories and facilities for practical and hands-on-training are fully equipped with number of instruments allowing each individual student to perform practical.

The students of Agricultural Engineering discipline undergo Two five weeks Skill Development Trainings under Hands-on-training after IV and VI semester. The industrial attachment training for 10 weeks and Experiential Learning on campus programme of 12 weeks is carried out in VII semester. The requisite facilities for conduction of experiential learning programme are provided to students to practically fulfill programme requirements and achieve desired skills. Within VIII semester students perform 12 Weeks Project planning and report writing as per ICAR guidelines. The facilities for project are provided to the students as per requirement.

Students have undergone the hands on training for the skill development during the training programme to make them fit for demonstrating the responsibilities effectively in the professional career. During the training students developed the skill in the field of farm machinery training and testing, repair and maintenance, renewable energy, soil and water conservation, design structures, Irrigation and water management, food processing & value addition, post-harvest management etc.

Table. 16 a) Experiential Learning Modules for B. Tech (Agricultural Engineering)

Department	Module for B. Tech (Agricultural Engineering)
IDE	Layout of irrigation system on field and its cost estimation Planning, design and installation of pressurized irrigation systems. Maintenance and Management of Pressurized Irrigation Systems. Cropping pattern and irrigation management in canal command for major/minor/medium irrigation projects Irrigation and Nutrient Management in Greenhouse
SWCE	Watershed Planning, Development and Evaluation Design & Development of Rainwater Harvesting
FMPE	Farm Mechanization Manufacturing of Agricultural Tools & Implements
REE	Drying of Different Vegetables using Solar dryer Preparation of Briquettes for Furnaces, & Cook Stoves
PFE	Processing and value addition of Milk Products Processing of Horticultural crops

Table. 16 b) Titles of Experiential Learning Modules for B. Tech (Agricultural Engineering) implemented during 2015-16 and 2019-20

Sl. No.	Title of EL	Year of Sanction	EL Location	Discipline
1	a) Processing of milk and	2015-16	PFE Deptt	PFE

	milk products b) Production of cereal-based extruded product, spices and pine apple			
2	Participatory Rural Appraisal of Chotta Singtam Village	2016-17	Chotta Singtam Village	SWCE
3	Processing of milk and milk products and value addition of horticultural crops	2016-17	PFE Deptt & FPPSDC	PFE
4	Processing of milk and milk products and value addition of horticultural crops	2017-18	PFE Deptt & FPPSDC	PFE
5	Fabrication of improved farm tools and equipment	2017-18	FMPE Deptt	FMPE
6	Design, Development and Performance Evaluation of Polycarbonate Canopy Solar Tunnel Dryer	2017-18	REE Deptt	REE
7	Installation of Gravity Drip Irrigation System for small Vegetable growers	2017-18	IDE Deptt	IDE
8	a) Processing of milk and milk products b) Processing and value addition of horticultural crops	2018-19	PFE & FPPSDC	PFE
9	Design and construction of Naturally ventilated Poly-house for organic farming	2018-19	SWCE Deptt	SWCE
10	Installation of Gravity Drip Irrigation system for small vegetable Growers	2018-19	IDE Deptt	IDE
11	Development of 3D model of farm machinery	2018-19	FMPE Deptt	FMPE
12	Designed Solar Tunnel Dryer using software CATIA	2018-19	REE Deptt	REE
13	Processing milk and milk products of and value addition of horticultural	2019-20	PFE Deptt & FPPSDC	PFE

	crops			
14	Natural Resource Database Management Using GIS	2019-20	SWCE Deptt	SWCE
15	Development of idea to 3D model using CATIA V6	2019-20	FMPE Deptt	FMPE
16	Design, Costing and Depreciation Analysis of Solar Tunnel Dryer (STD)	2019-20	REE Deptt	REE
17	Layout of irrigation system on field and its cost estimation	19-20	IDE Deptt	IDE

Table. 16 c) Major skills imparted through Experiential Learning Modules for B. Tech (Agricultural Engineering) implemented during 2015-16 and 2019-20

Sl. No.	Year	No. of students trained	Major skills imparted
1	2015-16	07	a) Formulation and manufacture of value added products b) Operation and maintenance of processing equipments c) Development of managerial skills under protected environment d) Skill to develop Detailed Project Proposal to start entrepreneurship- e) Registration and licensing enterprise to run business
2	2016-17	06	a) Formulation and manufacture of value added products b) Operation and maintenance of processing equipments c) Development of managerial skills under protected environment d) Skill to develop Detailed Project Proposal to start entrepreneurship e) Registration and licensing enterprise to run business
3	2016-17	04	a) Concept of Venn diagram was developed. SWOT analysis and problem identification in village b) Information on Indigenous and technological knowledge were also obtained
4	2017-18	07	a) Formulation and manufacture of value added products b) Operation and maintenance of processing equipments c) Development of managerial skills under protected environment d) Skill to develop Detailed Project Proposal to start entrepreneurship e) Registration and licensing enterprise to run business
5	2017-18	04	Design and installation of gravity Drip Irrigation
6	2017-18	04	Fabrication of improved farm implement
7	2017-18	04	Learned about drying mechanisms and dryer design, installations and utilization
8	2018-19	04	Skill was imparted to design and Construction of naturally ventilated polyhouse

9	2018-19	06	a) Formulation and manufacture of value added products b) Operation and maintenance of processing equipments c) Development of managerial skills under protected environment d) Skill to develop Detailed Project Proposal to start entrepreneurship e) Registration and licensing enterprise to run business
10	2018-19	04	Installation, Maintenance and Hydraulic Evaluation of Drip Irrigation system
11	2018-19	03	Learned about drying mechanisms and dryer design, installations and utilization
12	2018-19	06	• Understanding the components in a machine e.g. Paddy thresher • Determining the accurate dimensions of the machine components • Development of 3D models of the machine components using CATIA V6 • Assembly of the components developed to make the 3D model of the machine Understanding the working mechanism of the machine
13	2019-20	06	a) Formulation and manufacture of value added products b) Operation and maintenance of processing equipments c) Development of managerial skills under protected environment d) Skill to develop Detailed Project Proposal to start entrepreneurship e) Registration and licensing enterprise to run business
14	2019-20	07	Fabrication of Parshall Flume, Layout of Irrigation System on field, Cost estimation
15	2019-20	07	Learned about drying mechanisms and dryer design, installations and utilization
16	2019-20	07	• Understanding the components in a machine e.g. Paddy thresher • Determining the accurate dimensions of the machine components • Development of 3D models of the machine components using CATIA V6 • Assembly of the components developed to make the 3D model of the machine Understanding the working mechanism of the machine
17	2019-20	04	Study was carried out to obtain information of the natural resource conservation and management by local community

Table. 17 a) Places of Training for Skill Development summer Training -I of 5 weeks duration (after IVth semester)

Year	List of Training Institutes **B. Tech 2nd year Agril. Engineering**
2015-16	Southern Region Farm Machinery Training and testing Institute, Anantpur:10 Northern Region Farm Machinery Training and testing Institute, Hisar:02 North Eastern Region Farm Machinery Training and Testing Institute, Assam:12 NERIWALAM, Tezpur:02

2016-17	Central Farm Machinery Training and Testing Institute, Budani, Bhopal:04 Southern Region Farm Machinery Training and testing Institute, Anantpur:06 Northern Region Farm Machinery Training and testing Institute, Hisar:08 North Eastern Region Farm Machinery Training and Testing Institute,Biswanath CharaliAssam:05
2017-18	Central Farm Machinery Training and Testing Institute, Budani, Bhopal:06 Southern Region Farm Machinery Training and testing Institute, Anantpur:12 Northern Region Farm Machinery Training and testing Institute, Hisar:10
2018-19	Central Farm Machinery Training and Testing Institute, Budani, Bhopal:05 Southern Region Farm Machinery Training and testing Institute, Anantpur:13 Northern Region Farm Machinery Training and testing Institute, Hisar:10 North Eastern Region Farm Machinery Training and Testing Institute, Biswanath CharaliAssam:06
2019-20	Central Farm Machinery Training and Testing Institute, Budani, Bhopal: 03 Southern Region Farm Machinery Training and testing Institute, Anantpur:11 Northern Region Farm Machinery Training and testing Institute, Hisar:08
2020-21	Mahindra and Mahindra Ltd, Nagpur

Table. 17 b) Places of Training for Skill Development summer Training -II of 5 weeks duration (after VIth semester)

Year	List of Training Institutes **B. Tech 3rd year Agril. Engineering**
2015-16	CIPHET, Ludhiana: 10 ICAR Research complex for NEH Region, Barapani: 09 ICAR-Indian Institute of Soil and Water conservation, Regional centre, Vasad, Gujarat: 10
2016-17	ICAR-Indian Institute of Soil and Water conservation, Regional centre, Udhagamandalam, Tanil Nadu: 05 ICAR Research complex for NEH Region, Barapani: 11 ICAR- Indian Institute of Soil and Water conservation, Regional centre , Koraput:05 One cert, Jaipur: 05
2017-18	ICAR-Indian Institute of Soil and Water conservation, Regional centre, Udhagamandalam, Tanil Nadu: 05 ICAR Research complex for NEH Region, Barapani: 09 CRIDA, Hyderabad:04 CIPHET, Ludhiana:03 ICAR- Indian Institute of Soil and Water conservation, Regional centre , Agra:02

2018-19	Indian Institute of Food Processing Technology, Thanjavur, Tamil Nadu:11 ICAR-Indian Institute of Soil and Water conservation, Regional centre, Udhagamandalam, Tanil Nadu: 04 ICAR Research complex for NEH Region, Barapani: 06 ICAR- Indian Institute of Soil and Water conservation, Regional centre , Agra:04
2019-20	Central Institute of Agricultural Engineering, Bhopal:10 Indian Institute of Food Processing technology (IIFPT), Guwahati: 08 ICAR Research complex for NEH Region, Barapani:09 ICAR-IISWC, Ooty:05 Likla Thangjam Agro, Imphal:05
2020-21	Agrinext Consultancy, Pune Maharastra:21

Table. 17 c) Centers for In-Plant Training for VII semester for B. Tech (Agricultural Engineering)

Year	List of Training Institutes **In Plant training**
2019-20	Likla Thangjam Agro, Imphal:04 Govt. Fruit Preservation Factory, Singtam, Sikkim: 14 Mizoram Milk Producers Cooperative Union Ltd (MULCO), Aizwal:05 Gomati Cooperative Milk Producers Union Ltd., Agartala: 03 Kanchan Bhog Floor Mill Ltd., Tadong Sikkim:05 Reymond UCO De3nim Pvt.Ltd, Yavatmal, MS: 01 Lambu-Subu Food & Beverages, Lower Subansari, arunachal Pradesh :02
2020-21 Proposed	Govt. Fruit Preservation Factory, Singtam, Sikkim Likla Thangjam Agro, Imphal

6.4.6. Supervision of students in UG/PG / Ph. D Programmes:

(number of qualified faculty in relation to the intake of students, as per the guidelines in the matter.)

This college have started PG programs in 2013 onwards and Ph. D. from 2016 onwards. Currently all departments are running PG programs and 3 departments are having PhD program.

Table. 18 a) Number of PG/PhD students passed out till Academic year 2019-20

S. No	Degree	Discipline wise	Total

1	M. Tech. (Agril. Engg.)	FMPE- 5 SWCE- 6 PFE-6	17
2	PhD (Agril. Engg.)	0	0

Table. 18 b) Number of faculty eligible for PG and PhD supervision department wise

S. No	Degree	Department	Intake	Qualified faculty
1	M. Tech. (Agril. Engg.)	FMPE	3+2*	4
		SWCE	3+2*	4
		PFE	3+2*	4
		IDE	2+1#	4
		REE	2+1#	3
2	PhD (Agril. Engg.)	FMPE	2	3
		SWCE	2	2
		PFE	2	2
		IDE	0	2
		REE	0	1

**ICAR Quota (Currently available)*

 # ICAR Quota from CAU, Imphal allotted, Programmes will be opting for accreditation once first batch is passed out)

6.4.7. Feedback of stakeholders: (Students, Parents, Industries, Employers, Farmers *etc*.)

This college has kept suggestion and complaints box in college premises. Regular counseling meetings are organized and in emergency parents are also participated for the personality developments of students. This college has provided an excellent platform and infrastructure to establish rapport between students and teachers. The farmers, entrepreneurs and trainees from various Government, Private and public sector units, stakeholders and unemployed youth coming to various programme provide feedbacks through open platform available at programmes, through feedback books, emails, WhatsApp and available platforms. These feedbacks are taken righteously and proper discussion and action is taken by concerned persons and college authorities time to time.

6.4. 8. Student intake and attrition in the programme for the last five years

Table: 19. Student intake and attrition in the programme for the five years

Name of the Degree Programme	Actual students admitted in last five years					Attrition (%)				
	2015-16	2016-17	2017-18	2018-19	2019-20	2015-16	2016-17	2017-18	2018-19	2019-20
B. Tech (Agril. Engg.)	30	40	36	33	39	3.33	2.5	8.33	0	12.82
B. Tech (Food Technology)	11	09	09	9	10	15	22.2	11.11	18.18	10
M. Tech (FMPE)	01	0	02	03	2	0	0	0	0	0
M. Tech (SWCE)	03	01	02	05	2	0	0	0	0	0
M. Tech (PFE)	02	02	02	04	2	0	0	0	0	0
M. Tech (IDE)	NA	NA	NA	NA	1	0	0	0	0	0
M. Tech (REE)	NA	NA	NA	NA	1	0	0	0	0	0
Ph.D. (FMPE)	-	1	-	1	2	0	0	0	0	0
Ph.D. (SWCE)	-	-	-	1	0	0	0	0	0	0
Ph.D. (PFE)	-	-	1	1	1	0	0	0	0	0

6.4.9. ICT Application in curricula delivery:

- **Interactive whiteboards and touch based computer system:**

The College of Agricultural Engineering and Post-Harvest Technology (CAEPHT) Computer Laboratory, under Central Agricultural University (CAU), Imphal, is well-equipped with 2 smart classrooms having facilities of Interactive whiteboards for conduction of online lectures and smart board allows projection of images, manipulation of images, dragging, clicking and copying of matter. Simultaneously Teacher is availed with facility to provide handwritten notes on board and same can be saved for later use.

- **Computer facilities:**

The College of Agricultural Engineering and Post-Harvest Technology (CAEPHT) Computer Laboratory, under Central Agricultural University (CAU), Imphal, is well-equipped with 20 computers for computing facilities to all the students of the college, teaching and non-teaching staff members along with Internet connectivity. It also provides Internet facilities to all teaching staff, administrative staff and all students of the college. There are approximately more than 300 users who are availing the Internet and computing facilities. The Computer Centre supports a wide 1000 Mbps fiber optic network (OFN) that connects all the academic units, hostels, library, dispensary, residence and other central facilities to the Computer Centre. Users can use the computing resources of Computer Center from their offices, academics unit, hostels and residences. Login is provided to all the students, faculty and staff members for Internet browsing. Besides, Wi-Fi facility is provided to boysô hostel, girlsô hostel, ATIC Building, guest house, dispensary, VC camp, and Deanôs residence. LAN is provided through optical fiber connection in North Academic building, South Academic building, new girlsô hostel, auditorium, staff quarter, medical unit and Farmers Produce Processing cum Skill Development Centre. The network Security is Provided through UTM/Firewall.

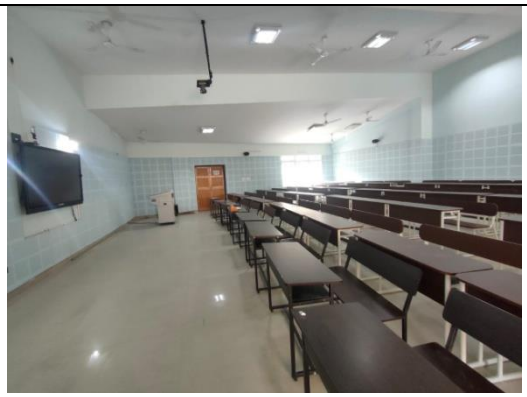


Fig 1: Smart Classroom	**Fig 2: Language Lab**

Fig 3: Computer Lab

(b) Library Services:

The Library provides circulation and reference services. All the in-house operations of the Library are fully computerized using the networked version of the Library software KOHA with Web OPAC facilities. The Library also has access to online e-journals through CeRA. Photocopying and printing facility is also available in the Library. Details of library are as given below: Area of Library: 2400 sq. ft. (223 sq. m.)

Table. 20 Details of Library

Sl No.	Particulars	Details
1.	Present staff	• 1 Senior Library Assistants • 1 Library Assistants • 3 Multi-tasking Staffs
2.	Availability of Wi-fi	• Wi-fi facilities area available in the library with a band width speed of 1GBps from NIC-NKN network.
3.	Books	• For College of Agricultural Engineering and Post-Harvest Technology: **7831 books**
4.	Other reading materials	• National and local newspaper such as Dainik Jagran (Hindi), The Telegraph, The Times of India, Sikkim Express (English), Hamro Prajashakti (Nepali)etc.

		• Magazines like India Today, Down To Earth, Pratiyogita Darpan, Civil Services Chronicle, Kurukshetra, Yojana, Agriculture Today, Economics and Political weekly.
5.	Research Journals	• Students and faculty can access journals through online portal of CeRA, ICAR.
6.	Internet with computers	• Two
7.	Sitting capacity	• 28numbers
8.	Latest technology in library	• KOHA LMS is being used for Library Automation in CAEPHT Library. Necessary steps have been initiated for accessing online journals and study materials at Electronic Resource Management package for e-journals access through CeRA (Consortia fore-Resources in Agriculture)
9.	Stocking arrangement	Library adopted Open Access System for accessing library collection and classified according to Dewey Decimal Classification (DDC) scheme (22 Ed.) and arranged in APUPA pattern, stacked in different parts like, • Subject books • Kannada/Literature books • General books • Reference books • Competitive Exam books • Thesis • Back volumes Seminar scripts
10.	Operating hours	• 10.00 AM to 05.00PM
11.	Books available in COH	• Horticulture, Crop Physiology, Plant Biotechnology Genetics and Plant Breeding,

		Entomology, Microbiology, Agronomy, Plant Pathology, Crop Physiology, Soil Science & Ag. Chemistry, Agro forestry, Ecology, Text book of Advanced Pomology, Plant Biotechnology, Plant Biochemistry, Ag. Economics, Ag. Extension, Statistics, Computer Application & IPR, Botany, Floriculture, Pest management in vegetables, Handbook of Beekeeping.

Fig 4: Library at College of Agricultural Engineering & Post-Harvest Technology

Fig 5: Website Page of CAEPHT Library portal for quick access

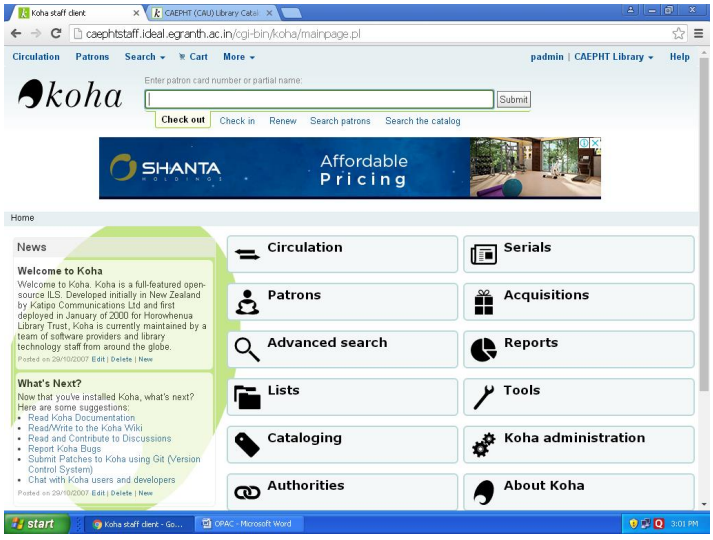


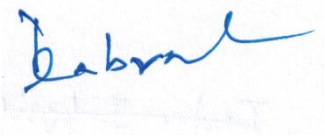
Fig 6: Maintenance of library books, circulation, documentation, nomenclature and serials using KOHA

6.4.10. The information pertaining to 6.4.1 to 6.4.9 has been provided for UG programme *i.e.,* B.Tech.(Agricultural 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, Parmendra Prasad Dabral, the **Dean, College of Agricultural Engg & PHT, CAU, Ranipool Gangtok Sikkim** hereby certify that the information contained in Sections 6.4.1 to 6.4.9 are furnished as per the record available in the college and degree awarding university.



(P. P. Dabral)

Dean

Annexure I

Farm Machinery Laboratory

Farm Power Laboratory

<table>
<tr><td> </td><td> </td></tr>
<tr><td>Ergonomics and Safety Laboratory</td><td>Soil Dynamics Laboratory</td></tr>
<tr><td> </td><td> </td></tr>
<tr><td>Farm Machinery Testing Laboratory</td><td>Thermodynamics and heat engine laboratory</td></tr>
<tr><td colspan="2"> </td></tr>
<tr><td colspan="2">Theory of machine laboratory</td></tr>
</table>

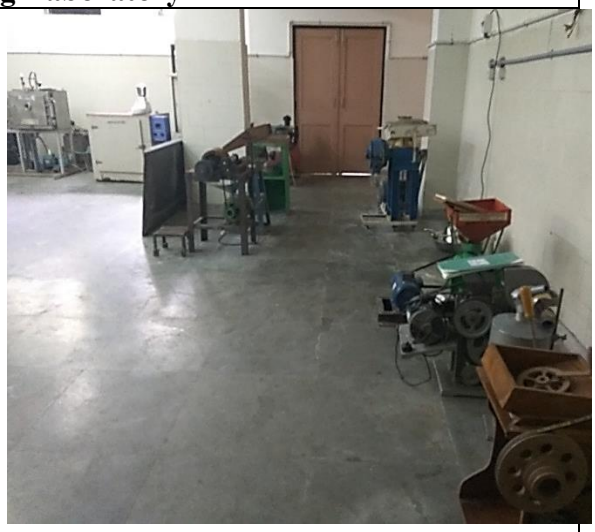
College workshop

Renewable Energy Laboratory

Renewable energy Field Laboratory-1

Renewable energy Field Laboratory-2

Food Engineering Laboratory



Process Engineering Laboratory

Agricultural Structures & Environmental Control Laboratory Engineering laboratory

Food Analytics Laboratory

Pilot Plant

Washer-cum-peeler Machine

Slicing Machine

Grinding Machine

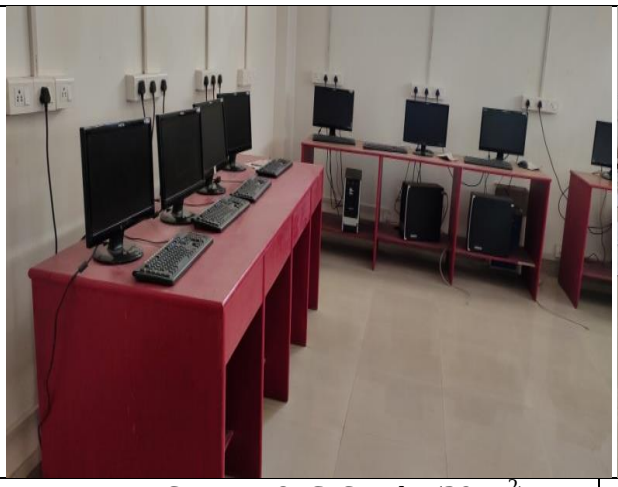
Planetary Mixer

Tray Drier

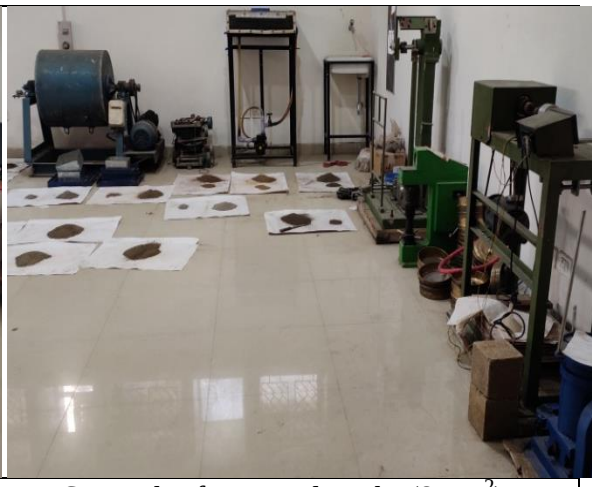
Noodles Making unit in operation

Ginger paste making machine

Farmers' Produce Processing – cum – Skill Development Center

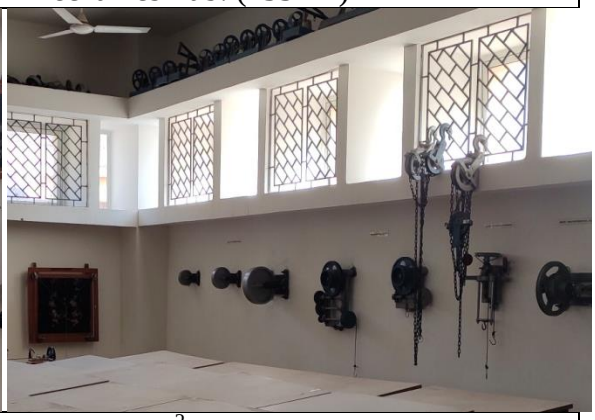


Remote Sensing & GIS Lab. (39 m^2)



Strength of Materials Lab. (81 m^2)

Soil Water Conservation & Soil Mechanics Lab. (135 m^2)



Applied Mechanics Lab. (105 m^2)

Engineering Drawing Lab. (58.5 m^2)

Soil & Water Quality Lab. (40.32 m^2)

Irrigation, Drainage & Fluid Mechanics Lab. (225 m^2)

Biochemistry/Microbiology/ Agriculture Laboratory

Electronics/ Electrical Engineering Laboratory

Computer laboratory

Physics Laboratory

Annexure II

2015-16 (PFE)
EL Module:
A) Processing of milk and milk products
b) Production of cereal-based extruded product , spices and pine apple

During academic year 2015-2016, seven students were participated in ELP (Skill module). In this module students have successfully learned and achieved skill to produce various products such as paneer, ice-cream, turmeric, pasta, ginger powder, osmo-air dehydrated pineapple slices, and orange ginger RTS. In addition they have imparted skills of operation and maintenance of processing equipments, development of art and science of production and managerial skills under protected environment, skill to develop detailed project proposal to start entrepreneurship. Student also learned and acquired skills of analysis of these products as per FSSAI standards. They also acquired knowledge to register and get licence from FSSAI to start food business.

Fig.11: Stages of operation in ice-cream manufacturing process.

2016-2017 (SWCE)

EL Module:

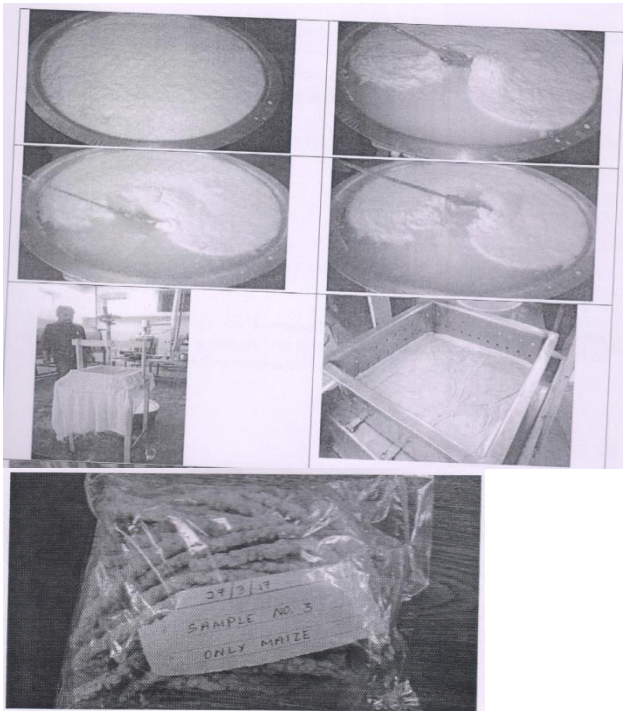
Participatory Rural Appraisal of Chotta Singtam Village

Firstly village mobility, social, resource, technological and bio resource maps were constructed. Information on Indigenous and technological knowledge were also obtained. Concept of Venn diagram was also developed. SWOT analysis and problem identification in village and its ranking were done. Finally action plan was suggested for construction of various soil conservation structures.

2016-17 (PFE)

Processing of milk and milk products and value addition of horticultural crops

During academic year 2016-2017, six students were participated in ELP (Skill module). In this module students have successfully learned and achieved skill to produce various products such as churpi, yoghurt and extruded snacks. In addition they have imparted skills of operation and maintenance of processing equipments, development of art and science of production and managerial skills under protected environment, skill to develop detailed project proposal to start entrepreneurship. Student also learned and acquired skills of analysis of these products as per FSSAI standards. They also acquired knowledge to register and get licence from FSSAI to start food business.



2017-18 (PFE)
EL Module:
Processing of milk and milk products and value addition of horticultural crops
During academic year 2017-2018, seven students were participated in ELP (Skill module). In this module students have successfully learned and achieved skill to produce various products such as paneer, ice-cream, ice-candy, turmeric powder, dried ginger slices, pineapple ginger RTS. In addition they have imparted skills of operation and maintenance of processing equipments, development of art and science of production and managerial skills under protected environment, skill to develop detailed project proposal to start entrepreneurship. Student also learned and acquired skills of analysis of these products as per FSSAI standards. They also acquired knowledge to register and get licence from FSSAI to start food business.

2017-2018 (FMPE)
EL Module:
Fabrication of improved farm tools and equipment

Department: Farm Machinery and Power Engineering, CAEPHT, Gangtok

During 2017-18, 5 students of B.Tech. (Agricultural Engineering) final year students of College of Agricultural Engineering and Post Harvest Technology (Central Agricultural University, Imphal) Ranipool, Gangtok CAEPHT were engaged for three months under experiential learning under ñfabrication of improved farm tools and equipmentò module.

They were assigned to fabricate and sale 5 numbers of animal drawn improved wedge ploughand 4 numbers of improved peg type puddlers. These two implements are gaining popularity among the farmers. The students fabricated these implements at the production cost of Rs 2500/- and Rs 800/- respectively. Out of 9 units fabricated, 4 units were sold to farmers and KVK at selling price of Rs 3500/- and 1000/- respectively.

2017-18 (REE)
EL Module:
Design, Development and Performance Evaluation of Polycarbonate Canopy Solar Tunnel Dryer
During 2017-18, 4 students (Mr. Abhijeet Kumar, Mr. Abhishek Kumar, Mr. Macariush N. Sangma and Mr. Nirmalya Kumar Nath) of B. Tech. (Agricultural Engineering) final year students of College of Agricultural Engineering and Post Harvest Technology, Ranipool, Gangtok, Sikkim were engaged for final semester under experiential learning programme in the Department of Renewable Energy engineering. The solar tunnel dryer is a tunnel like semi cylindrical in shape, poly house made up of acrylic polythene sheet. The capacity is large enough that it can be used to dry 320 kg of ginger and turmeric under controlled environmental conditions. A solar tunnel dryer was designed, Fabrication and Economy analysis of Solar Tunnel Dryer at the premises of M/s Natures Gift, Rangpo, Sikkim. Solar tunnel dryer was designed for drying of 320 kg of ginger and turmeric with drying period of 15 sunshine hours. Total cost of Rs. 2,50,000 of solar tunnel dryer was borne by M/s Natures Gift, Rangpo, Sikkim. This program has boosted up the confidence of the students due to hands on training and some students have shown positive interest in being an entrepreneur.

Fabricating Solar Tunnel Dryer

Solar Tunnel Dryer installed M/s Natures Gift, Rangpo, Sikkim

2017-18 (IDE)
EL Module:
Title: Installation of Gravity Drip Irrigation System for Small Vegetable Growers
Department of Irrigation & Drainage Engineering
Brief report: Water is an important component for the entire crop production system. About 75%

of the global freshwater is used for agricultural irrigation.

Efficient use of available irrigation water is essential for increasing agricultural productivity for the alarming Indian population.

Therefore, hand in hand with technologies for water harvesting and storage, technologies for precision water application methods need to be adopted. Micro-irrigation technology is the most efficient irrigation method available as at present. Micro-irrigation mainly deals with drip and sprinkler irrigation.

Objectives:

1. Installation of gravity drip irrigation system for small vegetable growers
2. To evaluate the field performance of the gravity drip irrigation system.

Materials and Methods

As reviewed earlier, the present study was conducted with installation of gravity feed drip irrigation. The study was conducted in the month of February to May, 2018.

The study area comprises at the college (CAEPHT) area located in the district of East-Sikkim. In the present study was conducted nearby New Girlôs Hostel lies between latitude 27 17ô23ò N to longitude 88 35ô26ò E. Gravity drip irrigation system was designed and evaluated for the small area. The components of gravity drip irrigation system are: Storage tank, Main line& Sub-main,Laterals,Drippers,Filter and Fitting accessories

Conclusions: Gravity drip irrigation system was designed for the small area of 100 m² near the new girlôs hostel of college of Agricultural Engineering and Post Harvest Technology, Ranipool. Following conclusions were drawn from the study: The Field evaluation of the system were adjudged by the hydraulic performance criteria such as emission uniformity, field application efficiency and the distribution efficiency. The designed gravity drip irrigation system showed the effectiveness in terms of its performance and found to be very suitable for the adoption by the small farmers. The Emission uniformity (Eu) observed to be 93.06 % for the 3 m head with the o % slope. Similarly, Eu varies from 87.47 % to 83.59 % for the 2.5 to 2 m head.

2018-19 (PFE)

EL Module:

a) Processing of milk and milk products

b) Processing and value addition of horticultural crops

During academic year 2018-2019, six students were participated in ELP (Skill module). In this module students have successfully learned and achieved skill to produce various products such as paneer, ice-candy, mango ice-candy, turmeric powder, and dried ginger slices. In addition they have imparted skills of operation and maintenance of processing equipments, development of art and science of production and managerial skills under protected environment, skill to develop detailed project proposal to start entrepreneurship. Student also learned and acquired skills of analysis of these products as per FSSAI standards. They also acquired knowledge to register and get licence from FSSAI to start food business.

2018-19 (SWCE)

EL Module:

Design and Construction of naturally ventilated polyhouse for organic farming

The objective of this experiential learning unit was to construct naturally ventilated poly house considering the design parameters of ventilation for organic cultivation. The poly house was constructed in a farmers field (Shri. Pratap Thatwal) in Soureni village (Assam Lingzey) located in Jalipool Tehsil of East Sikkim. For designing the green house following consideration were taken into account: Site selection, orientation, structural forms, covering materials, structural frames and water supply. The

dimension of the NVP constructed in the farmers field was 24.6 m length and 5.0 m width, with total floor area of 123 sq.m. the provision of ventilation was kept at 2 feet from the surface for all four sides along the full length and breadth. The roof ventilation was also provided for better air-exchange, carbon dioxide replenishment and temperature reduction in the NVP. This naturally ventilated poly house was constructed using bamboo (70 nos) having diameter 91.5mm. This plastic film (UV Protected) sheets 2200 micron was used. The shade nettings were also designed to protect the crops and plants from UV radiations. They also provide protection from changing weather conditions. Beside this zig-zag aluminium wire and aluminium profile were also used for fixing this green house. The ventilation of the NVP was provided at roof top and side(4 sides). The cost of construction of NVP is as follows (Table 1)

Table 1:

Sl. No.	Types of cost	Cost (in Rupees)
1	Labor	10500
2	Plastic Film	17000
3	Miscellaneous	5000
4	Bamboo	21000
	Total	**53500**

The cost per sq. m of the constructed NVP in the farmerôs field is found to be about Rs 435.00 per square meter. Thus the low cost bamboo polyhouse constructed in the farmerôs field will support the organic mission in Sikkim as the NVP constructed in the farmerôs field is being used to cultivate capsicum

Fig. Low cost bamboo polyhouse constructed in the farmer's field

2018-19 (IDE)
EL Module:
Title: Installation, maintenance and hydraulic evaluation of drip irrigation system and development of low cost vertical farming structures
Introduction: Drip irrigation is an artificial application of water to the soil through various systems of pumps, tubes and emitters. It is normally used in areas where rainfall is inconsistent or dry conditions or drought is expected. In drip irrigation water is supplied to the soil surface directly at the plant root zone, drip by drip. Water is applied at frequent and slow application to the soil, near the root zone of the plants through mechanical devices called emitters that are located at selected

points along water delivery lines. It is most suitable for row crops (vegetables, soft fruits), tree and vine crops where one or more emitters can be provided for each plant. Generally, only high value crops are considered because of the high capital cost of installing a drip system. It is adaptable to any farmable slope.

Construction of low cost vertical farming structures: This experiment was conducted outside the IDE laboratory. Bamboo was collected from the campus area and brought to the construction site. Three shelves were made on both side of the A shape vertical farming system using binding materials (wire and nail). Field manure was filled on to these shelves and fenugreek was planted. The growth observations for crop was noted daily.

Construction of A shape vertical farming model and fenugreek grown

Conclusion: Two gravity fed drip irrigation system were installed inside the poly-house and in open field near the new library building. Hydraulic evaluation was carried out for both the systems and showed very good performance with minimal head losses.The constructed vertical farming structures using locally available bamboo can effectively be used for the cultivation of close growing leafy vegetables such as fenugreek and coriander etc.

2018-19 (FMPE)

EL Module:

Development of 3D model of farm machinery

Three dimensional model of various farm machinery namelyself-propelled zero till planter, axial flow paddy thresher and power drill operated seed drill cum planter have been developed using CATIA V6 in the year 2018-19 as a part of experiential learning program. The students have imparted the skill of making 3D model of machine components along with the assembly of the components to develop a complete model. The students have also learnt the working mechanism of the machines and are aware of the dimensions, material used, etc. Learning this software will help them in presenting their ideas in an easy and scientific way in their carrier. Figure 1 shows the 3D model of self-propelled zero till planter developed using CATIA V6.

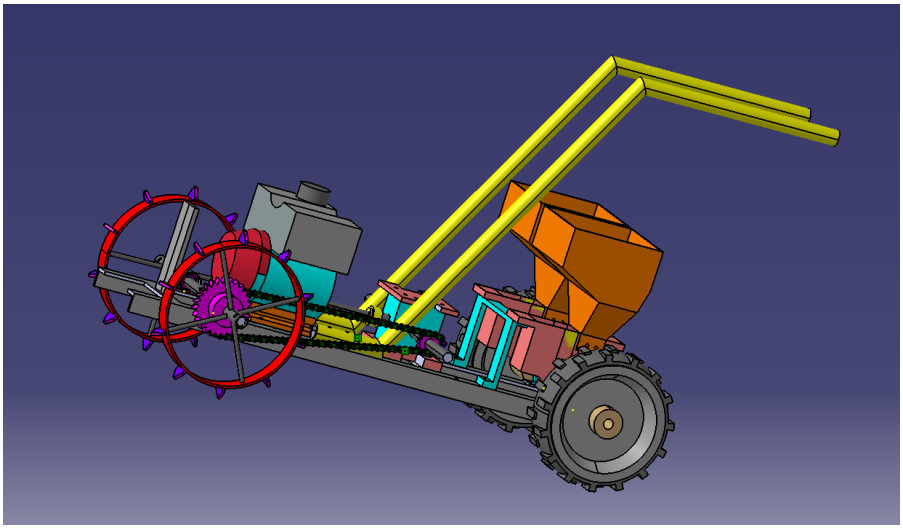


Figure 1. 3D model of self-propelled zero till planter using CATIA V6

2018-19 (REE)

EL Module:

Designed Solar Tunnel Dryer using software CATIA

In this work students have designed a STD using CATIA V5R20 software for different load capacities. According to the different loads, different dimensions have also found by design analysis manually. According to the dimensions, approximate cost operations of the STD was found out to ₹89,257.25 for 150 kg, ₹1,74,104.25 for 300 kg, ₹2,56,694.26 for 450 kg and ₹3,40,922 for 600 kg.

Working stability of STD depends on the transparency of the cover materials used. Transparency depends on the radiation receiving outside and inside the STD. In this work, transparency of the material was found to be declining by 60% by the 6th useful years. And it was found by using an equation derived from the transparency-age graph that by the 10th useful year it will not be useful anymore since its transparency will be declining by 50%. Because by the 50%, the heat produced and heat loss will be same.

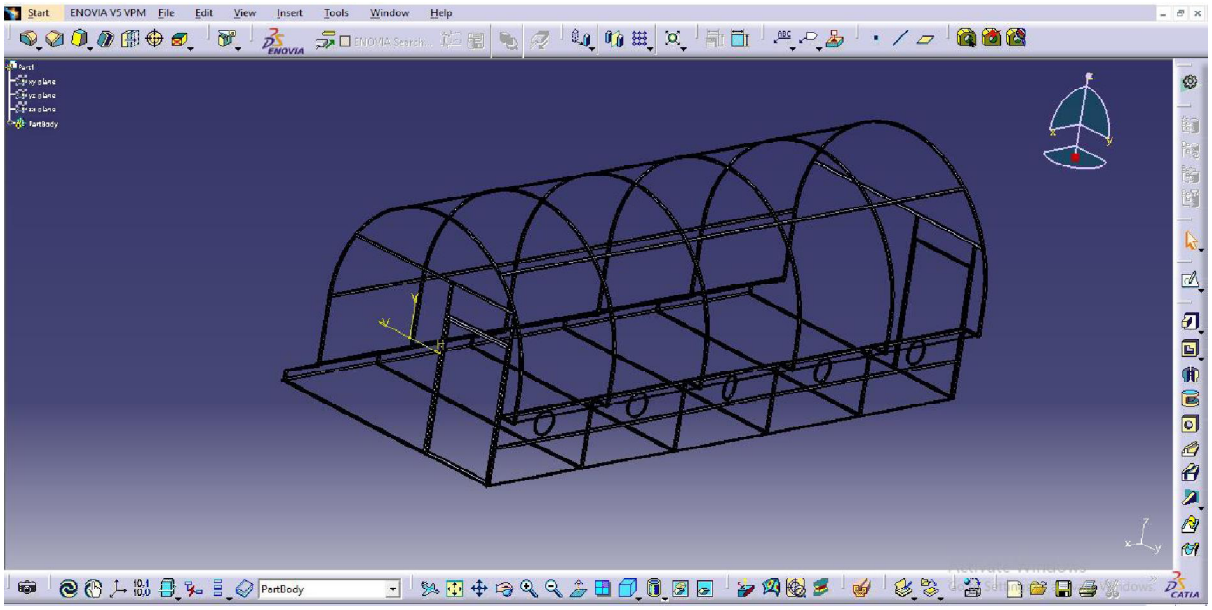


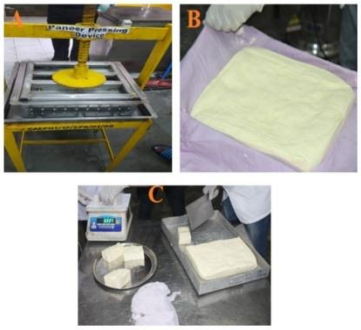
Fig: Complete 3-D structure of a simple STD in a part design with exhaust fans and doors

2019-20 (PFE)

EL Module:

Processing milk and milk products of and value addition of horticultural crops

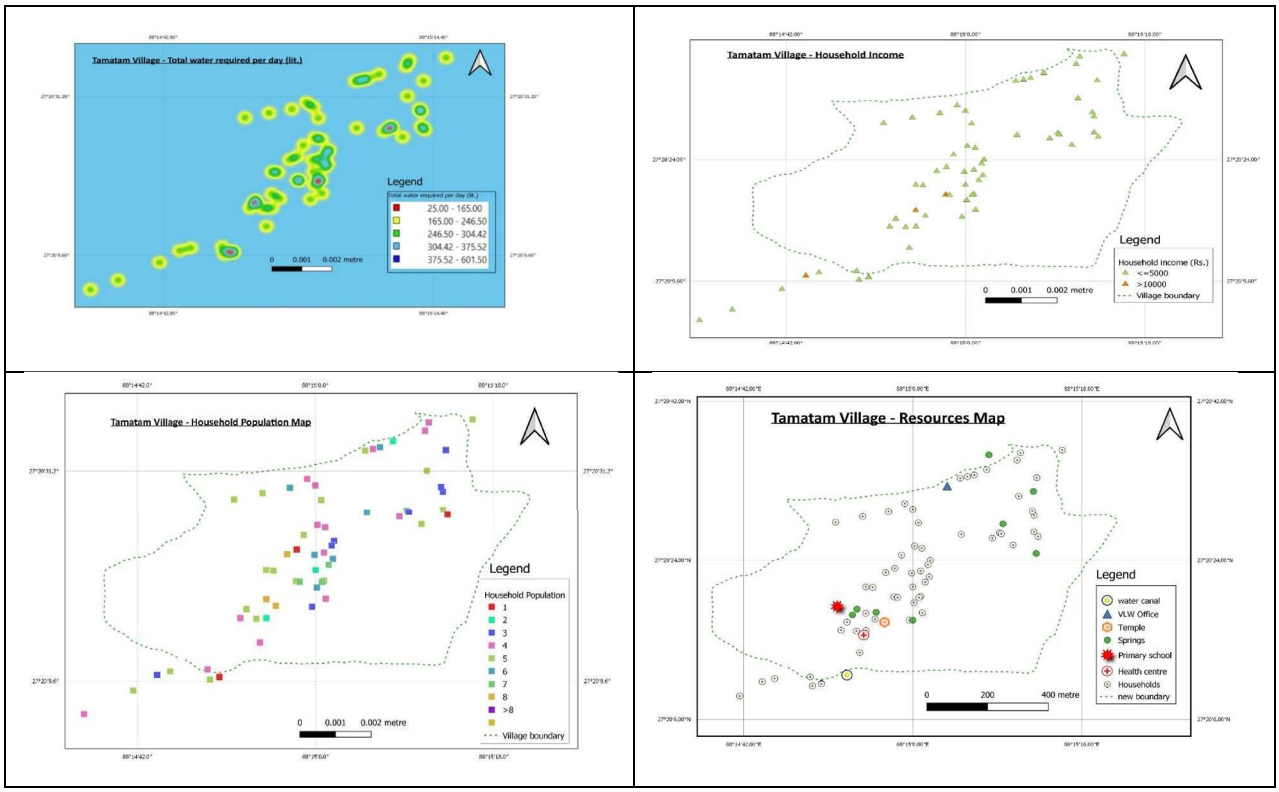
During academic year 2019-2020, seven students were participated in ELP (Skill module). In this module students have successfully learned and achieved skill to produce various products such as paneer, ice-candy, and mango ice-candy,. In addition they have imparted skills of operation and maintenance of processing equipments, development of art and science of production and managerial skills under protected environment, skill to develop detailed project proposal to start entrepreneurship. Student also learned and acquired skills of analysis of these products as per FSSAI standards. They also acquired knowledge to register and get licence from FSSAI to start food business.

		
2019-20		

2019-20 (SWCE)
EL Module:
Natural Resource Database Management Using GIS

Objective of this experiential learning was to create resource data base of a village and to study the natural resource conservation and management by local community of Tamatam Village, East Sikkim
Firstly a questionnaire was prepared. Primary and secondary data of the village were collected. Exchange of ideas and awareness generation among the community member of the village regarding conservation of water were made. Water availability and requirement of each house hold were carried out. Using GIS and remote sensing, resource, house hold income and population maps were created. By this study students develops following skills:

- Development of communication skills with village community.
- Preparation of questionnaire.
- Primary data collection related to socio economic and natural resources.
- Idea exchange with the village community on Natural resource management.



2019-20 (FMPE)
EL Module:
Development of idea to 3D model

In the year 2019-20, the students have learned how to conceptualize their ideas and convert into a 3D model. Figure 2 shows the 3D model of a bund digger. The student had an idea of developing a machine

which will be suitable for digging or making holes in bund for planting paddy, millets, etc. which is generally practised in Apatani farming system in Arunachal Pradesh. With the help of CATIA V6, he has successfully developed a 3D model of his idea. The developed model is made based on actual dimensions which will be suitable for application in the field. Therefore, it would be easier and time saving while fabricating the machine. To mention, such type of machine has not been developed so far till date. Learning of modelling software like CATIA V6 encourages the students towards innovation.

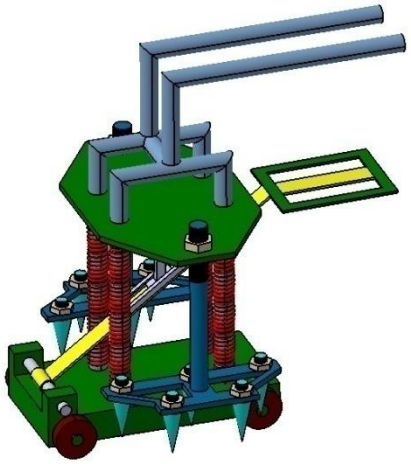


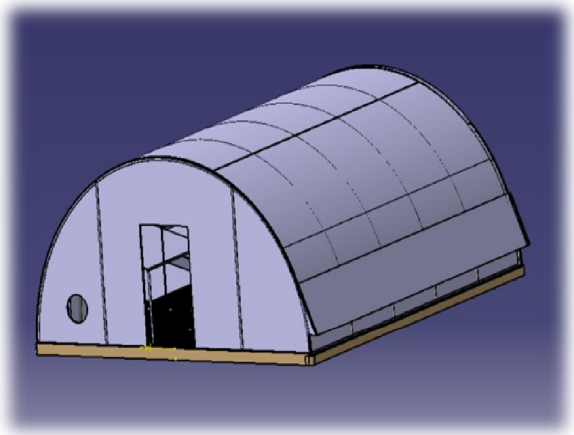
Figure 2. 3D model of a bund digger

2019-20 (REE)

EL Module:

Design, Costing and Depreciation Analysis of Solar Tunnel Dryer (STD)

During 2019-20, 7 students (Ms. Madhu, Ms. Lalthangmawaii, Mr. Bivek Chakma, Ms. HamtoitiReang, Mr. Suvranil Majumdar, Mr.Biswajit Dey and Ms. Rima Das)of B.Tech. (Agricultural Engineering) final year students of College of Agricultural Engineering and Post Harvest Technology, Ranipool, Gangtok, Sikkim were engaged for experiential learning programme within Student Ready of VII semester in the Department of Renewable Energy engineering. The solar tunnel dryer is a tunnel like semi cylindrical in shape, poly house made up of acrylic polythene sheet. The capacity is large enough that it can be used to dry 100 kg of ginger and turmeric under controlled environmental conditions. A solar tunnel dryer was designed, Fabrication and Economy analysis of Solar Tunnel Dryer at the premises of Farmerôs house in Soureni Village, Assam Lingzey, Sikkim. Solar tunnel dryer was designed for drying of 100 kg of ginger and turmeric with drying period of 18-24 sunshine hours. The economics of solar dryer has shown significant returns of Rs. 1200 to Rs. 2400 per batch of 100 kg drying of turmeric and ginger respectively.



Overall length	5.85 m
Overall width	4.05 m
Overall height	2.3 m
Radius of the tunnel	3.048 m
Fam Diameter	0.18 m
Tilt angle of the collector	30° with horizontal
Gap between absorber plate and polycarbonate sheet	0.152 m
Polycarbonate sheet thickness	2 mm
Number of tray layers	2
Number of trays	12

CATIA Model of STD | **Shape and dimensions of the STD**

Construction phase of STD

Loading of ginger peel and Dryer loaded with Ginger

Module: Design, performance and economic evaluation of Solar Tunnel dryer (STD)

Solar Tunnel Dryer located at Soureni Village

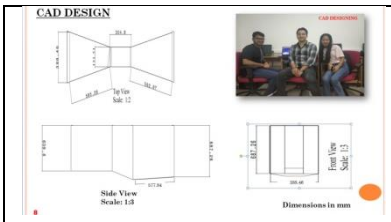
Dryer tray arrangement and absorber polythene for maximize heat trappings

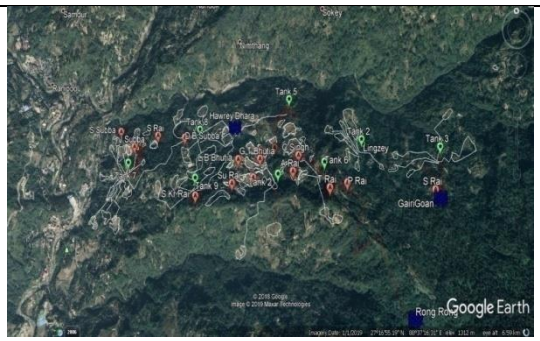
IDE (2019-20)
EL Module:
Layout of irrigation system on field and its cost estimation

The present study was conducted as a part of experiential learning programme under the Department of Irrigation and Drainage Engineering, College of Agricultural Engineering & Post Harvest Technology. For this purpose three major objectives were formulated consisting of Fabrication of Parshall Flume, Layout of Irrigation System on field & Cost estimation of the Pipe layout & water storage tanks. Following work was carried out :

1. As per IS 14371:1996, the standard dimensions of a 6-inch (15.24 cm) Parshall flume was fabricated. Students successfully fabricated the discharge measuring device (Parshall Flume) in workshop. Using the fabricated Parhall Flume spring water source discharge was measured at Aho (Ranipool) Village in East Sikkim. The measured water discharge was 0.0004623 □ □/□ for a head of 1.8 cm and 0.0003838 □ □/□ for a head of 1.6 cm.

2. For the same village a study on Geotagging, using GIS was carried out for Irrigation field layout. Cost estimation of pipe layout & tank construction was also carried out.

	
CAD design of Parshal flume	Fabrication of Parshal Flume

	
Designing Of Irrigation Field Layout	Identification Of Water Source & Pipe Layering
Module: Layout of irrigation system on field and its cost estimation	

Annexure- III

Details of project conducted for B. Tech (Agricultural Engineering)

S.No.	Year	Thesis Title	Name of the student	Guide
1	2015	Drought evaluation of tadong east Sikkim through reconnaissance drought index	Ms. Lalrohlui	Dr. S.R Yadav
2	2015	Performance evaluation of reference evapotranspiration methods for jorhat district of Assam	Pintu Kr. Gupta	Er. Vanita Pandey
3	2015	Use of probability distribution functions in rainfall analysis of east Sikkim	Mr. Malsawmtharzela	Dr. S.R. Yadav
4	2015	Studies of draftabilty of non-descript bullocks of Sikkim	Mr. Avinash Rai	Er. S.K Chauhan
5	2015	Ergonomic evaluation of hand operated maize shellors	Ms. Mishma Jamatia	Dr. N.S Chauhan
6	2015	Effect of organic manure and bio-fertilizer on growth and yield of tomato under low cost polyhouse	Mr. Arjun Raj Ghosh	Dr. A.B Sherpa
7	2015	Design and development of power tiller operated seed drill cum planter	Mr. Nawang Palden Bhutia	Er. S.K Satpathy
8	2015	Effect of rapid sand filter in removing turbidity from water	Mr. Deepak Raikwal & Ms. Hkawanlee Pisi	Dr. A.K Vashisht
9	2015	Design and modification and field evaluation of mechanically powered zero tillage multi crop planter	Mr. Amlan Bhattacharjee & Mr. Saihmingiana Sailo	Dr. S.N Yadav
10	2015	Soil erodibility factor for lower transact of rani khola watershed of east Sikkim	Susanta Das & Ratan Sarkar	Dr. P.K Bora
11	2015	Performance evaluation of elevated absorber solar tunnel dryer	Mr. Indira Taloh	Er. S.M.K Zzaman
12	2015	Studies on anti-oxidant activities of some locally iavailable vegetables in Sikkim	Mr. Bomli Kaye	Dr. Y. Ranjana Dev
13	2015	Evaluation of reference evapo-transpiration methods for jorhat district of Assam	Mr. Lalruatkima	Er. Vanita Pandey
14	2015	Experimental analysis of floating drum type potable kitchen waste bio-gas plant in NEH region	Mr. Rajeev Kumar & Ms. Diki Doma Tamang	Dr. M.S Sevada
15	2015	Estimation of infiltration rate from soil properties using regression model for fallow cultivation land	Mr. Tatung Taka Sikar	Dr. G.T Patle

16	2015	Development of pedo transfer functions to predict saturated hydraullic conductivity for fallow cultivated lands	Ms. P.C Vanlalnuchhani	Dr. G.T Patle
17	2015	Developing water resource management strategy for Sikkim (south district) using remote sensing & GIS	Mr. Chabungbam Niranjit Khuman & Ms. Janu Taibang	Dr. Basant Kumar Singh
18	2015	Optimization study of ready-to-eat extruded snacks usingblack rice, buckwheat and maize	Ms. Tannima Debbarma & Momocha Meinam	Er. A.I Singh
19	2015	Spray drying of milk-ginger juice	Mr. Jitson Achon & Mr. Leishangthem Romicha Singh	Dr. Sujata Jena
20	2015	Study on moisture sorption characteristics of sea buckthorm	Mr. Huirem Momocha Singh	Dr. Sujata Jena
21	2016	Development of potable power paddy thresher for hill agriculture	Sarbajaya Debbarma & Igel Lollen	Er. S.K Satpathy
22	2016	Morphometric evaluation of the rani khola watershed in Sikkim, India using ASTER GEDEM data in GIS enviroment	Bajieborlang L. Chyne	Dr. S.R Yadav
23	2016	Development & performance evaluation of furrow openers matching with self propelled stubble mulcher cum zero till planter	Mr. Lalruatfela	Er. S.K Chauhan
24	2016	Performance of different size of bio-gas plants for production of bi0-gas from kitchen waste in NEH region of India	Chiradip Barua & Amit	Dr. M.S. Sevada
25	2016	Development and performance evaluation of animal drawn bio-fertilizer applicator cum maize planter for hilly region	Sudip Sahaji & Alka Thapa	Er. S.K Chauhan
26	2016	Evaluation of metrological parameter based solar radiation models and selection of best model for the supply area	Ms. B. Lalthanpuii & Ms. Anastasia ch. Sangma	Er. Vanita Pandey
27	2016	Study of hot air drying characteristics and functional properties of red cherry pepper	Mr. Janang Tajo & Miss Mukta Majumdar	Dr. Sujata Jena
28	2016	Sensitivity analysis of climatic parameters in reference evapo-transpiration in east district of Sikkim	Mr. Doyaram Sengdo & Mr. Minkeng Tapak	Dr. G.T Patle
29	2016	A study of large cardamom curing using rotary dryer	Ms. Hemam Henarita Devi & Ms. Huidrom Romita Devi	Er. A.I.Singh
30	2016	A study of effect of convecting drying parameters on drying characteristic and quality of pumpkin	Sylvia Nongthombam	Dr. Sujata Jena
31	2016	Production of pine apple wine usine indigenous wine yeast of	Mr. Ramendra Debnath &	Dr. Sujata Jena

		Sikkim	Doctor joy Tripura	
32	2016	Design and development of hand operated descaling machine for fish	Moirangthem Haribika & Hage Ropo	Dr. B.K Singh
33	2016	Climatic change of sunshine duration and influencing metrological parameters	Lalhriatpuii Khiangle & Jimpi DeBBARMA	Dr. Deepak Jhajharia
34	2016	Development of a ginger paste making machine	Mr. Andrew Hming Sangbera & Mr. Salam Shreekant	Dr. P.P. Said
35	2016	Modification of brush cutter into a paddy harvester	Mr. Hawaki San Laloo	Er. N. Devarani
36	2016	Estimation of soil erodibility indices of east Sikkim district	Mr. Kishan Nath & Parmita Ghosh	Dr. B.C. Kusre
37	2017	Measurement and modeling rainfall interception loss from four tree species in the CAEPHT, Ranipool, campus	Prem Sunwar	Dr. Santosh Rangrao Yadav
38	2017	Measurement of horizontal and vertical components of pure of animal drawn bio-fertilizer applicator cum maize planter under laboratory condition	Dinesh Thockhom	Er. S.K. Chauhan
39	2017	Development and performance evaluation of hand operated tool for descaling of fish	Minerva Pheiroijam	Dr. B.K. Singh
40	2017	Study on some physical and textual properties of different varieties of chayote in Sikkim	Mwchangei Debbarma	Dr. Sujata Jena
41	2017	Study on mass transfer kinectics and textural properties during osmotic dehydration of chayote	Sophia Chanu Warepam	Dr. Sujata Jena
42	2017	Effect of machine parameters on the performance of CAEPHT small axial flow paddy thresher	Eva P.C. lanunmawii	Er. S.K. Satpathy
43	2017	Influence of climatic parameters on pan evaporation Case study from Imphal, Manipur	Nongmaithem Geebson Singh	Dr. Deepak Jhahjaria
44	2017	IIdentification of potential water harvesting sites using geo-vis-utilization concept	Manbhalang Dakermi Shylla	Dr. Ghanshyam Singh Yurembam
45	2017	Spray pattern uniformity and droplet size distribution analysis using image analysis for organic pesticides	Lalawmpuii	Er. S.K Sathpathy
46	2017	Optimization of vaccum drying process parameter for drying of chayote	H.P. Lalrammawii	Dr. Said Prashant Pandharinath

47	2017	Design and performance evaluation of large cardamom grader	Arpana Thapa	Er. Angona Ingocha Singh
48	2017	Energetic of paddy cultivation in terraces of Sikkim	Aruna Chettri	Dr. N.S. Chauhan
49	2017	Ergonomic evaluation of sprouted rice seeder in terraces of Sikkim	Khumbaron Kiranbala Kabui	Dr. N.S Chauhan
50	2017	Experimental analysis of updraft gasifier for different biomass fuels	Daiakmenlang Sana	Dr. Mahendra S. Sevada
51	2017	Study of solar thermal water pump suitable for hilly region of Sikkim	Abhishek Kumar	Mr. S.M Kamaruzzaman
52	2017	Design modification and performance evaluation of zero till self propelled multicrop planter	Kumar Priyank	Dr. S.N. Yadav
53	2017	Experimental investigation of a solar cooker based on parabolic dish collector in Sikkim climatic conditions	Prasenjit Das Gupta	Dr. Mahendra S. Sevada
54	2017	Field scale mapping of soil variables using geostatistics technique	Abhijeet Kumar	Dr. J. Panda
55	2017	Rainfall characterization and itôs analysis for improving water use planning for agricultural use planning for agricultural development in Meghalaya (India)	Macariush N. Sangma	Dr. B.C Kusre
56	2017	Morphometric evaluation of the ranikhola watershed in Sikkim India using cartostat-1 DEM data in GIS enviroment	Nirmalya Kumar Nath	Dr. S.R. Yadav
57	2017	Evapotranspiration modeling using multiple linear regression and artificial neural network model	Bijenfra Prashad Mandal	Dr. G.T. Patle
58	2017	Soil fertility status of east Sikkim and south Sikkim	Bosco Sajinngam	Dr. Ch. Birendrajit
59	2017	A study of marketing system of agricultural organic produces in Sikkim	Purushottam Kumar	Dr. A. Anuradha Devi
60	2018	Applicability of TRMM rainfall data and its spatial and temporal analysis over Sikkim	Karisma Yumnam	Dr. B.C Kusre
61	2018	Study of vaccum drying characteristics and functional properties of Kiwi	Malemnganba Saikhom	Dr. Sujata Jena
62	2018	Design and Development of buckwheat dehulling mechanism	Anisha Pradhan	Lt. Angom Ingocha Singh

63	2018	Modelling of Pan evaporation using multiplenlinear regression and artificial neural network model	Manisha Chettri	Dr. G.T Patle
64	2018	Time-lag evaluation from recession curves	Ranjita Soram & Gebi Ete	Dr. A,K Vashisht
65	2018	Assessment of functional properties of sprouted grain flours	Joram Menia	Dr. S. Prashant Pandharinath
66	2018	To standardize the process technology for preparation of instant herbal black tea powder	Lalremruati	Dr. Rakesh Kumar Raigar
67	2018	Development and testing of loboratory fog harvesting mechanism	Mayanglambam Aarbindro Singh	Dr. Ghanshyam Singh Yurembam
68	2018	Effect of different mulching materials on growth and yield of Ginger (Zingiber officinate)	Loukrakpam oyethoungamba	Dr. A.B Sherpa
69	2018	Performance evaluation of small power tillers for dry tillage in Sikkim	Kenzang Choden Lepcha	Dr. S.K Satpathy
70	2018	Development of RTS Beverages from chayote	Emy Lepcha	Dr. B.K Singh
71	2018	Estimation of different engineering properties of soils of watershed in Sikkim	Lsabetshisha Kharbhih	Dr. Jagabandu Panda
72	2018	Drought analysis over different districts of Arunachal Pradesh	Geying Mize	Dr. Deepak Jhajharia
73	2018	Study of technological efficiency of ginger processing in east Sikkim ï A case study	Peli Ronya	Dr. A. Anuradha Devi
74	2018	Study of livestock shelters of Sikkim	Shagolshem Mukta Singh & Pratiksha Sharma	Dr. R.P Mishra
75	2018	Development of knapsack cum push type paddy harvester	Huidrom Kennedy Singh	Er. N. Devarani
76	2018	Domestic waste management through vermicomposting	Sagar Debbarma	Dr. Sushma Gurumayum
77	2018	Performance evaluation of solar thermal water pumping system	Raju Gawli	Dr. Mahendra S.Sevada
78	2018	Design and fabrication of solar thermal water pump	Lalthlengliana	Er. S.M. Kamaruzzaman
79	2018	Ergonomic evaluation of pedal operated thresher in paddy threshing	Maibam Jamenjoy Meitei	Dr. N.S. Chauhan
80	2018	Design refinement and performance evaluation of light weight	Vishal Singh	Er. S.K Chauhan

		planker-cum-leveler (Dante) for small firm		
81	2018	Stage-Discharge rating curve for two mountain streams in east district of Sikkim	Sonu Kumar	Dr. S.R. Yadav
82	2018	Performance evaluation of zero till self-propelled multi crop planter	Sanath Das	Dr. S.N. Yadav
83	2019	Development of ergonomically designed pedal operated maize shelter for Sikkim women workers	Vusa Manisha	Dr. N.S. Chauhan
84	2019	Analysis of water quality parameter of a stretch of ranikhola river	Chakrabati Haobam	Dr. Ghanshyam Singh Yurembam
85	2019	Resource efficiency and economic evaluation of post harvest losses of orange in Arunachal Pradesh and Sikkim	Daniel Torchi	Dr. A. Anuradha Devi
86	2019	Development of paneer whey enriched avocado fruit beverage	Chanamthabam	Dr R.K Raigar
87	2019	Pre and post harvest management of garlic- A review	Naorem Nirmala Devi & Geetanjali Samjetsabam	Dr. Said Prashant Pandharinath
88	2020	A status report on farm level turmeric processing equipment development development in India	Stefynia Kharkongor	Dr. Sujata Jena
89	2020	Life cycle impact costing and embodied energy analysis of double mirror reflector box-type solar cooker	Bivek Chakma & Lenjachung Serto	Dr. Kharpude S.N
90	2020	Study of solar PV water pumping system in Sikkim	Ravindra Yadav & Rajbham Vaishya	Prof. Mahendra S. Seveda
91	2020	Performance evaluation of power operated maize sheller in Sikkim	Tailyang Rema & Thomas Lalthlamuana	Dr. S.K. Satpathy
92	2020	Variability and trend analysis of rainfall data of Shillong and Agartala stations of North East India	Mirbana Lusick K. Sangma & Hamtoiti Reang	Dr. G.T. Patle
93	2020	Review of nutritional quality and storage life of fish pickles	Chalamba Yumnam	Dr. B.K. Singh
94	2020	Modification and performance evaluation of pedal operated maize sheller	Ravikant Singh	Prof. N.S.Chauhan
95	2020	Manually operated bund digger for apatami farming system	Tage Tamo	Er. N. Devarani
96	2020	Assessment of water quality index by weight & arithmetic water quality index method	Swapnajit Chowdhury	Dr. Ghanashyam Singh Yurembam
97	2020	Study of garlic flaking machine	Bhuban Chakma & C.	Dr. R.P Mishra

			Lalthlamuana	
98	2020	Climatology and trends in wind speed over Sikkim, India	Sankalp Shrestha & Survanie Majumdar	Dr. Deepak Jhajharia
99	2020	Design refinement and Development of Jet Plough for north east region	Madhu	Er. S.K. Chauhan
100	2020	Hydraulic Modelling of greywater flow from high raised buildings for electricity generation	Bharat Singh	Dr. S.R. Yadav
101	2020	Extrapolation of stage discharge rating curves of ranikhola and busk-khola rivers in Sikkim	Najima Debbarma	Dr. S.R. Yadav
102	2020	Study on trend and decomposition of pineapple production in Arunachal Pradesh, north east India	Tapi Tada	Dr. A. Anuradha Devi
103	2020	Design and economic analysis of community size floating drum bio-gas plant for NEH region of India	Daiolutibha I Ka Rymbai & Arpan Rai	Dr. Pradip D. Narale
104	2020	Study on trend and decomposition of pineapple production in Manipur, north east India	Akrabiya Okram & Silvia Devi Moirangthem	Dr. A. Anuradha Devi
105	2020	A review report on post harvest processing of large cardamom in north eastern region of India	Lalthangmawii	Dr. R.K Raigar
106	2020	Spatio-Temporal analysis of extreme precipitation index over Sikkim Himalayan region	Devi Charan Sharma	Dr. Shivam
107	2020	Development of soil moisture index in Sikkim	Shivam Kumar singh	Dr. B.C Kusre