7.2 : Best Practices

Best Practice 2
Thomasian CARE

OTHER RELEVANT INFORMATION

CRITERION : 7

INSTITUTIONAL VALUES AND BEST PRACTICES

ST. THOMAS COLLEGE, RANNI

BEST PRACTICE 2

Title*: *Thomasian CARE

1. **Campus Environment CARE Initiative (Green Initiatives** and **External/Internal Green Audit)**
2. **Beyond the campus Environment CARE Initiative**

REPORT SUMMARY

2017-2022

CAMPUS ENVIRONMENT CARE INITIATIVE

2017-2022

GREEN INITIATIVES- REPORT

2017-18

World Environment Day-Planting tree saplings.	
Organising Department/ Agency	Date
Nature Club	**05/06/2017**

As part of the World Environment Day celebrations, members of Nature Club gathered to participate in the tree planting event. With a strong commitment to environmental sustainability, they embarked on this project to ensure the well-being and growth of the newly planted saplings. Every member of Nature Club played an active role in the event, demonstrating their dedication to preserving nature.

World Tourism Day- Seminar on the topic: "Sustainable Tourism- a Tool for Development"	
Organising Department/ Agency	Date
PG Dept. of Tourism & Travel Management	**27/09/2017**

As part of World Tourism Day celebration, the PG Department of Tourism & Travel Management hosted a seminar on "Sustainable Tourism - A Tool for Development". Dr. Anila Thomas, a distinguished expert in the field, was the keynote speaker. Her presentation focused on highlighting the importance of sustainable tourism in achieving a harmonious balance between economic growth, environmental preservation, and the preservation of cultural heritage.

2018-19

A talk on " Environmental History of Pathanamthitta"	
Organising Department/ Agency	Date
Bhoomitra Sena Club	**06/10/2018**

In an effort to raise awareness among students about the pressing environmental issues of our times and to foster a sense of deep love and respect for nature, Bhoomitra Sena Club was formed on 6th October 2018. The chief guest of the inaugural ceremony was Dr. M. S. Sunil, Professor (retd) of Zoology, Catholicate College, Pathanamthitta. The event also featured a thought-provoking talk on "Environmental History of Pathanamthitta" by Mr. Arun S., member, District Level Appraisal Committee.

Butterfly garden	
Organising Department/ Agency	Date
Bhoomithra Sena Club	**12/10/2018**

Bhoomitra Sena Club, dedicated to environmental preservation, started a butterfly garden in the campus in October 2018. This initiative was carried out with the aim of creating a congenial habitat for butterflies by providing suitable nectar sources and host plants for their reproduction.

Quiz Competition	
Organising Department/ Agency	Date
Bhoomitra Sena Club	**02/11/2018**

Bhoomitra Sena Club conducted a quiz competition aimed at assessing the level of environmental awareness among students. The event attracted enthusiastic participation of students from various departments and served as a platform in promoting environmental consciousness among the student community.

Debate competition	
Organising Department/ Agency	Date
Bhoomitra Sena Club	**02/11/2018**

Bhoomitra Sena Club organised a debate competition and the event provided the students an opportunity to express their perspectives, engage in constructive dialogue, and exchange ideas regarding intricate environmental challenges. It also served to foster critical thinking and promote insightful discussions on environmental issues.

2019-20

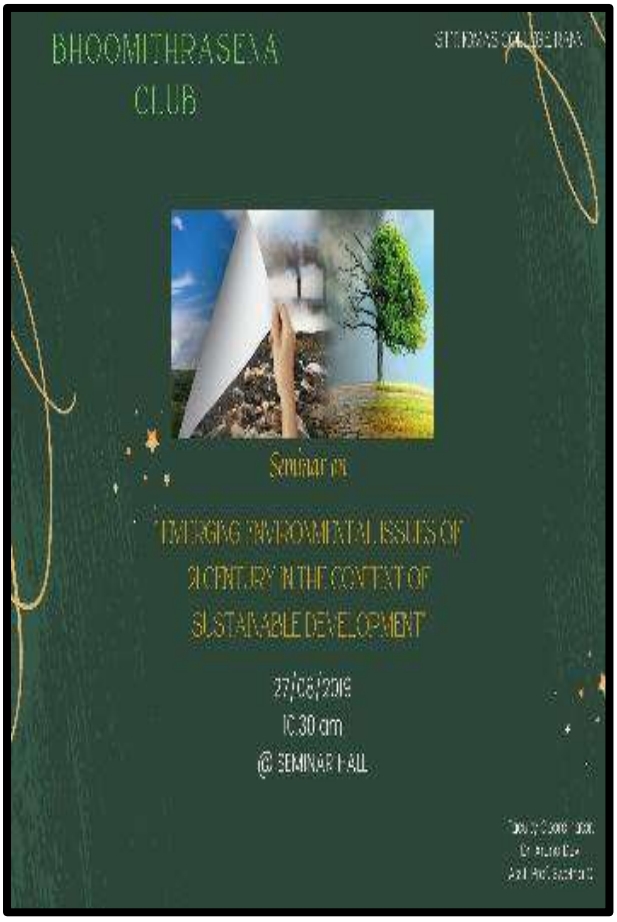
Vana Mahotsava celebration	
Organising Department/ Agency	Date
Dept. of Botany	**02/07/2019**

In an endeavour towards maintaining the green cover of the campus and spreading the message of conserving nature, Department of Botany celebrated Vana Mahotsava, the annual tree planting festival. Distinguished environmentalist, Dr. Abhilash R., Assistant Professor of Zoology, Christian College, Chengannur, delivered the keynote address. The week-long celebration initiated the creation of a Star Forest in the campus.

Construction of plastic waste disposal unit	
Organising Department/ Agency	Date
NSS	**20/07/2019**

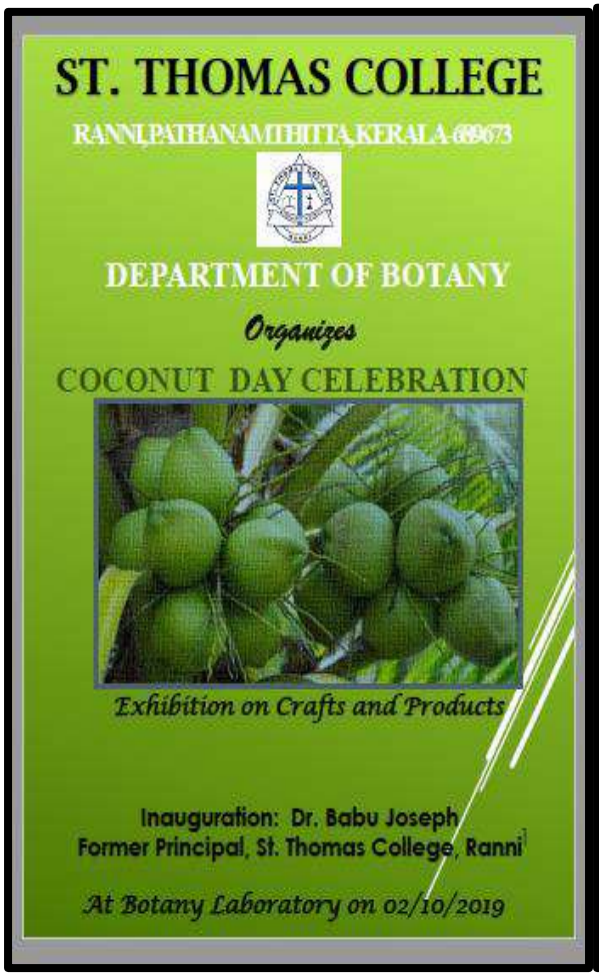
Volunteers of the NSS Unit undertook the construction of a plastic waste disposal unit within the campus with the aim of addressing plastic waste management issues in the campus and promoting sustainability practices.

Seminar on the topic: " Emerging Environmental Issues of 21st century in the Context of Sustainable Development"	
Organising Department/ Agency	Date
Bhoomitra Sena club	**27/08/2019**



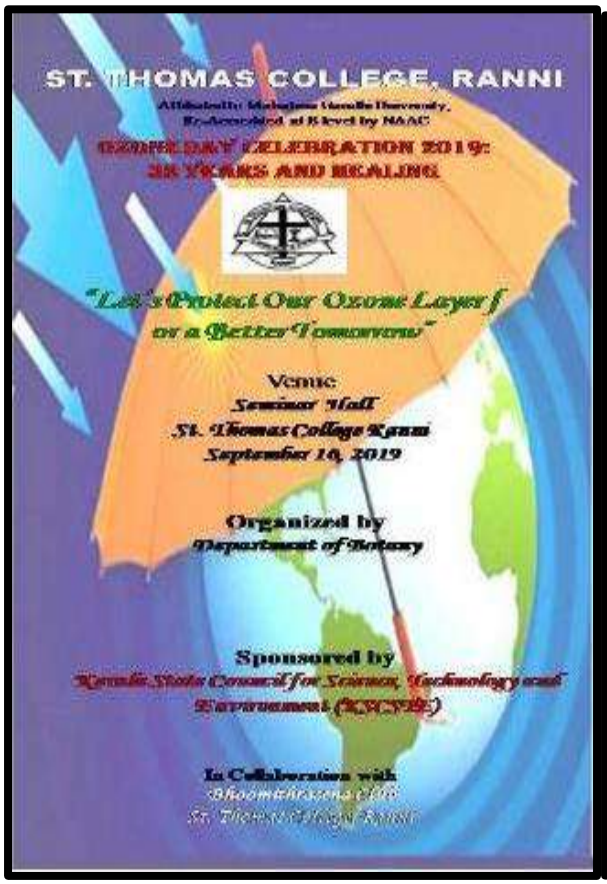
Bhoomitra Sena Club organised a seminar titled "Emerging Environmental Issues of 21st Century in the Context of Sustainable Development" aimed at exploring the environmental concepts and actions that go beyond the curriculum and syllabus, providing the participants with a broader understanding of the challenges and remedies associated with environmental issues. Dr. K.P. Joy, Chairman, State Environment Impact Assessment Authority and Principal (retd) of Baselius College, Kottayam, was the resource person of the event.

World Coconut Day celebration	
Organising Department/ Agency	Date
Dept. of Botany	**02/09/2019**



Department of Botany organised an exhibition of the value-added products of coconut to celebrate World Coconut Day. The event was inaugurated by Dr. Babu Joseph, former principal of the institution. The exhibition featured informative charts on the history and uses of coconut, along with a display of the coir products from Southern Coir Mills, Alappuzha.

International Day for the Preservation of Ozone Layer	
Organising Department/ Agency	Date
Dept. of Botany	**16/09/2019**

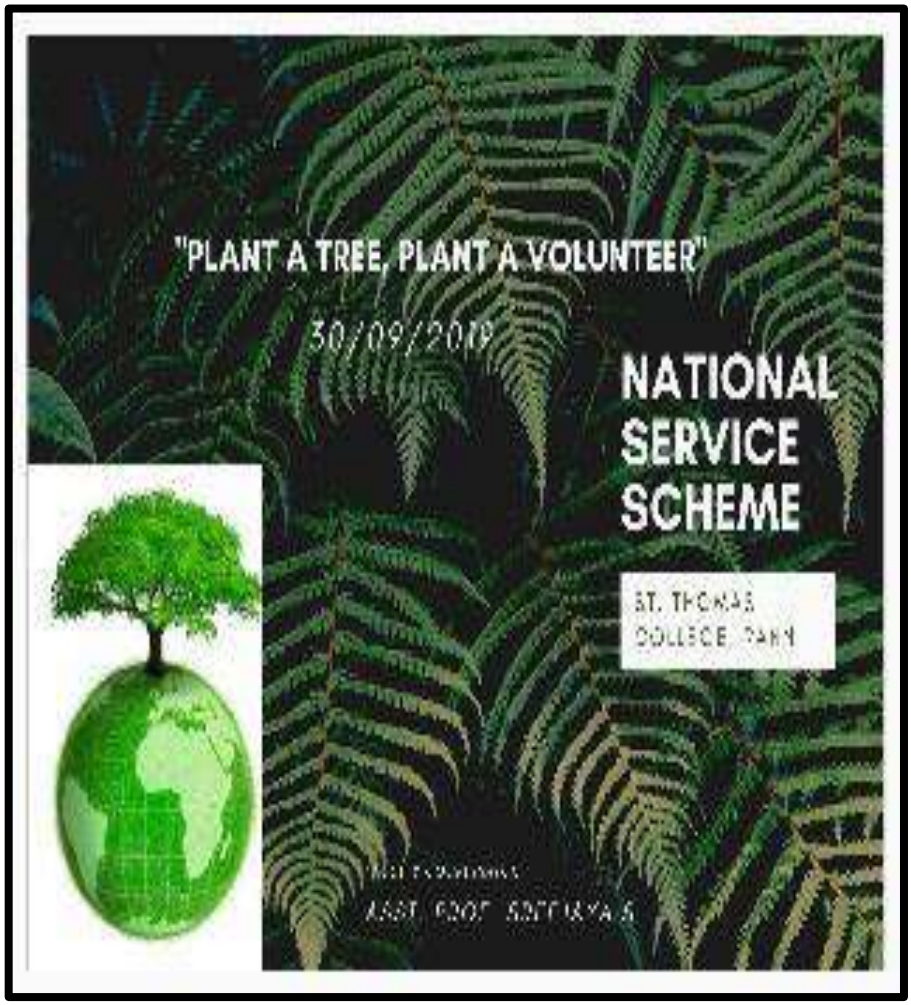


International Day for the Preservation of Ozone Layer was observed in a befitting manner under the aegis of the Department of Botany by conducting an awareness session themed on "Let's Protect Our Ozone Layer for a Better Tomorrow". The event was inaugurated by Dr. K. A. Sreejith, Scientist, Kerala Forest Research Institute, Peechi, who emphasised the importance of the conservation of ozone layer and its environmental implications.

Organic Farming Unit	
Organising Department/ Agency	Date
NSS	**26/09/2019**

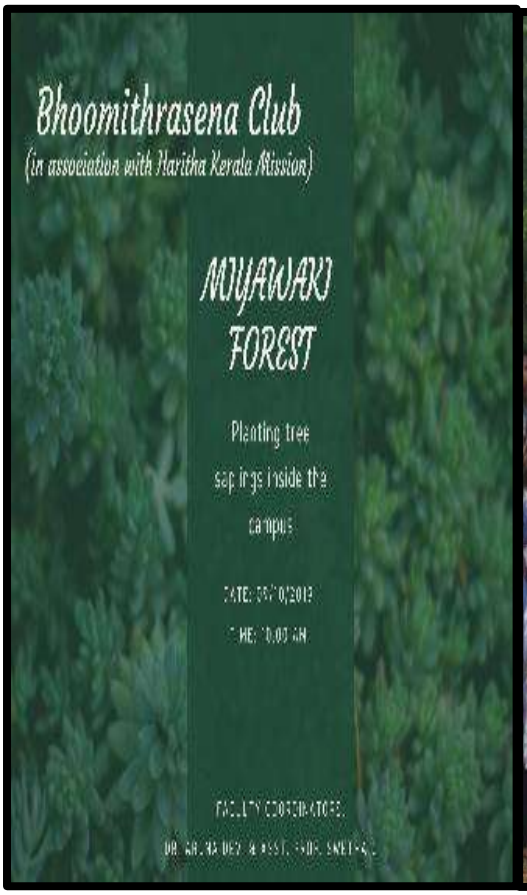
An organic farming unit was established in the college campus and NSS volunteers played a pivotal role in the development and maintenance of this unit. The objective was to promote sustainable agricultural practices, minimise the use of synthetic chemicals, and encourage the production of organic crops.

“Plant a tree, Plant a volunteer”	
Organising Department/ Agency	Date
NSS	**30/09/2019**



The NSS unit of the college organised "Plant a Tree, Plant a Volunteer" programme with the objective of engaging the volunteers in hands-on environmental conservation methods by planting tree saplings in the college campus. The programme sought to foster a greener and more sustainable future by encouraging the volunteers to embrace their roles as environmental stewards.

Setting up "Pachathuruthu"	
Organising Department/ Agency	Date
Bhoomitra Sena club in collaboration with Haritha Keralam Mission	**09/10/2019**

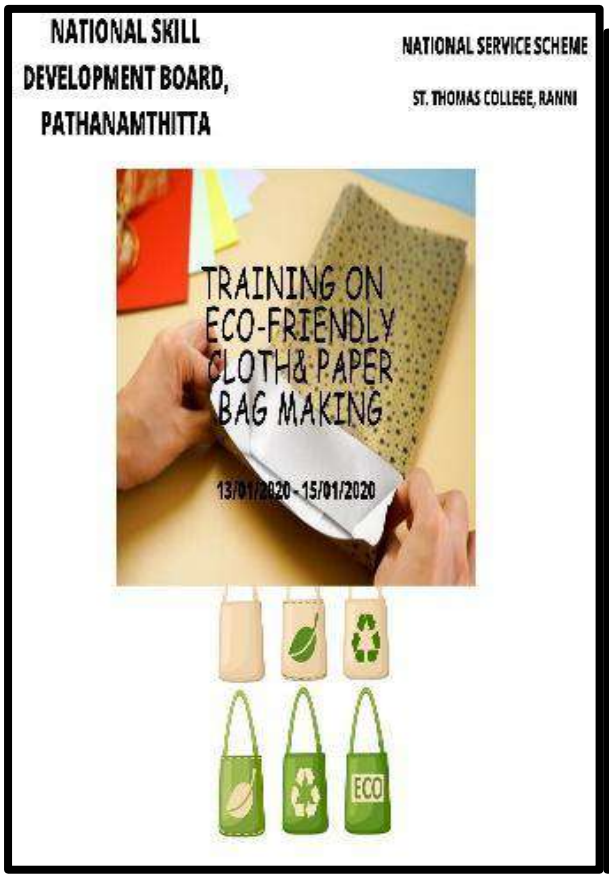


In collaboration with the Haritha Keralam Mission, the Bhoomitra Sena Club initiated the establishment of a "Pachathuruthu" within the college campus. The project was inaugurated by Mr. Rajesh, Coordinator, Haritha Keralam Mission, Pathanamthitta Division, who played a crucial role in guiding the endeavour. The inaugural session was marked by the members of the Bhoomitra Sena Club actively planting tree saplings of various types. This initiative served as an inspiration for students and encouraged them to embrace their role in protecting and preserving the environment for a sustainable future.

Green Campus Campaign- Distribution of Cloth Carry Bags	
Organising Department/ Agency	Date
Bhoomitra Sena Club	**11/10/2019**

As a part of the Green Campus Campaign, aimed at fostering environment-friendly practices, distribution of cloth carry bags was organised by Bhoomitra Sena Club. Recognising the adverse impact of plastic on the environment, the campaign sought to replace plastic bags with reusable cloth bags. During the inauguration of this initiative cloth bags designed by the club members, Ms. Arpitha (D2 Zoology) and Ms. Rona (D1 Zoology) were presented to Shri S. Balasankar, Asst. Editor, Aranyam magazine who was the chief guest of the event.

Training on eco-friendly cloth and paper bag making	
Organising Department/ Agency	Date
NSS Unit in collaboration with National Skill Development Board	**13/01/2020 to 15/01/2020**



NSS volunteers actively participated in a skill development programme organised by National Skill Development Board, Pathanamthitta. The programme focused specifically on eco-friendly cloth and paper bag making techniques. Through hands-on training and guidance, the volunteers were equipped with the necessary knowledge and skills to produce environmentally sustainable bags. The training programme highlighted the importance of eco-friendly bag making as a sustainable alternative to single-use plastic bags. By utilising materials such as cloth and paper, volunteers were encouraged to contribute to the reduction of plastic waste and promote environmental consciousness within their communities.

Craft Exhibition- “Waste into Wealth”	
Organising Department/ Agency	Date
Bhoomithra Sena Club	**JANUARY 2020**

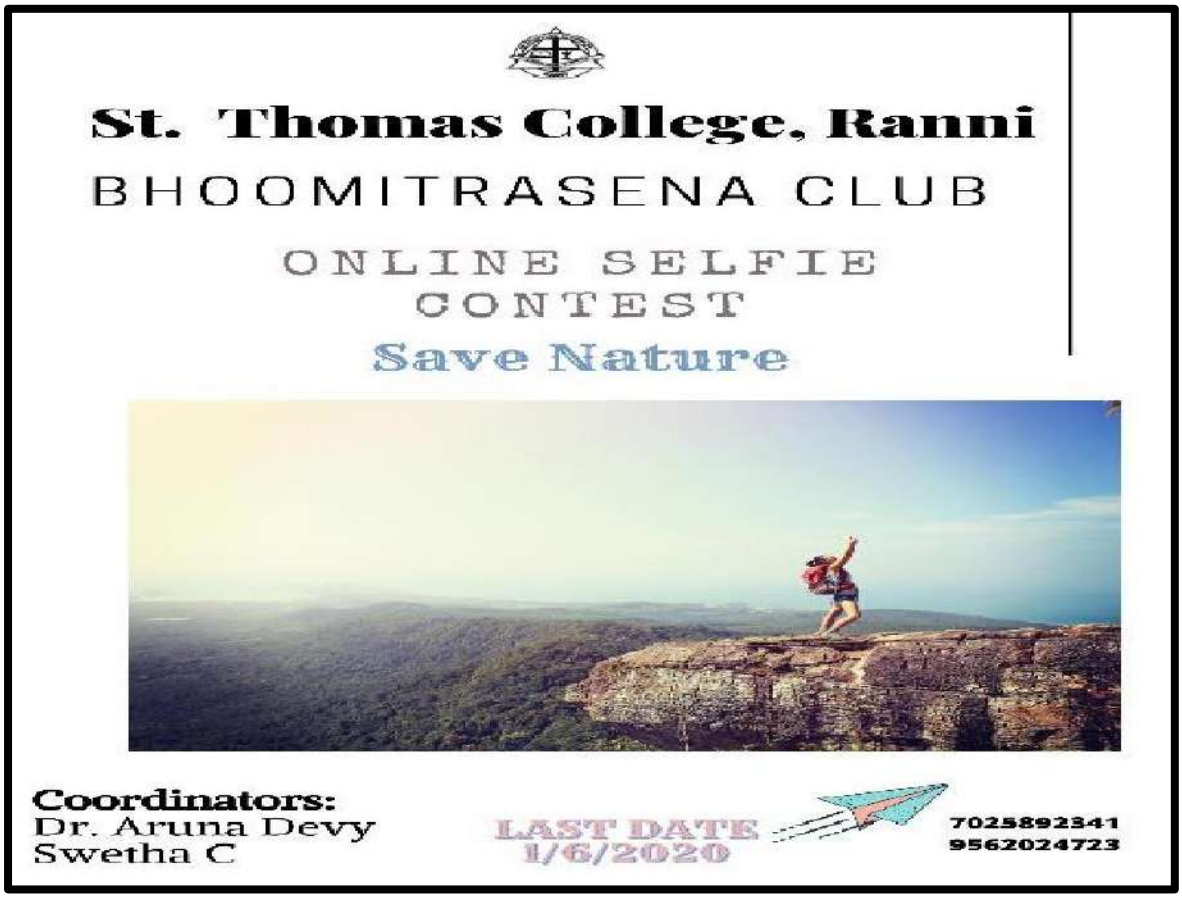
Bhoomithra Sena Club organised a craft exhibition titled "Waste into Wealth” that showcased a wide range of handicrafts meticulously crafted using recycled and waste materials. The exhibition was inaugurated by the Principal, Dr. Lata Marina Varghese, by buying a mat made of waste clothes. The exhibition aimed to raise awareness about the potential of waste materials and the importance of recycling and upcycling in reducing environmental impact. It served as a platform to promote sustainable practices and encourage individuals to rethink their approach to waste management.

Seminar on the topic: "Environment Protection and Waste Management"	
Organising Department/ Agency	Date
IQAC in association with Haritha Keralam Mission	**JANUARY 2020**

IQAC in collaboration with Haritha Keralam Mission, Pathanamthitta, organised a seminar in the college auditorium on the topic of "Environmental Protection and Waste Management." Additionally, an exhibition showcasing cloth products was held in the same venue. The seminar was inaugurated by Adv. Sakkeer Hussain, Chairman, Child Welfare Society. Session on "Bio Waste Management" was led by M.B. Dileep Kumar, Managing Director, Clean Kerala Company Limited. NSS volunteers (2nd year Zoology) of the college received award of recognition from Haritha Keralam Mission for the best project proposal themed on "My Campus, Clean Campus".

2020-21

Online Selfie Contest on the Theme "Save Nature"	
Organising Department/ Agency	Date
Bhoomitra Sena Club in association with Nature Club	**01/06/2020**

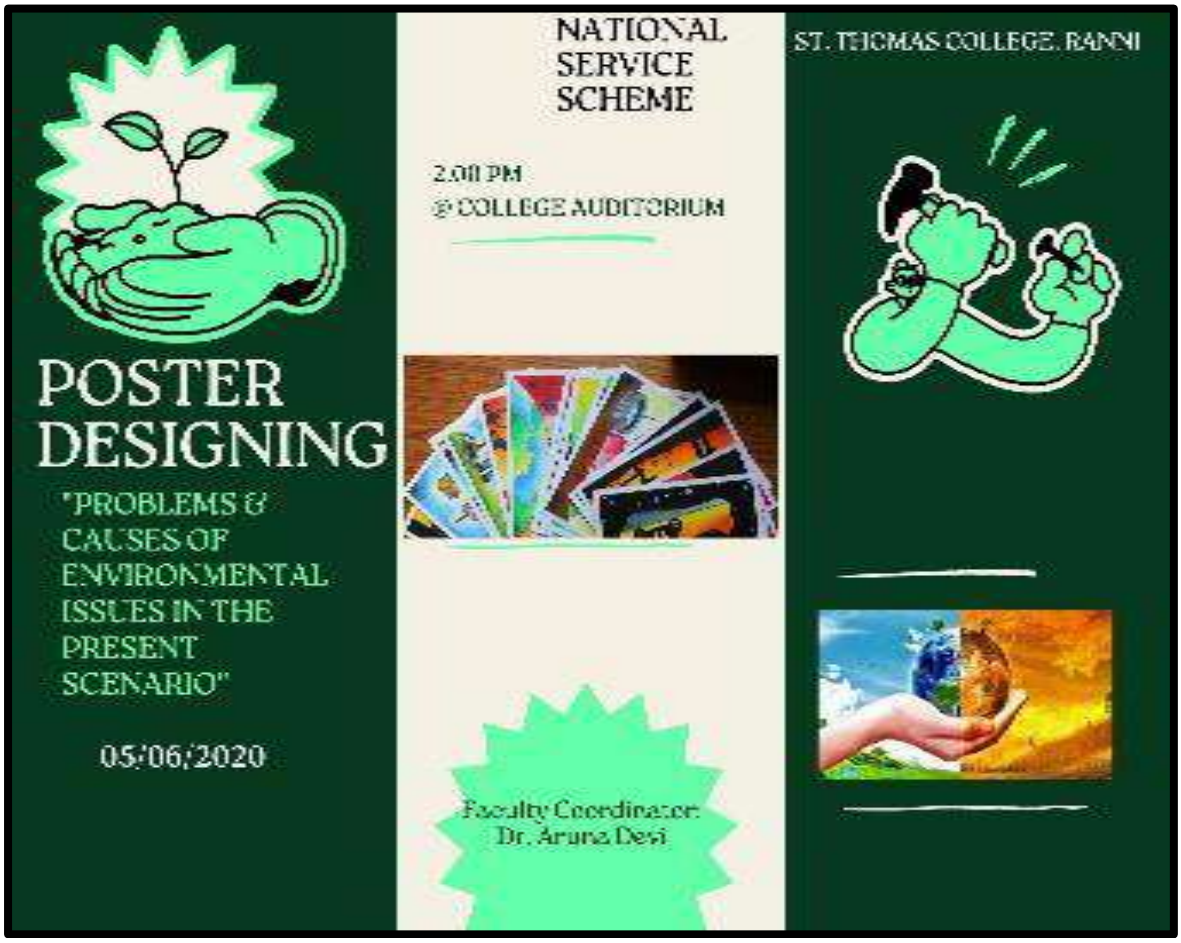


Online Selfie Contest themed on "Save Nature" urged the contestants to creatively portray their efforts, actions and thoughts regarding the protection and preservation of the natural environment. By participating in the competition, the club members demonstrated their commitment to fostering a sense of responsibility towards nature and encouraging others to do the same.

World Environment Day- Planting tree saplings in the campus	
Organising Department/ Agency	Date
Bhoomitra Sena Club in association with Nature Club	**05/06/2020**

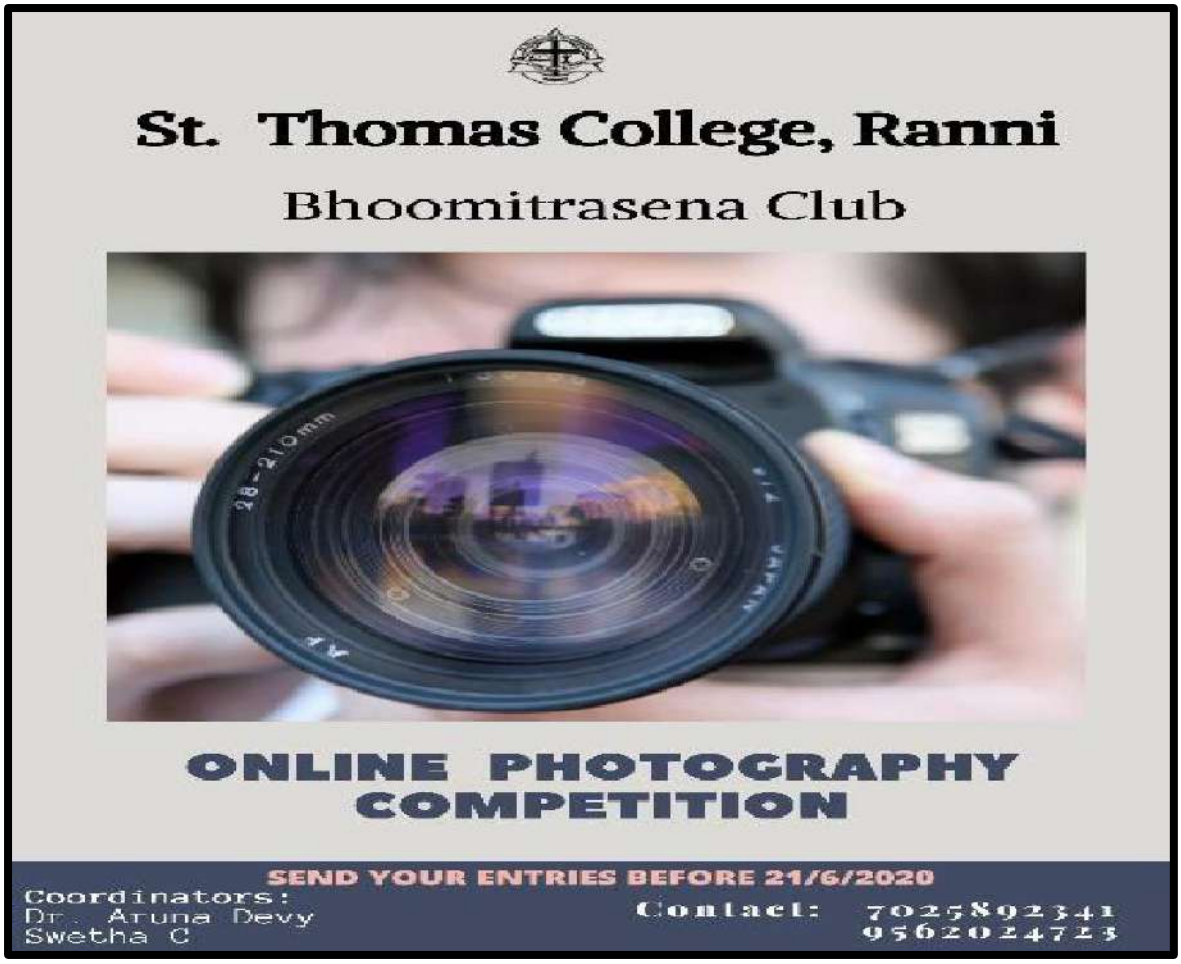
As part of the observance of World Environment Day, Bhoomitra Sena and Nature Clubs collaborated to organise a tree planting programme. The event provided a platform for volunteers to engage in environmental conservation activities by planting trees. This initiative also served as an opportunity to nurture a deep connection with nature and promote sustainable practices.

Poster Designing Competition- "Problems and Causes of Environmental Issues in the Present Scenario"	
Organising Department/ Agency	Date
NSS	**05/06/2020**



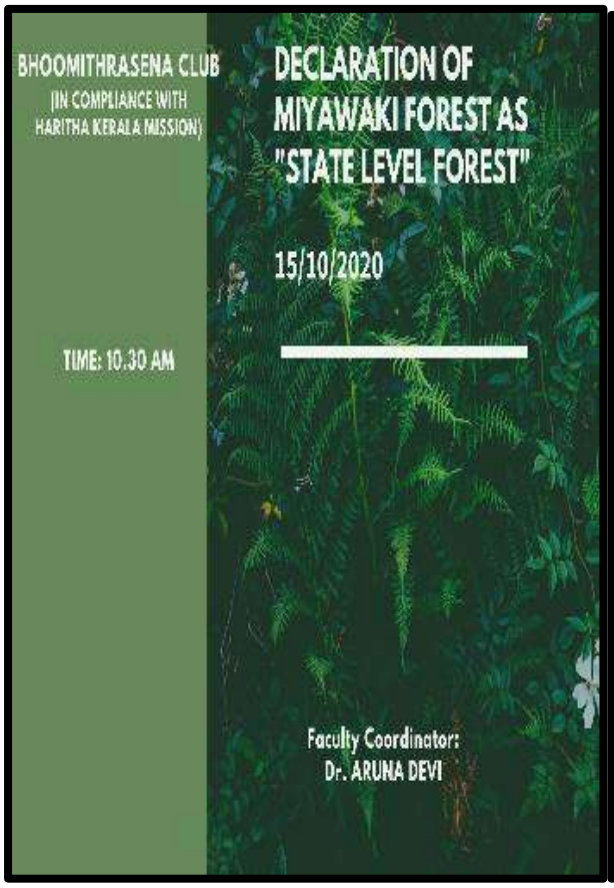
To commemorate World Environment Day, NSS Volunteers organised a poster designing competition that invited department-wise entries. Each department was encouraged to submit three posters, resulting in a total of 21 entries. After careful evaluation, the first prize was awarded to the Chemistry department for their exceptional entry. This event successfully engaged the students in a creative exploration of environment-related themes and showcased their collective dedication to raising awareness about environmental issues through the power of art and design.

Online Photography Contest on the theme: "Nature"	
Organising Department/ Agency	Date
Bhoomitra Sena Club	**21/06/2020**



Bhoomitra Sena Club organised an Online Mobile Photography Competition. Enthusiastic participants from various departments joined the competition, eager to capture the beauty and essence of the natural world through their mobile cameras. The competition not only showcased the talent and skill of the participants but also fostered a sense of appreciation and admiration for the wonders of nature. Through their photographs, the participants encouraged viewers to connect with the environment, sparking a deeper understanding and sense of responsibility towards nature conservation.

Declaration of "Pachathuruthu" as State Level Forest.	
Organising Department/ Agency	Date
Bhoomitra Sena Club in association with Haritha Keralam Mission	**15/10/2020**



"Pachathuruthu" established by the BMSC (Bhoomitra Sena Club), achieved the remarkable milestone of being declared a state-level forest by the Haritha Kerala Mission. The recognition of "Pachathuruthu" as a state-level forest, highlights the tremendous efforts and dedication put forth by the members of the BMSC and their commitment to environmental conservation.

Webinar - "Household Farming"	
Organising Department/ Agency	Date
Bhoomitra Sena Club in association with Nature Club	**01/02/2021**

Bhoomitra Sena Club and Nature Club collaborated to organise a webinar on "Household Farming" to familiarise the students with traditional agricultural practices through household vegetation. Sri V. K. Sreedharan, Faculty Coordinator, Kerala Institute of Local Administration (KILA) delivered the keynote address wherein he shared his extensive knowledge on the subject.

Setting up of Pipe Compost Units	
Organising Department/ Agency	Date
Bhoomitra Sena Club	**23/03/2021**

Members of the Bhoomitra Sena Club took a proactive step towards promoting sustainable waste management practices by implementing pipe compost units in the campus. Four pipe compost units were installed at different locations, specifically near the areas where students washed their lunch boxes, to create a convenient and efficient system for students to dispose of their food waste responsibly.

2021-22

World Environment Day-Online Inter-Collegiate Quiz Competition	
Organising Department/ Agency	Date
Bhoomitra Sena Club	**05/06/2021**

Bhoomithra Sena Club organised an online Intercollege Quiz Contest as part of celebration of World Environment Day. The contest served as a platform for students from various colleges to showcase their knowledge and understanding of environmental topics. Ms.Arathi, St.Thomas College, Ranni, emerged as the first prize winner. The contest aimed to engage and educate participants on important environmental issues while fostering a sense of friendly competition. Participants were tested on their knowledge of various aspects of the environment, including sustainability, conservation, and climate change.

Mobile Photography Contest on the theme "Nature"	
Organising Department/ Agency	Date
Bhoomitra Sena Club in association with Zoology Dept.	**09/06/2021**

In collaboration with the Department of Zoology, Bhoomitra Sena Club organised a Mobile Photography Contest based on the theme "Nature". This contest provided participants with an opportunity to showcase their photography skills and capture the beauty of the natural world. Aiswarya Manoharan and Alfiya Majeed secured first and second prizes respectively.

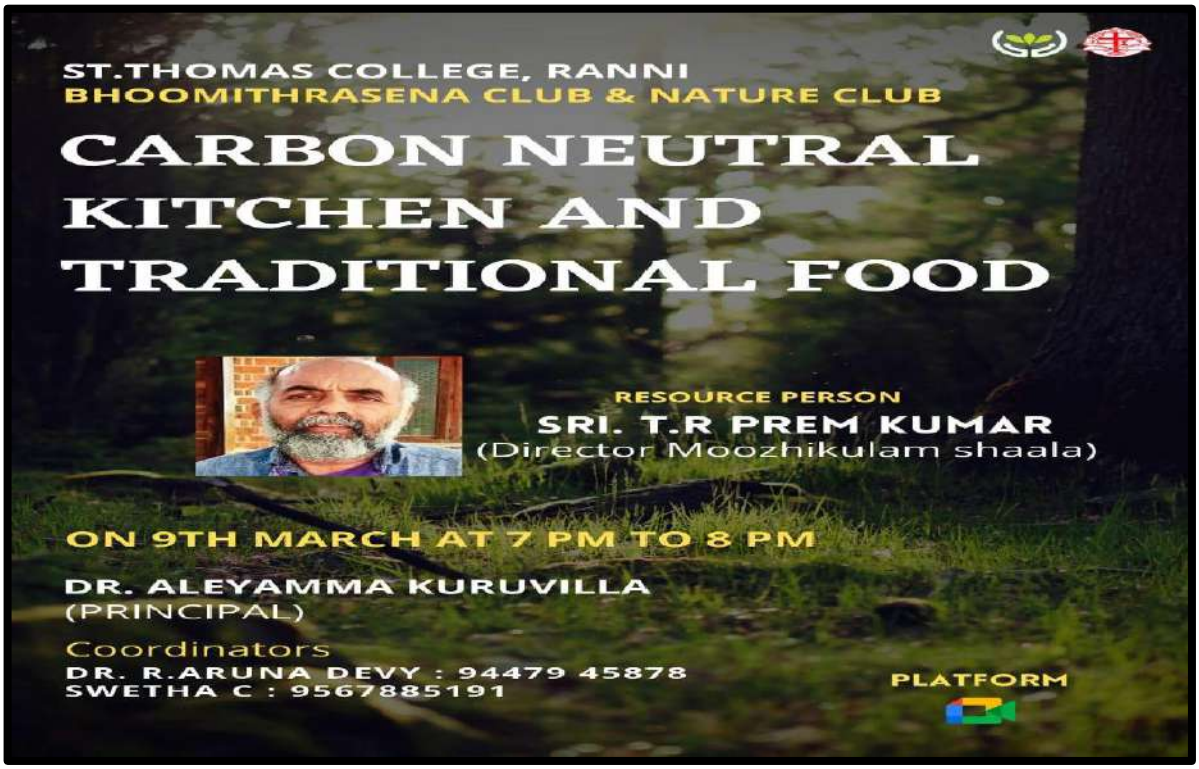
1. Webinar on "Varu Namukkoru Vanam Srishtikkam"	
Organising Department/ Agency	**Date**
Bhoomitra Sena Club in association with Nature Club	09/02/2022

Bhoomitra Sena club and Nature club jointly organised a webinar "Varoo Namukkoru Vanam Srishtikkam" ("Come, Let's Create a Forest") in which Sri Manoj Kumar I.B., an electrical engineer-turned-environmentalist talked about the importance of nature conservation. He shared his experience of turning an acre of land around his house to a jungle, by not tending to brambles and weeds, of doing a lot of things by doing nothing.

2. Zero-Waste Competition	
Organising Department/ Agency	Date
Bhoomitra Sena Club	**20/02/2022**

Bhoomitra Sena Club organised an engaging "Zero Waste Competition" aimed at promoting creativity and environmental consciousness. Participants were encouraged to create art and craft pieces using plastic, electronic, and other waste materials, showcasing their talent and resourcefulness. The competition witnessed a remarkable display of artistic skills and ingenuity, with participants transforming discarded materials into attractive works of art. Ms. Siji Thomas, a student from the II DC Botany secured the first prize.

3. Talk on "Carbon-Neutral Kitchen & Traditional Food"	
Organising Department/ Agency	Date
Bhoomitra Sena Club in association with Nature Club	**09/03/2022**



Bhoomitra Sena Club and Nature Club jointly organised an enlightening online talk by Sri. T R Premkumar, the Director of Muzhikulam Shala. The session was based on the prospects of Carbon-Neutral Kitchen and the value of traditional food practices. The talk shed light on the health and environmental benefits of consuming raw and uncooked food, also known as Carbon-Neutral food. He emphasized the significance of returning to our roots and embracing traditional methods of living to lead a more sustainable lifestyle.

4. Food Fest: " Neutre-en-Carbone"	
Organising Department/ Agency	Date
Bhoomitra Sena Club in association with Nature Club	**14/03/2022**

Bhoomithra Sena Club and Nature Club jointly organised an exciting food fest titled "Neutre-en-Carbone " in the college auditorium. The event aimed to promote sustainable food practices and raise awareness about carbon-neutral cuisine. The event showcased how simple dietary choices and cooking methods can contribute to a healthier planet. From plant-based delights to innovative recipes that minimize environmental impact, the Food Fest presented a diverse range of culinary delights that were both flavourful and sustainable.

Awareness Class on Safe Disposal of Waste	
Organizing Department/ Agency	Date
NSS in association with State Suchitwa Mission	**25/03/2022**

NSS Unit, in collaboration with State Suchitwa Mission organised an awareness class on the proper disposal of bio-waste. Mr. Ajay K. R., District Program Officer, Suchitwa Mission, was the keynote speaker. The objective of the awareness class was to educate and inform students about the safe and responsible management of bio-waste.

INTERNAL GREEN AUDIT TRAINING SESSIONS

INTERNAL GREEN AUDIT DATA COLLECTED BY STUDENTS AND FACULTY MEMBERS

BIODIVERSITY AUDIT 2021-22 - DATA

SPECIES CODE	NAME OF ORGANISM	WEEK 1	WEEK 2	WEEK 3	WEEK 4	WEEK 5	WEEK 6
1	Common bush brown	9	11	13	11	12	9
2	Common emmigrant	8	5	2	3	4	4
3	Common four ring	7	9	12	11	13	10
4	Common mime	7	5	3	1	0	2
5	Psyche	5	7	6	5	4	6
6	Common Castor	7	8	9	8	11	9
7	Common grass yellow	14	12	15	11	13	11
8	Mottled emigrant	3	4	2	3	0	1
9	Blue mormon	1	1	0	2	1	0
10	Striped tiger	2	1	0	0	2	1
11	Great egg fly	4	4	3	4	4	3
12	Common leopard	0	3	2	4	6	4
13	Donald egg fly	3	2	2	3	1	1
14	Teany coaster	2	0	1	1	0	0
15	Common evening brown	6	8	10	8	8	6
16	Common mormon	1	0	2	0	1	3
17	Common rose	1	0	0	2	1	0
18	Common wanderer	0	0	0	1	0	1
19	Common Jezebel	0	0	1	1	0	1
20	Common blue bottle	0	0	1	0	0	1
21	Chocolate pansy	4	5	5	6	4	6
22	plain tiger	0	0	2	1	0	0

RANNY

Dr. Aleyamma Kuruvilla

ST. THOMAS COLLEGE, RANNI

WASTE AUDIT 2021-22 - DATA

TIES CNPI

COLLEGE WASTE AUDIT SHEET 1

1. Collect the data from: College Campus, Office, Canteen, Hostel

Sl.No	Location Type	Waste Type				
		Paper Waste (Carton, Paper cover, etc.) per week (gms)	Plastic (Cover, packing, others) per day (gms)	Biowaste; (sweepings, food waste, crop waste) per day (gms)	E-waste (CD, Printer, Computer, etc.,)per year (gms)	Other waste (Construction and demolition waste, Sandals, Clothes,etc) in grams/ number (per year) (gms)
1	College campus	1245.08	200.00	854	2563.08	556890
2	Office	1145.67	95.22	110.6	4789.2	4578
3	Canteen	0	0	0	0	0
4	Hostel	975.85	85.05	1500	0	8632
5	Others	456.34	32.25	450	780	7855

II. Waste Disposal Find whether the following are there :

A. Biowaste Biogas Plant : Nil

B. Compost : Yes (Vermicompost , Pipe compost & compost pit)

C. Other Person collecting : No

B. Paper, Carton, Plastic

1.Burning: Yes 2. Plastic Shredder Incinerator: No 3. Collection and selling: Occasionally, not regular

4. Others : Dumped in the outer courtyard

C. E-Waste

Selling: Yes Dumping: Nil Throwing: Nil

III. Other Suggestion:

1.

2.

3.

4.

Dr. Aleyamma Kuruvilla

ST THOMAS COLLEGE, RANNI

WATER AUDIT 2021-22
DATA

CNPI WATER AUDIT FORM
(Table 1 Data collections)

Total capacity of water tank: 14,500 lr

MAIN BLOCK

- No of tanks 4
- Capacity :2000 lr

4 tank : 500 lr

ECONOMICS

- 400 lr tank

ENGLISH

- 2000 lr tank

COMMERCE

- 2000 lr

ELECTRICITY BILL FOR PUMP & MOTOR / MONTH

- 10/2/21 =Rs. 424
- 18/8/21 =Rs. 855
- 12/10/21 =Rs. 424
- 12/10/21 =Rs. 10746
- 23/11/21 =Rs. 424
- 3/12/21 =Rs. 4813
- 10/2/22 = R. 5611

CNPI Water Audit Form

Table 1. Data sheet for entry of water usage pattern for a location/ building

Building name: **ENGLISH DEPARTMENT.**
Location Name:
Date and time of data collections: 9/3/22

	Tap no./ name*	Type of the tap (plastic/ brass etc.)	Condition (poor/moderate/good)	Average number of people using per day	Average time per head per day	Average amount of water releasing per minute	Leaking or not	If leaking average amount of water loss per minute
1	Kitchen tap 1							
2	Wash basin tap 1	Brass	Good	6	30	6 l	Not	
3	Toilet tap 1	Plastic	Good	6	30	8 l	Not	
4	Toilet flush	Plastic	Good	6	2m	6 l	Not	
5	Shower							
6	Health fosset	Plastic	Good	6	20	1 l	Not	

*Put the correct names and list of your location as applicable

SR. NO	FIXTURES	MEASUREMENT OF WATER USE (per day)					
		RATE OF DISCHARGE (liter/min)	DURATION OF USE (minutes)	AVERAGE QUANTITY PER USE (litre)	No. OF USES	TOTAL DAILY USES (in litre)	PER CAPITA DAILY USE (in Litre)
1	WASH BASIN TAP 1	6	3	2	6	12	2
2	TOILET TAP 1	8	3	1.33	6	7.98	1.33
3	TOILET FLUSH	6	12	3	6	18	3
4	BATHROOM FAUCET	1	2	0.33	6	2	0.33

Summary of Results

Total daily use of water = 29.98 litre
Per capita use of water =6.66 litre
Capacity of Water tank
Frequency of filling the tanks in a day
No. of leaking taps = nil
Quantity of water loss per day through leaking
Electricity bill for Pump & motor/ month

Table 1. Data sheet for entry of water usage pattern for a location/ building.
Building Name: MAIN BLOCK (office, chemistry, physics, botany, zoology)
Location Name: **1st Floor**
Date and time of data collections: 10/3/22

Tap no/ name	Type of the tap (plastic/brass etc.)	Condition (poor/ moderate/good)	Average number of people using per day	Average time per head per day	Average amount of water releasing per minute	Leaking or not	If leaking average amount of water loss per minute
Kitchen Tap		Moderate	6	1 m	4.78 l	not	
Wash basin tap 1		Moderate	12	15 sec	7.47 l	not	
Toilet tap 1		Good	8	20 sec	8.69 l	not	
Toilet flush		Moderate	8	7.41 sec	10 l	not	
Shower							
Health fosset		Good	8	6.50 sec	2.33 l	not	

Table 2. Consolidated statement of water usage in the college

SR. NO	FIXTURES	MEASUREMENT OF WATER USE (per day)					
		RATE OF DISCHARGE (liter/min)	DURATION OF USE (minutes)	AVERAGE QUANTITY PER USE (litre)	No. OF USES	TOTAL DAILY USES (in litre)	PER CAPITA DAILY USE (in Litre)
1	KITCHEN TAP	4.5	1 min 12 sec	5.25	4	21	5.25
2	UTILITY TAPS	2.69	6 min 36 sec	2.59	20	17.30	2.59
3	BATHROOM FAUCET	2.33	1 min 20sec	1.04	10	3.47	1.04
4	BATHROOM WASH BASIN	2.93	1 min 40 sec	1.31	10	4.38	1.31
5	BATHROOM TAP	9.3	2 min 30 sec	2.32	10	23.2	2.32

Summary of Results

Total daily use of water = 69.35 litre
Per capita use of water = 12.51 litre
Capacity of Water tank
Frequency of filling the tanks in a day
No. of leaking taps
Quantity of water loss per day through leaking
Electricity bill for Pump & motor/ month

Table 1. Data sheet for entry of water usage pattern for a location/ building.
Building Name: MAIN BLOCK (office, chemistry, physics, botany, zoology)
Location Name: **2nd Floor**
Date and time of data collections: 10/3/22

Tap no/ name	Type of the tap (plastic/brass etc.)	Condition (poor/ moderate/good)	Average number of people using per day	Average time per head per day	Average amount of water releasing per minute	Leaking or not	If leaking average amount of water loss per minute
Wash basin tap 1	Brass	Moderate	7	40 sec	7.52/m	Not	Not
Toilet tap 1	Brass	Moderate	7	60 sec	4.35/m	Not	Not
Toilet flush	Plastic	Good	8	50 sec	8.91/m	Not	Not
Health fosset	steel	Good	6	50 sec	2.33/m	not	not

Table 2. Consolidated statement of water usage in the college

SR. NO	FIXTURES	MEASUREMENT OF WATER USE (per day)					
		RATE OF DISCHARGE (liter/min)	DURATION OF USE (minutes)	AVERAGE QUANTITY PER USE (litre)	No. OF USES	TOTAL DAILY USES (in litre)	PER CAPITA DAILY USE (in Litre)
1	UTILITY TAPS	3	2m 35 sec	1.25	6	7.5	1.25
2	TAP	4.79	4 min 30 sec	1.06	18	19.16	1.06
3	HEALTH FOSSET	7.52	5 min	1.88	20	37.6	1.88
4	BATHROOM FAUCET	2.33	6 min 20 sec	1.16	12	14	1.16
5	LAB TAPS. (3days in a week)	8.87	57 min	16.85	30	505	16.85

Summary of Results

Total daily use of water = 583.26 litre
Per capita use of water =22.2 litre
Capacity of Water tank
Frequency of filling the tanks in a day
No. of leaking taps
Quantity of water loss per day through leaking
Electricity bill for Pump & motor/ month

Table 1. Data sheet for entry of water usage pattern for a location/ building.
Building Name: MAIN BLOCK (office, chemistry, physics, botany, zoology)
Location Name: **3rd Floor**
Date and time of data collections: 10/3/22

Tap no/ name	Type of the tap (plastic/brass etc.)	Condition (poor/ moderate/good)	Average number of people using per day	Average time per head per day	Average amount of water releasing per minute	Leaking or not	If leaking average amount of water loss per minute
Kitchen Tap							
Wash basin tap 1	Brass	Moderate	8	30 sec	7.10/m	Not	
Toilet tap 1	steel	Moderate	15	40 sec	3.27/m	Not	
Toilet flush	Plastic	Moderate	15	7.40sec (1 flush)	5/m	Not	

Table 2. Consolidated statement of water usage in the college

SR. NO	FIXTURES	MEASUREMENT OF WATER USE (per day)					
		RATE OF DISCHARGE (liter/min)	DURATION OF USE (minutes)	AVERAGE QUANTITY PER USE (litre)	No. OF USES	TOTAL DAILY USES (in litre)	PER CAPITA DAILY USE (in Litre)
1	WASH BASIN TAP 1	7.10	5 min 35 sec	4.8	8	38.4	4.8
2	TOILET TAP 1	3.27	6 min 20 sec	1.42	15	21.42	1.42
3	TOILET FLUSH	5		5	15	75	5

Summary of Results

Total daily use of water = 134.82 litre
Per capita use of water =11.22 litre
Capacity of Water tank
Frequency of filling the tanks in a day
No. of leaking taps
Quantity of water loss per day through leaking
Electricity bill for Pump & motor/ month

Table 1. Data sheet for entry of water usage pattern for a location/ building

Building name:
Location Name: COMMON TAP NEAR AUDITORIUM
Date and time of data collections: 11/3/22

Tap no/name	Type of the tap (plastic/brass)	Condition (poor/moderate/good)	Average number of people using per day	Average time per head per day	Average amount of water releasing per minute	Leaking or not	If leaking average amount of water loss per minute.
Common tap (no of taps: 8)	brass	moderate	450	20 sec	7.5	Not leaking	not

Table 2. Consolidated statement of water usage in the college

SR. NO	FIXTURES	MEASUREMENT OF WATER USE (per day)					
		RATE OF DISCHARGE (liter/min)	DURATION OF USE (minutes)	AVERAGE QUANTITY PER USE (litre)	No. OF USES	TOTAL DAILY USES (in litre)	PER CAPITA DAILY USE (in Litre)
1	COMMON TAP (8 taps)	7.5	150	2.5	450	1125	2.5

Summary of Results

Total daily use of water = 1125 litre
Per capita use of water =2.5 litre
Capacity of Water tank
Frequency of filling the tanks in a day
No. of leaking taps
Quantity of water loss per day through leaking
Electricity bill for Pump & motor/ month

Table 1. Data sheet for entry of water usage pattern for a location/ building

Building name:
Location Name: LIBRARY
Date and time of data collections: 11/3/22

Tap no/name	Type of the tap (plastic/brass)	Condition (poor/moderate/good)	Average number of people using per day	Average time per head per day	Average amount of water releasing per minute	Leaking or not	If leaking average amount of water loss per minute.
Tap 1	brass	good	2	20 sec	4.14	not	

Table 2. Consolidated statement of water usage in the college

SR. NO	FIXTURES	MEASUREMENT OF WATER USE (per day)					
		RATE OF DISCHARGE (liter/min)	DURATION OF USE (minutes)	AVERAGE QUANTITY PER USE (litre)	No. OF USES	TOTAL DAILY USES (in litre)	PER CAPITA DAILY USE (in Litre)
1	TAP	4.14	40 sec	1.38	4	5.52	1.38

Summary of Results

Total daily use of water = 5.52 litre
Per capita use of water = 1.38 litre
Capacity of Water tank
Frequency of filling the tanks in a day
No. of leaking taps
Quantity of water loss per day through leaking
Electricity bill for Pump & motor/ month

Table 1. Data sheet for entry of water usage pattern for a location/ building

Building name: PHYSICAL EDUCATION DEPARTMENT (1st FLOOR)
Location Name:
Date and time of data collections: 11/3/22

Tap no/name	Type of the tap (plastic/brass)	Condition (poor/moderate/good)	Average number of people using per day	Average time per head per day	Average amount of water releasing per minute	Leaking or not	If leaking average amount of water loss per minute.
Wash basin tap	brass	good	1	20sec	7.9 l	not	No
Toilet tap	brass	moderate	1	6sec	4.5 l	not	No

Table 2. Consolidated statement of water usage in the college

SR. NO	FIXTURES	MEASUREMENT OF WATER USE (per day)					
		RATE OF DISCHARGE (liter/min)	DURATION OF USE (minutes)	AVERAGE QUANTITY PER USE (litre)	No. OF USES	TOTAL DAILY USES (in litre)	PER CAPITA DAILY USE (in Litre)
1	WASH BASIN TAP	7.9	2 min	2.6	2	15.8	2.6
2	TOILET TAP	4.5	12 sec	0.45	2	1.8	0.45

Summary of Results

Total daily use of water = 17.3 litre
Per capita use of water = 3.05 litre
Capacity of Water tank
Frequency of filling the tanks in a day
No. of leaking taps
Quantity of water loss per day through leaking
Electricity bill for Pump & motor/ month

Table 1. Data sheet for entry of water usage pattern for a location/ building

Building name: PHYSICAL EDUCATION DEPARTMENT (2nd FLOOR)
Location Name:
Date and time of data collections: 11/3/22

Tap no/name Total no of taps: 11	Type of the tap (plastic/brass)	Condition (poor/moderate/good)	Average number of people using per day	Average time per head per day	Average amount of water releasing per minute	Leaking or not	If leaking average amount of water loss per minute.
Wash basin tap (3 taps)		good	Not using everyday.		4.3 l (full open) 1.9 l (half open)		
Toilet tap (4 taps)		good	"		11.4 l (full open) 7.02 (half open)		
Bathroom tap (4 taps		good			8.7 l		

Table 1. Data sheet for entry of water usage pattern for a location/ building

Building name: HOSTEL (GROUND FLOOR)
Location Name:
Date and time of data collections: 15/3/22

Tap no/name	Type of the tap (plastic/brass)	Condition (poor/moderate/good)	Average number of people using per day	Average time per head per day	Average amount of water releasing per minute	Leaking or not	If leaking average amount of water loss per minute.
tap (18 taps)		Good	11	20 sec	2.8(full) 2.3(half)	not	not

Table 2. Consolidated statement of water usage in the college

SR. NO	FIXTURES	MEASUREMENT OF WATER USE (per day)					
		RATE OF DISCHARGE (liter/min)	DURATION OF USE (minutes)	AVERAGE QUANTITY PER USE (litre)	No. OF USES	TOTAL DAILY USES (in litre)	PER CAPITA DAILY USE (in Litre)
1	TAP	2.8	4 min	0.93	11	11.2	0.93

No. of uses- .... persons ..... times a day.

Summary of Results

Total daily use of water = 11.2 litre
Per capita use of water = 0.93 litre
Capacity of Water tank
Frequency of filling the tanks in a day
No. of leaking taps
Quantity of water loss per day through leaking
Electricity bill for Pump & motor/ month

Table 1. Data sheet for entry of water usage pattern for a location/ building

Building name: HOSTEL (FIRST FLOOR)
Location Name:
Date and time of data collections: 15/3/22

Tap no/name	Type of the tap (plastic/brass)	Condition (poor/moderate/good)	Average number of people using per day	Average time per head per day	Average amount of water releasing per minute	Leaking or not	If leaking average amount of water loss per minute.
Wash basin (3 taps)		Good	11	30 sec	2.3 (full) 2(half)	not	not
Bathroom tap		Good	11		14.1(full) 7.9(half)	not	not
toilet		good	11		9.6(full) 4.5(half)	not	not

Table 2. Consolidated statement of water usage in the college

SR. NO	FIXTURES	MEASUREMENT OF WATER USE (per day)					
		RATE OF DISCHARGE (liter/min)	DURATION OF USE (minutes)	AVERAGE QUANTITY PER USE (litre)	No. OF USES	TOTAL DAILY USES (in litre)	PER CAPITA DAILY USE (in Litre)
1	WASH BASIN 3 TAPS	2.3	6 min	1.15	11	13.8	1.15
2	BATHROOM TAP	14.1	6 min	7.05	12	169.2	7.05
3	TOILET TAP	9.6	6 min	4.8	8	57	4.8

Summary of Results

Total daily use of water =240 litre
Per capita use of water = 13 litre
Capacity of Water tank
Frequency of filling the tanks in a day
No. of leaking taps
Quantity of water loss per day through leaking
Electricity bill for Pump & motor/ month

Table 1. Data sheet for entry of water usage pattern for a location/ building

Building name: HOSTEL (SECOND FLOOR)
Location Name:
Date and time of data collections: 15/3/22

Tap no/name	Type of the tap (plastic/brass)	Condition (poor/moderate/good)	Average number of people using per day	Average time per head per day	Average amount of water releasing per minute	Leaking or not	If leaking average amount of water loss per minute.
Wash basin(3taps)		good	29	30 sec	4.3(full) 1.9(half)	not	not
Toilet tap(4taps)		good	29	2 m	11.4(full) 7.02(half)	not	not
Bathroom (4 taps)		good	29	5 m	8.7(full) 4.2(half)	not	not

Table 2. Consolidated statement of water usage in the college

SR. NO	FIXTURES	MEASUREMENT OF WATER USE (per day)					
		RATE OF DISCHARGE (liter/min)	DURATION OF USE (minutes)	AVERAGE QUANTITY PER USE (litre)	No. OF USES	TOTAL DAILY USES (in litre)	PER CAPITA DAILY USE (in Litre)
1	WASH BASIN TAP (3 TAPS)	4.3	14 min	2.15	29	60.2	2.15
2	TOILET TAP (4)	11.4	58 min	22.8	29	661	22.8
3	BATHROOM TAPS(4)	8.7	145 min	17.4	29	1261	17.4

No. of uses- .... persons ..... times a day.

Summary of Results

Total daily use of water =1992.2 litre
Per capita use of water =42.35 litre
Capacity of Water tank
Frequency of filling the tanks in a day
No. of leaking taps
Quantity of water loss per day through leaking
Electricity bill for Pump & motor/ month

Table 1. Data sheet for entry of water usage pattern for a location/ building

Building name: NAALUKETTU BUILDING (TOURISM) (staffroom)
Location Name:
Date and time of data collections: 28/2/22

Tap no/name (staffroom)	Type of the tap (plastic/brass)	Condition (poor/moderate/good)	Average number of people using per day	Average time per head per day	Average amount of water releasing per minute	Leaking or not	If leaking average amount of water loss per minute.
Wash basin tap (1 tap : leaking)		poor	6	20 sec	2.3 l (full open). 1.67 l (half open)	not	not
tap		moderate	6	10 sec	3.75 l (full open) 2.2 l (half open)	not	Not
Toilet flesh	plastic	NOT WORKING					

Bathroom (BOYS) Wash basin tap		moderate	20	10 sec	3.33 l (full) 2.14 l (half)		
Bathroom tap		good	10	6 sec	8.58 l (full) 2.86 l (half)	not	Not

Table 2. Consolidated statement of water usage in the college

SR. NO	FIXTURES	MEASUREMENT OF WATER USE (per day)					
		RATE OF DISCHARGE (liter/min)	DURATION OF USE (minutes)	AVERAGE QUANTITY PER USE (litre)	No. OF USES	TOTAL DAILY USES (in litre)	PER CAPITA DAILY USE (in Litre)
1	WASH BASIN TAP	2.3	2 min	0.766	6	5	0.766
2	TAP	3.75	1 min	0.625	6	3.75	0.625
3	TOILET FLUSH not working						
4	BATHROOM (BOYS) WASH BASIN TAP	3.33	5 min	0.55	20	16.65	0.55
5	BATHROOM TAP	8.58	10 min	0.858	10	85.8	0.858

Summary of Results

Total daily use of water =111.2 litre
Per capita use of water =2.799 litre
Capacity of Water tank
Frequency of filling the tanks in a day
No. of leaking taps
Quantity of water loss per day through leaking
Electricity bill for Pump & motor/ month

Table 1. Data sheet for entry of water usage pattern for a location/ building

Building name: NAALUKETTU BUILDING (HISTORY DEPARTMENT) (1st floor : staffroom)
Location Name:
Date and time of data collections: 28/2/22

Tap no/name	Type of the tap (plastic/brass)	Condition (poor/moderate/good)	Average number of people using per day	Average time per head per day	Average amount of water releasing per minute	Leaking or not	If leaking average amount of water loss per minute.
Wash basin tap		moderate	6	20 sec	4.3 l (full) 2.1 l (half)	not	Not

Table 2. Consolidated statement of water usage in the college

SR. NO	FIXTURES	MEASUREMENT OF WATER USE (per day)					
		RATE OF DISCHARGE (liter/min)	DURATION OF USE (minutes)	AVERAGE QUANTITY PER USE (litre)	No. OF USES	TOTAL DAILY USES (in litre)	PER CAPITA DAILY USE (in Litre)
1	WASH BASIN TAP	4.3	2	1.43	6	8.6	1.43

No. of uses- .... persons ..... times a day.

Summary of Results

Total daily use of water =8.6 litre
Per capita use of water =1.43 litre
Capacity of Water tank
Frequency of filling the tanks in a day
No. of leaking taps
Quantity of water loss per day through leaking
Electricity bill for Pump & motor/ month

Table 1. Data sheet for entry of water usage pattern for a location / building

Building name: NAALUKETTU BUILDING TOURISM DEPARTMENT
Location Name:
Date and time of data collections: 1/3/22

Tap no/name	Type of the tap (plastic/brass)	Condition (poor/moderate/good)	Average number of people using per day	Average time per head per day	Average amount of water releasing per minute	Leaking or not	If leaking average amount of water loss per minute.
Wash basin tap 1	Steel	poor				leaking	300 ml
Tap 2	Steel	good	150	15 sec	4 l (full) 1.5 l (half)	Not	
Tap 3	steel	good	50	20 sec	4 l	Not	
Toilet tap 1	steel	good	35	25 sec	8.5 l (full) 2.8 l (half	not	

Toilet tap 2	steel	moderate	30	25 sec	7.5 l (full) 1.87 l (half)	not	
Toilet tap 3	steel	good	30	30 sec	7.5 l (full) 3 l (half)	not	

Table 2. Consolidated statement of water usage in the college

SR. NO	FIXTURES	MEASUREMENT OF WATER USE (per day)					
		RATE OF DISCHARGE (liter/min)	DURATION OF USE (minutes)	AVERAGE QUANTITY PER USE (litre)	No. OF USES	TOTAL DAILY USES (in litre)	PER CAPITA DAILY USE (in Litre)
1	WASH BASIN TAP	Leaking					
2	TAP 2	4	37 min 5 sec	1	150	148	1
3	TAP 3	4	16 min 6 sec	1	50	66	1
4	TOILET TAP 1	8.5	14 min 5 sec	3.54	35	119	3.54
5	TOILET TAP 2	7.5	12 min 5 esc	3.12	30	90	3.12
6	TOILET TAP 3	7.5	15 min	3.75	30	112.5	3.75

No. of uses- .... persons ..... times a day.

Summary of Results

Total daily use of water =535.5 litre
Per capita use of water =12.41 litre
Capacity of Water tank
Frequency of filling the tanks in a day
No. of leaking taps
Quantity of water loss per day through leaking
Electricity bill for Pump & motor/ month

Table 1. Data sheet for entry of water usage pattern for a location/ building

Building name: NAALUKETTU BUILDING (ground floor toilet)
Location Name:
Date and time of data collections: 1/3/22

Tap no/name	Type of the tap (plastic/brass)	Condition (poor/moderate/good)	Average number of people using per day	Average time per head per day	Average amount of water releasing per minute	Leaking or not	If leaking average amount of water loss per minute.
Washbasin tap 1	steel	good	200	20 sec	10 (full) 5 (half)	not	not
Tap 2	steel	good		20 sec	10		
Wash basin tap (near grill)		Moderate		20 sec	7.5 (full) 3 (half)		
Filter tap(press)		good	100	25 sec	2.61 (full) 1.36 (half)	not	not
Bathroom	Steel	poor	60	30 sec	4 (full)	not	not

tap					2 (half)		
Bathroom (near step)	NEW: NOT WORKING						

Table 2. Consolidated statement of water usage in the college

SR. NO	FIXTURES	MEASUREMENT OF WATER USE (per day)					
		RATE OF DISCHARGE (liter/min)	DURATION OF USE (minutes)	AVERAGE QUANTITY PER USE (litre)	No. OF USES	TOTAL DAILY USES (in litre)	PER CAPITA DAILY USE (in Litre)
1	WASH BASIN TAP 1	10	60 min	3	200	600	3
2	TAP 2	10					
3	WASH BASIN TAP (near grill)	7.5					
4	FILTER TAP (press)	2.61	40 min	1.08	100	104.4	1.08
5	BATHROOM TAP	4	30 min	2	60	120	2

No. of uses- .... persons ..... times a day.

Summary of Results

Total daily use of water =824.4 litre
Per capita use of water =6.08 litre
Capacity of Water tank
Frequency of filling the tanks in a day
No. of leaking taps
Quantity of water loss per day through leaking
Electricity bill for Pump & motor/ month

Table 1. Data sheet for entry of water usage pattern for a location/ building

Building name: NAALUKETTU BUILDING COMMERCE DEPARTMENT
Location Name:
Date and time of data collections: 2/3/22

Tap no/name	Type of the tap (plastic/brass)	Condition (poor/moderate/good)	Average number of people using per day	Average time per head per day	Average amount of water releasing per minute	Leaking or not	If leaking average amount of water loss per minute.
Bathroom tap (washbasin tap)		poor	50	20 sec	8.57 l	not	not
tap		good		30 sec	15 l(full) 7.5 l (half)	not	not
flesh	plastic	good	25	30 sec	Capacity of flesh : 5 litre	not	not
Spray tap		good	25	10 sec	4.286 l	not	not

Table 2. Consolidated statement of water usage in the college

SR. NO	FIXTURES	MEASUREMENT OF WATER USE (per day)					
		RATE OF DISCHARGE (liter/min)	DURATION OF USE (minutes)	AVERAGE QUANTITY PER USE (litre)	No. OF USES	TOTAL DAILY USES (in litre)	PER CAPITA DAILY USE (in Litre)
1	BATHROOM TAP	8.57	16 min 6 sec	2.85	50	137.12	2.85
2	TAP	15					
3	FLESH	5	12 min 5 sec	5	25	5	5
4	SPRAY PIPE	4.286	5 min	0.714	25	21.43	0.714

No. of uses- .... persons ..... times a day.

Summary of Results

Total daily use of water =163.55 litre
Per capita use of water =8.564 litre
Capacity of Water tank
Frequency of filling the tanks in a day
No. of leaking taps
Quantity of water loss per day through leaking
Electricity bill for Pump & motor/ month

Table 1. Data sheet for entry of water usage pattern for a location/ building

Building name: MAIN BLOCK FIRST FLOOR
Location Name:
Date and time of data collections: 28/2/22

Tap no/name	Type of the tap (plastic/brass)	Condition (poor/moderate/good)	Average number of people using per day	Average time per head per day	Average amount of water releasing per minute	Leaking or not	If leaking average amount of water loss per minute.
Tap 1 (staff only toilet)		Good	8	20 sec	8.69 l	not	not
Wash basin (office)		Good	10	15 sec	10.16 l	not	Not
Wash basin 2 (principal's office)		Good	1	10 sec	11 l (full) 6.80 l (half)	not	not
Tap 1		good	1	10sec	8.20(half)	not	not
flesh		NOT WORKING					

Table 1. Data sheet for entry of water usage pattern for a location/ building

Building name: MAIN BLOCK FIRST FLOOR (manager's office)
Location Name:
Date and time of data collections: 28/2/22

Tap no/name	Type of the tap (plastic/brass)	Condition (poor/moderate/good)	Average number of people using per day	Average time per head per day	Average amount of water releasing per minute	Leaking or not	If leaking average amount of water loss per minute.
Wash basin 1		good		10 sec	9.30	not	not
Wash basin 2		NOT WORKING					
Flesh		NOT WORKING					
Tap		good		20 sec	9.3 (full) 4.78 (half)	not	not
Spray pipe							

Table 1. Data sheet for entry of water usage pattern for a location/ building

Building name: ECONOMICS DEPARTMENT
Location Name:
Date and time of data collections: 1/3/22

Tap no/name	Type of the tap (plastic/brass)	Condition (poor/moderate/good)	Average number of people using per day	Average time per head per day	Average amount of water releasing per minute	Leaking or not	If leaking average amount of water loss per minute.
Wash basin		good	3	23 sec	2 l	Not	Not
Toilet tap		good	3	15 sec	2.5 l	Not	not
Toilet flush	plastic	good	3	1 m	3 l	Not	Not
Health fosset		good	3	30 sec	3 l	not	not

Table 2. Consolidated statement of water usage in the college

SR. NO	FIXTURES	MEASUREMENT OF WATER USE (per day)					
		RATE OF DISCHARGE (liter/min)	DURATION OF USE (minutes)	AVERAGE QUANTITY PER USE (litre)	No. OF USES	TOTAL DAILY USES (in litre)	PER CAPITA DAILY USE (in Litre)
1	WASH BASIN	2	2	0.76	3	4	0.76
2	TOILET TAP	2.5	1	0.625	3	2.5	0.625
3	TOILET FLUSH	3	3	3	3	3	3
4	HEALTH FAUCET	3	1 min 30 sec	1.5	3	4	1.5

No. of uses- .... persons ..... times a day.

Summary of Results

Total daily use of water =13.5 litre
Per capita use of water = 5.8 litre
Capacity of Water tank
Frequency of filling the tanks in a day
No. of leaking taps
Quantity of water loss per day through leaking
Electricity bill for Pump & motor/ month

Table 1. Data sheet for entry of water usage pattern for a location/ building

Building name: ECONOMICS DEPARTMENT
Location Name:
Date and time of data collections: 2/3/22

Tap no/name	Type of the tap (plastic/brass)	Condition (poor/moderate/good)	Average number of people using per day	Average time per head per day	Average amount of water releasing per minute	Leaking or not	If leaking average amount of water loss per minute.
Wash basin	plastic	good	50	10 sec	3.4	not	not
Girls toilet tap	steel	good	30	30 sec	1.2	not	Not
Teachers staffroom tap	plastic	good	2	10 sec	4.8	not	not
Teacher's staffroom washbasin	steel	good	3				

Table 2. Consolidated statement of water usage in the college

SR. NO	FIXTURES	MEASUREMENT OF WATER USE (per day)					
		RATE OF DISCHARGE (liter/min)	DURATION OF USE (minutes)	AVERAGE QUANTITY PER USE (litre)	No. OF USES	TOTAL DAILY USES (in litre)	PER CAPITA DAILY USE (in Litre)
1	WASH BASIN TAP	3.4	10	0.5	50	34	0.5
2	GIRLS TOILET TAP	1.2	15 min	0.6	30	18	0.6
3	TEACHERS STAFFROOM TAP	4.8	20 sec	0.8	2	1.6	0.8
4	TEACHERS STAFFROOM WASH BASIN						

No. of uses- .... persons ..... times a day.

Summary of Results

Total daily use of water = 53.6 litre
Per capita use of water = 1.9 litre
Capacity of Water tank
Frequency of filling the tanks in a day
No. of leaking taps
Quantity of water loss per day through leaking
Electricity bill for Pump & motor/ month

RANNY

Dr. Aleyamma Kuruvilla

INTERNAL GREEN AUDIT 2021-2022
REPORT

CNPI GREEN AUDIT REPORT

St Thomas College, Ranni,
Pathanamthitta

1. WASTE MANAGEMENT AUDIT

Waste" is everything that no longer has a use or purpose and needs to be disposed of. The term certainly applies to discarded material, but there are specific definitions for waste that affect how waste is regulated and must be handled, especially in professional settings. A college campus has both biodegradable and non-biodegradable wastes. Besides hazardous (chemicals *etc.*) and non-hazardous wastes are also there. Both solid and liquid wastes are also in every campus. The present survey and audit are pertaining to the solid wastes alone. Waste management or waste disposal means the processes and actions required to manage waste from its inception to its final disposal. It is matter of concern that proper scientific waste disposal mechanisms are limited to very few campuses in India.

Waste management audit means the assessment of quantity and quality of different type of wastes, and its management in an establishment. The present audit assessed the quantity and quality of solid wastes, present management methods and future suggestions. The audit can also make the organization more effective at reducing waste management costs by educating staff about proper waste disposal and making better use of natural resources. When performing a waste audit, the organization should not inform staff about the audit prior to the completion of the audit. Informing staff in advance can alter waste disposal habits resulting in an inaccurate and counterproductive audit.

1.1. AIM

To conduct a waste management audit of the St Thomas College, Ranni campus and propose a future plan.

1.2. OBJECTIVES

- To identify the quantity and quality of various types of solid wastes of the college campus
- To identify the various disposal methods adopted inside the campus
- To propose suggestions to enhance waste disposal of the college campus

1.3 METHODOLOGY

A baseline survey of the waste generated inside the campus was conducted through site survey and interactions with system staff and stakeholders. Students were divided into separate groups for assessing the same using a questionnaire survey method. The amount of waste generated including paper waste, plastic waste, e- waste, biowaste and other waste (construction and demolition waste, clothes, sandals, *etc*) were estimated for college campus, office, hostel *etc.*, separately. During the auditing period the canteen of the college was closed, so the data of the canteen area is not included. The data was recorded in tabular sheets. There were 3 student co-ordinators and 2 teacher co-ordinator for waste management audit.

1.4 RESULTS AND OBSERVATION

WASTE AUDITING OF ST THOMAS COLLEGE, RANNI							
Sl.No.	Location	Waste Type					
		Paper Waste (Carton ,Paper coverlet) in kilograms per week	Plastic (cover, packing, others)in kilograms (per week)	Biowaste (sweeping, food waste, crop waste) in kilograms per week)	Amount of weekly waste generated (in kg) (Plastic, Paper, Bio-waste)	E-Waste (CD, Printer, Computer, etc) in grams per year	Other waste(Construction and demolition waste, sandals, clothes etc.) in kg (per year)
1	College Campus	1.245	1.4	5.978	2.299	2.563	556.89
2	Office	1.145	0.67	0.774	1.351	4.789	4.578
3	Canteen	0	0	0	0	0	0
4	Hostel	0.975	0.59	10.5	2.560	0	8.632
5	Others	0.456	0.225	3.15	0.9385	0.78	7.855
	Total	**3.823**	**2.89**	**20.402**	**7.149**	**8.132**	**577.955**

Table 1. Waste Auditing of St Thomas College, Ranni

The data was collected weekly and yearly basis. Paper, plastic and biowaste data was collected on weekly basis, on the other hand, e-waste and other waste which means construction and demolition waste, sandals, etc. were accounted on a yearly basis. The major portion of weekly waste accounts for bio-waste followed by paper and plastic. In the whole waste audit data in the canteen was shown nil, as the canteen was closed.

Table 2: Amount of different weekly waste generated at each location

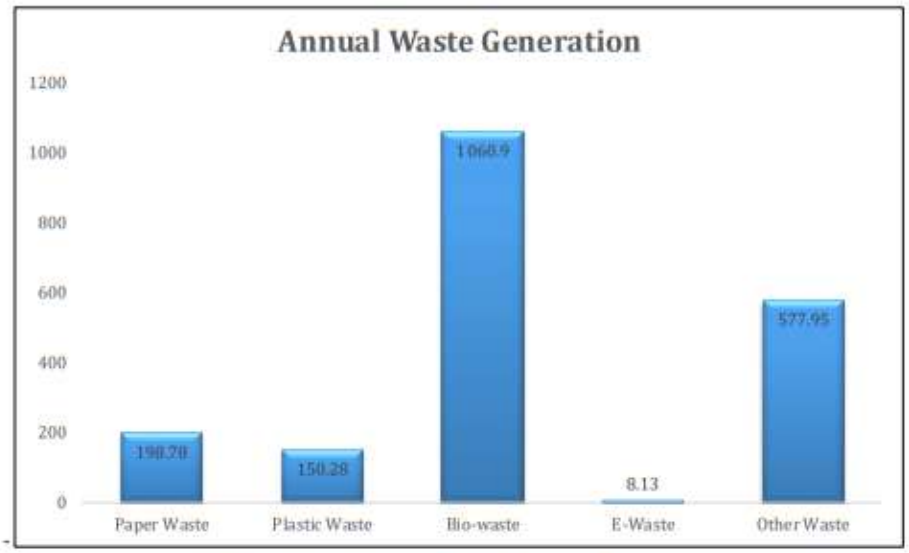
Section*	Quantity in kg
College Campus	8.623
Office	2.589
Canteen	0
Hostel	12.065
Others	3.836

(*here bio-waste, plastic waste and paper waste are considered)

E-waste and other waste were audited on an annual basis and in that other waste like Construction and demolition waste, sandals, clothes etc, accounts the lions' share, which means 577.955 kg/year and e-waste accounts for 8.132 kg/year.

Paper Waste (Carton, Paper cover, etc.) per year (kg)	Plastic (Cover, packing, others) per year (kg)	Biowaste; (sweepings, food waste, crop waste) per year (kg)	E-waste (CD, Printer, Computer, etc.,)per year (kg)	Other waste (Construction and demolition waste, Sandals, Clothes,etc) in grams/ number (per year) (kg)
64.74	72.8	310.856	2.563	556.89
59.5712	34.84	40.248	4.7892	4.578
0	0	0	0	0
50.7416	30.68	546	0	8.632
23.7276	11.96	163.8	0.78	7.855
198.7804	**150.28**	**1060.904**	**8.1322**	**577.955**

Table 3: Annual waste generation



Graph 1: Amount of different waste (Annual) at St Thomas College campus

The major . of waste generated inside the campus is the bio-waste , that is 53% of the total waste generated, followed by other waste. The current audit shows that the college is generating very less quantity of plastic waste and which shows a good attitude towards the environment. The audit also reveals that there are some efforts put forward by the college in the waste disposal mechanism in the college campus. The e-waste generated is selling outside to some vendors rather than dumping in the campus. In the case of bio-waste, vermicompost, pipe compost and a compost pit methods are followed. But in the case of paper waste, a portion of it is burned and rest are dumped in the outer courtyard. So a planned and sustainable waste management measures are required inside the campus.

Fig. 1: Vermicomposting Unit at St Thomas College

1.5 CONCLUSION & RECOMMENDATIONS

Green audit in the St Thomas College was conducted as a tool to enhance its sustainable development by adopting necessary management and conservation strategies. By analyzing the results of present state of the energy, water and biodiversity audit, suggestions and recommendations are provided to reduce their anti-environmental activities, to adopt energy and water conservation measures, and strategies to improve the biodiversity of the campus.

The pioneering green audit in the college is successfully completed. The inputs collected during the study can be used in further research activities.

After the initial study, TIES suggests that similar green auditing programmes should be conducted every year for the improvement of overall environmental performance of the college. Gradually, sustainable resource utilization can be achieved within a period of 4 years.

The greatest source of waste generated in the campus is the bio-waste, so proper management measures should be taken to dispose or compost the waste into useful other products, like biogas, fertilizer, etc. Recycled paper should be used in the campus. Even though plastic waste is less, it's reduction will a eco-friendly green campus.

- Use of recycled paper will reduce the dependency over the normal paper
- Instead of giving the bio-waste for outside agents composting can be done inside the campus. Composting is a simple as well as effortless way of recycling organic waste. The biodegradable waste will be degraded by microorganisms and that can be used as good manure for trees as well as vegetable garden.
- Follow the principle of 3R's *viz*: Reduce, Recycle and Reuse
- Hazardous waste should be treated properly to avoid environmental and health issues
- Encourage students for recycling waste into usable products.
- Avoid the use of single-use plastics, and other items.
- Replace disposable with reusable items; ban all disposables in the campus.
- Installing a biogas plant will help to reduce the biowaste (including food waste, toilet waste, *etc*) and the gas generated can be used in labs, kitchens, etc.

- Thumboormuzhi composting model, Deenabandhu bio-gas unit, *etc* are good examples to concert waste-to-energy
- Encourage parents to make a green lifestyle at their homes through students

2. WATER AUDIT

Water audits provide an enjoyable educational way for students to examine the ways that they use water every day, and to encourage classmates, teachers and college administrators to make their college more water-efficient and cost-effective. By completing the project, students and college staff learnt about the amount of water that is consumed in the college for activities including washing hands, drinking, in the laboratories, watering landscaped areas and flushing toilets and urinals. From the results obtained, students and staffs will consider better ways to improve water conservation throughout the building and on college campus. Water auditing is the systematic and scientific examination of water usage in the campus. It determines the usage pattern of water in different departments, laboratories and other areas in the campus with the help of students and teachers. In order to facilitate proper usage of water, water audit is a an essential tool.

However, the investigators were unable to collect all the required data, as the college has not been working normally due to Covid-19 restrictions.

2.1. AIM

To find out the usage pattern and conservation of water in the St Thomas College campus.

2.2. OBJECTIVES

- To find out the pattern of water use in the St Thomas College campus
- To find out the quantity of water wastage in the St Thomas College campus
- To suggest remedial measures and water conservation practices

2.3. METHODOLOGY

After getting orientation about Green audit, students were divided into groups and conducted mock audit. For the study, the students were further divided into several groups and assigned different areas of the campus for auditing. The whole campus was mainly divided into three areas, viz., Main block, Commerce block and Economic block.

The data was tabulated and analyzed. Auditing was done at 17 locations by 23 students and two teacher co-ordinators. Water audit was done as an on-site survey in which several fixtures, leakages, etc. were identified and noted.

2.4. RESULTS AND OBSERVATIONS

The data on water usage pattern of the St Thomas College campus was estimated through a systematic and time-bound survey. The total water usage data is given below (Table 5). The major source of water in the campus are well water, panchayat piper water and also a rain water harvesting system. The water is used as drinking water, irrigation purpose, bathroom usage, and other domestic usages along with laboratory purposes.

During the audit it was reported that there are 7 water storage tanks in the campus which has a total of 6400 L capacity. These are situated in the main block, Economics block, English and commerce block respectively.

Sl.No.	Area	No.	Capacity (L)
1	Main Block	4	500
2	Economics Block	1	400
3	English Block	1	2000
4	Commerce Block	1	2000
TOTAL		**7**	**6400**

Table 4: Various water storage tanks in the campus

The highest quantity of water usage was observed at the second floor of the hostel that is 1982 L, followed by the area near the auditorium (Table 5 and Graph 6). It was found that 5919.28 L of water is consumed in the campus a day and thus yearly approximately 2160537 L/Year. The least amount of water is used at the Library that is 5.52 L.

The loss of water through leakage in the campus was also estimated. Data shows that there is one leakage at the Tourism Department (Table 6).

Location	Total daily usage of water (L)
English Department	39.98
Main Block 1st Floor	69.35
Main Block 2nd Floor	583.26
Main Block 3rd Floor	134.82
Near Auditorium	1125
Library	5.52
Physical Education Dept. (1st Floor)	17.6
Physical Education Dept. (2nd Floor)	0
Hostel (Ground Floor)	11.2
Hostel (1st Floor)	240
Hostel (2nd Floor)	1982.2
Naalukettu Building (Tourism Department Staff Room)	111.2
Naalukettu Building (History Department 1st Floor)	8.6
Naalukettu Building (Tourism Department)	535.5
Naalukettu Building (Ground Floor Toilet)	824.4
Naalukettu Building (Commerce Department)	163.55
Economics Department	67.1
Total	**5919.28**

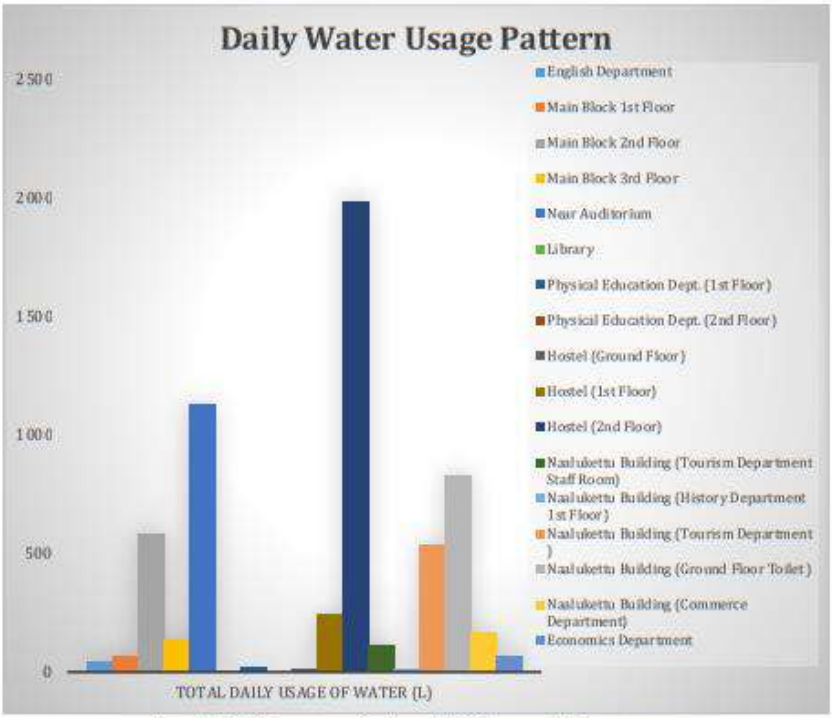
Table 5: Various water storage tanks in the campus

Location	Equipment type	Condition	Rate of discharge (L/ min)	Duration of Use (minutes)	Average quantity per use (L)	Average No. of users	Total Daily Uses (L)	Leakage or not (L/minute)	Amount of Leakage (L/minute)	Amount of Leakage (L/day)
English Department	Wash Basin Tap	Good	6	3	2	6	12	0	0	0
	Toilet Tap	Good	8	3	1.33	6	7.98	0	0	0
	Toilet Flush	Good	6	12	3	6	18	0	0	0
	Bathroom Faucet	Good	18	2	0.33	6	2	0	0	0
Main Block (1st Floor)	Kitchen Tap	Moderate	4.5	1	5.25	4	21	0	0	0
	Utility Tap		2.69	6	2.59	20	17.3	0	0	0
	Bathroom Faucet	Good	2.33	1	1.04	10	3.47	0	0	0
	Bathroom Washbasin	Moderate	2.93	1	1.31	10	4.38	0	0	0
	Bathroom Tap	Good	9.3	2	2.32	10	23.2	0	0	0
Main Block (2nd Floor)	Utility Tap		3	2	1.25	6	7.5	0	0	0
	Tap		4.79	4	1.06	18	19.16	0	0	0
	Health Faucet	Good	7.52	5	1.88	20	37.6	0	0	0
	Bathroom Faucet		2.33	6	1.16	12	14	0	0	0
	Lab Taps		8.87	57	16.85	30	505	0	0	0
Main Block (3rd Floor)	Wash Basin Tap	Moderate	7.1	5	4.8	8	38.4	0	0	0
	Toilet Tap	Moderate	3.27	6	1.42	15	21.42	0	0	0
	Toilet Flush	Moderate	5	0	5	15	75	0	0	0
Common Tap Near Auditorium	Common Tap	Moderate	7.5	150	2.5	450	1125	0	0	0
Library	Tap	Good	4.14	0.66	1.38	4	5.52	0	0	0
Physical Education Department (1st Floor)	Wash Basin Tap	Good	7.9	2	2.6	2	15.8	0	0	0
	Toilet Tap	Moderate	4.5	0.2	0.45	2	1.8	0	0	0
Physical Education Department (2nd Floor)	Wash Basin Tap	Good	4.3	0	0	0	0	0		
	Toilet Tap	Good	11.4	0	0	0	0	0		
	Bathroom Tap	Good	8.7	0	0	0	0	0		
Hostel (Ground Floor)	Tap	Good	2.8	4	0.93	11	11.2	0	0	0
Hostel (First Floor)	Wash Basin Tap	Good	2.3	6	1.15	11	13.8	0	0	0

	Bathroom Tap	Good	14.1	6	7.05	12	169.2	0	0	0
	Toilet	Good	9.6	6	4.8	8	57	0	0	0
Hostel (Second Floor)	Wash Basin Tap	Good	4.3	14	2.15	29	60.2	0	0	0
	Toilet Tap	Good	11.4	58	22.8	29	661	0	0	0
	Bathroom Tap	Good	8.7	145	17.4	29	1261	0	0	0
Naalukettu Building	Wash Basin Tap	Poor	2.3	2	0.766	6	5	0	0	0
	Tap	Moderate	3.75	1	0.625	6	3.75	0	0	0
	Toilet Flush	Not Working	0	0	0	0	0	0	0	0
	Wash Basin Tap (Boys Bathroom)	Moderate	3.33	5	0.55	20	16.65	0	0	0
	Bathroom Tap	Good	8.58	10	0.858	10	85.8	0	0	0
Naalukettu Building (History Department 1st Floor)	Wash Basin Tap	Moderate	4.3	2	1.43	6	8.6	0	0	0
Naalukettu Building (Tourism Department)	Wash Basin Tap	Poor (Leaking)	0	0	0	0	0	1	0.3	432
	Tap	Good	4	37.08	1	150	148	0	0	0
	Tap	Good	4	16.1	1	50	66	0	0	0
	Toilet Tap	Good	8.5	14.08	3.54	35	119	0	0	0
	Toilet Tap	Moderate	7.5	12.08	3.12	30	90	0	0	0
	Toilet Tap	Good	7.5	15	3.75	30	112.5	0	0	0
Naalukettu Building (Ground Floor Toilet)	Wash Basin Tap	Good	10	60	3	200	600	0	0	0
	Tap	Good	10	0	0	0	0	0	0	0
	Wash Basin Tap	Moderate	7.5	0	0	0	0	0	0	0
	Filter Tap	Good	2.61	40	1.08	100	104.4	0	0	0
	Bathroom Tap	Poor	4	30	2	60	120	0	0	0
	Bathroom	New, not working	0	0	0	0	0	0	0	0
	Bathroom Tap	Good	8.57	16.1	2.85	50	137.12	0	0	0

Naalukettu Building (Commerce Department)	Tap	Good	15	0	0	0	0	0	0	0
	Flush	Good	5	12.08	5	25	5	0	0	0
	Spray Tap	Good	4.286	5	0.714	25	21.43	0	0	0
Economics Department	Wash Basin	Good	2	2	0.76	3	4	0	0	0
	Toilet Tap	Good	2.5	1	0.625	3	2.5	0	0	0
	Toilet Flush	Good	3	3	3	3	3	0	0	0
	Health Faucet	Good	3	1.5	1.5	3	4	0	0	0
Economics Department	Wash Basin Tap	Good	3.4	10	0.5	50	34	0	0	0
	Toilet Tap (Girls)	Good	1.2	15	0.6	30	18	0	0	0
	Tap (Staffroom)	Good	4.8	0.33	0.8	2	1.6	0	0	0
	Wash Basin (Staffroom)	Good	0	0	0	0	0	0	0	0

Table 6: Total water usage of St Thomas College Campus



Graph 2: Daily usage of water at St Thomas College campus

2.6 CONCLUSIONS & RECOMMENDATIONS

The water audit is an effective method to assess the water usage pattern and estimate the quantity the used in the college. Besides, it provides scientific measures to improve the water conservation preventing the water loss and lazy usage habits.

The water audit conducted in the St Thomas College campus revealed that the water usage pattern in the college is high and there is loss of water taking place in the college due to leaking taps. Hence, proper water conservation measures should be implemented in the campus.

The highest use of water is in the Ladies Toilet. The per capita use of water was not estimated.

- The leakages need to be repaired.
- The students and other staff should get regular vigil on water usage and methods such as generating awareness of water conservation through banners and posters.
- Need for regular discussions among the group members for bringing new methods and ways for conserving water in and around the campus.
- Install flow restrictors to cut down the water flow
- Turn off the taps and other water sources after use
- Checks faucets and pipes for any leakages (should do a regular examination of the same)
- Plant native trees and plants in the campus, because it adapts to the climate and other water usage which reduce the usage of water in the gardens
- Put a layer of mulch around the plants and trees inorder to maintain a cool atmosphere in the soil and which helps to store water and also mulch lowers evaporation
- Install dual flush tank to reduce the usage of water

3. BIODIVERSITY AUDIT

The biodiversity audit is conducted to analyze the present biodiversity status of the college and to propose plans to enhance the existing biodiversity. Following the audit, students have identified the floral and faunal diversity at the college surroundings through transect and quadrant methods. It provides students with hands on experience outside the classroom; their observational and identification skills will be improved identifying different flora and fauna. The random number of observation walks conducted during the last couple of months enabled the student community classify the rich biodiversity around them that provides the right ambience to pursue higher learning.

The results indicate presence of higher floral diversity against limited space availability. However, the faunal diversity is moderate. A planned greening programme will make the campus richer including more native organisms.

3.1. AIM

To conduct a biodiversity audit of the St Thomas College campus and propose areas of improvement

3.2. OBJECTIVES

- To identify the floral and faunal diversity of the college campus
- To impart scientific temperament and culture among the students through participatory research methods
- To propose suggestions to enhance biodiversity of the college campus

3.3. METHODOLOGY

A baseline survey of flora and fauna at the college campus was conducted. The total area of the college campus was divided into several plots. The audit team was divided into 8 groups with 3 members in each group. Auditing area was divided into 16 Zones and each group was

assigned with 2 zones for the 6 week auditing period. The students were guided by two teachers. The Simpson's Diversity Index (D), developed by Simpson (1949) was also assessed for flora and butterflies.

3.4. RESULTS & DISCUSSION

A group of students were assigned with the audit and specific areas were surveyed them and the flora, fauna, butterflies, odonates of the campus were identified. The data was recorded in tabular sheets:

Sl. No.	Scientific name	Malayalam name	English Name	No.
1.	*Artocarpus heterophyllus*	പ്ലാവ്	JACKFRUIT TREE	12
2.	*Mangifera indica*	മാവ്	MANGO	9
3.	*Saracaasoca*	അശോകം	ASHOKA TREE	1
4.	*Mimusposelengi*	ഇലഞ്ഞി	BULLET WOOD	2
5.	*Tectona grandis*	തേക്ക്	TEAK	84
6.	*Cocos nucifera*	തെങ്ങ്	COCONUT TREE	21
7.	*Artocarpus hirsutus*	ആഞ്ഞിലി	WILD JACK	7
8.	*Delonix regia*	ഗുൽമോഹർ	ROYAL PRINCIANA	4
9.	*Swietenia macrophylla*	മഹാഗണി	MAHAGONY	38
10.	*Annona muricata*	മുള്ളാത്ത	SOURSOP TREE	7
11.	*Cassia fistula*	കണിക്കൊന്ന	GOLDEN SHOWER TREE	8
12.	*Psidium guajava*	പേര	GUAVA TREE	10
13.	*Nephelium lappaceum*	റംബുട്ടാൻ	RAMBUTAN	3
14.	*Peltophorum pterocarpum*	മഞ്ഞവാക	COPPER POD	3
15.	*Polyathia longifolia*	അശോകം	FALSE ASHOKA	6
16.	*Casuarina equisetifolia*	ചൂള	CATURINA	1
17.	*Palmacaea*	അലങ്കാര പന	ORNAMENTAL PALM	10
18.	*Pimenta dioica*	സർവ്വസുഗന്ധി	ALL SPICE	1
19.	*Lagerstroemia speciosa*	മണിമരുത്	PRIDE OF INDIA	2
20.	*Caruca papaya*	പപ്പായ	PAPAYA	2
21.	*Cinnamumum verum*	വഴന	BAY LEAF	1
22.	*Albizia julibrissin*	പൂവാക	PERSIAN SILK TREE	1
23.	*Araucaria heterophylla*	ഒരകേറിയ	ARAUCARIA	1
24.	*Palmacaea*	അലങ്കാര പന	HYOPHORBE	1
25.	*Ficus exasperata*	ഇരുകം	SAND PAPER TREE	1

Table 7. Floral Diversity of St Thomas College Campus

The Simpson's Diversity Index (D) is 0.8 in the case of trees and this is a very low level of diversity.

Sl. No.	Scientific name	Malayalam name	English Name	No.
1.	*Graphium teredon*	നീലകുടുക്ക	COMMON BLUE BOTTLE	1
2.	*Ypthima huebneri*	നാല്ക്കണ്ണി	COMMON FOUR-RING	10
3.	*Danaus chrysippus*	എരുക്കുത്തപ്പ്	PLAIN TIGER	1
4.	*Junonia iphita*	കരിയില ശലഭം	CHOCOLATE PANSY	5
5.	*Mycalesis perseus*	തവിടൻ	COMMON BUSHBROWN	10
6.	*Papilio polytes*	നരകക്കാളി	COMMON MORMON	1
7.	*Eurema hecabe*	മഞ്ഞപ്പുള്ളി	COMMON GRASS YELLOW	12
8.	*Ariadne merione*	ആവണച്ചോപ്പൻ	COMMON CASTOR	8
9.	*Danaus genutia*	വരയൻ കടുവ	STRIPED TIGER	1
10	*Hypolimnas bolina*	വൻചോട്ടശലഭം	GREAT EGG FLY	3
11	*Phalanta phalantha*	പുലിത്തപ്പൻ	COMMON LEOPARD	3
12	*Hypolimnas misippus*	ചെറുശലഭം	DANAID EGG FLY	2
13	*Acraea terpsicore*	തീച്ചിറകൻ	TAWNY COASTER	1
14	*Melanitis leda*	കരിയില ശലഭം	COMMON EVENING BROWN	7
15	*Catopsilia pyranthe*	തകരമുത്തി	MOTTLED EMIGRANT	2
16	*Papilio polymnestor*	കൃഷ്ണശലഭം	BLUE MORMON	1
17	*Pachliopta aristolochiae*	നാട്ടു റോസ്	COMMON ROSE	1
18	*Pareronia hippia*	നാടോടി	COMMON WANDERER	1
19	*Catopsilia pomona*	മഞ്ഞതകരമുത്തി	COMMON EMIGRENT	4
20	*Leptosia nina*	പൊട്ടുവെള്ളാട്ടി	PSYCHE	5
21	*Delias eucharis*	വിലാസിനി	COMMON JEZEBEL	1
22	*Papilio clytia*	വഴനപൂമ്പാറ്റ	COMMON MIME	3

Table 8. Butterfly Diversity of St Thomas College Campus

The Simpson's Diversity Index (D) is 0.9 in the case of trees and this is a extremely low level of diversity

Sl. No.	*Scientific name*	Malayalam name	English Name
1	*Trithemis festiva*	കാർത്തുമ്പി	BLACK STREAM GLIDER
2	*Orthetrum pruinosum*	പവിഴവാലൻ വ്യാളി	CRIMSON TAILED MARSH HAWK
3	*Libellago indica*	തവളക്കണ്ണൻ	SOUTHERN HELIODAR

Table 9. Odonate Diversity of St Thomas College Campus

Sl. No.	*Scientific name*	Malayalam name	English Name
1	*Corvus splendens*	പേനക്കാക്ക	HOUSE CROW
2	*Ocyceros griseus*	കോഴി വേഴാമ്പൽ	MALABAR HORNBILL
3	*Corvus macrorhynchos*	ബാലികാക്ക	LARGE BILLED CROW
4	*Dicaeum erythrorhynchos*	ഇത്തിക്കണ്ണികുരുവി	PALE BILLED FLOWER PECKER
5	*Psilopogon viridis*	ചിന്നകുട്ടുറുവൻ	WHITE CHEEKED BARBET

Table 10. Faunal Diversity of St Thomas College Campus

The above data shows the different species identified in the campus during the auditing. The Floral diversity of the campus is moderate and 25 species of trees were identified. Trees like Teak, Mahagony, Coconut tree are more in numbers. The faunal and odonate diversity in the campus is comparatively less with a number 5 and 3 species respectively in both categories. The list of both are incomplete, it may be due to lack of proper field survey, so it is not significant to calculate the odonate diversity of the area. Butterfly shows a good number in the campus with 22 species identified. A planned effort to make green the nook and corners of the campus will definitely improve the diversity at all levels.

Fig. 2. Biodiversity Field Survey Training

External Green Audit Reports

2018-2020

Report-Green Audit

2018-2020

GREEN AUDIT REPORT

ST THOMAS COLLEGE

RANNI

OTTOTRACTIONS
Energy-Engineering-Environment

Green Audit Report
St. Thomas College, Ranni
Report No: EA 1004A/GA
2020

About OTTOTRACTIONS

OTTOTRACTIONS established in 2005, is an organization with proven track record and knowledge in the field of energy, engineering, and environmental services. They are the first Accredited Energy Auditor from Kerala for conducting Mandatory Energy Audits in Designated Consumers as per Energy Conservation Act-2001. Government of Kerala recognized and appreciated OTTOTRACTIONS by presenting its prestigious "The Kerala State Energy Conservation Award 2009" for the best performance as an Energy Auditor. Ottotractions is an ISO 9001-2015, ISO 17020-2012 and ISO 14001-2015 Certified organization, which ensures the quality of its services.

Acknowledgment

We were privileged to work together with the administration and staff of St. Thomas College, Ranni for their timely help extended to complete the audit and bringing out this report.

With gratitude, we acknowledge the diligent effort and commitments of all those who have helped to bring out this report.

We also take this opportunity to thank the bona-fide efforts of audit team for unstinted support in carrying out this audit.

We thank our consultants, engineers and backup staff for their dedication to bring this report.

Thank you.

B V Suresh Babu
Accredited Energy Auditor
AEA 33, Bureau of Energy Efficiency

Preface

Educational institutions always had an important leadership role in society in demonstrating types of changes that used to occur with respect to the prime issues of the time. All around the world, educational institutions are taking steps to declare themselves the next carbon neutral school as a part of the global trend of becoming sustainable. In 2007, Victoria University School of Architecture and Design declared themselves the first carbon neutral campus in the world through the purchase of carbon credits. This concept is not a sustainable model as it does not guarantee the capture of carbon forever and also it is expensive.

The potential for any academic institution- (may be a school in a remote village or a university in an urban setting) - to become the driver for change is huge. Its role of practicing leadership in its community can be utilized to encourage and influence carbon neutral living.

The biggest factors that contribute towards emission are Energy, Transportation and Waste. Any reduction in the carbon emission by the above sectors, starts with the behavioral changes (Low cost) and/or technological investments (High cost). In order to make these changes, the students are to be educated properly on the concept of carbon neutral campuses and methods to reduce it.

In India, the concept of carbon neutral campuses is gaining momentum. Green Audit in Campuses measures the amount of Green House Gases (GHG) emissions produced as a result of its operations through an accounting like inventory of all the sources of GHGs and carbon sequestration in the school campus. Based on this, the total carbon footprint is estimated. Measures are recommended to bring down the carbon footprint of the campus and to make it a carbon neutral campus.

B Zachariah
Director, OTTOTRACTIONS

Contents

OTTOTRACTIONS
Energy Engineering Environment

1
Introduction

Background

All across the developed countries, educational institutions are now moving to a sustainable future by becoming carbon neutral and greener spaces. They are taking responsibility for their environmental impact and are working to neutralize those effects. To become carbon neutral, institutions are working to reduce their emissions of greenhouse gases, cut their use of energy, use energy efficient equipment, use more renewable energy, plant and protect green cover and emphasize the importance of sustainable energy sources. Institutions that have committed to becoming carbon neutral have recognized the threat of global warming and are therefore committing to reverse the trend. Studies on this line has not struck roots in most of the developing countries-especially among students.

The Sustainable Development Goals (SDGs), launched by the United Nations in 2015, are an excellent vehicle for driving this change. They represent an action plan for the planet and society to thrive by 2030. The SDGs provide a window of opportunity for creating multidimensional operational approaches for climate change adaptation. They address poverty, hunger and climate change, among other issues central to human progress and sustainable development, such as gender equality, clean water and sanitation, and responsible consumption and production.

The Green Audit of **St. Thomas College, Ranni** aims to assist campus to reduce their carbon footprint and educate tomorrow's leaders about strategies for carbon mitigation using their campus as a model. Also, this audit covers institutes responses towards SDGs by covering SDG 3,6,7,11,13,15. The green audit also aims to educate students and teachers on the concept of carbon footprint and to enable the students to collect data pertaining to the carbon emissions and carbon sequestration in their campus and to calculate the specific carbon footprint of the campus.

The project also suggests plans to make the campus carbon neutral or even carbon negative by implementing carbon mitigation strategies in areas such as,

a. Energy
b. Transportation
c. Waste minimisation
d. Carbon Sequestration etc.

The major objectives of the audit are:

- To make aware students and teachers on the concept of carbon footprint.
- To calculate the specific carbon footprint of the campus and classify it as carbon negative, neutral or positive.
- To create carbon mitigation plans to reduce their footprint based on the data generated.

ST. THOMAS COLLEGE, RANNI

The history of the college is embedded in the history of Ranni. The college is situated on the top of a serene hill, in a sylvan surrounding, away from the din and bustle of the city, easily accessible and is at a walkable distance from the heart of Ranni town. The college was established in 1964, as a junior college by St Thomas Valiyapally Ranni, a pioneer parish of the Syrian Knanaya Arch Diocese of Malankara, with the whole hearted support of the then Bishop late lamented His Excellency Abraham Mor Clemis to meet the educational needs of the youth of the local community. The college was upgraded to a first grade college in 1968 and is the only institution for higher education in this part of the country. When the de-linking of Pre Degree sector was made possible by the government on administrative measures we were left with graduate and Post Graduate courses. The transmutation lead this institution to a

knowledge hub with divorcified courses. In addition to the conventional courses, we now offer UG & PG courses in Tourism also. During its 53 years of illustrious existence, the college gave birth to brilliant academicians, administrators, politicians and entrepreneurs.

The college aims at creating cultured and educated citizens who love God and their country. With its rural background and `Gurukula' atmosphere, the college fosters uninterrupted pursuit of knowledge. The first Principal, Late Prof. K. A. Mathew, served as minister and PSC member in the Kerala State. He played a vital role in upgrading the junior college to a first grade one in 1968. As the Golden Jubilee project St. Thomas College of Advanced Studies, Edamury, Ranni, a Self Financing College affiliated to M.G. University, Kottayam was established in June 2014. In March 2016, the College was assessed and re-accredited in the second cycle by the National Assessment and Accreditation Council (NAAC) of UGC and graded at B level.

Occupancy Details		
Particulars	2018-19	2019-20
Total Students	859	829
Staffs	64	64
Total Occupancy of the college	923	893

For calculating per capita carbon emission estimation, only the student strength is taken into account.

BASELINE DATA SHEET FOR GREEN AUDIT											
1	Name of the Organisation	St. Thomas College, Ranni									
2	Address (include telephone, fax & e-mail)	St. Thomas College, Ranni, Pathanamthitta, 689641, stcranni@gmail.com,+91 8301057965									
2	Year of Establishment	1964									
3	Name of building and Total No. of Electrical Connections/building	St. Thomas college (8)									
4	Total Number of Students	Boys		Girls		Total	829				
5	Total Number of Staff	64									
6	Total Occupancy	893									
7	Total area of green cover	50%									
8	Type of Electrical Connection	HT	0	LT	8						
9	Total Connected Load (kW)	107									
10	Average Maximum Demand (KVA)	-									
11	Total built up area of the building (M^2)	8317									
12	Number of Buildings	5									
13	Average system Power Factor	0.96									
14	Details of capacitors connected	NA									
15	Transformer Details (Nos., kVA, Voltage ratio)	TR 1									
		NA									
15	DG Set Details (kVA,)	DG1	DG2	DG3	DG4	DG5	Remarks				
		10									
16	Details of motors	Rating		Nos.		Remarks					
		5 to 10		2							
		10 to 50									
		Above 50									
17	Brief write-up about the firm and the energy/environmental conservation activities already undertaken.	Installed LED Lights, Solar Street Lamps etc.									
18	Contact Person & Telephone number	Dr Lata Marina Varghese									
		9446978383									

2
METHODOLOGY

2.1. Sensitisation

Low Carbon campus initiatives are successful when everyone in the campus is engaged including students, teachers and staff. A team of students, teachers and staff were formed to participate in the audit. A sensitisation among students and teachers on the concept of carbon footprint was conducted.

During the audit the students and staffs were sensitised on the project and trained to be a part of the data collection team. This helped in conducting the survey in a participatory mode so that the awareness will penetrate to the grass root level. During the data collection field visit it was stressed that the team will spread these ideas to their homes and friends. This will help in a horizontal and vertical spread of the message to a wider group. It is assumed that through 1054 occupants of this campuses will reach same number of households. This message will spread to at least 4000 individuals approximately.

2.2 Estimation of carbon footprint

A carbon footprint is the amount of greenhouse gases—primarily carbon dioxide—released into the atmosphere by a particular human activity. A carbon footprint can be a broad measure or be applied to the actions of an individual, a family, an event, an organization, or even entire nation. It is usually measured as tons of CO_2 emitted per year, a number that can be supplemented by tons of CO_2-equivalent gases, including methane, nitrous oxide, and other greenhouse gases.

Global Warming Potential (GWP) is a measure of how much heat a greenhouse gas traps in the atmosphere up to a specific time horizon, relative to carbon dioxide. The Global Warming Potential (GWP) was developed to allow comparisons of the global warming impacts of different gases. Specifically, it is a measure of how much energy the emissions of one ton of a gas will absorb over a given period of time, relative to the emissions of one ton of carbon dioxide (CO_2).

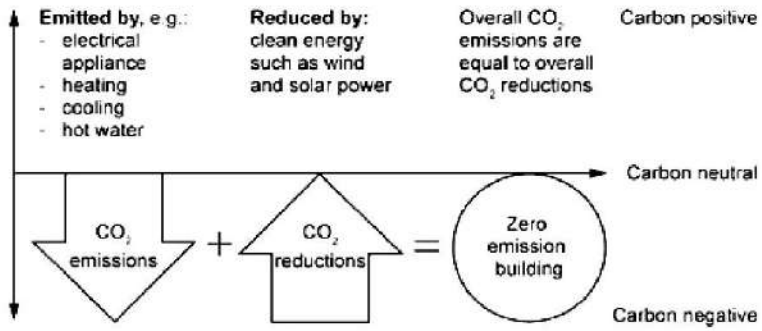
Global Warming Potentials (IPCC Second Assessment Report)					
Species	Chemical formula	Lifetime (years)	Global Warming		
			20 years	100 years	500 years
Carbon dioxide	CO2	variable §	1	1	1
Methane *	CH4	12±3	56	21	6.5
Nitrous oxide	N2O	120	280	310	170
HFC-23	CHF3	264	9100	11700	9800
HFC-32	CH2F2	5.6	2100	650	200
HFC-41	CH3F	3.7	490	150	45
HFC-43-10mee	C5H2F10	17.1	3000	1300	400
HFC-125	C2HF5	32.6	4600	2800	920
HFC-134	C2H2F4	10.6	2900	1000	310
HFC-134a	CH2FCF3	14.6	3400	1300	420
HFC-152a	C2H4F2	1.5	460	140	42
HFC-143	C2H3F3	3.8	1000	300	94
HFC-143a	C2H3F3	48.3	5000	3800	1400
HFC-227ea	C3HF7	36.5	4300	2900	950
HFC-236fa	C3H2F6	209	5100	6300	4700
HFC-245ca	C3H3F5	6.6	1800	560	170
Sulphur hexafluoride	SF6	3200	16300	23900	34900
Perfluoromethane	CF4	50000	4400	6500	10000
Perfluoroethane	C2F6	10000	6200	9200	14000
Perfluoropropane	C3F8	2600	4800	7000	10100
Perfluorobutane	C4F10	2600	4800	7000	10100
Perfluorocyclobutane	c-C4F8	3200	6000	8700	12700
Perfluoropentane	C5F12	4100	5100	7500	11000
Perfluorohexane	C6F14	3200	5000	7400	10700

The methodology for carbon footprint calculations are still evolving and it is emerging as an important tool for green house management. In the present study carbon emission data from the campus is estimated under four categories viz.

a. Energy
b. Transportation
c. Waste minimisation
d. Carbon Sequestration

Carbon neutrality refers to achieving net zero GHG emission by balancing the measured amount of carbon released into atmosphere due to human activities, with an equal amount sequestrated in carbon sinks. It is crucial to restrict atmospheric concentrations of GHGs released from various socio-economic, developmental and life style activities using biological or natural processes. It is recognized that addressing climate change is not as simple as switching to renewable energy or

offsetting GHG emissions. Rather, providing an opportunity for innovation in new developmental activities for viable and effective approach to address the problem.



Energy

In the campus carbon emission from energy consumption is categorised under two headings viz. energy from Electrical and Thermal. Energy used for transportation is calculated under transportation sector.

A detailed energy audit is conducted to understand the energy consumption of the campus. Information on total connected loads, their duration of usage and documents like electricity bills are evaluated. Connected loads are calculated by conducting a survey on electrical equipment on each location. Duration of usage was found out by surveying the users. The survey of equipment was conducted in a participatory mode.

The fuel consumption for cooking, like LPG, was studied by analysing the annual fuel bills and usage schedules during the study. Discussions were carried out with the concerned individuals who actually operate the cooking system.

Transportation

Carbon emission from transportation to be calculated by using the following formula:

Carbon Emission = Number of each type of vehicles × Avg. fuel consumed per year × Emission factors (based on the fuel used by the vehicle)

Waste Minimisation

The waste generated from the campus is also responsible for the greenhouse gas emission. So, in order to calculate the total carbon foot print of the campus it is

necessary to estimate the greenhouse gas emission from the waste generated in the campus by the activity of the students, teachers and staffs.

The calculation of the waste generated has been conducted by keeping measuring buckets for collecting the waste generated in a day. This waste so generated was calculated by weighing it.

Carbon Sequestration

Carbon sequestration is the process involved in the long-term storage of atmospheric carbon dioxide. Trees remove carbon dioxide from the atmosphere through the natural process of photosynthesis and store the carbon in their leaves, branches, stems, bark, and roots.

Carbon sequestrated by a tree can be found out by using different methods. Since this study is employed the volumetric approach, the calculation consists of five processes.

- Determining the total weight of the tree
- Determining the dry weight of the tree
- Determining the weight of carbon in the tree
- Determining the weight of CO_2 sequestrated in the tree
- Determining the weight of CO_2 sequestrated in the tree per year

Detailed calculations and results are given below.

Step 1: Determine the total green weight of the tree

The green weight is the weight of the tree when it is alive. First, you have to calculate the green weight of the above-ground weight as follows:

W above-ground= 0.25 D2 H (for trees with D<11)

W above-ground= 0.15 D2 H (for trees with D>11)

W above-ground= Above-ground weight in pounds

D = Diameter of the trunk in inches

H = Height of the tree in feet

The root system weight is about 20% of the above-ground weight. Therefore, to determine the total green weight of the tree, multiply the above-ground weight by 1.2:

$W_{\text{total green weight}} = 1.2 * W_{\text{above-ground}}$

Step 2: Determine the dry weight of the tree

The average tree is 72.5% dry matter and 27.5% moisture. Therefore, to determine the dry weight of the tree, multiply the total green weight of the tree by 72.5%.

$W_{\text{dry weight}} = 0.725 * W_{\text{total green weight}}$

Step 3: Determine the weight of carbon in the tree

The average carbon content is generally 50% of the tree's dry weight total volume. Therefore, in determining the weight of carbon in the tree, multiply the dry weight of the tree by 50%.

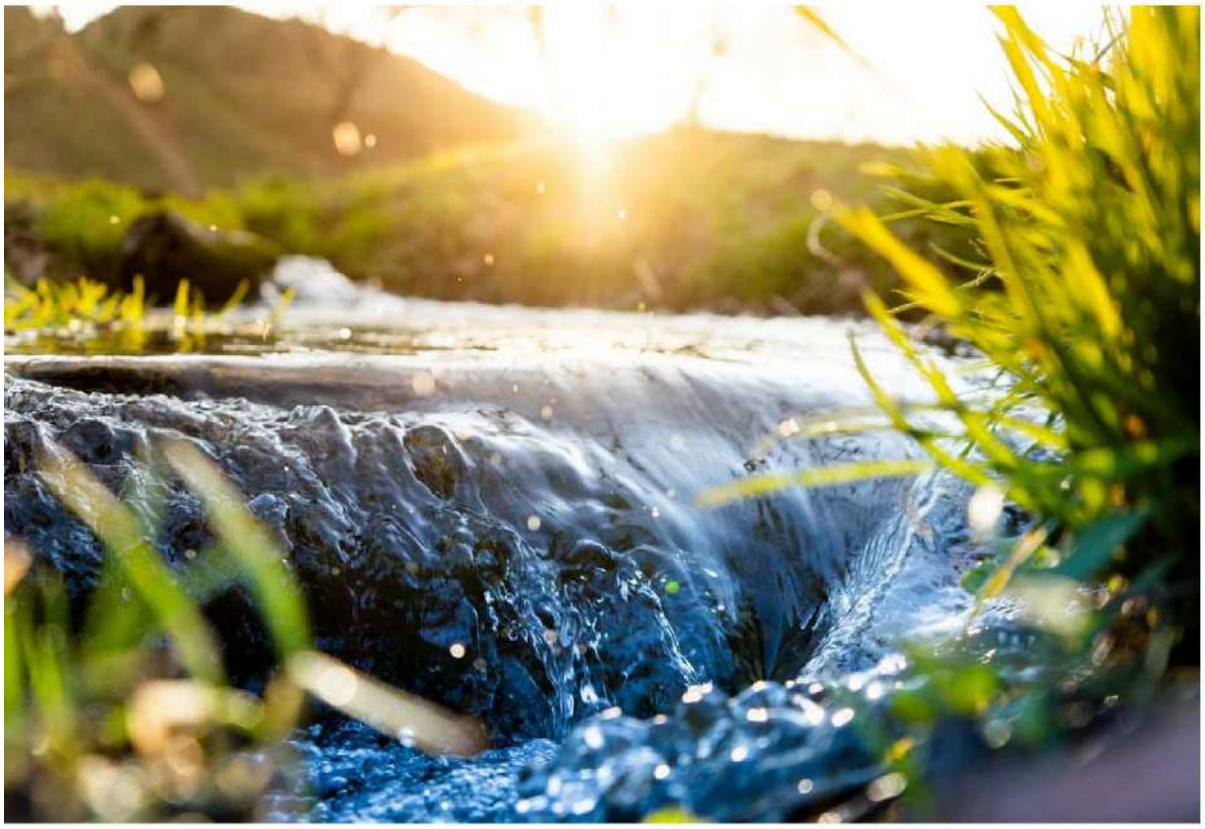
$W_{\text{carbon}} = 0.5 * W_{\text{dry weight}}$

Step 4: Determine the weight of carbon dioxide sequestered in the tree

CO_2 has one molecule of Carbon and 2 molecules of Oxygen. The atomic weight of Carbon is 12 (u) and the atomic weight of Oxygen is 16 (u). The weight of CO_2 in trees is determined by the ratio of CO_2 to C is 44/12 = 3.67. Therefore, to determine the weight of carbon dioxide sequestered in the tree, multiply the weight of carbon in the tree by 3.67. $W_{\text{carbon-dioxide}} = 3.67 * W_{\text{carbon}}$

3

RESULTS AND DISCUSSIONS



3.1 CARBON FOOTPRINT ESTIMATION

3.1.1 ENERGY

a. Electricity

Electricity is purchased from KSEB under 8 LT Connections, the details are given below.

Electricity Connection Details		
St. Thomas College, Ranni		
1	Name of the Consumer	St. Thomas College, Ranni
2	Tariff	LT-6A 3Ph
3	Consumer Numbers	1146072000540, 1146071019877, 1146079005428, 1146073013642, 1146070013641, 1146079016949, 1146076000773, 1146071019877
5	Connected Load Total (kW)	107
6	Annual Electricity Consumption (kWh)	28219

Electricity Bill Analysis

Annual Electricity Consumption (kWh)			
Consumer No	**2018-19**	**2019-20**	Connected Load (kW)
1146072000540	522	611	2
1146071019877	5432	513	6
1146079005428	1213	1834	4
1146073013642	2234	4675	16
1146070013641	13029	14234	16
1146079016949	3672	1876	35
1146076000773	9821	3241	22
1146071019877	2987	1235	6
Total	**35923**	**28219**	**107**

Diesel

Diesel Consumption Details				
	Transportation	Generator	Total	cost
	in L	in L	in L	in Rs
2018-19	0	344	344	30960
2019-20	0	289	289	26010

LPG

LPG Consumption Details		
	2018-19	2019-20
No Cylinders	4	5
Canteen/Lab LPG Consumption in kg	60	75
Total in kg	60	75

Base Line Energy Data			
St. Thomas College, Ranni			
		2018-19	2019-20
1	Electricity KSEB (kWh)	35923	28219
2	Electricity DG (kWh)	1032	867
3	Electricity Solar , Off grid (kWh)	0.00	0.00
4	Electricity (KSEB + DG + Off grid) kWh	36955	29086
5	Electricity Grid Tied (kWh)	1278	1278
6	Diesel (L)	0	0
7	LPG (kg)	60.00	75.00
8	Biogas (m3)	0.00	0.00

Energy Consumption Profile			
Sl No	Fuel	2018-19	2019-20
1	Electricity	31781300	25013960
2	Diesel	0	0
3	LPG	720000	900000
4	Biogas	0	0
Total		32501300	25913960

Thermal Fuel Consumption		
St. Thomas College, Ranni		
	2018-19	2019-20
Annual LPG consumption in kg	60	75
Annual Diesel consumption in L	344	289
Annual petrol consumption in L	0	0
Annual Biogas consumption in m3	0	0

Renewable Energy

biogas plant is installed in a facility and is not working, it is recommended to repair the plant to effectively manage bio degradable waste. Some common reasons why a biogas plant may not be working include clogging of the pipes, leaks in the system, and inadequate maintenance. Therefore, it is important to regularly maintain the plant to ensure that it is functioning properly.

Once the biogas plant is repaired and functioning, it can provide numerous benefits such as reducing waste management costs, reducing greenhouse gas emissions, and providing a renewable energy source.

Specific Energy Consumption

OTTOTRACTIONS- ENERGY AUDIT			
St. Thomas College, Ranni			
Energy Performance Index (EPI)			
Sl No	Particulars	2018-19	2019-20
1	Total building area (m²)	8317	8317
2	Annual Energy Consumption (kCal)	32501300	25913960
3	Annual Energy Consumption (kWh)	37792	30133
4	Total Energy in Toe	3.25	2.59
5	Specific Energy Consumption kWh/m²	4.54	3.62

The specific energy consumption in 2019-20 may be taken as benchmark.

3.3. Waste Generation total

The major concern of waste management will be focused on the solid waste produced by the campus. Solid wastes produced in the campus are mainly of three types, food waste, paper waste, and plastic waste. Food wastes produced in the campus are mainly by two means. The vegetable wastes produced in the kitchen during the food preparation. The food waste produced by the students and staffs of the campus after the consumption of meals.

Degradable Waste

Degradable Waste Generation		
St. Thomas College, Ranni		
Particulars	2018-19	2019-20
Total Occupancy	923	893
Waste generated in kg /day	18.46	17.86
Waste generated in kg /Yr	4061.2	3929.2

Non-Degradable waste

Solid non degradable Waste Generation		
St. Thomas College, Ranni		
Particulars	2018-19	2019-20
Total Occupancy	923	893
Waste paper generated in kg /day	0.1846	0.1786
Waste plastic generated in kg /day	0.2769	0.2679
Waste paper generated in kg /Yr	40.61	39.29
Waste plastic generated in kg /Yr	60.92	58.94

3.4. Transportation

The college does not have any vehicles for logistics

Carbon Emission Profile (2019-20)

Carbon emissions in the campus due to the day-to-day activities are calculated and is discussed below. The emission factors considered for estimation and its units are given.

Emission Factors		
Item	Factor	Unit
Electricity	0.00082	tCo_2e/kWh
LPG	0.0015	tCo_2e/kg
Diesel	0.0032	tCo_2e/kg
Petrol	0.0031	tCo_2e/kg
Food Waste	0.00063	tCo_2e/kg
Paper Waste	0.00056	tCo_2e/kg
Plastic Waste	0.00034	tCo_2e/kg

Carbon Foot Print 2019-20

Carbon Foot Print					
Sl. No.	Particulars	2018-19	tCO2e	2019-20	tCO2e
1	Electricity (kWh)	36955	30.30	29086	23.85
2	Diesel (L)	0	0.00	0	0.00
3	LPG (kg)	60.00	0.09	75.00	0.11
4	Biogas (m3)	0.00	0.00	0.00	0.000
5	Degradable Waste in kg/yr.	4061.2	2.56	3929.2	2.48
6	Paper Waste in kg/yr	40.61	0.02	39.29	0.02
Total Carbon Foot Print tCO_2e/yr			32.97		26.46

3.5. CARBON SEQUESTRATION

All the activities including energy consumption and waste management have their equivalent carbon emission and they positively contribute to the carbon footprint of the campus. Carbon sequestration is the reverse process, at which the emitted carbon dioxide will get sequestrated according to the type of carbon sequestration employed. Even though there are many natural sequestration processes are involved in a campus, the major type of sequestration among them is the carbon sequestration by trees.

Carbon Sequestration		
Particular's	2018-19	2019-20
Total No of Trees	236	236
Carbon sequestrated by trees in the campus (tCO2e)	6.6	6.90

Trees sequestrate carbon dioxide through the biochemical process of photosynthesis and it is stored as carbon in their trunk, branches, leaves and roots. The amount of carbon sequestrated by a tree can be calculated by different methods. In this study, the volumetric approach was taken into account, thus the details including CBH (Circumference at Breast Height), height, average age, and total number of the trees, are required. Details of the trees in the campus compound are given in the Table. Detailed table is included in the technical supplement.

Carbon sequestrated by a tree can be found out by using different methods. Since this study is employed the volumetric approach, the calculation consists of five processes.

- Determining the total weight of the tree
- Determining the dry weight of the tree
- Determining the weight of carbon in the tree
- Determining the weight of CO_2 sequestrated in the tree
- Determining the weight of CO_2 sequestrated in the tree per year

List of Trees in Campus

List of Trees and Plants		
Sl. No.	English Name	QTY
1	Jackfruit Tree	12
2	Mango	9
3	Ashoka Tree	1
4	Bulletwood	2
5	Teak	84
6	Coconut	21
7	Wild Jack	7
8	Royal Princiana	4
9	Mahagony	38
10	Soursop Tree	7
11	Golden Shower Tree	8
12	Guava Tree	10
13	Rambutan	3
14	Copper Pod	3
15	False Ashoka	6
16	Caturina	1
17	Ornamental Palm	10
18	All Spice	1
19	Pride of India	2
20	Papaya	2
21	Bay Leaf	1
22	Persian Silk Tree	1
23	Araucaria	1
24	Hyophorbe	1
25	Sand Paper Tree	1
Total		236

CARBON FOOTPRINT OF THE CAMPUS (2019-20)

Various carbon emitting activities such as consumption of energy, transportation and waste generation leads to the total emission of **26.46 tCO_2e** per year by the campus. The total carbon sequestration by trees in the campus compound is **6.90tCO_2e**. Thus, the current carbon footprint of the campus will be the difference of total carbon emission and total carbon sequestration/mitigation. The following table shows the carbon footprint level

Specific CO2 Footprint

Amount of Carbon to be mitigated for Low Carbon Campus			
Sl No	Particulars	2018-19	2019-20
1	Total carbon emission tCO_2e	32.97	26.46
2	Total carbon sequestration tCO_2e	6.56	6.90
3	Amount of carbon mitigated through renewable energy tCO_2e	1.05	1.05
4	To be mitigated tCO_2e	25.37	18.51
5	Total No of Students	923	893
6	Specific Carbon Footprint kg CO_2e/Student/Yr	27.49	20.73

The total specific carbon footprint is estimated as **20.73** kg of CO_2e per student for the year 2019-20.

OTTOTRACTIONS
Energy-Engineering-Environment

4

Carbon Mitigation Plans

The total emission of the carbon dioxide per student is **26.46** kg per year (2019-2020). Emission reduction plans were prepared to bring the existing per capita carbon footprint to zero or below so as to bring the campus a carbon neutral or carbon negative campus.

This can be achieved in many ways but, every alternate plan must be in such a way that, it must fulfill the actual purpose of each activity that is considered.

Here, three major methods are taken in to account as the plans for reducing the carbon emission of the campus.

- Resource optimisation
- Energy efficiency
- Renewable energy

RESOURCE OPTIMISATION

The effective use of resources can limit its unnecessary wastage. Optimal usage of the resources (such as fuels) can save the fuel and can also reduce the carbon emission due to its consumption. This technique can be effectively implemented in the 'transportation' and 'waste' sectors of the campus.

WASTE MINIMISATION

Optimal utilisation of paper and plastic stationaries can reduce the frequency of purchase of items. This can reduce the unnecessary wastage of money as well as the excess production of waste. In the case of food, proper food habits and housekeeping practices can optimise its usage.

Currently, the campus is taking an appreciable effort to reduce the unnecessary production of wastes. But the campus still has opportunities to reduce the generation of waste and can improve much more. Resource optimisation can be effectively implemented in all type of waste generated in the campus and the campus can expect about 50% reduction the total waste produced.

ENERGY EFFICIENCY

Energy efficiency is the practice of reducing the energy requirements while achieving the required energy output. Energy efficiency can be effectively implemented in all the sectors of the campus.

FUELS FOR COOKING

The campus uses commercial LPG cylinders for its cooking purpose. The campus can install a biogas plant to treat food waste and the biogas thus generated can be used in kitchen. Installation of a solar water heater to rise the water temperature to a much higher level, then it has to consume only very less amount of thermal energy for preparing the same amount of food is another method. This can make a positive benefit to the campus by saving money, energy and can reduce the carbon emission of the campus due to thermal energy consumed for cooking.

TRANSPORTATION

Energy efficiency of the transportation sector is mainly depended on the fuel efficiency of the vehicles used. Here mileage of the vehicle (kmpl - Kilometres per Litre) is calculated to assess the fuel efficiency of the vehicle.

Percentage of closeness is the ratio of actual mileage of the vehicle to its expected mileage. If the percentage of closeness of mileages of each vehicle is greater than that of its average, then the efficiency status of the vehicle is considered as 'Above average' and else, it is considered as 'Below average'.

OTTOTRACTIONS
Energy-Engineering-Environment

Carbon Mitigation Proposals

After analyzing the historical and measured data the following projects are proposed to make the campus carbon neutral. The projects are from energy efficiency and renewable energy. The further additions in the green cover increase will also give positive impact in the carbon mitigation.

OTTOTRACTIONS- ENERGY AUDIT						
St. Thomas College, Ranni						
Greenhouse Gas Mitigation through Major Energy Efficiency Projects						
Sl No	Projects	Energy saved(Yearly)		Sustainability (Years)	First year ton of CO2 mitigated	Expected Tons of CO2 mitigated through out life cycle
		(kWh)	MWh	Years		
1	Energy Saving in Lighting by replacing existing 58 No's T12 (55W) Lamps to 18W LED Tube	3591	3.59	10	2.62	26.21
2	Energy Saving in Lighting by replacing existing 84 No's T8 (40W) Lamps to 18W LED Tube	3105	3.10	10	2.27	22.66
3	Energy Saving in Lighting by replacing existing 46 No's CFL(15W) Lamps to 9W LED Bulb	397	0.40	10	0.29	2.90
4	Energy Saving by replacing existing 156 No's in-efficent ceiling fans with Energy Efficient Five star fans	4770	4.77	10	3.48	34.82
Total		**11863**	**12**	**10**	**8.66**	**86.60**

St. Thomas College, Ranni						
Greenhouse Gas Mitigation through Renewable Energy Projects						
Sl No	Projects	Energy saved(Yearly)		Sustainability (Years)	First year ton of CO2 mitigated	Expected Tons of CO2 mitigated through out life cycle
		(kWh)	MWh	Years		
1	Installation of 10kWp Solar Power Plant	13688	13.69	25	9.99	249.80
	Total	13688	14	25	9.99	250

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 1	
Energy Saving in Lighting by replacing existing 84 No's T8 (40W) Lamps to 18W LED Tube	
Existing Scenario	
84 numbers of T8(40 W) lamps were identified during the energy audit field survey in the facility. During discussion with officers it is observed that the average utility of these fittings are of 30%.	
Proposed System	
The existing T8 may be replaced to LED Tube of 18W in phased manner and the savings will be of 55% (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2400
No of fittings	84
Total load (kW)	3.36
Annual Energy Consumption (kWh)	5645
Expected Annual Energy saving for replacing all fittings (kWh)	3105
Cost of Power	8.00
Annual saving in Lakhs Rs (1st year)	0.25
Investment required for complete replacements [@Rs 300 per fittings](Lakhs Rs)	0.25
Simple Pay Back (in Months)	12.18

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code	
Energy Saving in Lighting by replacing existing 58 No's T12 (55W) Lamps to 18W LED Tube	
Existing Scenario	
257 numbers of T12(55 W) lamps were identified during the energy audit field survey in the facility. During discussion with officers it is observed that the average utility of these fittings are of 30%.	
Proposed System	
The existing T12 may be replaced to LED Tube of 18W in phased manner and the savings will be of 67% (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2400
No of fittings	58
Total load (kW)	3.19
Annual Energy Consumption (kWh)	5359
Expected Annual Energy saving for replacing all fittings (kWh)	3591
Cost of Power	8.00
Annual saving in Lakhs Rs (1st year)	0.29
Investment required for complete replacements [@Rs 300 per fittings](Lakhs Rs)	0.17
Simple Pay Back (in Months)	7.27

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal	
Energy Saving by replacing existing 156 No's in-efficient ceiling fans with Energy Efficient Five star fans	
Existing Scenario	
There are 156 numbers of ceiling fans installed in the facility with minimum 8 hrs a day operation. All are conventional type and most of them are very old.	
Proposed System	
There is an energy saving opportunity in replace the existing fans with new five star labelled fans.The five star labelled fans give a savings up to 30% with higher service value (air delivery/watt).	
Financial Analysis	
Annual working hours (hrs)	2400
Total numbers of ordinary fans	156
Total load (kW)	10.92
Annual Energy Consumption (kWh)	17035
Expected Annual Energy saving, for total replacement(kWh)	4770
Cost of Power (Rs)	8.00
Annual saving in Lakhs Rs (1st year)	0.38
Investment required for a total replacement (Lakhs Rs)[@3000 Rs per Fan with 50W at full speed]	4.68
Simple Pay Back (in Months)	147.17

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal	
Energy Saving in Lighting by replacing existing 46 No's CFL(15W) Lamps to 9W LED Bulb	
Existing Scenario	
24 numbers of CFL (15W) lamps were identified during the energy audit field survey in the facility. During discussion with officers it is observed that the average utility of these fittings are of 30%.	
Proposed System	
The existing CFL may be replaced to LED Bulb of 9W in phased manner and the savings will be of 40% (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2400
No of fittings	46
Total load (kW)	0.69
Annual Energy Consumption (kWh)	994
Expected Annual Energy saving for replacing all fittings (kWh)	397
Cost of Power	8.00
Annual saving in Lakhs Rs (1st year)	0.03
Investment required for complete replacements [@Rs 90 per fittings](Lakhs Rs)	0.04
Simple Pay Back (in Months)	15.63

Energy Saving Proposal	
Installation of 10kWp Solar Power Plant	
Existing Scenario	
There is a good potential of solar power electricity generation. The availability of sunlight is very high. There are some canopies available in the proposed site, but by having proper trimming of trees this may be avoided. If the SPVs are place in the roof top it will help improving RTTV (Roof Thermal Transmit Value) of the building.	
Proposed System	
It is proposed to have a Solar Power Plant of 10kW at the beginning stage. The state and central government is pushing and giving good assistance to the installation. It can be installed as an internal grid connected system which is much cheaper than off grid system. Now days the technology provides trouble free grid interactive and connected system. The installation will provide 25yrs trouble free generation with only 20% efficiency loss at the 25th year.	
Financial Analysis	
Proposed Solar installed Capacity (kW)	10
Total average kWh per day expected (3.5kWh/day average)	37.50
Total annual Generating Capacity (kWh)	13688
Cost of energy generated annually Lakhs Rs	1.82
Investment required (INR lakh)(Approx)	5.50
Simple Pay Back (in Months)	36.26
Life cycle in Yrs	25
Total Saving in Life Cycle (Approx) RS lakh	45.51

Executive Summary					
Consolidated Cost Benefit Analysis of Energy Efficiency Improvement Projects					
St. Thomas College, Ranni					
Sl No	Projects	Investment	Cost saving	SPB	Energy saved
		(Lakhs Rs)	(Rs)/Yr	Months	kWh/Yr
1	Energy Saving in Lighting by replacing existing 58 No's T12 (55W) Lamps to 18W LED Tube	0.17	0.29	7.27	3591
2	Energy Saving in Lighting by replacing existing 84 No's T8 (40W) Lamps to 18W LED Tube	0.25	0.248	12.18	3105
3	Energy Saving in Lighting by replacing existing 46 No's CFL(15W) Lamps to 9W LED Bulb	0.04	0.032	15.63	397
4	Energy Saving by replacing existing 156 No's in-efficent ceiling fans with Energy Efficient Five star fans	4.68	0.382	147.17	4770
5	Installation of 10kWp Solar Power Plant	5.50	1.820	36.26	13688
	Total	**10.47**	**2.48**	**43.70**	**21959**
(The saving are projected as per the assumed operation time observed based in the discussions with the plant officials. The data of saving percentages are taken from BEE guide books and field measurements.)					

5
CONCLUSION

The carbon emission from different sectors namely, Energy, Transportation and wastes were calculated using standard procedures. Carbon sequestration by the trees present in the campus was also estimated. From these the total carbon footprint of the campus was arrived at.

Net Carbon Emission after implementing Energy Efficiency projects and Renewable Energy Projects Proposed		
1	Total Carbon Foot Print tCO_2e/yr	26.46
2	Carbon Sequestrated tCO_2e/yr	6.90
3	Carbon mitigated by Renewable Energy tCO_2e/yr (Installed)	1.05
4	Carbon mitigated by Renewable Energy tCO_2e/yr (Proposed)	9.99
5	Carbon mitigated by Energy Efficiency (Proposed) tCO_2e/yr	8.66
6	Effective Carbon footprint tCO_2e/yr	-0.14
7	Total No of Students	829
8	Specific Carbon Footprint kg CO_2e/Student/Yr	-0.17

From this study it was found that carbon footprint of the campus to be **-0.17** $kgCO_2e$/ Student/ Year in place of current footprint i.e., **31.92** $kgCO_2e$/ student/ Year. To achieve this an investment of **10.47 lakhs Rs** is required through energy efficiency and renewable energy projects proposed. It will be around **1263 Rs per student** to make the campus the carbon negative.

Cost to make the campus Carbon Negative		
1	Cost of implementation in Energy Efficiency Lakhs Rs	4.97
2	Cost of implementation in Renewable Energy Lakhs Rs	5.50
3	Total Lakhs Rs	10.47
4	Total number of students	829
5	Cost per student to make the campus carbon negative Rs/ Student	1263

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OTTOTRACTIONS
Energy-Engineering-Environment

6

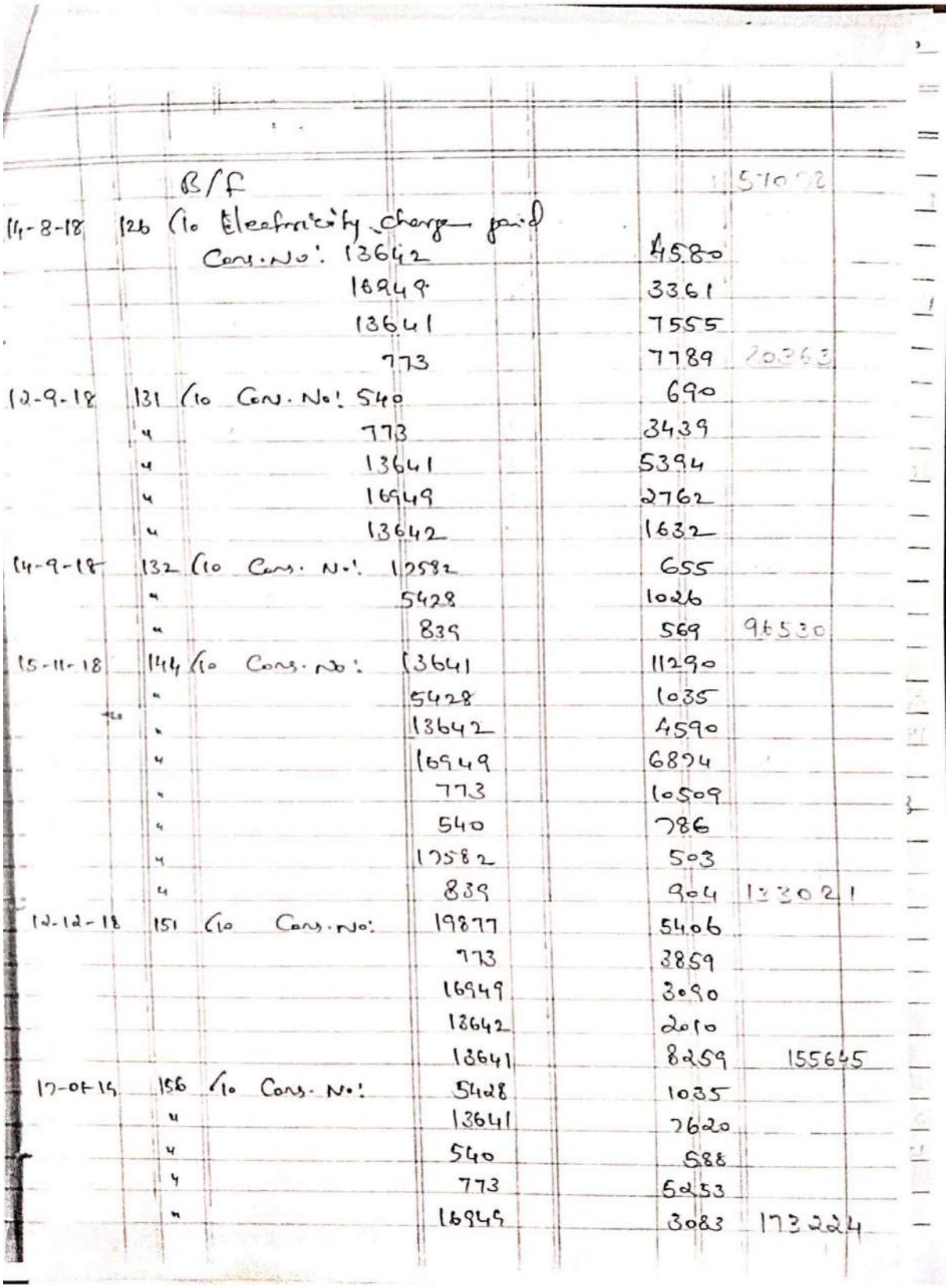
TECHNICAL SUPPLEMENT

St. Thomas College, Ranni																
		Lights							Fans		IT			Others		
Sl.No	Location	LED-T	LED-B	LED-SQ	T8	T12	ICL	CFL	CF	EF	Printer	Projector	PC	TV	AC (1TR)	Fridge
1	Principal	1		9		1			2		1		1	1		
2	Conf Hall				2	2			1				1		1	
3	Office	1			3	4			6		2		2			
4	Admn Room	1			4				3		3		1			
5	Manager					1			2		1		1			
6	Malayalam Dpmt	1							1							
7	3 Rooms	3							3							
8	4 Rooms					4			4							
9	9 Rooms					27			13							
10	Seminar Hall	3							6	1		1				
11	4 Rooms				4				4							
12	Botany department					1			2		1		1			1
13	Museum	1							2				1			
14	5 Classrooms	1				5			5							
15	Physics Department	1	1		2	1		2	5			1	1			
16	Computer lab				3				2				5			
17	3 Rooms							12	9							
18	3 Rooms				3				3							
19	3 Rooms				3				3							
20	English department					2			1				1			
21	6 Rooms				6				6							
22	Conf Hall		2					22	6							
23	3 Rooms						3		3							

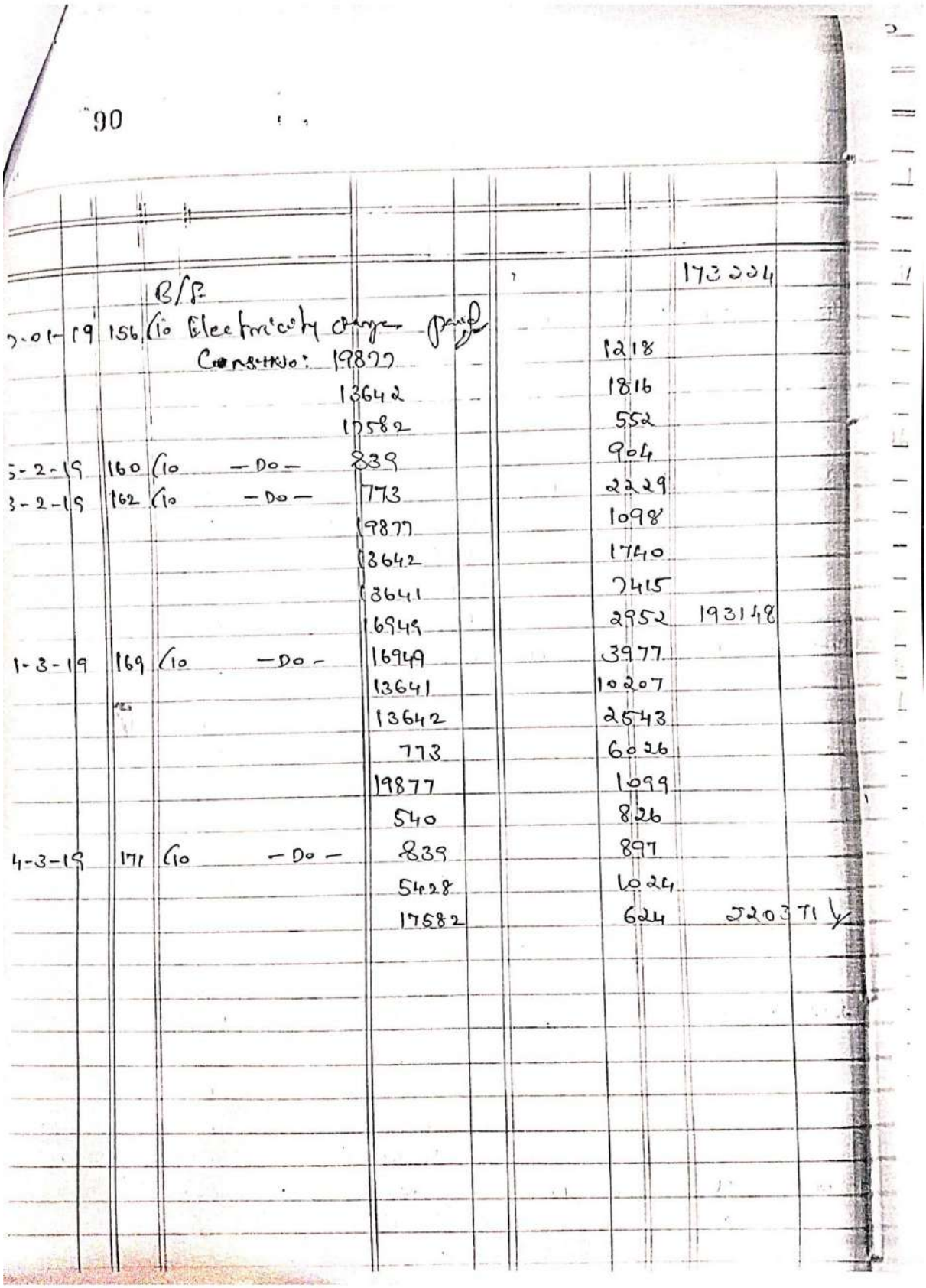
24	Lab				2	1		3	4		1		24			
25	3 Departments				6	6			14							
26	6 Rooms				6			2	6							
27	9 Rooms	1			5	1		1	9							
28	4 Rooms							4	4							
29	3 Rooms				3				4							
30	2 Rooms				2				2							
31	3 Rooms	1			1	2			3							
32	5 Rooms				7				5							
33	Auditorium	4			22				13							
	Total	**19**	**3**	**9**	**84**	**58**	**3**	**46**	**156**	**1**	**9**	**2**	**39**	**1**	**1**	**1**

28 Electricity charge — 2018-2019 3000000/-

4-18	94	To Electricity charge paid				11-
		Cons. No.	16949	3906		
			773	5468		
			19877	1095		
			13642	2649		
			13641	11552		
-5-18	99	Cons. No:	839	885		12-(
	"	"	5428	1017		
	"	"	16949	3563		
	"	"	540	515		
	"	"	773	3469		
	"	"	19877	1095		11-(
	"	"	13642	815		
	"	"	13641	5367	41396	
6-18	105	"	17582	450		15-(
-6-18	107	"	13642	2685		
	"	"	13641	3009		
	"	"	16949	1589		
	"	"	773	4330	53459	
-7-18	114	"	17582	695		
	114	"	540	352		
7-18	115	By Reimbursement of Electricity bill (NCC Camp)	7000			12-
-7-18	117	To Electricity charge paid				
		Cons. No:	5428	857		
		"	16949	3480		
		"	13641	7323		
		"	839	322	59178	17-(
8-18	121	By Reimbursement of Electricity bill (NCC Camp)	5000			
"	122	To Electricity charge paid				
	"	Cons. No:	773	1090	57028	
			13642	1500		



		B/f			57078
14-8-18	126	C/o Electricity charge paid Cons. No:	13642	4580	
			16949	3361	
			13641	7555	
			773	7789	20363
12-9-18	131	C/o Con. No:	540	690	
	"		773	3439	
	"		13641	5394	
	"		16949	2762	
	"		13642	1632	
14-9-18	132	C/o Cons. No:	17582	655	
	"		5428	1026	
	"		839	569	96530
15-11-18	144	C/o Cons. No:	13641	11290	
	"		5428	1035	
	"		13642	4590	
	"		16949	6894	
	"		773	10509	
	"		540	786	
	"		17582	503	
	"		839	904	130021
12-12-18	151	C/o Cons. No:	19877	5406	
			773	3859	
			16949	3090	
			13642	2010	
			13641	8259	155645
17-04-19	156	C/o Cons. No:	5428	1035	
	"		13641	7620	
	"		540	588	
	"		773	5233	
	"		16949	3083	173224



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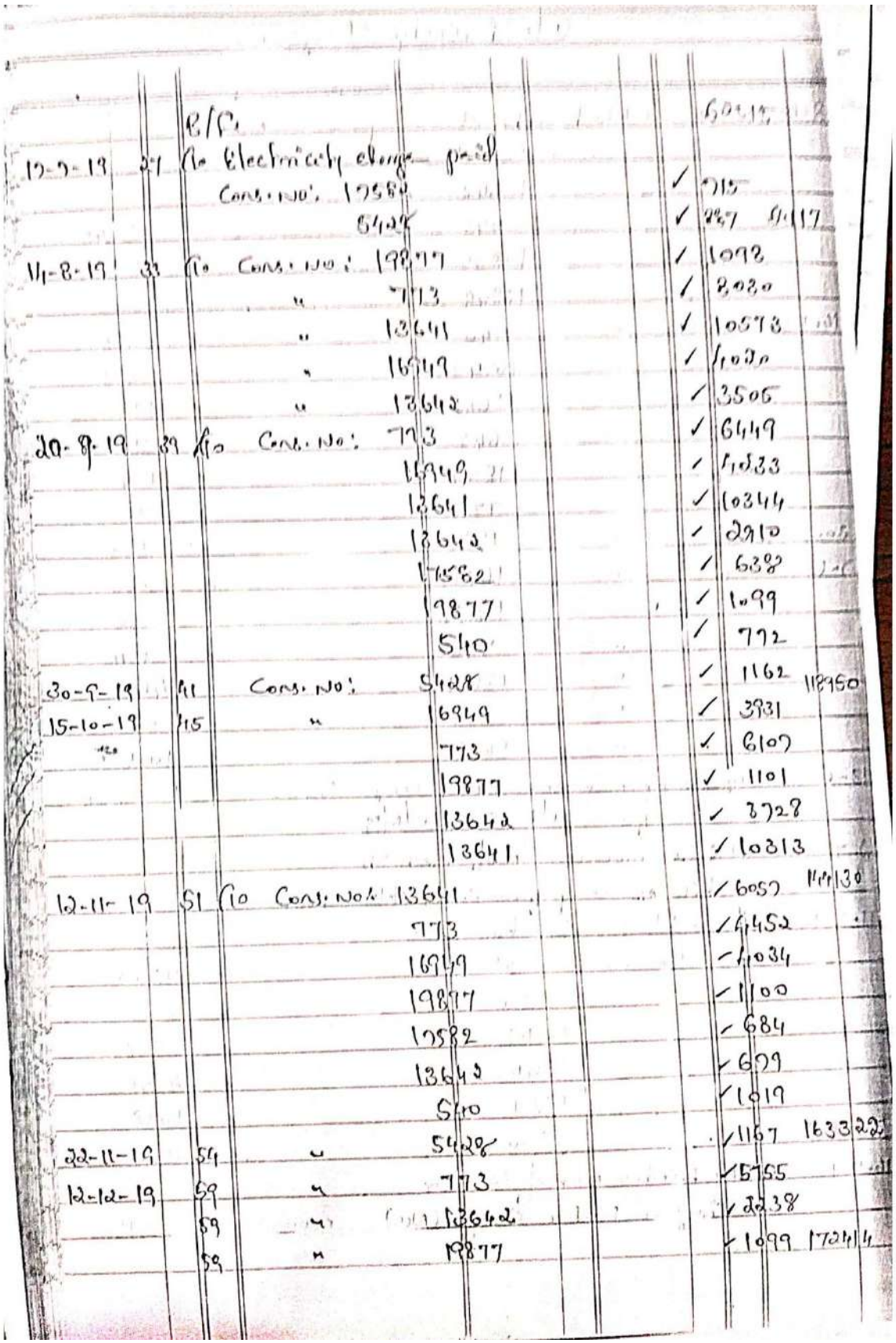
			B/F			173224	
2-01-19	156	C/o	Electricity charges paid				
			Constructo:	19877	1218		
				13642	1816		
				17582	552		
5-2-19	160	C/o	—Do—	839	904		
3-2-19	162	C/o	—Do—	773	2229		
				19877	1098		
				13642	1740		
				13641	7415		
				16949	2952	193148	
1-3-19	169	C/o	—Do—	16949	3977		
				13641	10207		
				13642	2543		
				773	6026		
				19877	1099		
				540	826		
4-3-19	171	C/o	—Do—	839	897		
				5428	1024		
				17582	624	220371	

3000000

Electricity charge - 2019-2020

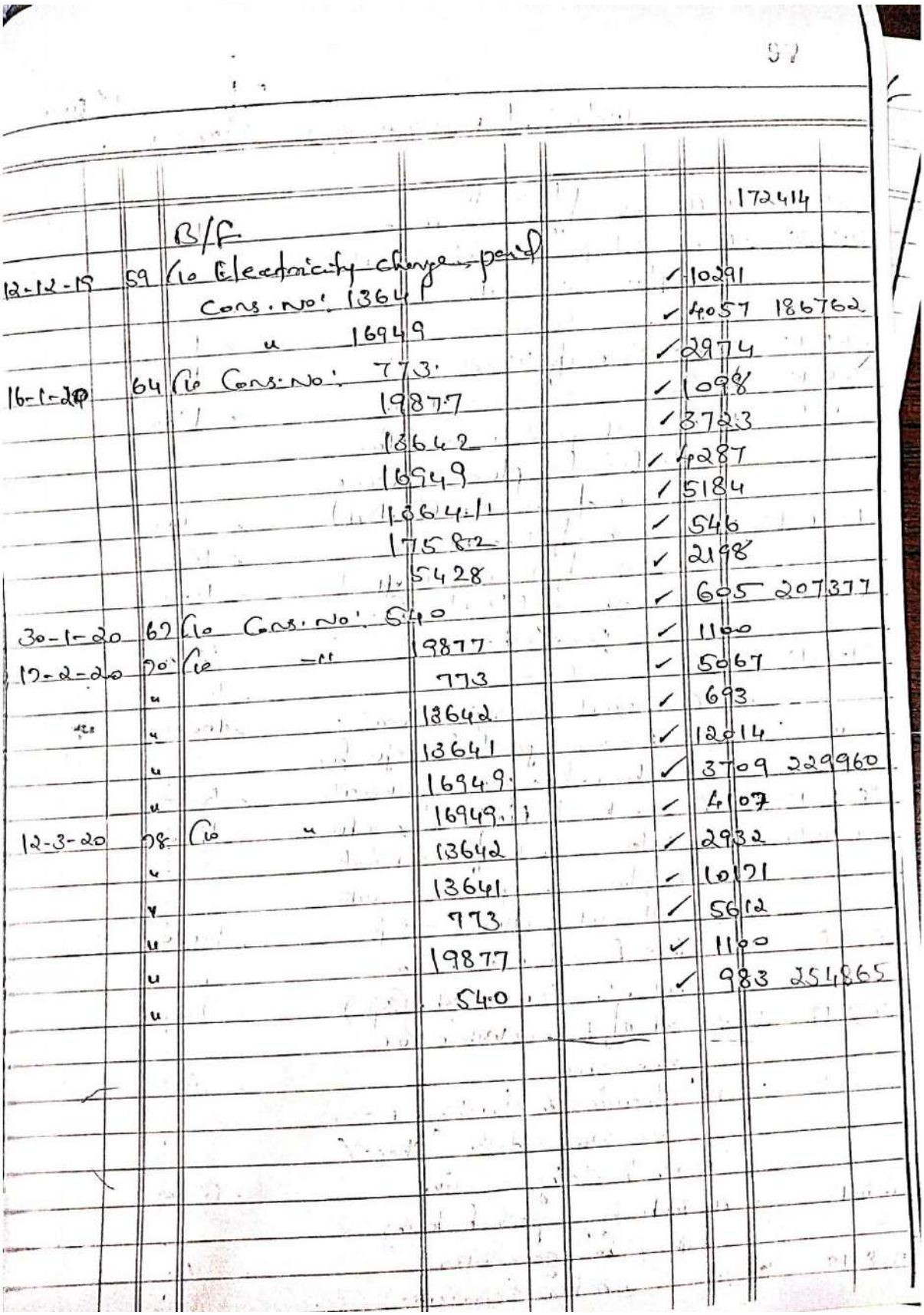
8-4-19	2	C/o Electricity charge - paid			✓	12723
	"	Cons. No: 13641			✓	2288
	"	13642			✓	5345
	"	773			✓	1098
	"	19877			✓	3656
	"	16949			✓	965
14-5-19	6	" 540			✓	3492
	"	" 16949			✓	1963
	"	13641			✓	2192
	"	13642			✓	1098
	"	19877			✓	9108
	"	773			✓	558
30-5-19	9	" 17582			✓	3037
7-6-19	12	" 16949			✓	792
		" 19877			✓	2154
		" 773			✓	4611
		" 13641			✓	887
		" 839			✓	1016
		" 5428				
13-6-19	14	By Reimbursement Nec Camp from 1/6/19 - 10/6/19	7000		✓	49983
2-7-19	21	By Reimbursement of electricity bill - Nec Camp from 20/6/19 - 2/7/19	8000		✓	
11-7-19	25	C/o Electricity charge - paid				
		Cons. No: 13641			✓	9590
		773			✓	8471
		16949			✓	3898
		13642			✓	4321
		19877			✓	1098
		540			✓	1104
16-7-19	26	By Reimbursement of electricity charge & water charge (Nec)	8000		✓	62515



R/Rs

12-9-19	27	To Electricity charge paid			
		Cons. No:	17582		
			5428		
11-8-19	33	To Cons. No:	19877		
		"	773		
		"	13641		
		"	16949		
		"	13642		
20-8-19	39	To Cons. No:	773		
			16949		
			13641		
			13642		
			17582		
			19877		
			5410		
30-9-19	41	Cons. No:	5428		
15-10-19	45	"	16949		
			773		
			19877		
			13642		
			13641		
12-11-19	51	To Cons. No:	13641		
			773		
			16949		
			19877		
			17582		
			13642		
			5410		
22-11-19	54	"	5428		
12-12-19	59	"	773		
	59	"	13642		
	59	"	19877		

60-12		
✓ 715		
✓ 287	9.117	
✓ 1092		
✓ 2020		
✓ 10573		
✓ 10320		
✓ 3506		
✓ 6449		
✓ 10233		
✓ 10344		
✓ 2910		
✓ 6388		
✓ 1099		
✓ 772		
✓ 1162	118950	
✓ 3931		
✓ 6107		
✓ 1101		
✓ 3728		
✓ 10313		
✓ 6057	11,130	
✓ 4452		
✓ 10034		
✓ 1100		
✓ 684		
✓ 609		
✓ 1019		
✓ 1167	163322	
✓ 5755		
✓ 2238		
✓ 1099	17241	



		B/F		172414
12-12-19	59	C/o Electricity charges paid		✓ 10291
		Cons. No: 13641		✓ 4057 186762
		" 16949		✓ 2974
16-1-20	64	C/o Cons. No: 773		✓ 1098
		19877		✓ 3723
		13642		✓ 4287
		16949		✓ 5184
		13641		✓ 546
		17582		✓ 2198
		5428		✓ 605 207377
30-1-20	62	C/o Cons. No: 540		✓ 1100
12-2-20	90	C/o "	19877	✓ 5067
	"		773	✓ 693
	"		13642	✓ 12014
	"		13641	✓ 3709 229960
	"		16949	✓ 4107
12-3-20	98	C/o "	16949	✓ 2932
	"		13642	✓ 10171
	"		13641	✓ 5612
	"		773	✓ 1100
	"		19877	✓ 983 254865
	"		540	

Report- Energy Audit

2018-2020

ENERGY AUDIT REPORT

ST. THOMAS COLLEGE

RANNI

OTTOTRACTIONS
Energy-Engineering-Environment

Energy Audit Report
St. Thomas College, Ranni
Report No: EA 1004B
2020

Empaneled Accredited Energy Auditor, AEA 33
Bureau of Energy Efficiency
Government of India

Empaneled Energy Auditor, EMCEEA-0211F,
Energy Management Centre
Government of Kerala.

Authorized Energy Auditor, GEDA/ENC/EAC: Autho/2014/8/103/2316,
Gujarat Energy Development Agency
Government of Gujarat

Empaneled Energy Auditor, India SME Technology Services Ltd
A joint Venture of SIDBI, SBI, Indian Bank, Oriental Bank of Commerce
& Indian Overseas Bank

About OTTOTRACTIONS

OTTOTRACTIONS established in 2005, is an organization with proven track record and knowledge in the field of energy, engineering, and environmental services. They are the first Accredited Energy Auditor from Kerala for conducting Mandatory Energy Audits in Designated Consumers as per Energy Conservation Act-2001. Government of Kerala recognized and appreciated OTTOTRACTIONS by presenting its prestigious "The Kerala State Energy Conservation Award" for the best performance as an Energy Auditor.

Acknowledgment

We were privileged to work together with the administration and staff of St. Thomas College, Ranni for their timely help extended to complete the audit and bringing out this report.

With gratitude, we acknowledge the diligent effort and commitments of all those who have helped to bring out this report.

We also take this opportunity to thank the bona-fide efforts of audit team for unstinted support in carrying out this audit.

We thank our consultants, engineers and backup staff for their dedication to bring this report.

Thank you.

B V Suresh Babu
Accredited Energy Auditor
AEA 33, Bureau of Energy Efficiency
For OTTOTRACTIONS

Contents

Certification

This is to certify that

The data collection has been carried out diligently and truthfully;

All data monitoring devices are in good working condition and have been calibrated or certified by approved agencies authorised and no tampering of such devices has occurred;

All reasonable professional skill, care and diligence had been taken in preparing the energy audit report and the contents thereof are a true representation of the facts;

Adequate training provided to personnel involved in daily operations after implementation of recommendations; and

The energy audit has been carried out in accordance with the Bureau of Energy Efficiency (Manner and Intervals of Time for the Conduct of Energy Audit) Regulations, 2010.

SURESH BABU B V
ACCREDITED ENERGY AUDITOR (AEA 33)

Executive Summary					
Consolidated Cost Benefit Analysis of Energy Efficiency Improvement Projects					
St. Thomas College, Ranni					
Sl No	Projects	Investment	Cost saving	SPB	Energy saved
		(Lakhs Rs)	(Rs)/Yr	Months	kWh/Yr
1	Energy Saving in Lighting by replacing existing 58 No's T12 (55W) Lamps to 18W LED Tube	0.17	0.29	7.27	3591
2	Energy Saving in Lighting by replacing existing 84 No's T8 (40W) Lamps to 18W LED Tube	0.25	0.248	12.18	3105
3	Energy Saving in Lighting by replacing existing 46 No's CFL(15W) Lamps to 9W LED Bulb	0.04	0.032	15.63	397
4	Energy Saving by replacing existing 156 No's in-efficient ceiling fans with Energy Efficient Five star fans	4.68	0.382	147.17	4770
5	Installation of 10kWp Solar Power Plant	5.50	1.820	36.26	13688
	Total	**10.47**	**2.48**	**43.70**	**21959**
(The saving are projected as per the assumed operation time observed based in the discussions with the plant officials. The data of saving percentages are taken from BEE guide books and field measurements.)					

1

Introduction

A detailed energy audit has been carried out at St. Thomas College Ranni by OTTOTRACTIONS in April 2020. During the energy audit energy saving opportunities has been identified to help improving energy efficiency of the facility. OTTOTRACTIONS is an Accredited Energy Auditor of Bureau of Energy Efficiency and Empaneled Energy Auditor of Energy Management Centre, Government of Kerala.

This energy audit report complies with the clauses in *Energy Conservation Act, 2001* on mandatory energy audit (**Form 4** [refer regulation 6(2)] guidelines for preparation of energy audit report) and complies with the G.O (Rt) No.2/2011/PD dated 01.01.2011 issued by Government of Kerala on mandatory energy audit.

1.1. General Building details and descriptions

The history of the college is embedded in the history of Ranni. The college is situated on the top of a serene hill, in a sylvan surrounding, away from the din and bustle of the city, easily accessible and is at a walkable distance from the heart of Ranni town. The college was established in 1964, as a junior college by St Thomas Valiyapally Ranni, a pioneer parish of the Syrian Knanaya Arch Diocese of Malankara, with the whole hearted support of the then Bishop late lamented His Excellency Abraham Mor Clemis to meet the educational needs of the youth of the local community. The college was upgraded to a first grade college in 1968 and is the only institution for higher education in this part of the country. When the de-linking of Pre Degree sector was

made possible by the government on administrative measures we were left with graduate and Post Graduate courses. During its 53 years of illustrious existence, the college gave birth to brilliant academicians, administrators, politicians and entrepreneurs.

The college aims at creating cultured and educated citizens who love God and their country. With its rural background and `Gurukula' atmosphere, the college fosters uninterrupted pursuit of knowledge. The first Principal, Late Prof. K. A. Mathew, served as minister and PSC member in the Kerala State. He played a vital role in upgrading the junior college to a first grade one in 1968. As the Golden Jubilee project St. Thomas College of Advanced Studies, Edamury, Ranni, a Self-Financing College affiliated to M.G. University, Kottayam was established in June 2014. In March 2016, the College was assessed and re-accredited in the second cycle by the National Assessment and Accreditation Council (NAAC) of UGC and graded at B level.

Occupancy Details		
Particulars	2018-19	2019-20
Total Students	859	829
Staffs	64	64
Total Occupancy of the college	923	893

For calculating specific energy consumption, the total built-up area is taken into account.

Energy audit team

The Energy Audit team is listed below. Besides this list various domine experts also participated in this project.

1. Suresh Babu B V, Accredited Energy Auditor, AEA 33
2. B. Zachariah, Chief Technical Consultant
3. Abin Baby, Project Engineer
4. Jomon J S, Project Engineer
5. Amrutha A M, Data Analyst
6. Anjana B S, Project Assistant

2

Process description

The energy audit has been carried out at St. Thomas College, Ranni The following is the baseline data of this building.

BASELINE DATA SHEET FOR GREEN AUDIT								
1	Name of the Organisation	St. Thomas College, Ranni						
2	Address (include telephone, fax & e-mail)	St. Thomas College, Ranni, Pathanamthitta, 689641, stcranni@gmail.com,+91 8301057965						
2	Year of Establishment	1964						
3	Name of building and Total No. of Electrical Connections/building	St. Thomas college (8)						
4	Total Number of Students	Boys		Girls		Total	829	
5	Total Number of Staff	64						
6	Total Occupancy	893						
7	Total area of green cover	50%						
8	Type of Electrical Connection	HT	0	LT	8			
9	Total Connected Load (kW)	107						
10	Average Maximum Demand (KVA)	-						
11	Total built up area of the building (M^2)	8317						
12	Number of Buildings	5						
13	Average system Power Factor	0.96						
14	Details of capacitors connected	NA						
15	Transformer Details (Nos., kVA, Voltage ratio)	TR 1						
		NA						
15	DG Set Details (kVA,)	DG1	DG2	DG3	DG4	DG5	Remarks	
		10						
16	Details of motors	Rating		Nos.		Remarks		
		5 to 10		2				
		10 to 50						
		Above 50						

3

Energy and utility system description

3.1.1 Electricity

Electricity is purchased from KSEB under 8 LT Connections, the details are given below. A 10 kVA Diesel Generator are in operation at this campus

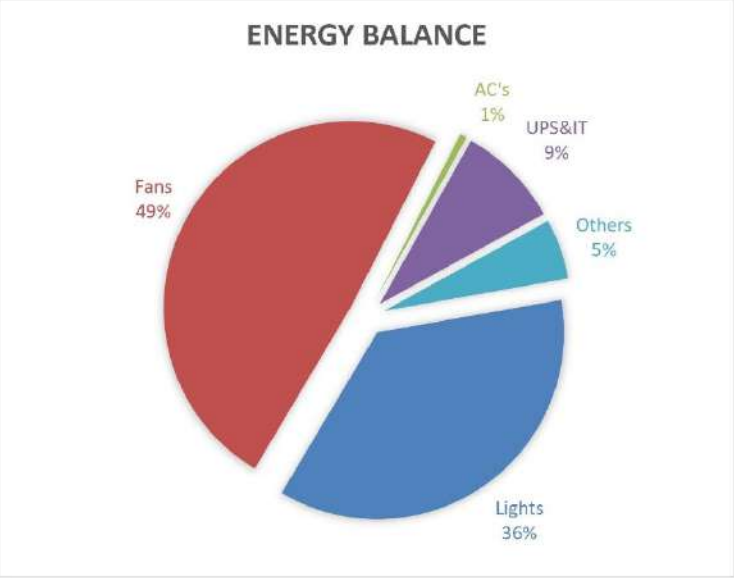
Electricity Connection Details		
St. Thomas College, Ranni		
1	Name of the Consumer	St. Thomas College, Ranni
2	Tariff	LT-6A 3Ph
3	Consumer Numbers	1146072000540, 1146071019877, 1146079005428, 1146073013642, 1146070013641, 1146079016949, 1146076000773, 1146071019877
5	Connected Load Total (kW)	107
6	Annual Electricity Consumption (kWh)	28219

3.2. Thermal Energy / Transportation

There are no vehicles operated from college for transportation. LPG is used for cooking in the canteen and diesel is used to operate Diesel Generators.

4

Energy Balance



49 % of the total energy consumed in this facility is used to operate Fans. Lighting uses 36% UPS and IT Uses AC uses 9%. Air-conditioners uses 1% and Others uses 5%.

OTTOTRACTIONS

5

Performance evaluation of major utilities and process equipment's /systems.

5.1. List of equipment and process where performance testing was done.

5.1.1. Electrical System

5.1.2. Lighting & Fans

5.2. Results of performance testing

5.2.1. Electrical System

The average unit cost of electricity is **8.00 Rs/kWh**. This is taken as the basis for the financial analysis of electrical energy efficiency projects. The information on average energy consumption is taken from the historical electricity bill analysis.

Electricity Consumption

Annual Electricity Consumption (kWh)			
Consumer No	**2018-19**	**2019-20**	Connected Load (kW)
1146072000540	522	611	2
1146071019877	5432	513	6
1146079005428	1213	1834	4
1146073013642	2234	4675	16
1146070013641	13029	14234	16
1146079016949	3672	1876	35
1146076000773	9821	3241	22
1146071019877	2987	1235	6
Total	**35923**	**28219**	**107**

Diesel

The campus has a Diesel Generator. The details of Diesel consumption is given below.

Diesel Consumption Details				
	Transportation	Generator	Total	cost
	in L	in L	in L	in Rs
2018-19	0	344	344	30960
2019-20	0	289	289	26010

Base Line Energy Data St. Thomas College, Ranni			
		2018-19	2019-20
1	Electricity KSEB (kWh)	35923	28219
2	Electricity DG (kWh)	1032	867
3	Electricity Solar , Off grid (kWh)	0.00	0.00
4	Electricity (KSEB + DG + Off grid) kWh	36955	29086
5	Electricity Grid Tied (kWh)	1278	1278
6	Diesel (L)	0	0
7	LPG (kg)	60.00	75.00
8	Biogas (m3)	0.00	0.00

Energy Consumption Profile			
Sl No	Fuel	2018-19	2019-20
1	Electricity	31781300	25013960
2	Diesel	0	0
3	LPG	720000	900000
4	Biogas	0	0
Total		32501300	25913960

Solar Power Plant

Solar Power Plant		
Capacity (kWp)	2018-19	2019-20
1	1278	1278

Lighting

St. Thomas College, Ranni										
Sl.No	Location	Lights							Fans	
		LED-T	LED-B	LED-SQ	T8	T12	ICL	CFL	CF	EF
1	Principal	1		9		1			2	
2	Conf Hall				2	2			1	
3	Office	1			3	4			6	
4	Admn Room	1			4				3	
5	Manager					1			2	
6	Malayalam Dpmt	1							1	
7	3 Rooms	3							3	
8	4 Rooms					4			4	
9	9 Rooms					27			13	
10	Seminar Hall	3							6	1
11	4 Rooms				4				4	
12	Botany department					1			2	
13	Museum	1							2	
14	5 Classrooms	1				5			5	
15	Physics Department	1	1		2	1		2	5	
16	Computer lab				3				2	
17	3 Rooms							12	9	
18	3 Rooms				3				3	
19	3 Rooms				3				3	
20	English department					2			1	
21	6 Rooms				6				6	

22	Conf Hall		2					22	6	
23	3 Rooms						3		3	
24	Lab				2	1		3	4	
25	3 Departments				6	6			14	
26	6 Rooms				6			2	6	
27	9 Rooms	1			5	1		1	9	
28	4 Rooms							4	4	
29	3 Rooms				3				4	
30	2 Rooms				2				2	
31	3 Rooms	1			1	2			3	
32	5 Rooms				7				5	
33	Auditorium	4			22				13	
	Total	**19**	**3**	**9**	**84**	**58**	**3**	**46**	**156**	**1**

Lux Measurement

Sl. No:	Location	Lux Avg
1	Manager	64
2	Seminar Hall	74
3	Botany department	80
4	Museum	84
5	Physics Department	93
6	Computer lab	75
7	Lab	76
8	Auditorium	88

OTTOTRACTIONS

6

Energy efficiency in utility and process system

The specific energy consumption is normally taken as the ratio of total energy consumed to the total are of building.

OTTOTRACTIONS- ENERGY AUDIT			
St. Thomas College, Ranni			
Energy Performance Index (EPI)			
Sl No	Particulars	2018-19	2019-20
1	Total building area (m²)	8317	8317
2	Annual Energy Consumption (kCal)	32501300	25913960
3	Annual Energy Consumption (kWh)	37792	30133
4	Total Energy in Toe	3.25	2.59
5	Specific Energy Consumption kWh/m²	4.54	3.62

The Energy Performance Index (EPI) is

3.62 kWh/m²

The EPI of 2019-20 may be taken as benchmark.

OTTOTRACTIONS

7

Evaluation of energy management system

Energy management policy

There is no written energy policy available, but environment policy is available which includes energy conservation also. A draft energy management policy is given below. The management may constitute an energy management policy and display the same in the plant to motivate the staff.

ST. THOMAS COLLEGE RANNI,
RANNI

ENERGY POLICY

(Draft)

We are committed to optimally utilize various forms of energy in a cost effective manner to effect conservation of energy resources. We are committed to conserve the energy which is a scarce resource with the requisite consistency in the efficiency, effectiveness in the cost involved in the operations and ensuring that production quality and quantity, environment, safety, health of people are maintained. We are also committed to increase the renewable energy share of the total energy we use.

We are also committed to monitor continuously the saving achieved and reduce its specific energy consumption by minimum of 2% every year.

Date ----------

Head of the Institution

7.1. Energy management monitoring system

- **Energy Management Cell** has to be constituted with an objective to revise action plan for energy conservation thereby reducing the production cost.
- Energy conservation tips/ posters are displayed in crucial points.
- Use of renewable energy has to be encouraged.

7.2. Training to staff responsible for operational and Documentation.

- The staff and students need to be made more aware of the importance of energy saving and management.
- Log books shall be maintained to record Electricity Consumption and Diesel consumption.
- Meter reading shall be taken and compared with KSEB regularly.
- Better operating practices regarding appliances and fixtures should be taught to the staff.

7.3. Best Practices

- Have solid waste management program
- Conducted Green Audit.
- Have different social and environmental clubs
- Started to installing LED Lights
- Conducted Energy Conservation Training Programs
- Installed Solar street lights

OTTOTRACTIONS
Energy Engineering Environment

8

Energy Conservation Measures and Recommendations

Executive Summary					
Consolidated Cost Benefit Analysis of Energy Efficiency Improvement Projects					
St. Thomas College, Ranni					
Sl No	Projects	Investment	Cost saving	SPB	Energy saved
		(Lakhs Rs)	(Rs)/Yr	Months	kWh/Yr
1	Energy Saving in Lighting by replacing existing 58 No's T12 (55W) Lamps to 18W LED Tube	0.17	0.29	7.27	3591
2	Energy Saving in Lighting by replacing existing 84 No's T8 (40W) Lamps to 18W LED Tube	0.25	0.248	12.18	3105
3	Energy Saving in Lighting by replacing existing 46 No's CFL(15W) Lamps to 9W LED Bulb	0.04	0.032	15.63	397
4	Energy Saving by replacing existing 156 No's in-efficent ceiling fans with Energy Efficient Five star fans	4.68	0.382	147.17	4770
5	Installation of 10kWp Solar Power Plant	5.50	1.820	36.26	13688
	Total	**10.47**	**2.48**	**43.70**	**21959**
(The saving are projected as per the assumed operation time observed based in the discussions with the plant officials. The data of saving percentages are taken from BEE guide books and field measurements.)					

OTTOTRACTIONS
Energy Engineering Environment

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 1	
Energy Saving in Lighting by replacing existing 84 No's T8 (40W) Lamps to 18W LED Tube	
Existing Scenario	
84 numbers of T8(40 W) lamps were identified during the energy audit field survey in the facility. During discussion with officers it is observed that the average utility of these fittings are of 30%.	
Proposed System	
The existing T8 may be replaced to LED Tube of 18W in phased manner and the savings will be of 55% (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2400
No of fittings	84
Total load (kW)	3.36
Annual Energy Consumption (kWh)	5645
Expected Annual Energy saving for replacing all fittings (kWh)	3105
Cost of Power	8.00
Annual saving in Lakhs Rs (1st year)	0.25
Investment required for complete replacements [@Rs 300 per fittings](Lakhs Rs)	0.25
Simple Pay Back (in Months)	12.18

OTTOTRACTIONS
Energy Engineering Environment

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code	
Energy Saving in Lighting by replacing existing 58 No's T12 (55W) Lamps to 18W LED Tube	
Existing Scenario	
257 numbers of T12(55 W) lamps were identified during the energy audit field survey in the facility. During discussion with officers it is observed that the average utility of these fittings are of 30%.	
Proposed System	
The existing T12 may be replaced to LED Tube of 18W in phased manner and the savings will be of 67% (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2400
No of fittings	58
Total load (kW)	3.19
Annual Energy Consumption (kWh)	5359
Expected Annual Energy saving for replacing all fittings (kWh)	3591
Cost of Power	8.00
Annual saving in Lakhs Rs (1st year)	0.29
Investment required for complete replacements [@Rs 300 per fittings](Lakhs Rs)	0.17
Simple Pay Back (in Months)	7.27

OTTOTRACTIONS
Energy Engineering Environment

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal	
Energy Saving by replacing existing 156 No's in-efficient ceiling fans with Energy Efficient Five star fans	
Existing Scenario	
There are 156 numbers of ceiling fans installed in the facility with minimum 8 hrs a day operation. All are conventional type and most of them are very old.	
Proposed System	
There is an energy saving opportunity in replace the existing fans with new five star labelled fans.The five star labelled fans give a savings up to 30% with higher service value (air delivery/watt).	
Financial Analysis	
Annual working hours (hrs)	2400
Total numbers of ordinary fans	156
Total load (kW)	10.92
Annual Energy Consumption (kWh)	17035
Expected Annual Energy saving, for total replacement(kWh)	4770
Cost of Power (Rs)	8.00
Annual saving in Lakhs Rs (1st year)	0.38
Investment required for a total replacement (Lakhs Rs)[@3000 Rs per Fan with 50W at full speed]	4.68
Simple Pay Back (in Months)	147.17

OTTOTRACTIONS
Energy Engineering Environment

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal	
Energy Saving in Lighting by replacing existing 46 No's CFL(15W) Lamps to 9W LED Bulb	
Existing Scenario	
24 numbers of CFL (15W) lamps were identified during the energy audit field survey in the facility. During discussion with officers it is observed that the average utility of these fittings are of 30%.	
Proposed System	
The existing CFL may be replaced to LED Bulb of 9W in phased manner and the savings will be of 40% (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2400
No of fittings	46
Total load (kW)	0.69
Annual Energy Consumption (kWh)	994
Expected Annual Energy saving for replacing all fittings (kWh)	397
Cost of Power	8.00
Annual saving in Lakhs Rs (1st year)	0.03
Investment required for complete replacements [@Rs 90 per fittings](Lakhs Rs)	0.04
Simple Pay Back (in Months)	15.63

Energy Saving Proposal	
Installation of 10kWp Solar Power Plant	
Existing Scenario	
There is a good potential of solar power electricity generation. The availability of sunlight is very high. There are some canopies available in the proposed site, but by having proper trimming of trees this may be avoided. If the SPVs are place in the roof top it will help improving RTTV (Roof Thermal Transmit Value) of the building.	
Proposed System	
It is proposed to have a Solar Power Plant of 10kW at the beginning stage. The state and central government is pushing and giving good assistance to the installation. It can be installed as an internal grid connected system which is much cheaper than off grid system. Now days the technology provides trouble free grid interactive and connected system. The installation will provide 25yrs trouble free generation with only 20% efficiency loss at the 25th year.	
Financial Analysis	
Proposed Solar installed Capacity (kW)	10
Total average kWh per day expected (3.5kWh/day average)	37.50
Total annual Generating Capacity (kWh)	13688
Cost of energy generated annually Lakhs Rs	1.82
Investment required (INR lakh)(Approx)	5.50
Simple Pay Back (in Months)	36.26
Life cycle in Yrs	25
Total Saving in Life Cycle (Approx) RS lakh	45.51

OTTOTRACTIONS
Energy Engineering Environment

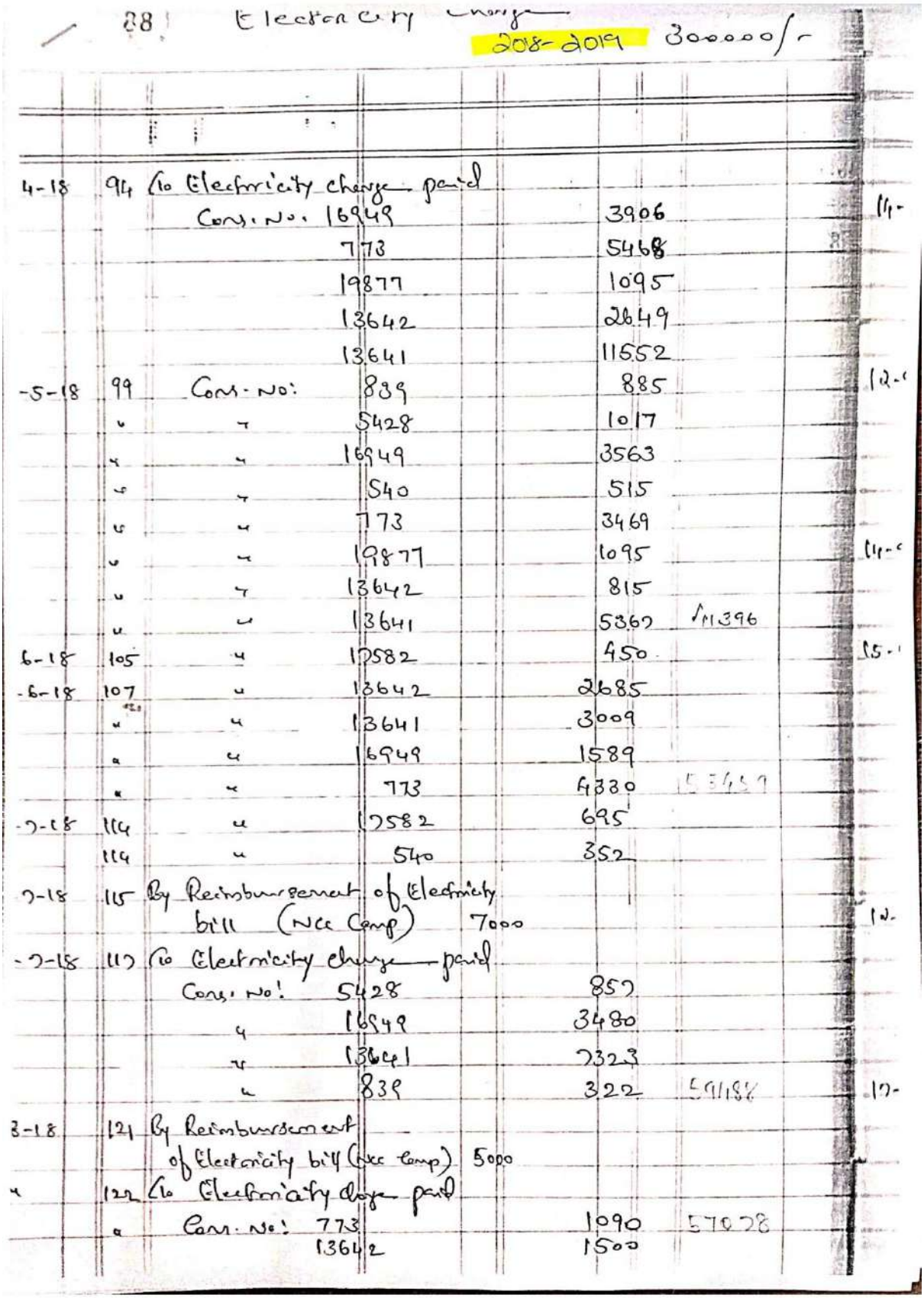
OTTOTRACTIONS- ENERGY AUDIT						
St. Thomas College, Ranni						
Greenhouse Gas Mitigation through Major Energy Efficiency Projects						
Sl No	Projects	Energy saved(Yearly)		Sustainability (Years)	First year ton of CO2 mitigated	Expected Tons of CO2 mitigated through out life cycle
		(kWh)	MWh	Years		
1	Energy Saving in Lighting by replacing existing 58 No's T12 (55W) Lamps to 18W LED Tube	3591	3.59	10	2.62	26.21
2	Energy Saving in Lighting by replacing existing 84 No's T8 (40W) Lamps to 18W LED Tube	3105	3.10	10	2.27	22.66
3	Energy Saving in Lighting by replacing existing 46 No's CFL(15W) Lamps to 9W LED Bulb	397	0.40	10	0.29	2.90
4	Energy Saving by replacing existing 156 No's in-efficent ceiling fans with Energy Efficient Five star fans	4770	4.77	10	3.48	34.82
Total		**11863**	**12**	**10**	**8.66**	**86.60**

St. Thomas College, Ranni						
Greenhouse Gas Mitigation through Renewable Energy Projects						
Sl No	Projects	Energy saved(Yearly)		Sustainability (Years)	First year ton of CO2 mitigated	Expected Tons of CO2 mitigated through out life cycle
		(kWh)	MWh	Years		
1	Installation of 10kWp Solar Power Plant	13688	13.69	25	9.99	249.80
	Total	13688	14	25	9.99	250

Technical Supplements

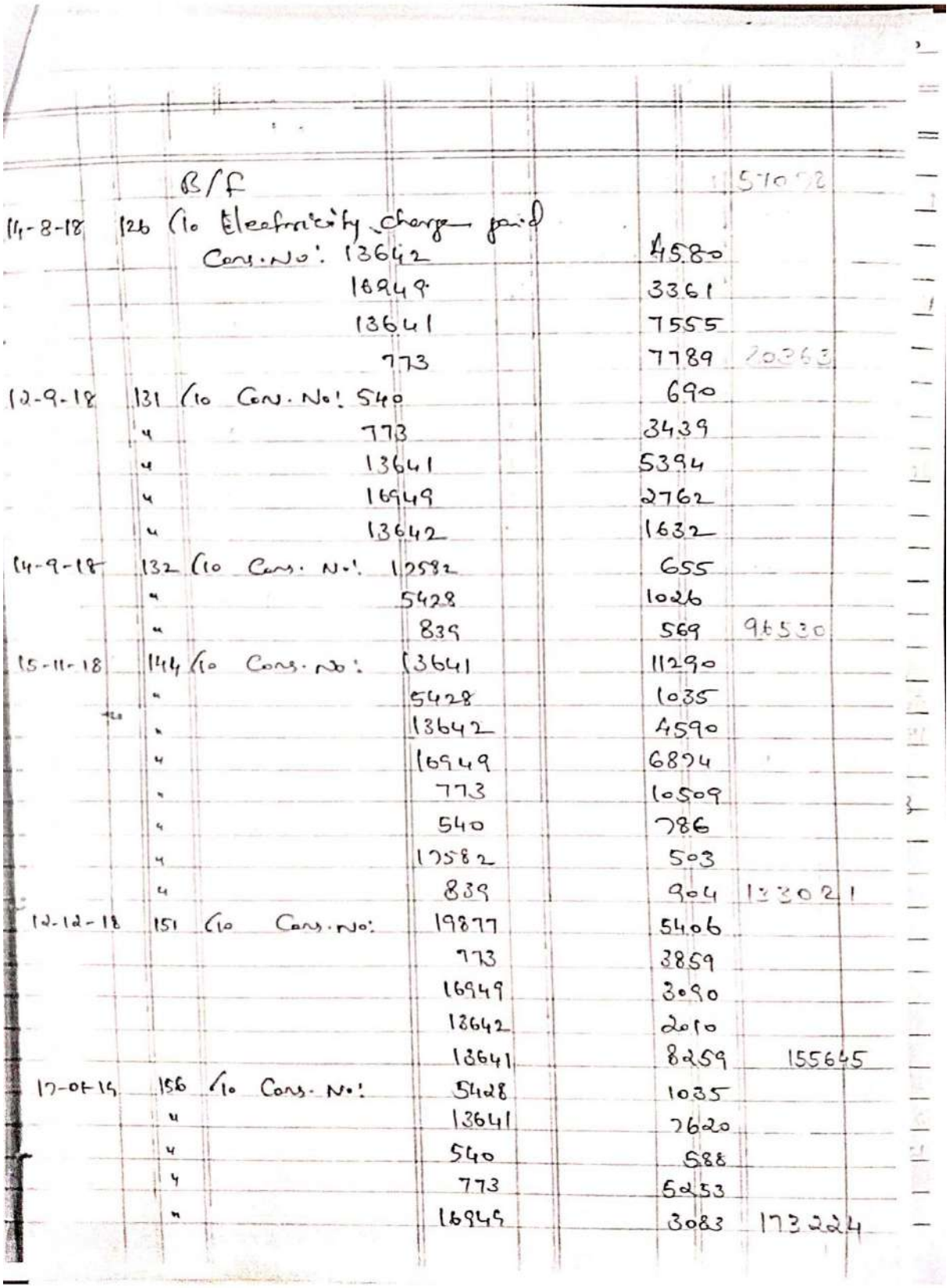
St. Thomas College, Ranni															
Sl.No	Location	Lights							Fans		IT			Others		
		LED-T	LED-B	LED-SQ	T8	T12	ICL	CFL	CF	EF	Printer	Projector	PC	TV	AC (1TR)	Fridge
1	Principal	1		9		1			2		1		1	1		
2	Conf Hall				2	2			1				1		1	
3	Office	1			3	4			6		2		2			
4	Admn Room	1			4				3		3		1			
5	Manager					1			2		1		1			
6	Malayalam Dpmt	1							1							
7	3 Rooms	3							3							
8	4 Rooms					4			4							
9	9 Rooms					27			13							
10	Seminar Hall	3							6	1		1				
11	4 Rooms				4				4							
12	Botany department					1			2		1		1			1
13	Museum	1							2				1			
14	5 Classrooms	1				5			5							
15	Physics Department	1	1		2	1		2	5			1	1			
16	Computer lab				3				2				5			
17	3 Rooms							12	9							
18	3 Rooms				3				3							
19	3 Rooms				3				3							
20	English department					2			1				1			
21	6 Rooms				6				6							

22	Conf Hall		2					22	6							
23	3 Rooms						3		3							
24	Lab				2	1		3	4		1		24			
25	3 Departments				6	6			14							
26	6 Rooms				6			2	6							
27	9 Rooms	1			5	1		1	9							
28	4 Rooms							4	4							
29	3 Rooms				3				4							
30	2 Rooms				2				2							
31	3 Rooms	1			1	2			3							
32	5 Rooms				7				5							
33	Auditorium	4			22				13							
	Total	**19**	**3**	**9**	**84**	**58**	**3**	**46**	**156**	**1**	**9**	**2**	**39**	**1**	**1**	**1**

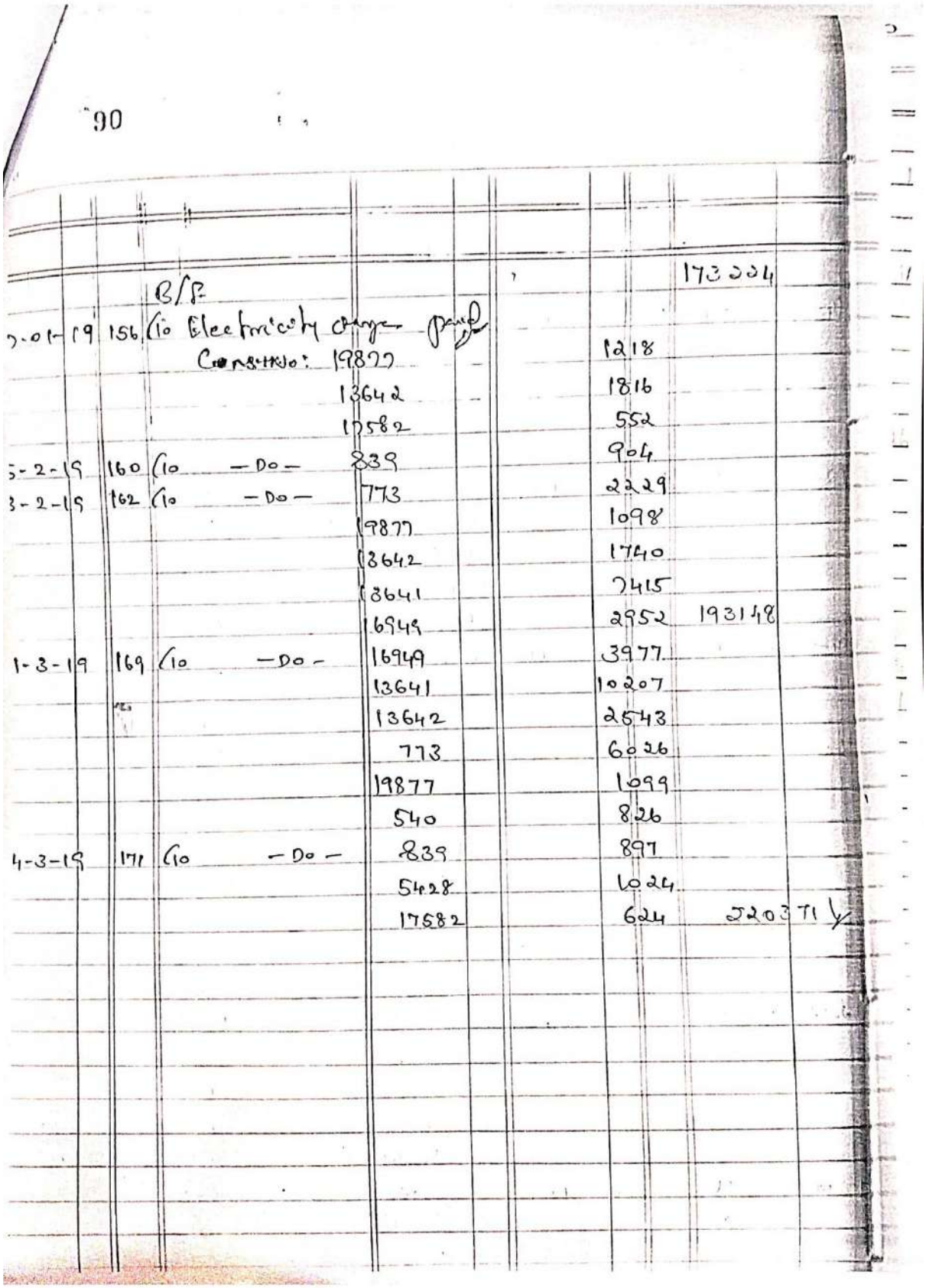


28 Electricity charge — 2018-2019 3000000/-

4-18	94	To Electricity charge paid				11-
		Cons. No.	16949	3906		
			773	5468		
			19877	1095		
			13642	2649		
			13641	11552		
-5-18	99	Cons. No:	839	885		12-(
	"	"	5428	1017		
	"	"	16949	3563		
	"	"	540	515		
	"	"	773	3469		
	"	"	19877	1095		11-(
	"	"	13642	815		
	"	"	13641	5367	41396	
6-18	105	"	17582	450		15-(
-6-18	107	"	13642	2685		
	"	"	13641	3009		
	"	"	16949	1589		
	"	"	773	4330	53459	
-7-18	114	"	17582	695		
	114	"	540	352		
7-18	115	By Reimbursement of Electricity bill (NCC Camp)	7000			12-
-7-18	117	To Electricity charge paid				
		Cons. No:	5428	857		
		"	16949	3480		
		"	13641	7323		
		"	839	322	59178	17-
8-18	121	By Reimbursement of Electricity bill (NCC Camp)	5000			
"	122	To Electricity charge paid				
	"	Cons. No:	773	1090	57028	
			13642	1500		



		B/f			57078
14-8-18	126	C/o Electricity charge paid Cons. No:	13642	4580	
			16949	3361	
			13641	7555	
			773	7789	20363
12-9-18	131	C/o Con. No:	540	690	
	"		773	3439	
	"		13641	5394	
	"		16949	2762	
	"		13642	1632	
14-9-18	132	C/o Cons. No:	17582	655	
	"		5428	1026	
	"		839	569	96530
15-11-18	144	C/o Cons. No:	13641	11290	
	"		5428	1035	
	"		13642	4590	
	"		16949	6894	
	"		773	10509	
	"		540	786	
	"		17582	503	
	"		839	904	130021
12-12-18	151	C/o Cons. No:	19877	5406	
			773	3859	
			16949	3090	
			13642	2010	
			13641	8259	155645
17-04-19	156	C/o Cons. No:	5428	1035	
	"		13641	7620	
	"		540	588	
	"		773	5233	
	"		16949	3083	173224



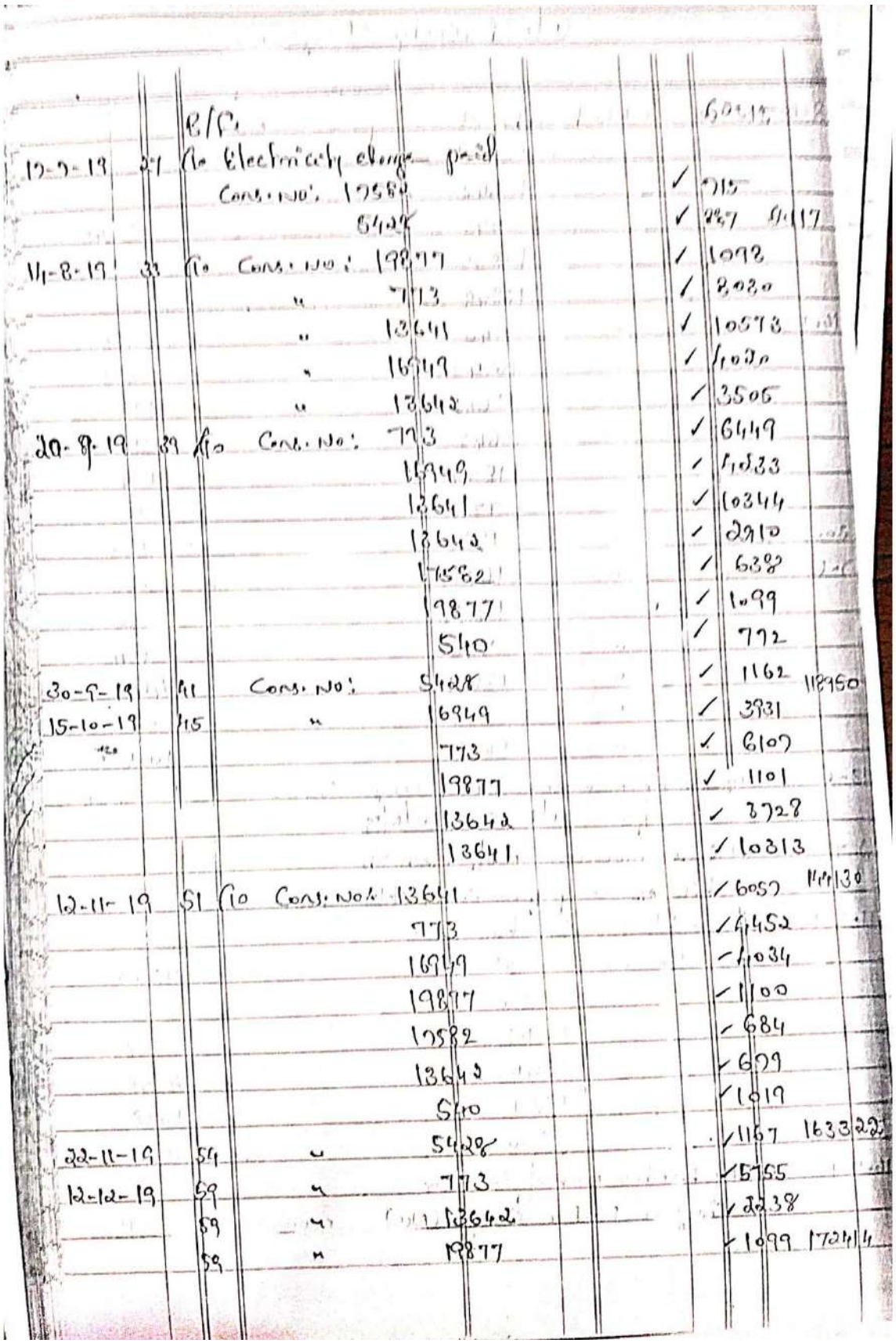
90

			B/F			173204	
2-01-19	156	C/o	Electricity charges paid				
			Constructo:	19877	1218		
				13642	1816		
				17582	552		
5-2-19	160	C/o	—Do—	839	904		
3-2-19	162	C/o	—Do—	773	2229		
				19877	1098		
				13642	1740		
				13641	7415		
				16949	2952	193148	
1-3-19	169	C/o	—Do—	16949	3977		
				13641	10207		
				13642	2543		
				773	6026		
				19877	1099		
				540	826		
4-3-19	171	C/o	—Do—	839	897		
				5428	1024		
				17582	624	220371	

3000000

Electricity charge - 2019-2020

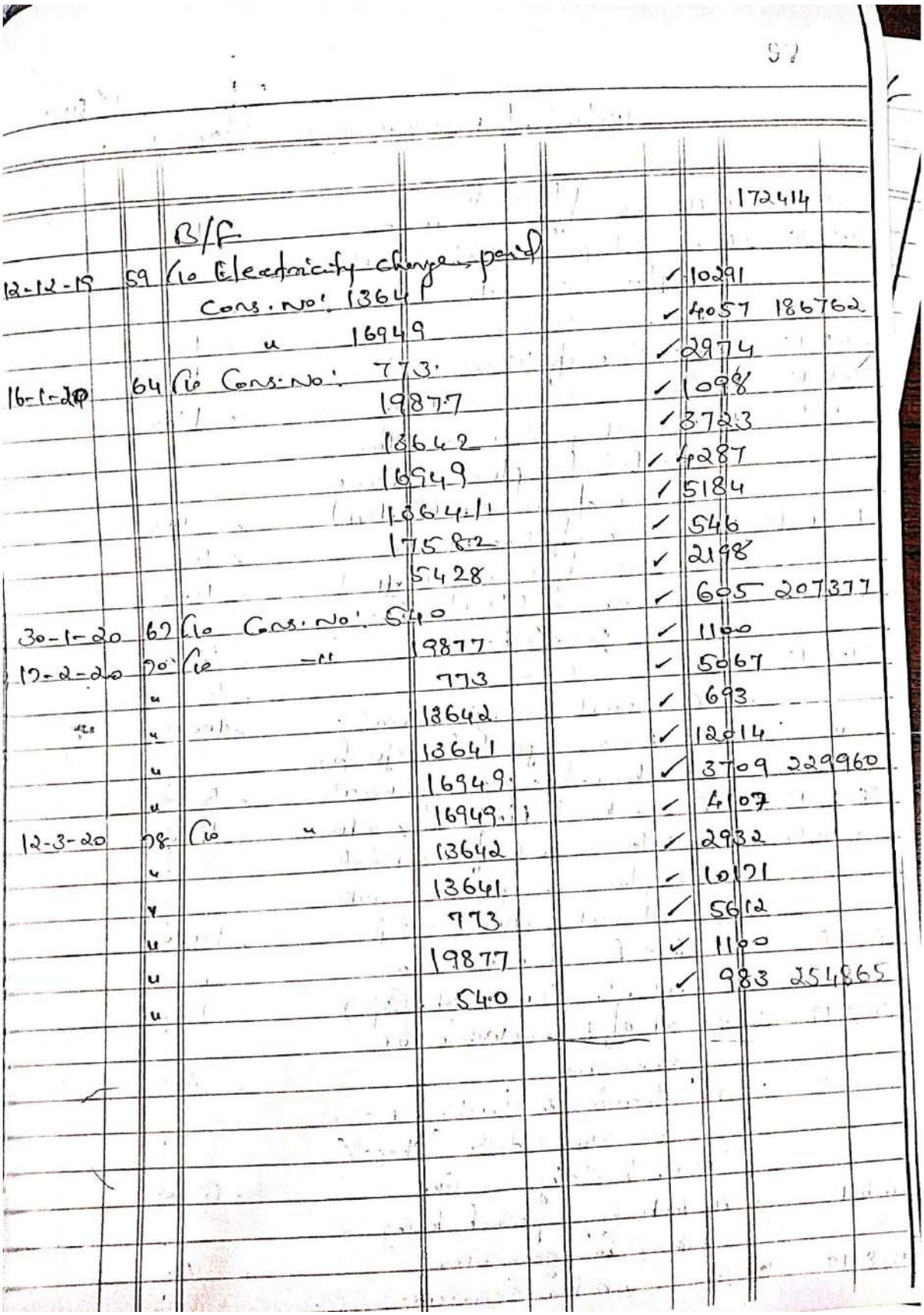
8-4-19	2	C/o Electricity charge - paid			✓	12723
	"	Cons. No: 13641			✓	2288
	"	13642			✓	5345
	"	773			✓	1098
	"	19877			✓	3656
	"	16949			✓	965
14-5-19	6	" 540			✓	3492
	"	" 16949			✓	1963
	"	13641			✓	2192
	"	13642			✓	1098
	"	19877			✓	9108
	"	773			✓	558
30-5-19	9	" 17582			✓	3037
7-6-19	12	" 16949			✓	792
		" 19877			✓	2154
		" 773			✓	4611
		" 13641			✓	887
		" 839			✓	1016
		" 5428				
13-6-19	14	By Reimbursement Nec Camp from 1/6/19 - 10/6/19	7000		✓	49983
2-7-19	21	By Reimbursement of electricity bill - Nec Camp from 20/6/19 - 2/7/19	8000		✓	
11-7-19	25	C/o Electricity charge - paid				
		Cons. No: 13641			✓	9590
		773			✓	8471
		16949			✓	3898
		13642			✓	4321
		19877			✓	1098
		540			✓	1104
16-7-19	26	By Reimbursement of electricity charge & water charge (Nec)	8000		✓	62515



R/Rs

12-9-19	27	To Electricity charge paid			
		Cons. No:	17582		
			5428		
14-8-19	33	To Cons. No:	19877		
		"	773		
		"	13641		
		"	16949		
		"	13642		
20-8-19	39	To Cons. No:	773		
			16949		
			13641		
			13642		
			17582		
			19877		
			540		
30-9-19	41	Cons. No:	5428		
15-10-19	45	"	16949		
			773		
			19877		
			13642		
			13641		
12-11-19	51	To Cons. No:	13641		
			773		
			16949		
			19877		
			17582		
			13642		
			540		
22-11-19	54	"	5428		
12-12-19	59	"	773		
	59	"	13642		
	59	"	19877		

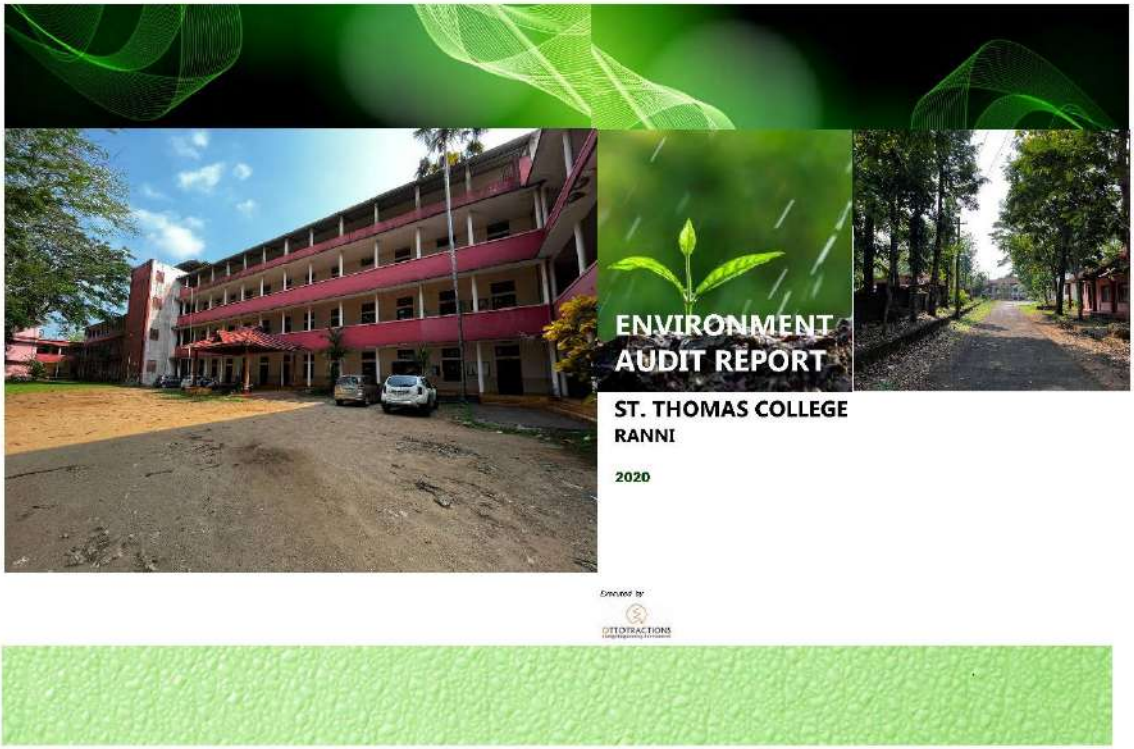
	60-12	
✓	715	
✓	287	9-117
✓	1092	
✓	2020	
✓	10573	
✓	1020	
✓	3506	
✓	6449	
✓	10233	
✓	10344	
✓	2910	
✓	6382	
✓	1099	
✓	772	
✓	1162	118950
✓	3931	
✓	6107	
✓	1101	
✓	3728	
✓	10313	
✓	6057	11-130
✓	4452	
✓	1034	
✓	1100	
✓	684	
✓	609	
✓	1019	
✓	1167	163322
✓	5755	
✓	2238	
✓	1099	17241



		B/F		172414
12-12-19	59	C/o Electricity charges paid		✓ 10291
		Cons. No: 13641		✓ 4057 186762
		" 16949		✓ 2974
16-1-20	64	C/o Cons. No: 773		✓ 1098
		19877		✓ 3723
		13642		✓ 4287
		16949		✓ 5184
		13641		✓ 546
		17582		✓ 2198
		5428		✓ 605 207377
30-1-20	62	C/o Cons. No: 540		✓ 1100
12-2-20	90	C/o "	19877	✓ 5067
	"		773	✓ 693
	"		13642	✓ 12014
	"		13641	✓ 3709 229960
	"		16949	✓ 4107
12-3-20	98	C/o "	16949	✓ 2932
	"		13642	✓ 10171
	"		13641	✓ 5612
	"		773	✓ 1100
	"		19877	✓ 983 254865
	"		540	

Report- Environment Audit

2018-2020



ENVIRONMENT AUDIT REPORT

ST. THOMAS COLLEGE

RANNI

OTTOTRACTIONS
Energy-Engineering-Environment

Environment Audit Report
ST. THOMAS COLLEGE, RANNI
EA 1004C, 2020

Audit Team

Ottotractions

1	Er. Suresh Babu B V,	Accredited Energy Auditor, AEA 33
2	Er. B. Zachariah,	Director, Ottotractions
3	Er. Abin Baby,	Project Engineer,
4	Er. Joemon J S	Project Engineer,
5	Ms.Amrutha	Data Analyst
6	Ms.Anjana	Project Assistant

About OTTOTRACTIONS

OTTOTRACTIONS established in 2005, is an organization with proven track record and knowledge in the field of energy, engineering, and environmental services. They are the first Accredited Energy Auditor from Kerala for conducting Mandatory Energy Audits in Designated Consumers as per Energy Conservation Act-2001. Government of Kerala recognized and appreciated OTTOTRACTIONS by presenting its prestigious "The Kerala State Energy Conservation Award 2009" for the best performance as an Energy Auditor. Ottotractions is an ISO 9001-2015 and ISO 14001-2015 Certified organization, which ensures the quality of its services.

Acknowledgment

We were privileged to work together with the administration and staff of St. Thomas College, Ranni for their timely help extended to complete the audit and bringing out this report.

With gratitude, we acknowledge the diligent effort and commitments of all those who have helped to bring out this report.

We also take this opportunity to thank the bona-fide efforts of team OTTOTRACTIONS for unstinted support in carrying out this audit.

We thank our consultants, engineers and backup staff for their dedication to bring this report.

Thank you.

B V Suresh Babu
Accredited Energy Auditor
AEA 33, Bureau of Energy Efficiency
Government of India

Contents

OTTOTRACTIONS
Energy-Engineering-Environment

INTRODUCTION

St. Thomas College, Ranni has entrusted Ottotractions to carry out an environment audit of their campus building.

Each section contains recommendations for improvements relating to environmental issues, which are consolidated in the action plan in section 4.

BACKGROUND

The history of the college is embedded in the history of Ranni. The college is situated on the top of a serene hill, in a sylvan surrounding, away from the din and bustle of the city, easily accessible and is at a walkable distance from the heart of Ranni town. The college was established in 1964, as a junior college by St Thomas Valiyapally Ranni, a pioneer parish of the Syrian Knanaya Arch Diocese of Malankara, with the whole hearted support of the then Bishop late lamented His Excellency Abraham Mor Clemis to meet the educational needs of the youth of the local community. The college was upgraded to a first grade college in 1968 and is

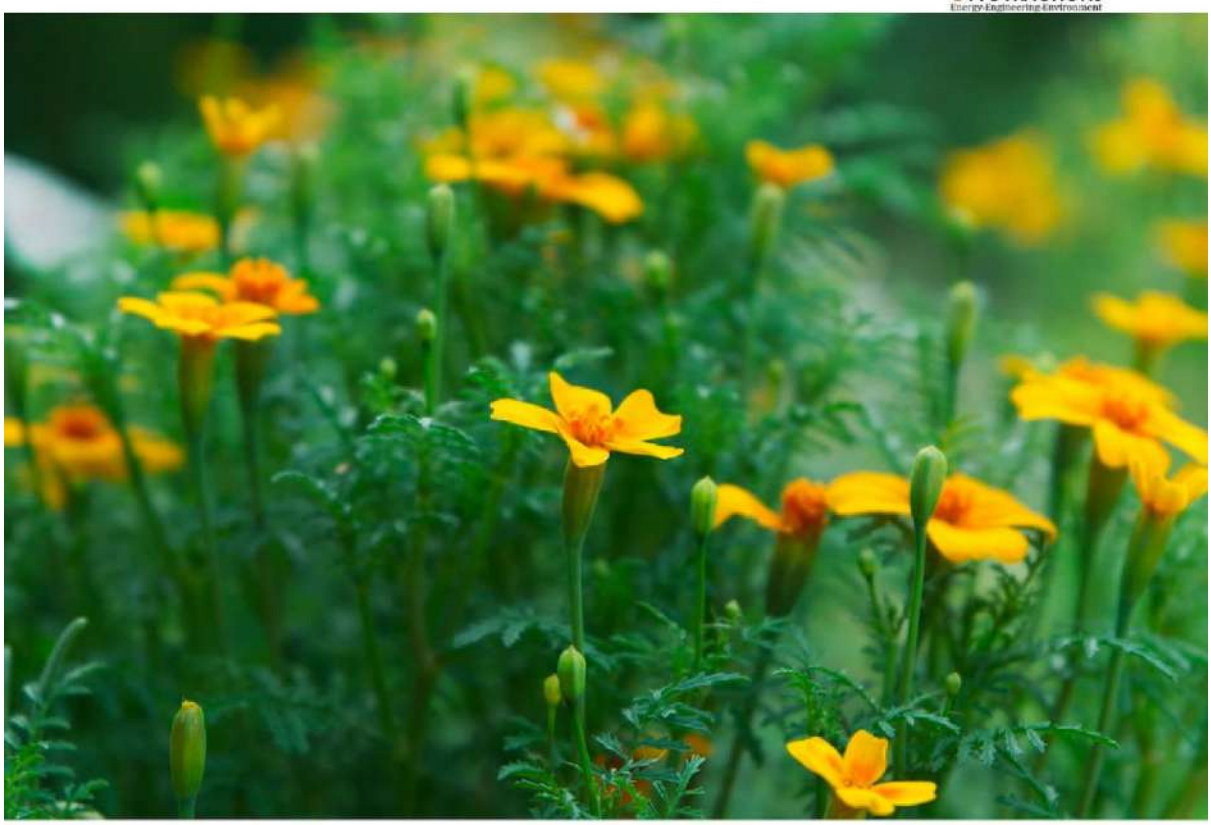
the only institution for higher education in this part of the country. When the de-linking of Pre Degree sector was made possible by the government on administrative measures we were left with graduate and Post Graduate courses. During its 53 years of illustrious existence, the college gave birth to brilliant academicians, administrators, politicians and entrepreneurs.

The college aims at creating cultured and educated citizens who love God and their country. With its rural background and `Gurukula' atmosphere, the college fosters uninterrupted pursuit of knowledge. The first Principal, Late Prof. K. A. Mathew, served as minister and PSC member in the Kerala State. He played a vital role in upgrading the junior college to a first grade one in 1968. As the Golden Jubilee project St. Thomas College of Advanced Studies, Edamury, Ranni, a Self Financing College affiliated to M.G. University, Kottayam was established in June 2014. In March 2016, the College was assessed and re-accredited in the second cycle by the National Assessment and Accreditation Council (NAAC) of UGC and graded at B level.

Occupancy Details		
Particulars	2018-19	2019-20
Total Students	859	829
Staffs	64	64
Total Occupancy of the college	923	893

Total student strength of the campus is 829. For calculating per capita carbon emission estimation, the student strength is taken into account.

OTTOTRACTIONS
Energy-Engineering-Environment



ENVIRONMENTAL ISSUES

This section is broken down into the following different areas: waste, water, energy, resource and materials use and procurement. A final 'other' section is also included for any additional issues.

1.1. Waste

The way communities generate and manage their waste plays an absolutely key role in their ability to use resources efficiently. All buildings contain bins for both general

waste and mixed recyclables (plastic bottles, card, cans and paper). On average each floor in the buildings areas has its own general waste bin and one recycling bin. When the bins are emptied by the cleaning staff. Bins are marked and kept in different colors for identification, however in some locations throughout the building it was unclear which bins were for which waste streams.

There are four basic ways in which campus can do **plastic** recycling **collection** services for **plastic** bottles and containers – curbside, drop-off, buy-back or deposit/refund programs. The first, and most widely accessible, **collection** method is curbside **collection** of recyclables. The campus is installed bins to collect plastic bottles and single use plastics. The college has given a proper awareness on plastic waste problems and they are discouraging the students or teachers to carry plastics to the campus. The Bhoomitra Sena Club is very active in the campus and do a verity of programs to build awareness on waste management. The reports on different activities of the club are attached as technical supplement of this report.

The major concern of waste management will be focused on the solid waste produced by the campus. Solid wastes produced in the campus are mainly of three types, food waste, paper waste, and plastic waste. Food wastes produced in the campus are mainly by two means. The vegetable wastes produced in the kitchen during the food preparation. The food waste produced by the students and staffs of the campus after the consumption of meals. The degradable waste is treated in the biogas plant, the biogas generated is used in the kitchen. A state of art sewage treatment plant is installed in the campus

Degradable Waste Generation		
St. Thomas College, Ranni		
Particulars	2018-19	2019-20
Total Occupancy	923	893
Waste generated in kg /day	18.46	17.86
Waste generated in kg /Yr	4061.2	3929.2

Burning plastics shall be strictly restricted inside the campus. **Burning plastic** and other wastes releases dangerous substances such as heavy metals, Persistent Organic Pollutants, and other toxics into the air and ash waste residues. Such

pollutants contribute to the development of asthma, cancer, endocrine disruption, and the global burden of disease.

Solid non degradable Waste Generation		
St. Thomas College, Ranni		
Particulars	2018-19	2019-20
Total Occupancy	923	893
Waste paper generated in kg /day	0.1846	0.1786
Waste plastic generated in kg /day	0.2769	0.2679
Waste paper generated in kg /Yr	40.61	39.29
Waste plastic generated in kg /Yr	60.92	58.94

WASTE MINIMIZATION AND RECYCLING			
1	Does your institute generate any waste?		Yes, Solid waste, Canteen waste, paper, plastic, Horticulture Waste etc.
	If so, what are they?		
2	What is the approximate amount of waste generated per day? (in Kilograms/) (approx.)		18
3	How is the waste generated in the institute managed? By		Reuse of one side printed Paper for internal communication. Kitchen waste is used to generate manures and biogas. Two types of Waste bins are provided at campus for biodegradable and non-biodegradable waste.
	1	Composting	In-house
	2	Recycling	In-house
	3	Reusing	In-house
	4	Others (specify)	
4	Do you use recycled paper in institute?		Yes
5	Do you use reused paper in institute?		Yes
6	How would you spread the message of recycling to others in the community? Have you taken any initiatives? If yes,		Number of awareness programs through Nature Club, Biodiversity Club and NSS Camp
	please specify.		
7	Can you achieve zero garbage in your institute? If yes, how?		Not yet achieved. Possible through waste management plan.

Green Cover Audit			
1	**Is there a garden in your institute?**	**Yes**	
2	Do students spend time in the garden?	Yes	
3	Total number of Plants in Campus	Plant type	Approx. number
		Trees	236
		Ornamental	Not estimated
4	Number of Tree Plantation Drives organized by School per annum. (If Any)	Yes, through Nature Club and Biodiversity club plantation drives are organized.	
5	Number of Trees Planted in Last FY.	60	
	Survival Rate	90%	

All the activities including energy consumption and waste management have their equivalent carbon emission and they positively contribute to the carbon footprint of the campus. Carbon sequestration is the reverse process, at which the emitted carbon dioxide will get sequestrated according to the type of carbon sequestration employed. Even though there are many natural sequestration processes are involved in a campus, the major type of sequestration among them is the carbon sequestration by trees.

Trees sequestrate carbon dioxide through the biochemical process of photosynthesis and it is stored as carbon in their trunk, branches, leaves and roots. The amount of carbon sequestrated by a tree can be calculated by different methods. In this study, the volumetric approach was taken into account, thus the details including CBH (Circumference at Breast Height), height, average age, and total number of the trees, are required. Detailed table is included in the technical supplement.

Carbon Sequestration		
Particulars	2018-19	2019-20
Total No of Trees	236	236
Carbon sequestrated by trees in the campus (tCO_2e)	6.6	6.90

Carbon sequestrated by a tree can be found out by using different methods. Since this study is employed the volumetric approach, the calculation consists of five processes.

- Determining the total weight of the tree
- Determining the dry weight of the tree
- Determining the weight of carbon in the tree
- Determining the weight of CO_2 sequestrated in the tree
- Determining the weight of CO_2 sequestrated in the tree per year

Carbon sequestrated by each species of trees in the campus compound is given in the Table. Detailed calculation results are listed out in the tables provided in the technical supplements of 'Carbon sequestration'.

List of Trees and Plants		
Sl. No.	English Name	QTY
1	Jackfruit Tree	12
2	Mango	9
3	Ashoka Tree	1
4	BulletWood	2
5	Teak	84
6	Coconut	21
7	Wild Jack	7
8	Royal Princiana	4
9	Mahagony	38
10	Soursop Tree	7
11	Golden Shower Tree	8
12	Guava Tree	10
13	Rambutan	3
14	Copper Pod	3
15	False Ashoka	6
16	Caturina	1
17	Ornamental Palm	10
18	All Spice	1
19	Pride of India	2
20	Papaya	2
21	Bay Leaf	1
22	Persian Silk Tree	1
23	Araucaria	1
24	Hyophorbe	1
25	Sand Paper Tree	1
Total		236

3.1.1 ENERGY

a. Electricity

The total emission of the carbon dioxide per student is 20.73 kg per year. Emission reduction plans were prepared to bring the existing per capita carbon footprint to zero or below so as to bring the campus a carbon neutral or carbon negative campus. All energy efficiency projects shall be implemented, So, the effective specific carbon emission per student is -0.17kg of CO_2 per year only

This can be achieved in many ways but, every alternate plan must be in such a way that, it must fulfill the actual purpose of each activity that is considered.

Here, three major methods are taken in to account as the plans for reducing the carbon emission of the campus.

- Resource optimization
- Energy efficiency
- Renewable energy

Electricity Consumption

Electricity Connection Details		
St. Thomas College, Ranni		
1	Name of the Consumer	St. Thomas College, Ranni
2	Tariff	LT-6A 3Ph
3	Consumer Numbers	1146072000540, 1146071019877, 1146079005428, 1146073013642, 1146070013641, 1146079016949, 1146076000773, 1146071019877
5	Connected Load Total (kW)	107
6	Annual Electricity Consumption (kWh)	28219

Annual Electricity Consumption (kWh)			
Consumer No	**2018-19**	**2019-20**	Connected Load (kW)
1146072000540	522	611	2
1146071019877	5432	513	6
1146079005428	1213	1834	4
1146073013642	2234	4675	16
1146070013641	13029	14234	16
1146079016949	3672	1876	35
1146076000773	9821	3241	22
1146071019877	2987	1235	6
Total	**35923**	**28219**	**107**

RESOURCE OPTIMISATION

The effective use of resources can limit its unnecessary wastage. Optimal usage of the resources (such as fuels) can save the fuel and can also reduce the carbon emission due to its consumption. This technique can be effectively implemented in the 'transportation' and 'waste' sectors of the campus.

WASTE MINIMISATION

Optimal utilization of paper and plastic stationaries can reduce the frequency of purchase of items. This can reduce the unnecessary wastage of money as well as the excess production of waste. In the case of food, proper food habits and housekeeping practices can optimize its usage.

Currently, College is taking an appreciable effort to reduce the unnecessary production of wastes. But the campus still has opportunities to reduce the generation of waste and can improve much more. Resource optimization can be effectively implemented in all type of waste generated in the campus and the campus can expect about 50% reduction the total waste produced.

ENERGY EFFICIENCY

Energy efficiency is the practice of reducing the energy requirements while achieving the required energy output. Energy efficiency can be effectively implemented in all the sectors of the campus.

FUELS FOR COOKING

The campus can install a solar water heater to rise the water temperature to a much higher level, then it has to consume only very less amount of thermal energy for preparing the same amount of food. This can make a positive benefit to the campus by saving money, energy and can reduce the carbon emission of the campus due to thermal energy consumed for cooking.

TRANSPORTATION

Energy efficiency of the transportation sector is mainly depended on the fuel efficiency of the vehicles used. Here mileage of the vehicle (kmpl - Kilometres per Litre) is calculated to assess the fuel efficiency of the vehicle. Percentage of closeness is the ratio of actual mileage of the vehicle to its expected mileage. If the percentage of closeness of mileages of each vehicle is greater than that of its average, then the efficiency status of the vehicle is considered as 'Above average' and else, it is considered as 'Below average'

Renewable Energy

1kWp Solar power plant is installed in the campus which helps offsetting the carbon foot print. The details of these projects are given in the concerned chapters.

After analyzing the historical and measured data the following projects are proposed to make the campus carbon neutral. The projects are from energy efficiency and renewable energy. The further additions in the green cover increase will also give positive impact in the carbon mitigation.

OTTOTRACTIONS- ENERGY AUDIT						
St. Thomas College, Ranni						
Greenhouse Gas Mitigation through Major Energy Efficiency Projects						
Sl No	Projects	Energy saved(Yearly)		Sustainability (Years)	First year ton of CO2 mitigated	Expected Tons of CO2 mitigated through out life cycle
		(kWh)	MWh	Years		
1	Energy Saving in Lighting by replacing existing 58 No's T12 (55W) Lamps to 18W LED Tube	3591	3.59	10	2.62	26.21
2	Energy Saving in Lighting by replacing existing 84 No's T8 (40W) Lamps to 18W LED Tube	3105	3.10	10	2.27	22.66
3	Energy Saving in Lighting by replacing existing 46 No's CFL(15W) Lamps to 9W LED Bulb	397	0.40	10	0.29	2.90
4	Energy Saving by replacing existing 156 No's in-efficient ceiling fans with Energy Efficient Five star fans	4770	4.77	10	3.48	34.82
Total		**11863**	**12**	**10**	**8.66**	**86.60**

St. Thomas College, Ranni						
Greenhouse Gas Mitigation through Renewable Energy Projects						
Sl No	Projects	Energy saved(Yearly)		Sustainability (Years)	First year ton of CO2 mitigated	Expected Tons of CO2 mitigated throughout life cycle
		(kWh)	MWh	Years		
1	Installation of 10kWp Solar Power Plant	13688	13.69	25	9.99	249.80
	Total	13688	14	25	9.99	250

General Environmental Awareness Questionnaire	
Are you aware of any environmental Laws pertaining to different aspects of environmental management?	Yes
Does your institute have any rules to protect the environment? List possible rules you could include.	Yes
Dose Environmental Ambient Air Quality Monitoring conducted by the Institute?	No
Dose Environmental Water and Wastewater Quality monitoring conducted by the Institute?	Yes
Dose stack monitoring of DG sets conducted by the Institute?	No
Is any warning notice, letter issued by state government bodies?	No
Dose any Hazardous waste generated by the Institute? If yes explain its category and disposal method	No
Are you aware of any environmental Laws pertaining to different aspects of environmental management?	Yes
Does your institute have any rules to protect the environment? List possible rules you could include.	Yes
Does housekeeping schedule in your campus?	Yes
Are students and faculties aware of environmental cleanliness ways? If Yes Explain	Yes
Does Important Days Like World Environment Day, Earth Day, and Ozone Day etc. eminent in Campus?	Yes
Does Institute participate in National and Local Environmental Protection Movement?	Yes
Does the institute have any Recognition/certification for environment friendliness?	No
Does the institute use renewable energy?	Yes
Does the Institution conduct a green/environmental audit of its campus?	Yes
Has the institution been audited / accredited by any other agency such as NABL, NABET, TQPM, NAAC etc.?	Yes (NAAC)

Best Practices and Initiatives	
Renewable Energy	Yes
Solar Power Plant	Yes
Energy Audit and Green Audit Conducted	Yes
Biogas Plant installed	No
Biodiversity Conservation	Yes
Green Cover	Yes
Tree Plantation Drives	Yes
ECO clubs	Yes
Groundwater Recharge	Yes
Rain Water Harvesting System.	Yes
Pollution Reduction Public Transportation	Yes
E Waste Management	Yes
Connected to authorized recycler	Yes
Solid Waste Management	Yes
Lifting of garbage from the campus on alternate days by the Municipal Corporation.	No
Adoption of Village	Yes
CSR	Yes
Water Conservation	Yes
Energy Conservation	Yes

OTTOTRACTIONS
Energy-Engineering-Environment

RECOMMENDATIONS

1. Implement a utility monitoring program.
   - Allocate staff to carry out meter readings for electricity, waste and water on regular basis
   - Add monitoring data to spreadsheet so results can be viewed graphically
   - Compare with the utility bills meter readings in order to ensure accuracy;
2. Consider adopting and implementing a sustainable procurement policy which takes into account the whole life cycle of a product, and make sure environmental issues are written into tenders when contracting out.
3. Consider trialing recycled paper again – many recycled brands today, such as

Evolve, are just as good as virgin paper.

4. Trial the use of re-manufactured (i.e., refilled) ink and toner cartridges rather than purchasing new ones.
5. Consider producing some designated 'environmental' pages on the intranet to make it easier for staff to find environmental information. If possible, a discussion forum could be set up to allow easy internal communications and staff to make suggestions for environmental improvements.
6. Environmental training could be formalized and carried out for all staff. It does not have to be too long or onerous, providing it covers key points, particularly in relation to waste so all staff are aware of the legal requirements. At the very least, environmental information should be included in the induction pack.
7. It is strongly recommended that environmental information is also given to students and staff during induction. It is particularly important for them to be aware of what waste they can dispose of on site and where they can dispose of it, and what waste streams they must take away with them.
8. Consider implementing an environmental management system to incorporate all improvements and monitoring requirements. It does not need to be a complex system certified to any particular standard, merely a way of ensuring that baselines are set and progress is measured. Formation of Environment Policy and communicated to all faculties and other staff.
9. Plan for Zero Waste Campus Project
10. E-waste monthly inventory be maintained at campus as per E waste rules 2016.
11. A Water Meter should be installed at the institute for monitoring of water consumption per capita.
12. Increase in Environmental promotional activities for spreading awareness at campus.
13. Environment/Green committee formation for regulating eco-friendly initiatives at campus premises and periphery.

CONCLUSION

This audit involved extensive consultation with all the campus team, interactions with key personnel on a wide range of issues related to Environmental aspects. The audit has identified several observations for making the campus premise more environmentally friendly. The recommendations are also mentioned with observations for St. Thomas college, Ranni team to initiate actions.

OTTOTRACTIONS
Energy-Engineering-Environment

Carbon Foot Print					
Sl. No.	Particulars	2018-19	tCO2e	2019-20	tCO2e
1	Electricity (kWh)	36955	30.30	29086	23.85
2	Diesel (L)	0	0.00	0	0.00
3	LPG (kg)	60.00	0.09	75.00	0.11
4	Biogas (m3)	0.00	0.00	0.00	0.000
5	Degradable Waste in kg/yr.	4061.2	2.56	3929.2	2.48
6	Paper Waste in kg/yr	40.61	0.02	39.29	0.02
Total Carbon Foot Print tCO2e/yr			32.97		26.46

Net Carbon Emission after implementing Energy Efficiency projects and Renewable Energy Projects Proposed		
1	Total Carbon Foot Print tCO_2e/yr	26.46
2	Carbon Sequestrated tCO_2e/yr	6.90
3	Carbon mitigated by Renewable Energy tCO_2e/yr (Installed)	1.05
4	Carbon mitigated by Renewable Energy tCO_2e/yr (Proposed)	9.99
5	Carbon mitigated by Energy Efficiency (Proposed) tCO_2e/yr	8.66
6	Effective Carbon footprint tCO_2e/yr	-0.14
7	Total No of Students	829
8	Specific Carbon Footprint kg CO_2e/Student/Yr	-0.17

However, there is scope for further improvement, particularly in relation to waste minimization and energy monitoring. By implementing a basic environmental management system, current good practice can be formalized and a framework can be set up for monitoring, implementation of action plans and continual improvement.

The audit team observed that the overall site is maintained well from an environmental perspective. There are no major observations but few things are important to initiate urgently are waste management records by monthly inventory of hazardous waste, rainwater harvesting recharge; water balance cycle and periodic inspection of buildings; environment policy and initiation of composting at campus.

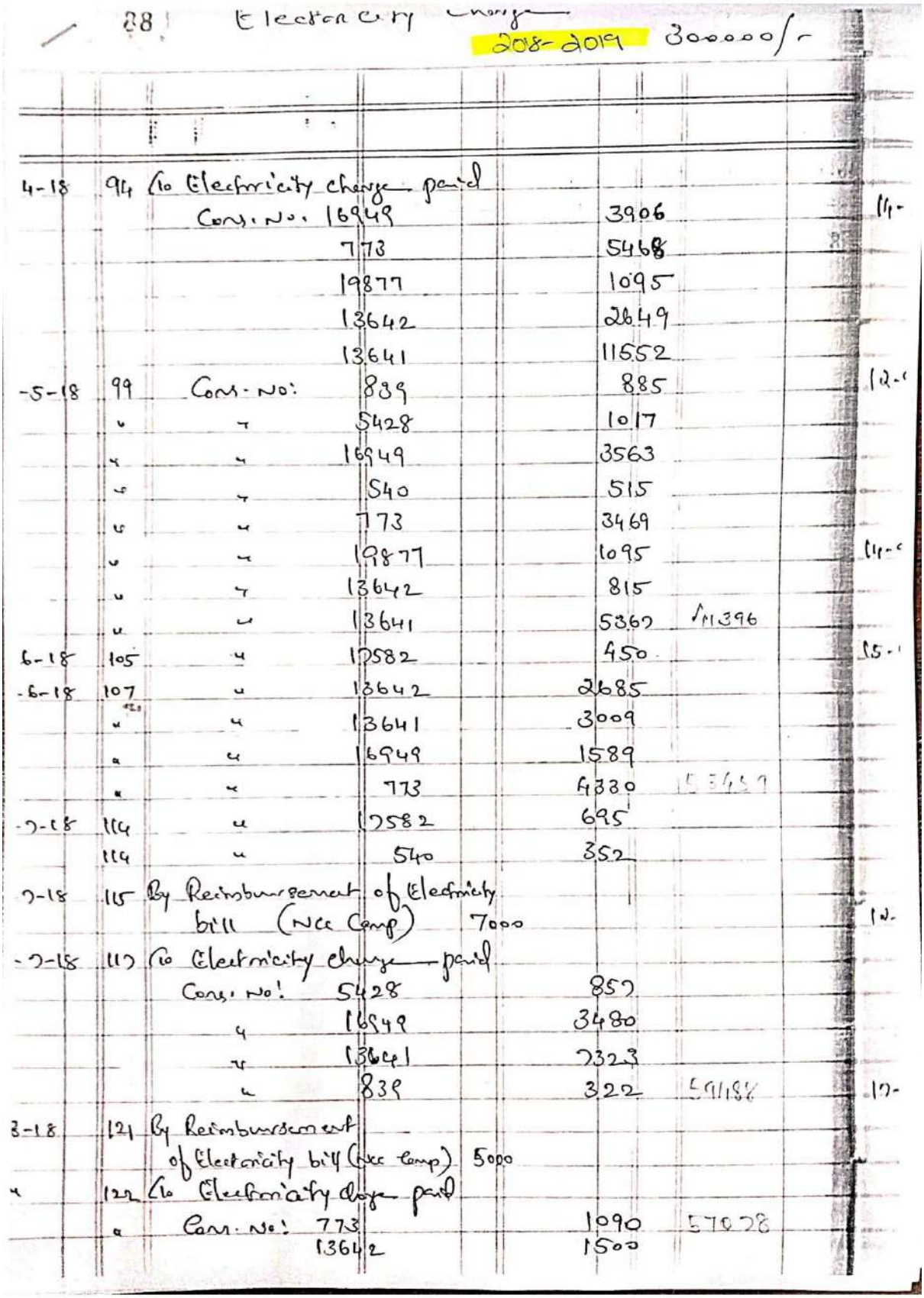
References

- The Environment [Protection] Act – 1986 (Amended 1991) & Rules-1986 (Amended 2010)
- The Petroleum Act: 1934 – The Petroleum Rules: 2002
- The Central Motor Vehicle Act: 1988 (Amended 2011) and The Central Motor Vehicle
- Rules:1989 (Amended in 2005)
- Energy Conservation Act 2010.
- The Water [Prevention & Control Of Pollution] Act – 1974 (Amended 1988) & the Water (Prevention & Control of Pollution) Rules – 1975
- The Water [Prevention & Control Of Pollution] Cess Act-1977 (Amended 2003) and Rules- 1978
- The Air [Prevention & Control Of Pollution] Act – 1981 (Amended 1987) The Air (Prevention & Control of Pollution) Rules – 1982
- The Gas Cylinders Rules – 2016 (Replaces the Gas Cylinder Rules – 1981
- E-waste management rules 2016
- Electrical Act 2003 (Amended 2001) / Rules 1956 (Amended 2006)
- The Hazardous Waste (Management and Handling and Trans-boundary Movement) Rules, 2008 (Amended 2016)
- The Noise Pollution Regulation & Control rules, 2000 (Amended 2010)
- The Batteries (Management and Handling) rules, 2001 (Amended 2010)
- Relevant Indian Standard Code practices

OTTOTRACTIONS
Energy-Engineering-Environment

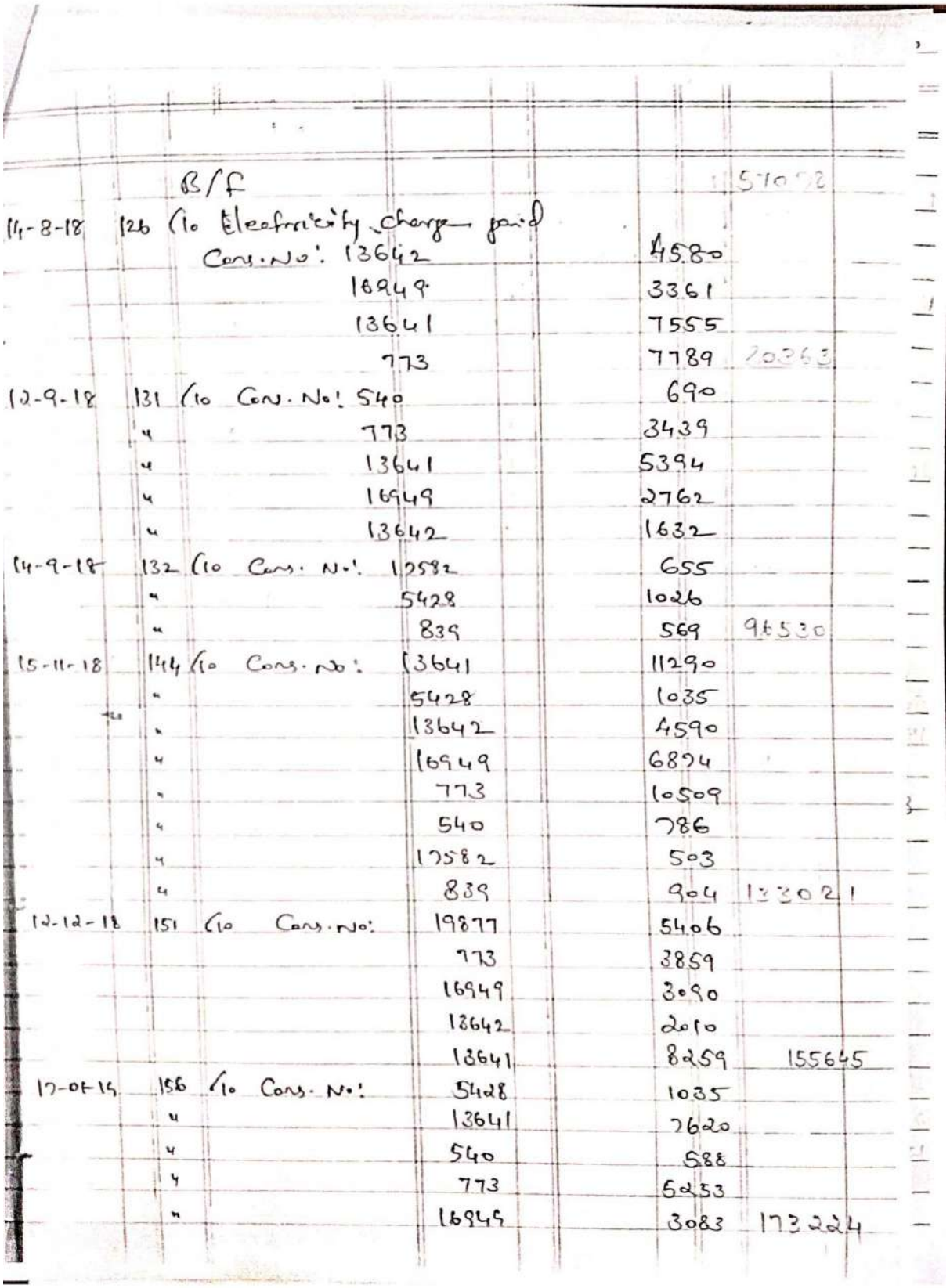
TECHNICAL SUPPLEMENTS

Sl. No.	Scientific name	Malayalam name	English Name	No.
1.	*Artocarpus heterophyllus*	പ്ലാവ്	JACKFRUIT TREE	12
2.	*Mangifera indica*	മാവ്	MANGO	9
3.	*Saracaasoca*	അശോകം	ASHOKA TREE	1
4.	*Mimusposelengi*	ഇലഞ്ഞി	BULLET WOOD	2
5.	*Tectona grandis*	തേക്ക്	TEAK	84
6.	*Cocos nucifera*	തെങ്ങ്	COCONUT TREE	21
7.	*Artocarpus hirsutus*	ആഞ്ഞിലി	WILD JACK	7
8.	*Delonix regia*	ഗുൽമോഹർ	ROYAL PRINCIANA	4
9.	*Swietenia macrophylla*	മഹാഗണി	MAHAGONY	38
10.	*Annona muricata*	മുള്ളാത്ത	SOURSOP TREE	7
11.	*Cassia fistula*	കണിക്കൊന്ന	GOLDEN SHOWER TREE	8
12.	*Psidium guajava*	പേര	GUAVA TREE	10
13.	*Nephelium lappaceum*	റംബുട്ടാൻ	RAMBUTAN	3
14.	*Peltophorum pterocarpum*	മഞ്ഞവാക	COPPER POD	3
15.	*Polyathia longifolia*	അരണമരം	FALSE ASHOKA	6
16.	*Casuarina equisetifolia*	ചൂള	CATURINA	1
17.	*Palmacaea*	അലങ്കാര പന	ORNAMENTAL PALM	10
18.	*Pimenta dioica*	സർവ്വസുഗന്ധി	ALL SPICE	1
19.	*Lagerstroemia speciosa*	മണിമരുത്	PRIDE OF INDIA	2
20.	*Caruca papaya*	പപ്പായ	PAPAYA	2
21.	*Cinnamumum verum*	വഴന	BAY LEAF	1
22.	*Albizia julibrissin*	പൂവാക	PERSIAN SILK TREE	1
23.	*Araucaria heterophylla*	ഒരകേറിയ	ARAUCARIA	1
24.	*Palmacaea*	അലങ്കാര പന	HYOPHORBE	1
25.	*Ficus exasperata*	തേരകം	SAND PAPER TREE	1

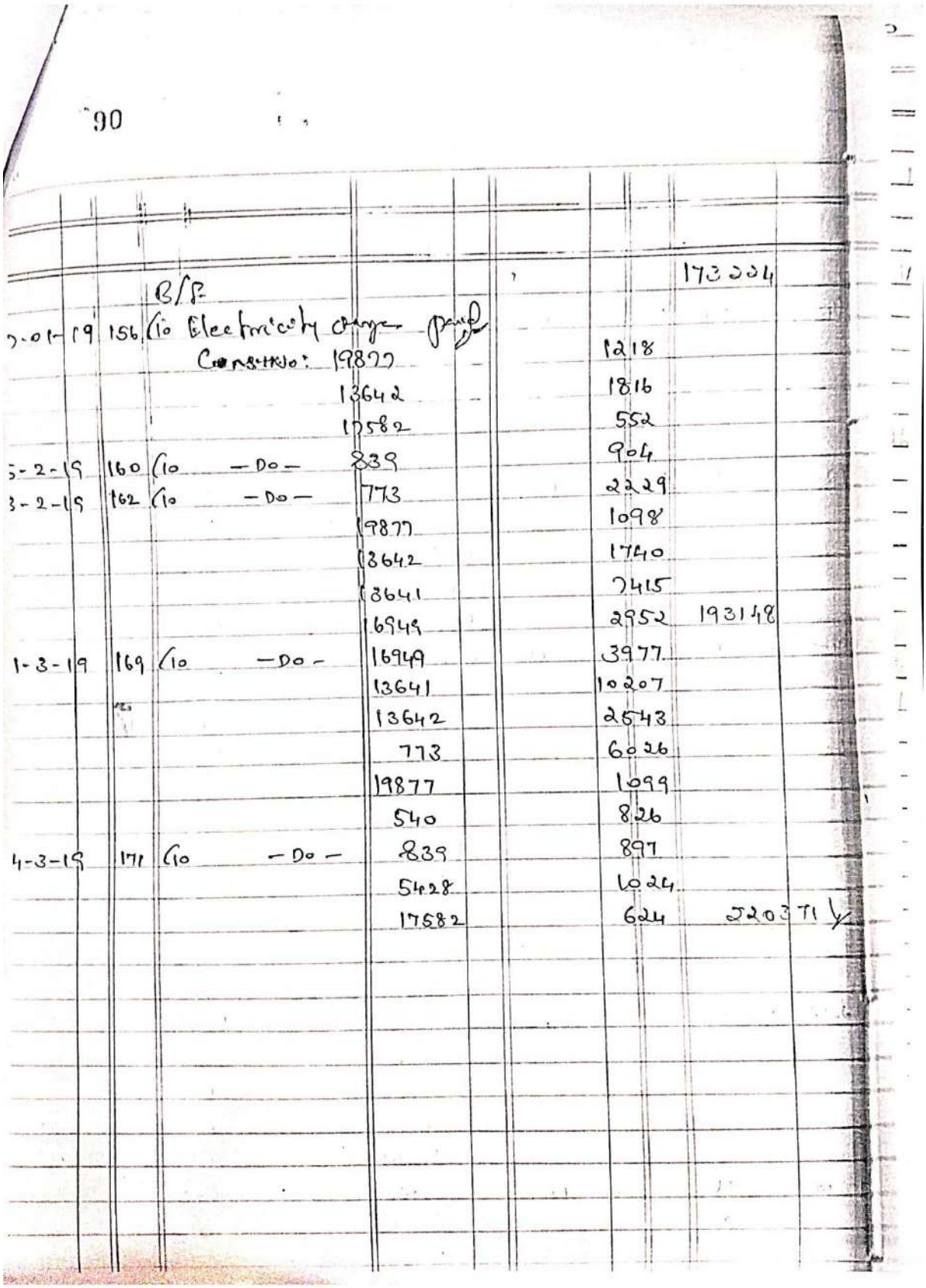


28 Electricity charge — 2018-2019 3000000/-

4-18	94	To Electricity charge paid				11-
		Cons. No.	16949	3906		
			773	5468		
			19877	1095		
			13642	2649		
			13641	11552		
-5-18	99	Cons. No:	839	885		12-(
	"	"	5428	1017		
	"	"	16949	3563		
	"	"	540	515		
	"	"	773	3469		
	"	"	19877	1095		11-(
	"	"	13642	815		
	"	"	13641	5367	41396	
6-18	105	"	17582	450		15-(
-6-18	107	"	13642	2685		
	"	"	13641	3009		
	"	"	16949	1589		
	"	"	773	4330	53459	
-7-18	114	"	17582	695		
	114	"	540	352		
7-18	115	By Reimbursement of Electricity bill (NCC Camp)	7000			12-
-7-18	117	To Electricity charge paid				
		Cons. No:	5428	857		
		"	16949	3480		
		"	13641	7323		
		"	839	322	59178	17-(
8-18	121	By Reimbursement of Electricity bill (NCC Camp)	5000			
"	122	To Electricity charge paid				
	"	Cons. No:	773	1090	57028	
			13642	1500		



		B/f			57078
14-8-18	126	C/o Electricity charge paid Cons. No:	13642	4580	
			16949	3361	
			13641	7555	
			773	7789	20363
12-9-18	131	C/o Con. No:	540	690	
	"		773	3439	
	"		13641	5394	
	"		16949	2762	
	"		13642	1632	
14-9-18	132	C/o Cons. No:	12582	655	
	"		5428	1026	
	"		839	569	96530
15-11-18	144	C/o Cons. No:	13641	11290	
	"		5428	1035	
	"		13642	4590	
	"		16949	6894	
	"		773	10509	
	"		540	786	
	"		12582	503	
	"		839	904	130021
12-12-18	151	C/o Cons. No:	19877	5406	
			773	3859	
			16949	3090	
			13642	2010	
			13641	8259	155645
17-04-19	156	C/o Cons. No:	5428	1035	
	"		13641	7620	
	"		540	588	
	"		773	5233	
	"		16949	3083	173224



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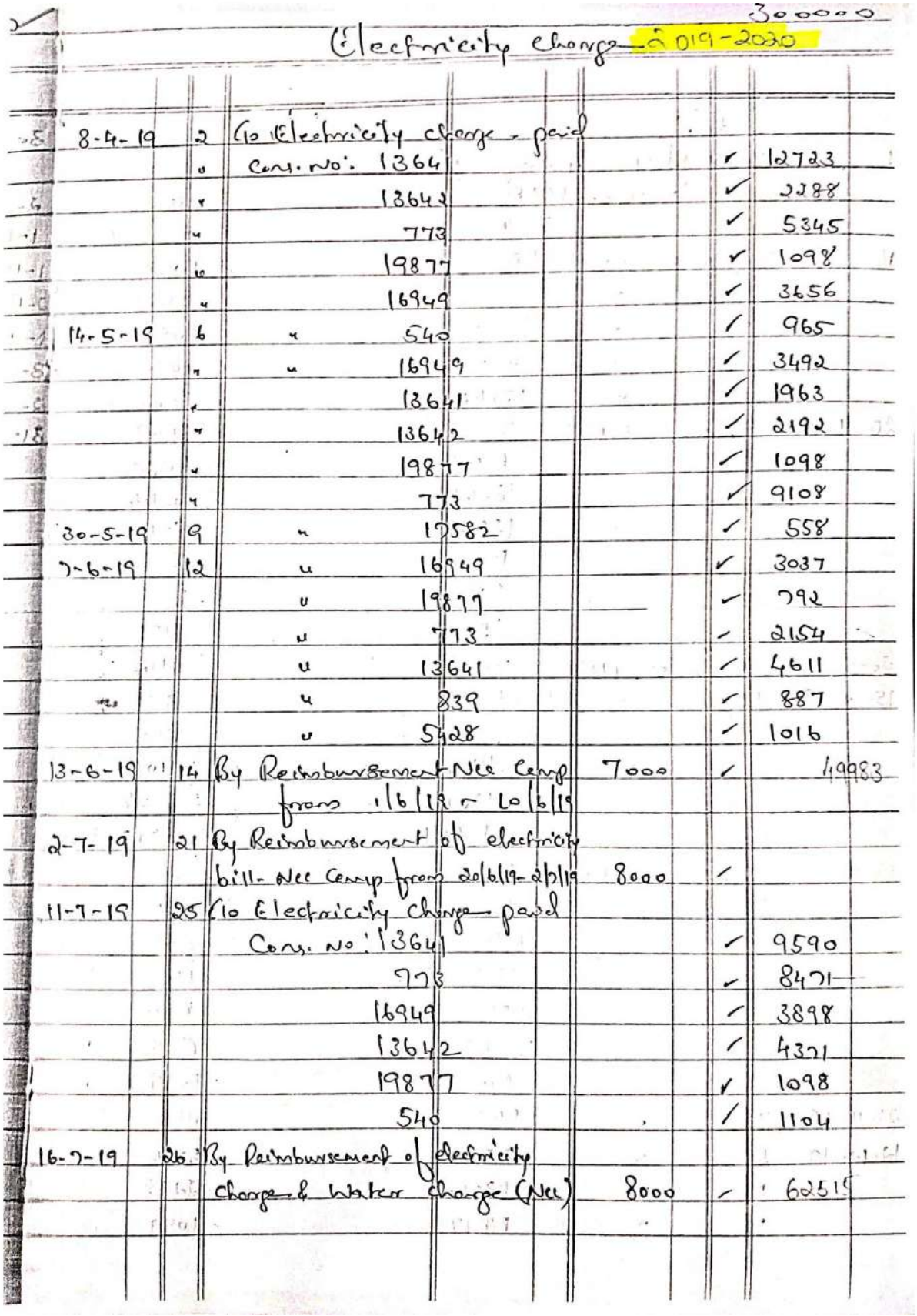
			B/F			173204	
2-01-19	156	C/o	Electricity charges paid				
			Constructo:	19877		1218	
				13642		1816	
				17582		552	
5-2-19	160	C/o	—Do—	839		904	
3-2-19	162	C/o	—Do—	773		2229	
				19877		1098	
				13642		1740	
				13641		7415	
				16949		2952	193148
1-3-19	169	C/o	—Do—	16949		3977	
				13641		10207	
				13642		2543	
				773		6026	
				19877		1099	
				540		826	
4-3-19	171	C/o	—Do—	839		897	
				5428		1024	
				17582		624	220371

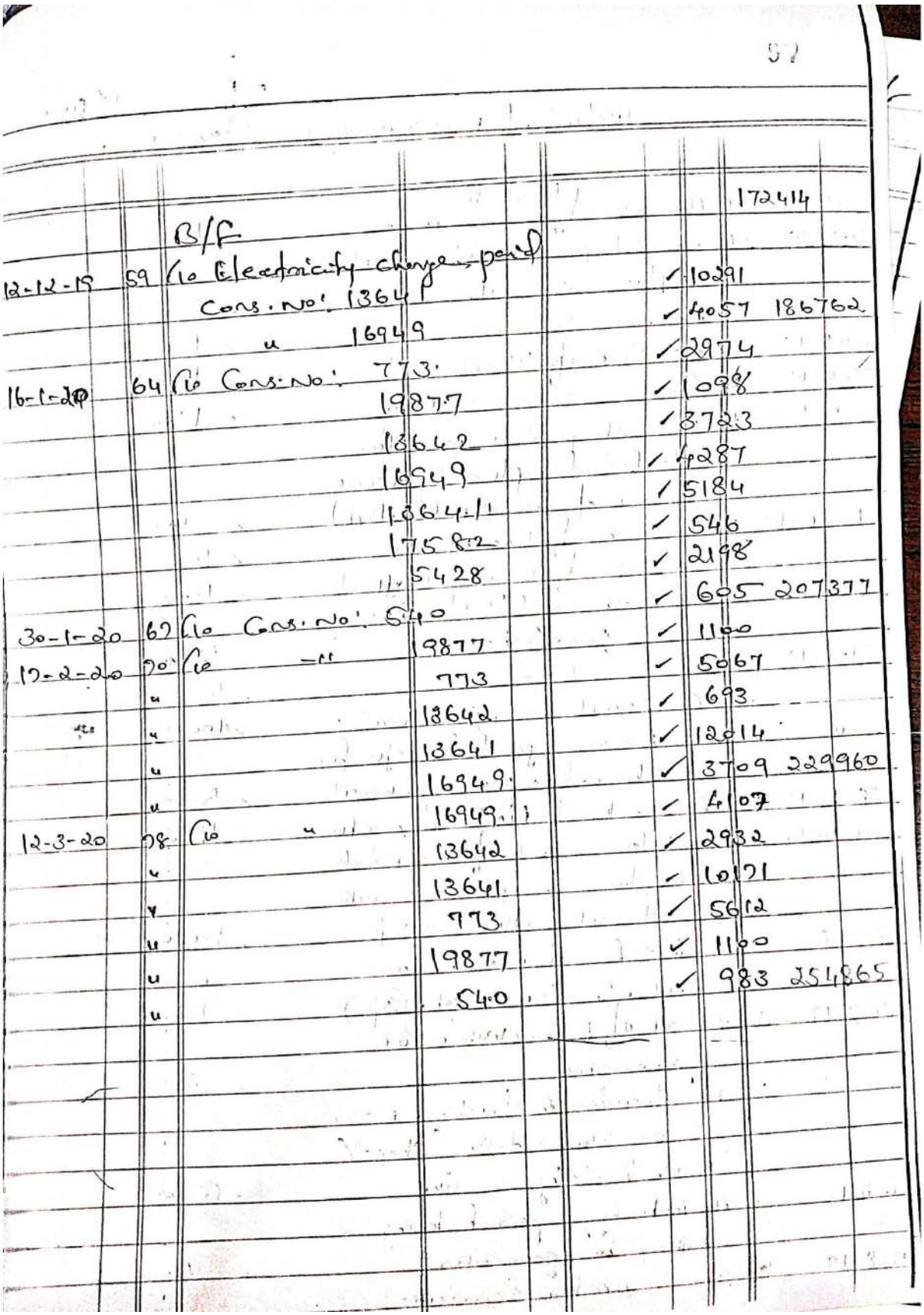


3000000

Electricity charge - 2019-2020

8-4-19	2	C/o Electricity charge - paid			✓	12723
	"	Cons. No: 13641			✓	2288
	"	13642			✓	5345
	"	773			✓	1098
	"	19877			✓	3656
	"	16949			✓	965
14-5-19	6	" 540			✓	3492
	"	" 16949			✓	1963
	"	13641			✓	2192
	"	13642			✓	1098
	"	19877			✓	9108
	"	773			✓	558
30-5-19	9	" 17582			✓	3037
7-6-19	12	" 16949			✓	792
		" 19877			✓	2154
		" 773			✓	4611
		" 13641			✓	887
		" 839			✓	1016
		" 5428				
13-6-19	14	By Reimbursement Nec Camp from 1/6/19 - 10/6/19	7000		✓	49983
2-7-19	21	By Reimbursement of electricity bill - Nec Camp from 20/6/19 - 2/7/19	8000		✓	
11-7-19	25	C/o Electricity charge - paid				
		Cons. No: 13641			✓	9590
		773			✓	8471
		16949			✓	3898
		13642			✓	4321
		19877			✓	1098
		540			✓	1104
16-7-19	26	By Reimbursement of electricity charge & water charge (Nec)	8000		✓	62515

		B/F			60415
17-7-19	27	To Electricity charge paid Cons. No: 17582		✓	715
		5428		✓	237 61417
14-8-19	33	To Cons. No: 19877		✓	1098
		" 773		✓	8020
		" 13641		✓	10573
		" 16949		✓	4020
		" 13642		✓	3505
20-8-19	39	To Cons. No: 773		✓	6449
		16949		✓	4533
		13641		✓	10344
		13642		✓	2910
		17582		✓	638
		19877		✓	1099
		540		✓	772
30-9-19	41	Cons. No: 5428		✓	1162 118950
15-10-19	45	" 16949		✓	3931
		773		✓	6107
		19877		✓	1101
		13642		✓	3728
		13641		✓	10313
12-11-19	51	To Cons. No: 13641		✓	6057 144130
		773		✓	4452
		16949		✓	4034
		19877		✓	1100
		17582		✓	684
		13642		✓	679
		540		✓	1019
		5428		✓	1167 163322
22-11-19	54	" 773		✓	5755
12-12-19	59	" 13642		✓	2238
	59	" 19877		✓	1099 172414
	59	"			



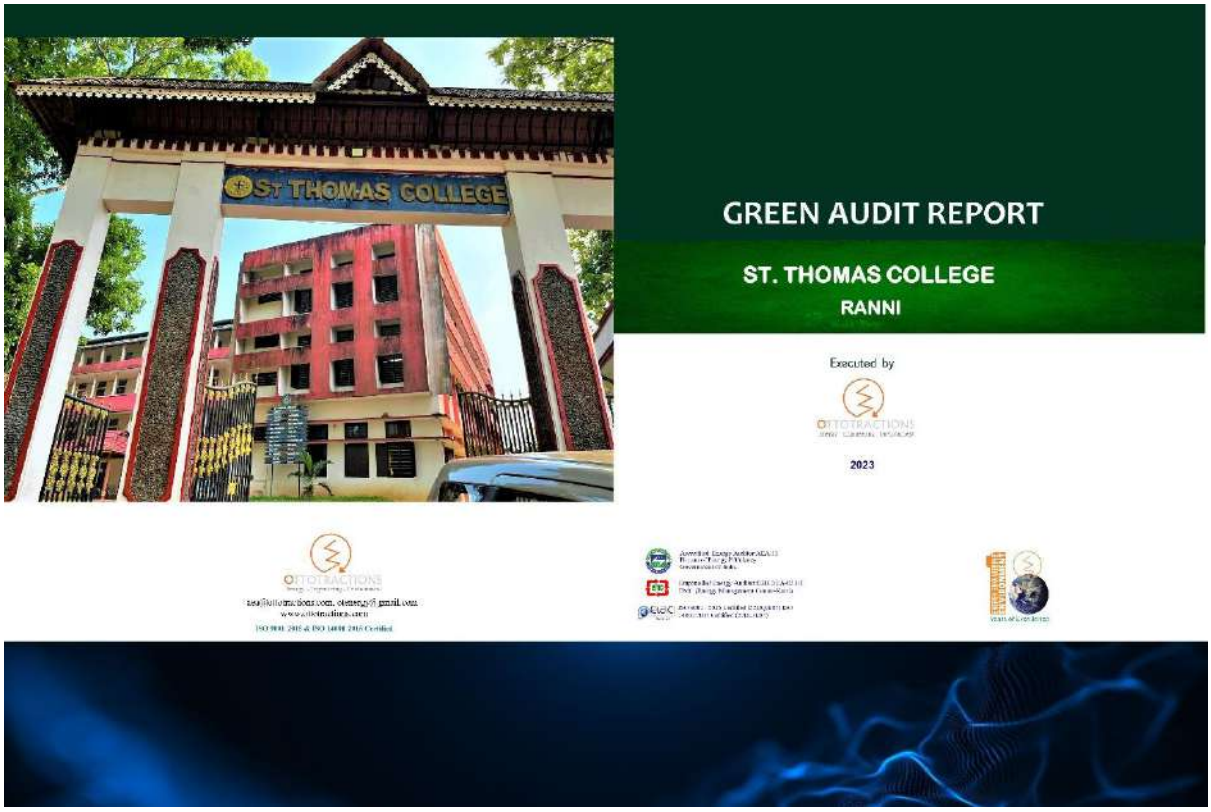
		B/F		172414
12-12-19	59	C/o Electricity charges paid		✓ 10291
		Cons. No: 13641		✓ 4057 186762
		" 16949		✓ 2974
16-1-20	64	C/o Cons. No: 773		✓ 1098
		19877		✓ 3723
		13642		✓ 4287
		16949		✓ 5184
		13641		✓ 546
		17582		✓ 2198
		5428		✓ 605 207377
30-1-20	62	C/o Cons. No: 540		✓ 1100
12-2-20	90	C/o "	19877	✓ 5067
	"		773	✓ 693
	"		13642	✓ 12014
	"		13641	✓ 3709 229960
	"		16949	✓ 4107
12-3-20	98	C/o "	16949	✓ 2932
	"		13642	✓ 10171
	"		13641	✓ 5612
	"		773	✓ 1100
	"		19877	✓ 983 254865
	"		540	

External Green Audit Reports

2020-2023

Report-Green Audit

2020-2023



GREEN AUDIT REPORT

ST THOMAS COLLEGE

RANNI

OTTOTRACTIONS
Energy-Engineering-Environment

Green Audit Report
St. Thomas College, Ranni
Report No: EA 1004/GA
2023-March

About OTTOTRACTIONS

Established in 2005, OTTOTRACTIONS is a reputable organization with extensive expertise in the fields of energy, engineering, and environmental services. They hold the distinction of being the first Accredited Energy Auditor from Kerala, entrusted with conducting Mandatory Energy Audits in Designated Consumers as per the Energy Conservation Act-2001. The Government of Kerala has recognized and commended OTTOTRACTIONS, honoring them with the prestigious "The Kerala State Energy Conservation Award 2009" for their outstanding performance as an Energy Auditor. OTTOTRACTIONS is an ISO 9001-2015, ISO 17020-2012, and ISO 14001-2015 certified organization, demonstrating their commitment to delivering high-quality services.

Acknowledgment

We extend our sincere appreciation to the administration and staff of St. Thomas College, Ranni for their invaluable assistance in ensuring the timely completion of the audit and the production of this green audit report. We are grateful for their support and collaboration throughout the process.

Furthermore, we would like to express our gratitude to the diligent efforts and unwavering commitment of all individuals who contributed to the development of this report. Their dedicated contributions have been instrumental in its successful completion.

We would also like to acknowledge the exceptional support provided by our audit team, whose bona-fide efforts have greatly contributed to the successful execution of this audit.

Additionally, we extend our thanks to our consultants, engineers, and backup staff for their unwavering dedication and hard work in bringing this report to fruition.

Thank you for your continued support

B V Suresh Babu
Accredited Energy Auditor
AEA 33, Bureau of Energy Efficiency

Preface

Throughout history, educational institutions have played a crucial leadership role in society, showcasing the necessary changes concerning key issues of their time. Today, educational institutions worldwide are embracing the global trend of sustainability by striving to become carbon-neutral schools. An example of this is Victoria University School of Architecture and Design, which made history in 2007 by declaring itself the world's first carbon-neutral campus through the purchase of carbon credits. However, this approach is not a sustainable model as it does not guarantee the permanent capture of carbon and can also be financially burdensome.

Academic institutions, regardless of their location, whether it be a school in a remote village or a university in an urban setting, possess immense potential to become catalysts for change. They can take on a leadership role within their communities, using their influence and platform to promote and encourage carbon-neutral living.

The primary contributors to carbon emissions are energy consumption, transportation, and waste. To effectively reduce carbon emissions in these sectors, two approaches can be taken: behavioral changes, which are low-cost but require mindset shifts, and technological investments, which are more expensive but offer long-term solutions. In order to facilitate these changes, it is essential to educate students about the concept of carbon-neutral campuses and provide them with the necessary knowledge and methods to actively participate in emission reduction efforts.

The idea of carbon-neutral campuses is rapidly gaining traction in India. Green audits conducted on campuses involve assessing the quantity of greenhouse gas (GHG) emissions generated as a result of campus operations. This assessment is carried out through an inventory-like process that takes into account all sources of GHG emissions and carbon sequestration within the school campus. Using this information, the total carbon footprint of the campus is calculated. Recommendations are then provided to reduce the carbon footprint and achieve carbon neutrality for the campus.

BENCY ZACHARIAH
Director, OTTOTRACTIONS

Contents

1
Introduction

Background

All across the developed countries, educational institutions are now moving to a sustainable future by becoming carbon neutral and greener spaces. They are taking responsibility for their environmental impact and are working to neutralize those effects. To become carbon neutral, institutions are working to reduce their emissions of greenhouse gases, cut their use of energy, use energy efficient equipment, use more renewable energy, plant and protect green cover and emphasize the importance of sustainable energy sources. Institutions that have committed to becoming carbon neutral have recognized the threat of global warming and are therefore committing to reverse the trend. Studies on this line has not struck roots in most of the developing countries-especially among students.

The Sustainable Development Goals (SDGs), launched by the United Nations in 2015, are an excellent vehicle for driving this change. They represent an action plan for the planet and society to thrive by 2030. The SDGs provide a window of opportunity for creating multidimensional operational approaches for climate change adaptation. They address poverty, hunger and climate change, among other issues central to human progress and sustainable development, such as gender equality, clean water and sanitation, and responsible consumption and production.

The Green Audit of **St. Thomas College, Ranni** aims to assist campus to reduce their carbon footprint and educate tomorrow's leaders about strategies for carbon mitigation using their campus as a model. Also, this audit covers institutes responses towards SDGs by covering SDG 3,6,7,11,13,15. The green audit also aims to educate students and teachers on the concept of carbon footprint and to enable the students to collect data pertaining to the carbon emissions and carbon sequestration in their campus and to calculate the specific carbon footprint of the campus.

The project also suggests plans to make the campus carbon neutral or even carbon negative by implementing carbon mitigation strategies in areas such as,

a. Energy
b. Transportation
c. Waste minimisation
d. Carbon Sequestration etc.

The major objectives of the audit are:

- To make aware students and teachers on the concept of carbon footprint.
- To calculate the specific carbon footprint of the campus and classify it as carbon negative, neutral or positive.
- To create carbon mitigation plans to reduce their footprint based on the data generated.

ST. THOMAS COLLEGE, RANNI

The history of the college is embedded in the history of Ranni. The college is situated on the top of a serene hill, in a sylvan surrounding, away from the din and bustle of the city, easily accessible and is at a walkable distance from the heart of Ranni town. The college was established in 1964, as a junior college by St Thomas Valiyapally Ranni, a pioneer parish of the Syrian Knanaya Arch Diocese of Malankara, with the whole hearted support of the then Bishop late lamented His Excellency Abraham Mor Clemis to meet the educational needs of the youth of the local community. The college was upgraded to a first grade college in 1968 and is the only institution for higher education in this part of the country. When the de-linking of Pre Degree sector was made possible by the government on administrative measures we were left with graduate and Post Graduate courses. The transmutation

lead this institution to a knowledge hub with divorcified courses. In addition to the conventional courses, we now offer UG & PG courses in Tourism also. During its 53 years of illustrious existence, the college gave birth to brilliant academicians, administrators, politicians and entrepreneurs.

The college aims at creating cultured and educated citizens who love God and their country. With its rural background and `Gurukula' atmosphere, the college fosters uninterrupted pursuit of knowledge. The first Principal, Late Prof. K. A. Mathew, served as minister and PSC member in the Kerala State. He played a vital role in upgrading the junior college to a first grade one in 1968. As the Golden Jubilee project St. Thomas College of Advanced Studies, Edamury, Ranni, a Self Financing College affiliated to M.G. University, Kottayam was established in June 2014. In March 2016, the College was assessed and re-accredited in the second cycle by the National Assessment and Accreditation Council (NAAC) of UGC and graded at B level.

Occupancy Details			
Particulars	2020-21	2021-22	2022-23
Total Students	900	881	805
Staffs	64	64	64
Total Occupancy of the college	964	945	869

For calculating per capita carbon emission estimation, only the student strength is taken into account.

BASELINE DATA SHEET FOR GREEN AUDIT								
1	Name of the Organisation	St. Thomas College, Ranni						
2	Address (include telephone, fax & e-mail)	St. Thomas College, Ranni, Pathanamthitta, 689641, stcranni@gmail.com, +91 8301057965						
2	Year of Establishment	1964						
3	Name of building and Total No. of Electrical Connections/building	St. Thomas college (8)						
4	Total Number of Students	Boys		Girls		Total	805	
5	Total Number of Staff	64						
6	Total Occupancy	869						
7	Total area of green cover	50%						
8	Type of Electrical Connection	HT	0	LT	8			
9	Total Connected Load (kW)	107						
10	Average Maximum Demand (KVA)	-						
11	Total built up area of the building (M^2)	8317						
12	Number of Buildings	5						
13	Average system Power Factor	0.96						
14	Details of capacitors connected	NA						
15	Transformer Details (Nos., kVA, Voltage ratio)	TR 1						
		NA						
15	DG Set Details (kVA)	DG1	DG2	DG3	DG4	DG5	Remarks	
		10						
16	Details of motors	Rating		Nos.		Remarks		
		5 to 10		2				
		10 to 50						
		Above 50						
17	Brief write-up about the firm and the energy/environmental conservation activities already undertaken.	Installed LED Lights, Solar Street Lamps etc.						
18	Contact Person & Telephone number	Dr. Sneha Elcy Jacob						
		9847888783						

2
METHODOLOGY

2.1. Sensitisation

Low Carbon campus initiatives are successful when everyone in the campus is engaged including students, teachers and staff. A team of students, teachers and staff were formed to participate in the audit. A sensitisation among students and teachers on the concept of carbon footprint was conducted.

During the audit the students and staffs were sensitised on the project and trained to be a part of the data collection team. This helped in conducting the survey in a participatory mode so that the awareness will penetrate to the grass root level. During the data collection field visit it was stressed that the team will spread these ideas to their homes and friends. This will help in a horizontal and vertical spread of the message to a wider group. It is assumed that through 1054 occupants of this campuses will reach same number of households. This message will spread to at least 4000 individuals approximately.

2.2 Estimation of carbon footprint

A carbon footprint is the amount of greenhouse gases—primarily carbon dioxide—released into the atmosphere by a particular human activity. A carbon footprint can be a broad measure or be applied to the actions of an individual, a family, an event, an organization, or even entire nation. It is usually measured as tons of CO_2 emitted per year, a number that can be supplemented by tons of CO_2-equivalent gases, including methane, nitrous oxide, and other greenhouse gases.

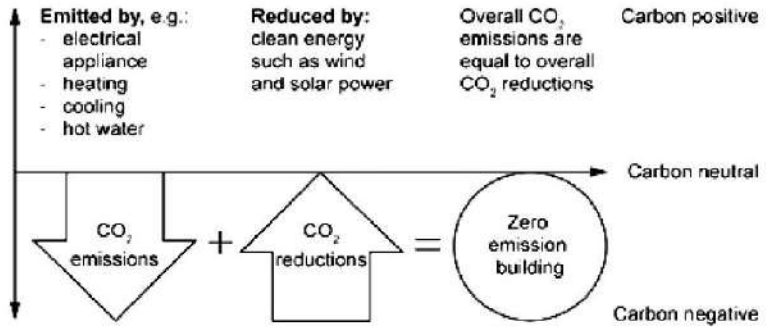
Global Warming Potential (GWP) is a measure of how much heat a greenhouse gas traps in the atmosphere up to a specific time horizon, relative to carbon dioxide. The Global Warming Potential (GWP) was developed to allow comparisons of the global warming impacts of different gases. Specifically, it is a measure of how much energy the emissions of one ton of a gas will absorb over a given period of time, relative to the emissions of one ton of carbon dioxide (CO_2).

Global Warming Potentials (IPCC Second Assessment Report)					
Species	Chemical formula	Lifetime (years)	Global Warming		
			20 years	100 years	500 years
Carbon dioxide	CO2	variable §	1	1	1
Methane *	CH4	12±3	56	21	6.5
Nitrous oxide	N2O	120	280	310	170
HFC-23	CHF3	264	9100	11700	9800
HFC-32	CH2F2	5.6	2100	650	200
HFC-41	CH3F	3.7	490	150	45
HFC-43-10mee	C5H2F10	17.1	3000	1300	400
HFC-125	C2HF5	32.6	4600	2800	920
HFC-134	C2H2F4	10.6	2900	1000	310
HFC-134a	CH2FCF3	14.6	3400	1300	420
HFC-152a	C2H4F2	1.5	460	140	42
HFC-143	C2H3F3	3.8	1000	300	94
HFC-143a	C2H3F3	48.3	5000	3800	1400
HFC-227ea	C3HF7	36.5	4300	2900	950
HFC-236fa	C3H2F6	209	5100	6300	4700
HFC-245ca	C3H3F5	6.6	1800	560	170
Sulphur hexafluoride	SF6	3200	16300	23900	34900
Perfluoromethane	CF4	50000	4400	6500	10000
Perfluoroethane	C2F6	10000	6200	9200	14000
Perfluoropropane	C3F8	2600	4800	7000	10100
Perfluorobutane	C4F10	2600	4800	7000	10100
Perfluorocyclobutane	c-C4F8	3200	6000	8700	12700
Perfluoropentane	C5F12	4100	5100	7500	11000
Perfluorohexane	C6F14	3200	5000	7400	10700

The methodology for carbon footprint calculations are still evolving and it is emerging as an important tool for green house management. In the present study carbon emission data from the campus is estimated under four categories viz.

a. Energy
b. Transportation
c. Waste minimisation
d. Carbon Sequestration

Carbon neutrality refers to achieving net zero GHG emission by balancing the measured amount of carbon released into atmosphere due to human activities, with an equal amount sequestrated in carbon sinks. It is crucial to restrict atmospheric concentrations of GHGs released from various socio-economic, developmental and life style activities using biological or natural processes. It is recognized that addressing climate change is not as simple as switching to renewable energy or offsetting GHG emissions. Rather, providing an opportunity for innovation in new developmental activities for viable and effective approach to address the problem.



Energy

In the campus carbon emission from energy consumption is categorised under two headings viz. energy from Electrical and Thermal. Energy used for transportation is calculated under transportation sector.

A detailed energy audit is conducted to understand the energy consumption of the campus. Information on total connected loads, their duration of usage and documents like electricity bills are evaluated. Connected loads are calculated by conducting a survey on electrical equipment on each location. Duration of usage was

found out by surveying the users. The survey of equipment was conducted in a participatory mode.

The fuel consumption for cooking, like LPG, was studied by analysing the annual fuel bills and usage schedules during the study. Discussions were carried out with the concerned individuals who actually operate the cooking system.

Transportation

Carbon emission from transportation to be calculated by using the following formula:

Carbon Emission = Number of each type of vehicles × Avg. fuel consumed per year × Emission factors (based on the fuel used by the vehicle)

Waste Minimisation

The waste generated from the campus is also responsible for the greenhouse gas emission. So, in order to calculate the total carbon foot print of the campus it is necessary to estimate the greenhouse gas emission from the waste generated in the campus by the activity of the students, teachers and staffs.

The calculation of the waste generated has been conducted by keeping measuring buckets for collecting the waste generated in a day. This waste so generated was calculated by weighing it.

Carbon Sequestration

Carbon sequestration is the process involved in the long-term storage of atmospheric carbon dioxide. Trees remove carbon dioxide from the atmosphere

through the natural process of photosynthesis and store the carbon in their leaves, branches, stems, bark, and roots.

Carbon sequestrated by a tree can be found out by using different methods. Since this study is employed the volumetric approach, the calculation consists of five processes.

- Determining the total weight of the tree
- Determining the dry weight of the tree
- Determining the weight of carbon in the tree
- Determining the weight of CO_2 sequestrated in the tree
- Determining the weight of CO_2 sequestrated in the tree per year

Detailed calculations and results are given below.

Step 1: Determine the total green weight of the tree

The green weight is the weight of the tree when it is alive. First, you have to calculate the green weight of the above-ground weight as follows:
W above-ground= 0.25 D2 H (for trees with D<11)
W above-ground= 0.15 D2 H (for trees with D>11)
W above-ground= Above-ground weight in pounds
D = Diameter of the trunk in inches
H = Height of the tree in feet
The root system weight is about 20% of the above-ground weight. Therefore, to determine the total green weight of the tree, multiply the above-ground weight by 1.2:
$W_{\text{total green weight}} = 1.2 * W_{\text{above-ground}}$

Step 2: Determine the dry weight of the tree

The average tree is 72.5% dry matter and 27.5% moisture. Therefore, to determine the dry weight of the tree, multiply the total green weight of the tree by 72.5%.
$W_{\text{dry weight}} = 0.725 * W_{\text{total green weight}}$

Step 3: Determine the weight of carbon in the tree

The average carbon content is generally 50% of the tree's dry weight total volume. Therefore, in determining the weight of carbon in the tree, multiply the dry weight of the tree by 50%.

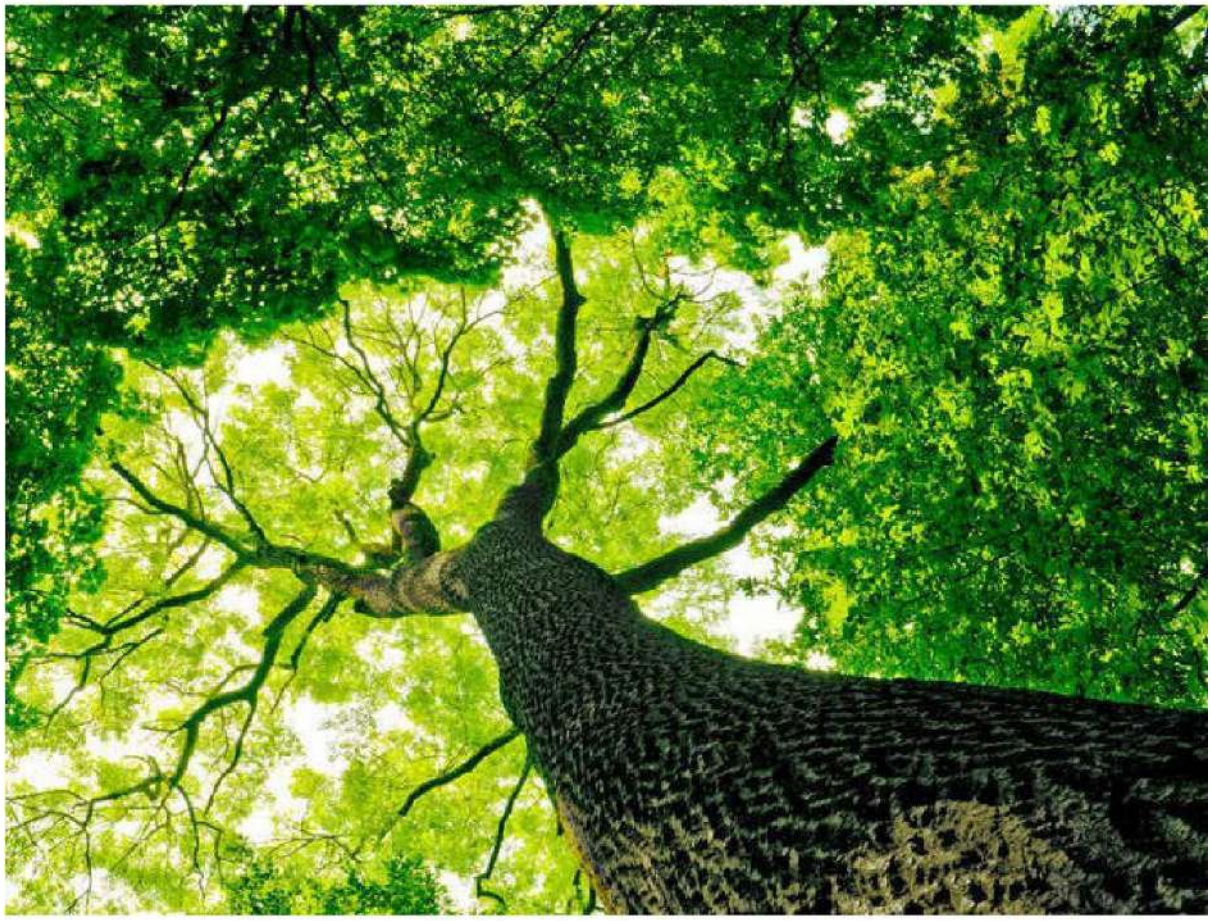
$W_{carbon} = 0.5 * W_{dry\ weight}$

Step 4: Determine the weight of carbon dioxide sequestered in the tree

CO_2 has one molecule of Carbon and 2 molecules of Oxygen. The atomic weight of Carbon is 12 (u) and the atomic weight of Oxygen is 16 (u). The weight of CO_2 in trees is determined by the ratio of CO_2 to C is 44/12 = 3.67. Therefore, to determine the weight of carbon dioxide sequestered in the tree, multiply the weight of carbon in the tree by 3.67. $W_{carbon\text{-}dioxide} = 3.67 * W_{carbon}$

3

RESULTS AND DISCUSSIONS



3.1 CARBON FOOTPRINT ESTIMATION

3.1.1 ENERGY

a. Electricity

Electricity is purchased from KSEB under 8 LT Connections, the details are given below.

Electricity Connection Details		
St. Thomas College, Ranni		
1	Name of the Consumer	St. Thomas College, Ranni
2	Tariff	LT-6A 3Ph
3	Consumer Numbers	1146072000540, 1146071019877, 1146079005428, 1146073013642, 1146070013641, 1146079016949, 1146076000773, 1146071019877
5	Connected Load Total (kW)	107
6	Annual Electricity Consumption (kWh)	29879

Electricity Bill Analysis

2022-2023			
Name of the Consumer		**St. Thomas College, Ranni**	
Connected load	**2**	Consumer no	**1146072000540**
Tariff	LT-6A 3Ph	Section	**Ranny North**
Month	**kWh**	**Rs (Total)**	**Rs/kwh**
May-22	208	1294	**6.22**
Jul-22	221	1483	**6.72**
Sep-22	127	941	**7.39**
Nov-22	141	1041	**7.39**
Jan-23	121	1012	**8.39**
Mar-23	176	1473	**8.39**

2022-2023			
Name of the Consumer		**St. Thomas College, Ranni**	
Connected load	**6**	Consumer no	**1146071019877**
Tariff	LT-6A 3Ph	Section	**Ranny North**
Month	**kWh**	**Rs (Total)**	**Rs/kwh**
May-22	258	1098	**4.26**
Jul-22	0	1098	**0.00**
Sep-22	0	1098	**0.00**
Nov-22	0	1098	**0.00**
Jan-23	0	1098	**0.00**
Mar-23	0	1098	**0.00**

2022-2023

Name of the Consumer		**St. Thomas College, Ranni**	
Connected load	**4**	Consumer no	**1146079005428**
Tariff	LT-6A 3Ph	Section	**Ranny North**
Month	**kWh**	**Rs (Total)**	**Rs/kwh**
May-22	325	3325	**10.23**
Jul-22			
Sep-22			
Nov-22			
Jan-23	332	2618	**7.89**
Mar-23			

2022-2023

Name of the Consumer		**St. Thomas College, Ranni**	
Connected load	**16**	Consumer no	**1146073013642**
Tariff	LT-6A 3Ph	Section	**Ranny North**
Month	**kWh**	**Rs (Total)**	**Rs/kwh**
Apr-22	166	2099	**12.64**
May-22	180	1799	**9.99**
Jun-22	457	4566	**9.99**
Jul-22			
Aug-22	349	3074	**8.81**
Sep-22			
Oct-22	697	6137	**8.81**
Nov-22	475	4185	**8.81**
Jan-23			
Mar-23	436	2548	**5.84**

2022-2023

Name of the Consumer		St. Thomas College, Ranni	
Connected load	**16**	Consumer no	**1146070013641**
Tariff	LT-6A 3Ph	Section	**Ranny North**
Month	**kWh**	**Rs (Total)**	**Rs/kwh**
May-22	1272	10161	**7.99**
Jul-22	1393	16508	**11.85**
Sep-22	934	12235	**13.10**
Nov-22	865	11522	**13.32**
Jan-23			
Mar-23	1106	14123	**12.77**

2022-2023

Name of the Consumer		St. Thomas College, Ranni	
Connected load	**35**	Consumer no	**1146079016949**
Tariff	LT-6A 3Ph	Section	**Ranny North**
Month	**kWh**	**Rs (Total)**	**Rs/kwh**
Apr-22	315	4124	**13.09**
May-22	242	3812	**15.75**
Jul-22	0	0	
Sep-22	271	4197	**15.49**
Oct-22	286	4066	**14.22**
Nov-22	320	4554	**14.22**
Jan-23	294	4178	**14.22**
Mar-23	271	4483	**16.54**

2022-2023

Name of the Consumer		St. Thomas College, Ranni	
Connected load	**22**	Consumer no	**1146076000773**
Tariff	LT-6A 3Ph	Section	**Ranny North**
Month	**kWh**	**Rs (Total)**	**Rs/kwh**
May-22	627	5931	**9.46**
Jun-22	392	3507	**8.95**
Jul-22	449	4022	**8.95**
Aug-22	475	4249	**8.95**
Sep-22	0		**8.95**
Nov-22	0		**8.95**
Jan-23	0		**8.95**
Mar-23	613	6102	**9.95**

2022-2023

Name of the Consumer		St. Thomas College, Ranni	
Connected load	6	Consumer no	1146071019877
Tariff	LT-6A 3Ph	Section	Ranny North
Month	**kWh**	**Rs (Total)**	**Rs/kwh**
May-22	123	1098	**8.93**
Jun-22	124	1098	**8.85**
Jul-22	125	1098	**8.78**
Aug-22	123	1098	**8.93**
Sep-22	123	1098	**8.93**
Oct-22	123	1098	**8.96**
Nov-22	122	1098	**9.00**
Dec-22	122	1098	**9.04**
Jan-23	121	1098	**9.07**
Feb-23	121	1098	**9.11**
Mar-23	120	1098	**9.15**

Annual Electricity Consumption (kWh)				
Consumer No	**2020-21**	**2021-22**	**2022-23**	Connected Load (kW)
1146072000540	210	672	993	2
1146071019877	5387	4487	516	6
1146079005428	2090	1164	1971	4
1146073013642	2446	2108	4731	16
1146070013641	3102	12628	13368	16
1146079016949	3476	3513	2999	35
1146076000773	4068	8099	3834	22
1146071019877	1445	1656	1468	6
Total	**20778**	**32671**	**29879**	**107**

Diesel

Diesel Consumption Details				
	Transportation	Generator	Total	cost
	in L	in L	in L	in Rs
20-21	0	310	310	28800
21-22	0	323	323	30060
22-23	0	328	328	31200

LPG

LPG Consumption Details			
	2020-21	2021-22	2022-23
No Cylinders	4	5	5
Canteen/Lab LPG Consumption in kg	60	75	75
Total in kg	60	75	75

Base Line Energy Data				
St. Thomas College, Ranni				
		2020-21	2021-22	2022-23
1	Electricity KSEB (kWh)	20778	32671	29879
2	Electricity DG (kWh)	929	970	985
3	Electricity Solar, Off grid (kWh)	0.00	0.00	0.00
4	Electricity (KSEB + DG + Off grid) kWh	21707	33641	30864
5	Electricity Grid Tied (kWh)	1214	1214	1278
6	Diesel (L)	0	0	0
7	LPG (kg)	60.00	75.00	75.00
8	Biogas (m3)	0.00	0.00	0.00

Energy Consumption Profile				
Sl No	Fuel	2020-21	2021-22	2022-23
		(kCal)		
1	Electricity	18667740	28931009	26543354
2	Diesel	0	0	0
3	LPG	720000	900000	900000
4	Biogas	0	0	0
Total		19387740	29831009	27443354

Thermal Fuel Consumption St. Thomas College, Ranni			
	2020-21	2021-22	2022-23
Annual LPG consumption in kg	60	75	75
Annual Diesel consumption in L	310	323	328
Annual petrol consumption in L	0	0	0
Annual Biogas consumption in m3	0	0	0

Renewable Energy

biogas plant is installed in a facility and is not working, it is recommended to repair the plant to effectively manage bio degradable waste. Some common reasons why a biogas plant may not be working include clogging of the pipes, leaks in the system, and inadequate maintenance. Therefore, it is important to regularly maintain the plant to ensure that it is functioning properly.

Once the biogas plant is repaired and functioning, it can provide numerous benefits such as reducing waste management costs, reducing greenhouse gas emissions, and providing a renewable energy source.

Specific Energy Consumption

OTTOTRACTIONS- ENERGY AUDIT				
St. Thomas College, Ranni				
Energy Performance Index (EPI)				
Sl No	Particulars	2020-21	2021-22	2022-23
1	Total building area (m²)	8317	8317	8317
2	Annual Energy Consumption (kCal)	19387740	29831009	27443354
3	Annual Energy Consumption (kWh)	22544	34687	31911
4	Total Energy in Toe	1.94	2.98	2.74
5	Specific Energy Consumption kWh/m²	2.71	4.17	3.84

The specific energy consumption in 2022-23 may be taken as benchmark.

3.3. Waste Generation total

The major concern of waste management will be focused on the solid waste produced by the campus. Solid wastes produced in the campus are mainly of three types, food waste, paper waste, and plastic waste. Food wastes produced in the campus are mainly by two means. The vegetable wastes produced in the kitchen during the food preparation. The food waste produced by the students and staffs of the campus after the consumption of meals.

Degradable Waste

Degradable Waste Generation			
St. Thomas College, Ranni			
Particulars	2020-21	2021-22	2022-23
Total Occupancy	964	945	869
Waste generated in kg /day	19.28	18.9	17.38
Waste generated in kg /Yr	4241.6	4158	3823.6

Non-Degradable waste

Solid non degradable Waste Generation			
St. Thomas College, Ranni			
Particulars	2020-21	2021-22	2022-23
Total Occupancy	964	945	869
Waste paper generated in kg /day	0.1928	0.189	0.1738
Waste plastic generated in kg /day	0.2892	0.2835	0.2607
Waste paper generated in kg /Yr	42.42	41.58	38.24
Waste plastic generated in kg /Yr	63.62	62.37	57.35

3.4. Transportation

The college does not have any vehicles for logistics

Carbon Emission Profile (2022-23)

Carbon emissions in the campus due to the day-to-day activities are calculated and is discussed below. The emission factors considered for estimation and its units are given.

Emission Factors		
Item	Factor	Unit
Electricity	0.00082	tCo_2e/kWh
LPG	0.0015	tCo_2e/kg
Diesel	0.0032	tCo_2e/kg
Petrol	0.0031	tCo_2e/kg
Food Waste	0.00063	tCo_2e/kg
Paper Waste	0.00056	tCo_2e/kg
Plastic Waste	0.00034	tCo_2e/kg

Carbon Foot Print 2022-23

Carbon Foot Print							
Sl. No.	Particulars	2020-21	tCO_2e	2021-22	tCO_2e	2022-23	tCO_2e
1	Electricity (kWh)	21707	17.80	33641	27.59	30864	25.31
2	Diesel (L)	0	0	0	0.00	0	0.00
3	LPG (kg)	60.00	0	75.00	0.11	75.00	0.11
4	Biogas (m3)	0.00	0	0.00	0.00	0.00	0.000
5	Degradable Waste in kg/yr.	4241.6	3	4158	2.62	3823.6	2.41
6	Paper Waste in kg/yr	42.42	0	41.58	0.02	38.24	0.02
Total Carbon Foot Print tCO_2e/yr			**20.59**		**30.34**		**27.85**

3.5. CARBON SEQUESTRATION

All the activities including energy consumption and waste management have their equivalent carbon emission and they positively contribute to the carbon footprint of the campus. Carbon sequestration is the reverse process, at which the emitted carbon dioxide will get sequestrated according to the type of carbon sequestration employed. Even though there are many natural sequestration processes are involved in a campus, the major type of sequestration among them is the carbon sequestration by trees.

Carbon Sequestration			
Particulars	2020-21	2021-22	2022-23
Total No of Trees	236	236	236
Carbon sequestrated by trees in the campus (tCO2e)	6.4	7.1	7.50

Trees sequestrate carbon dioxide through the biochemical process of photosynthesis and it is stored as carbon in their trunk, branches, leaves and roots. The amount of carbon sequestrated by a tree can be calculated by different methods. In this study, the volumetric approach was taken into account, thus the details including CBH (Circumference at Breast Height), height, average age, and total number of the trees, are required. Details of the trees in the campus compound are given in the Table. Detailed table is included in the technical supplement.

Carbon sequestrated by a tree can be found out by using different methods. Since this study is employed the volumetric approach, the calculation consists of five processes.

- Determining the total weight of the tree
- Determining the dry weight of the tree
- Determining the weight of carbon in the tree
- Determining the weight of CO_2 sequestrated in the tree
- Determining the weight of CO_2 sequestrated in the tree per year

List of Trees in Campus

List of Trees and Plants		
Sl. No.	English Name	QTY
1	Jackfruit Tree	12
2	Mango	9
3	Ashoka Tree	1
4	Bulletwood	2
5	Teak	84
6	Coconut	21
7	Wild Jack	7
8	Royal Princiana	4
9	Mahagony	38
10	Soursop Tree	7
11	Golden Shower Tree	8
12	Guava Tree	10
13	Rambutan	3
14	Copper Pod	3
15	False Ashoka	6
16	Caturina	1

17	Ornamental Palm	10
18	All Spice	1
19	Pride of India	2
20	Papaya	2
21	Bay Leaf	1
22	Persian Silk Tree	1
23	Araucaria	1
24	Hyophorbe	1
25	Sand Paper Tree	1
Total		236

CARBON FOOTPRINT OF THE CAMPUS (2022-23)

Various carbon emitting activities such as consumption of energy, transportation and waste generation leads to the total emission of **27.85 tCO_2e** per year by the campus. The total carbon sequestration by trees in the campus compound is **7.50tCO_2e**. Thus, the current carbon footprint of the campus will be the difference of total carbon emission and total carbon sequestration/mitigation. The following table shows the carbon footprint level

Specific CO2 Footprint

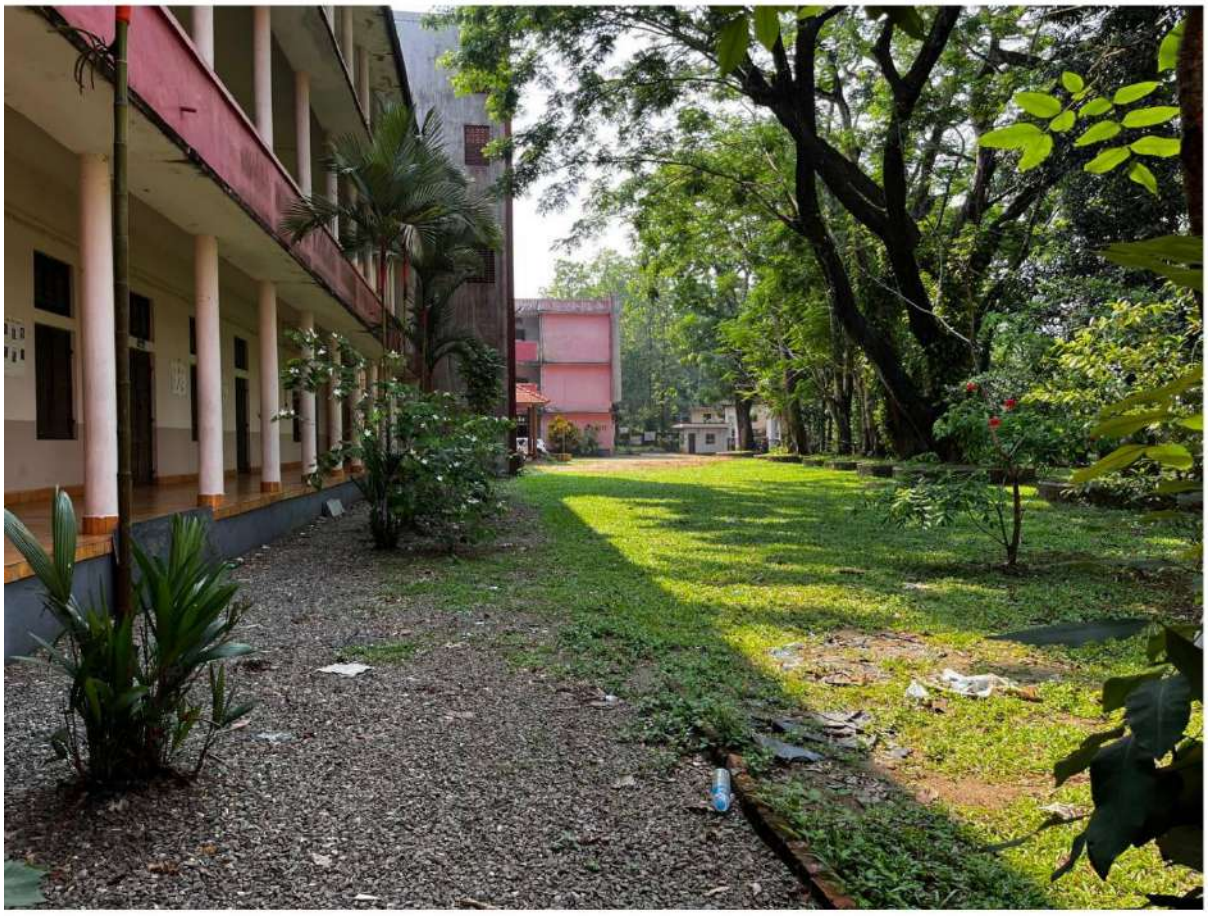
Amount of Carbon to be mitigated for Low Carbon Campus				
Sl No	Particulars	2020-21	2021-22	2022-23
1	Total carbon emission tCO2e	20.59	30.34	27.85
2	Total carbon sequestration tCO2e	6.41	7.13	7.50
3	Amount of carbon mitigated through renewable energy tCO2e	1.00	1.00	1.05
4	To be mitigated tCO2e	13.18	22.22	19.30
5	Total No of Students	964	945	869
6	Specific Carbon Footprint kg CO2e/Student/Yr	13.67	23.51	22.21

The total specific carbon footprint is estimated as **22.41** kg of CO_2e per student for the year 2022-23.

OTTOTRACTIONS
Energy-Engineering-Environment

4

Carbon Mitigation Plans



The total emission of the carbon dioxide per student is **27.85** kg per year (2022-2023). Emission reduction plans were prepared to bring the existing per capita carbon footprint to zero or below so as to bring the campus a carbon neutral or carbon negative campus.

This can be achieved in many ways but, every alternate plan must be in such a way that, it must fulfill the actual purpose of each activity that is considered.

Here, three major methods are taken in to account as the plans for reducing the carbon emission of the campus.

- Resource optimisation
- Energy efficiency
- Renewable energy

RESOURCE OPTIMISATION

The effective use of resources can limit its unnecessary wastage. Optimal usage of the resources (such as fuels) can save the fuel and can also reduce the carbon emission due to its consumption. This technique can be effectively implemented in the 'transportation' and 'waste' sectors of the campus.

WASTE MINIMISATION

Optimal utilisation of paper and plastic stationaries can reduce the frequency of purchase of items. This can reduce the unnecessary wastage of money as well as the excess production of waste. In the case of food, proper food habits and housekeeping practices can optimise its usage.

Currently, the campus is taking an appreciable effort to reduce the unnecessary production of wastes. But the campus still has opportunities to reduce the generation of waste and can improve much more. Resource optimisation can be effectively implemented in all type of waste generated in the campus and the campus can expect about 50% reduction the total waste produced.

ENERGY EFFICIENCY

Energy efficiency is the practice of reducing the energy requirements while achieving the required energy output. Energy efficiency can be effectively implemented in all the sectors of the campus.

FUELS FOR COOKING

The campus uses commercial LPG cylinders for its cooking purpose. The campus can install a biogas plant to treat food waste and the biogas thus generated can be used in kitchen. Installation of a solar water heater to rise the water temperature to a much higher level, then it has to consume only very less amount of thermal energy for preparing the same amount of food is another method. This can make a positive benefit to the campus by saving money, energy and can reduce the carbon emission of the campus due to thermal energy consumed for cooking.

TRANSPORTATION

Energy efficiency of the transportation sector is mainly depended on the fuel efficiency of the vehicles used. Here mileage of the vehicle (kmpl - Kilometres per Litre) is calculated to assess the fuel efficiency of the vehicle.

Percentage of closeness is the ratio of actual mileage of the vehicle to its expected mileage. If the percentage of closeness of mileages of each vehicle is greater than that of its average, then the efficiency status of the vehicle is considered as 'Above average' and else, it is considered as 'Below average'.

Carbon Mitigation Proposals

After analyzing the historical and measured data the following projects are proposed to make the campus carbon neutral. The projects are from energy efficiency and renewable energy. The further additions in the green cover increase will also give positive impact in the carbon mitigation.

OTTOTRACTIONS- ENERGY AUDIT St. Thomas College, Ranni Greenhouse Gas Mitigation through Major Energy Efficiency Projects						
Sl No	Projects	Energy saved(Yearly)		Sustainability (Years)	First year ton of CO2 mitigated	Expected Tons of CO2 mitigated through out life cycle
		(kWh)	MWh	Years		
1	Energy Saving in Lighting by replacing existing 34 No's T12 (55W) Lamps to 18W LED Tube	902	0.90	10	0.66	6.59
2	Energy Saving in Lighting by replacing existing 64 No's T8 (40W) Lamps to 18W LED Tube	1014	1.01	10	0.74	7.40
3	Energy Saving in Lighting by replacing existing 16 No's CFL(15W) Lamps to 9W LED Bulb	69	0.07	10	0.05	0.50
4	Energy Saving by replacing existing 178 No's in-efficent ceiling fans with Energy Efficient Five star fans	4187	4.19	10	3.06	30.56
Total		**6172**	**6**	**10**	**4.51**	**45.05**

OTTOTRACTIONS- ENERGY AUDIT St. Thomas College, Ranni Greenhouse Gas Mitigation through Renewable Energy Projects						
Sl No	Projects	Energy saved (Yearly)		Sustainability (Years)	First year ton of CO2 mitigated	Expected Tons of CO2 mitigated throughout life cycle
		(kWh)	MWh	Years		
1	Installation of 20kWp Solar Power Plant	27375	27.38	25	19.98	499.59
	Total	27375	27	25	19.98	500

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 1	
Energy Saving in Lighting by replacing existing 64 No's T8 (40W) Lamps to 18W LED Tube	
Existing Scenario	
64 numbers of T8(40 W) lamps were identified during the energy audit field survey in the facility. During discussion with officers it is observed that the average utility of these fittings are of 30%.	
Proposed System	
The existing T8 may be replaced to LED Tube of 18W in phased manner and the savings will be of 55% (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2400
No of fittings	64
Total load (kW)	2.56
Annual Energy Consumption (kWh)	1843
Expected Annual Energy saving for replacing all fittings (kWh)	1014
Cost of Power	8.00
Annual saving in Lakhs Rs (1st year)	0.08
Investment required for complete replacements [@Rs 300 per fittings](Lakhs Rs)	0.19
Simple Pay Back (in Months)	28.41

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code	
Energy Saving in Lighting by replacing existing 34 No's T12 (55W) Lamps to 18W LED Tube	
Existing Scenario	
257 numbers of T12(55 W) lamps were identified during the energy audit field survey in the facility. During discussion with officers it is observed that the average utility of these fittings are of 30%.	
Proposed System	
The existing T12 may be replaced to LED Tube of 18W in phased manner and the savings will be of 67% (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2400
No of fittings	34
Total load (kW)	1.87
Annual Energy Consumption (kWh)	1346
Expected Annual Energy saving for replacing all fittings (kWh)	902
Cost of Power	8.00
Annual saving in Lakhs Rs (1st year)	0.07
Investment required for complete replacements [@Rs 300 per fittings](Lakhs Rs)	0.10
Simple Pay Back (in Months)	16.96

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal	
Energy Saving by replacing existing 178 No's in-efficient ceiling fans with Energy Efficient Five star fans	
Existing Scenario	
There are 178 numbers of ceiling fans installed in the facility with minimum 8 hrs a day operation. All are conventional type and most of them are very old.	
Proposed System	
There is an energy saving opportunity in replace the existing fans with new five star labelled fans. The five star labelled fans give a savings up to 30% with higher service value (air delivery/watt).	
Financial Analysis	
Annual working hours (hrs)	2400
Total numbers of ordinary fans	178
Total load (kW)	12.46
Annual Energy Consumption (kWh)	14952
Expected Annual Energy saving, for total replacement(kWh)	4187
Cost of Power (Rs)	8.00
Annual saving in Lakhs Rs (1st year)	0.33
Investment required for a total replacement (Lakhs Rs)[@3000 Rs per Fan with 50W at full speed]	5.34
Simple Pay Back (in Months)	191.33

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal	
Energy Saving in Lighting by replacing existing 16 No's CFL(15W) Lamps to 9W LED Bulb	
Existing Scenario	
24 numbers of CFL (15W) lamps were identified during the energy audit field survey in the facility. During discussion with officers it is observed that the average utility of these fittings are of 30%.	
Proposed System	
The existing CFL may be replaced to LED Bulb of 9W in phased manner and the savings will be of 40% (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2400
No of fittings	16
Total load (kW)	0.24
Annual Energy Consumption (kWh)	173
Expected Annual Energy saving for replacing all fittings (kWh)	69
Cost of Power	8.00
Annual saving in Lakhs Rs (1st year)	0.01
Investment required for complete replacements [@Rs 90 per fittings](Lakhs Rs)	0.01
Simple Pay Back (in Months)	31.25

Energy Saving Proposal	
Installation of 20kWp Solar Power Plant	
Existing Scenario	
There is a good potential of solar power electricity generation. The availability of sunlight is very high. There are some canopies available in the proposed site, but by having proper trimming of trees this may be avoided. If the SPVs are place in the roof top it will help improving RTTV (Roof Thermal Transmit Value) of the building.	
Proposed System	
It is proposed to have a Solar Power Plant of 10kW at the beginning stage. The state and central government is pushing and giving good assistance to the installation. It can be installed as an internal grid connected system which is much cheaper than off grid system. Now days the technology provides trouble free grid interactive and connected system. The installation will provide 25yrs trouble free generation with only 20% efficiency loss at the 25th year.	
Financial Analysis	
Proposed Solar installed Capacity (kW)	20
Total average kWh per day expected (3.5kWh/day average)	75.00
Total annual Generating Capacity (kWh)	27375
Cost of energy generated annually Lakhs Rs	3.64
Investment required (INR lakh)(Approx)	11.00
Simple Pay Back (in Months)	36.26
Life cycle in Yrs	25
Total Saving in Life Cycle (Approx) RS lakh	91.02

Executive Summary					
Consolidated Cost Benefit Analysis of Energy Efficiency Improvement Projects					
St. Thomas College, Ranni					
Sl No	Projects	Investment	Cost saving	SPB	Energy saved
		(Lakhs Rs)	(Rs)/Yr	Months	kWh/Yr
1	Energy Saving in Lighting by replacing existing 34 No's T12 (55W) Lamps to 18W LED Tube	0.10	0.07	16.96	902
2	Energy Saving in Lighting by replacing existing 64 No's T8 (40W) Lamps to 18W LED Tube	0.19	0.081	28.41	1014
3	Energy Saving in Lighting by replacing existing 16 No's CFL(15W) Lamps to 9W LED Bulb	0.01	0.006	31.25	69
4	Energy Saving by replacing existing 178 No's in-efficient ceiling fans with Energy Efficient Five star fans	5.34	0.335	191.33	4187
5	Installation of 20kWp Solar Power Plant	11.00	3.641	36.26	27375
	Total	**16.55**	**4.06**	**60.84**	**32644**
(The saving are projected as per the assumed operation time observed based in the discussions with the plant officials. The data of saving percentages are taken from BEE guide books and field measurements.)					

5
CONCLUSION

The carbon emission from different sectors namely, Energy, Transportation and wastes were calculated using standard procedures. Carbon sequestration by the trees present in the campus was also estimated. From these the total carbon footprint of the campus was arrived at.

Net Carbon Emission after implementing Energy Efficiency projects and Renewable Energy Projects Proposed		
1	Total Carbon Foot Print tCO2e/yr	27.85
2	Carbon Sequrested tCO2e/yr	7.50
3	Carbon mitigated by Renewable Energy tCO2e/yr (Installed)	1.05
4	Carbon mitigated by Renewable Energy tCO2e/yr (Proposed)	19.98
5	Carbon mitigated by Energy Efficiency (Proposed) tCO2e/yr	4.51
6	Effective Carbon footprint tCO2e/yr	-5.18
7	Total No of Students	805
8	Specific Carbon Footprint kg CO2e/Student/Yr	-6.44

From this study it was found that carbon footprint of the campus to be **-6.44** $kgCO_2e$/ Student/ Year in place of current footprint i.e., **27.85** $kgCO_2e$/ student/ Year. To achieve this an investment of **27.55 lakhs Rs** is required through energy efficiency and renewable energy projects proposed. It will be around **3422 Rs per student** to make the campus the carbon negative.

Cost to make the campus Carbon Negative		
1	Cost of implementation in Energy Efficiency Lakhs Rs	16.55
2	Cost of implementation in Renewable Energy Lakhs Rs	11.00
3	Total Lakhs Rs	27.55
4	Total number of students	805
5	Cost per student to make the campus carbon negative Rs/ Student	3422

REFERENCES

Reports and Books

- Towards campus climate neutrality: Simon Fraser University's carbon footprint (2007), Simon Fraser University, Bokowski, G., White, D., Pacifico, A., Talbot, S., DuBelko, A., Phipps, A.
- The bare necessities: How much household carbon do we really need? Ecological Economics (2010), 69, 1794–1804, Druckman, A., & Jackson, T.
- Home Energy Audit Manual (2017), Ottotractions & EMC Kerala, No.ES 26, Pp.114
- Screening of 37 Industrial PSUs in Kerala for Carbon Emission Reduction and CDM Benefits, (2011), Ottotractions & Directorate of Environment & climate Change, Kerala, No. ES-8, Pp.157

Website

- http://www.moef.nic.in/downloads/public-information/Report_INCCA.pdf
- https://ghgprotocol.org/sites/default/files/standards_supporting/Ch5_GHGP_Tech
- https://www.sciencedirect.com/science/article/pii/S0921344915301245
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- https://beeindia.gov.in/sites/default/files/guidebook-Campus.pdf
- https://www.elgas.com.au/blog/389-lpg-conversions-kg-litres-mj-kwh-and-m3
- http://www.sustainabilityoutlook.in/content/5-things-consider-you-plan-rooftop-pv-plant
- https://www.nrcan.gc.ca/energy/efficiency/transportation/20996
- https://www.americangeosciences.org/critical-issues/faq/how-does-recycling-save energy

6

TECHNICAL SUPPLEMENT

St. Thomas College, Ranni																
		Lights							Fans		IT			Others		
Sl No	Location	LED-T	LED-B	LED-SQ	T8	T12	ICL	CFL	CF	EF	Printer	Projector	PC	TV	AC (1TR)	Fridge
1	Principal	2		9					2		1		1	1		
2	Conf Hall	2			2				1				1		1	
3	Office	5			3				6		2		2			
4	Admn Room	1			4				3		3		1			
5	Manager					1			2		1		1			
6	Malayalam Dpmt	1							1							
7	3 Rooms	3							3							
8	4 Rooms					4			4							
9	9 Rooms					27			18							
10	Seminar Hall	3							6	1		1				
11	4 Rooms				4				4							
12	Botany department					1			2		1		1			1
13	Museum	1							2				1			
14	5 Classrooms	5							10							
15	Physics Department	2	1		2				5			1	1			
16	Computer lab				3				2				5			
17	3 Rooms							12	9							
18	3 Rooms	3							3							
19	3 Rooms				3				3							
20	English department	1				1			1				1			
21	6 Rooms				6				6							
22	Conf Hall		24						12							
23	3 Rooms						3		3							

OTTOTRACTIONS

24	Lab	3							4		1		24			
25	3 Departments	6			6				18							
26	6 Rooms				6				6							
27	9 Rooms	9							9							
28	4 Rooms							4	4							
29	3 Rooms	3							6							
30	2 Rooms				2				2							
31	3 Rooms	3							3							
32	5 Rooms				5				5							
33	Auditorium	8			18				13							
	Total	**61**	**25**	**9**	**64**	**34**	**3**	**16**	**178**	**1**	**9**	**2**	**39**	**1**	**1**	**1**
	Wattage	**20**	**10**	**20**	**40**	**55**	**100**	**18**	**80**	**60**	**100**	**120**	**200**	**100**	**1200**	**1200**
	Power	**1220**	**250**	**180**	**2560**	**1870**	**300**	**288**	**14240**	**60**	**900**	**240**	**7800**	**100**	**1200**	**1200**

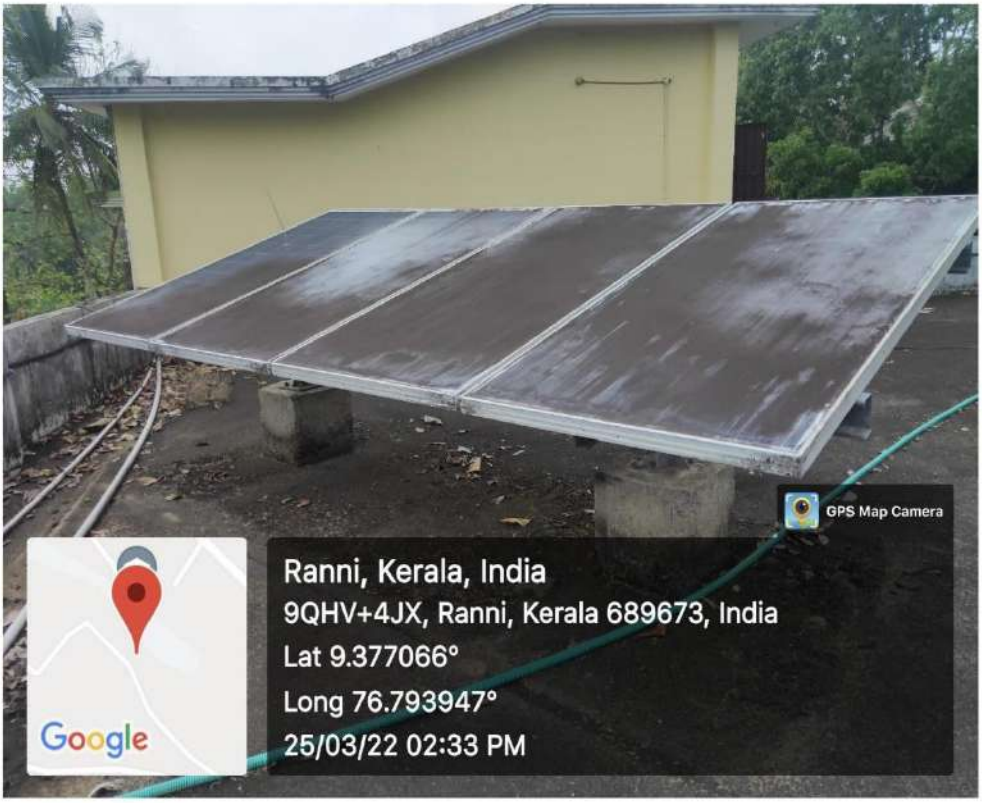
St. Thomas College, Ranni
Pazhavangadi P.O., Kerala, India - 689673
RE-ACCREDITED BY NAAC AT B LEVEL
(Affiliated to Mahatma Gandhi University, Kottayam - Kerala)

7.1.2 Facilities for alternate sources of energy and energy conservation measures in the Institution

Photographs of the facilities for alternate sources of energy

Ph : 04735-226238, 226738 (O)
E-mail : stcranni@gmail.com, www.stcranni.ac.in

Solar Plant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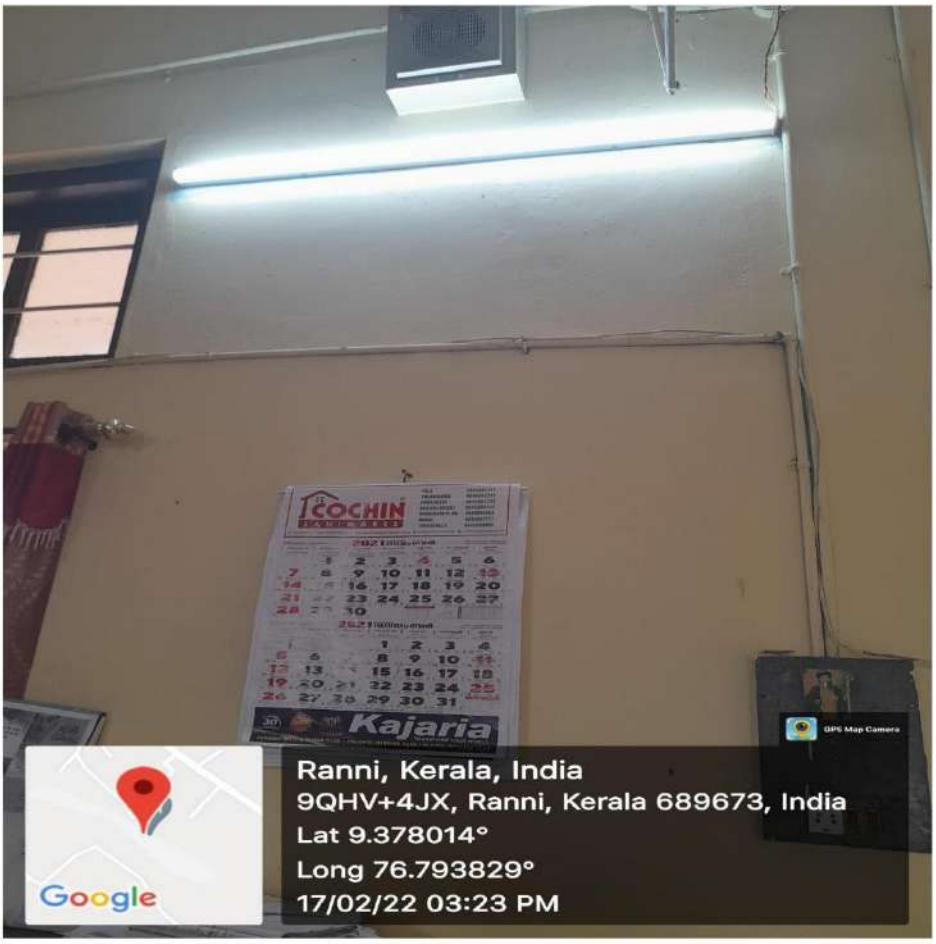
Google

LED tube light



Biogas Plant

CALL 1912
CUSTOMER CARE 24X7
KSEB

Demand/Disconnection Notice
(As per Reg 122 of Supply Code 2014)
Ranny North Section
0473-5226355
KSEBL GSTIN 32AAECK2277N8Z1

C#:1146076000773

Bill# : 4507220500065 773
Conn.Id : 6732710
Name : PRINCIPAL
St Thomas CollageRa
C Status : Connected
Pole : T63_0
Trans : RANNY COLLEGE
Meter# : 0000000773
Bill Area : M01/1/59
Bill Date : 01/05/2022
Due Date : 11/05/2022
Disconn Dt : 26/05/2022
Tariff : LT-6A NDon
Purpose : Educational Ins
S Deposit : 7210
Meter(KM)Status OK
Load : 22 KW
C Demand : 21.49 KVA
Phase : 3
Prv Rd Dt : 01/04/2022
Prs Rd Dt : 01/05/2022
Mt Rd(ONF) : 1

(3)

Prev. Payment

Prv Paid Dt : 12-04-2022
Prv Paid Amt : 5931

Readings & Cons

Unit	Curr	Prev	Cons	Avg
KWH/A/I	2021	1526	495	575

Bill Details

Fixed Charges : 1430.00
Meter Rent : 17.70
Energy Charges : 2621.50
Duty : 282.15
Round off : 0.30

Bill Amount : 4551.00
Surcharge : 2.00
Payable : 4553.00

4553/-

Remarks
Mtr Rent 15 CGST 9% 1.35 SGST 9% 1.35

Pay Online https://wss.kseb.in
BIJU D
Sub Engineer
SBM VI -1.36 [illegible]
05-05-2022 9:49:43 AM

CALL 1912
CUSTOMER CARE 24X7
KSEB

Demand/Disconnection Notice
(As per Reg 122 of Supply Code 2014).
Ranny North Section
0473-5226355
KSEBL GSTIN 32AAECK2277N8Z1

C#:1146071019877

Bill# : 4607220500086 19877
Conn.Id : 12043471
Name : THE MANAGER
ST THOMAS COLLEGE
C Status : Not Using
Pole : IAY 17/17
Trans : KAIPPUZHA-KARINKUTTY
Meter# : 22129
Bill Area : M01/1/60
Bill Date : 01/05/2022
Due Date : 11/05/2022
Disconn Dt : 26/05/2022
Tariff : LT-6C NDon
Purpose : ATM Counter
S Deposit : 4578
Meter(KM)Status DL
Load : 6 KW
C Demand : 5.3 KVA
Phase : 3
Prv Status : Average
Pvl Rd Dt : 01/06/2020
Prv Rd Dt : 01/04/2022
Prs Rd Dt : 01/05/2022
Mt Rd(ONF) : 1

(2)

Prev. Payment

Prv Paid Dt : 12-04-2022
Prv Paid Amt : 1098

DoorLock Details

Lst Dl Dt : 01-07-2020
Dl Count : 21

Readings & Cons

Unit	Curr	Prev	Cons	Avg
KWH/A/I		5735	0	0

Bill Details

Fixed Charges : 1080.00
Meter Rent : 17.70
Energy Charges : 0.00
Duty : 0.00
Round off : 0.30

Bill Amount : 1098.00
Advance : 0.85
Surcharge : 1.00
Payable : 1099.00

1099/-

Remarks
Mtr Rent 15 CGST 9% 1.35 SGST 9% 1.35

Pay Online https://wss.kseb.in
BIJU D
Sub Engineer
SBM VI -1.36 [illegible]
05-05-2022 9:[illegible]

CALL 1912
KSEB

Demand/Disconnection Notice
(As per Reg 122 of Supply Code 2014)
Ranny North Section
0473-5226355
KSEBL GSTIN 32AAECK2277N8Z1

C#:[illegible]

Bill# : 4607220500699 2000 540
Conn.Id : 6731715
Name : THE PRINCIPLE
St Thomas CollegeRa
C Status : Connected
Pole : 179_0
Trans : POOVATHUKUNNU
Meter# : 0030871490
Bill Area : A04/2/83
Bill Date : 02/05/2022
Due Date : 12/05/2022
Disconn Dt : 27/05/2022
Tariff : LT-6A NDon
Purpose : Educational Ins
S Deposit : 900
Meter(KM)Status OK
Load : 2 KW
[illegible]

(1)

Prev. Payment

Prv Paid Dt : 01-04-2022
Prv Paid Amt : 940

DoorLock Details

Lst Dl Dt : [illegible]-07-2021
Dl Count : 4

Readings & Cons

Unit	Curr	Prev	Cons	Avg
KWH/A/I	3544	3265	[illegible]	[illegible]

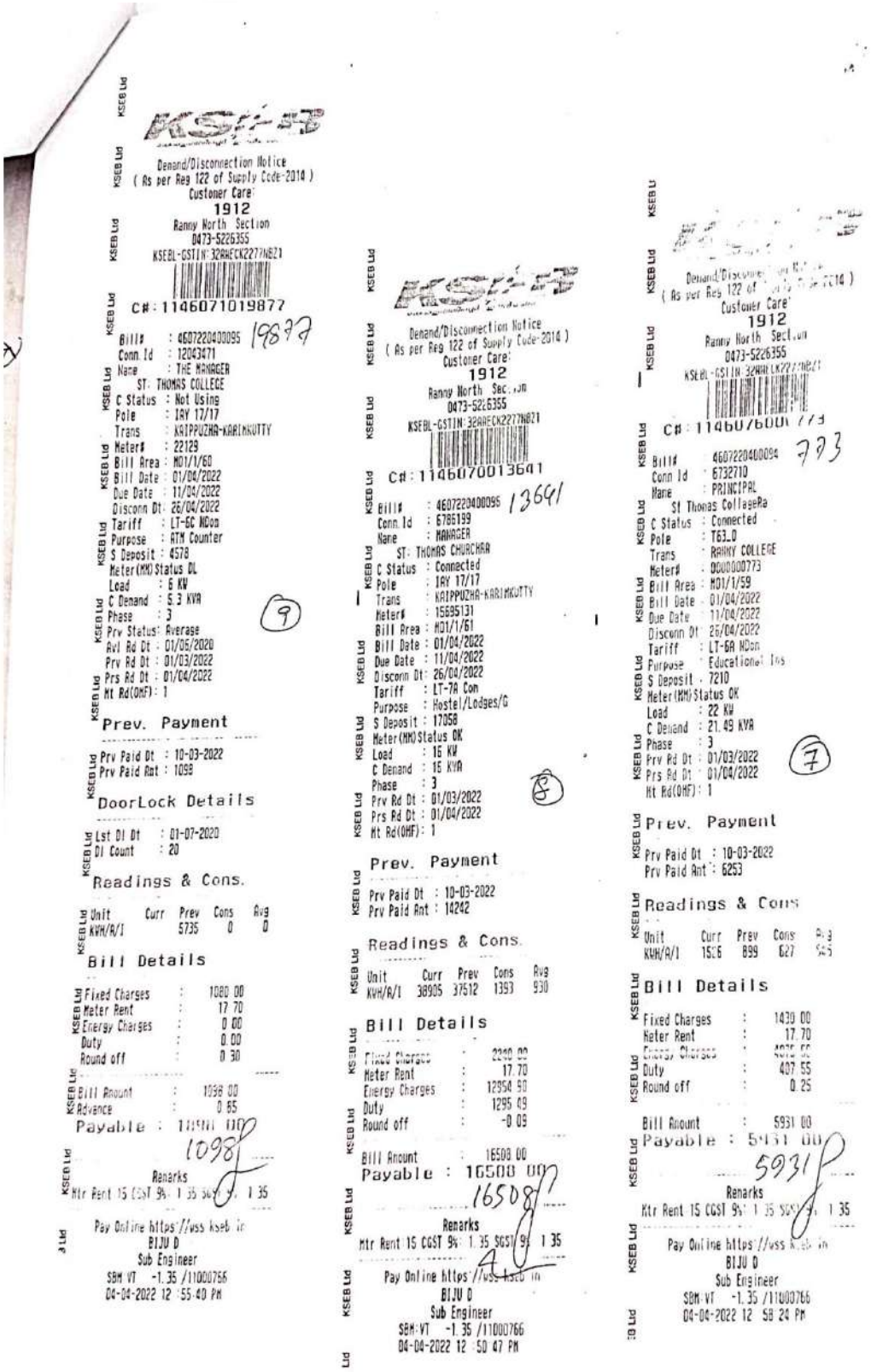
Bill Details

[illegible]
Surcharge : [illegible]
Payable : 1294.00

1294/-

Remarks

PRASAD GOPALAN
Meter Reader
[illegible]



KSEB Ltd

Demand/Disconnection Notice
(As per Reg 122 of Supply Code-2014)
Customer Care
1912
Ranny North Section
0473-5226355
KSEBL-GSTIN:32AAECK2277N8Z1

C#: 1146071019877

Bill# : 4607220400095 19877
Conn.Id : 12043471
Name : THE MANAGER
ST. THOMAS COLLEGE
C Status : Not Using
Pole : IAY 17/17
Trans : KAIPPUZHA-KARIMKUTTY
Meter# : 22129
Bill Area : M01/1/60
Bill Date : 01/04/2022
Due Date : 11/04/2022
Disconn Dt: 26/04/2022
Tariff : LT-6C NDom
Purpose : ATM Counter
S Deposit : 4578
Meter(MM)Status OL
Load : 6 KW
C Demand : 5.3 KVA
Phase : 3
Prv Status: Average
Avl Rd Dt : 01/05/2020
Prv Rd Dt : 01/03/2022
Prs Rd Dt : 01/04/2022
Mt Rd(OHF): 1

(9)

Prev. Payment

Prv Paid Dt : 10-03-2022
Prv Paid Amt : 1099

DoorLock Details

Lst DI Dt : 01-07-2020
DI Count : 20

Readings & Cons.

Unit	Curr	Prev	Cons	Avg
KWH/R/I	5735	0	0	0

Bill Details

Fixed Charges	:	1080 00
Meter Rent	:	17 70
Energy Charges	:	0 00
Duty	:	0 00
Round off	:	0 30
Bill Amount	:	1098 00
Advance	:	0 65
Payable	:	1098 00

1098

Remarks
Mtr Rent 15 CGST 9% 1 35 SGST 9% 1 35

Pay Online https://wss.kseb.in
BIJU D
Sub Engineer
SBM-VT -1.35 /11000766
04-04-2022 12:55:40 PM

KSEB Ltd

Demand/Disconnection Notice
(As per Reg 122 of Supply Code-2014)
Customer Care
1912
Ranny North Section
0473-5226355
KSEBL-GSTIN:32AAECK2277N8Z1

C#: 1146070013641

Bill# : 4607220400095 13641
Conn.Id : 6786199
Name : MANAGER
ST. THOMAS CHURCHAA
C Status : Connected
Pole : IAY 17/17
Trans : KAIPPUZHA-KARIMKUTTY
Meter# : 15695131
Bill Area : M01/1/61
Bill Date : 01/04/2022
Due Date : 11/04/2022
Disconn Dt: 26/04/2022
Tariff : LT-7A Com
Purpose : Hostel/Lodges/G
S Deposit : 17058
Meter(MM)Status OK
Load : 15 KW
C Demand : 15 KVA
Phase : 3
Prv Rd Dt : 01/03/2022
Prs Rd Dt : 01/04/2022
Mt Rd(OHF): 1

(8)

Prev. Payment

Prv Paid Dt : 10-03-2022
Prv Paid Amt : 14242

Readings & Cons.

Unit	Curr	Prev	Cons	Avg
KWH/R/I	38905	37512	1393	930

Bill Details

Fixed Charges	:	2160 00
Meter Rent	:	17 70
Energy Charges	:	12954 90
Duty	:	1295 49
Round off	:	-0 09
Bill Amount	:	16500 00
Payable	:	16500 00

16508

Remarks
Mtr Rent 15 CGST 9% 1 35 SGST 9% 1 35

Pay Online https://wss.kseb.in
BIJU D
Sub Engineer
SBM-VT -1.35 /11000766
04-04-2022 12:50:47 PM

KSEB Ltd

Demand/Disconnection Notice
(As per Reg 122 of Supply Code-2014)
Customer Care
1912
Ranny North Section
0473-5226355
KSEBL-GSTIN:32AAECK2277N8Z1

C#: 1146076001773

Bill# : 4607220400094 733
Conn.Id : 6732710
Name : PRINCIPAL
St Thomas CollegeRa
C Status : Connected
Pole : T63_0
Trans : RANNY COLLEGE
Meter# : 0000000773
Bill Area : M01/1/59
Bill Date : 01/04/2022
Due Date : 11/04/2022
Disconn Dt: 26/04/2022
Tariff : LT-6A NDom
Purpose : Educational Ins
S Deposit : 7210
Meter(MM)Status OK
Load : 22 KW
C Demand : 21.49 KVA
Phase : 3
Prv Rd Dt : 01/03/2022
Prs Rd Dt : 01/04/2022
Mt Rd(OHF): 1

(7)

Prev. Payment

Prv Paid Dt : 10-03-2022
Prv Paid Amt : 6253

Readings & Cons.

Unit	Curr	Prev	Cons	Avg
KWH/R/I	1506	899	607	505

Bill Details

Fixed Charges	:	1439 00
Meter Rent	:	17 70
Energy Charges	:	5012 55
Duty	:	407 55
Round off	:	0 25
Bill Amount	:	5931 00
Payable	:	5931 00

5931

Remarks
Mtr Rent 15 CGST 9% 1 35 SGST 9% 1 35

Pay Online https://wss.kseb.in
BIJU D
Sub Engineer
SBM-VT -1.35 /11000766
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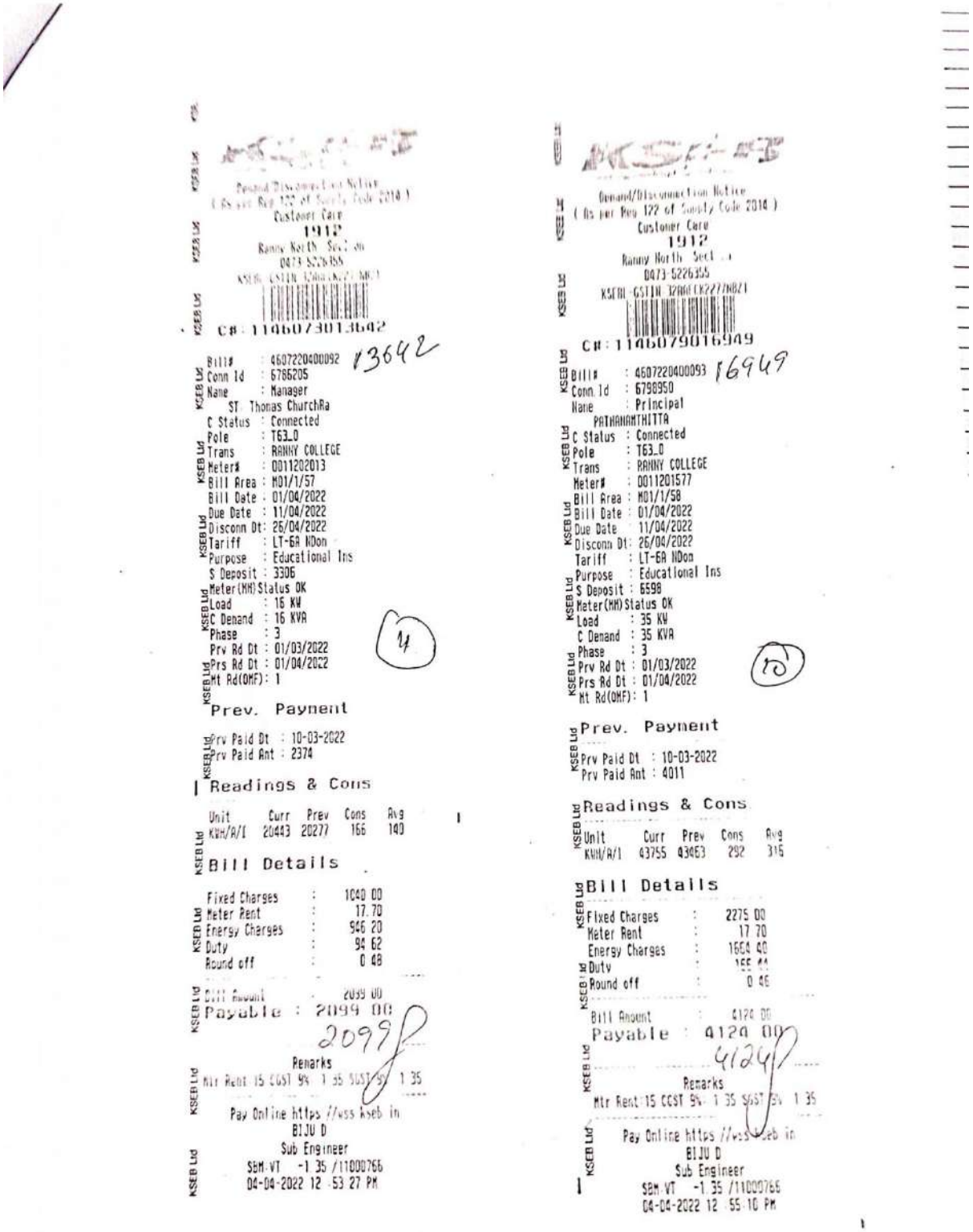

Demand/Disconnection Notice
(As per Reg 122 of Supply Code 2014)
Customer Care
1912
Ranny North Sect ..
0473-5226355
KSEB GSTIN 32AAECK2277NBZ1
C#: 11460730136 42

Bill# : 4607220400092 13642
Conn Id : 6786205
Name : Manager
ST Thomas ChurchRa
C Status : Connected
Pole : T63_0
Trans : RANNY COLLEGE
Meter# : 0011202013
Bill Area : MD1/1/57
Bill Date : 01/04/2022
Due Date : 11/04/2022
Disconn Dt: 26/04/2022
Tariff : LT-6A NDon
Purpose : Educational Ins
S Deposit : 3306
Meter(MM) Status OK
Load : 16 KW
C Demand : 16 KVA
Phase : 3
Prv Rd Dt : 01/03/2022
Prs Rd Dt : 01/04/2022
Mt Rd(OMF): 1

4

Prev. Payment

Prv Paid Dt : 10-03-2022
Prv Paid Amt : 2374

Readings & Cons

Unit	Curr	Prev	Cons	Avg
KWH/A/I	20443	20277	166	140

Bill Details

Fixed Charges	:	1040 00
Meter Rent	:	17 70
Energy Charges	:	946 20
Duty	:	94 62
Round off	:	0 48
Bill Amount	:	2099 00
Payable	:	2099 00

2099

Remarks
Mtr Rent 15 CCST 9% 1 35 SGST 9% 1 35

Pay Online https://wss.kseb.in
BIJU D
Sub Engineer
SBM-VT -1.35 /11000766
04-04-2022 12:53:27 PM

Demand/Disconnection Notice
(As per Reg 122 of Supply Code 2014)
Customer Care
1912
Ranny North Sect ..
0473-5226355
KSEB GSTIN 32AAECK2277NBZ1
C#: 11460790169 49

Bill# : 4607220400093 16949
Conn Id : 6798950
Name : Principal
PATHANAMTHITTA
C Status : Connected
Pole : T63_0
Trans : RANNY COLLEGE
Meter# : 0011201577
Bill Area : MD1/1/58
Bill Date : 01/04/2022
Due Date : 11/04/2022
Disconn Dt: 26/04/2022
Tariff : LT-6A NDon
Purpose : Educational Ins
S Deposit : 6598
Meter(MM) Status OK
Load : 35 KW
C Demand : 35 KVA
Phase : 3
Prv Rd Dt : 01/03/2022
Prs Rd Dt : 01/04/2022
Mt Rd(OMF): 1

15

Prev. Payment

Prv Paid Dt : 10-03-2022
Prv Paid Amt : 4011

Readings & Cons

Unit	Curr	Prev	Cons	Avg
KWH/A/I	43755	43503	252	316

Bill Details

Fixed Charges	:	2275 00
Meter Rent	:	17 70
Energy Charges	:	1664 40
Duty	:	166 44
Round off	:	0 46
Bill Amount	:	4124 00
Payable	:	4124 00

4124

Remarks
Mtr Rent 15 CCST 9% 1 35 SGST 9% 1 35

Pay Online https://wss.kseb.in
BIJU D
Sub Engineer
SBM-VT -1.35 /11000766
04-04-2022 12:55:10 PM

22-23

CALL 1912 CUSTOMER CARE 24X7 KSEB

Demand/Disconnection Notice
(As per Reg 122 of Supply Code-2014)
Ranny North Section
0473-5226355
KSEBL-GSTIN:32AAECK2277NBZ1

C#: 1146071019877

Bill# : 4607230201714
Conn.Id : 12043471
Name : THE MANAGER
ST: THOMAS COLLEGE
C Status : Not Using
Pole : IAY 17/17
Trans : KAIPPUZHA-KARIMKUTTY
Meter# : 22123
Bill Area : M01/1/79
Bill Date : 01/02/2023
Due Date : 11/02/2023
Disconn Dt: 27/02/2023
Tariff : LT-6C NDom
Purpose : ATM Counter
S Deposit : 6168

Prev. Payment

Prv Paid Dt : 16-01-2023
Prv Paid Amt : 1098

Main Meter

Meter(MM) Status OK
Load : 6 KW
C Demand : 5.3 KVA
Phase : 3
Prv Rd Dt : 02/01/2023
Prs Rd Dt : 01/02/2023
Mt Rd(OMF): 1

Readings & Cons. (MM)

Unit	Curr	Prev	Cons	Avg
KWH/A/1	5748	5748	0	258

Bill Details

Fixed Charges	:	1080.00
Meter Rent	:	17.70
Energy Charges	:	0.00
Duty	:	0.00
Round off	:	0.30
Bill Amount	:	1098.00
Advance	:	0.70
Surcharge	:	2.00
Payable	:	1100.00

Remarks
Mtr Rent 15 CGST 9%: 1.35 SGST 9%: 1.35

Pay Online https://wss.kseb.in
PRASANTH S J
1066871
Sub Engineer
SBM VT -1.45 /11000766
04-02-2023 11:27:47 AM

CALL 1912 CUSTOMER CARE 24X7 KSEB

Demand/Disconnection Notice
(As per Reg 122 of Supply Code-2014)
Ranny North Section
0473-5226355
KSEBL-GSTIN:32AAECK2277NBZ1

C#: 1146076000773

Bill# : 4607230201719
Conn.Id : 6732710
Name : PRINCIPAL
St Thomas CollageRa
C Status : Connected
Pole : T63_0
Trans : RANNY COLLEGE
Meter# : 37520
Bill Area : M01/1/83
Bill Date : 01/02/2023
Due Date : 11/02/2023
Disconn Dt: 27/02/2023
Tariff : LT-6A NDom
Purpose : Educational Ins
S Deposit : 11232

Prev. Payment

Prv Paid Dt : 16-01-2023
Prv Paid Amt : 5471

Main Meter

Meter(MM) Status OK
Load : 22 KW
C Demand : 21.49 KVA
Phase : 3
Prv Rd Dt : 02/01/2023
Prs Rd Dt : 01/02/2023
Mt Rd(OMF): 1

Readings & Cons. (MM)

Unit	Curr	Prev	Cons	Avg
KWH/A/1	107129	106379	750	494

Bill Details

Fixed Charges	:	1540.00
Meter Rent	:	17.70
Energy Charges	:	4987.50
Duty	:	498.75
Round off	:	0.05
Bill Amount	:	7044.00
Surcharge	:	8.00
Payable	:	7052.00

Remarks
15 CGST 9%: 1.35 SGST 9%: 1.35

Pay Online https://wss.kseb.in
PRASANTH S J
1066871
Sub Engineer
SBM VT -1.45 /11000766
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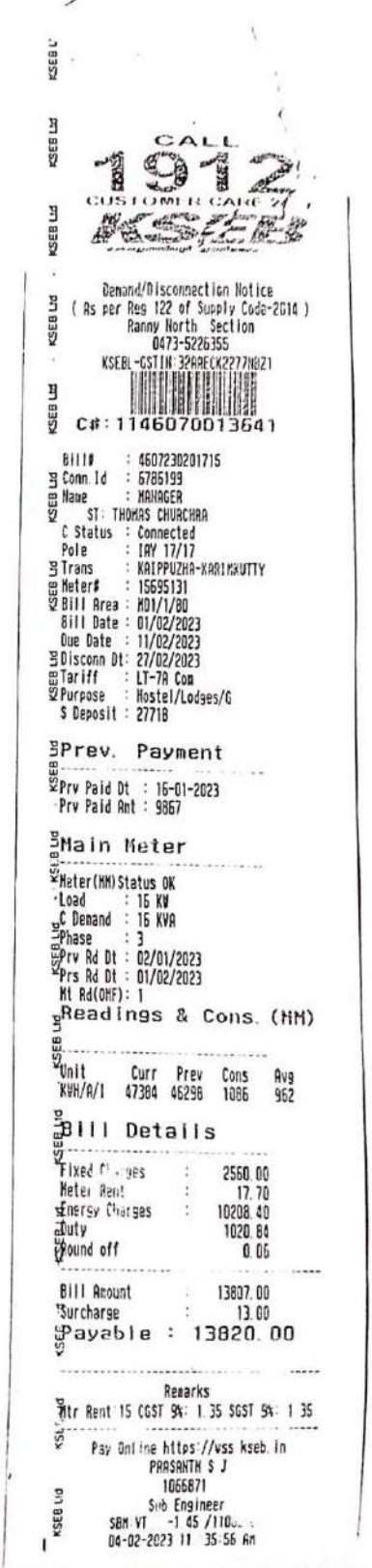


CALL 1912 CUSTOMER CARE 24X7 KSEB

Demand/Disconnection Notice
(As per Reg 122 of Supply Code-2014)
Ranny North Section
0473-5226355
KSEBL-GSTIN:32AAECK2277NBZ1

C#: 1146070013641

Bill# : 4607230201715
Conn.Id : 6785199
Name : MANAGER
ST: THOMAS CHURCHRA
C Status : Connected
Pole : IAY 17/17
Trans : KAIPPUZHA-KARIMKUTTY
Meter# : 15695131
Bill Area : M01/1/80
Bill Date : 01/02/2023
Due Date : 11/02/2023
Disconn Dt: 27/02/2023
Tariff : LT-7A Com
Purpose : Hostel/Lodges/G
S Deposit : 27718

Prev. Payment

Prv Paid Dt : 16-01-2023
Prv Paid Amt : 9867

Main Meter

Meter(MM) Status OK
Load : 16 KW
C Demand : 16 KVA
Phase : 3
Prv Rd Dt : 02/01/2023
Prs Rd Dt : 01/02/2023
Mt Rd(OMF): 1

Readings & Cons. (MM)

Unit	Curr	Prev	Cons	Avg
KWH/A/1	47384	46298	1086	962

Bill Details

Fixed Charges	:	2560.00
Meter Rent	:	17.70
Energy Charges	:	10208.40
Duty		1020.84
Round off		0.06
Bill Amount	:	13807.00
Surcharge	:	13.00
Payable	:	13820.00

Remarks
Mtr Rent 15 CGST 9%: 1.35 SGST 9%: 1.35

Pay Online https://wss.kseb.in
PRASANTH S J
1066871
Sub Engineer
SBM VT -1.45 /11000766
04-02-2023 11:35:56 AM

22-23

CALL 1912
CUSTOMER CARE 24X7
KSEB

Demand/Disconnection Notice
(As per Reg 122 of Supply Code-2014)
Ranny North Section
0473-5226355
KSEBL-GSTIN:32AAECK2277AB21

C#:1146073013642

Bill# 4607230201718
Conn Id 6786205
Name Manager
ST Thomas ChurchRa
Status Connected
Pole T63_0
Trans RANNY COLLEGE
Meter# 09415531
Bill Area M01/1/82
Bill Date 01/02/2023
Due Date 11/02/2023
Disconn Dt 27/02/2023
Tariff LT-6A NDom
Purpose Educational Ins
Deposit 62*0

Prev Payment

Prv Paid Dt : 16-01-2023
Prv Paid Amt : 2777

Main Meter

Meter(MM)Status DL
Load : 16 KW
C Demand 16 KVA
Phase : 3
Prv Rd Dt : 02/01/2023
Prs Rd Dt : 01/02/2023
Mt Rd(OMF): 1

Readings & Cons (MM)

Unit	Curr	Prev	Cons	Avg
KWH/A/I		23931	303	303

Bill Details

Fixed Charges	:	1120.00
Meter Rent	:	17.70
Energy Charges	:	1757.40
Duty	:	175.74
Round off	:	0.16
Bill Amount	:	3071.00
Surcharge	:	4.00
Payable	:	**3075.00**

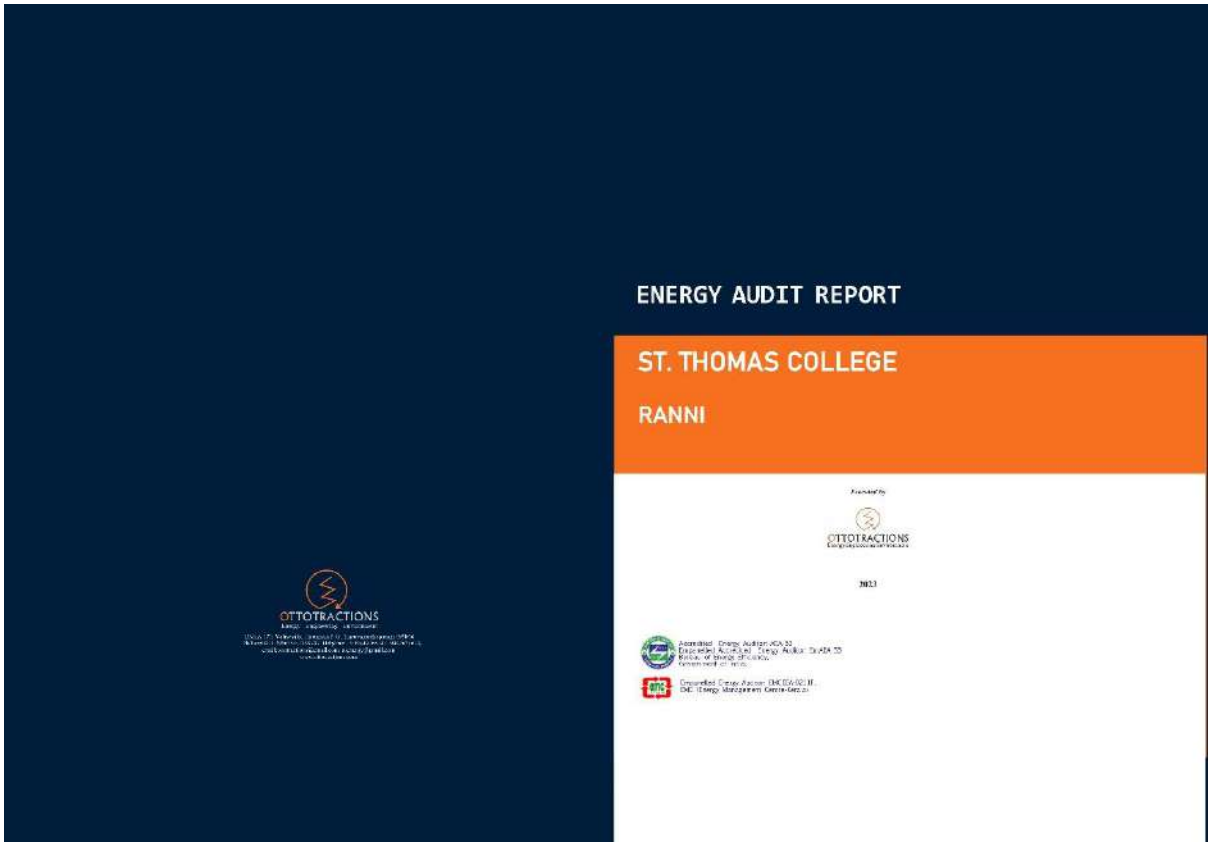
Remarks
Mtr Rent-15 CGST 9%: 1.35 SGST 9%: 1.35

Pay Online https://wss.kseb.in
PRASANTH S J
1055871
Sub Engineer
SBM VT -1.45 /11000766
04-02-2023

Sl. No.	Scientific name	Malayalam name	English Name	No.
1.	*Artocarpus heterophyllus*	പ്ലാവ്	JACKFRUIT TREE	12
2.	*Mangifera indica*	മാവ്	MANGO	9
3.	*Saracaasoca*	അശോകം	ASHOKA TREE	1
4.	*Mimusposelengi*	ഇലഞ്ഞി	BULLET WOOD	2
5.	*Tectona grandis*	തേക്ക്	TEAK	84
6.	*Cocos nucifera*	തെങ്ങ്	COCONUT TREE	21
7.	*Artocarpus hirsutus*	ആഞ്ഞിലി	WILD JACK	7
8.	*Delonix regia*	ഗുൽമോഹർ	ROYAL PRINCIANA	4
9.	*Swietenia macrophylla*	മഹാഗണി	MAHAGONY	38
10.	*Annona muricata*	മുള്ളാത്ത	SOURSOP TREE	7
11.	*Cassia fistula*	കണിക്കൊന്ന	GOLDEN SHOWER TREE	8
12.	*Psidium guajava*	പേര	GUAVA TREE	10
13.	*Nephelium lappaceum*	റംബുട്ടാൻ	RAMBUTAN	3
14.	*Peltophorum pterocarpum*	മഞ്ഞവാക	COPPER POD	3
15.	*Polyathia longifolia*	അരണമരം	FALSE ASHOKA	6
16.	*Casuarina equisetifolia*	ചൂള	CATURINA	1
17.	*Palmacaea*	അലങ്കാര പന	ORNAMENTAL PALM	10
18.	*Pimenta dioica*	സർവ്വസുഗന്ധി	ALL SPICE	1
19.	*Lagerstroemia speciosa*	മണിമരുത്	PRIDE OF INDIA	2
20.	*Caruca papaya*	പപ്പായ	PAPAYA	2
21.	*Cinnamumum verum*	വഴന	BAY LEAF	1
22.	*Albizia julibrissin*	പൂവാക	PERSIAN SILK TREE	1
23.	*Araucaria heterophylla*	ഒരകേറിയ	ARAUCARIA	1
24.	*Palmacaea*	അലങ്കാര പന	HYOPHORBE	1
25.	*Ficus exasperata*	തേരകം	SAND PAPER TREE	1

Report- Energy Audit

2020-2023



ENERGY AUDIT REPORT

ST. THOMAS COLLEGE

RANNI

OTTOTRACTIONS
Energy-Engineering-Environment

Energy Audit Report
St. Thomas College, Ranni
Report No: EA 1004
2023

Empaneled Accredited Energy Auditor, AEA 33
Bureau of Energy Efficiency
Government of India

Empaneled Energy Auditor, EMCEEA-0211F,
Energy Management Centre
Government of Kerala.

Authorized Energy Auditor, GEDA/ENC/EAC: Autho/2014/8/103/2316,
Gujarat Energy Development Agency
Government of Gujarat

Empaneled Energy Auditor, India SME Technology Services Ltd
A joint Venture of SIDBI, SBI, Indian Bank, Oriental Bank of Commerce
& Indian Overseas Bank

About OTTOTRACTIONS

OTTOTRACTIONS established in 2005, is an organization with proven track record and knowledge in the field of energy, engineering, and environmental services. They are the first Accredited Energy Auditor from Kerala for conducting Mandatory Energy Audits in Designated Consumers as per Energy Conservation Act-2001. Government of Kerala recognized and appreciated OTTOTRACTIONS by presenting its prestigious "The Kerala State Energy Conservation Award" for the best performance as an Energy Auditor.

Acknowledgment

We were privileged to work together with the administration and staff of St. Thomas College, Ranni for their timely help extended to complete the audit and bringing out this report.

With gratitude, we acknowledge the diligent effort and commitments of all those who have helped to bring out this report.

We also take this opportunity to thank the bona-fide efforts of audit team for unstinted support in carrying out this audit.

We thank our consultants, engineers and backup staff for their dedication to bring this report.

Thank you.

B V Suresh Babu
Accredited Energy Auditor
AEA 33, Bureau of Energy Efficiency
For OTTOTRACTIONS

Contents

Certification

This is to certify that

The data collection has been carried out diligently and truthfully;

All data monitoring devices are in good working condition and have been calibrated or certified by approved agencies authorised and no tampering of such devices has occurred;

All reasonable professional skill, care and diligence had been taken in preparing the energy audit report and the contents thereof are a true representation of the facts;

Adequate training provided to personnel involved in daily operations after implementation of recommendations; and

The energy audit has been carried out in accordance with the Bureau of Energy Efficiency (Manner and Intervals of Time for the Conduct of Energy Audit) Regulations, 2010.

SURESH BABU B V
ACCREDITED ENERGY AUDITOR (AEA 33)

Executive Summary					
Consolidated Cost Benefit Analysis of Energy Efficiency Improvement Projects					
St. Thomas College, Ranni					
Sl No	Projects	Investment	Cost saving	SPB	Energy saved
		(Lakhs Rs)	(Rs)/Yr	Months	kWh/Yr
1	Energy Saving in Lighting by replacing existing 34 No's T12 (55W) Lamps to 18W LED Tube	0.10	0.07	16.96	902
2	Energy Saving in Lighting by replacing existing 64 No's T8 (40W) Lamps to 18W LED Tube	0.19	0.081	28.41	1014
3	Energy Saving in Lighting by replacing existing 16 No's CFL(15W) Lamps to 9W LED Bulb	0.01	0.006	31.25	69
4	Energy Saving by replacing existing 178 No's in-efficient ceiling fans with Energy Efficient Five star fans	5.34	0.335	191.33	4187
5	Installation of 20kWp Solar Power Plant	11.00	3.641	36.26	27375
	Total	**16.55**	**4.06**	**60.84**	**32644**
(The saving are projected as per the assumed operation time observed based in the discussions with the plant officials. The data of saving percentages are taken from BEE guide books and field measurements.)					

1

Introduction

A detailed energy audit has been carried out at St. Thomas College Ranni by OTTOTRACTIONS in March 2023. During the energy audit energy saving opportunities has been identified to help improving energy efficiency of the facility. OTTOTRACTIONS is an Accredited Energy Auditor of Bureau of Energy Efficiency and Empaneled Energy Auditor of Energy Management Centre, Government of Kerala.

This energy audit report complies with the clauses in *Energy Conservation Act, 2001* on mandatory energy audit (**Form 4** [refer regulation 6(2)] guidelines for preparation of energy audit report) and complies with the G.O (Rt) No.2/2011/PD dated 01.01.2011 issued by Government of Kerala on mandatory energy audit.

1.1. General Building details and descriptions

The history of the college is embedded in the history of Ranni. The college is situated on the top of a serene hill, in a sylvan surrounding, away from the din and bustle of the city, easily accessible and is at a walkable distance from the heart of Ranni town. The college was established in 1964, as a junior college by St Thomas Valiyapally Ranni, a pioneer parish of the Syrian Knanaya Arch Diocese of Malankara, with the whole hearted support of the then Bishop late lamented His Excellency Abraham Mor Clemis to meet the educational needs of the youth of the local community. The college was upgraded to a first grade college in 1968 and is the only institution for higher education in this part of the country. When the de-

linking of Pre Degree sector was made possible by the government on administrative measures we were left with graduate and Post Graduate courses. During its 53 years of illustrious existence, the college gave birth to brilliant academicians, administrators, politicians and entrepreneurs.

The college aims at creating cultured and educated citizens who love God and their country. With its rural background and `Gurukula' atmosphere, the college fosters uninterrupted pursuit of knowledge. The first Principal, Late Prof. K. A. Mathew, served as minister and PSC member in the Kerala State. He played a vital role in upgrading the junior college to a first grade one in 1968. As the Golden Jubilee project St. Thomas College of Advanced Studies, Edamury, Ranni, a Self-Financing College affiliated to M.G. University, Kottayam was established in June 2014. In March 2016, the College was assessed and re-accredited in the second cycle by the National Assessment and Accreditation Council (NAAC) of UGC and graded at B level.

Occupancy Details			
Particulars	2020-21	2021-22	2022-23
Total Students	900	881	805
Staffs	64	64	64
Total Occupancy of the college	964	945	869

For calculating specific energy consumption, the total built-up area is taken into account.

Energy audit team

The Energy Audit team is listed below. Besides this list various domine experts also participated in this project.

1. Suresh Babu B V, Accredited Energy Auditor, AEA 33
2. B. Zachariah, Chief Technical Consultant
3. Abin Baby, Project Engineer
4. Jomon J S, Project Engineer
5. Amrutha A M, Data Analyst
6. Anjana B S, Project Assistant

2

Process description

The energy audit has been carried out at St. Thomas College, Ranni The following is the baseline data of this building.

BASELINE DATA SHEET FOR GREEN AUDIT											
1	Name of the Organisation	St. Thomas College, Ranni									
2	Address (include telephone, fax & e-mail)	St. Thomas College, Ranni, Pathanamthitta, 689641, stcranni@gmail.com,+91 8301057965									
2	Year of Establishment	1964									
3	Name of building and Total No. of Electrical Connections/building	St. Thomas college (8)									
4	Total Number of Students	Boys		Girls		Total	805				
5	Total Number of Staff	64									
6	Total Occupancy	869									
7	Total area of green cover	50%									
8	Type of Electrical Connection	HT	0	LT	8						
9	Total Connected Load (kW)	107									
10	Average Maximum Demand (KVA)	-									
11	Total built up area of the building (M^2)	8317									
12	Number of Buildings	5									
13	Average system Power Factor	0.96									
14	Details of capacitors connected	NA									
15	Transformer Details (Nos., kVA, Voltage ratio)	TR 1									
		NA									
15	DG Set Details (kVA,)	DG1	DG2	DG3	DG4	DG5	Remarks				
		10									
16	Details of motors	Rating		Nos.		Remarks					
		5 to 10		2							
		10 to 50									
		Above 50									

3

Energy and utility system description

3.1.1 Electricity

Electricity is purchased from KSEB under 8 LT Connections, the details are given below. A 10 kVA Diesel Generator are in operation at this campus

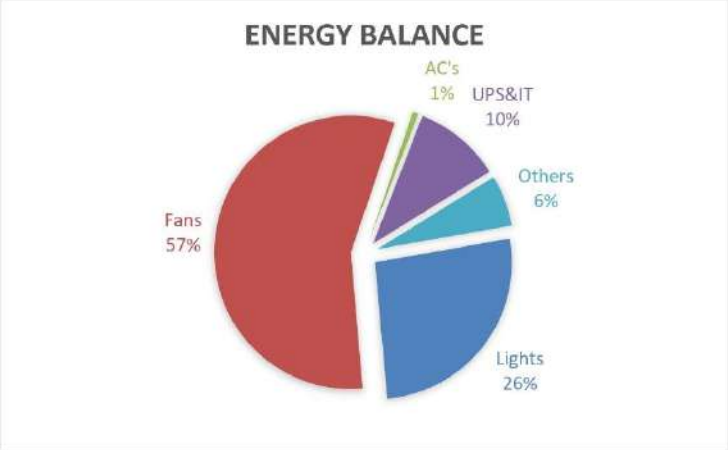
Electricity Connection Details		
St. Thomas College, Ranni		
1	Name of the Consumer	St. Thomas College, Ranni
2	Tariff	LT-6A 3Ph
3	Consumer Numbers	1146072000540, 1146071019877, 1146079005428, 1146073013642, 1146070013641, 1146079016949, 1146076000773, 1146071019877
5	Connected Load Total (kW)	107
6	Annual Electricity Consumption (kWh)	29879

3.2. Thermal Energy / Transportation

There are no vehicles operated from college for transportation. LPG is used for cooking in the canteen and diesel is used to operate Diesel Generators.

4

Energy Balance



57 % of the total energy consumed in this facility is used to operate Fans. Lighting uses 26% UPS and IT Uses AC uses 10%. Air-conditioners uses 1% and Others uses 6%.

OTTOTRACTIONS
Energy Engineering Environment

5

Performance evaluation of major utilities and process equipment's /systems.

5.1. List of equipment and process where performance testing was done.

5.1.1. Electrical System

5.1.2. Lighting & Fans

5.2. Results of performance testing

5.2.1. Electrical System

The average unit cost of electricity is **8.00 Rs/kWh**. This is taken as the basis for the financial analysis of electrical energy efficiency projects. The information on average energy consumption is taken from the historical electricity bill analysis.

OTTOTRACTIONS
Energy Engineering Environment

Electricity Consumption

2022-2023			
Name of the Consumer		**St. Thomas College, Ranni**	
Connected load	**2**	Consumer no	**1146072000540**
Tariff	LT-6A 3Ph	Section	**Ranny North**
Month	**kWh**	**Rs (Total)**	**Rs/kwh**
May-22	208	1294	**6.22**
Jul-22	221	1483	**6.72**
Sep-22	127	941	**7.39**
Nov-22	141	1041	**7.39**
Jan-23	121	1012	**8.39**
Mar-23	176	1473	**8.39**

Name of the Consumer		**St. Thomas College, Ranni**	
Connected load	**16**	Consumer no	**1146073013642**
Tariff	LT-6A 3Ph	Section	**Ranny North**
Month	**kWh**	**Rs (Total)**	**Rs/kwh**
Apr-22	166	2099	**12.64**
May-22	180	1799	**9.99**
Jun-22	457	4566	**9.99**
Jul-22			
Aug-22	349	3074	**8.81**
Sep-22			
Oct-22	697	6137	**8.81**
Nov-22	475	4185	**8.81**
Jan-23			
Mar-23	436	2548	**5.84**

OTTOTRACTIONS

2022-2023			
Name of the Consumer		**St. Thomas College, Ranni**	
Connected load	**16**	Consumer no	**1146070013641**
Tariff	LT-6A 3Ph	Section	**Ranny North**
Month	**kWh**	**Rs (Total)**	**Rs/kwh**
May-22	1272	10161	**7.99**
Jul-22	1393	16508	**11.85**
Sep-22	934	12235	**13.10**
Nov-22	865	11522	**13.32**
Jan-23			
Mar-23	1106	14123	**12.77**

2022-2023			
Name of the Consumer		**St. Thomas College, Ranni**	
Connected load	**35**	Consumer no	**1146079016949**
Tariff	LT-6A 3Ph	Section	**Ranny North**
Month	**kWh**	**Rs (Total)**	**Rs/kwh**
Apr-22	315	4124	**13.09**
May-22	242	3812	**15.75**
Jul-22	0	0	
Sep-22	271	4197	**15.49**
Oct-22	286	4066	**14.22**
Nov-22	320	4554	**14.22**
Jan-23	294	4178	**14.22**
Mar-23	271	4483	**16.54**

Diesel

The campus has a Diesel Generator. The details of Diesel consumption is given below.

Diesel Consumption Details				
	Transportation	Generator	Total	cost
	in L	in L	in L	in Rs
20-21	0	310	310	28800
21-22	0	323	323	30060
22-23	0	328	328	31200

OTTOTRACTIONS
Energy Engineering Environment

Annual Electricity Consumption (kWh)				
Consumer No	**2020-21**	**2021-22**	**2022-23**	Connected Load (kW)
1146072000540	210	672	993	2
1146071019877	5387	4487	516	6
1146079005428	2090	1164	1971	4
1146073013642	2446	2108	4731	16
1146070013641	3102	12628	13368	16
1146079016949	3476	3513	2999	35
1146076000773	4068	8099	3834	22
1146071019877	1445	1656	1468	6
Total	**20778**	**32671**	**29879**	**107**

Base Line Energy Data St. Thomas College, Ranni				
		2020-21	2021-22	2022-23
1	Electricity KSEB (kWh)	20778	32671	29879
2	Electricity DG (kWh)	929	970	985
3	Electricity Solar , Off grid (kWh)	0.00	0.00	0.00
4	Electricity (KSEB + DG + Off grid) kWh	21707	33641	30864
5	Electricity Grid Tied (kWh)	1214	1214	1278
6	Diesel (L)	0	0	0
7	LPG (kg)	60.00	75.00	75.00
8	Biogas (m3)	0.00	0.00	0.00

Energy Consumption Profile				
Sl No	Fuel	2020-21	2021-22	2022-23
		(kCal)		
1	Electricity	18667740	28931009	26543354
2	Diesel	0	0	0
3	LPG	720000	900000	900000
4	Biogas	0	0	0
Total		19387740	29831009	27443354

Solar Power Plant

Solar Power Plant			
Capacity (kWp)	Annual Generation		
	2020-21	2021-22	2022-23
1	1214	1214	1278

OTTOTRACTIONS
Energy Engineering Environment

Lighting

St. Thomas College, Ranni										
Sl.No	Location	Lights							Fans	
		LED-T	LED-B	LED-SQ	T8	T12	ICL	CFL	CF	EF
1	Principal	2		9					2	
2	Conf Hall	2			2				1	
3	Office	5			3				6	
4	Admn Room	1			4				3	
5	Manager					1			2	
6	Malayalam Dpmt	1							1	
7	3 Rooms	3							3	
8	4 Rooms					4			4	
9	9 Rooms					27			18	
10	Seminar Hall	3							6	1
11	4 Rooms				4				4	
12	Botany department					1			2	
13	Museum	1							2	
14	5 Classrooms	5							10	
15	Physics Department	2	1		2				5	
16	Computer lab				3				2	
17	3 Rooms							12	9	
18	3 Rooms	3							3	
19	3 Rooms				3				3	
20	English department	1				1			1	
21	6 Rooms				6				6	
22	Conf Hall		24						12	
23	3 Rooms						3		3	
24	Lab	3							4	
25	3 Departments	6			6				18	
26	6 Rooms				6				6	
27	9 Rooms	9							9	
28	4 Rooms							4	4	
29	3 Rooms	3							6	
30	2 Rooms				2				2	
31	3 Rooms	3							3	
32	5 Rooms				5				5	
33	Auditorium	8			18				13	
	Total	**61**	**25**	**9**	**64**	**34**	**3**	**16**	**178**	**1**

Lux Measurement

Sl. No:	Location	Lux Avg
1	Manager	69
2	Seminar Hall	77
3	Botany department	90
4	Museum	83
5	Physics Department	96
6	Computer lab	79
7	Lab	79
8	Auditorium	90

OTTOTRACTIONS
Energy Engineering Environment

6

Energy efficiency in utility and process system

The specific energy consumption is normally taken as the ratio of total energy consumed to the total are of building.

OTTOTRACTIONS- ENERGY AUDIT				
St. Thomas College, Ranni				
Energy Performance Index (EPI)				
Sl No	Particulars	2020-21	2021-22	2022-23
1	Total building area (m²)	8317	8317	8317
2	Annual Energy Consumption (kCal)	19387740	29831009	27443354
3	Annual Energy Consumption (kWh)	22544	34687	31911
4	Total Energy in Toe	1.94	2.98	2.74
5	Specific Energy Consumption kWh/m²	2.71	4.17	3.84

The Energy Performance Index (EPI) is

3.84 kWh/m²

The EPI of 2022-23 may be taken as benchmark.

7

Evaluation of energy management system

Energy management policy

There is no written energy policy available, but environment policy is available which includes energy conservation also. A draft energy management policy is given below. The management may constitute an energy management policy and display the same in the plant to motivate the staff.

ST. THOMAS COLLEGE RANNI,
RANNI

ENERGY POLICY

(Draft)

We are committed to optimally utilize various forms of energy in a cost effective manner to effect conservation of energy resources. We are committed to conserve the energy which is a scarce resource with the requisite consistency in the efficiency, effectiveness in the cost involved in the operations and ensuring that production quality and quantity, environment, safety, health of people are maintained. We are also committed to increase the renewable energy share of the total energy we use.

We are also committed to monitor continuously the saving achieved and reduce its specific energy consumption by minimum of 2% every year.

Date ----------

Head of the Institution

7.1. Energy management monitoring system

- **Energy Management Cell** has to be constituted with an objective to revise action plan for energy conservation thereby reducing the production cost.
- Energy conservation tips/ posters are displayed in crucial points.
- Use of renewable energy has to be encouraged.

7.2. Training to staff responsible for operational and Documentation.

- The staff and students need to be made more aware of the importance of energy saving and management.
- Log books shall be maintained to record Electricity Consumption and Diesel consumption.
- Meter reading shall be taken and compared with KSEB regularly.
- Better operating practices regarding appliances and fixtures should be taught to the staff.

7.3. Best Practices

- Have solid waste management program
- Conducted Green Audit.
- Have different social and environmental clubs
- Installed LED bulbs
- Conducted Energy Conservation Training Programs
- Installed Solar Power Plant

OTTOTRACTIONS
Energy Engineering Environment

8

Energy Conservation Measures and Recommendations

Executive Summary					
Consolidated Cost Benefit Analysis of Energy Efficiency Improvement Projects					
St. Thomas College, Ranni					
Sl No	Projects	Investment	Cost saving	SPB	Energy saved
		(Lakhs Rs)	(Rs)/Yr	Months	kWh/Yr
1	Energy Saving in Lighting by replacing existing 34 No's T12 (55W) Lamps to 18W LED Tube	0.10	0.07	16.96	902
2	Energy Saving in Lighting by replacing existing 64 No's T8 (40W) Lamps to 18W LED Tube	0.19	0.081	28.41	1014
3	Energy Saving in Lighting by replacing existing 16 No's CFL(15W) Lamps to 9W LED Bulb	0.01	0.006	31.25	69
4	Energy Saving by replacing existing 178 No's in-efficient ceiling fans with Energy Efficient Five star fans	5.34	0.335	191.33	4187
5	Installation of 20kWp Solar Power Plant	11.00	3.641	36.26	27375
	Total	**16.55**	**4.06**	**60.84**	**32644**
(The saving are projected as per the assumed operation time observed based in the discussions with the plant officials. The data of saving percentages are taken from BEE guide books and field measurements.)					

OTTOTRACTIONS
Energy Engineering Environment

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 1	
Energy Saving in Lighting by replacing existing 64 No's T8 (40W) Lamps to 18W LED Tube	
Existing Scenario	
64 numbers of T8(40 W) lamps were identified during the energy audit field survey in the facility. During discussion with officers it is observed that the average utility of these fittings are of 30%.	
Proposed System	
The existing T8 may be replaced to LED Tube of 18W in phased manner and the savings will be of 55% (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2400
No of fittings	64
Total load (kW)	2.56
Annual Energy Consumption (kWh)	1843
Expected Annual Energy saving for replacing all fittings (kWh)	1014
Cost of Power	8.00
Annual saving in Lakhs Rs (1st year)	0.08
Investment required for complete replacements [@Rs 300 per fittings](Lakhs Rs)	0.19
Simple Pay Back (in Months)	28.41

OTTOTRACTIONS
Energy Engineering Environment

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code	
Energy Saving in Lighting by replacing existing 34 No's T12 (55W) Lamps to 18W LED Tube	
Existing Scenario	
257 numbers of T12(55 W) lamps were identified during the energy audit field survey in the facility. During discussion with officers it is observed that the average utility of these fittings are of 30%.	
Proposed System	
The existing T12 may be replaced to LED Tube of 18W in phased manner and the savings will be of 67% (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2400
No of fittings	34
Total load (kW)	1.87
Annual Energy Consumption (kWh)	1346
Expected Annual Energy saving for replacing all fittings (kWh)	902
Cost of Power	8.00
Annual saving in Lakhs Rs (1st year)	0.07
Investment required for complete replacements [@Rs 300 per fittings](Lakhs Rs)	0.10
Simple Pay Back (in Months)	16.96

OTTOTRACTIONS
Energy Engineering Environment

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal	
Energy Saving by replacing existing 178 No's in-efficient ceiling fans with Energy Efficient Five star fans	
Existing Scenario	
There are 178 numbers of ceiling fans installed in the facility with minimum 8 hrs a day operation. All are conventional type and most of them are very old.	
Proposed System	
There is an energy saving opportunity in replace the existing fans with new five star labelled fans.The five star labelled fans give a savings up to 30% with higher service value (air delivery/watt).	
Financial Analysis	
Annual working hours (hrs)	2400
Total numbers of ordinary fans	178
Total load (kW)	12.46
Annual Energy Consumption (kWh)	14952
Expected Annual Energy saving, for total replacement(kWh)	4187
Cost of Power (Rs)	8.00
Annual saving in Lakhs Rs (1st year)	0.33
Investment required for a total replacement (Lakhs Rs)[@3000 Rs per Fan with 50W at full speed]	5.34
Simple Pay Back (in Months)	191.33

OTTOTRACTIONS
Energy Engineering Environment

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal	
Energy Saving in Lighting by replacing existing 16 No's CFL(15W) Lamps to 9W LED Bulb	
Existing Scenario	
24 numbers of CFL (15W) lamps were identified during the energy audit field survey in the facility. During discussion with officers it is observed that the average utility of these fittings are of 30%.	
Proposed System	
The existing CFL may be replaced to LED Bulb of 9W in phased manner and the savings will be of 40% (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2400
No of fittings	16
Total load (kW)	0.24
Annual Energy Consumption (kWh)	173
Expected Annual Energy saving for replacing all fittings (kWh)	69
Cost of Power	8.00
Annual saving in Lakhs Rs (1st year)	0.01
Investment required for complete replacements [@Rs 90 per fittings](Lakhs Rs)	0.01
Simple Pay Back (in Months)	31.25

Energy Saving Proposal	
Installation of 20kWp Solar Power Plant	
Existing Scenario	
There is a good potential of solar power electricity generation. The availability of sunlight is very high. There are some canopies available in the proposed site, but by having proper trimming of trees this may be avoided. If the SPVs are place in the roof top it will help improving RTTV (Roof Thermal Transmit Value) of the building.	
Proposed System	
It is proposed to have a Solar Power Plant of 10kW at the beginning stage. The state and central government is pushing and giving good assistance to the installation. It can be installed as an internal grid connected system which is much cheaper than off grid system. Now days the technology provides trouble free grid interactive and connected system. The installation will provide 25yrs trouble free generation with only 20% efficiency loss at the 25th year.	
Financial Analysis	
Proposed Solar installed Capacity (kW)	20
Total average kWh per day expected (3.5kWh/day average)	75.00
Total annual Generating Capacity (kWh)	27375
Cost of energy generated annually Lakhs Rs	3.64
Investment required (INR lakh)(Approx)	11.00
Simple Pay Back (in Months)	36.26
Life cycle in Yrs	25
Total Saving in Life Cycle (Approx) RS lakh	91.02

OTTOTRACTIONS

Technical Supplements

St. Thomas College, Ranni																
		Lights							Fans		IT			Others		
Sl.No	Location	LED-T	LED-B	LED-SQ	T8	T12	ICL	CFL	CF	EF	Printer	Projector	PC	TV	AC (1TR)	Fridge
1	Principal	2		9					2		1		1	1		
2	Conf Hall	2			2				1				1		1	
3	Office	5			3				6		2		2			
4	Admn Room	1			4				3		3		1			
5	Manager					1			2		1		1			
6	Malayalam Dpmt	1							1							
7	3 Rooms	3							3							
8	4 Rooms					4			4							
9	9 Rooms					27			18							
10	Seminar Hall	3							6	1		1				
11	4 Rooms				4				4							
12	Botany department					1			2		1		1			1
13	Museum	1							2				1			
14	5 Classrooms	5							10							
15	Physics Department	2	1		2				5			1	1			
16	Computer lab				3				2				5			
17	3 Rooms							12	9							
18	3 Rooms	3							3							
19	3 Rooms				3				3							

OTTOTRACTIONS

20	English department	1				1			1				1			
21	6 Rooms				6				6							
22	Conf Hall		24						12							
23	3 Rooms						3		3							
24	Lab	3							4		1		24			
25	3 Departments	6			6				18							
26	6 Rooms				6				6							
27	9 Rooms	9							9							
28	4 Rooms							4	4							
29	3 Rooms	3							6							
30	2 Rooms				2				2							
31	3 Rooms	3							3							
32	5 Rooms				5				5							
33	Auditorium	8			18				13							
	Total	**61**	**25**	**9**	**64**	**34**	**3**	**16**	**178**	**1**	**9**	**2**	**39**	**1**	**1**	**1**
	Wattage	**20**	**10**	**20**	**40**	**55**	**100**	**18**	**80**	**60**	**100**	**120**	**200**	**100**	**1200**	**1200**
	Power	**1220**	**250**	**180**	**2560**	**1870**	**300**	**288**	**14240**	**60**	**900**	**240**	**7800**	**100**	**1200**	**1200**

CALL 1912
CUSTOMER CARE 24X7
KSEB

Demand/Disconnection Notice
(As per Reg 122 of Supply Code 2014)
Ranny North Section
0473-5226355
KSEBL GSTIN 32AAECK2277NB21

C#:1146076000773

Bill#	: 4507220500065 773
Conn.Id	: 6732710
Name	: PRINCIPAL
	St Thomas CollageRa
C Status	: Connected
Pole	: T63_0
Trans	: RANNY COLLEGE
Meter#	: 0000000773
Bill Area	: MD1/1/59
Bill Date	: 01/05/2022
Due Date	: 11/05/2022
Disconn Dt	: 26/05/2022
Tariff	: LT-6A NDom
Purpose	: Educational Ins
S Deposit	: 7210
Meter(MM)Status	OK
Load	: 22 KW
C Demand	: 21.49 KVA
Phase	: 3
Prv Rd Dt	: 01/04/2022
Prs Rd Dt	: 01/05/2022
Mt Rd(OMF)	: 1

(3)

Prev. Payment

Prv Paid Dt : 12-04-2022
Prv Paid Amt : 5931

Readings & Cons

Unit	Curr	Prev	Cons	Avg
KWH/A/I	2021	1526	495	575

Bill Details

Fixed Charges	:	1430.00
Meter Rent	:	17.70
Energy Charges	:	2821.50
Duty	:	282.15
Round off	:	0.30
Bill Amount	:	4551.00
Surcharge	:	2.00
Payable	:	4553.00

4553/-

Remarks
Mtr Rent 15 CGST 9% 1.35 SGST 9% 1.35

Pay Online https://wss.kseb.in
BIJU D
Sub Engineer
SBM VI -1.36 /11000766
05-05-2022 9 49 43 AM

CALL 1912
CUSTOMER CARE 24X7
KSEB

Demand/Disconnection Notice
(As per Reg 122 of Supply Code 2014).
Ranny North Section
0473-5226355
KSEBL GSTIN 32AAECK2277NB21

C#:1146071019877

Bill#	: 4607220500086 19877
Conn.Id	: 12043471
Name	: THE MANAGER
	ST THOMAS COLLEGE
C Status	: Not Using
Pole	: 1AY 17/17
Trans	: KAIPPUZHA-KARIMKUTTY
Meter#	: 22129
Bill Area	: MD1/1/60
Bill Date	: 01/05/2022
Due Date	: 11/05/2022
Disconn Dt	: 26/05/2022
Tariff	: LT-6C NDom
Purpose	: ATM Counter
S Deposit	: 4578
Meter(MM)Status	DL
Load	: 6 KW
C Demand	: 5.3 KVA
Phase	: 3
Prv Status	: Average
Pvl Rd Dt	: 01/06/2020
Prv Rd Dt	: 01/04/2022
Prs Rd Dt	: 01/05/2022
Mt Rd(OMF)	: 1

(2)

Prev. Payment

Prv Paid Dt : 12-04-2022
Prv Paid Amt : 1098

DoorLock Details

Lst Dl Dt : 01-07-2020
Dl Count : 21

Readings & Cons

Unit	Curr	Prev	Cons	Avg
KWH/A/I		5735	0	0

Bill Details

Fixed Charges	:	1080.00
Meter Rent	:	17.70
Energy Charges	:	0.00
Duty	:	0.00
Round off	:	0.30
Bill Amount	:	1098.00
Advance	:	0.85
Surcharge	:	1.00
Payable	:	1099.00

1099/-

Remarks
Mtr Rent 15 CGST 9% 1.35 SGST 9% 1.35

Pay Online https://wss.kseb.in
BIJU D
Sub Engineer
SBM VI -1.36 /11...
05-05-2022 9 ...

CALL 1912

Demand/Disconnection Notice
(As per Reg 122 of Supply Code 2014)
Ranny North Section
0473-5226355
KSEBL GSTIN 32AAECK2277NB21

...1260721...

Bill#	4607220500699 2000
Conn.Id	6731715 540
Name	THE PRINCIPLE
	St Thomas CollegeRa
C Status	Connected
Pole	179_0
Trans	POOVATHUKUNNU
Meter#	0030871930
Bill Area	MD4/2/83
Bill Date	02/05/2022
Due Date	12/05/2022
Disconn Dt	27/05/2022
Tariff	LT-6A NDom
Purpose	Educational Ins
S Deposit	900
Meter(MM)Status	OK
Load	2 KW

(1)

Prs Rd Dt
Mt Rd(OMF)

01-04-2022
940

Lock Details

Lst Dl Dt : ...-07-2021
Dl Count : 4

Readings & Cons

Unit	Curr	Prev	Cons	Avg
KWH/A/I	3544	3265		

Bill Details

Duty
Round off
Advance
Surcharge
Payable : 1294.00

1294/-

Remarks

PRASAD GOPALAN
Meter Reader

CALL
1912
KSEB

Demand/Disconnection Notice
(As per Reg 122 of Supply Code 2014)
Ranny North Section
0473-5226355

C# 1146079011909

Bill# 4507220500086 16945
Conn Id 6798950
Name Principal
PATHANAMTHITTA
C Status Connected
Pole T63.0
Trans RANNY COLLEGE
Meter# 0211201577
Bill Area M01/1/56
Bill Date 01/05/2022
Due Date 11/05/2022
Disconn Dt 26/05/2022
Tariff LT-6A NDom
Purpose Educational Ins
S Deposit 6598
Meter(MM)Status OK
Load 35 KW
C Demand 35 KVA
Phase 3
Prv Rd Dt 01/04/2022
Prs Rd Dt 01/05/2022
Mt Rd(OMF) 1

(6)

Prev. Payment
Prv Paid Dt 12-04-2022
Prv Paid Amt 4124

Readings & Cons

Unit	Curr	Prev	Cons	Avg
KWH/A/I	43597	43755	242	118

Bill Details
Fixed Charges 2275.00
Meter Rent
Energy Charges
Duty 137.94
Round off

Bill Amount
Surcharge 2.00
Payable : 3812.00
3812

Remarks
Mtr Rent 15 CGST 9% 1.35 SGST 9% 1.35

Pay Online https://wss.kseb.in
BIJU D
Sub Engineer
SBM VI -1.36
05-05-2022 9 08 19 AM

CALL
1912
KSEB

Demand/Disconnection Notice
(As per Reg 122 of Supply Code 2014)
Ranny North Section
0473-5226355

C# 1146070013641

Bill# 4607220500087 13641
Conn Id 6786199
Name MANAGER
ST THOMAS CHURCHAA
C Status Connected
Pole IAY 17/17
Trans KAIPPUZHA
Meter# 15595131
Bill Area M01/1/E1
Bill Date 01/05/2022
Due Date 11/05/2022
Disconn Dt 26/05/2022
Tariff LT-7A Com
Purpose Hostel/Lodges/C
S Deposit 1705R
Meter(MM)Status OK
Load 16 KW
C Demand 16 KVA
Phase 3
Prv Rd Dt 01/04/2022
Prs Rd Dt 01/05/2022
Mt Rd(OMF) 1

(5)

Prev. Payment
Prv Paid Dt 12-04-2022
Prv Paid Amt 16508

Readings & Cons

Unit	Curr	Prev	Cons	Avg
KWh/A/I	39677	38905	772	1169

Bill Details
Fixed Charges
Meter Rent
Energy Charges
Duty
Round off

Bill Amount
Surcharge 6.00
Payable : 10161.00
10161

Remarks

Pay Online https://
BIJU D
Sub Eng.
SBM VI -1.36
05-05-2022 9

CALL
1912
KSEB

Demand/Disconnection Notice
(As per Reg 122 of Supply Code 2014)
Ranny North Section
0473-5226355
KSEBL GSTIN 32AAECK2277NEZY

C# 1146073013642

Bill# 4607220500093 13642
Conn Id 6786205
Name Manager
ST THOMAS CHURCHA
C Status Connected
Pole T63.0
Trans RANNY COLLEGE
Meter#
Bill Area M01/1/57
Bill Date 01/05/2022
Due Date 11/05/2022
Disconn Dt 26/05/2022
Tariff LT-6A NDom
Purpose Educational Ins
S Deposit 3306
Meter(MM)Status OK
Load 16 KW
C Demand 16 KVA
Phase 3
Prv Rd Dt 01/04/2022
Prs Rd Dt 01/05/2022
Mt Rd(OMF) 1

(4)

Prev. Payment
Prv Paid Dt 12-04-2022
Prv Paid Amt 2099

Readings & Cons

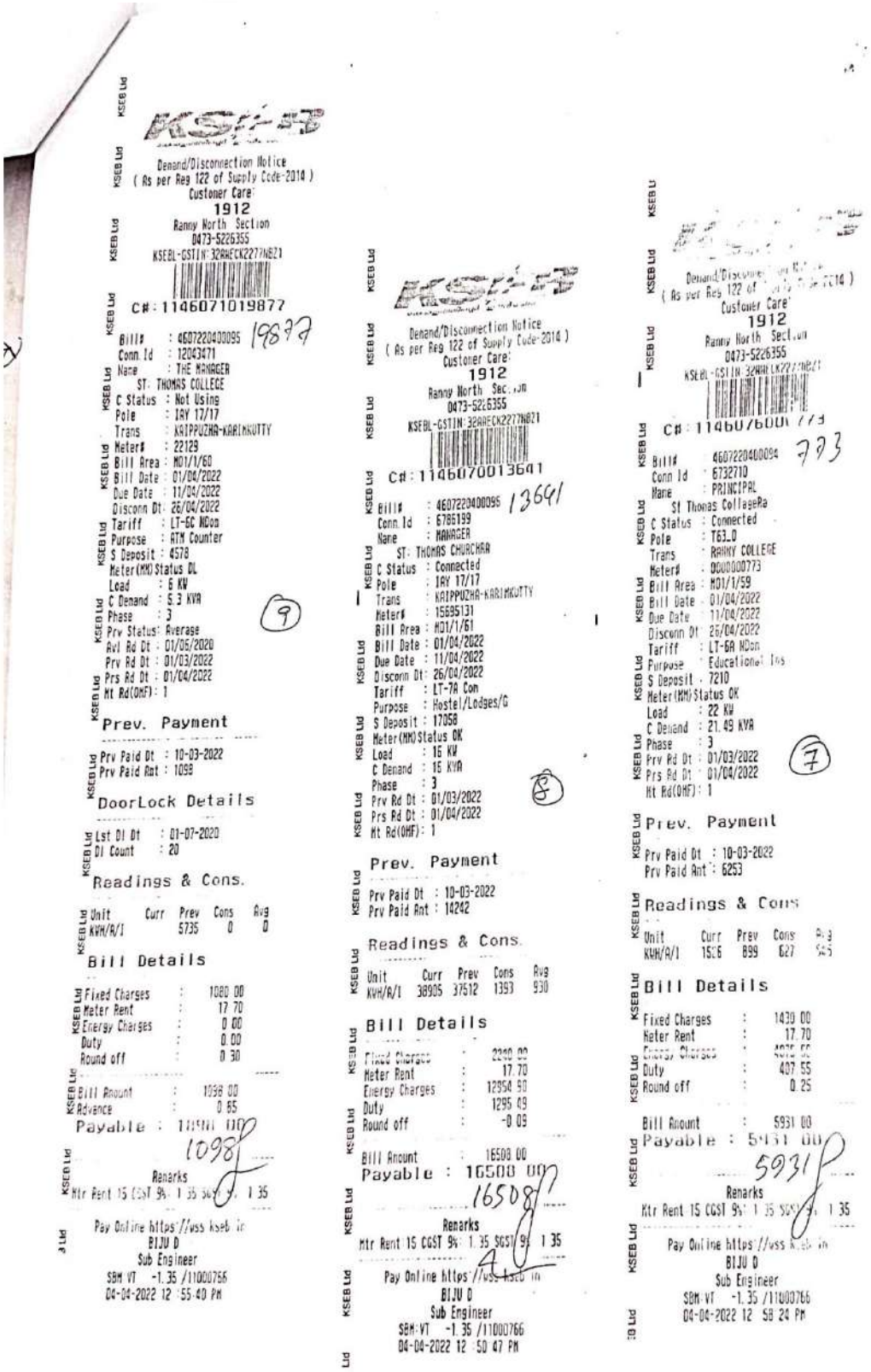
Unit	Curr	Prev	Cons	Avg
KWH/A/I	20561	20443	118	159

Bill Details
Fixed Charges
Meter Rent 17.70
Energy Charges 672.60
Duty 67.26
Round off 0.44

Bill Amount 1798.00
Surcharge 1.00
Payable : 1799.00
1799

Remarks
Mtr Rent 15 CGST 9% 1.35 SGST 9% 1.35

Pay Online https://wss.kseb.in
BIJU D
Sub Engineer
SBM VI -1.36
05-05-2022 9 44 35 AM



KSEB Ltd

Demand/Disconnection Notice
(As per Reg 122 of Supply Code-2014)
Customer Care
1912
Ranny North Section
0473-5226355
KSEBL-GSTIN:32AAECK2277N1Z1

C#: 1146071019877

Bill# : 4607220400095 19877
Conn.Id : 12043471
Name : THE MANAGER
ST. THOMAS COLLEGE
C Status : Not Using
Pole : IAY 17/17
Trans : KAIPPUZHA-KARIMKUTTY
Meter# : 22129
Bill Area : MD1/1/60
Bill Date : 01/04/2022
Due Date : 11/04/2022
Disconn Dt: 26/04/2022
Tariff : LT-6C NDom
Purpose : ATM Counter
S Deposit : 4578
Meter(MM)Status OK
Load : 6 KW
C Demand : 5.3 KVA
Phase : 3
Prv Status: Average
Avl Rd Dt : 01/05/2020
Prv Rd Dt : 01/03/2022
Prs Rd Dt : 01/04/2022
Mt Rd(OHF): 1

(9)

Prev. Payment

Prv Paid Dt : 10-03-2022
Prv Paid Amt : 1099

DoorLock Details

Lst DI Dt : 01-07-2020
DI Count : 20

Readings & Cons.

Unit	Curr	Prev	Cons	Avg
KWH/R/1	5735	0	0	0

Bill Details

Fixed Charges	:	1080 00
Meter Rent	:	17 70
Energy Charges	:	0 00
Duty	:	0 00
Round off	:	0 30
Bill Amount	:	1098 00
Advance	:	0 65

Payable : 1098 00
1098

Remarks
Mtr Rent 15 CGST 9% 1 35 SGST 9% 1 35

Pay Online https://wss.kseb.in
BIJU D
Sub Engineer
SBM-VT -1.35 /11000766
04-04-2022 12 :55:40 PM

KSEB Ltd

Demand/Disconnection Notice
(As per Reg 122 of Supply Code-2014)
Customer Care
1912
Ranny North Section
0473-5226355
KSEBL-GSTIN:32AAECK2277N1Z1

C#: 1146070013641

Bill# : 4607220400095 13641
Conn.Id : 6786199
Name : MANAGER
ST. THOMAS CHURCHAA
C Status : Connected
Pole : IAY 17/17
Trans : KAIPPUZHA-KARIMKUTTY
Meter# : 15695131
Bill Area : MD1/1/61
Bill Date : 01/04/2022
Due Date : 11/04/2022
Disconn Dt: 26/04/2022
Tariff : LT-7A Com
Purpose : Hostel/Lodges/G
S Deposit : 17058
Meter(MM)Status OK
Load : 15 KW
C Demand : 15 KVA
Phase : 3
Prv Rd Dt : 01/03/2022
Prs Rd Dt : 01/04/2022
Mt Rd(OHF): 1

(8)

Prev. Payment

Prv Paid Dt : 10-03-2022
Prv Paid Amt : 14242

Readings & Cons.

Unit	Curr	Prev	Cons	Avg
KWH/R/1	38905	37512	1393	930

Bill Details

Fixed Charges	:	2240 00
Meter Rent	:	17 70
Energy Charges	:	12954 90
Duty	:	1295 49
Round off	:	-0 09
Bill Amount	:	16508 00

Payable : 16508 00
16508

Remarks
Mtr Rent 15 CGST 9% 1 35 SGST 9% 1 35

Pay Online https://wss.kseb.in
BIJU D
Sub Engineer
SBM-VT -1.35 /11000766
04-04-2022 12 :50 47 PM

KSEB Ltd

Demand/Disconnection Notice
(As per Reg 122 of Supply Code-2014)
Customer Care
1912
Ranny North Section
0473-5226355
KSEBL-GSTIN:32AAECK2277N1Z1

C#: 1146076001 773

Bill# : 4607220400094 773
Conn.Id : 6732710
Name : PRINCIPAL
St Thomas CollegeRa
C Status : Connected
Pole : T63_0
Trans : RANNY COLLEGE
Meter# : 0000000773
Bill Area : MD1/1/59
Bill Date : 01/04/2022
Due Date : 11/04/2022
Disconn Dt: 26/04/2022
Tariff : LT-6A NDom
Purpose : Educational Ins
S Deposit : 7210
Meter(MM)Status OK
Load : 22 KW
C Demand : 21.49 KVA
Phase : 3
Prv Rd Dt : 01/03/2022
Prs Rd Dt : 01/04/2022
Mt Rd(OHF): 1

(7)

Prev. Payment

Prv Paid Dt : 10-03-2022
Prv Paid Amt : 6253

Readings & Cons.

Unit	Curr	Prev	Cons	Avg
KWH/R/1	1506	899	607	565

Bill Details

Fixed Charges	:	1439 00
Meter Rent	:	17 70
Energy Charges	:	4075 55
Duty	:	407 55
Round off	:	0 25
Bill Amount	:	5931 00

Payable : 5931 00
5931

Remarks
Mtr Rent 15 CGST 9% 1 35 SGST 9% 1 35

Pay Online https://wss.kseb.in
BIJU D
Sub Engineer
SBM-VT -1.35 /11000766
04-04-2022 12 :58 24 PM

Demand/Disconnection Notice
(As per Reg 122 of Supply Code 2014)
Customer Care
1912
Ranny North Sect ..
0473-5226355
KSEB GSTIN 32AAECK2277NBZ1

C#: 11460730136 42

Bill# : 4607220400092 13642
Conn Id : 6786205
Name : Manager
ST Thomas ChurchRa
C Status : Connected
Pole : T63_0
Trans : RANNY COLLEGE
Meter# : 0011202013
Bill Area : MD1/1/57
Bill Date : 01/04/2022
Due Date : 11/04/2022
Disconn Dt: 26/04/2022
Tariff : LT-6A NDon
Purpose : Educational Ins
S Deposit : 3306
Meter(MM) Status OK
Load : 16 KW
C Demand : 16 KVA
Phase : 3
Prv Rd Dt : 01/03/2022
Prs Rd Dt : 01/04/2022
Mt Rd(OMF): 1

4

Prev. Payment

Prv Paid Dt : 10-03-2022
Prv Paid Amt : 2374

Readings & Cons

Unit	Curr	Prev	Cons	Avg
KWH/A/I	20443	20277	166	140

Bill Details

Fixed Charges	:	1040 00
Meter Rent	:	17 70
Energy Charges	:	946 20
Duty	:	94 62
Round off	:	0 48
Bill Amount	:	2099 00
Payable	:	2099 00

2099

Remarks
Mtr Rent 15 CCST 9% 1 35 SGST 9% 1 35

Pay Online https://wss.kseb.in
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Sub Engineer
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Demand/Disconnection Notice
(As per Reg 122 of Supply Code 2014)
Customer Care
1912
Ranny North Sect ..
0473-5226355
KSEB GSTIN 32AAECK2277NBZ1

C#: 11460790169 49

Bill# : 4607220400093 16949
Conn Id : 6798950
Name : Principal
PATHANAMTHITTA
C Status : Connected
Pole : T63_0
Trans : RANNY COLLEGE
Meter# : 0011201577
Bill Area : MD1/1/58
Bill Date : 01/04/2022
Due Date : 11/04/2022
Disconn Dt: 26/04/2022
Tariff : LT-6A NDon
Purpose : Educational Ins
S Deposit : 6598
Meter(MM) Status OK
Load : 35 KW
C Demand : 35 KVA
Phase : 3
Prv Rd Dt : 01/03/2022
Prs Rd Dt : 01/04/2022
Mt Rd(OMF): 1

5

Prev. Payment

Prv Paid Dt : 10-03-2022
Prv Paid Amt : 4011

Readings & Cons

Unit	Curr	Prev	Cons	Avg
KWH/A/I	43755	43463	292	316

Bill Details

Fixed Charges	:	2275 00
Meter Rent	:	17 70
Energy Charges	:	1664 40
Duty	:	166 44
Round off	:	0 46
Bill Amount	:	4124 00
Payable	:	4124 00

4124

Remarks
Mtr Rent 15 CCST 9% 1 35 SGST 9% 1 35

Pay Online https://wss.kseb.in
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Sub Engineer
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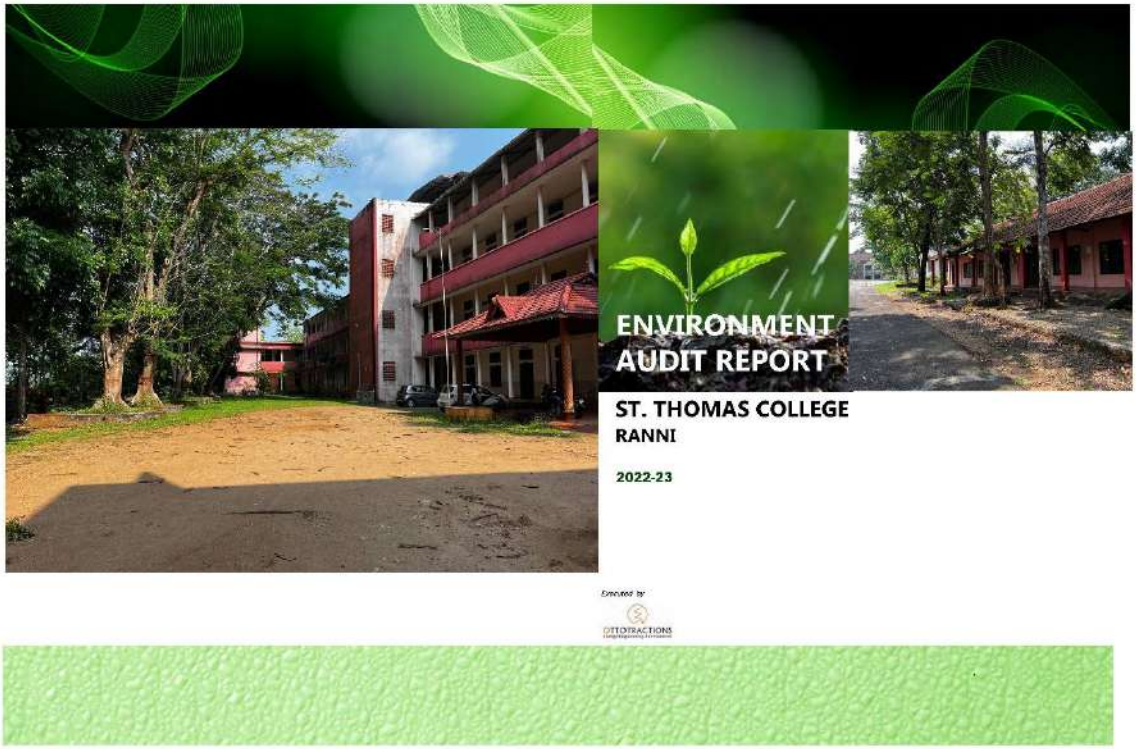
Report- Environment Audit

2020-2023



ENVIRONMENT AUDIT REPORT

ST. THOMAS COLLEGE

RANNI

OTTOTRACTIONS
Energy-Engineering-Environment

Environment Audit Report
ST. THOMAS COLLEGE, RANNI
EA 1004, 2023

Audit Team

Ottotractions

1	Er. Suresh Babu B V,	Accredited Energy Auditor, AEA 33
2	Er. B. Zachariah,	Director, Ottotractions
3	Er. Abin Baby,	Project Engineer,
4	Er. Joemon J S	Project Engineer,
5	Ms.Amrutha	Data Analyst
6	Ms.Anjana	Project Assistant

About OTTOTRACTIONS

OTTOTRACTIONS established in 2005, is an organization with proven track record and knowledge in the field of energy, engineering, and environmental services. They are the first Accredited Energy Auditor from Kerala for conducting Mandatory Energy Audits in Designated Consumers as per Energy Conservation Act-2001. Government of Kerala recognized and appreciated OTTOTRACTIONS by presenting its prestigious "The Kerala State Energy Conservation Award 2009" for the best performance as an Energy Auditor. Ottotractions is an ISO 9001-2015 and ISO 14001-2015 Certified organization, which ensures the quality of its services.

Acknowledgment

We were privileged to work together with the administration and staff of St. Thomas College, Ranni for their timely help extended to complete the audit and bringing out this report.

With gratitude, we acknowledge the diligent effort and commitments of all those who have helped to bring out this report.

We also take this opportunity to thank the bona-fide efforts of team OTTOTRACTIONS for unstinted support in carrying out this audit.

We thank our consultants, engineers and backup staff for their dedication to bring this report.

Thank you.

B V Suresh Babu
Accredited Energy Auditor
AEA 33, Bureau of Energy Efficiency
Government of India

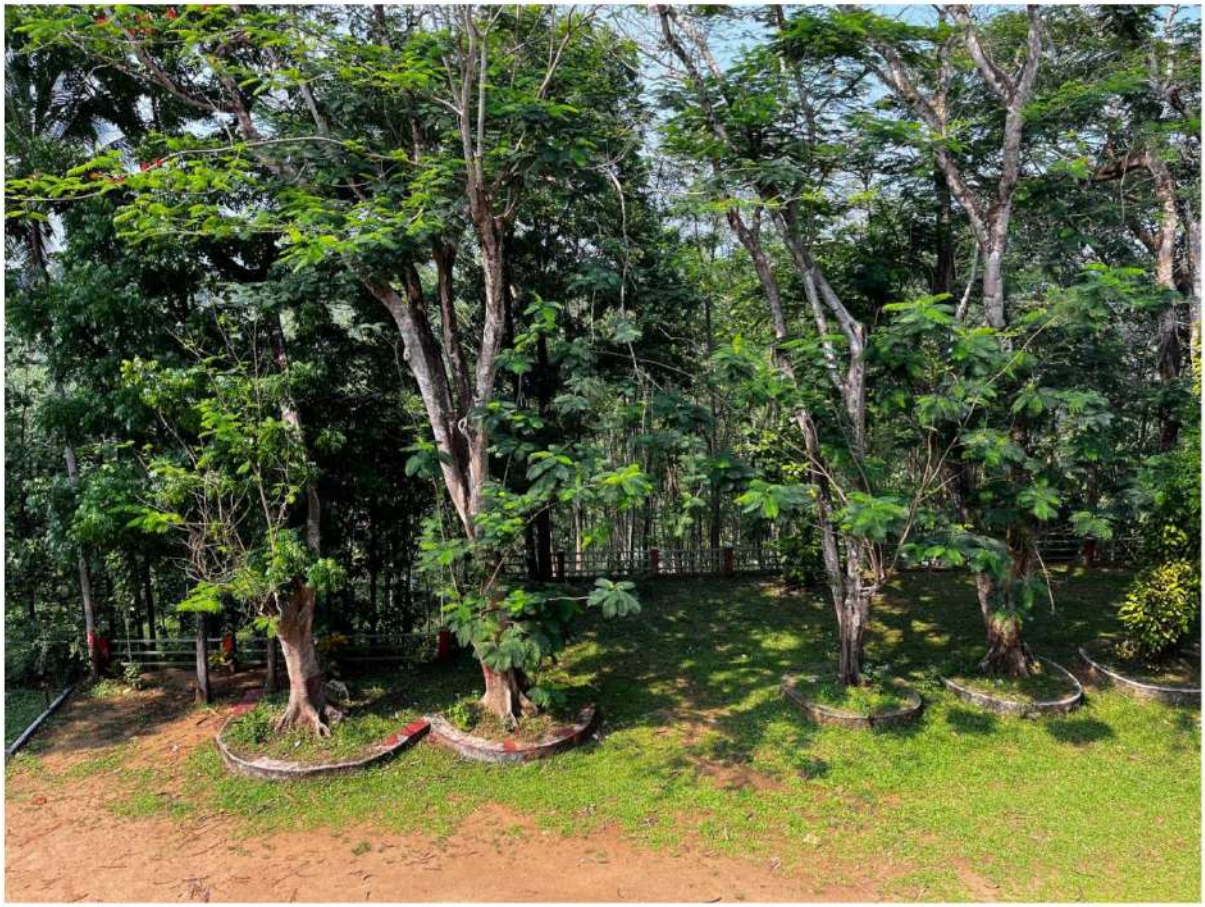
Contents

OTTOTRACTIONS
Energy-Engineering-Environment

INTRODUCTION

St. Thomas College, Ranni has entrusted Ottotractions to carry out an environment audit of their campus building.

Each section contains recommendations for improvements relating to environmental issues, which are consolidated in the action plan in section 4.



BACKGROUND

The history of the college is embedded in the history of Ranni. The college is situated on the top of a serene hill, in a sylvan surrounding, away from the din and bustle of the city, easily accessible and is at a walkable distance from the heart of Ranni town. The college was established in 1964, as a junior college by St Thomas Valiyapally Ranni, a pioneer parish of the Syrian Knanaya Arch Diocese of

Malankara, with the whole hearted support of the then Bishop late lamented His Excellency Abraham Mor Clemis to meet the educational needs of the youth of the local community. The college was upgraded to a first grade college in 1968 and is the only institution for higher education in this part of the country. When the de-linking of Pre Degree sector was made possible by the government on administrative measures we were left with graduate and Post Graduate courses. During its 53 years of illustrious existence, the college gave birth to brilliant academicians, administrators, politicians and entrepreneurs.

The college aims at creating cultured and educated citizens who love God and their country. With its rural background and `Gurukula' atmosphere, the college fosters uninterrupted pursuit of knowledge. The first Principal, Late Prof. K. A. Mathew, served as minister and PSC member in the Kerala State. He played a vital role in upgrading the junior college to a first grade one in 1968. As the Golden Jubilee project St. Thomas College of Advanced Studies, Edamury, Ranni, a Self Financing College affiliated to M.G. University, Kottayam was established in June 2014. In March 2016, the College was assessed and re-accredited in the second cycle by the National Assessment and Accreditation Council (NAAC) of UGC and graded at B level.

Occupancy Details			
Particulars	2020-21	2021-22	2022-23
Total Students	900	881	805
Staffs	64	64	64
Total Occupancy of the college	964	945	869

Total student strength of the campus is 805. For calculating per capita carbon emission estimation, the student strength is taken into account.

OTTOTRACTIONS
Energy-Engineering-Environment

ENVIRONMENTAL ISSUES

This section is broken down into the following different areas: waste, water, energy, resource and materials use and procurement. A final 'other' section is also included for any additional issues.

1.1. Waste

The way communities generate and manage their waste plays an absolutely key role in their ability to use resources efficiently. All buildings contain bins for both general waste and mixed recyclables (plastic bottles, card, cans and paper). On average each floor in the buildings areas has its own general waste bin and one recycling bin. When the bins are emptied by the cleaning staff. Bins are marked and kept in different colors for identification, however in some locations throughout the building it was unclear which bins were for which waste streams.

There are four basic ways in which campus can do **plastic** recycling **collection** services for **plastic** bottles and containers – curbside, drop-off, buy-back or deposit/refund programs. The first, and most widely accessible, **collection** method is curbside **collection** of recyclables. The campus is installed bins to collect plastic bottles and single use plastics. The college has given a proper awareness on plastic waste problems and they are discouraging the students or teachers to carry plastics to the campus. The Bhoomitra Sena Club is very active in the campus and do a verity of programs to build awareness on waste management. The reports on different activities of the club are attached as technical supplement of this report.

The major concern of waste management will be focused on the solid waste produced by the campus. Solid wastes produced in the campus are mainly of three types, food waste, paper waste, and plastic waste. Food wastes produced in the campus are mainly by two means. The vegetable wastes produced in the kitchen during the food preparation. The food waste produced by the students and staffs of

the campus after the consumption of meals. The degradable waste is treated in the biogas plant, the biogas generated is used in the kitchen. A state of art sewage treatment plant is installed in the campus

Degradable Waste Generation			
St. Thomas College, Ranni			
Particulars	2020-21	2021-22	2022-23
Total Occupancy	964	945	869
Waste generated in kg /day	19.28	18.9	17.38
Waste generated in kg /Yr	4241.6	4158	3823.6

Burning plastics shall be strictly restricted inside the campus. **Burning plastic** and other wastes releases dangerous substances such as heavy metals, Persistent Organic Pollutants, and other toxics into the air and ash waste residues. Such pollutants contribute to the development of asthma, cancer, endocrine disruption, and the global burden of disease.

Solid non degradable Waste Generation			
St. Thomas College, Ranni			
Particulars	2020-21	2021-22	2022-23
Total Occupancy	964	945	869
Waste paper generated in kg /day	0.1928	0.189	0.1738
Waste plastic generated in kg /day	0.2892	0.2835	0.2607
Waste paper generated in kg /Yr	42.42	41.58	38.24
Waste plastic generated in kg /Yr	63.62	62.37	57.35

WASTE MINIMIZATION AND RECYCLING		
1	Does your institute generate any waste?	Yes, Solid waste, Canteen waste, paper, plastic, Horticulture Waste etc.
	If so, what are they?	
2	What is the approximate amount of waste generated per day? (in Kilograms/) (approx.)	19
3	How is the waste generated in the institute managed? By	Reuse of one side printed Paper for internal communication. Kitchen waste is used to generate manures and biogas. Two types of Waste bins are provided at campus for biodegradable and non-biodegradable waste.

	1	Composting	In-house
	2	Recycling	In-house
	3	Reusing	In-house
	4	Others (specify)	
4	Do you use recycled paper in institute?		Yes
5	Do you use reused paper in institute?		Yes
6	How would you spread the message of recycling to others in the community? Have you taken any initiatives? If yes, please specify.		Number of awareness programs through Nature Club, Biodiversity Club and NSS Camp
7	Can you achieve zero garbage in your institute? If yes, how?		Not yet achieved. Possible through waste management plan.

Green Cover Audit			
1	**Is there a garden in your institute?**	**Yes**	
2	Do students spend time in the garden?	Yes	
3	Total number of Plants in Campus	Plant type	Approx. number
		Trees	236
		Ornamental	Not estimated
4	Number of Tree Plantation Drives organized by School per annum. (If Any)	Yes, through Nature Club and Biodiversity club plantation drives are organized.	
5	Number of Trees Planted in Last FY.	30	
	Survival Rate	90%	

All the activities including energy consumption and waste management have their equivalent carbon emission and they positively contribute to the carbon footprint of the campus. Carbon sequestration is the reverse process, at which the emitted carbon dioxide will get sequestrated according to the type of carbon sequestration employed. Even though there are many natural sequestration processes are involved in a campus, the major type of sequestration among them is the carbon sequestration by trees.

Trees sequestrate carbon dioxide through the biochemical process of photosynthesis and it is stored as carbon in their trunk, branches, leaves and roots. The amount of carbon sequestrated by a tree can be calculated by different methods. In this study,

the volumetric approach was taken into account, thus the details including CBH (Circumference at Breast Height), height, average age, and total number of the trees, are required. Detailed table is included in the technical supplement.

Carbon Sequestration			
Particulars	2020-21	2021-22	2022-23
Total No of Trees	236	236	236
Carbon sequestrated by trees in the campus (tCO2e)	6.4	7.1	7.50

Carbon sequestrated by a tree can be found out by using different methods. Since this study is employed the volumetric approach, the calculation consists of five processes.

- Determining the total weight of the tree
- Determining the dry weight of the tree
- Determining the weight of carbon in the tree
- Determining the weight of CO_2 sequestrated in the tree
- Determining the weight of CO_2 sequestrated in the tree per year

Carbon sequestrated by each species of trees in the campus compound is given in the Table. Detailed calculation results are listed out in the tables provided in the technical supplements of 'Carbon sequestration'.

List of Trees and Plants		
Sl. No.	English Name	QTY
1	Jackfruit Tree	12
2	Mango	9
3	Ashoka Tree	1
4	BulletWood	2
5	Teak	84
6	Coconut	21
7	Wild Jack	7
8	Royal Princiana	4
9	Mahagony	38
10	Soursop Tree	7
11	Golden Shower Tree	8
12	Guava Tree	10
13	Rambutan	3
14	Copper Pod	3
15	False Ashoka	6
16	Caturina	1
17	Ornamental Palm	10
18	All Spice	1
19	Pride of India	2
20	Papaya	2
21	Bay Leaf	1
22	Persian Silk Tree	1
23	Araucaria	1
24	Hyophorbe	1
25	Sand Paper Tree	1
Total		236

3.1.1 ENERGY

a. Electricity

The total emission of the carbon dioxide per student is 22.21 kg per year. Emission reduction plans were prepared to bring the existing per capita carbon footprint to zero or below so as to bring the campus a carbon neutral or carbon negative campus. All energy efficiency projects shall be implemented, So, the effective specific carbon emission per student is -6.44kg of CO_2 per year only

This can be achieved in many ways but, every alternate plan must be in such a way that, it must fulfill the actual purpose of each activity that is considered.

Here, three major methods are taken in to account as the plans for reducing the carbon emission of the campus.

- Resource optimization
- Energy efficiency
- Renewable energy

Electricity Consumption

Electricity Connection Details		
St. Thomas College, Ranni		
1	Name of the Consumer	St. Thomas College, Ranni
2	Tariff	LT-6A 3Ph
3	Consumer Numbers	1146072000540, 1146071019877, 1146079005428, 1146073013642, 1146070013641, 1146079016949, 1146076000773, 1146071019877
5	Connected Load Total (kW)	107
6	Annual Electricity Consumption (kWh)	29879

Annual Electricity Consumption (kWh)				
Consumer No	**2020-21**	**2021-22**	**2022-23**	Connected Load (kW)
1146072000540	210	672	993	2
1146071019877	5387	4487	516	6
1146079005428	2090	1164	1971	4
1146073013642	2446	2108	4731	16
1146070013641	3102	12628	13368	16
1146079016949	3476	3513	2999	35
1146076000773	4068	8099	3834	22
1146071019877	1445	1656	1468	6
Total	**20778**	**32671**	**29879**	**107**

RESOURCE OPTIMISATION

The effective use of resources can limit its unnecessary wastage. Optimal usage of the resources (such as fuels) can save the fuel and can also reduce the carbon emission due to its consumption. This technique can be effectively implemented in the 'transportation' and 'waste' sectors of the campus.

WASTE MINIMISATION

Optimal utilization of paper and plastic stationaries can reduce the frequency of purchase of items. This can reduce the unnecessary wastage of money as well as the excess production of waste. In the case of food, proper food habits and housekeeping practices can optimize its usage.

Currently, College is taking an appreciable effort to reduce the unnecessary production of wastes. But the campus still has opportunities to reduce the generation of waste and can improve much more. Resource optimization can be effectively implemented in all type of waste generated in the campus and the campus can expect about 50% reduction the total waste produced.

ENERGY EFFICIENCY

Energy efficiency is the practice of reducing the energy requirements while achieving the required energy output. Energy efficiency can be effectively implemented in all the sectors of the campus.

FUELS FOR COOKING

The campus can install a solar water heater to rise the water temperature to a much higher level, then it has to consume only very less amount of thermal energy for preparing the same amount of food. This can make a positive benefit to the campus by saving money, energy and can reduce the carbon emission of the campus due to thermal energy consumed for cooking.

TRANSPORTATION

Energy efficiency of the transportation sector is mainly depended on the fuel efficiency of the vehicles used. Here mileage of the vehicle (kmpl - Kilometres per Litre) is calculated to assess the fuel efficiency of the vehicle. Percentage of closeness is the ratio of actual mileage of the vehicle to its expected mileage. If the percentage of closeness of mileages of each vehicle is greater than that of its average, then the efficiency status of the vehicle is considered as 'Above average' and else, it is considered as 'Below average'

Renewable Energy

1kWp Solar power plant is installed in the campus which helps offsetting the carbon foot print. The details of these projects are given in the concerned chapters.

After analyzing the historical and measured data the following projects are proposed to make the campus carbon neutral. The projects are from energy efficiency and renewable energy. The further additions in the green cover increase will also give positive impact in the carbon mitigation.

OTTOTRACTIONS- ENERGY AUDIT						
St. Thomas College, Ranni						
Greenhouse Gas Mitigation through Major Energy Efficiency Projects						
Sl No	Projects	Energy saved(Yearly)		Sustainability (Years)	First year ton of CO2 mitigated	Expected Tons of CO2 mitigated through out life cycle
		(kWh)	MWh	Years		
1	Energy Saving in Lighting by replacing existing 34 No's T12 (55W) Lamps to 18W LED Tube	902	0.90	10	0.66	6.59
2	Energy Saving in Lighting by replacing existing 64 No's T8 (40W) Lamps to 18W LED Tube	1014	1.01	10	0.74	7.40
3	Energy Saving in Lighting by replacing existing 16 No's CFL(15W) Lamps to 9W LED Bulb	69	0.07	10	0.05	0.50
4	Energy Saving by replacing existing 178 No's in-efficient ceiling fans with Energy Efficient Five star fans	4187	4.19	10	3.06	30.56
Total		**6172**	**6**	**10**	**4.51**	**45.05**

OTTOTRACTIONS- ENERGY AUDIT						
St. Thomas College, Ranni						
Greenhouse Gas Mitigation through Renewable Energy Projects						
Sl No	Projects	Energy saved(Yearly)		Sustainability (Years)	First year ton of CO2 mitigated	Expected Tons of CO2 mitigated through out life cycle
		(kWh)	MWh	Years		
1	Installation of 20kWp Solar Power Plant	27375	27.38	25	19.98	499.59
	Total	27375	27	25	19.98	500

OTTOTRACTIONS
Energy-Engineering-Environment

General Environmental Awareness Questionnaire	
Are you aware of any environmental Laws pertaining to different aspects of environmental management?	Yes
Does your institute have any rules to protect the environment? List possible rules you could include.	Yes
Dose Environmental Ambient Air Quality Monitoring conducted by the Institute?	No
Dose Environmental Water and Wastewater Quality monitoring conducted by the Institute?	Yes
Dose stack monitoring of DG sets conducted by the Institute?	No
Is any warning notice, letter issued by state government bodies?	No
Dose any Hazardous waste generated by the Institute? If yes explain its category and disposal method	No
Are you aware of any environmental Laws pertaining to different aspects of environmental management?	Yes
Does your institute have any rules to protect the environment? List possible rules you could include.	Yes
Does housekeeping schedule in your campus?	Yes
Are students and faculties aware of environmental cleanliness ways? If Yes Explain	Yes
Does Important Days Like World Environment Day, Earth Day, and Ozone Day etc. eminent in Campus?	Yes
Does Institute participate in National and Local Environmental Protection Movement?	Yes
Does the institute have any Recognition/certification for environment friendliness?	No
Does the institute use renewable energy?	Yes
Does the Institution conduct a green/environmental audit of its campus?	Yes
Has the institution been audited / accredited by any other agency such as NABL, NABET, TQPM, NAAC etc.?	Yes (NAAC)

Best Practices and Initiatives	
Renewable Energy	Yes
Solar Power Plant	Yes
Energy Audit and Green Audit Conducted	Yes
Biogas Plant installed	No
Biodiversity Conservation	Yes
Green Cover	Yes
Tree Plantation Drives	Yes
ECO clubs	Yes
Groundwater Recharge	Yes
Rain Water Harvesting System.	Yes
Pollution Reduction Public Transportation	Yes
E Waste Management	Yes
Connected to authorized recycler	Yes
Solid Waste Management	Yes
Lifting of garbage from the campus on alternate days by the Municipal Corporation.	No
Adoption of Village	Yes
CSR	Yes
Water Conservation	Yes
Energy Conservation	Yes

OTTOTRACTIONS
Energy-Engineering-Environment

RECOMMENDATIONS

1. Implement a utility monitoring program.
   - Allocate staff to carry out meter readings for electricity, waste and water on regular basis
   - Add monitoring data to spreadsheet so results can be viewed graphically
   - Compare with the utility bills meter readings in order to ensure accuracy;
2. Consider adopting and implementing a sustainable procurement policy which takes into account the whole life cycle of a product, and make sure environmental issues are written into tenders when contracting out.

3. Consider trialing recycled paper again – many recycled brands today, such as Evolve, are just as good as virgin paper.
4. Trial the use of re-manufactured (i.e., refilled) ink and toner cartridges rather than purchasing new ones.
5. Consider producing some designated 'environmental' pages on the intranet to make it easier for staff to find environmental information. If possible, a discussion forum could be set up to allow easy internal communications and staff to make suggestions for environmental improvements.
6. Environmental training could be formalized and carried out for all staff. It does not have to be too long or onerous, providing it covers key points, particularly in relation to waste so all staff are aware of the legal requirements. At the very least, environmental information should be included in the induction pack.
7. It is strongly recommended that environmental information is also given to students and staff during induction. It is particularly important for them to be aware of what waste they can dispose of on site and where they can dispose of it, and what waste streams they must take away with them.
8. Consider implementing an environmental management system to incorporate all improvements and monitoring requirements. It does not need to be a complex system certified to any particular standard, merely a way of ensuring that baselines are set and progress is measured. Formation of Environment Policy and communicated to all faculties and other staff.
9. Plan for Zero Waste Campus Project
10. E-waste monthly inventory be maintained at campus as per E waste rules 2016.
11. A Water Meter should be installed at the institute for monitoring of water consumption per capita.
12. Increase in Environmental promotional activities for spreading awareness at campus.
13. Environment/Green committee formation for regulating eco-friendly initiatives at campus premises and periphery.

OTTOTRACTIONS
Energy-Engineering-Environment

CONCLUSION

This audit involved extensive consultation with all the campus team, interactions with key personnel on a wide range of issues related to Environmental aspects. The audit has identified several observations for making the campus premise more environmentally friendly. The recommendations are also mentioned with observations for St. Thomas college, Ranni team to initiate actions.

OTTOTRACTIONS
Energy-Engineering-Environment

Carbon Foot Print							
Sl. No.	Particulars	2020-21	tCO2e	2021-22	tCO2e	2022-23	tCO2e
1	Electricity (kWh)	21707	17.80	33641	27.59	30864	25.31
2	Diesel (L)	0	0	0	0.00	0	0.00
3	LPG (kg)	60.00	0	75.00	0.11	75.00	0.11
4	Biogas (m3)	0.00	0	0.00	0.00	0.00	0.000
5	Degradable Waste in kg/yr.	4241.6	3	4158	2.62	3823.6	2.41
6	Paper Waste in kg/yr	42.42	0	41.58	0.02	38.24	0.02
Total Carbon Foot Print tCO2e/yr			20.59		30.34		27.85

Net Carbon Emission after implementing Energy Efficiency projects and Renewable Energy Projects Proposed		
1	Total Carbon Foot Print tCO2e/yr	27.85
2	Carbon Sequestrated tCO2e/yr	7.50
3	Carbon mitigated by Renewable Energy tCO2e/yr (Installed)	1.05
4	Carbon mitigated by Renewable Energy tCO2e/yr (Proposed)	19.98
5	Carbon mitigated by Energy Efficiency (Proposed) tCO2e/yr	4.51
6	Effective Carbon footprint tCO2e/yr	-5.18
7	Total No of Students	805
8	Specific Carbon Footprint kg CO2e/Student/Yr	-6.44

However, there is scope for further improvement, particularly in relation to waste minimization and energy monitoring. By implementing a basic environmental management system, current good practice can be formalized and a framework can be set up for monitoring, implementation of action plans and continual improvement.

The audit team observed that the overall site is maintained well from an environmental perspective. There are no major observations but few things are important to initiate urgently are waste management records by monthly inventory of hazardous waste, rainwater harvesting recharge; water balance cycle and periodic inspection of buildings; environment policy and initiation of composting at campus.

References

- The Environment [Protection] Act – 1986 (Amended 1991) & Rules-1986 (Amended 2010)
- The Petroleum Act: 1934 – The Petroleum Rules: 2002
- The Central Motor Vehicle Act: 1988 (Amended 2011) and The Central Motor Vehicle
- Rules:1989 (Amended in 2005)
- Energy Conservation Act 2010.
- The Water [Prevention & Control Of Pollution] Act – 1974 (Amended 1988) & the Water (Prevention & Control of Pollution) Rules – 1975
- The Water [Prevention & Control Of Pollution] Cess Act-1977 (Amended 2003) and Rules- 1978
- The Air [Prevention & Control Of Pollution] Act – 1981 (Amended 1987) The Air (Prevention & Control of Pollution) Rules – 1982
- The Gas Cylinders Rules – 2016 (Replaces the Gas Cylinder Rules – 1981
- E-waste management rules 2016
- Electrical Act 2003 (Amended 2001) / Rules 1956 (Amended 2006)
- The Hazardous Waste (Management and Handling and Trans-boundary Movement) Rules, 2008 (Amended 2016)
- The Noise Pollution Regulation & Control rules, 2000 (Amended 2010)
- The Batteries (Management and Handling) rules, 2001 (Amended 2010)
- Relevant Indian Standard Code practices

OTTOTRACTIONS
Energy-Engineering-Environment

TECHNICAL SUPPLEMENTS

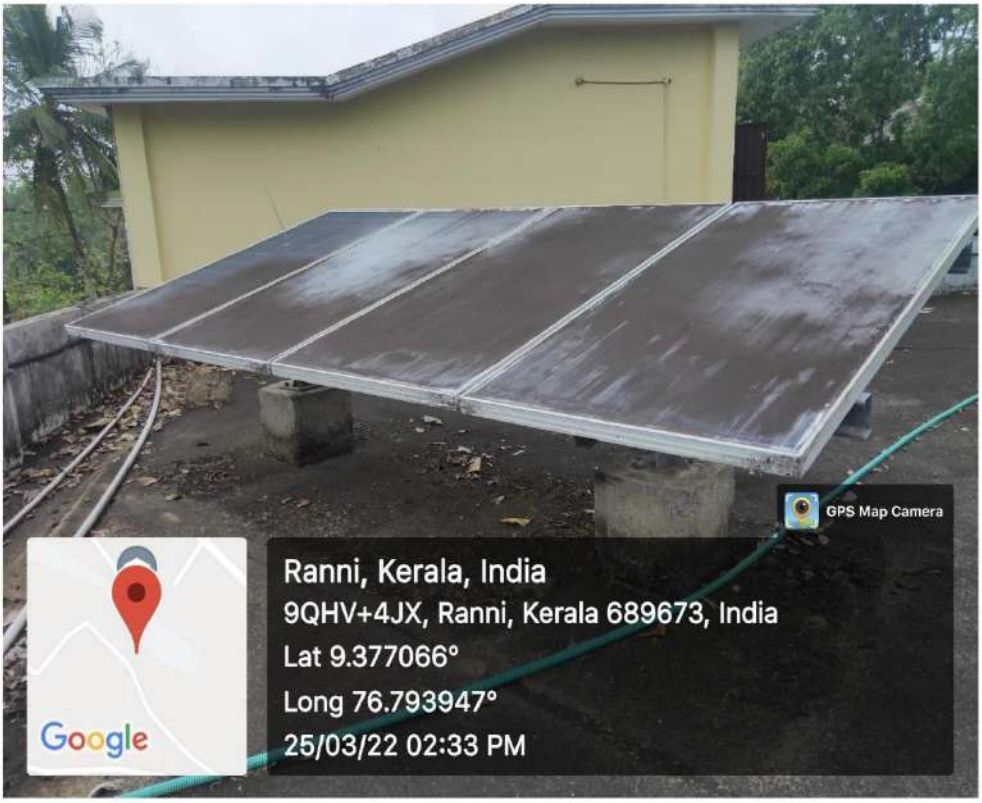
St. Thomas College, Ranni
Pazhavangadi P.O., Kerala, India - 689673
RE-ACCREDITED BY NAAC AT B LEVEL
(Affiliated to Mahatma Gandhi University, Kottayam - Kerala)

7.1.2 Facilities for alternate sources of energy and energy conservation measures in the Institution

Photographs of the facilities for alternate sources of energy

Ph : 04735-226238, 226738 (O)
E-mail : stcranni@gmail.com, www.stcranni.ac.in

Solar Plant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Ranni, Kerala, India
9QHV+4JX, Ranni, Kerala 689673, India
Lat 9.377066°
Long 76.793947°
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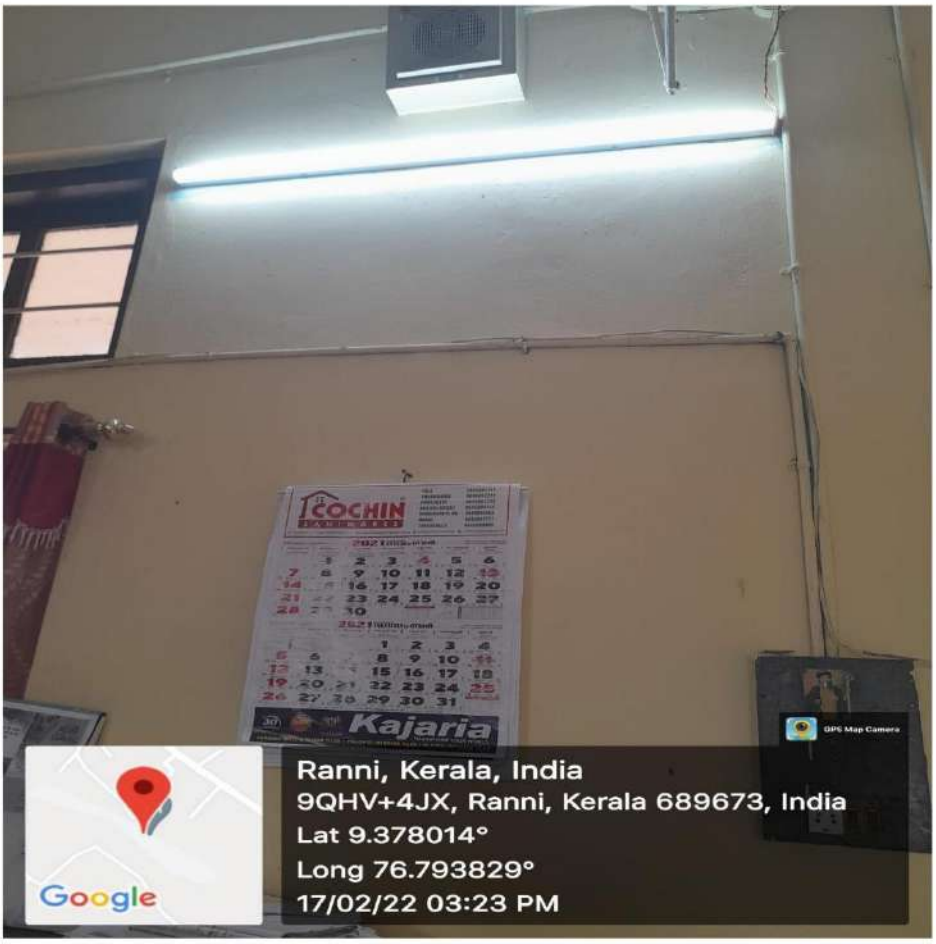
Google

LED tube light



Biogas Plant

Sl. No.	Scientific name	Malayalam name	English Name	No.
1.	*Artocarpus heterophyllus*	പ്ലാവ്	JACKFRUIT TREE	12
2.	*Mangifera indica*	മാവ്	MANGO	9
3.	*Saracaasoca*	അശോകം	ASHOKA TREE	1
4.	*Mimusposelengi*	ഇലഞ്ഞി	BULLET WOOD	2
5.	*Tectona grandis*	തേക്ക്	TEAK	84
6.	*Cocos nucifera*	തെങ്ങ്	COCONUT TREE	21
7.	*Artocarpus hirsutus*	ആഞ്ഞിലി	WILD JACK	7
8.	*Delonix regia*	ഗുൽമോഹർ	ROYAL PRINCIANA	4
9.	*Swietenia macrophylla*	മഹാഗണി	MAHAGONY	38
10.	*Annona muricata*	മുള്ളാത്ത	SOURSOP TREE	7
11.	*Cassia fistula*	കണിക്കൊന്ന	GOLDEN SHOWER TREE	8
12.	*Psidium guajava*	പേര	GUAVA TREE	10
13.	*Nephelium lappaceum*	റംബുട്ടാൻ	RAMBUTAN	3
14.	*Peltophorum pterocarpum*	മഞ്ഞവാക	COPPER POD	3
15.	*Polyathia longifolia*	അരണമരം	FALSE ASHOKA	6
16.	*Casuarina equisetifolia*	ചൂള	CATURINA	1
17.	*Palmacaea*	അലങ്കാര പന	ORNAMENTAL PALM	10
18.	*Pimenta dioica*	സർവ്വസുഗന്ധി	ALL SPICE	1
19.	*Lagerstroemia speciosa*	മണിമരുത്	PRIDE OF INDIA	2
20.	*Caruca papaya*	പപ്പായ	PAPAYA	2
21.	*Cinnamumum verum*	വഴന	BAY LEAF	1
22.	*Albizia julibrissin*	പൂവാക	PERSIAN SILK TREE	1
23.	*Araucaria heterophylla*	ഒരകേറിയ	ARAUCARIA	1
24.	*Palmacaea*	അലങ്കാര പന	HYOPHORBE	1
25.	*Ficus exasperata*	തേരകം	SAND PAPER TREE	1

KSEB

CALL 1912

Demand/Disconnection Notice
(As per Reg 122 of Supply Code-2014)
Ranny North Section
0473-5226355
KSEBL-GSTIN-32AAECK2277M1Z1

C#: 1146076000773

Bill#	: 4607220500085
Conn Id	: 6732710
Name	: PRINCIPAL
	St Thomas CollageRa
C Status	: Connected
Pole	: T63_0
Trans	: RANNY COLLEGE
Meter#	: 0000000773
Bill Area	: MD1/1/59
Bill Date	: 01/05/2022
Due Date	: 11/05/2022
Disconn Dt	: 26/05/2022
Tariff	: LT-6A NDom
Purpose	: Educational Ins
S Deposit	: 7210
Meter(KW)	Status OK
Load	: 22 KW
C Demand	: 21.49 KVA
Phase	: 3
Prv Rd Dt	: 01/04/2022
Prs Rd Dt	: 01/05/2022
Mt Rd(CMF)	: 1

Prev. Payment

Prv Paid Dt	: 12-04-2022
Prv Paid Amt	: 5931

Readings & Cons

Unit	Curr	Prev	Cons	Avg
KWH/R/I	2021	1526	495	575

Bill Details

Fixed Charges	:	1430 00
Meter Rent	:	17 70
Energy Charges	:	2621 52
Duty	:	282 15
Round off	:	0 70
Bill Amount	:	4551 00
Surcharge	:	2 00
Payable	:	4553 00

Remarks
Mtr Rent 15 CGST 9% 1 35 SGST 9% 1 35

Pay Online https://ess.kseb.in
BIJU D
Sub Engineer
SBM VT -1 36 /1100076b
05-05-2022 9 49 43 AM

KSEB

CALL 1912

Demand/Disconnection Notice
(As per Reg 122 of Supply Code-2014)
Ranny North Section
0473-5226355
KSEBL-GSTIN-32AAECK2277M1Z1

C#: 1146071019877

Bill#	: 4607220500086
Conn Id	: 12043471
Name	: THE MANAGER
	ST THOMAS COLLEGE
C Status	: Not Using
Pole	: 18Y 17/17
Trans	: KAIPPUZHA-KARIMKUTTY
Meter#	: 22129
Bill Area	: MD1/1/60
Bill Date	: 01/05/2022
Due Date	: 11/05/2022
Disconn Dt	: 26/05/2022
Tariff	: LT-6C NDom
Purpose	: ATM Counter
S Deposit	: 4578
Meter(KW)	Status OK
Load	: 6 KW
C Demand	: 5.3 KVA
Phase	: 3
Prv Status	: Average
Avl Rd Dt	: 01/05/2020
Prv Rd Dt	: 01/04/2022
Prs Rd Dt	: 01/05/2022
Mt Rd(CMF)	: 1

Prev. Payment

Prv Paid Dt	: 12-04-2022
Prv Paid Amt	: 1098

DoorLock Details

Lst DI Dt	: 01-07-2020
DI Count	: 21

Readings & Cons

Unit	Curr	Prev	Cons	Avg
KWH/R/I		5735	0	0

Bill Details

Fixed Charges	:	1060 00
Meter Rent	:	17 70
Energy Charges	:	0 00
Duty	:	0 00
Round off	:	5 30
Bill Amount	:	1098 00
Advance	:	0 85
Surcharge	:	1 00
Payable	:	1099 00

Remarks
Mtr Rent 15 CGST 9% 1 35 SGST 9% 1 35

Pay Online https://ess.kseb.in
BIJU D
Sub Engineer
SBM VT -1 36 /1100076b
05-05-2022 9 49 43 AM

KSEB

CALL 1912

Ranny North Section
0473-5226355

Bill#	4607220500699
Conn Id	6731715
Name	THE PRINCIPLE
	St Thomas CollegeRa
C Status	Connected
Pole	179_0
Trans	POOVATHUKUNNU
Meter#	0030871990
Bill Area	MD4/2/83
Bill Date	02/05/2022
Due Date	12/05/2022
Disconn Dt	27/05/2022
Tariff	LT-6A NDom
Purpose	Educational Ins
S Deposit	900
Meter(KW)	Status OK
Load	2 KW
C Demand	1.490
Phase	3
Prv Status	Average
Avl Rd Dt	01/04/2020
Prv Rd Dt	01/04/2022
Prs Rd Dt	01/05/2022
Mt Rd(CMF)	1

Prev. Payment

Prv Paid Dt	01-04-2022
Prv Paid Amt	940

DoorLock Details

Lst DI Dt	13-07-2021
DI Count	4

Readings & Cons

Unit	Curr	Prev	Cons	Avg
KWH/R/I	3344	3265	79	1

Bill Details

Fixed Charges	:	1430 00
Meter Rent	:	17 70
Energy Charges	:	0 00
Duty	:	0 00
Round off	:	5 30
Bill Amount	:	1294 00
Advance	:	0 85
Surcharge	:	1 00
Payable	:	1295 00

Remarks

Pay Online https://ess.kseb.in
PRASAD GOPALAN
Meter Reader
SBM VT -1 36 /1100076b
05-05-2022 9 49 43 AM

CALL 1912
KSEB

Demand/Disconnection Notice
(As per Reg 122 of Supply Code 2014)
Ranny North Section
0473-5226355
KSEBL GSTIN [illegible]

C# 1146079011909

Bill# 4507220500086 16945
Conn Id 6798950
Name Principal
PATHANAMTHITTA
C Status Connected
Pole T63.0
Trans RANNY COLLEGE
Meter# 0211201577
Bill Area M01/1/56
Bill Date 01/05/2022
Due Date 11/05/2022
Disconn Dt 26/05/2022
Tariff LT-6A NDom
Purpose Educational Ins
S Deposit 6598
Meter(MM)Status OK
Load 35 KW
C Demand 35 KVA
Phase 3
Prv Rd Dt 01/04/2022
Prs Rd Dt 01/05/2022
Mt Rd(OMF) 1

(6)

Prev. Payment

Prv Paid Dt 12-04-2022
Prv Paid Amt 4124

Readings & Cons

Unit	Curr	Prev	Cons	Avg
KWh/A/I	43597	43755	[illegible]	[illegible]

Bill Details

Fixed Charges	2275.00
Meter Rent	[illegible]
Energy Charges	1379.20
Duty	137.94
Round off	-0.04
Bill Amount	3810.00
Surcharge	2.00
Payable :	3812.00

3812

Remarks
Mtr Rent 15 CGST 9% 1.35 SGST 9% 1.35

Pay Online https://wss.kseb.in
BIJU D
Sub Engineer
SBM V1 -1.36 /11020111
05-05-2022 9:08:19 AM

CALL 1912
KSEB

Demand/Disconnection Notice
(As per Reg 122 of Supply Code 2014)
Ranny North Section
0473-5226355
KSEBL GSTIN 32AAECK2277N0Z1

C# 1146070013641

Bill# 4507220500087 13641
Conn Id 6786199
Name MANAGER
ST THOMAS CHURCHAA
C Status Connected
Pole IAY 17/17
Trans KAIPPUZHA KARIMKUTTY
Meter# 15595131
Bill Area M01/1/E1
Bill Date 01/05/2022
Due Date 11/05/2022
Disconn Dt 26/05/2022
Tariff LT-7A Com
Purpose Hostel/Lodges/G
S Deposit 1705R
Meter(MM)Status OK
Load 16 KW
C Demand 15 KVA
Phase 3
Prv Rd Dt 01/04/2022
Prs Rd Dt 01/05/2022
Mt Rd(OMF) 1

(5)

Prev. Payment

Prv Paid Dt 12-04-2022
Prv Paid Amt 16508

Readings & Cons

Unit	Curr	Prev	Cons	Avg
KWh/A/I	39677	38905	772	1169

Bill Details

Fixed Charges	[illegible]
Meter Rent	[illegible]
Energy Charges	[illegible]
Duty	717.96
Round off	[illegible]
Bill Amount	101[illegible]
Surcharge	6.00
Payable :	101[illegible]

10161

Remarks
Mtr Rent 15 CGST 9% [illegible] 1.35

Pay Online https://[illegible]
BIJU D
Sub Engineer
SBM V1 -1.36
05-05-2022 9 [illegible]

CALL 1912
KSEB

Demand/Disconnection Notice
(As per Reg 122 of Supply Code 2014)
Ranny North Section
0473-5226355
KSEBL GSTIN 32AAECK2277N0Z1

C# 1146073013642

Bill# 4507220500093 13642
Conn Id [illegible]5205
Name [illegible]
ST [illegible] CHURCH
C Status Connected
Pole T63.6
Trans RANNY COLLEGE
Meter# [illegible]
Bill Area M01/1/57
Bill Date 01/05/2022
Due Date 11/05/2022
Disconn Dt 26/05/2022
Tariff LT-6A NDom
Purpose Educational Ins
S Deposit 3306
Meter(MM)Status OK
Load 16 KW
C Demand 16 KVA
Phase 3
Prv Rd Dt 01/04/2022
Prs Rd Dt 01/05/2022
Mt Rd(OMF) 1

(4)

Prev. Payment

Prv Paid Dt 12-04-2022
Prv Paid Amt 2099

Readings & Cons

Unit	Curr	Prev	Cons	Avg
KWh/A/I	20561	20443	118	159

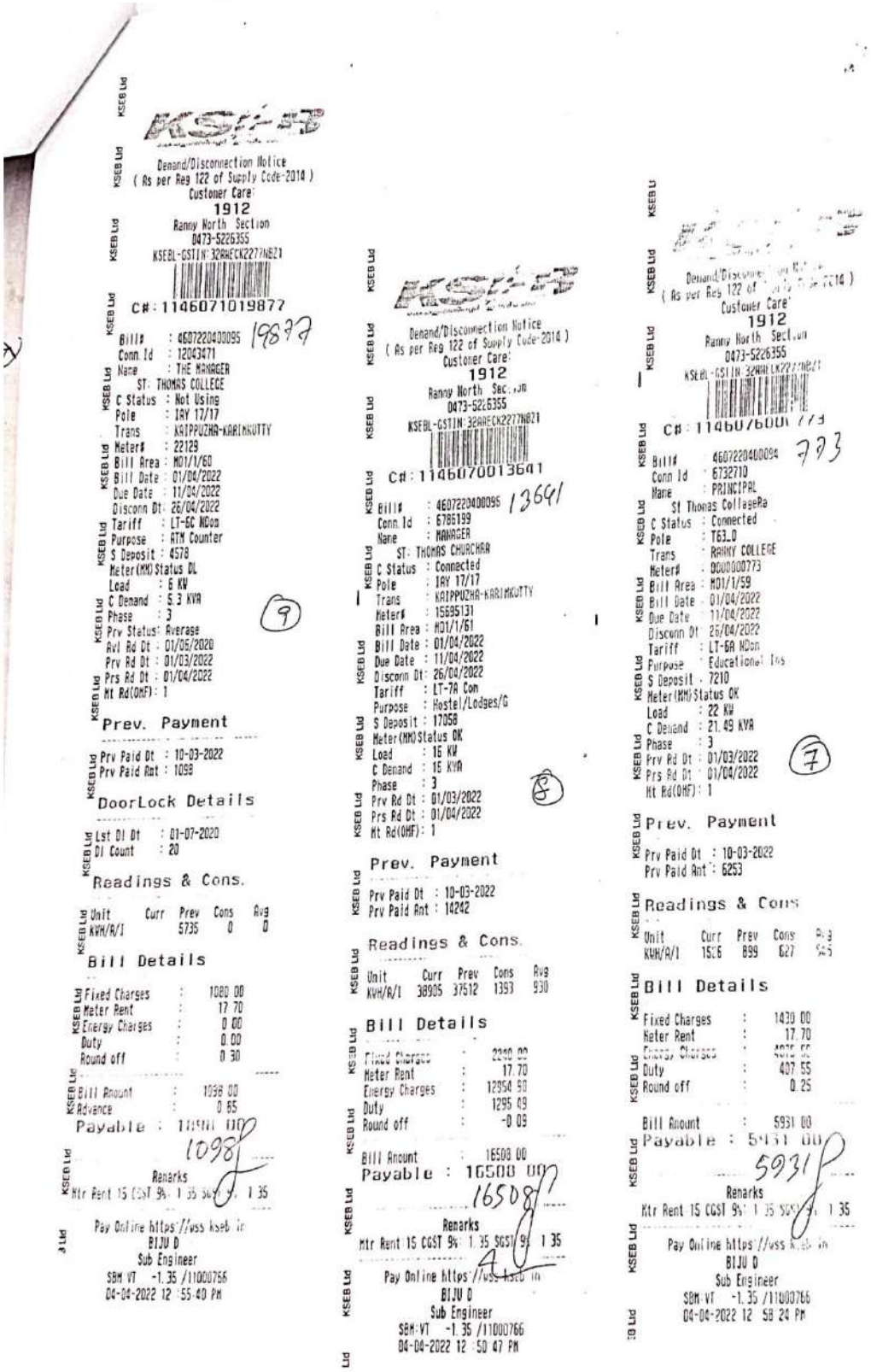
Bill Details

Fixed Charges	[illegible]
Meter Rent	17.70
Energy Charges	672.60
Duty	67.26
Round off	0.44
Bill Amount	1798.00
Surcharge	1.00
Payable :	1799.00

1799

Remarks
Mtr Rent 15 CGST 9% 1.35 SGST 9% 1.35

Pay Online https://wss.kseb.in
BIJU D
Sub Engineer
SBM V1 -1.36 /11020111
05-05-2022 9:04:35 AM



KSEB Ltd

Demand/Disconnection Notice
(As per Reg 122 of Supply Code-2014)
Customer Care
1912
Ranny North Section
0473-5226355
KSEBL-GSTIN:32AAECK2277N8Z1

C#: 1146071019877

Bill# : 4607220400095 19877
Conn.Id : 12043471
Name : THE MANAGER
ST. THOMAS COLLEGE
C Status : Not Using
Pole : IAY 17/17
Trans : KAIPPUZHA-KARIMKUTTY
Meter# : 22129
Bill Area : MD1/1/60
Bill Date : 01/04/2022
Due Date : 11/04/2022
Disconn Dt: 26/04/2022
Tariff : LT-6C NDom
Purpose : ATM Counter
S Deposit : 4578
Meter(MM)Status OL
Load : 6 KW
C Demand : 5.3 KVA
Phase : 3
Prv Status: Average
Avl Rd Dt : 01/05/2020
Prv Rd Dt : 01/03/2022
Prs Rd Dt : 01/04/2022
Mt Rd(OHF): 1

(9)

Prev. Payment

Prv Paid Dt : 10-03-2022
Prv Paid Amt : 1099

DoorLock Details

Lst DI Dt : 01-07-2020
DI Count : 20

Readings & Cons.

Unit	Curr	Prev	Cons	Avg
KWH/R/1	5735	0	0	0

Bill Details

Fixed Charges	:	1080 00
Meter Rent	:	17 70
Energy Charges	:	0 00
Duty	:	0 00
Round off	:	0 30
Bill Amount	:	1098 00
Advance	:	0 65

Payable : 1098 00 1098

Remarks
Mtr Rent 15 CGST 9% 1 35 SGST 9% 1 35

Pay Online https://wss.kseb.in
BIJU D
Sub Engineer
SBM VT -1.35 /11000766
04-04-2022 12 :55:40 PM

KSEB Ltd

Demand/Disconnection Notice
(As per Reg 122 of Supply Code-2014)
Customer Care
1912
Ranny North Section
0473-5226355
KSEBL-GSTIN:32AAECK2277N8Z1

C#: 1146070013641

Bill# : 4607220400095 13641
Conn.Id : 6786199
Name : MANAGER
ST. THOMAS CHURCHAA
C Status : Connected
Pole : IAY 17/17
Trans : KAIPPUZHA-KARIMKUTTY
Meter# : 15695131
Bill Area : MD1/1/61
Bill Date : 01/04/2022
Due Date : 11/04/2022
Disconn Dt: 26/04/2022
Tariff : LT-7A Com
Purpose : Hostel/Lodges/G
S Deposit : 17058
Meter(MM)Status OK
Load : 15 KW
C Demand : 15 KVA
Phase : 3
Prv Rd Dt : 01/03/2022
Prs Rd Dt : 01/04/2022
Mt Rd(OHF): 1

(8)

Prev. Payment

Prv Paid Dt : 10-03-2022
Prv Paid Amt : 14242

Readings & Cons.

Unit	Curr	Prev	Cons	Avg
KWH/R/1	38905	37512	1393	930

Bill Details

Fixed Charges	:	2280 00
Meter Rent	:	17 70
Energy Charges	:	12954 90
Duty	:	1295 49
Round off	:	-0 09
Bill Amount	:	16500 00

Payable : 16500 00 16508

Remarks
Mtr Rent 15 CGST 9% 1 35 SGST 9% 1 35

Pay Online https://wss.kseb.in
BIJU D
Sub Engineer
SBM VT -1.35 /11000766
04-04-2022 12 :50 47 PM

KSEB Ltd

Demand/Disconnection Notice
(As per Reg 122 of Supply Code-2014)
Customer Care
1912
Ranny North Section
0473-5226355
KSEBL-GSTIN:32AAECK2277N8Z1

C#: 1146076001 773

Bill# : 4607220400094 773
Conn.Id : 6732710
Name : PRINCIPAL
St Thomas CollegeRa
C Status : Connected
Pole : T63_0
Trans : RANNY COLLEGE
Meter# : 0000000773
Bill Area : MD1/1/59
Bill Date : 01/04/2022
Due Date : 11/04/2022
Disconn Dt: 26/04/2022
Tariff : LT-6A NDom
Purpose : Educational Ins
S Deposit : 7210
Meter(MM)Status OK
Load : 22 KW
C Demand : 21.49 KVA
Phase : 3
Prv Rd Dt : 01/03/2022
Prs Rd Dt : 01/04/2022
Mt Rd(OHF): 1

(7)

Prev. Payment

Prv Paid Dt : 10-03-2022
Prv Paid Amt : 6253

Readings & Cons.

Unit	Curr	Prev	Cons	Avg
KWH/R/1	1526	899	627	565

Bill Details

Fixed Charges	:	1439 00
Meter Rent	:	17 70
Energy Charges	:	4975 55
Duty	:	497 55
Round off	:	0 25
Bill Amount	:	5931 00

Payable : 5931 00 5931

Remarks
Mtr Rent 15 CGST 9% 1 35 SGST 9% 1 35

Pay Online https://wss.kseb.in
BIJU D
Sub Engineer
SBM VT -1.35 /11000766
04-04-2022 12 :58 24 PM

Demand/Disconnection Notice
(As per Reg 122 of Supply Code 2014)
Customer Care
1912
Ranny North Sect ..n
0473-5226355
KSEB GSTIN 32AAECK2277NBZ1

C#: 11460730136 42

Bill# : 4607220400092 13642
Conn Id : 6786205
Name : Manager
ST Thomas ChurchRa
C Status : Connected
Pole : T63_0
Trans : RANNY COLLEGE
Meter# : 0011202013
Bill Area : MD1/1/57
Bill Date : 01/04/2022
Due Date : 11/04/2022
Disconn Dt: 26/04/2022
Tariff : LT-6A NDon
Purpose : Educational Ins
S Deposit : 3306
Meter(MM) Status OK
Load : 16 KW
C Demand : 16 KVA
Phase : 3
Prv Rd Dt : 01/03/2022
Prs Rd Dt : 01/04/2022
Mt Rd(OMF): 1

4

Prev. Payment

Prv Paid Dt : 10-03-2022
Prv Paid Amt : 2374

Readings & Cons

Unit	Curr	Prev	Cons	Avg
KWH/A/I	20443	20277	166	140

Bill Details

Fixed Charges	:	1040 00
Meter Rent	:	17 70
Energy Charges	:	946 20
Duty	:	94 62
Round off	:	0 48
Bill Amount	:	2099 00
Payable	:	2099 00

2099

Remarks
Mtr Rent 15 CCST 9% 1 35 SGST 9% 1 35

Pay Online https://wss.kseb.in
BIJU D
Sub Engineer
SBM-VT -1.35 /11000766
04-04-2022 12:53:27 PM

Demand/Disconnection Notice
(As per Reg 122 of Supply Code 2014)
Customer Care
1912
Ranny North Sect ..n
0473-5226355
KSEB GSTIN 32AAECK2277NBZ1

C#: 11460790169 49

Bill# : 4607220400093 16949
Conn Id : 6798950
Name : Principal
PATHANAMTHITTA
C Status : Connected
Pole : T63_0
Trans : RANNY COLLEGE
Meter# : 0011201577
Bill Area : MD1/1/58
Bill Date : 01/04/2022
Due Date : 11/04/2022
Disconn Dt: 26/04/2022
Tariff : LT-6A NDon
Purpose : Educational Ins
S Deposit : 6598
Meter(MM) Status OK
Load : 35 KW
C Demand : 35 KVA
Phase : 3
Prv Rd Dt : 01/03/2022
Prs Rd Dt : 01/04/2022
Mt Rd(OMF): 1

5

Prev. Payment

Prv Paid Dt : 10-03-2022
Prv Paid Amt : 4011

Readings & Cons

Unit	Curr	Prev	Cons	Avg
KWH/A/I	43755	43463	292	316

Bill Details

Fixed Charges	:	2275 00
Meter Rent	:	17 70
Energy Charges	:	1664 40
Duty	:	166 41
Round off	:	0 49
Bill Amount	:	4124 00
Payable	:	4124 00

4124

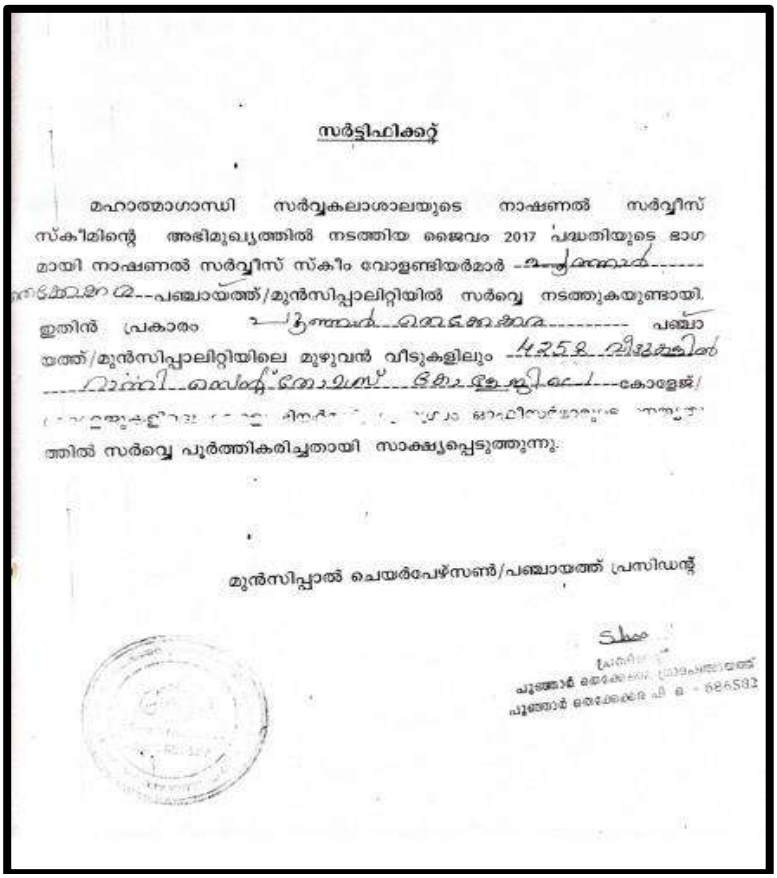
Remarks
Mtr Rent 15 CCST 9% 1 35 SGST 9% 1 35

Pay Online https://wss.kseb.in
BIJU D
Sub Engineer
SBM-VT -1.35 /11000766
04-04-2022 12:55:10 PM

BEYOND THE CAMPUS ENVIRONMENT CARE INITIATIVE

2017-18

Jaiva Saksharathayajnam	
Organising Department/ Agency	Date
NSS in collaboration with Mahatma Gandhi University	**August/September 2017**



സർട്ടിഫിക്കറ്റ്

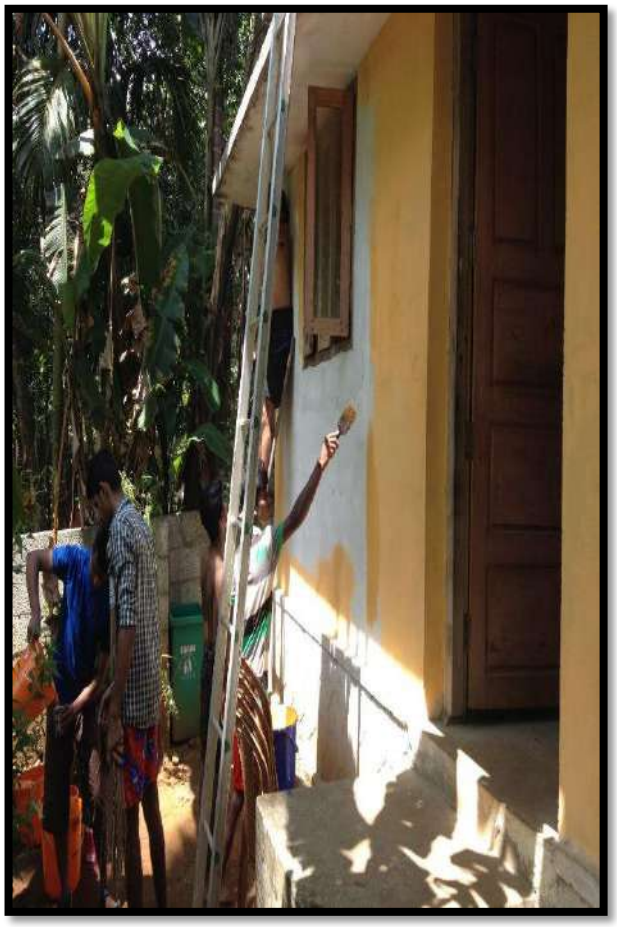
മഹാത്മാഗാന്ധി സർവ്വകലാശാലയുടെ നാഷണൽ സർവ്വീസ് സ്കീമിന്റെ അഭിമുഖ്യത്തിൽ നടത്തിയ ജൈവം 2017 പദ്ധതിയുടെ ഭാഗമായി നാഷണൽ സർവ്വീസ് സ്കീം വോളണ്ടിയർമാർ ---പഞ്ചായത്ത്/മുൻസിപ്പാലിറ്റിയിൽ സർവ്വെ നടത്തുകയുണ്ടായി. ഇതിൻ പ്രകാരം ---പഞ്ചായത്ത്/മുൻസിപ്പാലിറ്റിയിലെ മുഴുവൻ വീടുകളിലും 4252 വീടുകളിൽ ---കോളേജ് ത്തിൽ സർവ്വെ പൂർത്തികരിച്ചതായി സാക്ഷ്യപ്പെടുത്തുന്നു.

മുൻസിപ്പാൽ ചെയർപേഴ്സൺ/പഞ്ചായത്ത് പ്രസിഡന്റ്

പൂഞ്ഞാർ തെക്കേക്കര പി ഒ - 686582

As part of Haritha Keralam project introduced by Government of Kerala, Mahatma Gandhi University, in collaboration with affiliated colleges introduced "Jaiva Saksharathayajnam 2017" to spread the importance of organic farming. NSS volunteers ensured their participation by successfully undertaking a survey of the prospects of organic farming in Poonjar-Thekkekara Panchayat and uploading the data promptly.

Renovation of Anganvady	
Organising Department/ Agency	Date
NSS Unit	**02/10/2017**



NSS volunteers initiated a small scale renovation drive at the Anganvady situated in Mothiravayal, 52 colony. The drive included activities like painting, minor refurbishing and maintenance tasks, cleaning the premises etc.

Cleaning Thaluk Hospital Premises	
Organising Department/ Agency	Date
NSS	**05/10/2017**

ശുചീകരിച്ചു

റാന്നി • സെന്റ് തോമസ് കോളജ് നാഷനൽസർവീസ്സ്കീംയൂണിറ്റിന്റെ നേതൃത്വത്തിൽ ഗാന്ധിജയന്തി ദിനാഘോഷം നടത്തി. താലൂക്കാശുപത്രിയുടെ പരിസരം ശുചീകരിച്ചു. ഡോ. ഏബ്രഹാം വി. കുര്യാക്കോസ്, ഡോ. എം. കെ. സുരേഷ്, ഡോ. ദീപ റോസ്‌ലിൻ ജോസഫ് പ്രസംഗിച്ചു.

വാകത്താനം • സിഎസ്ഡിഎസ്, സിഎസ്വൈഎഫ് നേതൃത്വത്തിൽ വാകത്താനം ഹോളി ഫാമിലി എൽപിഎസ് സ്കൂൾപടി-വാകത്താനം കോളനിപ്പടി റോഡ് ശുചീകരിച്ചു.

On 5th October 2017, NSS volunteers organised a cleaning drive at Thaluk Hospital, Ranni in connection with the week-long Gandhi Jayanthi celebration. The drive included initiatives like cleaning hospital premises and the sides of the approach road to the hospital

Rainwater Harvesting Pits	
Organizing Department/ Agency	Date
NSS	**05/11/2017**

In order to address water shortage in Bethany St. Mary's Higher Secondary School and Bethany Ashram, Ranni-Perunadu, NSS volunteers initiated a water conservation drive **by** digging ten rain water harvesting pits in the Rubber plantation situated in the premises of the institution

2018-19

Cleaning of the flood-affected houses	
Organising Department/ Agency	Date
NSS	**18/8/2018 - 23/8/2018**

Ranni was the one most affected areas during the 2018 Kerala floods. NSS volunteers rose to the occasion and actively participated in helping the people who were severely affected by the flood. They supplied essential food items to the flood victims and helped them to clean and sanitize their houses in the post-flood period.

Assistance in medical camp and medicine distribution	
Organizing Department/ Agency	Date
NSS	**18/8/2018**

NSS volunteers assisted the medical team of Thaluk Hospital, Ranni, in conducting the medical camp and distributing medicines to the flood victims at Mandirampadi and Adichippuzha Tribal Colony.

Collecting water samples from flood-affected wells for bacterial analysis	
Organizing Department/ Agency	Date
NSS	**06/9/2018**

NSS volunteers assisted the officials of Haritha Keralam Mission and Kerala State Pollution Control Board to collect water samples from 600 flood-affected wells in Ranni-Angadi Grama Panchayat for bacterial analysis and remedial action

SME survey of Industrial Damage	
Organizing Department/ Agency	Date
NSS	**29/10/2018 - 05/11/2018**

From 29th October to 5th November 2018, NSS volunteers assisted the officials of the Department of Industries and Commerce, District Industries Centre, Kozhencherry in conducting post-flood SME Survey to assess the industrial damage of the flood affected enterprises in ward No. 13 of the Pazhavangadi Panchayath and also to upload the damage data on the specially designed mobile app.

2019-20

Planting bamboo along the Pampa river bank	
Organizing Department/ Agency	Date
NSS	**03/08/2019**

In association with the Pazhavangadi Grama Panchayat, NSS volunteers planted bamboo along the Pampa riverside to protect the river banks from erosion.

Transporting and handing over of flood-relief materials	
Organizing Department/ Agency	Date
NSS	**14/08/2019**

During August 2019 Kerala Floods, staff and students generously contributed to flood relief fund raising and material collection project initiated by the institution. This was later delivered at the district collection centre at Pathanamthitta.

Cleaning drive at Sabarimala	
Organizing Department/ Agency	Date
NSS	**07/12/2019 - 11/12/2019**

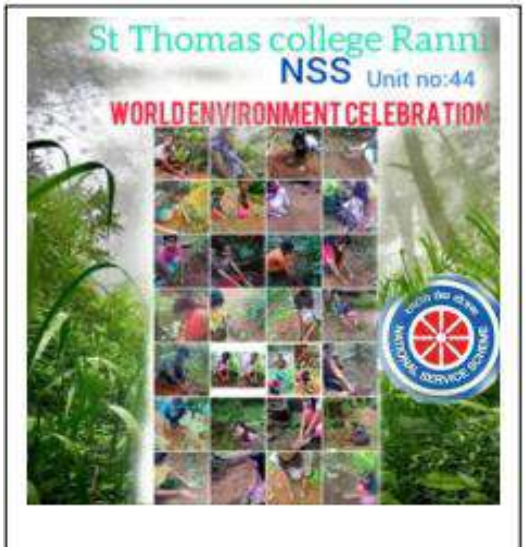
From 7th to 12th December 2019, seven students engaged themselves in a cleaning drive at Sabarimala on deputation by Kerala State Pollution Control.

Plogging ceremony	
Organizing Department/ Agency	Date
NSS, NCC and Bhoomitra Sena in association with Pazhavangadi Grama Panchayat	**24/01/2020**

A plogging ceremony was conducted in Ranni main public bus station. Volunteers of NCC, NSS, and Bhoomitra Sena club participated in the programme in association with Pazhavangadi Grama Panchayath, Ranni. A rally was conducted from college and covered the entire town of Ranni. On their way, the students collected all the plastic waste scattered on both the sides of the road and finally disposed of it in the waste disposal plant owned by Pazhavangadi Grama Panchayat.

2020-21

Environment Day Celebration	
Organizing Department/ Agency	Date
NSS	**05/06/2020**



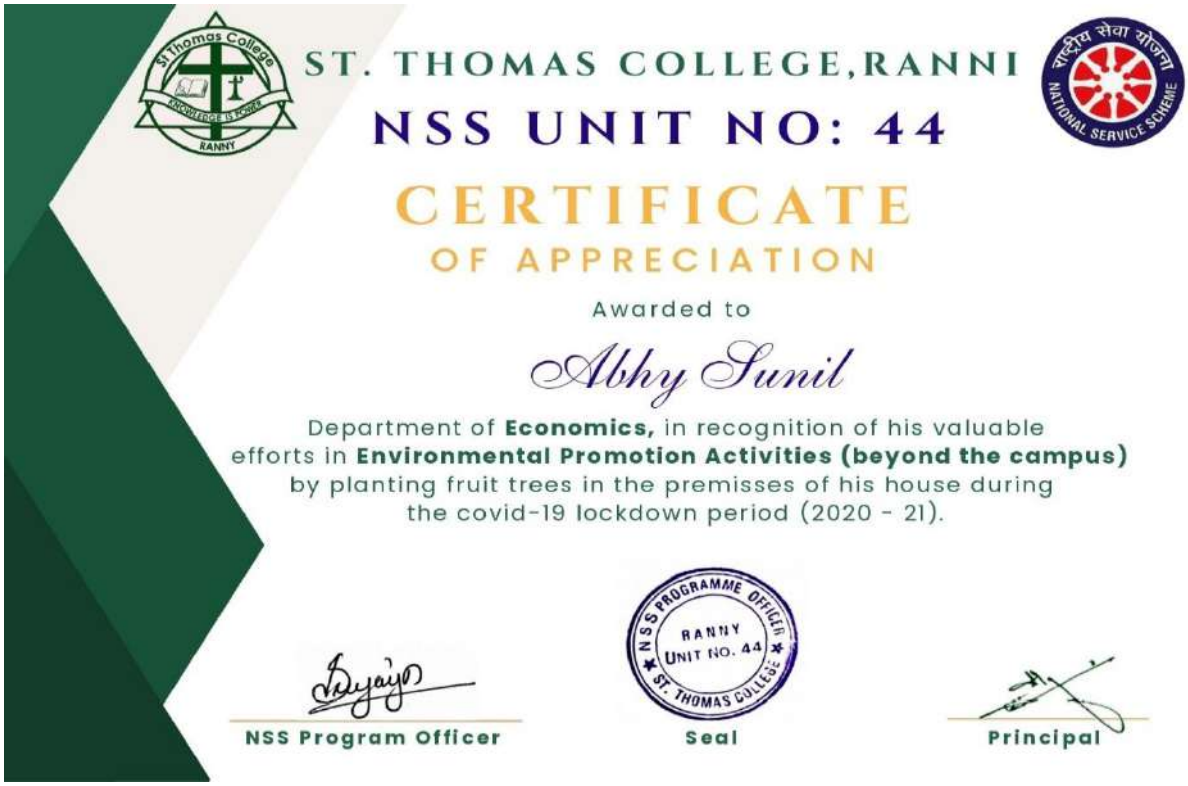
World Environment Day was celebrated by the NSS Volunteers in their own homes due to the Covid- 19 Pandemic condition by planting 3 fruit saplings at their own premises. The cleaning of the courtyard was also undertaken by most of the volunteers.

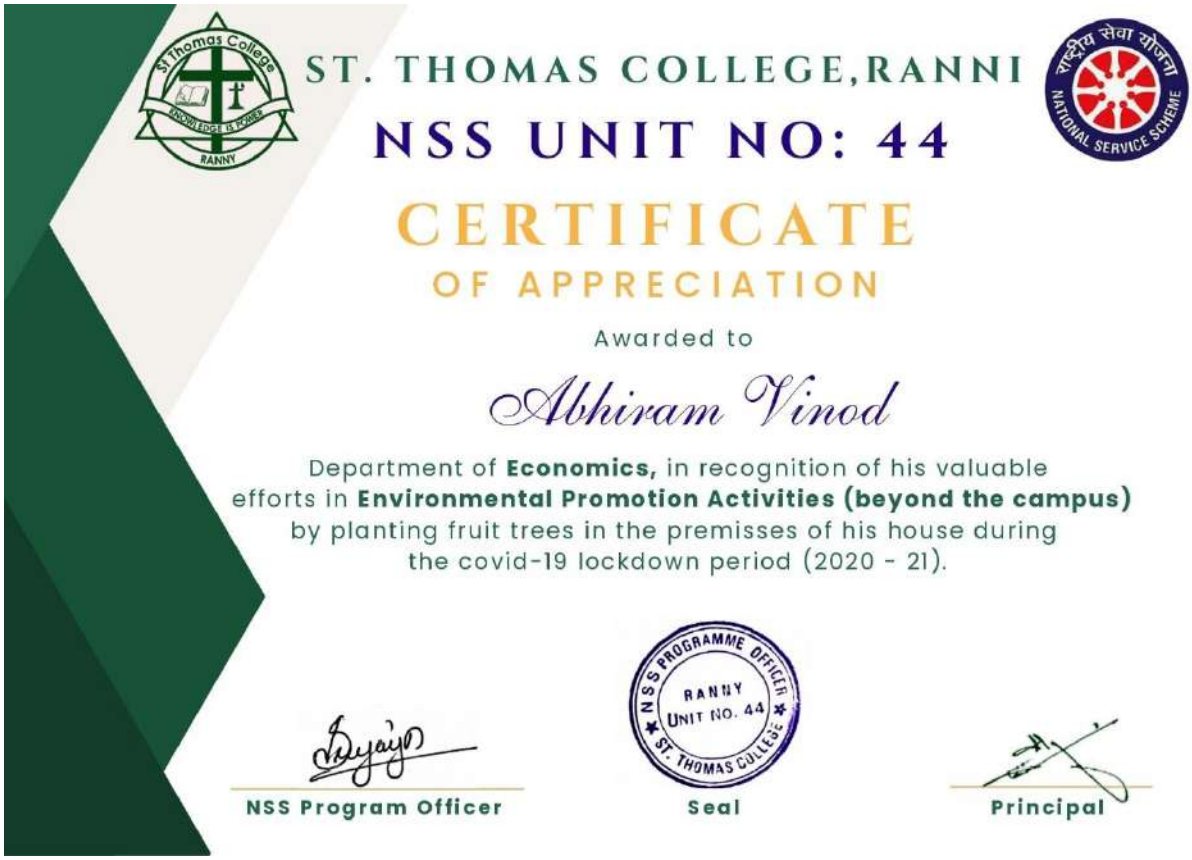
2021-22

Cleaning drive at Perunthenaruvi Tourist Centre	
Organizing Department/ Agency	Date
NSS	**May 2022**

Students volunteered to clean the tourist spots under the jurisdiction of Perunthenaruvi tourist Centre in Vechoochira Grama Panchayat once public places and tourist spots were reopened after the covid 19 lockdown

CERTIFICATES ISSUED TO STUDENTS BY NSS UNIT OF THE COLLEGE FOR ENVIRONMENTAL PROMOTION ACTIVITIES DURING COVID 19 LOCKDOWN





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Awarded to

Adish Pushpan

Department of **Economics,** in recognition of his valuable efforts in **Environmental Promotion Activities (beyond the campus)** by planting fruit trees in the premisses of his house during the covid-19 lockdown period (2020 - 21).

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Vaisakh Chandran

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Athira Raghu

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Chikku Surendran

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Divya Mol K A

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Farhana Fathima Ayoob

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Awarded to

Muhammed Aslam

Department of **Botany,** in recognition of his valuable efforts in **Environmental Promotion Activities (beyond the campus)** by planting fruit trees in the premisses of his house during the covid-19 lockdown period (2020 - 21).

NSS Program Officer | Seal | Principal

ST. THOMAS COLLEGE,RANNI

NSS UNIT NO: 44

CERTIFICATE

OF APPRECIATION

Awarded to

Muhammed Suhair

Department of **Botany,** in recognition of his valuable efforts in **Environmental Promotion Activities (beyond the campus)** by planting fruit trees in the premisses of his house during the covid-19 lockdown period (2020 - 21).

NSS Program Officer | Seal | Principal

ST. THOMAS COLLEGE,RANNI

NSS UNIT NO: 44

CERTIFICATE

OF APPRECIATION

Awarded to

Vishnu Biju

Department of **Botany,** in recognition of his valuable efforts in **Environmental Promotion Activities (beyond the campus)** by planting fruit trees in the premisses of his house during the covid-19 lockdown period (2020 - 21).

NSS Program Officer | Seal | Principal

ST. THOMAS COLLEGE,RANNI

NSS UNIT NO: 44

CERTIFICATE

OF APPRECIATION

Awarded to

Akhila Anilkumar

Department of **Chemistry,** in recognition of her valuable efforts in **Environmental Promotion Activities (beyond the campus)** by planting fruit trees in the premisses of her house during the covid-19 lockdown period (2020 - 21).

NSS Program Officer | Seal | Principal

ST. THOMAS COLLEGE,RANNI

NSS UNIT NO: 44

CERTIFICATE

OF APPRECIATION

Awarded to

Anjali M

Department of **Chemistry,** in recognition of her valuable efforts in **Environmental Promotion Activities (beyond the campus)** by planting fruit trees in the premisses of her house during the covid-19 lockdown period (2020 - 21).

NSS Program Officer | Seal | Principal

ST. THOMAS COLLEGE,RANNI

NSS UNIT NO: 44

CERTIFICATE

OF APPRECIATION

Awarded to

Anjana A

Department of **Chemistry,** in recognition of her valuable efforts in **Environmental Promotion Activities (beyond the campus)** by planting fruit trees in the premisses of her house during the covid-19 lockdown period (2020 - 21).

NSS Program Officer | Seal | Principal

ST. THOMAS COLLEGE,RANNI

NSS UNIT NO: 44

CERTIFICATE

OF APPRECIATION

Awarded to

Arathimol A

Department of **Chemistry,** in recognition of her valuable efforts in **Environmental Promotion Activities (beyond the campus)** by planting fruit trees in the premisses of her house during the covid-19 lockdown period (2020 - 21).

NSS Program Officer | Seal | Principal

ST. THOMAS COLLEGE,RANNI

NSS UNIT NO: 44

CERTIFICATE

OF APPRECIATION

Awarded to

Feba Anna John

Department of **Chemistry,** in recognition of her valuable efforts in **Environmental Promotion Activities (beyond the campus)** by planting fruit trees in the premisses of her house during the covid-19 lockdown period (2020 - 21).

NSS Program Officer | Seal | Principal

ST. THOMAS COLLEGE,RANNI

NSS UNIT NO: 44

CERTIFICATE

OF APPRECIATION

Awarded to

Jofina Siby

Department of **Chemistry,** in recognition of her valuable efforts in **Environmental Promotion Activities (beyond the campus)** by planting fruit trees in the premisses of her house during the covid-19 lockdown period (2020 - 21).

NSS Program Officer | Seal | Principal

ST. THOMAS COLLEGE,RANNI

NSS UNIT NO: 44

CERTIFICATE

OF APPRECIATION

Awarded to

Meenakashi H

Department of **Chemistry,** in recognition of her valuable efforts in **Environmental Promotion Activities (beyond the campus)** by planting fruit trees in the premisses of her house during the covid-19 lockdown period (2020 - 21).

NSS Program Officer | Seal | Principal

ST. THOMAS COLLEGE,RANNI

NSS UNIT NO: 44

CERTIFICATE

OF APPRECIATION

Awarded to

Sulthana K A

Department of **Chemistry,** in recognition of her valuable efforts in **Environmental Promotion Activities (beyond the campus)** by planting fruit trees in the premisses of her house during the covid-19 lockdown period (2020 - 21).

NSS Program Officer | Seal | Principal

ST. THOMAS COLLEGE,RANNI

NSS UNIT NO: 44

CERTIFICATE

OF APPRECIATION

Awarded to

Abhinand M Anil

Department of **Chemistry,** in recognition of his valuable efforts in **Environmental Promotion Activities (beyond the campus)** by planting fruit trees in the premisses of his house during the covid-19 lockdown period (2020 - 21).

NSS Program Officer | Seal | Principal

ST. THOMAS COLLEGE,RANNI

NSS UNIT NO: 44

CERTIFICATE

OF APPRECIATION

Awarded to

Ajesh M R

Department of **Chemistry,** in recognition of his valuable efforts in **Environmental Promotion Activities (beyond the campus)** by planting fruit trees in the premisses of his house during the covid-19 lockdown period (2020 - 21).

NSS Program Officer | Seal | Principal

ST. THOMAS COLLEGE,RANNI

NSS UNIT NO: 44

CERTIFICATE

OF APPRECIATION

Awarded to

Aravind Mohanan

Department of **Chemistry,** in recognition of his valuable efforts in **Environmental Promotion Activities (beyond the campus)** by planting fruit trees in the premisses of his house during the covid-19 lockdown period (2020 - 21).

NSS Program Officer | Seal | Principal

ST. THOMAS COLLEGE,RANNI

NSS UNIT NO: 44

CERTIFICATE

OF APPRECIATION

Awarded to

Savanth Salu

Department of **Chemistry,** in recognition of his valuable efforts in **Environmental Promotion Activities (beyond the campus)** by planting fruit trees in the premisses of his house during the covid-19 lockdown period (2020 - 21).

NSS Program Officer | Seal | Principal

ST. THOMAS COLLEGE,RANNI

NSS UNIT NO: 44

CERTIFICATE

OF APPRECIATION

Awarded to

Akshara Anish

Department of **Physics,** in recognition of her valuable efforts in **Environmental Promotion Activities (beyond the campus)** by planting fruit trees in the premisses of her house during the covid-19 lockdown period (2020 - 21).

NSS Program Officer | Seal | Principal

ST. THOMAS COLLEGE,RANNI

NSS UNIT NO: 44

CERTIFICATE

OF APPRECIATION

Awarded to

Arya Ashokan

Department of **Physics,** in recognition of her valuable efforts in **Environmental Promotion Activities (beyond the campus)** by planting fruit trees in the premisses of her house during the covid-19 lockdown period (2020 - 21).

NSS Program Officer | Seal | Principal

ST. THOMAS COLLEGE,RANNI

NSS UNIT NO: 44

CERTIFICATE

OF APPRECIATION

Awarded to

Aswathi R

Department of **Physics,** in recognition of her valuable efforts in **Environmental Promotion Activities (beyond the campus)** by planting fruit trees in the premisses of her house during the covid-19 lockdown period (2020 - 21).

NSS Program Officer | Seal | Principal

ST. THOMAS COLLEGE,RANNI

NSS UNIT NO: 44

CERTIFICATE

OF APPRECIATION

Awarded to

Lekshmi Anil

Department of **Physics,** in recognition of her valuable efforts in **Environmental Promotion Activities (beyond the campus)** by planting fruit trees in the premisses of her house during the covid-19 lockdown period (2020 - 21).

NSS Program Officer | Seal | Principal

ST. THOMAS COLLEGE,RANNI

NSS UNIT NO: 44

CERTIFICATE

OF APPRECIATION

Awarded to

Shikha Sajeev

Department of **Physics,** in recognition of her valuable efforts in **Environmental Promotion Activities (beyond the campus)** by planting fruit trees in the premisses of her house during the covid-19 lockdown period (2020 - 21).

NSS Program Officer | Seal | Principal

ST. THOMAS COLLEGE,RANNI

NSS UNIT NO: 44

CERTIFICATE

OF APPRECIATION

Awarded to

Silpa Mohan

Department of **Physics,** in recognition of her valuable efforts in **Environmental Promotion Activities (beyond the campus)** by planting fruit trees in the premisses of her house during the covid-19 lockdown period (2020 - 21).

NSS Program Officer | Seal | Principal

ST. THOMAS COLLEGE,RANNI

NSS UNIT NO: 44

CERTIFICATE

OF APPRECIATION

Awarded to

Sindhumol

Department of **Physics,** in recognition of her valuable efforts in **Environmental Promotion Activities (beyond the campus)** by planting fruit trees in the premisses of her house during the covid-19 lockdown period (2020 - 21).

NSS Program Officer | Seal | Principal

ST. THOMAS COLLEGE,RANNI

NSS UNIT NO: 44

CERTIFICATE

OF APPRECIATION

Awarded to

Aby Santhosh

Department of **Physics,** in recognition of his valuable efforts in **Environmental Promotion Activities (beyond the campus)** by planting fruit trees in the premisses of his house during the covid-19 lockdown period (2020 - 21).

NSS Program Officer | Seal | Principal

ST. THOMAS COLLEGE,RANNI

NSS UNIT NO: 44

CERTIFICATE

OF APPRECIATION

Awarded to

Dharmesh M S

Department of **Physics,** in recognition of his valuable efforts in **Environmental Promotion Activities (beyond the campus)** by planting fruit trees in the premisses of his house during the covid-19 lockdown period (2020 - 21).

NSS Program Officer | Seal | Principal

ST. THOMAS COLLEGE,RANNI

NSS UNIT NO: 44

CERTIFICATE

OF APPRECIATION

Awarded to

Sandeep V P

Department of **Physics,** in recognition of his valuable efforts in **Environmental Promotion Activities (beyond the campus)** by planting fruit trees in the premisses of his house during the covid-19 lockdown period (2020 - 21).

NSS Program Officer | Seal | Principal

ST. THOMAS COLLEGE,RANNI

NSS UNIT NO: 44

CERTIFICATE

OF APPRECIATION

Awarded to

Abitha Thomas

Department of **Zoology,** in recognition of her valuable efforts in **Environmental Promotion Activities (beyond the campus)** by planting fruit trees in the premisses of her house during the covid-19 lockdown period (2020 - 21).

NSS Program Officer | Seal | Principal

ST. THOMAS COLLEGE,RANNI

NSS UNIT NO: 44

CERTIFICATE

OF APPRECIATION

Awarded to

Anagha S Kurup

Department of **Zoology,** in recognition of her valuable efforts in **Environmental Promotion Activities (beyond the campus)** by planting fruit trees in the premisses of her house during the covid-19 lockdown period (2020 - 21).

NSS Program Officer | Seal | Principal

ST. THOMAS COLLEGE,RANNI

NSS UNIT NO: 44

CERTIFICATE

OF APPRECIATION

Awarded to

Aparna K Sasi

Department of **Zoology,** in recognition of her valuable efforts in **Environmental Promotion Activities (beyond the campus)** by planting fruit trees in the premisses of her house during the covid-19 lockdown period (2020 - 21).

NSS Program Officer | Seal | Principal

ST. THOMAS COLLEGE,RANNI

NSS UNIT NO: 44

CERTIFICATE

OF APPRECIATION

Awarded to

Arunya Raj A

Department of **Zoology,** in recognition of her valuable efforts in **Environmental Promotion Activities (beyond the campus)** by planting fruit trees in the premisses of her house during the covid-19 lockdown period (2020 - 21).

NSS Program Officer | Seal | Principal

ST. THOMAS COLLEGE,RANNI

NSS UNIT NO: 44

CERTIFICATE

OF APPRECIATION

Awarded to

Bivina Samuel

Department of **Zoology,** in recognition of her valuable efforts in **Environmental Promotion Activities (beyond the campus)** by planting fruit trees in the premisses of her house during the covid-19 lockdown period (2020 - 21).

NSS Program Officer | Seal | Principal

ST. THOMAS COLLEGE,RANNI

NSS UNIT NO: 44

CERTIFICATE

OF APPRECIATION

Awarded to

Jitty Sajo T S

Department of **Zoology,** in recognition of her valuable efforts in **Environmental Promotion Activities (beyond the campus)** by planting fruit trees in the premisses of her house during the covid-19 lockdown period (2020 - 21).

NSS Program Officer | Seal | Principal

ST. THOMAS COLLEGE,RANNI

NSS UNIT NO: 44

CERTIFICATE

OF APPRECIATION

Awarded to

K R Aswathy

Department of **Zoology,** in recognition of her valuable efforts in **Environmental Promotion Activities (beyond the campus)** by planting fruit trees in the premisses of her house during the covid-19 lockdown period (2020 - 21).

NSS Program Officer | Seal | Principal

ST. THOMAS COLLEGE,RANNI

NSS UNIT NO: 44

CERTIFICATE

OF APPRECIATION

Awarded to

Lekshmi Vinod

Department of **Zoology,** in recognition of her valuable efforts in **Environmental Promotion Activities (beyond the campus)** by planting fruit trees in the premisses of her house during the covid-19 lockdown period (2020 - 21).

NSS Program Officer | Seal | Principal

ST. THOMAS COLLEGE,RANNI

NSS UNIT NO: 44

CERTIFICATE

OF APPRECIATION

Awarded to

Reshma C Rajappan

Department of **Zoology,** in recognition of her valuable efforts in **Environmental Promotion Activities (beyond the campus)** by planting fruit trees in the premisses of her house during the covid-19 lockdown period (2020 - 21).

NSS Program Officer | Seal | Principal

ST. THOMAS COLLEGE,RANNI

NSS UNIT NO: 44

CERTIFICATE

OF APPRECIATION

Awarded to

Sreemol P

Department of **Zoology,** in recognition of her valuable efforts in **Environmental Promotion Activities (beyond the campus)** by planting fruit trees in the premisses of her house during the covid-19 lockdown period (2020 - 21).

NSS Program Officer | Seal | Principal

ST. THOMAS COLLEGE,RANNI

NSS UNIT NO: 44

CERTIFICATE

OF APPRECIATION

Awarded to

Surya Santhosh

Department of **Zoology,** in recognition of her valuable efforts in **Environmental Promotion Activities (beyond the campus)** by planting fruit trees in the premisses of her house during the covid-19 lockdown period (2020 - 21).

NSS Program Officer | Seal | Principal

ST. THOMAS COLLEGE,RANNI

NSS UNIT NO: 44

CERTIFICATE

OF APPRECIATION

Awarded to

Anandhu T S

Department of **Zoology,** in recognition of his valuable efforts in **Environmental Promotion Activities (beyond the campus)** by planting fruit trees in the premisses of his house during the covid-19 lockdown period (2020 - 21).

NSS Program Officer | Seal | Principal

ST. THOMAS COLLEGE,RANNI

NSS UNIT NO: 44

CERTIFICATE

OF APPRECIATION

Awarded to

Muhammed Swalih M S

Department of **Zoology,** in recognition of his valuable efforts in **Environmental Promotion Activities (beyond the campus)** by planting fruit trees in the premisses of his house during the covid-19 lockdown period (2020 - 21).

NSS Program Officer | Seal | Principal

ST. THOMAS COLLEGE,RANNI

NSS UNIT NO: 44

CERTIFICATE

OF APPRECIATION

Awarded to

Vipi Sankar T

Department of **Zoology,** in recognition of his valuable efforts in **Environmental Promotion Activities (beyond the campus)** by planting fruit trees in the premisses of his house during the covid-19 lockdown period (2020 - 21).

NSS Program Officer | Seal | Principal

CERTIFICATES OF RECOGNITION

Certificate of Appreciation awarded by the **Department of Industries and Commerce, District Industries Centre, Kozhencherry** to the NSS unit in recognition of the service rendered in conducting post-flood SME Survey

ANILKUMAR.P. N
General Manager
(Joint Director)

DISTRICT INDUSTRIES CENTRE,
KOZHENCHERRY P.O.
PATHANAMTHITTA-689641, KERALA.
PH NO.: 0468-2320339

CERTIFICATE OF APPRECIATION

Dept. of industries & Commerce appreciate and recognize the sincere and dedicated service rendered by NSS unit. St. Thomas College, Ranni in conducting post-flood SME survey of affected shops in Ranni town during October 2018. We remain thankful and observe that their dedicated and worthy service as a role model for others to replicate.

PATHANAMTHITTA
25.04.2023

GENERAL MANAGER
General Manager
District Industries Centre
Kozhencherry-689 641
Pathanamthitta District

Certificate of Appreciation awarded by **Ranni-Angadi Grama Panchayat** to Jeffin Jacob (2nd Year B. Com student) in recognition of his service as Covid-19 RRT member

RANNI ANGADI GRAMAPANCHAYAT
Angadi P.O, Ranni.
Pathanamthitta Dist, Pin -689674
Phone – 9496042657
Email – ranniangadigp@gmail.com

CERTIFICATE OF APPRECIATION

Awarded to

Mr. JEFFIN JACOB

(B.Com Student, St. Thomas College, Ranni)

For his Valuable efforts in environmental promotional activities (beyond the campus) as Covid- 19 RRT Member in Ranni Angadi Gramapanchayat, Ranni , during 2021-22

Office of the Ranni-Angadi Grama Panchayat Pathanamthitta District Kerala State Angadi P.O.

G. SUDHAKUMARI
SECRETARY
RANNI-ANGADI GRAMA PANCHAYAT
ANGADI P.O., RANNI
Ph: 04735-226275

BINDHU REGI
President
Ranni-Angadi Grama Panchayat
Ranni-Angadi P.O., Pathanamthitta
Kerala, India, Pin-689 674
Ph: 04735-226275

Certificate of Recognition awarded by **Ranni-Angadi Grama Panchayat** to NSS unit acknowledging the service during 2018 post-flood rehabilitation drive

RANNI ANGADI GRAMAPANCHAYAT
Angadi P.O, Ranni.
Pathanamthitta Dist, Pin -689674
Phone – 9496042657
Email – ranniangadigp@gmail.com

CERTIFICATE OF RECOGNITION
Awarded to
ST.THOMAS COLLEGE, RANNI

For the exemplary service of the volunteers of N.S.S unit of St.Thomas College, Ranni in collecting water samples for conducting water quality analysis in connection with the **2018 post- flood rehabilitation activities of Angadi Grama Panchayath** in collaboration with pollution Control Board, Harithakeralam and Kudumbasree.

President

BINDHU REGI
President
Ranni-Angadi Grama Panchayat
Ranni-Angadi P.O., Pathanamthitta
Kerala, India, Pin-689 674
Ph: 04735-226275

Secretary

G. SUDHAKUMARI
SECRETARY
RANNI-ANGADI GRAMA PANCHAYAT
ANGADI P.O., RANNI
Ph: 04735-226275

Office of the Ranni-Angadi Grama Panchayat Pathanamthitta District Kerala State Angadi P.O.

Certificates of Appreciation awarded by **Kerala State Pollution Control Board** to the students in recognition of their service in promoting cleanliness at Sabarimala Pilgrim Centre

KERALA STATE POLLUTION CONTROL BOARD

CERTIFICATE OF APPRECIATION

CERTIFIED that *Sri.Anandhu Krishna R, National Service Scheme Volunteer, ST.Thomas College, Ranni,* has rendered sincere and valuable service in promoting cleanliness and environmental upkeep at Sabarimala from 07.12.2019 to 11.12.2019 in the Pilgrims Assistance and Motivation Programme conducted by the Board in association with National Service Scheme.

ALEXANDER GEORGE
ENVIRONMENTAL ENGINEER

KERALA STATE POLLUTION CONTROL BOARD

CERTIFICATE OF APPRECIATION

CERTIFIED that *Sri.Sujin K S, National Service Scheme Volunteer, ST.Thomas College, Ranni,* has rendered sincere and valuable service in promoting cleanliness and environmental upkeep at Sabarimala from 07.12.2019 to 11.12.2019 in the Pilgrims Assistance and Motivation Programme conducted by the Board in association with National Service Scheme.

ALEXANDER GEORGE
ENVIRONMENTAL ENGINEER

KERALA STATE POLLUTION CONTROL BOARD

CERTIFICATE OF APPRECIATION

CERTIFIED that ***Sri.Sooraj T S, National Service Scheme Volunteer, ST.Thomas College, Ranni,*** has rendered sincere and valuable service in promoting cleanliness and environmental upkeep at Sabarimala from 07.12.2019 to 11.12.2019 in the Pilgrims Assistance and Motivation Programme conducted by the Board in association with National Service Scheme.

ALEXANDER GEORGE
ENVIRONMENTAL ENGINEER

KERALA STATE POLLUTION CONTROL BOARD

CERTIFICATE OF APPRECIATION

CERTIFIED that ***Sri.Harilal T L, National Service Scheme Volunteer, ST.Thomas College, Ranni,*** has rendered sincere and valuable service in promoting cleanliness and environmental upkeep at Sabarimala from 07.12.2019 to 11.12.2019 in the Pilgrims Assistance and Motivation Programme conducted by the Board in association with National Service Scheme.

ALEXANDER GEORGE
ENVIRONMENTAL ENGINEER

KERALA STATE POLLUTION CONTROL BOARD

CERTIFICATE OF APPRECIATION

CERTIFIED that *Sri.Nelbin Prakash, National Service Scheme Volunteer, ST.Thomas College, Ranni,* has rendered sincere and valuable service in promoting cleanliness and environmental upkeep at Sabarimala from 07.12.2019 to 11.12.2019 in the Pilgrims Assistance and Motivation Programme conducted by the Board in association with National Service Scheme.

ALEXANDER GEORGE
ENVIRONMENTAL ENGINEER

KERALA STATE POLLUTION CONTROL BOARD

CERTIFICATE OF APPRECIATION

CERTIFIED that *Sri.Ajesh P P, National Service Scheme Volunteer, ST.Thomas College, Ranni,* has rendered sincere and valuable service in promoting cleanliness and environmental upkeep at Sabarimala from 07.12.2019 to 11.12.2019 in the Pilgrims Assistance and Motivation Programme conducted by the Board in association with National Service Scheme.

ALEXANDER GEORGE
ENVIRONMENTAL ENGINEER

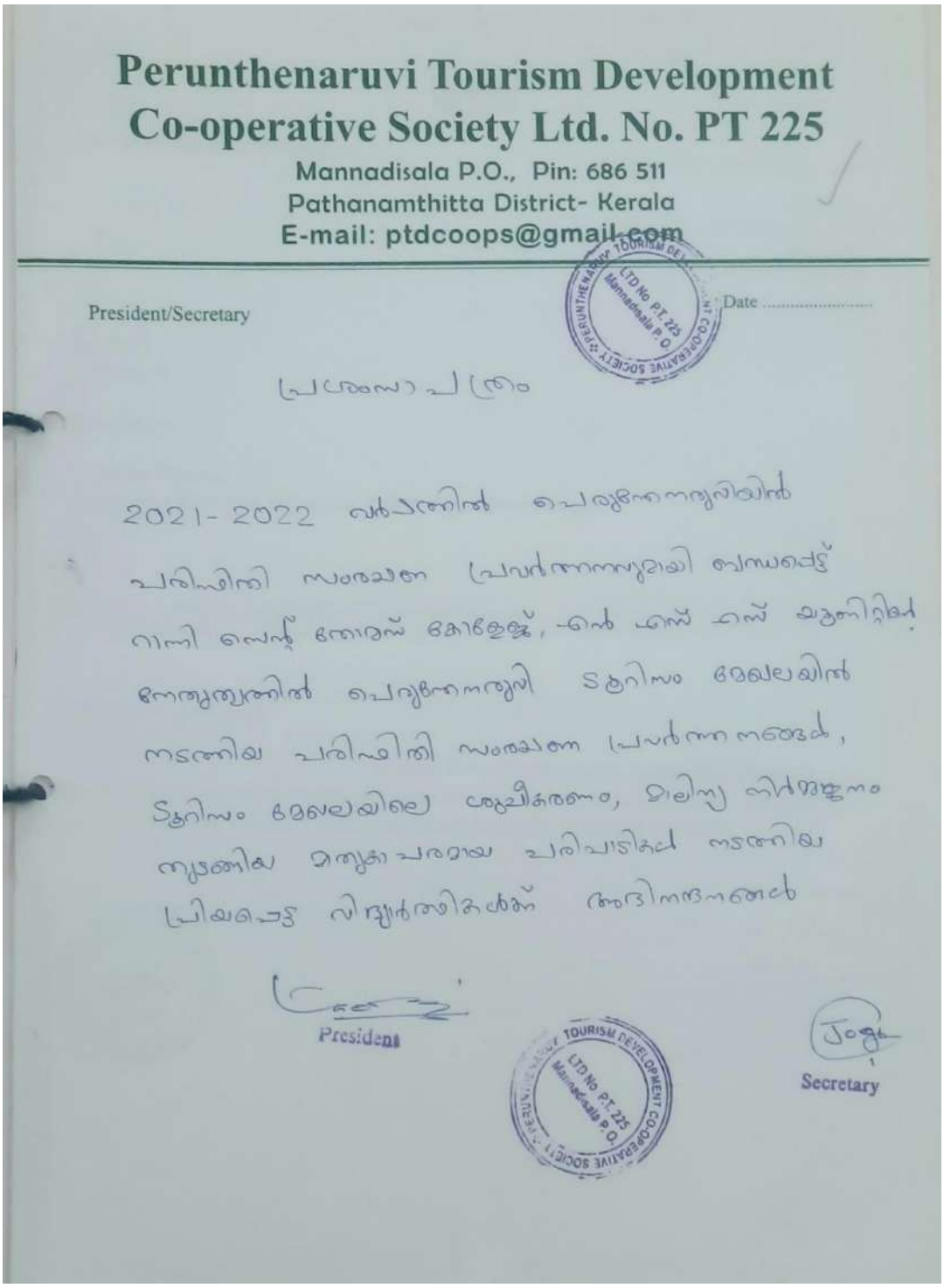
KERALA STATE POLLUTION CONTROL BOARD

CERTIFICATE OF APPRECIATION

CERTIFIED that ***Sri.Rahul Raju, National Service Scheme Volunteer, ST.Thomas College, Ranni,*** has rendered sincere and valuable service in promoting cleanliness and environmental upkeep at Sabarimala from 07.12.2019 to 11.12.2019 in the Pilgrims Assistance and Motivation Programme conducted by the Board in association with National Service Scheme.

ALEXANDER GEORGE
ENVIRONMENTAL ENGINEER

Certificate of Appreciation awarded by **Perunthenaruvi Tourism Development Co-operative Society** to the NSS unit for the cleaning drive initiated at Perunthenaruvi in the post-covid 19 period



Perunthenaruvi Tourism Development Co-operative Society Ltd. No. PT 225

Mannadisala P.O., Pin: 686 511
Pathanamthitta District- Kerala
E-mail: ptdcoops@gmail.com

President/Secretary

Date .....

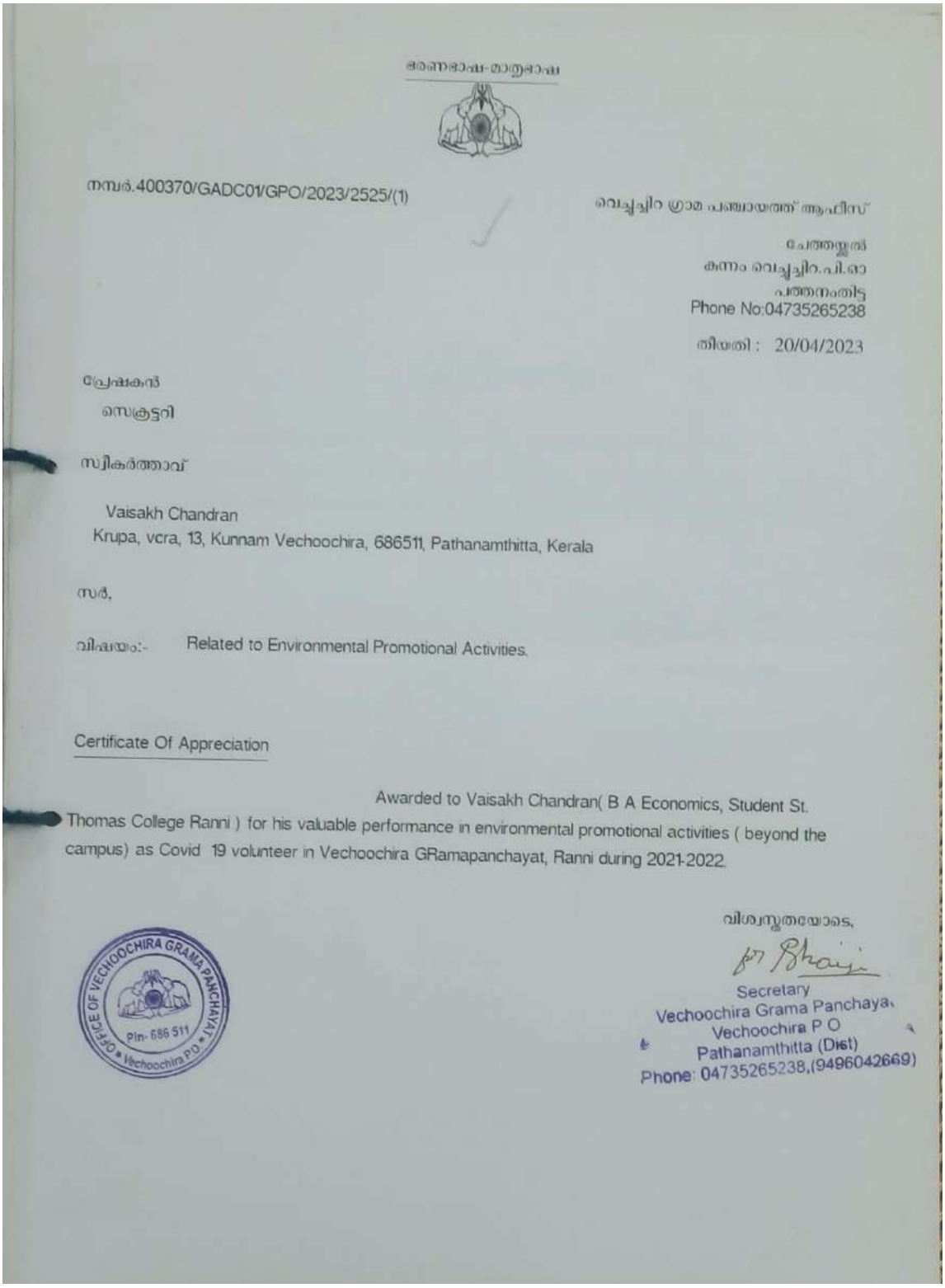
പ്രശംസാപത്രം

2021-2022 വർഷത്തിൽ പെരുനാടുമായിൽ പരിസ്ഥിതി സംരക്ഷണ പ്രവർത്തനവുമായി ബന്ധപ്പെട്ട് റാന്നി സെന്റ് തോമസ് കോളേജ്, എൻ എസ് എസ് യൂണിറ്റിന്റെ നേതൃത്വത്തിൽ പെരുനാടുമായി ടൂറിസം മേഖലയിൽ നടത്തിയ പരിസ്ഥിതി സംരക്ഷണ പ്രവർത്തനങ്ങൾ, ടൂറിസം മേഖലയിലെ ശുചീകരണം, മാലിന്യ നിർമ്മാർജ്ജനം തുടങ്ങിയ മാതൃകാപരമായ പരിപാടികൾ നടത്തിയ പ്രിയപ്പെട്ട വിദ്യാർത്ഥികൾക്ക് അഭിനന്ദനങ്ങൾ

President

Secretary

Certificate of Appreciation awarded by **Vechoochira Grama Panchayat** to Vaisakh Chandran (2nd year Economics Student) in recognition of his service as Covid-19 volunteer



ഭരണഭാഷ-മാതൃഭാഷ

നമ്പർ.400370/GADC01/GPO/2023/2525/(1)

വെച്ചൂച്ചിറ ഗ്രാമ പഞ്ചായത്ത് ആഫീസ്

ചേത്തയ്ക്കൽ
കന്നം വെച്ചൂച്ചിറ.പി.ഓ
പത്തനംതിട്ട
Phone No:04735265238

തീയതി : 20/04/2023

പ്രേഷകൻ
സെക്രട്ടറി

സ്വീകർത്താവ്

Vaisakh Chandran
Krupa, vcra, 13, Kunnam Vechoochira, 686511, Pathanamthitta, Kerala

സർ,

വിഷയം:- Related to Environmental Promotional Activities.

Certificate Of Appreciation

Awarded to Vaisakh Chandran(B A Economics, Student St. Thomas College Ranni) for his valuable performance in environmental promotional activities (beyond the campus) as Covid 19 volunteer in Vechoochira GRamapanchayat, Ranni during 2021-2022.

വിശ്വസ്തതയോടെ,

Secretary
Vechoochira Grama Panchaya
Vechoochira P O
Pathanamthitta (Dist)
Phone: 04735265238,(9496042669)

OFFICE OF VECHOOCHIRA GRAMA PANCHAYAT Pin- 686 511 Vechoochira P.O

Certificates awarded by **Tropical Institute of Ecological sciences (TIES)** to the faculty and students on successful completion of Internal Green Audit

TIES

TROPICAL INSTITUTE OF ECOLOGICAL SCIENCES
Ecological Research Campus, K.K.Road, Velloor P.O., Kottayam, 686 501. Kerala, India.
Tel: - 9497290339, 9633723305, 0481- 2957050.
Email: tropicalschool@gmail.com; info@ties.org.in
Approved Research Centre, Mahatma Gandhi University, Kottayam
Approved laboratory of Pollution Control Board
T I E S - t i e s M i n d a n d N a t u r e

CERTIFICATE

This is to certify that the report entitled "Green Audit of ST Thomas College, Ranni" is a bonafide work carried out by the students and faculty of ST Thomas College, Ranni with the collaboration of Tropical Institute of Ecological Sciences (TIES), Kottayam, during the period between June 2021 – March 2022.

Dr. Punnen Kurian
Secretary
Tropical Institute of Ecological Sciences
Kottayam

TROPICAL INSTITUTE OF ECOLOGICAL SCIENCES KOTTAYAM

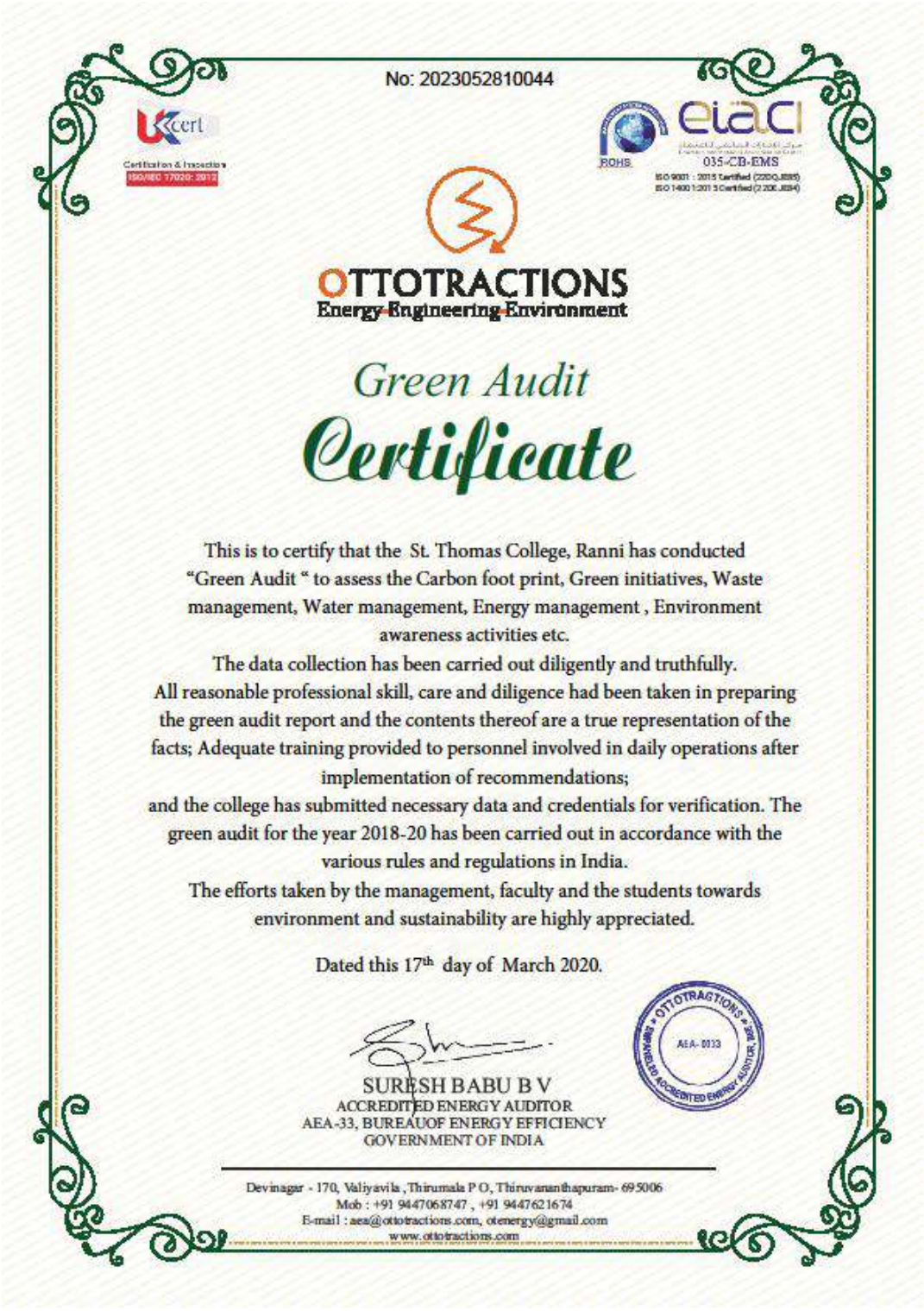
Velloor
30.03.2022

www.ties.org.in

External Green Audits Certificates

(2018-2020)

Green Audit Certificate



No: 2023052810044

OTTOTRACTIONS
Energy-Engineering-Environment

Green Audit
Certificate

This is to certify that the St. Thomas College, Ranni has conducted "Green Audit " to assess the Carbon foot print, Green initiatives, Waste management, Water management, Energy management , Environment awareness activities etc.

The data collection has been carried out diligently and truthfully.

All reasonable professional skill, care and diligence had been taken in preparing the green audit report and the contents thereof are a true representation of the facts; Adequate training provided to personnel involved in daily operations after implementation of recommendations;

and the college has submitted necessary data and credentials for verification. The green audit for the year 2018-20 has been carried out in accordance with the various rules and regulations in India.

The efforts taken by the management, faculty and the students towards environment and sustainability are highly appreciated.

Dated this 17th day of March 2020.

SURESH BABU B V
ACCREDITED ENERGY AUDITOR
AEA-33, BUREAUOF ENERGY EFFICIENCY
GOVERNMENT OF INDIA

Devinagar - 170, Valiyavila ,Thirumala P O, Thiruvananthapuram- 695006
Mob : +91 9447068747 , +91 9447621674
E-mail : aea@ottotractions.com, otenergy@gmail.com
www.ottotractions.com

Energy Audit Certificate

No: 2023052810045

OTTOTRACTIONS
Energy Engineering Environment

Energy Audit

Certificate

This is to certify that the data collection has been carried out diligently and truthfully;

All data monitoring devices are in good working condition and have been calibrated or certified by approved agencies authorised and no tampering of such devices has occurred;

All reasonable professional skill, care and diligence had been taken in preparing the audit report and the contents thereof are a true representation of the facts;

Adequate training provided to personnel involved in daily operations after implementation of recommendations; and

The Energy Audit for the year 2018-20 has been carried out in accordance with Energy conservation act 2001(Bureau of Energy Efficiency (Manner and Intervals of Time for the Conduct of Energy Audit) Regulations, 2010).

This Certificate is issued to St. Thomas College, Ranni on their request.

Dated this 17th day of March 2020.

SURESH BABU B V
ACCREDITED ENERGY AUDITOR
AEA-33, BUREAUOF ENERGY EFFICIENCY
GOVERNMENT OF INDIA

Devinagar - 170, Valiyavila , Thirumala P O, Thiruvananthapuram- 695006
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www.ottotractions.com

Environment Audit Certificate

No: 2023052810046

OTTOTRACTIONS
Energy-Engineering-Environment

Environment Audit Certificate

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Adequate training provided to personnel involved in daily operations after implementation of recommendations; and

The Environment Audit for the year 2018-20 has been carried out in accordance with various rules and regulations in India.

This Certificate is issued to St. Thomas College, Ranni on their request.

Dated this 17th day of March 2020.

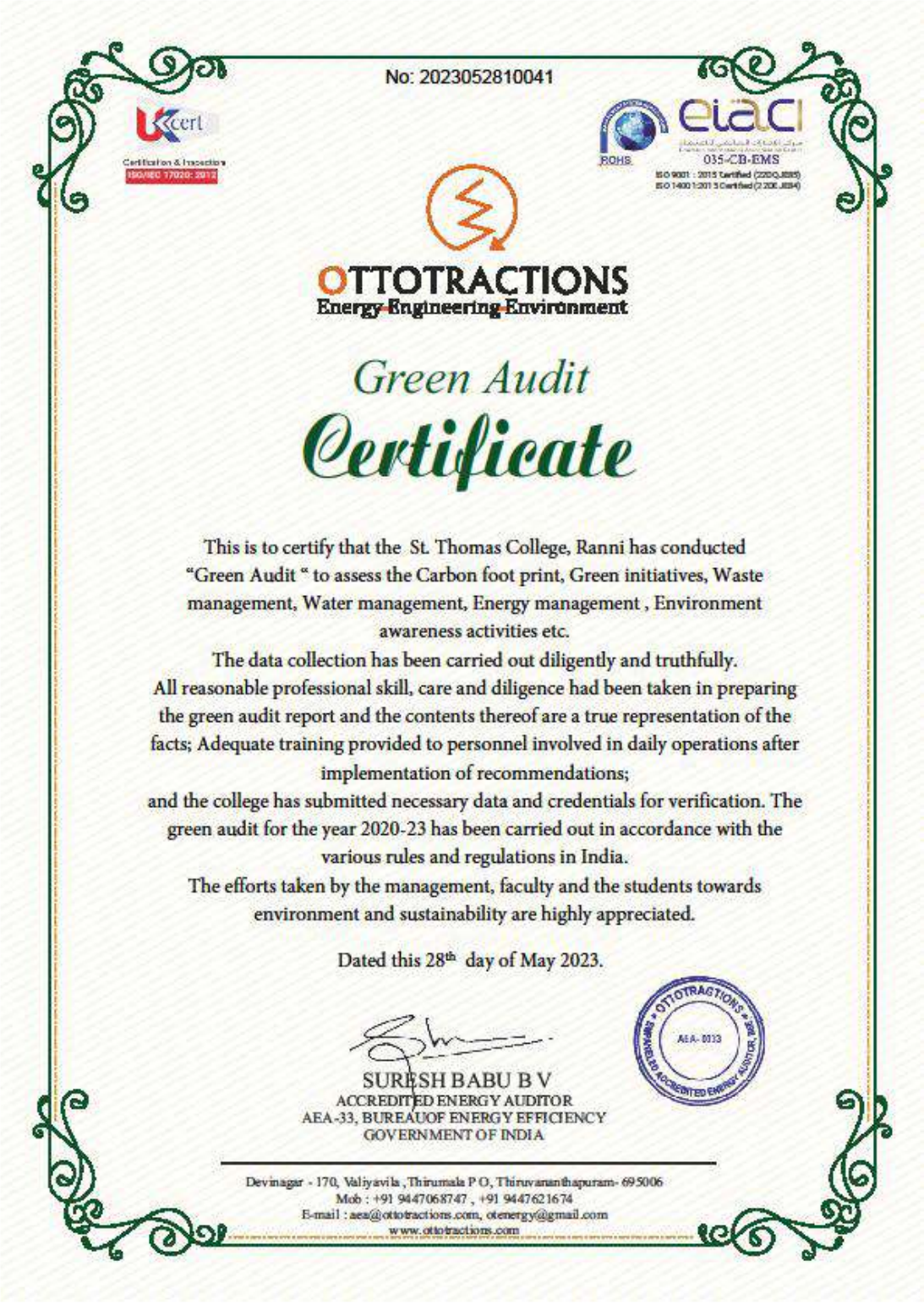
SURESH BABU B V
ACCREDITED ENERGY AUDITOR
AEA-33, BUREAU OF ENERGY EFFICIENCY
GOVERNMENT OF INDIA

Devinagar - 170, Valiyavila , Thirumala P O, Thiruvananthapuram- 695006
Mob : +91 9447068747 , +91 9447621674
E-mail : aea@ottotractions.com, otenergy@gmail.com
www.ottotractions.com

External Green Audit Certificates

(2020-2023)

Green Audit Certificate



No: 2023052810041

OTTOTRACTIONS
Energy-Engineering-Environment

Green Audit
Certificate

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and the college has submitted necessary data and credentials for verification. The green audit for the year 2020-23 has been carried out in accordance with the various rules and regulations in India.

The efforts taken by the management, faculty and the students towards environment and sustainability are highly appreciated.

Dated this 28th day of May 2023.

SURESH BABU B V
ACCREDITED ENERGY AUDITOR
AEA-33, BUREAUOF ENERGY EFFICIENCY
GOVERNMENT OF INDIA

Devinagar - 170, Valiyavila , Thirumala P O, Thiruvananthapuram- 695006
Mob : +91 9447068747 , +91 9447621674
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www.ottotractions.com

Energy Audit Certificate

No: 2023052810042

OTTOTRACTIONS
Energy Engineering Environment

Energy Audit

Certificate

This is to certify that the data collection has been carried out diligently and truthfully;

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This Certificate is issued to St. Thomas College, Ranni on their request.

Dated this 28th day of May 2023.

SURESH BABU B V
ACCREDITED ENERGY AUDITOR
AEA-33, BUREAUOF ENERGY EFFICIENCY
GOVERNMENT OF INDIA

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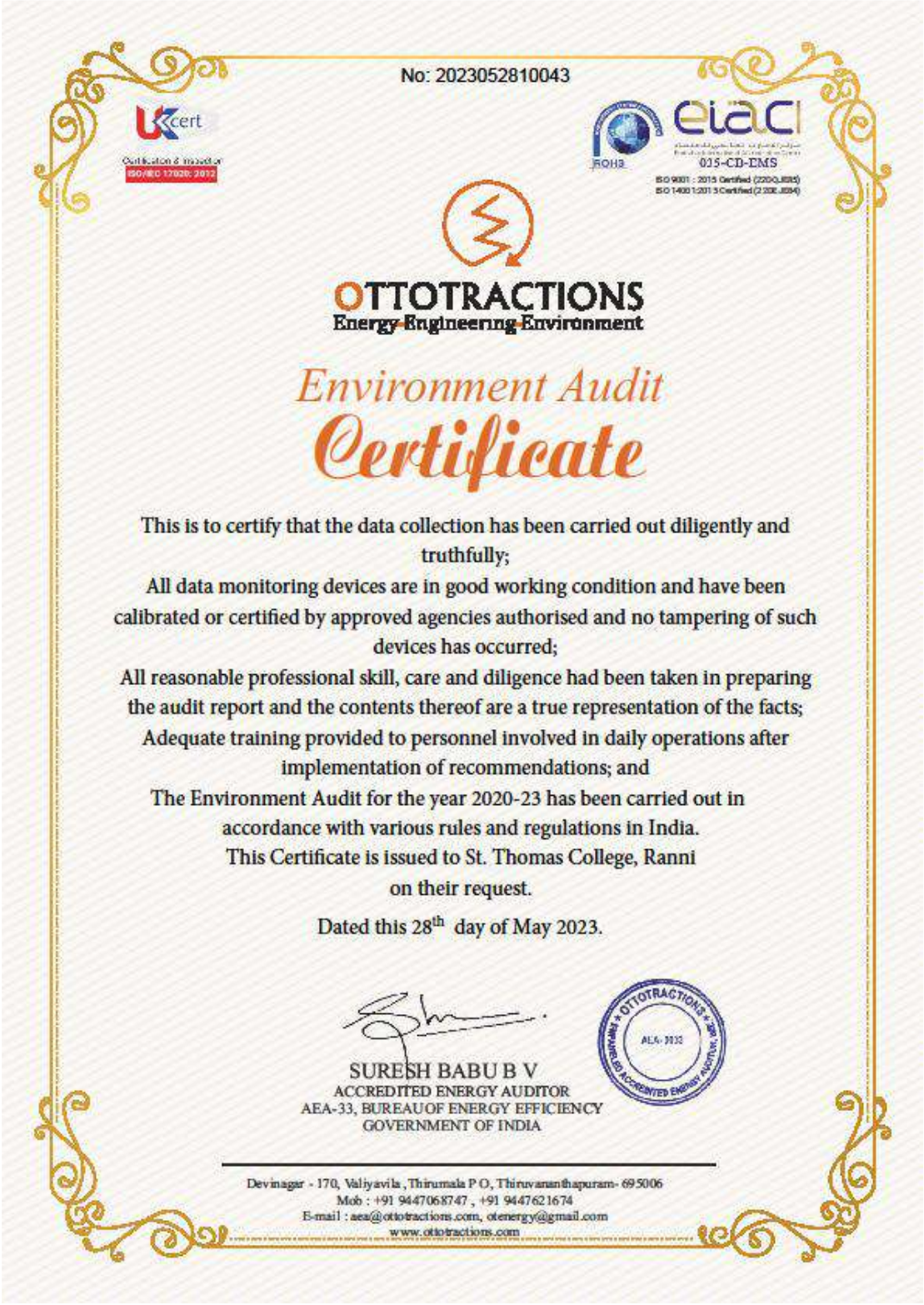
Environment Audit Certificate



No: 2023052810043

UKcert
Certification & Inspection
ISO/IEC 17020: 2012

eiaCI
035-CD-EMS
ISO 9001 : 2015 Certified (220QJ035)
ISO 14001:2015 Certified (220EJ034)

OTTOTRACTIONS
Energy-Engineering-Environment

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Dated this 28th day of May 2023.

SURESH BABU B V
ACCREDITED ENERGY AUDITOR
AEA-33, BUREAU OF ENERGY EFFICIENCY
GOVERNMENT OF INDIA

OTTOTRACTIONS AEA-033 ACCREDITED ENERGY AUDITOR

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TROPICAL INSTITUTE OF ECOLOGICAL SCIENCES
ECOLOGICAL RESEARCH CAMPUS, KOTTAYAM, KERALA,
INDIA

Approved Research Centre, Mahatma Gnadhi University, Kottayam
Approved laboratory of Pollution Control Board

CERTIFICATE

OF APPRECIATION

Awarded to

Sri. RENJU JOSEPH

Asst. Prof. of Commerce, St.Thomas College, Ranni

for his valuable contribution as **Audit Officer of the Internal Waste Audit** carried out by the students and faculty of St. Thomas College, Ranni in collaboration with Tropical Institute of Ecological Sciences (TIES), Kottayam, during 2021-22

VELLOOR
30/03/2022

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INDIA

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Approved laboratory of Pollution Control Board

CERTIFICATE

OF APPRECIATION

Awarded to

PRARTHANA PRASAD

B.Sc Zoology St.Thomas College, Ranni

for her valuable contribution as **Student Coordinator of the Internal Waste Audit** carried out by the students and faculty of St. Thomas College, Ranni in collaboration with Tropical Institute of Ecological Sciences (TIES), Kottayam, during 2021-22

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Approved laboratory of Pollution Control Board

CERTIFICATE
OF APPRECIATION

Awarded to

Sri. JIKKU JAMES

Asst. Prof. of Commerce, St.Thomas College, Ranni
for his valuable contribution as **Audit Officer of the Internal Energy Audit** carried out by the students and faculty of St. Thomas College, Ranni in collaboration with Tropical Institute of Ecological Sciences (TIES), Kottayam, during 2021-22

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CERTIFICATE
OF APPRECIATION

Awarded to

VAISAKH MOHANDAS

B.Sc Zoology, St.Thomas College, Ranni
for his valuable contribution as **Student Coordinator of the Internal Biodiversity Audit** carried out by the students and faculty of St. Thomas College, Ranni in collaboration with Tropical Institute of Ecological Sciences (TIES), Kottayam, during 2021-22

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CERTIFICATE

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JITHIN SEBASTIAN

B.A English, St.Thomas College, Ranni

for his valuable contribution as **Student Coordinator of the Internal Water Audit** carried out by the students and faculty of St. Thomas College, Ranni in collaboration with Tropical Institute of Ecological Sciences (TIES), Kottayam, during 2021-22

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Dr. SREEJAYA R

Asst. Prof. of Zoology, St.Thomas College, Ranni

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Sri. SACHIN SAJU

Asst. Prof. of Tourism, St.Thomas College, Ranni

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ANJANA PREM

B.Sc Botany, St.Thomas College, Ranni

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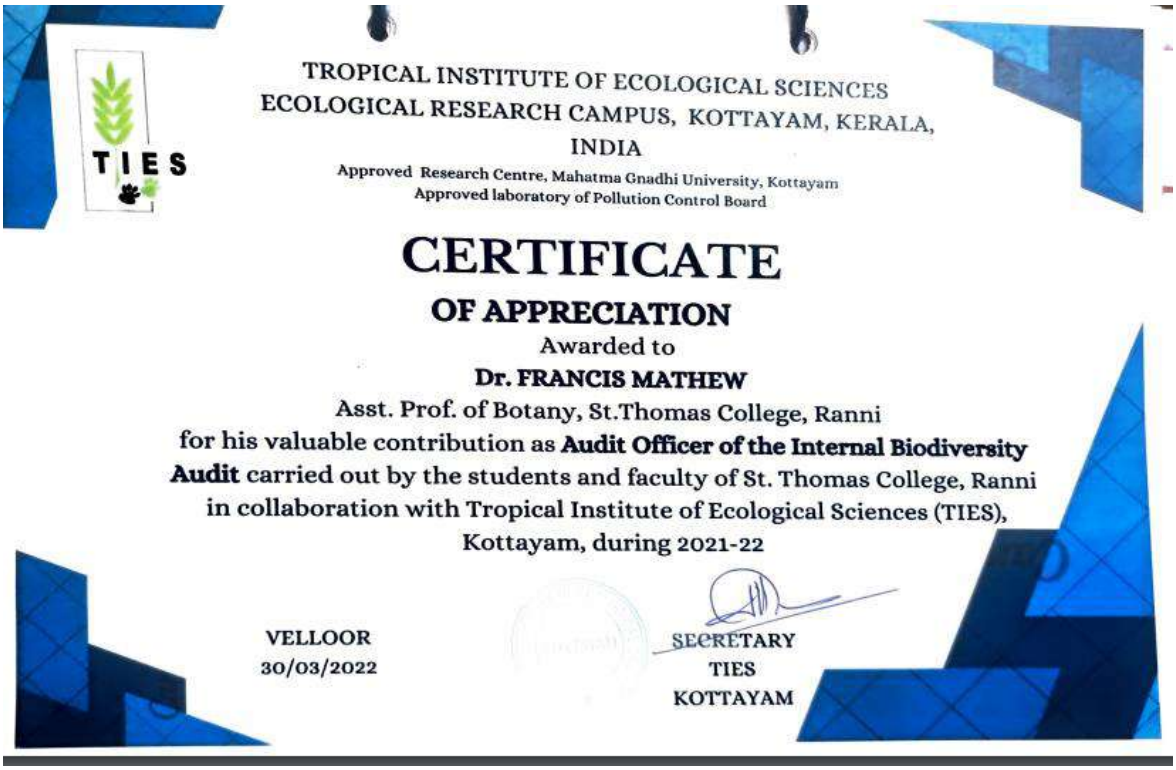

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Dr. FRANCIS MATHEW

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ASWATHY ULLAS

B.A English, St.Thomas College, Ranni

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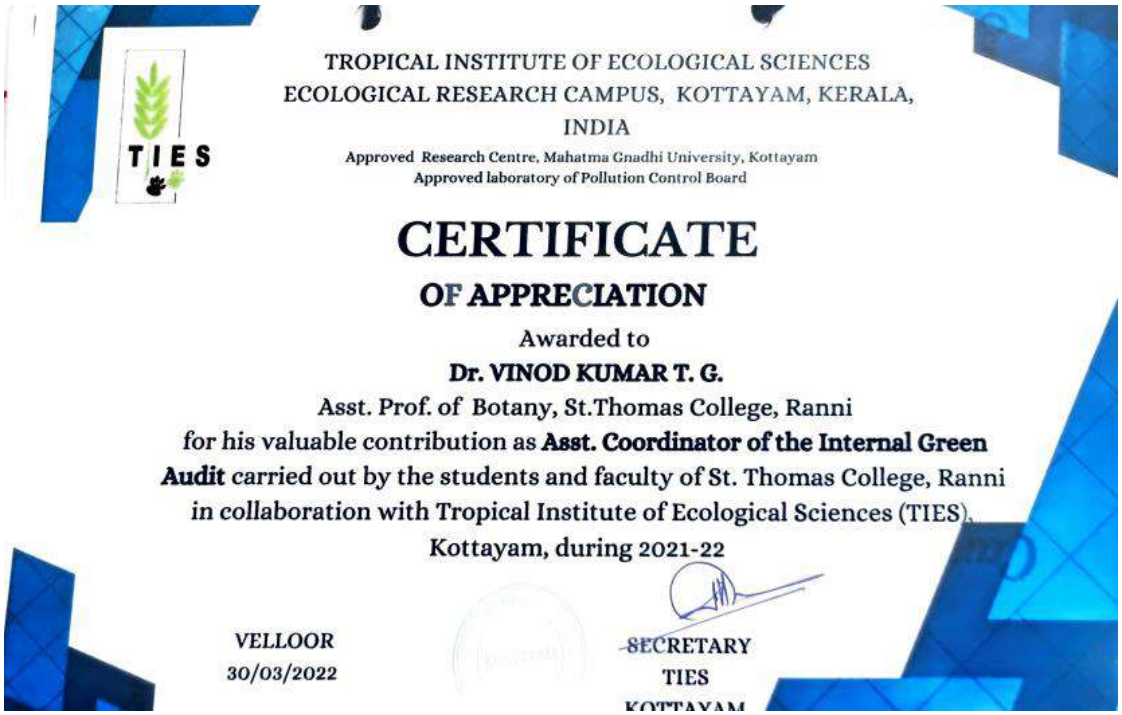

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Dr. VINOD KUMAR T. G.

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PRINCE V. R.

B.Sc Zoology St.Thomas College, Ranni

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Awarded to

SHREELAKSHMI NAIR

B. Com, St.Thomas College, Ranni

for her valuable contribution as **Student Coordinator of the Internal Energy Audit** carried out by the students and faculty of St. Thomas College, Ranni in collaboration with Tropical Institute of Ecological Sciences (TIES), Kottayam, during 2021-22

VELLOOR
30/03/2022

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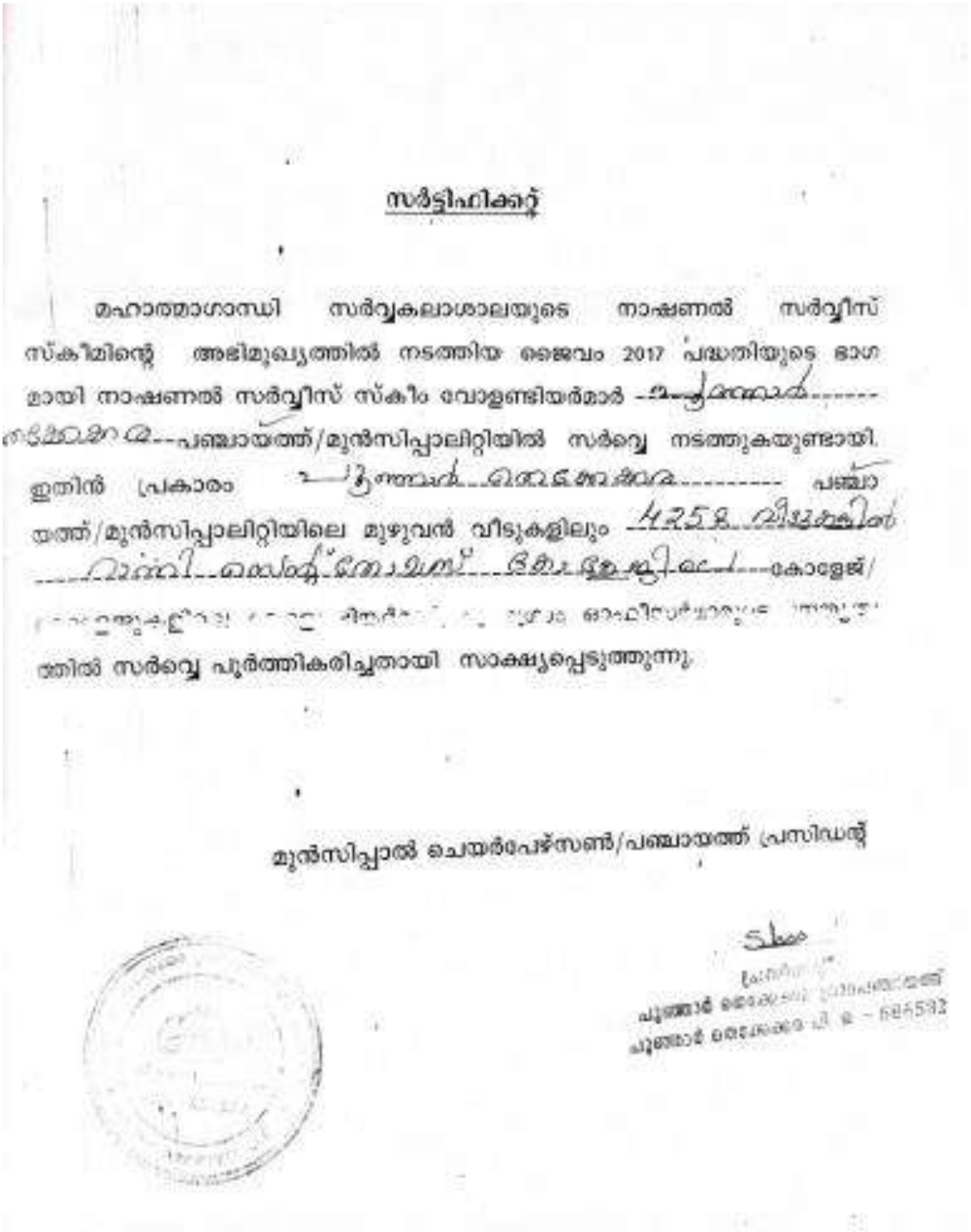
KOTTAYAM

Certificate of Appreciation awarded by **Poonjar-Thekkekara Grama Panchayat** to the NSS unit on successful completion of the survey in connection with the project JAIVA SAKSHRATHAYAJNAM 2017 of Mahatma Gandhi University



സർട്ടിഫിക്കറ്റ്

മഹാത്മാഗാന്ധി സർവ്വകലാശാലയുടെ നാഷണൽ സർവ്വീസ് സ്കീമിന്റെ അഭിമുഖ്യത്തിൽ നടത്തിയ ജൈവം 2017 പദ്ധതിയുടെ ഭാഗമായി നാഷണൽ സർവ്വീസ് സ്കീം വോളണ്ടിയർമാർ [illegible] പഞ്ചായത്ത്/മുൻസിപ്പാലിറ്റിയിൽ സർവ്വെ നടത്തുകയുണ്ടായി. ഇതിൻ പ്രകാരം [illegible] പഞ്ചായത്ത്/മുൻസിപ്പാലിറ്റിയിലെ മുഴുവൻ വീടുകളിലും 4258 വീടുകളിൽ [illegible] കോളേജ്/ [illegible] ത്തിൽ സർവ്വെ പൂർത്തികരിച്ചതായി സാക്ഷ്യപ്പെടുത്തുന്നു.

മുൻസിപ്പാൽ ചെയർപേഴ്സൺ/പഞ്ചായത്ത് പ്രസിഡന്റ്

പ്രസിഡന്റ്
പൂഞ്ഞാർ തെക്കേക്കര ഗ്രാമപഞ്ചായത്ത്
പൂഞ്ഞാർ തെക്കേക്കര പി.ഒ - 686582

Certificates of Experience awarded by **Mahatma Gandhi University** to the faculty mentors of MOOC on Organic Farming for 2020 admission students

Mahatma Gandhi University

(Established by Kerala State Legislature By Notification Number 3431/Leg.C1/85/Law dated 17th April 1985)

Massive Open Online Course

Experience Certificate

This certificate is awarded to

Dr.Sreejaya R

For being the Mentor of 2020 admission students of St. Thomas College, Ranni for the Massive Open Online Course on Organic Farming .

Certificate No-**20OFA0139**

Date of Issue- 20-01-2023

Director MOOC

Mahatma Gandhi University

(Established by Kerala State Legislature By Notification Number 3431/Leg.C1/85/Law dated 17th April 1985)

Massive Open Online Course

Experience Certificate

This certificate is awarded to

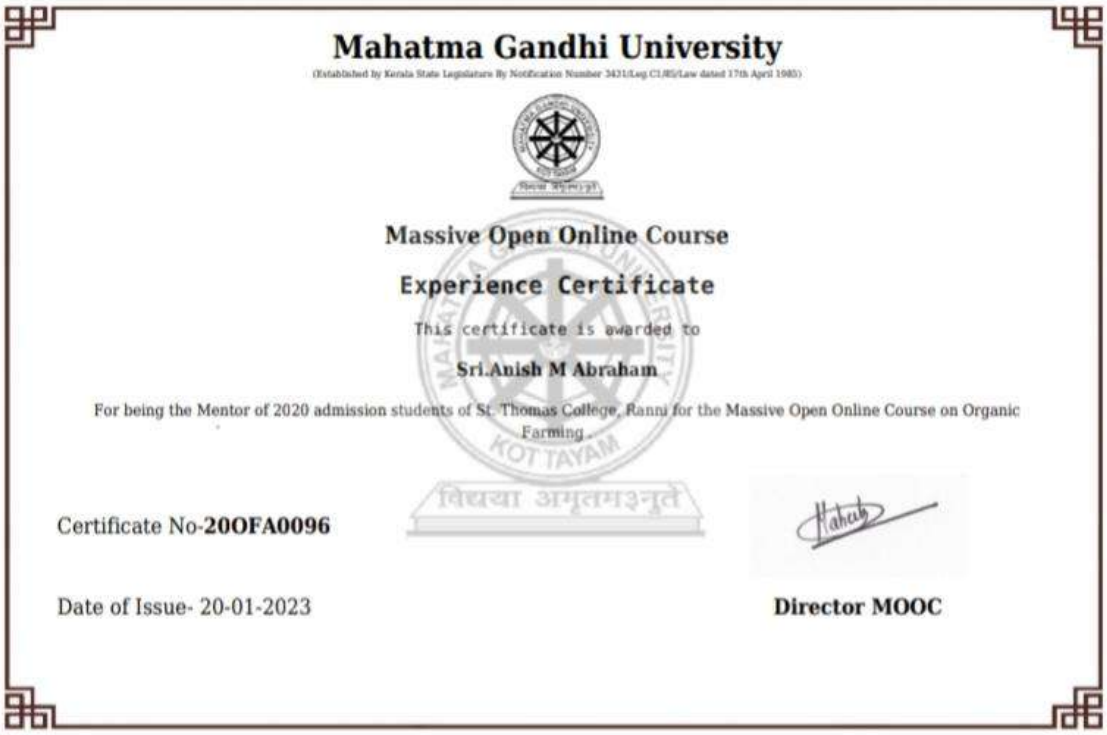
Ms. Divyasree S

For being the Mentor of 2020 admission students of St. Thomas College, Ranni for the Massive Open Online Course on Organic Farming .

Certificate No-**20OFA0530**

Date of Issue- 20-01-2023

Director MOOC



Mahatma Gandhi University

(Established by Kerala State Legislature By Notification Number 3431/Leg.C1/85/Law dated 17th April 1985)

Massive Open Online Course

Experience Certificate

This certificate is awarded to

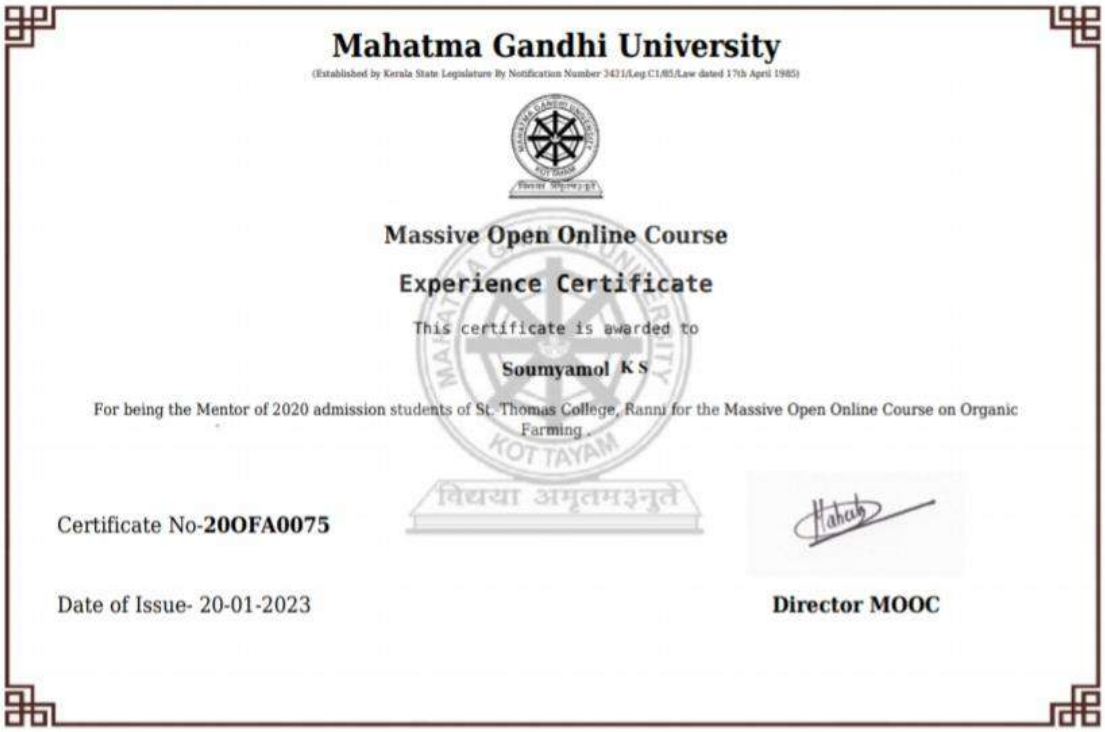
Sri.Anish M Abraham

For being the Mentor of 2020 admission students of St. Thomas College, Ranni for the Massive Open Online Course on Organic Farming .

Certificate No-**20OFA0096**

Date of Issue- 20-01-2023

Director MOOC



Mahatma Gandhi University

(Established by Kerala State Legislature By Notification Number 3431/Leg.C1/85/Law dated 17th April 1985)

Massive Open Online Course

Experience Certificate

This certificate is awarded to

Soumyamol K S

For being the Mentor of 2020 admission students of St. Thomas College, Ranni for the Massive Open Online Course on Organic Farming .

Certificate No-**20OFA0075**

Date of Issue- 20-01-2023

Director MOOC

Mahatma Gandhi University

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Massive Open Online Course

Experience Certificate

This certificate is awarded to

Haripriya

For being the Mentor of 2020 admission students of St. Thomas College, Ranni for the Massive Open Online Course on Organic Farming .

Certificate No-**20OFA0260**

Date of Issue- 20-01-2023

Director MOOC

Mahatma Gandhi University

(Established by Kerala State Legislature By Notification Number 3431/Leg.C1/85/Law dated 17th April 1985)

Massive Open Online Course

Experience Certificate

This certificate is awarded to

Dr.Devipriya M

For being the Mentor of 2020 admission students of St. Thomas College, Ranni for the Massive Open Online Course on Organic Farming .

Certificate No-**20OFA0531**

Date of Issue- 20-01-2023

Director MOOC

Mahatma Gandhi University

(Established by Kerala State Legislature By Notification Number 3431/Leg.C1/85/Law dated 17th April 1985)

Massive Open Online Course

Experience Certificate

This certificate is awarded to

Mr. Jikku James

For being the Mentor of 2020 admission students of St. Thomas College, Ranni for the Massive Open Online Course on Organic Farming .

Certificate No-**20OFA0532**

Date of Issue- 20-01-2023

Director MOOC

Mahatma Gandhi University

(Established by Kerala State Legislature By Notification Number 3431/Leg.C1/85/Law dated 17th April 1985)

Massive Open Online Course

Experience Certificate

This certificate is awarded to

Ms.Binimol Mathew

For being the Mentor of 2020 admission students of St. Thomas College, Ranni for the Massive Open Online Course on Organic Farming .

Certificate No-**20OFA0130**

Date of Issue- 20-01-2023

Director MOOC

Young Fish Farmer-2021 Award instituted by **Fisheries Department**, Pathanamthitta, won by Abin Chacko (2nd Year B. A. History student)

ST. THOMAS C GE
RANNY
PAZHAVANGADI P. O.

Principal
St. Thomas College
Pazhavangadi P.O., Ranni