ENERGY AUDIT REPORT

of

Shikshan Prasarak Mandali's,

TILAK COLLEGE OF EDUCATION,

S. P. College Campus, Pune 411 030

PURSUIT OF EXCELLENCE

Year: 2022-23

Prepared by

ENGRESS SERVICES

Yashashree, 26, Nirmal Bag Society,
Near Muktangan English School, Parvati, Pune 411009
Phone: 09890444795 Email: engress123@gmail.com

ENGRESS SERVICES PUNE

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Yashashree, 26, Nirmal Bag Society, Near Muktangan English School, Parvati, Pune 411 009
Tel: 09890444795 Email: engress123@gmail.com
MEDA Registration No: ECN/2022-23/CR-43/1709
ISO: 9001-2015 Certified (Cert No: 23EQKC13),
ISO: 14001-2015 Certified (Cert No: 23EEKW20)

ENERGY AUDIT CERTIFICATE

Certificate No: ES/TCOE/22-23/01 **Date: 21/7/2023**

This is to certify that we have conducted Energy Audit at Shikshan Prasarak Mandali's Tilak College of Education, S. P. College Campus, Pune 411 030, in the Academic year 2022-23.

The College has adopted following Energy Efficient Practices:

- Usage of Energy Efficient LED Fittings
- Maximum usage of Day Lighting
- Installation of 10 kWp Roof Top Solar PV Plant.

We appreciate the support of Management, involvement of faculty members and students in the process of Energy Conservation.

For Engress Services,

AMehendale

A Y Mehendale,
B E-Mechanical, M Tech- Energy
BEE Certified Energy Auditor, EA-8192

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CHAPTER-I
INTRODUCTION

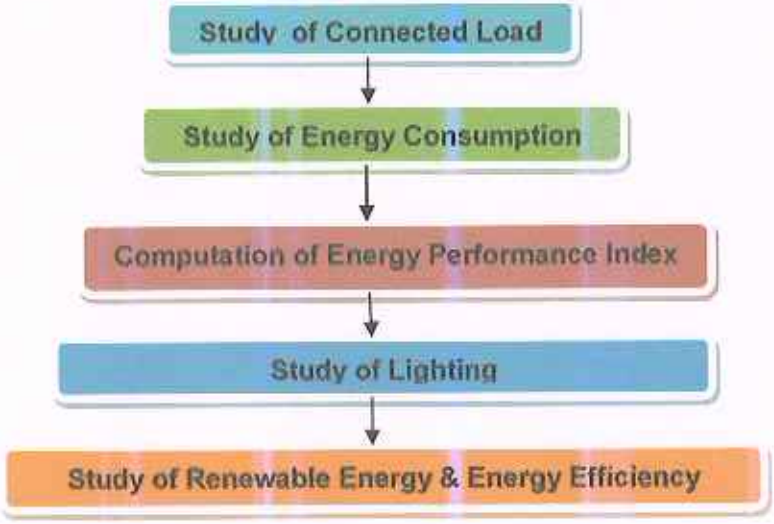
1.1 Introduction:

An Energy Audit is conducted at Shikshan Prasarak Mandali's Tilak College of Education, S. P. College Campus, Pune 411 030.

The guidelines followed for conducting the Energy Audit are:

- BEE India's Energy Conservation Building Code: ECBC-2017
- Maharashtra Energy Development Agency (www.mahaurja.com)
- Tata Power: www.tatapower.com

1.2 Audit Procedural Steps:



1.3 Google Earth Image:

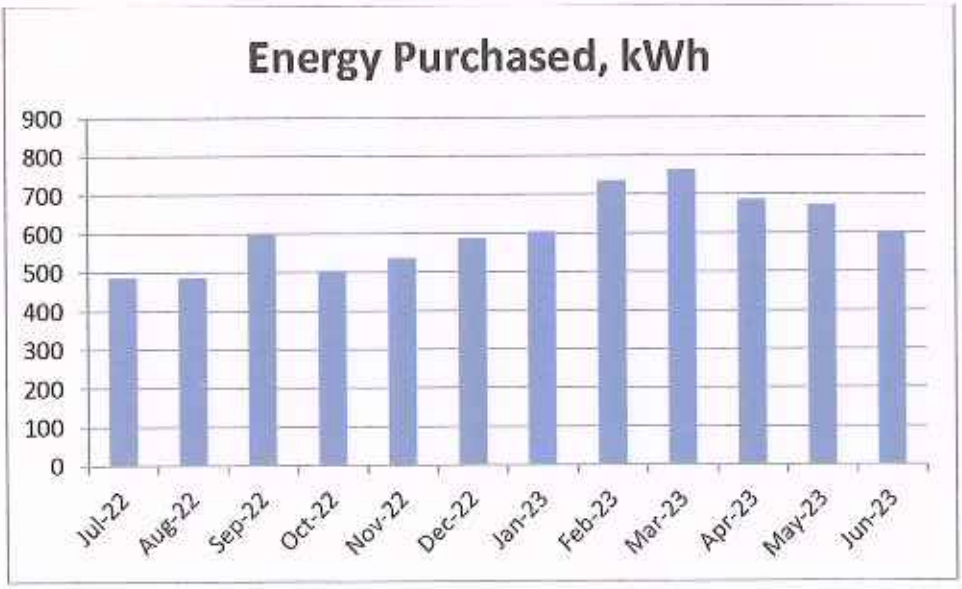
CHAPTER-III
STUDY OF PRESENT ENERGY CONSUMPTION

In this chapter, we present the analysis of Electricity Energy Consumption

Table No 2: Electrical Energy Consumption Analysis- 2022-23:

No	Month	Energy Purchased, kWh	CO2 Emissions, MT
1	Jul-22	487	0.44
2	Aug-22	487	0.44
3	Sep-22	598	0.54
4	Oct-22	503	0.45
5	Nov-22	536	0.48
6	Dec-22	587	0.53
7	Jan-23	604	0.54
8	Feb-23	736	0.66
9	Mar-23	765	0.69
10	Apr-23	687	0.62
11	May-23	672	0.60
12	Jun-23	598	0.54
13	Total	7260	6.53
14	Maximum	765	0.69
15	Minimum	487	0.44
16	Average	605	0.54

Chart No 2: To study the variation of Month wise Energy Consumption, kWh:



CHAPTER-VI
STUDY OF RENEWABLE ENERGY & ENERGY EFFICIENCY

6.1 Usage of Renewable Energy:

The College has installed:

- Roof Top Solar PV Plant of Capacity 50 kWp

Photograph of Roof Top Solar PV Plant:

6.2 Energy Efficiency Measures adopted:

- The College has Energy Efficient LED Fittings.

Photographs of LED Lighting:

PRINCIPAL
Tilak College of Education
Pune-411030.

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- Usage of Energy Efficient LED Fittings
- Installation of 10 kWp Roof Top Solar PV Plant.
- Segregation of Waste at source
- Provision of Bio Composting Bed, for conversion of Organic Waste
- Implementation of Rain Water Management Project
- Good Internal Road
- Internal Tree Plantation
- Provision of Ramp for Divyangajan
- Creation of awareness about Water Conservation by Display of Posters

We appreciate the support of Management, involvement of faculty members and students in the process of Energy Conservation & making the campus Green.

For Engress Services,

A Mehendale

A Y Mehendale,
B E- Mech, M Tech-Energy, Certified Energy Auditor, EA-8192
ASSOCHAM GEM Certified Professional: GEM: 22/788

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INDEX

EXECUTIVE SUMMARY

1. Shikshan Prasarak Mandali's Tilak College of Education, Pune consumes Energy in the form of **Electrical Energy;** used for various equipment.

2. Present Energy Consumption & CO_2 Emission:

No	Particulars	Value	Unit
1	Annual Energy Purchased	**7260**	kWh
2	Annual CO_2 Emissions	**6.53**	MT

3. Renewable Energy & Reduction in CO_2 Emissions:

- The College has installed Roof Top Solar PV Plant of Capacity **10 kWp.**
- The Energy generated by Solar PV Plant in 22-23 is **12000 kWh.**
- Reduction in CO_2 Emissions in 22-23 is **10.8 MT**

4. Waste Management:

No	Head	Particulars
1	Solid Waste	Segregation of Waste at source
2	Organic Waste	Arrangement of Bio Composting Bed
3	E Waste	Disposed of by Parent Society

5. Rain Water Management:

The College has installed Rain Water Management Project; the Rain Water from the terrace is collected through Pipes and is used to increase the underground Water Table.

6. Green & Sustainable Practices:

- Maintenance of good Internal Road
- Tree Plantation in the campus.
- Provision of Ramp for Divyangajan
- Creation of awareness on Water Conservation Display of Posters

7. Assumptions:

1. **1 kWh** of Electrical Energy releases **0.9 Kg of CO_2** into atmosphere
2. Energy generated by Roof Top Solar PV Plant: **4 kWh/kWp per Day**
3. Annual Solar Energy generation Days: **300 Nos**

8. References:

- For CO_2 Emissions: www.tatapower.com
- For Solar PV Energy generation: www.solarrooftop.gov.in

CHAPTER-I
INTRODUCTION

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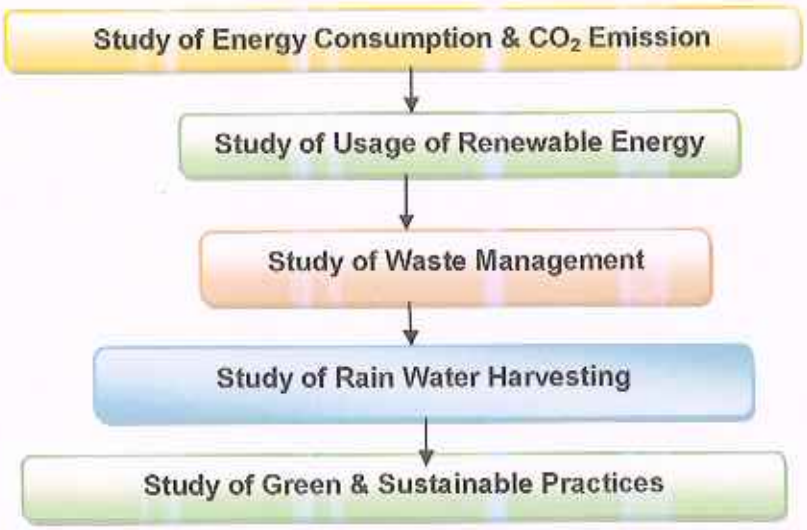

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CHAPTER-II
STUDY OF ENERGY CONSUMPTION & CO_2 EMISSION

A Carbon Foot print is defined as the Total Greenhouse Gas emissions, emitted due to various activities. **Basis for computation of CO_2 Emissions: 1 kWh** of Electrical Energy releases **0.9 Kg of CO_2** into atmosphere.

Table No 1: Month wise Energy Consumption & CO_2 Emissions:

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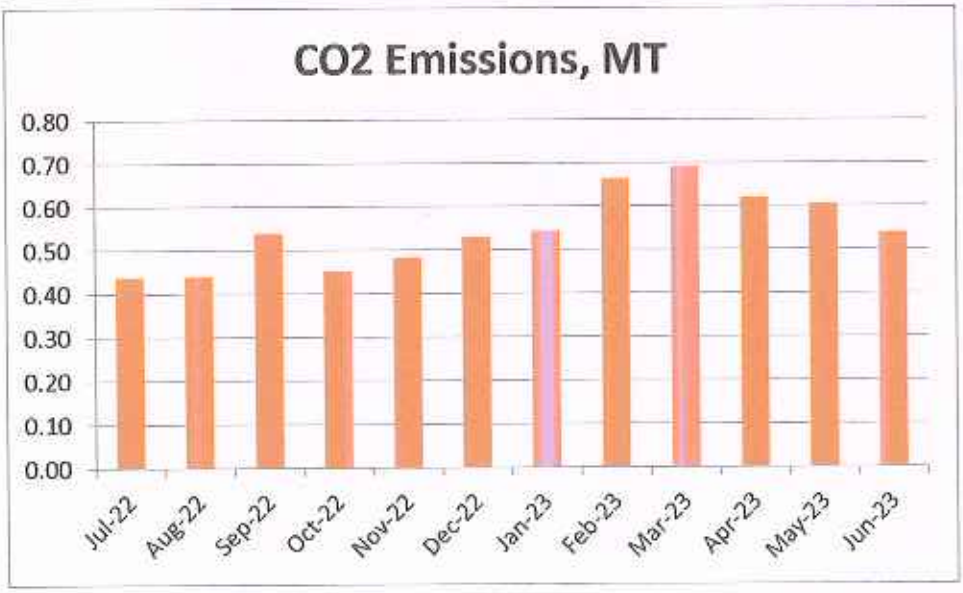


CHAPTER III
STUDY OF USAGE OF RENEWABLE ENERGY

The College has installed Roof Top Solar PV Plant of Capacity **10 kWp**
In the following Table, we present the reduction in CO_2 emissions due to Solar Energy:

Table No 2: Computation of Reduction in CO_2 Emissions:

No	Particulars	Value	Unit
1	Installed Capacity of Roof Top Solar PV Plant Capacity	10	kWp
2	Energy Generated in per kWp	4	kWh/kWp
3	Annual Solar Energy generation Days	300	Nos
4	Energy Generated in the Year: 21-22	**12000**	kWh
5	1 kWh of Electrical Energy saves	**0.9**	Kg/kWh
6	**Qty of CO_2 Saved by Solar PV Plant =(4)*(5) /1000**	**10.8**	**MT of CO_2**

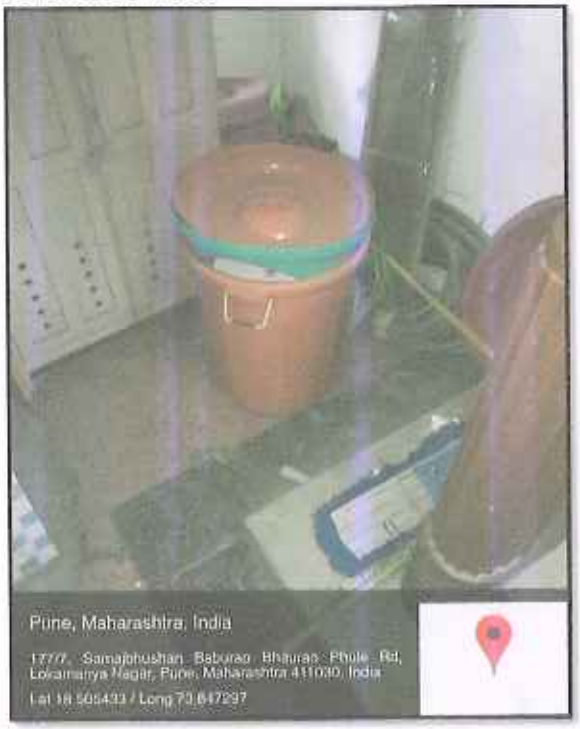
Photograph of Roof Top Solar PV Plant:

CHAPTER IV
STUDY OF WASTE MANAGEMENT

4.1 Segregation of Waste at Source:

The College has good housekeeping practices. The Waste is segregated at source. Waste collection Bins are placed at strategic locations.

Photograph of Waste Collection Bins:



4.2 Organic Waste Management:

The College has a Bio Composting Bed for conversion of Organic Waste.

Photograph of Bio Composting Arrangement:

4.3 E Waste Management:

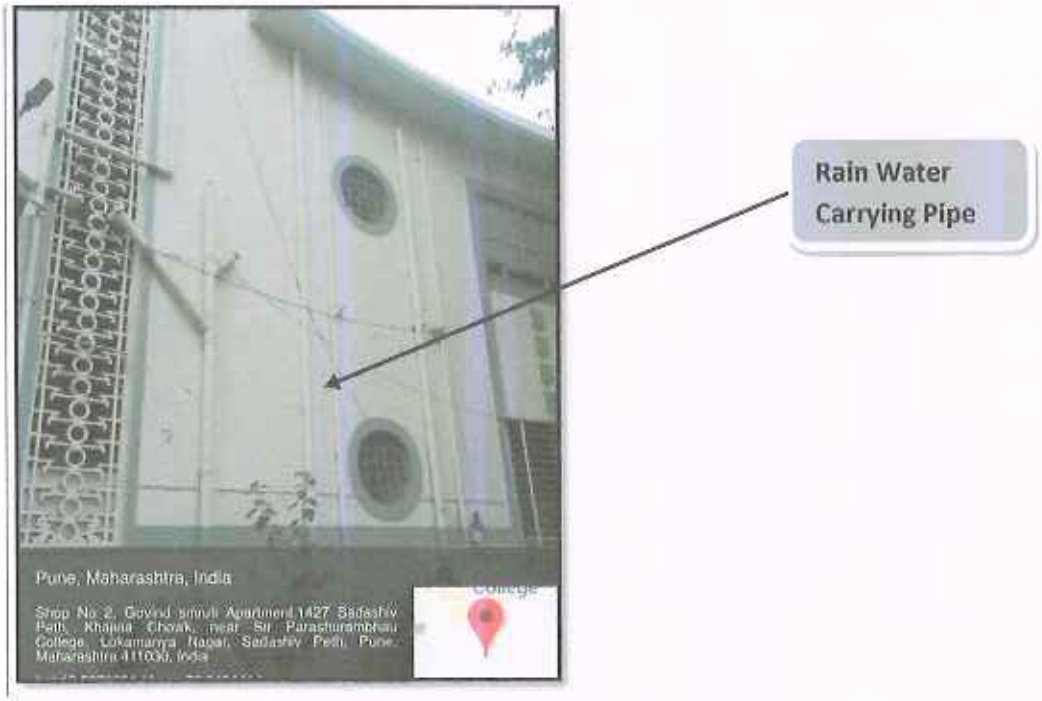
The College has made a Separate E Waste Collection Bin. The E Waste is disposed of centrally through the Parent Society.

Photograph of E Waste Collection Bin:

CHAPTER V
STUDY OF RAIN WATER MANAGEMENT

The College has installed Rain Water Management Project; the Rain Water from the terrace is collected through Pipes and is used to increase the Underground Water Table.

Photograph of Rain Water Collecting Pipe Section:



CHAPTER VI
STUDY OF GREEN & SUSTAINABLE PRACTICES

6.1 Pedestrian Friendly Road & Internal Tree Plantation:

The College has well maintained internal road to facilitate the easy movement of the students within the campus. The College has well maintained landscaped garden in the campus.

Photograph of Internal Road & Tree plantation:

6.2 Provision of Ramp for Divyangajan:

For easy movement of Divyangajan, the College has made provision of Ramp.

Photograph of Ramp:

6.3 Creation of Awareness about Water Conservation:

The College has displayed posters emphasizing on importance of Water Conservation.

Photograph of Poster on Water Conservation:

REGISTRATION CERTIFICATES

Maharashtra Energy Development Agency

CERTIFICATE OF REGISTRATION
FOR CLASS "A"

MEDA REGISTRATION CERTIFICATE

GEM Certificate

ASSOCHAM hereby certifies that

Mr. A Y Mehendale

has successfully passed the
Green and Eco-friendly Movement Certified Professional Test (GEM CP)
with
"Excellent Performance"
on
06 June, 2022

Pankaj R. Dhankar — GEM CP 22/165 — Deepak Sood

ASSOCHAM GEM CP CERTIFICATE

Certificate of Registration

This is to Certify that
Quality Management System of

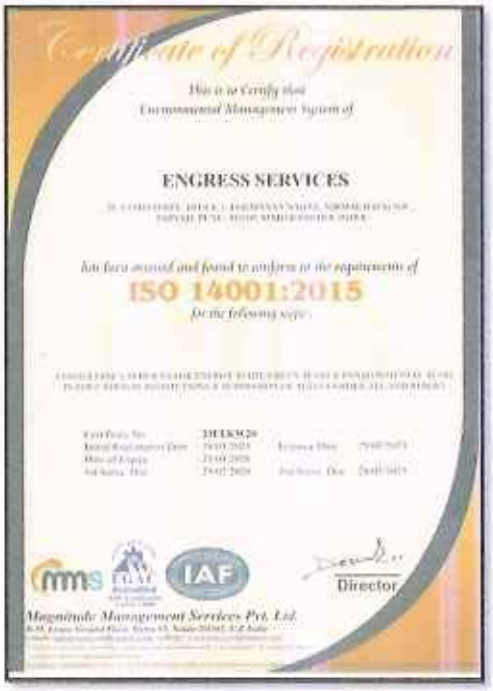
ENGRESS SERVICES

has been assessed and found to conform to the requirements of
ISO 9001:2015
for the following scope :

Director

Magnitude Management Services Pvt. Ltd.

ISO: 9001-2015 CERTIFICATE



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Environmental Management System of

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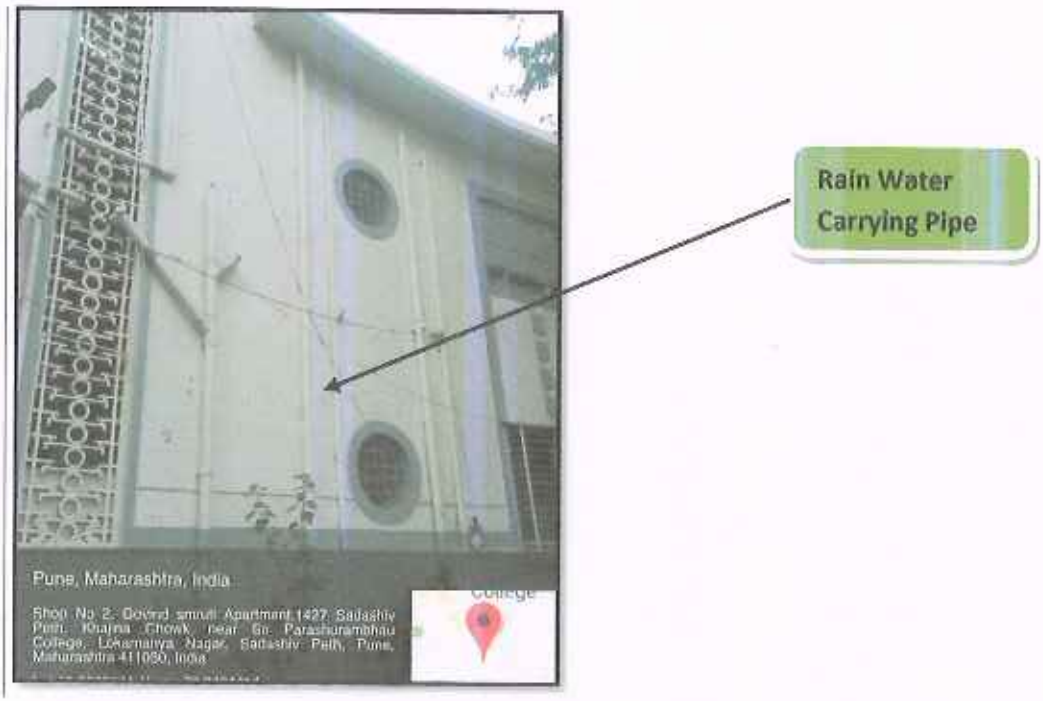
Photograph of Rain Water Collecting Pipe Section:



CHAPTER-VIII
STUDY OF ECO FRIENDLY PRACTICES

8.1Tree Plantation in the Campus:

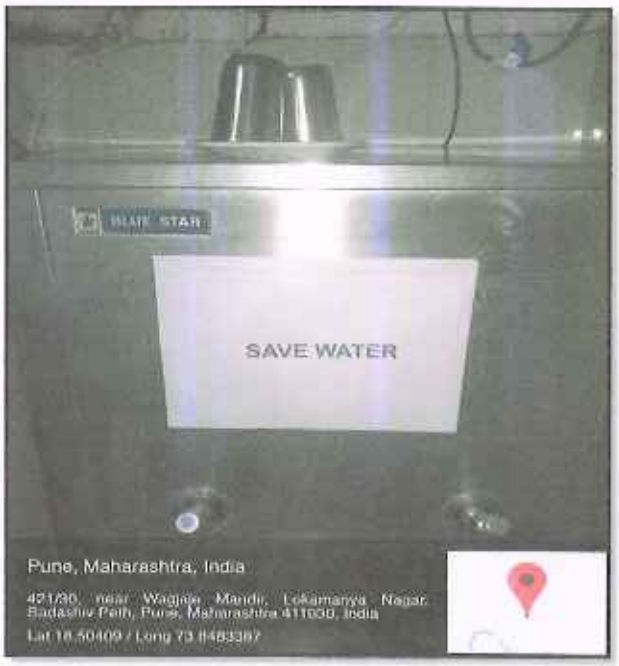
The College has maintained Tree Plantation in the campus.

Photograph of Tree Plantation:

8.2 Creation of Awareness about Water Conservation:

The College has displayed posters emphasizing on importance of Water Conservation.

Photograph of Poster on Water Conservation:



PRINCIPAL
Tilak College of Education
Pune-411030.

ANNEXURE-I:
INDOOR AIR QUALITY, NOISE & COMFORT STANDARDS:

1. Category Wise Air Quality Index Values & Concentration of PM 2.5 & PM10:

No	Category	AQI Value	Concentration Range, PM 2.5	Concentration Range, PM 10
1	Good	0 to 50	0 to 30	0 to 50
2	Satisfactory	51 to 100	31 to 60	51 to 100
3	Moderately Polluted	101 to 200	61 to 90	101 to 250
4	Poor	201 to 300	91 to 120	251 to 350
5	Very Poor	301 to 400	121 to 250	351 to 430
6	Severe	401 to 500	250 +	430 +

2. Recommended Noise Level Standards:

No	Location	Noise Level dB
1	Auditoriums	20-25
2	Outdoor Playground	55
3	Occupied Class Room	40-45
4	Un occupied Class Room	35
5	Apartment, Homes	35-40
6	Offices	45-50
7	Libraries	35-40
8	Restaurants	50-55

3. Thermal Comfort Conditions: For Non-conditioned Buildings:

No	Parameter	Value
1	Temperature	Less Than 33^0C
2	Humidity	Less Than 70%

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We appreciate the support of Management, involvement of faculty members and students in the process of Energy Conservation.

For Engress Services,

A Y Mehendale,
Certified Energy Auditor
EA-8192

CHAPTER-I
INTRODUCTION

1.1 Objectives:

1. To study Connected Load
2. present level of Energy Consumption
3. To Study the present CO_2 emissions
4. To study Usage of Renewable Energy
5. To study usage of LED Lights

1.2 Table No1: General Details of College:

No	Head	Particulars
1	Name	Tilak College of Education
2	Address	S. P. College Campus, Tilak Road, Pune 411 030
3	Affiliation	Savitribai Phule Pune University

1.3 Google Earth Image:

CHAPTER-V
STUDY OF USAGE OF ALTERNATE ENERGY

The College has installed **10 kWp** Roof Top Solar PV Plant.

In this Chapter, we compute the percentage of usage of Alternate / Renewable Energy to Annual Energy Demand of the College.

Table No 5: Computation of % usage of Alternate Energy to Annual Energy Demand:

No	Particulars	Value	Unit
1	Energy Purchased from MSEDCL	**7150**	kWh
2	Installed Roof Top Solar PV Plant Capacity	10	kWp
3	Average Daily Energy Generated	4	kWh/kWp
4	Annual Generation Days	300	Nos
5	Annual Solar Energy Generated	**12000**	kWh
6	Total Energy Demand = (1) + (5)	19150	kWh
7	% of Usage of Alternate Energy to Total Energy Demand= (5)*100/ (6)	**62.66**	%

Photograph of Roof Top Solar PV Plant:

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ENGRESS SERVICES PUNE

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In this chapter, we present the analysis of Electricity Energy Consumption

Table No 2: Electrical Energy Consumption Analysis- 2021-22:

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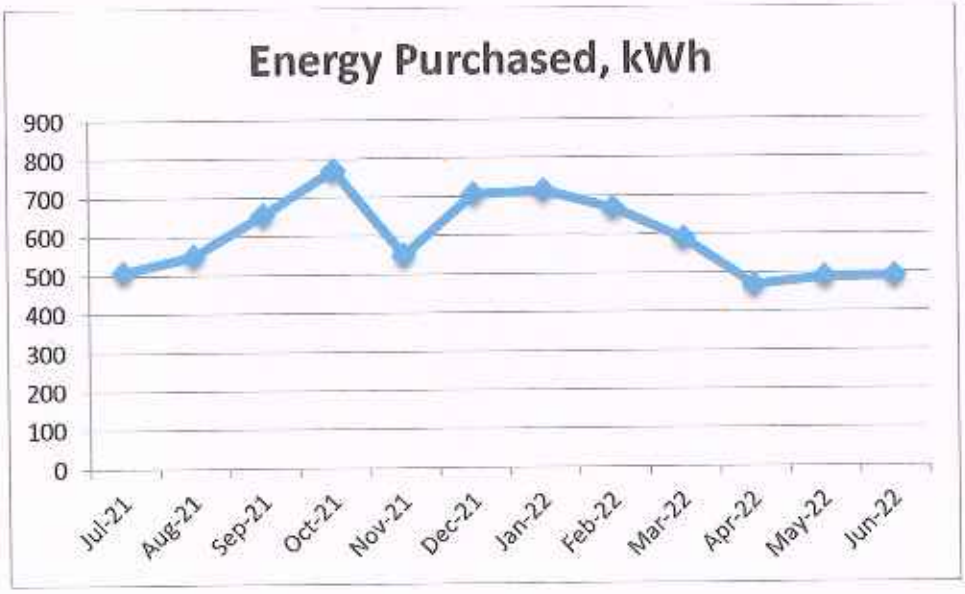
4	Oct-21	769
5	Nov-21	549
6	Dec-21	706
7	Jan-22	715
8	Feb-22	668
9	Mar-22	588
10	Apr-22	468
11	May-22	487
12	Jun-22	489
13	Total	7150
14	Maximum	769
15	Minimum	468
16	Average	595.83

Chart No 1: To study the variation of Month wise Energy Consumption, kWh:



CHAPTER-III
STUDY OF CARBON FOOTPRINTING

A Carbon Foot print is defined as the Total Greenhouse Gas emissions, emitted due to various activities. **Basis for computation of CO_2 Emissions:**

- **1 kWh** of Electrical Energy releases **0.9 Kg of CO_2** into atmosphere

Table No 3: Month wise CO_2 Emissions:

No	Month	Energy Purchased, kWh	CO_2 Emissions, MT
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2	Aug-21	549	0.49
3	Sep-21	654	0.59
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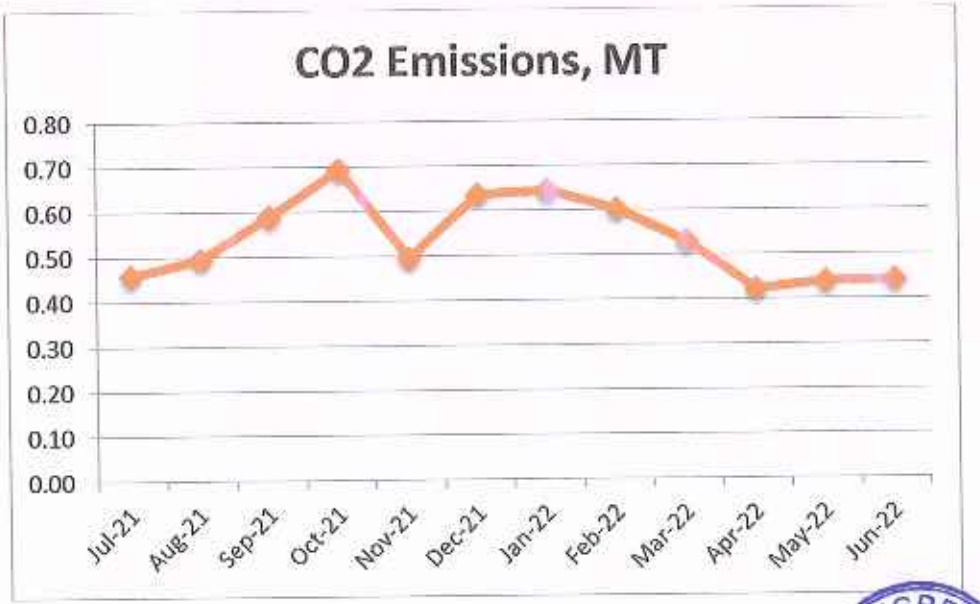
5	Nov-21	549	0.49
6	Dec-21	706	0.64
7	Jan-22	715	0.64
8	Feb-22	668	0.60
9	Mar-22	588	0.53
10	Apr-22	468	0.42
11	May-22	487	0.44
12	Jun-22	489	0.44
13	Total	7150	6.44
14	Maximum	769	0.69
15	Minimum	468	0.42
16	Average	595.83	0.54

Chart No 2: Representation of Month wise CO_2 emissions:



CHAPTER-IV
STUDY OF USAGE OF RENEWABLE ENERGY

The College has installed a Roof Top Solar PV Plant of capacity **10 kWp.** In the following Table we present the Annual Reduction in CO_2 Emissions due to Solar PV Plant.

Table No 3: Computation of Annual Reduction in CO_2 Emissions:

No	Particulars	Value	Unit
1	Installed Roof Top Solar PV Plant Capacity	10	kWp
2	Average Daily Energy Generated	4	kWh/kWp
3	Annual Generation Days	300	Nos
4	Annual Solar Energy Generated	**12000**	kWh
5	1 kWh of Electrical Energy emits	**0.9**	Kg of CO_2
6	Annual Reduction in CO2 Emissions = (4) * (5) /1000	**10.8**	MT

Photograph of Roof Top Solar PV Plant:

CHAPTER V
STUDY OF WASTE MANAGEMENT

5.1 Segregation of Waste at Source:

The College has good housekeeping practices. The Waste is segregated at source. Waste collection Bins are placed at strategic locations.

Photograph of Waste Collection Bin:

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The College has a Bio Composting Bed for conversion of Organic Waste.

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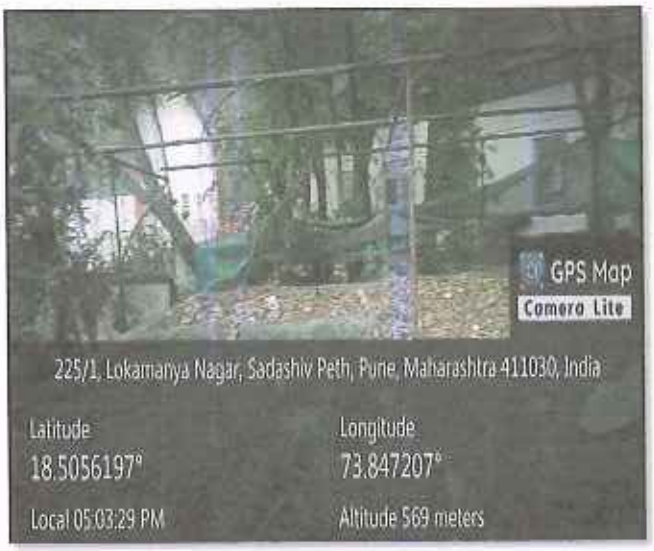

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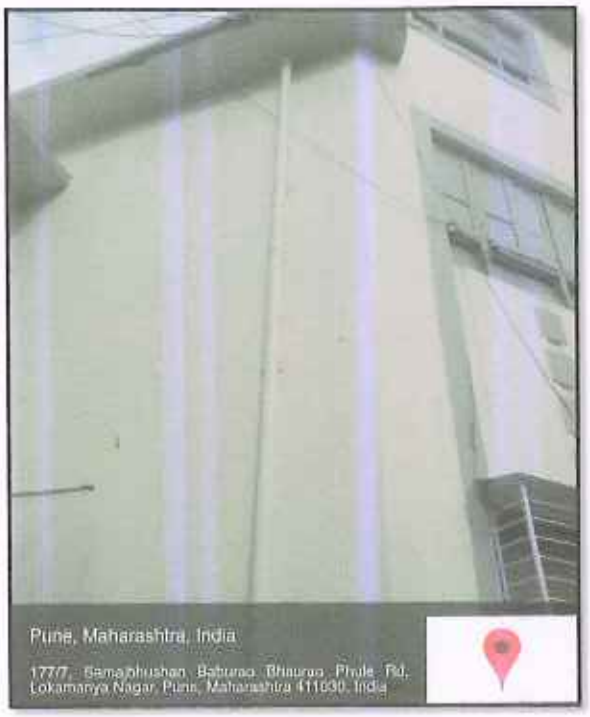


CHAPTER-VII
STUDY OF GREEN & SUSTAINABLE PRACTICES

7.1 Pedestrian Friendly Internal Road:

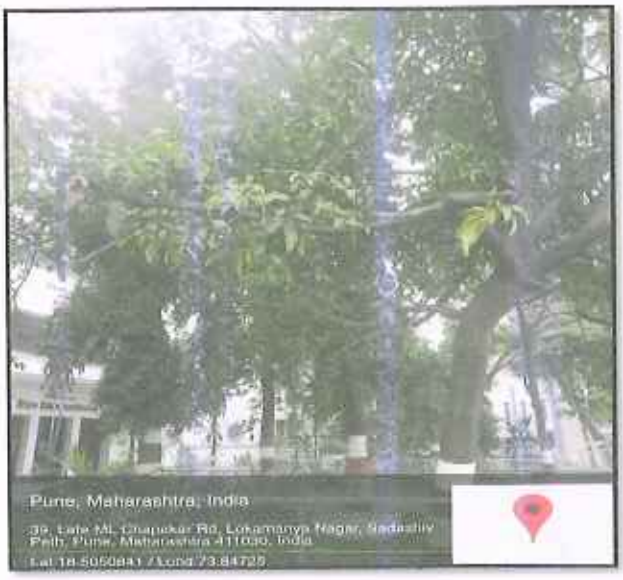
The College has well maintained internal road to facilitate the easy movement of the students within the campus.

Photograph of Internal Road:

7.2 Tree Plantation:

The College has well maintained Tree Plantation in the campus.

Photograph of Internal Tree Plantation:



7.3 Provision of Ramp for Divyangajan:

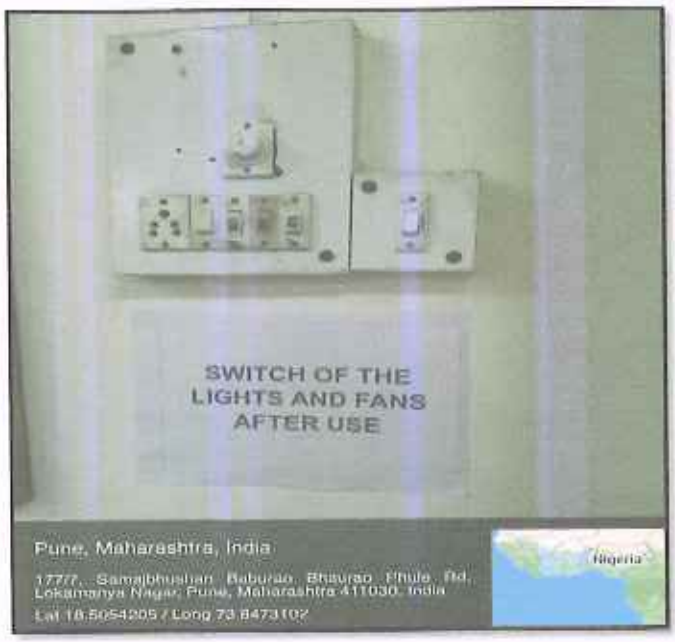
The College has made provision of Ramp for easy movement of Divyangajan.

Photograph of Ramp:

7.4 Creation of Awareness about Energy Conservation:

The College has displayed Posters on Importance of Energy Conservation.

Photograph of Posters on importance of Energy Conservation:



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