GREEN AUDIT REPORT

of

Jayawant Shikshan Prasarak Mandal's

Jayawantrao Sawant College of Pharmacy and Research,

Handewadi, Hadapsar, Pune

Year: 2022-23

Prepared by:

ENGRESS SERVICES

Yashashree, 26, Nirmal Bag Society

Near Muktangan English School, Parvati, Pune 411009

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ENGRESS SERVICES

Yashashree, 26, Nirmal Bag Society, Near Muktangan English School,
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MEDA Registration No: ECN/2022-23/CR-43/1709
ISO: 9001-2015 Certified (Cert No: 23EQKC13),
ISO: 14001-2015 Certified (Cert No: 23EEKW20)

GREEN AUDIT CERTIFICATE

Certificate No: ES/ JSCOPR /22-23/02 **Date: 24/5/2023**

This is to certify that we have conducted Green Audit at Jayawant Shikshan Prasarak Mandal's Jayawantrao Sawant College of Pharmacy & Research, Handewadi Pune, in the Academic year 2022-23.

The College has adopted following Green & Sustainable Practices:

- Usage of Energy Efficient LED Light Fitting
- Usage of BEE STAR Rated Energy Efficient Equipment
- Maximum Usage of Day Lighting
- Installation of Roof Top Solar PV Plant of Capacity 10 kWp
- Segregation of Waste at Source
- Provision of Fumigation Chamber for Fumes' Management
- Implementation of Rain Water Management Project
- Maintenance of good Internal Road
- Tree Plantation in the campus
- Provision of Ramp for Divyangajan
- Creation of Awareness on 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 Y Mehendale,
B E- Mech, M Tech-Energy, Certified Energy Auditor, EA-8192
ASSOCHAM GEM Certified Professional: GEM: 22/788

ENGRESS SERVICES * PUNE *

REGISTRATION CERTIFICATES

Maharashtra Energy Development Agency

CERTIFICATE OF REGISTRATION
FOR CLASS 'A'

MEDA REGISTRATION CERTIFICATE

ASSOCHAM

GEM Certificate

ASSOCHAM hereby certifies that

Mr. A Y Mehendale

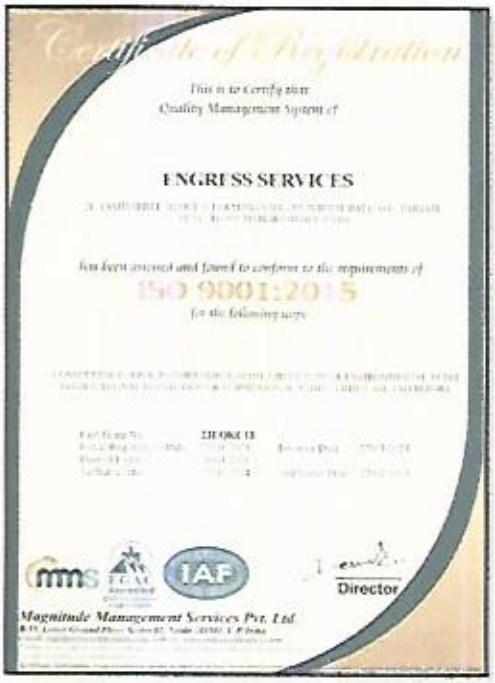
has successfully passed the
Green and Eco friendly Movement Certified Professional Test (GEM CP)
with
"Excellent Performance"
on
06 June 2022

Pankaj R. Dharkar

GEM CP 22:788

Deepak Sood

ASSOCHAM GEM CP CERTIFICATE



Certificate of Registration

This is to Certify that
Quality Management System of

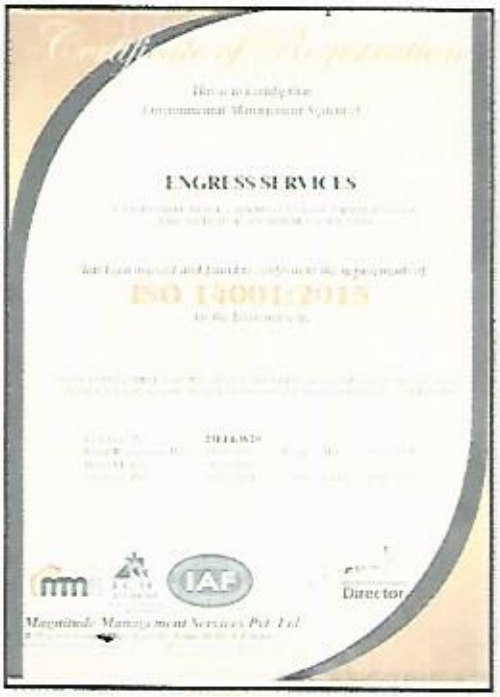
ENGRESS SERVICES

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



Certificate of Registration

ENGRESS SERVICES

ISO 14001:2015

Director

ISO: 14001-2015 Certificate

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ACKNOWLEDGEMENT

We Engress Services, Pune, express our sincere gratitude to the management of Jayawant Shikshan Prasarak Mandal's Jayawantrao Sawant College of Pharmacy & Research, Handewadi, Hadapsar, Pune for awarding us the assignment of Green Audit of their Campus for the Year: 2022-23.

We are thankful to all the staff members for helping us during the field study.

EXECUTIVE SUMMARY

1. Jayawant Shikshan Prasarak Mandal's Jayawantrao Sawant College of Pharmacy & Research, Handewadi, Pune consumes Energy in the form of **Electrical Energy & LPG;** used for various Electrical Equipment, office & other facilities.

2. Present Energy, LPG Consumption & CO_2 Emission:

No	Particulars	Value	Unit
1	Annual Energy Consumption	63542	kWh
2	Annual LPG Consumed	266	Kg
2	Annual CO_2 Emissions	57.90	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	Chemicals' Storage & Fumes	Provision of a fumigation Chamber
3	E Waste	Recommended to dispose of through Authorized Agency

5. Rain Water Management:

The College has installed the Rainwater Management Project; the rain water falling on the terrace is collected and is used for recharging the bore well.

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. Energy Consumption is computed based on Load Utilization Factor
2. **1 kWh** of Electrical Energy releases **0.9 Kg** of CO_2 into atmosphere
3. Energy generated by Roof Top Solar PV Plant: **4 kWh/kWp per Day**
4. 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

ABBREVIATIONS

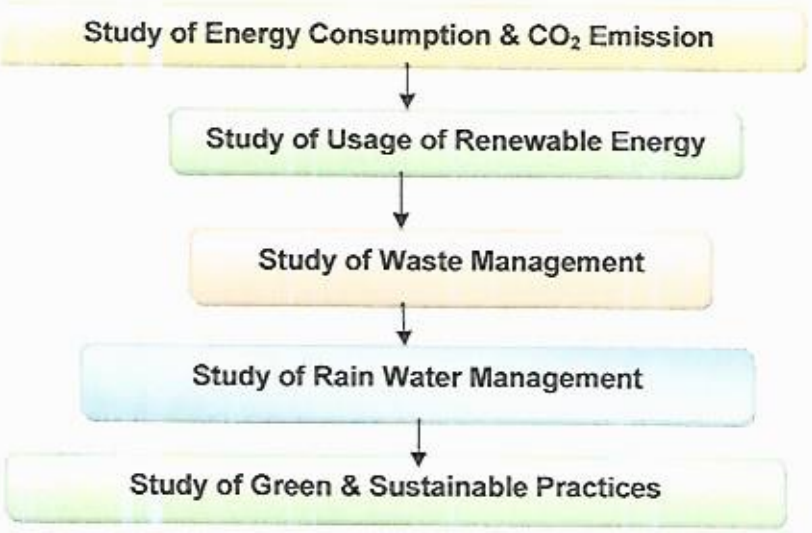
BEE	Bureau of Energy Efficiency
kWh	Kilo Watt Hour
LPD	Liters Per Day
Kg	Kilo Gram
MT	Metric Ton
CO_2	Carbon Di Oxide
Qty	Quantity

CHAPTER-I
INTRODUCTION

1.1 Introduction:

A Green Audit is conducted at Jayawant Shikshan Prasarak Mandal's Jayawantrao Sawant College of Pharmacy & Research, Handewadi, Hadapsar,

1.2 Audit Procedural Steps:



1.3 College Location Image:

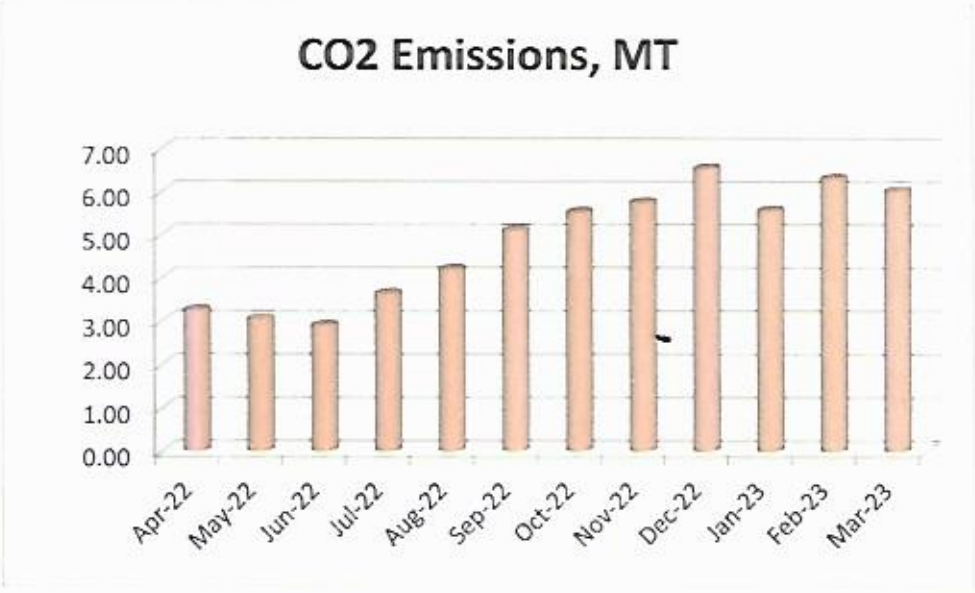
CHAPTER-II
STUDY OF ENERGY CONSUMPTION & CO_2 EMISSION

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 and **1 Kg** of LPG releases **2.68 Kg of CO_2** into atmosphere

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

No	Month	Energy Purchased, kWh	LPG Consumed, Kg	CO_2 Emissions, MT
1	Apr-22	3593	9	3.26
2	May-22	3366	10	3.08
3	Jun-22	3117	38	2.91
4	Jul-22	3991	19	3.64
5	Aug-22	4613	19	4.20
6	Sep-22	5623	19	5.11
7	Oct-22	6083	19	5.53
8	Nov-22	6280	38	5.75
9	Dec-22	7211	19	6.54
10	Jan-23	6073	38	5.57
11	Feb-23	6955	19	6.31
12	Mar-23	6638	19	6.03
13	Total	63542	266	57.90
14	Maximum	7211	38	6.59
15	Minimum	3117	0	2.80
16	Average	5295	22	4.83

Chart No 1: Month wise CO_2 Emissions:



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	4 kWh/kWp
3	Annual Solar Energy generation Days	300	Nos
4	Energy Generated in the Year: 22-23	**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 Chemicals' Storage & Fumes' Management:

The Chemicals are kept away from the students in a fumigation Chamber.

Photograph of Fumigation Chamber:

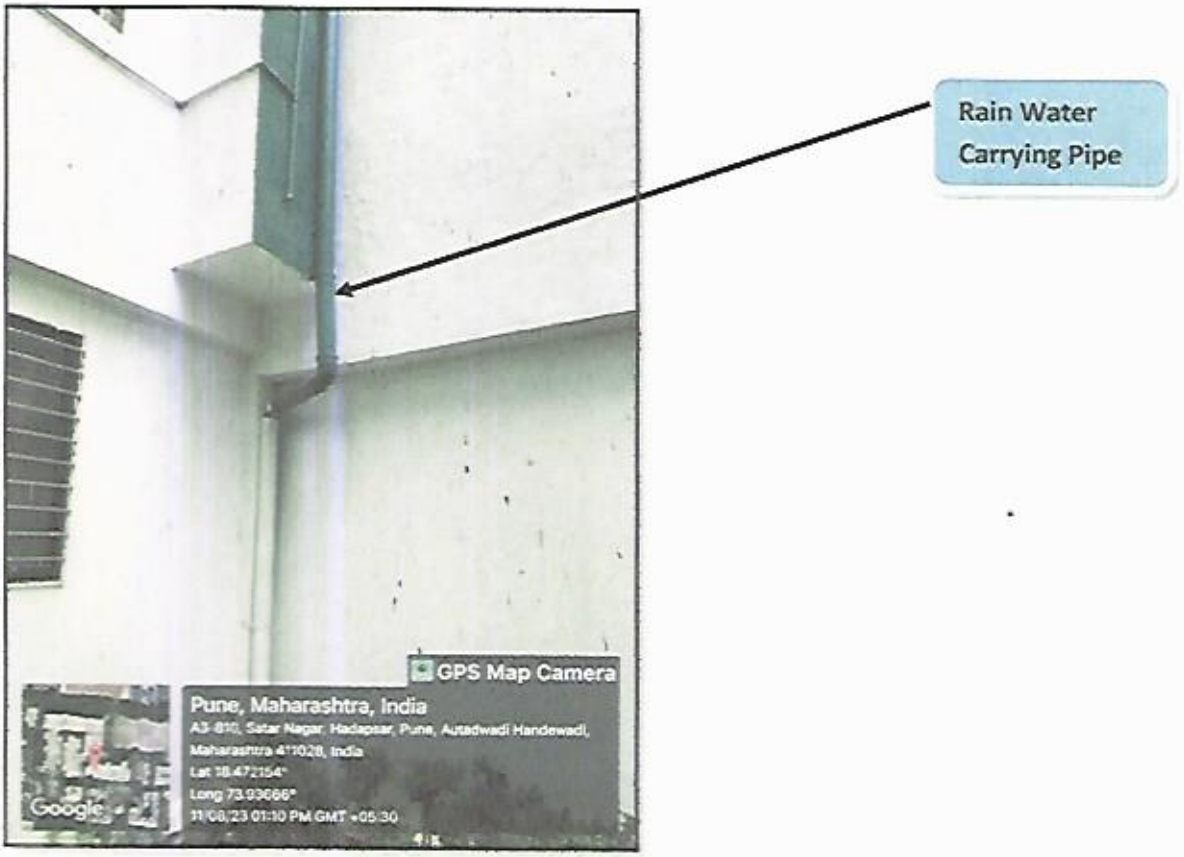
4.3 E Waste Management:

It is recommended to dispose of the E Waste through Authorized Agency

CHAPTER V
STUDY OF RAIN WATER MANAGEMENT

The College has implemented the Rain Water Management Project. The College has installed Pipe from the terrace and the Rain water falling on the terrace is gathered and is used for recharging the bore well.

Photograph of Rain Water Management Pipe Section:

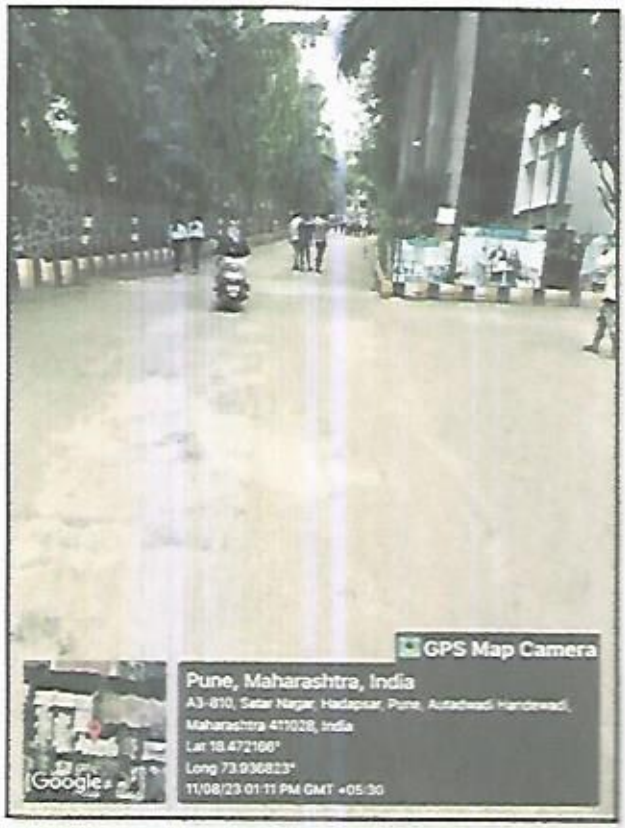


CHAPTER VI
STUDY OF GREEN & SUSTAINABLE PRACTICES

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:

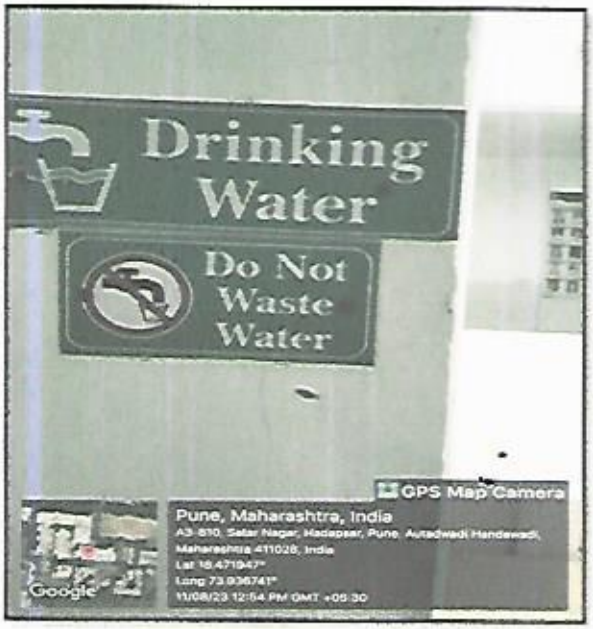
For easy movement of Divyangajan, the College has made provision of Ramp.

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:



ANNEXURE-1:
LIST OF TREES & PLANTS IN THE CAMPUS:

No	Common Name of Plant	No	Common Name of Plant
1	Hibiscus	24	Ratrarani
2	Vinca	25	Papaya
3	Jatropha	26	Bel
4	Colius	27	Adulsa
5	Dracina	28	Raktarohida
6	Duranda	29	Lajalu
7	Khalifa	30	Panfuti
8	Tikmal	31	Dhotra
9	Ova	32	Kantakari
10	Chincha	33	Pushkarmul
11	Mahabrhunga raj	34	Chitrak
12	Rudraksha	35	Tuti
13	Haad sandhi	36	Tantani
14	gokarna	37	Korphad
15	Nilgiri	38	Kadipatta
16	Bhuinimba	39	Idlimbu
17	Falsi	40	Koinel
18	Karanja	41	Vala
19	Ritha	42	Jireniyam
20	Khair	43	Tulas
21	Drumstick	44	Tikoma
22	Rose	45	Hemiliya
23	Mehendi	46	Plumbego

Photograph of Nakshatra Garden:

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MEDA Registration No: ECN/2022-23/CR-43/1709
ISO: 9001-2015 Certified (Cert No: 23EQKC13),
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- Usage of Energy Efficient BEE STAR Rated equipment
- 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 making the Campus Energy Efficient.

For Engress Services,

ENGRESS SERVICES * PUNE *

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

REGISTRATION CERTIFICATES

Regn. No. EA 0102 No. 2942

National Productivity Council
(National Certifying Agency)
PROVISIONAL CERTIFICATE

Achyut Yashavant Mehendale
Yashavant

Certified Energy Auditor

Place: Chennai
Date: 28th August

Controller of Examination

AUDITOR CERTIFICATE

Maharashtra Energy Development Agency

CERTIFICATE OF REGISTRATION
FOR CLASS 'A'

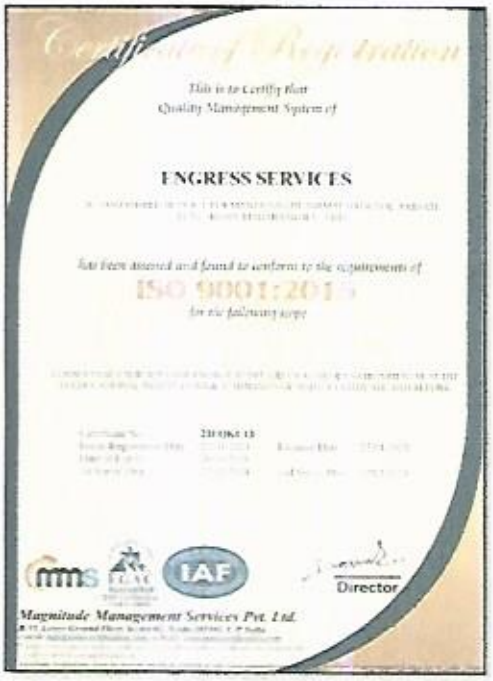
Name and Address of the firm

Registration Category

Registration Number

- 09th May, 2024

MEDA Registration Certificate



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for the following scope

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Magnitude Management Services Pvt. Ltd.

ISO: 9001-2015 Certificate

This is to Certify that
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ENGRESS SERVICES

ISO 14001:2015

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ISO: 14001-2015 Certificate

ENGRESS SERVICES PUNE

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1. Jayawant Shikshan Prasarak Mandal's Jayawantrao Sawant College of Pharmacy & Research, Handewadi, Pune consumes Energy in the form of **Electrical Energy & LPG;** used for various Electrical Equipment, Office & other facilities.

2. Present Connected Load & Energy Consumption:

No	Particulars	Value	Unit
1	Total Connected Load	**60**	kW
2	Annual Energy Purchased	**63542**	kWh
3	Annual CO_2 Emissions	**57.90**	MT

3. Energy Performance Index:

No	Particulars	Value	Unit
1	Total Annual Energy Purchased	63542	kWh
2	Annual Energy Generated	12000	kWh
3	Annual Energy Consumed=1+2	75542	kWh
4	Total Built up area of College	4929	m^2
5	Energy Performance Index =(3) / (4)	**12.89**	kWh/m^2

4. Study of Lighting Power Density & % Usage of LED Lighting:

No	Particulars	Value	Unit
1	Lighting Power Density	**2.53**	W/m^2
2	% of Usage of LED Lighting to Total Lighting Load	**30.39**	%

5. Renewable Energy & Energy Efficiency Projects:

- Usage of Energy Efficient LED fittings
- Installation of **10 kWp** Roof Top Solar PV Plant

6. Assumptions:

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

7. References:

- Audit Methodology: www.mahaurja.com
- Energy Conservation Building Code: ECBC-2017: www.beeindia.gov.in
- For CO_2 Emissions: www.tatapower.com
- For Solar PV Energy generation: www.solarrooftop.gov.in

ABBREVIATIONS

LED	:	Light Emitting Diode
MSEDCL	:	Maharashtra State Electricity Distribution Company Limited
BEE	:	Bureau of Energy Efficiency
ECBC	:	Energy Conservation Building Code
MEDA	:	Maharashtra Energy Development Agency
PV	:	Photo Voltaic
Kg	:	Kilo Gram
kWh	:	kilo-Watt Hour
CO_2	:	Carbon Di Oxide
MT	:	Metric Ton

CHAPTER-I
INTRODUCTION

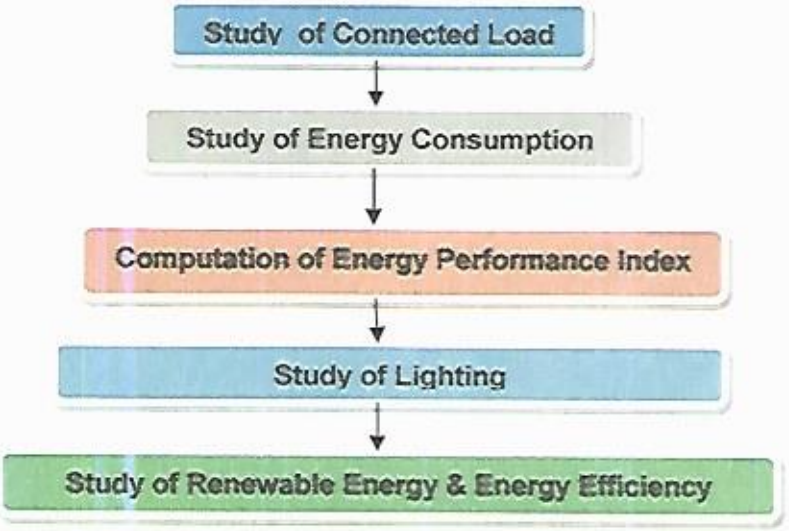
1.1 Introduction:

An Energy Audit is conducted at Jayawant Shikshan Prasarak Mandal's Jayawantrao Sawant College of Pharmacy & Research, Handewadi, Hadapsar,

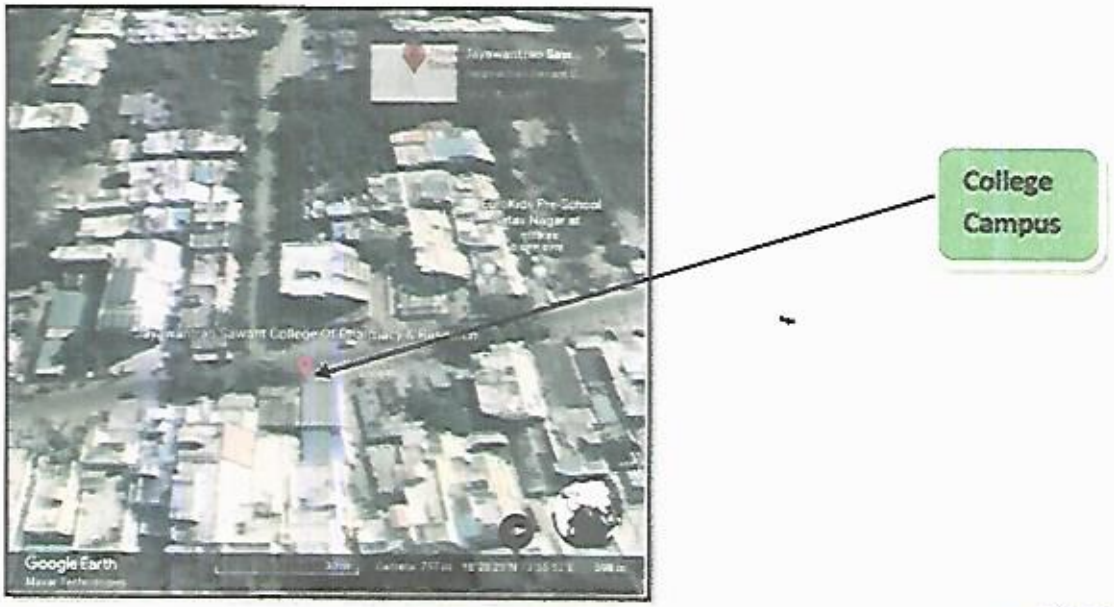
The guidelines followed for conducting the Energy Audit are:

- 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 College Location Image:



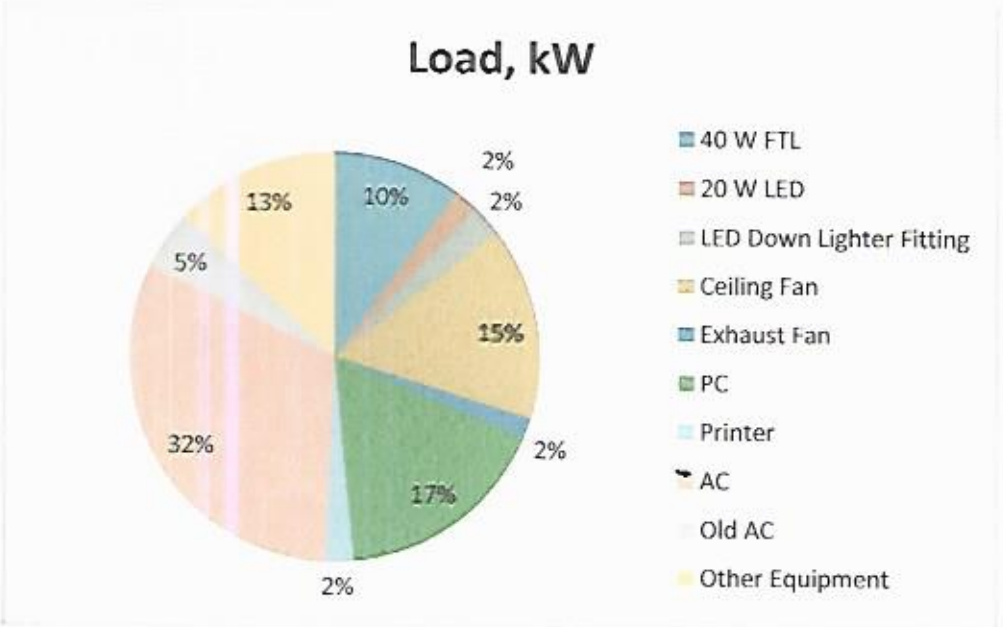
CHAPTER-II
STUDY OF CONNECTED LOAD

The major contributors to the connected load of the College include:

Table No 1: Study of Equipment wise Connected Load:

No	Equipment	Qty	Load, W/Unit	Load, kW
1	40 W FTL	150	40	6
2	20 W LED	59	20	1.18
3	LED Down Lighter Fitting	80	18	1.44
4	Ceiling Fan	140	65	9.1
5	Exhaust Fan	18	52	0.94
6	PC	68	150	10.2
7	Printer	9	150	1.35
8	AC	10	1875	18.75
9	Old AC	1	2775	2.78
10	Other Equipment	52	150	7.8
11	**Total**			**60**

Chart No 1: Study of Connected Load:



CHAPTER-III
STUDY OF PRESENT ENERGY CONSUMPTION

In this chapter, we present the analysis of Electrical Energy Consumption.

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

No	Month	Energy Purchased, kWh	LPG Consumed, Kg	CO_2 Emissions, MT
1	Apr-22	3593	9	3.26
2	May-22	3366	10	3.08
3	Jun-22	3117	38	2.91
4	Jul-22	3991	19	3.64
5	Aug-22	4613	19	4.20
6	Sep-22	5623	19	5.11
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11	Feb-23	6955	19	6.31
12	Mar-23	6638	19	6.03
13	Total	63542	266	57.90
14	Maximum	7211	38	6.59
15	Minimum	3117	0	2.80
16	Average	5295	22	4.83

Chart No 2: Variation in Monthly Energy Purchased, kWh:

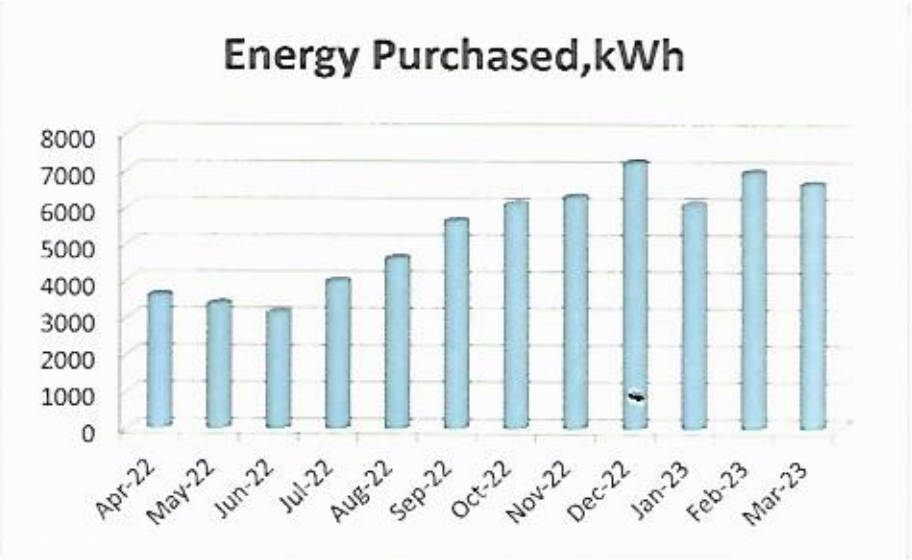
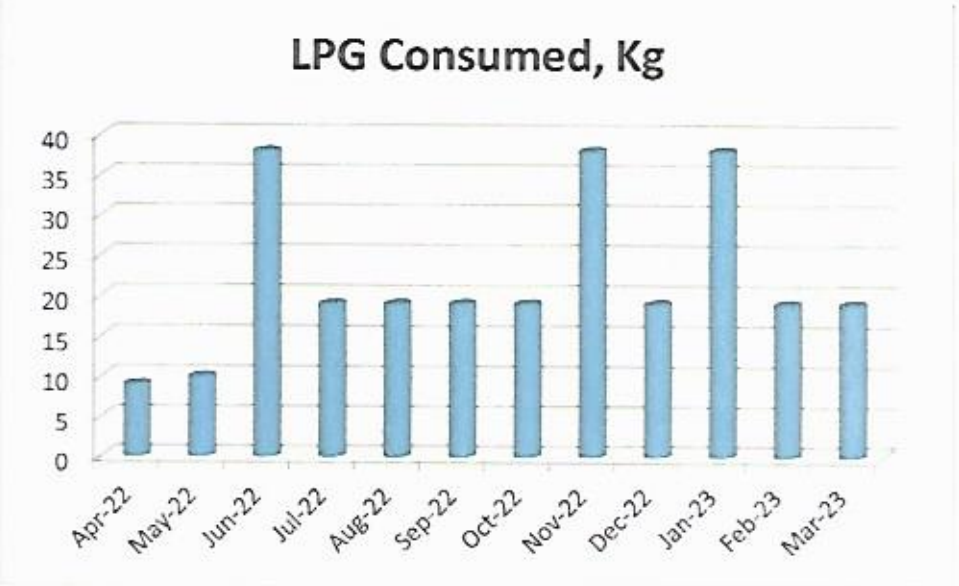


Chart No 3: Variation in Monthly LPG Consumption, Kg:



CHAPTER-IV
STUDY OF ENERGY PERFORMANCE INDEX

Energy Performance Index: Energy Performance Index of a Building is its Annual Energy Consumption in Kilo Watt Hours per square meter of the Building

It is determined by:

$$EPI = \frac{\text{(Annual Energy Consumption in kWh)}}{\text{(Total Built-up area in m}^2\text{)}}$$

Now we compute the EPI for the College as under:

Table No 3: Computation of Energy Performance Index:

No	Particulars	Value	Unit
1	Total Annual Energy Purchased	63542	kWh
2	Energy Generated by Solar PV Plant	12000	kWh
3	Total Energy Consumed= 1+2	75542	kWh
4	Total Built up area of College	4929	m^2
5	Energy Performance Index =(3) / (4)	**12.89**	kWh/m^2

CHAPTER V
STUDY OF LIGHTING

Terminology:

1. Lumen is a unit of light flow or luminous flux. The lumen rating of a lamp is a measure of the total light output of the lamp. The most common measurement of light output (or luminous flux) is the lumen. Light sources are labeled with an output rating in lumens.

2. Lux is the metric unit of measure for illuminance of a surface. One lux is equal to one lumen per square meter.

3. Circuit Watts is the total power drawn by lamps and ballasts in a lighting circuit under assessment.

4. Installed Load Efficacy is the average maintained illuminance provided on a horizontal working plane per circuit watt with general lighting of an interior. Unit: lux per watt per square metre (lux/W/m^2)

5. Lamp Circuit Efficacy is the amount of light (lumens) emitted by a lamp for each watt of power consumed by the lamp circuit, i.e. including control gear losses. This is a more meaningful measure for those lamps that require control gear. Unit: lumens per circuit watt (lm/W)

6. Installed Power Density. The installed power density per 100 lux is the power needed per square metre of floor area to achieve 100 lux of average maintained illuminance on a horizontal working plane with general lighting of an interior. Unit: watts per square metre per 100 lux (W/m^2/100 lux) 100 Installed power density (W/m^2/100 lux)

7. Lighting Power Density: It is defined as Total Lighting Load in a room divided by the Area of that Room in square meters.

In this Chapter we compute the Lighting Power Density of Class Room and the percentage usage of LED Lighting to total Lighting Load of the College.
Now, we compute the usage of LED Lighting to Total Lighting Load, as under.

Table No 4: Computation of Lighting Power Density: Class Room:

No	Particulars	Value	Unit
1	Qty of 40 W Fittings in Class Room	6	Nos
2	Load of 40 W Fitting	40	W/unit
3	Total Load of 6 Nos, 40 W Fittings	**240**	W
4	Built up area of Class Room: 303	**95**	m^2
5	**Lighting Power Density = (3)/(4)**	**2.53**	W/m^2

Table No 5: Percentage Usage of LED Lighting to Total Lighting Load:

No	Particulars	Value	Unit
1	No of 40 W FTL Tube Lights	150	Nos
2	Demand of 40 W FTL Fitting	40	W/Unit
3	Total Electrical Load of 40 W FTL Fittings	**6**	kW
4	No of 20 W LED Tube Lights	59	Nos
5	Demand of 20 W LED Tube Light	20	W/Unit
6	Total Electrical Load of 20 W LED Fittings	**1.18**	kW
7	No of 18 W LED Fitting	80	Nos
8	Demand of 18 W LED Fitting	18	W/Unit
9	Total Electrical Load of 18 W LED Fitting	**1.44**	kW
10	Total Lighting Load= **3 + 6 + 9**	**8.62**	kW
11	Total LED Lighting Load= **6 + 9**	**2.62**	kW
12	% of LEDs to Total Lighting Load = **(11)*100/(10)**	**30.39**	%

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 10 kWp

Photograph of Roof Top Solar PV Plant:

6.2 Energy Efficiency Measures adopted:

- The College has Energy Efficient LED Fittings.
- Usage of BEE STAR Rated Equipment

Photographs of STAR Rated AC & LED Lighting:

ENVIRONMENTAL AUDIT REPORT

of

Jayawant Shikshan Prasarak Mandal's

Jayawantrao Sawant College of Pharmacy and Research,

Handewadi, Hadapsar, Pune

Year: 2022-23

Prepared by:

ENGRESS SERVICES

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ENGRESS SERVICES

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MEDA Registration No: ECN/2022-23/CR-43/1709
ISO: 9001-2015 Certified (Cert No: 23EQKC13),
ISO: 14001-2015 Certified (Cert No: 23EEKW20)

ENVIRONMENTAL AUDIT CERTIFICATE

Certificate No: ES/ JSCOPR /22-23/03 **Date: 24/5/2023**

This is to certify that we have conducted Environmental Audit at Jayawant Shikshan Prasarak Mandal's Jayawantrao Sawant College of Pharmacy & Research, Handewadi Pune, in the Year 2022-23.

The College has adopted following Environment Friendly Practices:

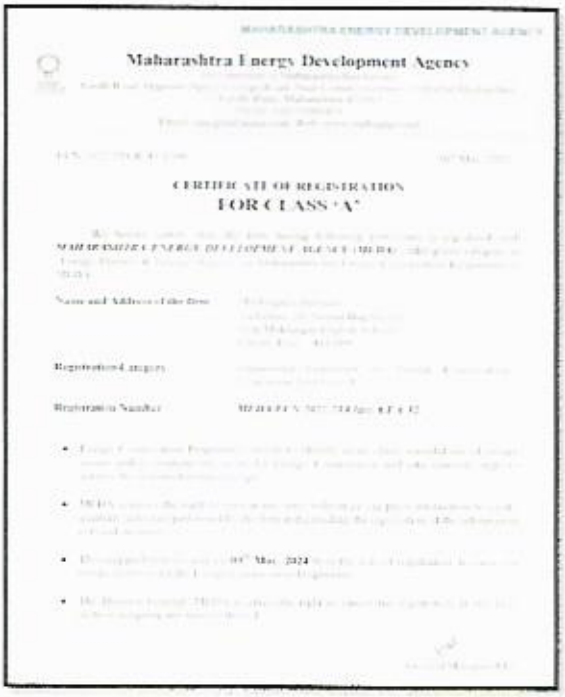
- Usage of Energy Efficient LED Light Fitting
- Usage of BEE STAR Rated Energy Efficient Equipment
- Maximum Usage of Day Lighting
- Installation of Roof Top Solar PV Plant of Capacity 10 kWp
- Segregation of Waste at Source
- Provision of Fumigation Chamber for Fumes' Management
- Implementation of Rain Water Management Project
- Tree Plantation in the campus
- Creation of Awareness on 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 Eco Friendly.

For Engress Services,

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

REGISTRATION CERTIFICATES



Maharashtra Energy Development Agency

CERTIFICATE OF REGISTRATION
FOR CLASS "A"

MEDA REGISTRATION CERTIFICATE

ASSOCHAM

GEM Certificate

ASSOCHAM hereby certifies that

Mr. A Y Mehendale

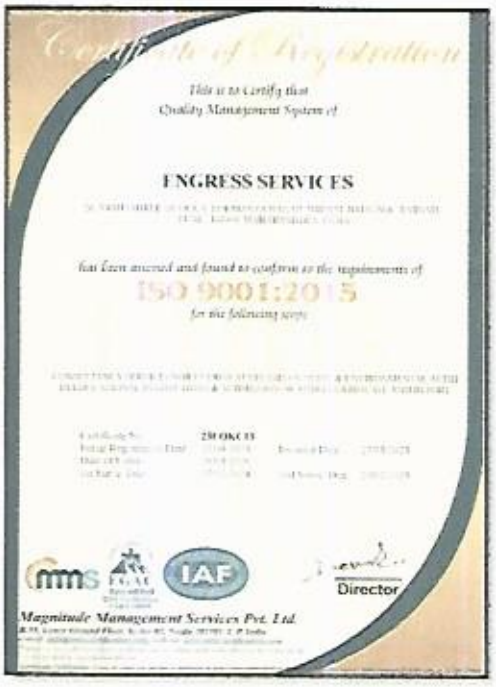
has successfully passed the
Green and Eco-friendly Movement Certified Professional Test (GEM CP)
with
"Excellent Performance"
on
06 June 2022

Pankaj R. Dharkar

GEM CP 22/788

Deepak Sood

ASSOCHAM GEM CP CERTIFICATE



Certificate of Registration

This is to Certify that
Quality Management System of

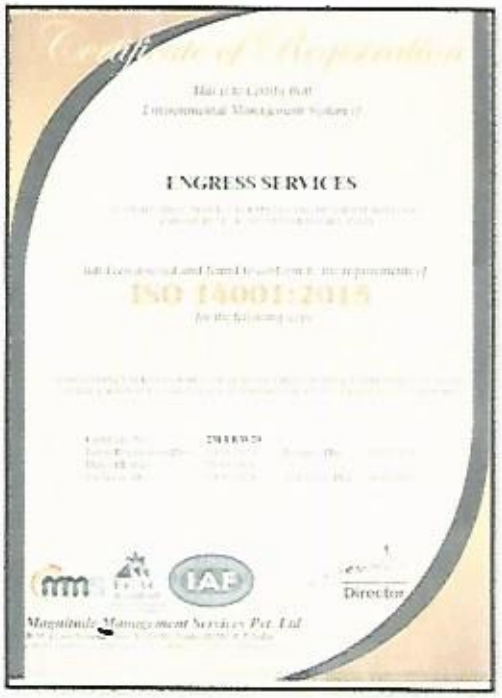
ENGRESS SERVICES

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



Certificate of Registration

ENGRESS SERVICES

ISO 14001:2015

Director

Magnitude Management Services Pvt. Ltd.

ISO: 14001-2015 CERTIFICATE

ENGRESS SERVICES PUNE

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ACKNOWLEDGEMENT

We Engress Services, Pune, express our sincere gratitude to the management of Jayawant Shikshan Prasarak Mandal's Jayawantrao Sawant College of Pharmacy & Research, Handewadi, Hadapsar, Pune for awarding us the assignment of Environmental Audit of their Campus for the Year: 2022-23.

We are thankful to all the staff members for helping us during the field study.

EXECUTIVE SUMMARY

1. Jayawant Shikshan Prasarak Mandal's Jayawantrao Sawant College of Pharmacy & Research, Handewadi, Pune consumes Energy in the form of **Electrical Energy & LPG;** used for various Electrical Equipment, office & other facilities.

2. Pollution due to College Activities:

- **Air pollution:** Mainly CO_2 on account of Electricity Consumption
- **Solid Waste:** Bio degradable Garden Waste
- **Liquid Waste:** Human liquid waste

3. Present Energy Consumption & CO_2 Emission:

No	Particulars	Value	Unit
1	Annual Energy Consumption	63542	kWh
2	Annual LPG Consumed	266	Kg
3	Annual CO_2 Emissions	57.90	MT

4. 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**

5. Indoor Air Quality Parameters:

No	Parameter/Value	AQI	PM-2.5	PM-10
1	Maximum	74	45	57
2	Minimum	66	40	49

6. Indoor Comfort Conditions:

No	Parameter/Value	Temperature, ^0C	Humidity, %	Lux Level	Noise Level, dB
1	Maximum	28.2	81	121	45
2	Minimum	27.9	79	105	41.8

7. Waste Management:

No	Head	Particulars
1	Solid Waste	Segregation of Waste at source
2	Chemicals' Storage & Fumes	Provision of a fumigation Chamber
3	E Waste	Recommended to dispose of through Authorized Agency

8. Rain Water Management:

The College has installed the Rainwater Management Project; the rain water falling on the terrace is collected and is used for recharging the bore well.

9. Environment Friendly Initiatives:

- Tree Plantation in the campus.
- Creation of awareness on Water Conservation Display of Posters

10. Assumptions:

1. Energy Consumption is computed based on Load Utilization Factor
2. 1 kWh of Electrical Energy releases 0.9 Kg of CO_2 into atmosphere
3. Energy generated by Roof Top Solar PV Plant: 4 kWh/kWp per Day
4. Annual Solar Energy generation Days: 300 Nos

11. References:

- For CO_2 Emissions: www.tatapower.com
- For Solar PV Energy generation: www.solarrooftop.gov.in
- For Various Indoor Air Parameters: www.ishrae.com
- For AQI & Water Quality Standards: www.cpcb.com

ABBREVIATIONS

Kg	:	Kilo Gram
MSEDCL	:	Maharashtra State Distribution Company Limited
MT	:	Metric Ton
kWh	:	kilo-Watt Hour
LPD	:	Liters per Day
LED	:	Light Emitting Diode
AQI	:	Air Quality Index
PM-2.5	:	Particulate Matter of Size 2.5 Micron
PM-10	:	Particulate Matter of Size 10 Micron
CPCB	:	Central Pollution Control Board
ISHRAE	:	The Indian Society of Heating & Refrigerating & Air Conditioning Engineers

CHAPTER-I
INTRODUCTION

1. Important Definitions:

1.1. Environment: Definition as per environment Protection Act: 1986

Environment includes water, air and land and the inter-relationship which exists among and between Water, Air, Land and Human beings, other living creatures, plants microorganism and property

1.2. Environmental Audit: Definition:

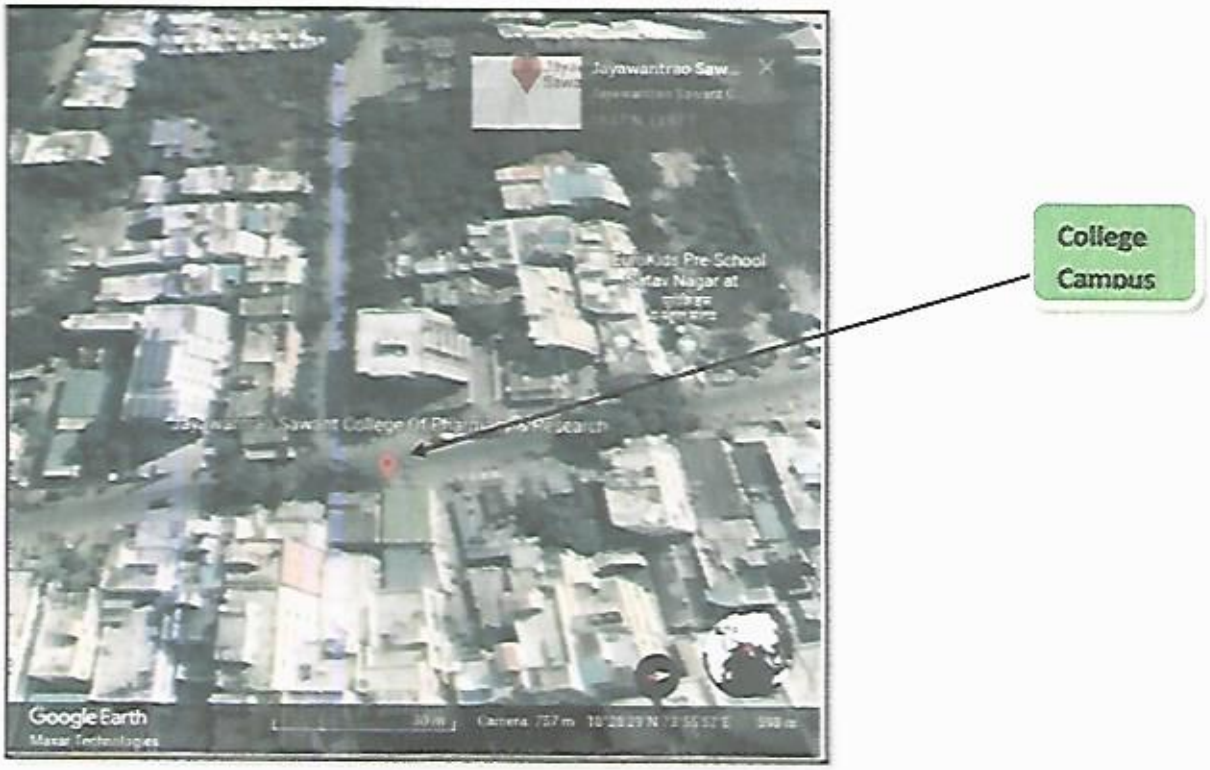
An audit which aims at verification and validation to ensure that various environmental laws are compiled with and adequate care has been taken towards environmental protection and preservation

According to UNEP, 1990, "Environmental audit can be defined as a management tool comprising systematic, documented and periodic evaluation of how well environmental organization management and equipment are performing with an aim of helping to regularize the environment

1.3. Environmental Pollutant: means any solid, liquid and gaseous substance present in the concentration as may be, or tend to be, injurious to Environment.

1.4 Audit Procedural Steps:

1.5 College Location Image:



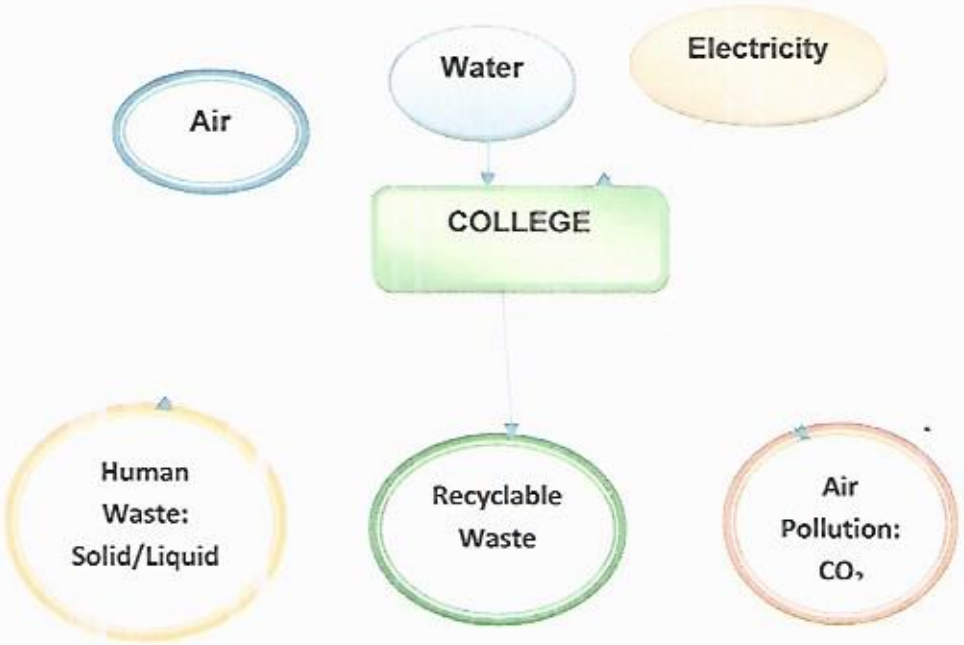
CHAPTER-II
STUDY OF RESOURCE CONSUMPTION & CO_2 EMISSION

The College consumes following basic/derived Resources:

1. Air
2. Water
3. Electrical Energy

We try to draw a schematic diagram for the College System & Environment as under.

Chart No 1: Representation of College as System & Study of Resources & Waste



Now we compute the Generation of CO_2 on account of consumption of Electrical Energy.
The basis of Calculation for CO_2 emissions due to Electrical Energy is as under.

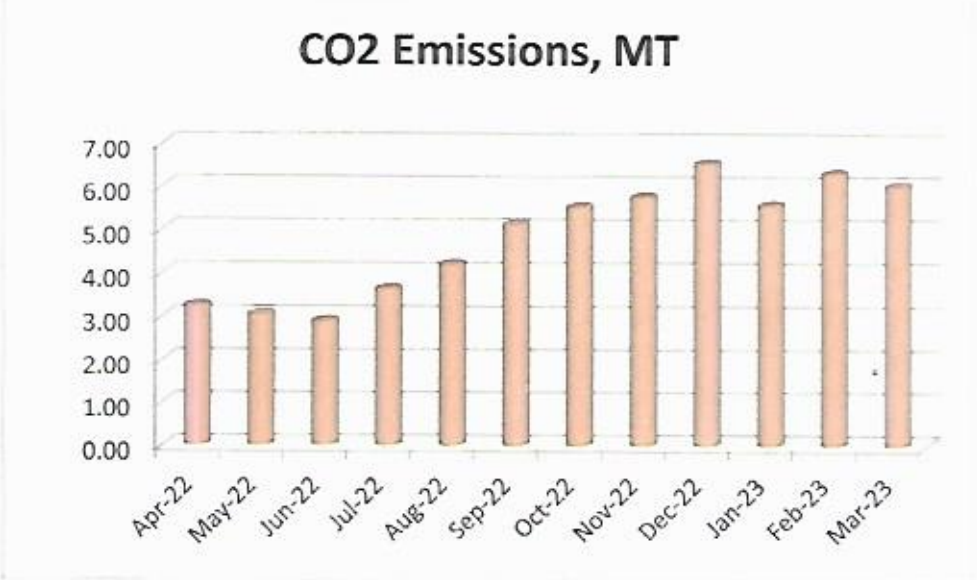
- **1 kWh** of Electrical Energy releases **0.9 Kg of CO_2** into atmosphere

Table No 1: Study of Purchase of Energy & CO_2 Emissions: 22-23:

No	Month	Energy Purchased, kWh	LPG Consumed, Kg	CO_2 Emissions, MT
1	Apr-22	3593	9	3.26
2	May-22	3366	10	3.08
3	Jun-22	3117	38	2.91
4	Jul-22	3991	19	3.64
5	Aug-22	4613	19	4.20
6	Sep-22	5623	19	5.11
7	Oct-22	6083	19	5.53

8	Nov-22	6280	38	5.75
9	Dec-22	7211	19	6.54
10	Jan-23	6073	38	5.57
11	Feb-23	6955	19	6.31
12	Mar-23	6638	19	6.03
13	Total	63542	266	57.90
14	Maximum	7211	38	6.59
15	Minimum	3117	0	2.80
16	Average	5295	22	4.83

Chart No 2: Month wise CO_2 Emissions:



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 CO2 Emissions:

No	Particulars	Value	Unit
1	Installed Capacity of Roof Top Solar PV Plant Capacity	10	kWp
2	Energy Generated in per kWp	4	4 kWh/kWp
3	Annual Solar Energy generation Days	300	Nos
4	Energy Generated in the Year: 22-23	**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 INDOOR AIR QUALITY

4.1 Importance of Air Quality:

Air: The common name given to the atmospheric gases used in breathing and photosynthesis.

By volume, Dry Air contains 78.09% Nitrogen, 20.95% Oxygen, 0.93% Argon, 0.039% carbon dioxide, and small amounts of other gases.

On average, a person inhales about **14,000 liters** of air every day. Therefore, poor air quality may affect the quality of life now and for future generations by affecting the health, the environment, the economy and the city's livability.

Air quality is a measure of the suitability of air for breathing by people, plants and animals.

4.2 Air Quality Index:

An **Air Quality Index (AQI)** is a number used by government agencies to measure the **air pollution** levels and communicate it to the population. As the AQI increases, it means that a large percentage of the population will experience severe adverse health effects.

We present herewith following important Parameters.

1. AQI- Air Quality Index
2. PM-2.5- Particulate Matter of Size 2.5 micron
3. PM-10- Particulate Matter of Size 10 micron

Table No 3: Indoor Air Quality Parameters:

No	Location	AQI	PM-2.5	PM-10
1	Principal Cabin-6A 116	71	43	54
2	Pharmaceutics Lab- 6A 105	73	44	55
3	Classroom-6 D 401	70	42	52
4	Faculty Room- 6 A 215	70	43	54
5	Tutorial Room- 6 A 006	66	40	49
6	Girls Common Room-6A 002	71	43	54
7	Pharma Chemistry lab 6A 313	74	45	57
	Maximum	**74**	**45**	**57**
	Minimum	**66**	**40**	**49**

CHAPTER V
STUDY OF INDOOR COMFORT CONDITION PARAMETERS

In this Chapter, we present the various Indoor Comfort Parameters measured during the Audit. The Parameters include:

1. Temperature
2. Humidity
3. Lux Level
4. Noise Level.

Table No 4: Study of Indoor Comfort Condition Parameters:

No	Location	Temperature, ^0C	Humidity, %	Lux Level	Noise Level, dB
1	Principal Cabin-6A 116	28	80	105	44
2	Pharmaceutics Lab- 6A 105	28.1	80	112	44.3
3	Classroom-6 D 401	27.9	79	115	42
4	Faculty Room- 6 A 215	28.1	79	112	41.9
5	Tutorial Room- 6 A 006	28.2	81	121	45
6	Girls Common Room-6A 002	28	81	121	41.8
7	Pharma Chemistry lab 6A 313	28.1	80	106	44.2
	Maximum	**28.2**	**81**	**121**	**45**
	Minimum	**27.9**	**79**	**105**	**41.8**

CHAPTER VI
STUDY OF WASTE MANAGEMENT

6.1 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:

6.2 Chemicals' Storage & Fumes Management:

The Chemicals are kept away from the students in a fumigation Chamber.

Photograph of Fumigation Chamber:

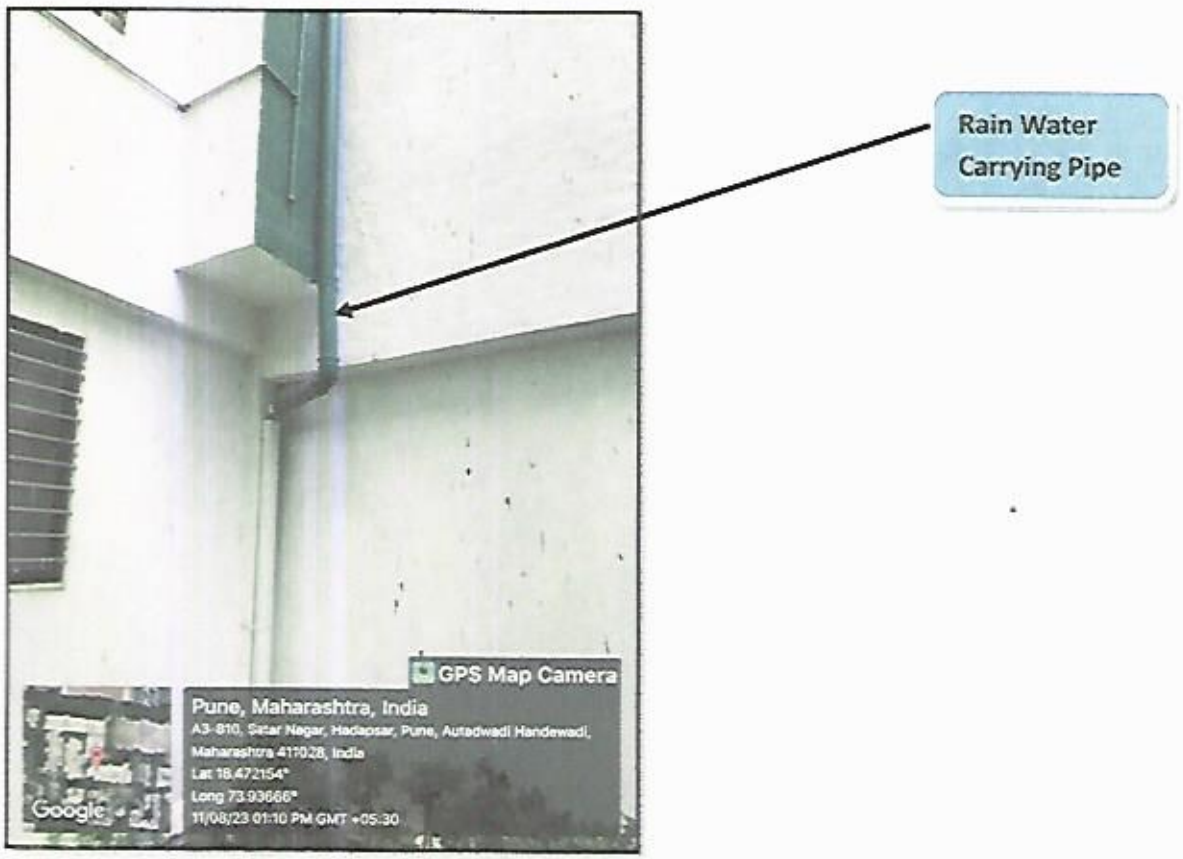
6.3 E Waste Management:

It is recommended to dispose of the E Waste through Authorized Agency

CHAPTER-VII
STUDY OF RAIN WATER MANAGEMENT

The College has implemented the Rain Water Management Project. The College has installed Pipe from the terrace and the Rain water falling on the terrace is gathered and is used for recharging the bore well.

Photograph of Rain Water Management Pipe Section:



CHAPTER-VIII
STUDY OF ECO FRIENDLY INITIATIVES

8.1 Internal Tree Plantation:

The College has 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:

ANNEXURE-I:
VARIOUS 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%