
	<p align="center"><b>Jayawant Shikshan Prasarak Mandal's</b>  <b>JAYAWANTRAO SAWANT COLLEGE OF PHARMACY &amp; RESEARCH</b></p>		
<p><b>Prof. Dr T. J. Sawant</b>  <b>B.E.(Elec.), MISTE</b>  <b>Founder-Secretary</b></p>	<p align="center">S. No. 58, Handewadi Road, Hadapsar, Pune 411 028.  Ph: +91- 75955920, Tele Fax: +91- 020-26970907  E- mail: <a href="mailto:jspm_jscopr@rediffmail.com">jspm_jscopr@rediffmail.com</a> Website : <a href="http://www.jspm.edu.in">www.jspm.edu.in</a>  (Approved by AICTE, PCI, New Delhi and Govt. of Maharashtra  Affiliated to Savitribai Phule Pune University, Pune  Accredited by National Assessment and Accreditation Council, Bengaluru</p>		<p align="center"><b>Dr V.V. Potnis</b>  <b>M Pharm., Ph.D,</b>  <b>Principal</b></p>

### 7.1.6 Quality audits on environment and energy are regularly undertaken by the institution

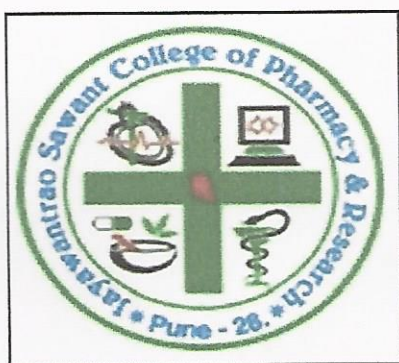
7.1.6. The institutional environment and energy initiatives are confirmed through the following

1. Green audit
2. Energy audit
3. Environment audit



  
**Principal**  
**Jayawantrao Sawant**  
**College of Pharmacy & Research**  
**Hadapsar, Pune - 411 028.**

**GREEN AUDIT REPORT**  
of  
**Jayawant Shikshan Prasarak Mandal's**  
**Jayawantrao Sawant College of Pharmacy and Research,**  
**Handewadi, Hadapsar, Pune (Maharashtra) -411 028.**

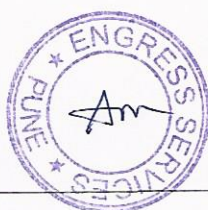


Year: 2021-22

Prepared by

**ENGRESS SERVICES**

Yashashree, 26, Nirmal Bag Society  
Near Mukhtangan English School, Parvati, Pune 411009  
Phone: 09890444795 Email: [engress123@gmail.com](mailto:engress123@gmail.com)



MAHARASHTRA ENERGY DEVELOPMENT AGENCY



**Maharashtra Energy Development Agency**

(Government of Maharashtra Institution)

Aundh Road, Opposite Spicer College Road, Near Commissionerate of Animal Husbandary,  
Aundh, Pune, Maharashtra 411067

Ph No: 020-35000450

Email: [eee@mahaurja.com](mailto:eee@mahaurja.com), Web: [www.mahaurja.com](http://www.mahaurja.com)

ECN/2022-23/CR-43/1709

10<sup>th</sup> May, 2022

**CERTIFICATE OF REGISTRATION  
FOR CLASS 'A'**

We hereby certify that, the firm having following particulars is registered with  
**MAHARASHTRA ENERGY DEVELOPMENT AGENCY (MEDA)** under given category as  
"Energy Planner & Energy Auditor" in Maharashtra for Energy Conservation Programme of  
MEDA.

**Name and Address of the firm** : M/s Engress Services  
Yashshree, 26, Nirmal Bag Society,  
Near Muktangan English School,  
Parvati, Pune – 411 009.

**Registration Category** : *Empanelled Consultant for Energy Conservation  
Programme for Class 'A'*

**Registration Number** : *MEDA/ECN/2022-23/Class A/EA-32.*

- Energy Conservation Programme intends to identify areas where wasteful use of energy occurs and to evaluate the scope for Energy Conservation and take concrete steps to achieve the evaluated energy savings.
- MEDA reserves the right to visit at any time without giving prior information to verify quarterly activities performed by the firm and canceling the registration, if the information is found incorrect.
- This empanelment is valid till **09<sup>th</sup> May, 2024** from the date of registration, to carry out energy audits under the Energy Conservation Programme
- The Director General, MEDA reserves the right to cancel the registration at any time without assigning any reasons thereof.

  
General Manager (EC)



## ENGRESS SERVICES

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Near Mukhtangan English School, Parvati, Pune 411 009  
Tel: 09890444795 Email: [engress123@gmail.com](mailto:engress123@gmail.com)

Ref: ES/JSCOPR/21-22/02

Date: 19/05/2022

### CERTIFICATE


This is to certify that we have conducted Green Audit at Jayawant Shikshan Prasarak Mandal's Jayawantrao Sawant College of Pharmacy & Research, Handewadi Pune (Maharashtra) , in the Academic year 2021-22.

The college has adopted following Green Initiatives:

- 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 10kWp
- Segregation of Waste at Source
- Installation of Bio Composting Pit
- Provision of Sanitary Waste Incinerator for Sanitary Waste Disposal
- 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 Resource 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,  
Certified Energy Auditor  
EA-8192



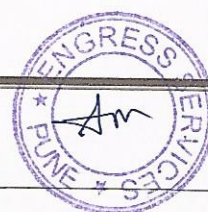
## INDEX

Sr. No	Particulars	Page No
I	Acknowledgement	5
II	Executive Summary	6
III	Abbreviations	8
1	Introduction	9
2	Study of Present Energy Consumption	10
3	Study of Carbon Foot Printing	12
4	Study of Usage of Renewable Energy	14
5	Study of Waste Management	15
6	Study of Rain water Management	17
7	Study of Green & Sustainable Practices	18
	<b>Annexure</b>	
I	List of Trees& Plants in the Campus	20

## 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(Maharashtra) – 411 028 for awarding us the assignment of Green Audit of their Campus for the Year: 2021-22.

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 (Maharashtra) consumes Energy in the form of **Electrical Energy** used for various Electrical Equipment, office & other facilities.

### 2. Present Energy Consumption & CO<sub>2</sub> Emissions:

No	Parameter/ Variation	Energy Consumed, kWh	CO <sub>2</sub> Emissions, MT
1	Total	60516	54.46
2	Maximum	6868	6.18
3	Minimum	2968	2.67
4	Average	5043	4.54

### 3. Various initiatives taken for Energy Conservation:

- Usage of Energy Efficient BEE STAR Rated Equipment
- Usage of Energy Efficient LED Lighting
- Maximum Usage of Day Lighting
- Installation of Roof Top Solar PV Plant of Capacity 10kWp.

### 4. Usage of Renewable Energy & Reduction in CO<sub>2</sub> Emission:

- The College has installed Roof Top Solar PV Plant of Capacity **10kWp**.
- The Electrical Energy generated in 21-22 is **12000 kWh**.
- Reduction in CO<sub>2</sub> Emissions in 2021-22 works out to be **10.8 MT**.

### 5. Waste Management:

#### 5.1 Segregation of Waste at Source:

The Waste is segregated at source and the recyclable waste, like paper, plastic waste is handed over to Authorized Agency for further action.

#### 5.2 Organic Waste Management:

The College has installed a Bio Composting Pit and the organic Waste is composted in to Bio Compost which is used in the own garden.

### 5.3 Sanitary Waste Management:

The College has installed Sanitary Waste Incinerator for disposal of Sanitary Waste.

### 5.4 E Waste Management:

The E-Waste is disposed of through Authorized Agency.

### 6. 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.

### 7. Green & Sustainable Initiatives

- Maintenance of good Internal Road
- Maintenance of Internal Garden
- Provision of Ramp for *Divyangajan*
- Creation of Awareness by Display of Posters on Resource Conservation

### 8. Assumptions:

1. 1 kWh of Electrical Energy releases **0.9 Kg** of CO<sub>2</sub> into atmosphere
2. **1 kWp** Roof Top Solar PV Plant generates **4 kWh** Electrical Energy per Day
3. Annual Solar Energy Generation Days: **300 Nos.**

### 9. References:

- For CO<sub>2</sub> Emissions: [www.tatapower.com](http://www.tatapower.com)
- For Roof Top Solar Energy generation: [www.solarrooftop.gov.in](http://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 <sub>2</sub>	Carbon Di Oxide
Qty	Quantity

## CHAPTER-I

### INTRODUCTION

#### 1.1 Objectives:

1. To study present Energy Consumption
2. To Study CO<sub>2</sub> emissions
3. To study usage of Renewable Energy
4. Study of Waste Management
5. Study of Rain Water Harvesting
6. Study of Green & Sustainable Practices

#### 1.2 General Details of College: Table No 1

No	Head	Particulars
1	Name of Institution	Jayawant Shikshan Prasarak Mandal's Jayawantrao Sawant College of Pharmacy & Research
2	Address	Handewadi, Hadapsar, Pune (Maharashtra)
3	Affiliation	Savitribai Phule Pune University

#### 1.3 Google Earth Image:



## CHAPTER-II

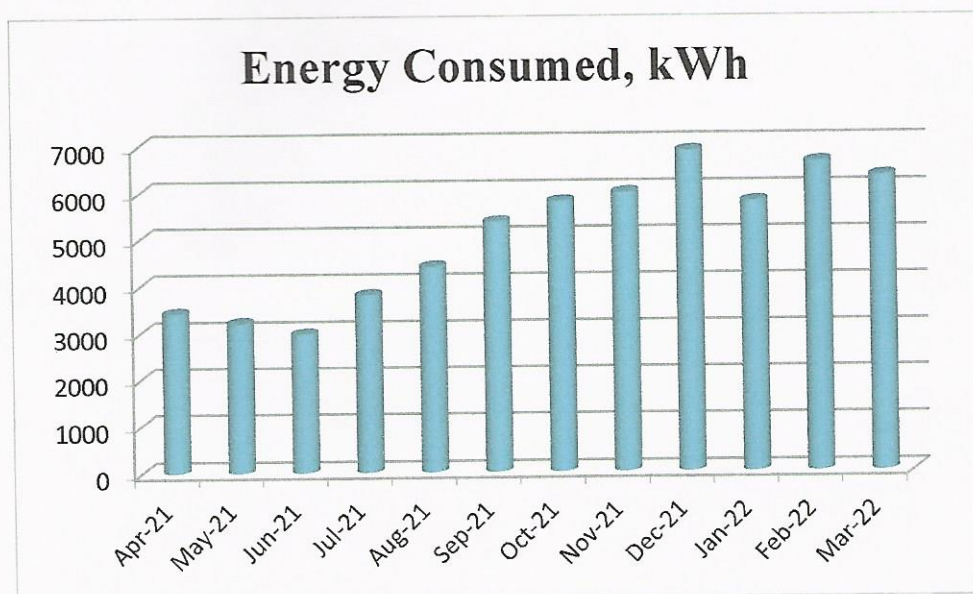
### STUDY OF PRESENT ENERGY CONSUMPTION

In this chapter, we present the analysis of Electricity Bills

**Table No 2: Electrical Bill Analysis- 2021-22:**

No	Month	Energy Consumed, kWh
1	Apr-21	3422
2	May-21	3206
3	Jun-21	2968
4	Jul-21	3801
5	Aug-21	4393
6	Sep-21	5356
7	Oct-21	5793
8	Nov-21	5981
9	Dec-21	6868
10	Jan-22	5784
11	Feb-22	6624
12	Mar-22	6322
13	Total	60516
14	Maximum	6868
15	Minimum	2968
16	Average	5043

**Chart No 1: Variation in Monthly Energy Consumption**



**Table No 3: Variation in Important Parameters:**

No	Parameter/ Variation	Energy Consumed, kWh
1	Total	60516
2	Maximum	6868
3	Minimum	2968
4	Average	5043

### CHAPTER III

## STUDY OF CARBON FOOTPRINTING

A **Carbon Foot Print** is defined as the Total Greenhouse Gas emissions, emitted due to various activities. In this we compute the emissions of Carbon-Di-Oxide, by usage of the various forms of Energy used by the College for performing its day to day activities.

The College uses Electrical Energy for various Electrical gadgets.

#### Basis for computation of CO<sub>2</sub> Emissions:

The basis of Calculation for CO<sub>2</sub> emissions due to Electrical Energy is as under.

- 1 kWh of Electrical Energy releases 0.9 Kg of CO<sub>2</sub> into atmosphere

Based on the above Data we compute the CO<sub>2</sub> emissions which are being released in to the atmosphere by the College due to its Day to Day operations

Table No4: Month wise CO<sub>2</sub> Emissions

No	Month	Energy Consumed, kWh	CO2 Emissions, MT
1	Apr-21	3422	3.08
2	May-21	3206	2.89
3	Jun-21	2968	2.67
4	Jul-21	3801	3.42
5	Aug-21	4393	3.95
6	Sep-21	5356	4.82
7	Oct-21	5793	5.21
8	Nov-21	5981	5.38
9	Dec-21	6868	6.18
10	Jan-22	5784	5.21
11	Feb-22	6624	5.96
12	Mar-22	6322	5.69
13	Total	60516	54.46
14	Maximum	6868	6.18
15	Minimum	2968	2.67
16	Average	5043	4.54

Chart No 2: Month wise CO<sub>2</sub>Emissions

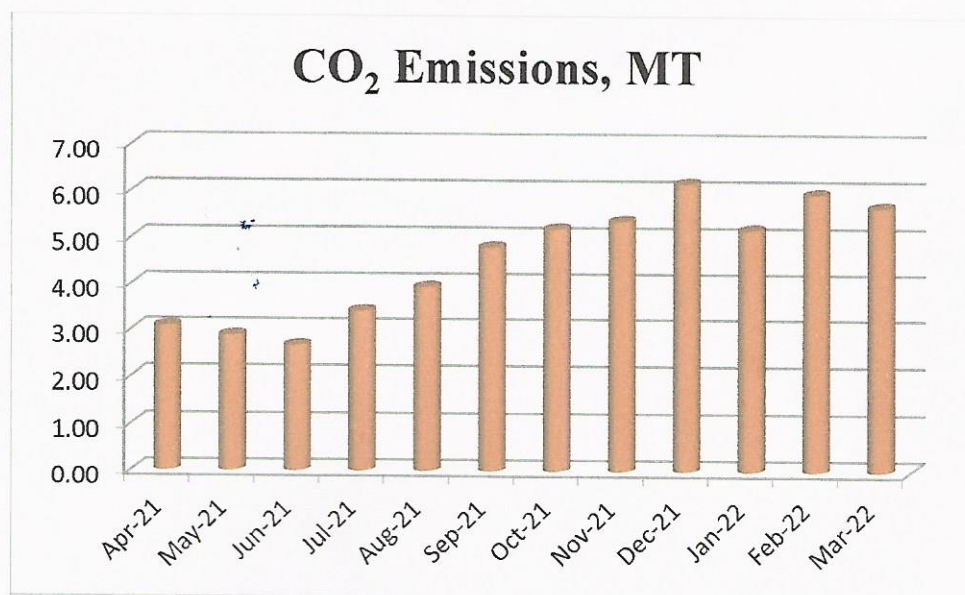


Table No 5: Variation in Important Parameters

Sr. No	Parameter/ Variation	Energy Consumed, kWh	CO2 Emissions, MT
1	Total	60516	54.46
2	Maximum	6868	6.18
3	Minimum	2968	2.67
4	Average	5043	4.54

## CHAPTER IV STUDY OF USAGE OF RENEWABLE ENERGY

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

In the following Table, we compute the Annual Reduction in CO<sub>2</sub> Emissions due to installation of Roof TOP Solar PV Plant.

**Table No6: Computation of Annual Reduction in CO<sub>2</sub> Emissions**

Sr. 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: 21-22	12000	kWh
5	1 kWh of Electrical Energy saves	0.9	Kg/kWh
6	Qty of CO <sub>2</sub> Saved by Solar PV Plant $= (4) * (5) / 1000$	10.8	MT of CO <sub>2</sub>

**Photograph of Roof Top Solar PV Plant**



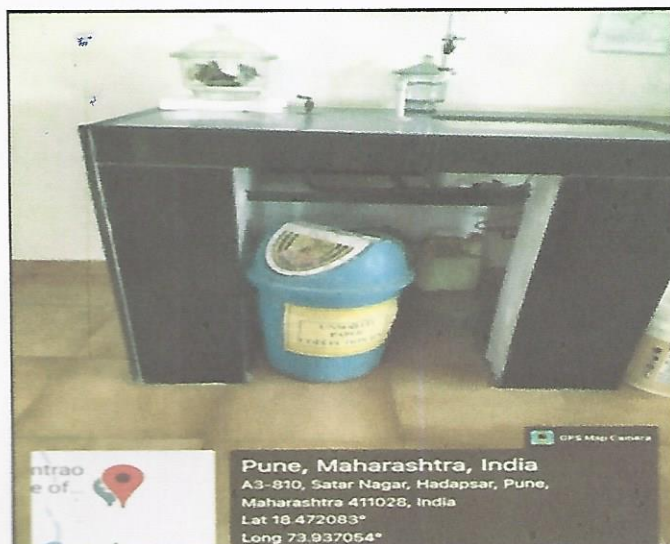
## CHAPTER V

### STUDY OF WASTE MANAGEMENT

#### 5.1 Solid Waste Management:

The recyclable waste, like paper waste is handed over to authorized waste collecting agent for further recycling.

Photograph of Waste Collection Bin



#### 5.2 Organic Waste Management:

The Bio degradable waste like leafy waste is composted in a Bio composting Plant.

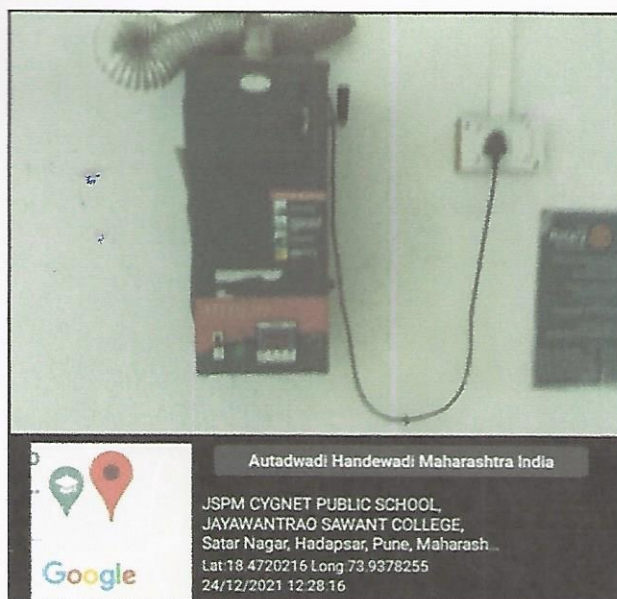
Photograph of Bio Composting Pit



### 5.3 Sanitary Waste Management:

For disposal of Sanitary Waste, a Sanitary Waste Incinerator is installed in the campus.

**Photograph of Sanitary Waste Incinerator**



### 5.4 E Waste Management:

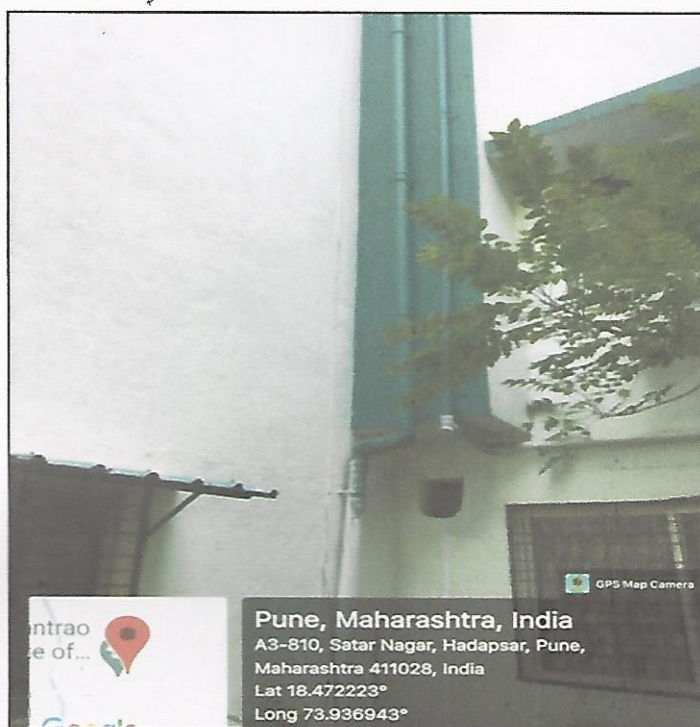
The E-Waste is disposed of through Authorized Agency.

## CHAPTER-VI

### 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 Harvesting Pipe Section



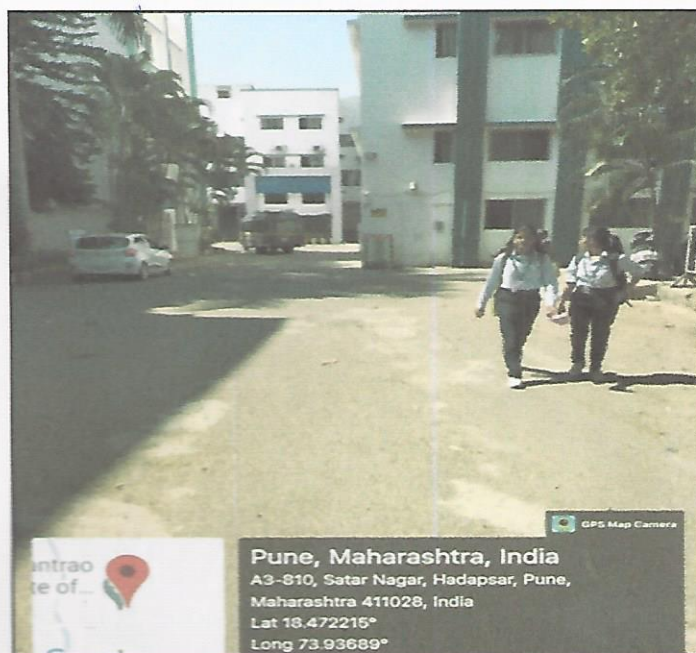
## CHAPTER-VII

### STUDY OF GREEN & SUSTAINABLE PRACTICES

#### 7.1 Pedestrian Friendly Roads:

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

Photograph of Internal Road



#### 7.2 Internal Tree Plantation:

The College has well maintained landscaped garden in the campus.

Photograph of Tree plantation



### 7.3 Provision of Ramp:

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

**Photograph of Ramp**



### 7.4 Creation of Awareness about Energy Conservation:

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

**Photograph of Poster on Energy Conservation**



### ANNEXURE-1:

#### LIST OF TREES & PLANTS IN THE CAMPUS

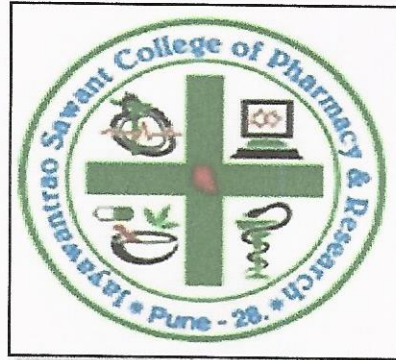
Sr. No	Common Name of Plant
1	<i>Hibiscus</i>
2	<i>Vinca</i>
3	<i>Jatropha</i>
4	<i>Colius</i>
5	<i>Dracina</i>
6	<i>Duranda</i>
7	<i>Khalifa</i>
8	<i>Tikmal</i>
9	<i>Ova</i>
10	<i>Chincha</i>
11	<i>Mahabrhunga raj</i>
12	<i>Rudraksha</i>
13	<i>Haadsandhi</i>
14	<i>gokarna</i>
15	<i>Nilgiri</i>
16	<i>Bhuinimba</i>
17	<i>Falsi</i>
18	<i>Karanja</i>
19	<i>Ritha</i>
20	<i>Khair</i>
21	<i>Drumstick</i>
22	<i>Rose</i>
23	<i>Mehendi</i>
24	<i>Ratrarani</i>
25	<i>Papaya</i>
26	<i>Bel</i>
27	<i>Adulsa</i>
28	<i>Raktarohida</i>
29	<i>Lajalu</i>
30	<i>Panfuti</i>
31	<i>Dhotra</i>
32	<i>Kantakari</i>
33	<i>Pushkarmul</i>
34	<i>Chitrak</i>

Sr. No	Common Name of Plant
35	<i>Tuti</i>
36	Tantani
37	Korphad
38	Kadipatta
39	Idlimbu
40	Koinel
41	Vala
42	Jireniyam
43	Tulas
44	Tikoma
45	Hemiliya
46	Plumbego

Photograph of *Nakshatra* Garden



**ENERGY AUDIT REPORT**  
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Year: 2021-22

Prepared by:

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ECN/2022-23/CR-43/1709

10<sup>th</sup> May, 2022

**CERTIFICATE OF REGISTRATION  
FOR CLASS 'A'**

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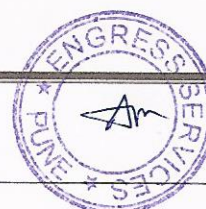
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Date: 19/05/2022

### CERTIFICATE

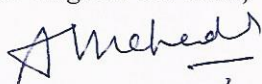
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The College has adopted following Energy Efficient practices:

- Usage of Energy Efficient LED Fittings
- 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,



A Y Mehendale,  
Certified Energy Auditor  
EA-8192



## INDEX

Sr. No	Particulars	Page No
I	Acknowledgement	5
II	Executive Summary	6
III	Abbreviations	7
1	Introduction	8
2	Study of Connected Load	9
3	Study of Present Energy Consumption	10
4	Carbon Foot Printing	12
5	Study of Usage of Alternate Energy	14
6	Study of LED Lighting	15

## ACKNOWLEDGEMENT

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1	Total	60516	54.46
2	Maximum	6868	6.18
3	Minimum	2968	2.67
4	Average	5043	4.54

### 3. Energy conservation projects already installed:

- Usage of Energy Efficient LED fittings
- Usage of BEE STAR Rated Equipment
- Installation of Roof Top Solar PV Plant of Capacity 10 kWp.

### 4. Usage of alternate energy:

- The college has installed Roof Top Solar PV Plant of Capacity **10 kWp**.
- Energy purchased from MSEDCL is **60516 kWh**.
- Energy generated by Roof Top Solar PV Plant is **12000 kWh**.
- Total annual energy requirement of college is **72516 kWh**.
- The percentage of usage of alternate energy to annual energy demand is **17 %**.

### 5. Usage of LED lighting:

- The total lighting load of the college is **8.62 kW**.
- The total LED lighting load is **2.62 kW**.
- The percentage of LED lighting to total lighting demand is **30.39 %**.

### 6. Assumptions:

1. 1 kWh of electrical energy releases **0.9 Kg of CO<sub>2</sub>** into atmosphere
2. **1 kWp** Roof Top Solar PV Plant generates **4 kWh** electrical energy per day
3. Annual solar energy generation days: **300 Nos.**

### 7. References:

- For CO<sub>2</sub> Emissions: [www.tatapower.com](http://www.tatapower.com)
- For Roof Top Solar PV Plant Energy generation: [www.solarroftop.gov.in](http://www.solarroftop.gov.in)

## ABBREVIATIONS

LED	: Light Emitting Diode
MSEDCL	: Maharashtra State Electricity Distribution Company Limited
IQAC	: Internal Quality Assurance Cell
BEE	: Bureau of Energy Efficiency
FTL	: Fluorescent Tube Light
CFL	: Compact Fluorescent Light
PV	: Photo Voltaic
Kg	: Kilo Gram
kWh	: kilo-Watt Hour
CO <sub>2</sub>	: Carbon Di Oxide
MT	: Metric Ton



## CHAPTER-I INTRODUCTION

### 1.1 Objectives:

1. To study Connected Load and Present Energy Consumption
2. To Study the present CO<sub>2</sub> emissions
3. To study usage of Alternate Energy
4. To study usage of LED Lighting

1.2 Table No 1: General Details of the College

No	Head	Particulars
1	Name of Institution	Jayawant Shikshan Prasarak Mandal's, Jayawantrao Sawant College of Pharmacy & Research
2	Address	Handewadi, Hadapsar, Pune (Maharashtra)
3	Affiliation	Savitribai Phule Pune University, Pune

### 1.3 Google Earth Image



## CHAPTER-II

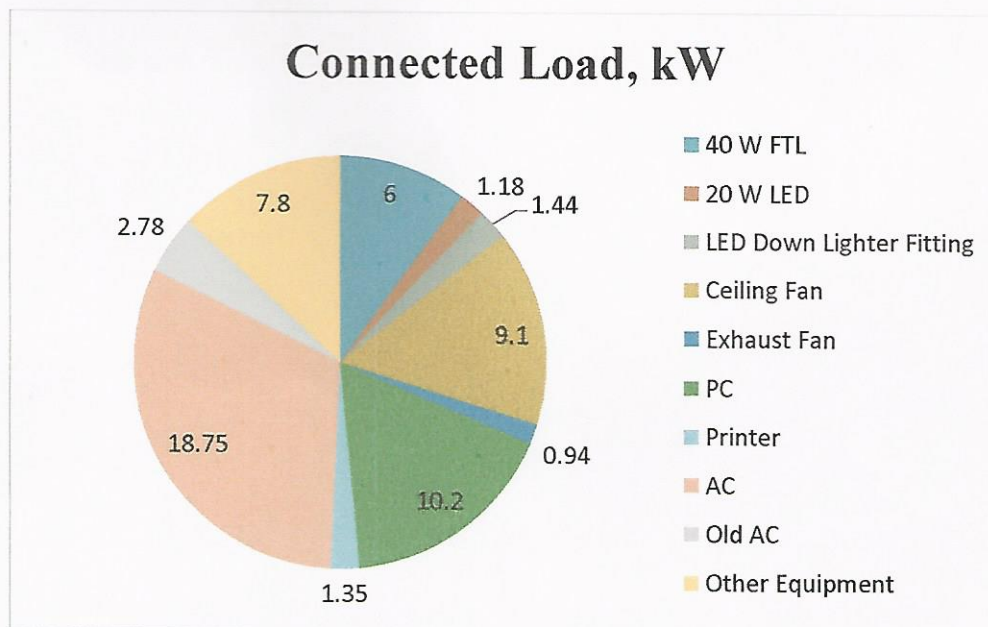
### STUDY OF CONNECTED LOAD

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

Table No 2: 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	<b>Total</b>			<b>60</b>

Chart No 1: Study of connected load



### CHAPTER-III

## STUDY OF PRESENT ENERGY CONSUMPTION

In this chapter, we present the analysis of electricity bills

Table No 3: Electrical bill analysis- 2021-22

No	Month	Energy Purchased, kWh
1	Apr-21	3422
2	May-21	3206
3	Jun-21	2968
4	Jul-21	3801
5	Aug-21	4393
6	Sep-21	5356
7	Oct-21	5793
8	Nov-21	5981
9	Dec-21	6868
10	Jan-22	5784
11	Feb-22	6624
12	Mar-22	6322
13	Total	60516
14	Maximum	6868
15	Minimum	2968
16	Average	5043

Chart No 2: Variation in monthly energy consumption

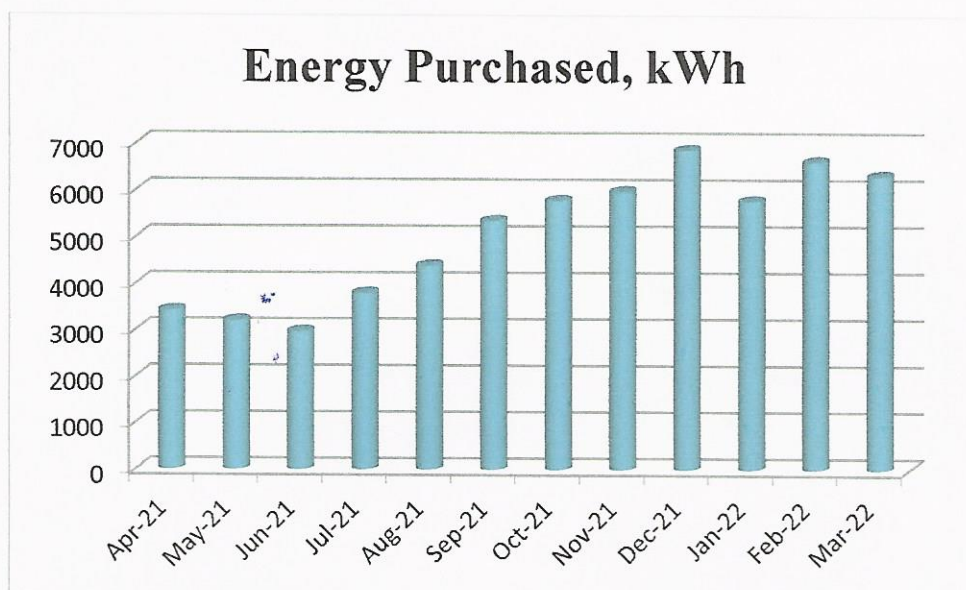


Table No4: Variation in important parameters

No	Parameter/ Variation	Energy Purchased, kWh
1	Total	60516
2	Maximum	6868
3	Minimum	2968
4	Average	5043

## CHAPTER-IV

### CARBON FOOTPRINTING

A **Carbon Foot print** is defined as the Total Greenhouse Gas emissions, emitted due to various activities.

In this we compute the emissions of Carbon-Di-Oxide, by usage of the various forms of Energy used by the college for performing its day to day activities

The college uses electrical energy for various electrical gadgets.

#### Basis for computation of CO<sub>2</sub> Emissions:

- 1 kWh of Electrical Energy releases **0.9 Kg of CO<sub>2</sub>** into atmosphere

Based on the above Data we compute the CO<sub>2</sub> emissions which are being released in to the atmosphere by the College due to its Day to Day operations

Table No5: Month wise CO<sub>2</sub> Emissions

Sr. No.	Month	Energy Purchased, kWh	CO <sub>2</sub> Emissions, MT
1	Apr-21	3422	3.08
2	May-21	3206	2.89
3	Jun-21	2968	2.67
4	Jul-21	3801	3.42
5	Aug-21	4393	3.95
6	Sep-21	5356	4.82
7	Oct-21	5793	5.21
8	Nov-21	5981	5.38
9	Dec-21	6868	6.18
10	Jan-22	5784	5.21
11	Feb-22	6624	5.96
12	Mar-22	6322	5.69
13	Total	60516	54.46
14	Maximum	6868	6.18
15	Minimum	2968	2.67
16	Average	5043	4.54

Chart No 3: Month wise CO<sub>2</sub>emissions:

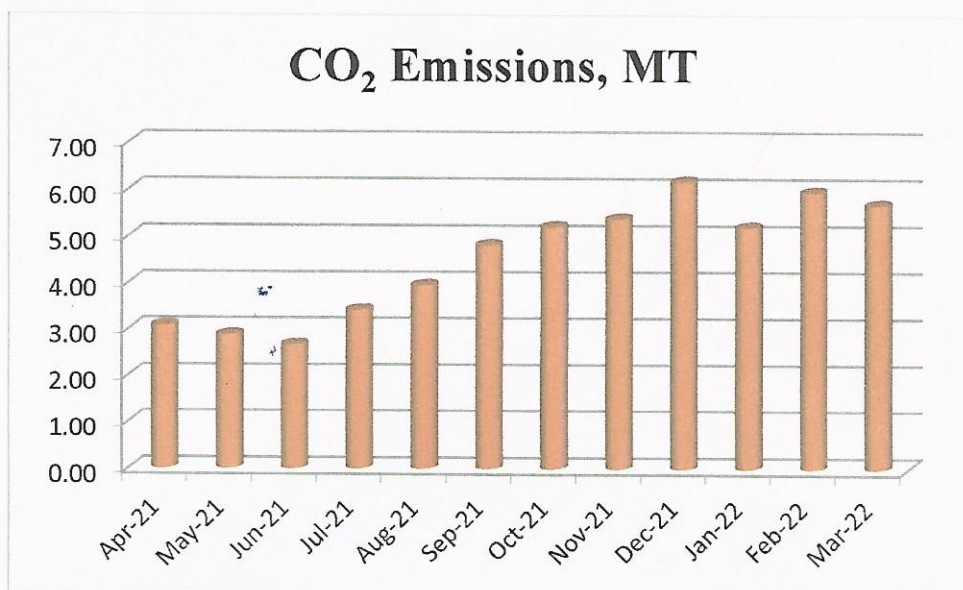


Table No 6: Important parameters

No	Parameter/ Variation	Energy Purchased, kWh	CO <sub>2</sub> Emissions, MT
1	Total	60516	54.46
2	Maximum	6868	6.18
3	Minimum	2968	2.67
4	Average	5043	4.54

## CHAPTER-V

### STUDY OF USAGE OF ALTERNATE ENERGY

The college has installed Roof Top Solar PV Plant of Capacity 10 kWp.

In the following Table, we compute the percentage of Usage of Alternate Energy to Annual Energy Demand of the College.

**Table No 7: Computation of % Annual Energy Demand met by Alternate Energy**

Sr. No	Particulars	Value	Unit
1	Energy purchased from MSEDCL	60516	kWh/Annum
2	Capacity of Roof Top Solar PV Capacity	10	kWp
3	Average Energy Generated per kWp per Day	4	kWh/kWp
4	Annual Generation Days	300	Nos
5	Annual Solar Energy Generated = $2*3*4$	12000	kWh/Annum
6	Total Energy Requirement = (1) + (5)	72516	kWh/Annum
7	Percent of Alternate Energy to Annual Energy Requirement = $(5)*100/(6)$	17	%

**Photograph of 3 kWp Roof Top Solar PV Plant**



## CHAPTER-V

### STUDY OF USAGE OF ALTERNATE ENERGY

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6	Total Energy Requirement = (1) + (5)	72516	kWh/Annum
7	Percent of Alternate Energy to Annual Energy Requirement = $(5) \times 100 / (6)$	17	%

**Photograph of 3 kWp Roof Top Solar PV Plant**



## CHAPTER VI

### STUDY OF USAGE OF LED LIGHTING

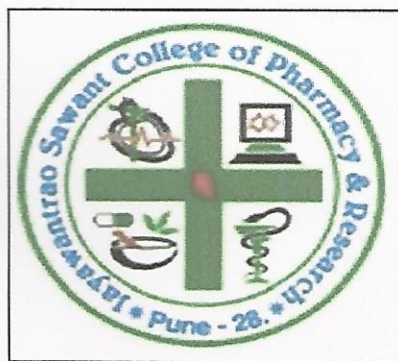
In this chapter, we compute the percentage of usage of LED Lighting to Annual Lighting power requirement.

**Table No 8: Percentage of Usage of LED Lighting to Annual Lighting Load**

Sr. 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 LED Lighting to Annual Lighting Requirement = $(11) \times 100 / (10)$	30.39	%

# ENVIRONMENTAL AUDIT REPORT

of  
Jayawant Shikshan Prasarak Mandal's  
Jayawantrao Sawant College of Pharmacy and Research,  
Handewadi, Hadapsar, Pune (Maharashtra)- 411 028.



Year: 2021-22

Prepared by

**ENGRESS SERVICES**

Yashashree, 26, Nirmal Bag Society  
Near Mukhtangan English School, Parvati, Pune 411009  
Phone: 09890444795 Email: [engress123@gmail.com](mailto:engress123@gmail.com)



MAHARASHTRA ENERGY DEVELOPMENT AGENCY



**Maharashtra Energy Development Agency**

(Government of Maharashtra Institution)

Aundh Road, Opposite Spicer College Road, Near Commissionerate of Animal Husbandary,  
Aundh, Pune, Maharashtra 411067

Ph No: 020-35000450

Email: [eee@mahaurja.com](mailto:eee@mahaurja.com), Web: [www.mahaurja.com](http://www.mahaurja.com)

ECN/2022-23/CR-4371709

10<sup>th</sup> May, 2022

**\* CERTIFICATE OF REGISTRATION  
FOR CLASS 'A'**

We hereby certify that, the firm having following particulars is registered with **MAHARASHTRA ENERGY DEVELOPMENT AGENCY (MEDA)** under given category as "Energy Planner & Energy Auditor" in Maharashtra for Energy Conservation Programme of MEDA.

**Name and Address of the firm** : M/s Engress Services  
Yashshree, 26, Nirmal Bag Society,  
Near Mukhtangan English School,  
Parvati, Pune – 411 009.

**Registration Category** : *Empanelled Consultant for Energy Conservation  
Programme for Class 'A'*

**Registration Number** : *MEDA/ECN/2022-23/Class A/EA-32.*

- Energy Conservation Programme intends to identify areas where wasteful use of energy occurs and to evaluate the scope for Energy Conservation and take concrete steps to achieve the evaluated energy savings.
- MEDA reserves the right to visit at any time without giving prior information to verify quarterly activities performed by the firm and canceling the registration, if the information is found incorrect.
- This empanelment is valid till **09<sup>th</sup> May, 2024** from the date of registration, to carry out energy audits under the Energy Conservation Programme
- The Director General, MEDA reserves the right to cancel the registration at any time without assigning any reasons thereof.

  
General Manager (EC)



## ENGRESS SERVICES

Yashashree, 26, Nirmal Bag Society,  
Near Muktangan English School, Parvati, Pune 411 009  
Tel: 09890444795 Email: [engress123@gmail.com](mailto:engress123@gmail.com)

Ref: ES/JSCOPR/21-22/03

Date: 19/05/2022

### CERTIFICATE

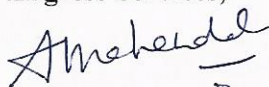
This is to certify that we have conducted Environmental Audit at Jayawant Shikshan Prasarak Mandal's Jayawantrao Sawant College of Pharmacy & Research, Handewadi Pune (Maharashtra), in the Academic Year 2021-22.

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 10kWp.
- Segregation of Waste at Source
- Installation of Bio Composting Pit
- Provision of Sanitary Waste Incinerator for Sanitary Waste Disposal
- Implementation of Rain Water Harvesting Project
- Tree Plantation in the campus
- Creation of awareness about Resource Conservation by displaying 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,  
Certified Energy Auditor  
EA-8192



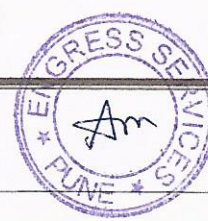
## INDEX

Sr. No.	Particulars	Page No
I	Acknowledgement	5
II	Executive Summary	6
III	Abbreviations	8
1	Introduction	9
2	Study of Resource Consumption & CO <sub>2</sub> Emission	12
3	Study of CO <sub>2</sub> Emission Reduction	14
4	Study of Indoor Air Quality	15
5	Study of Indoor Comfort Condition Parameters	17
6	Study of Waste Management	18
7	Study of Rain water Harvesting	20
8	Study of Environment Friendly Initiatives	22
	<b>Annexure</b>	
I	Various Standards in respect of Indoor Air Quality, Water, Noise & Indoor Comfort Condition	23

## 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: 2021-22.

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(Maharashtra) consumes Energy in the form of **Electrical Energy** used for various Electrical Equipment, office& other facilities.

### 2. Pollution due to College Activities:

- **Air pollution:** Mainly  $\text{CO}_2$  on account of Electricity Consumption
- **Solid Waste:** Bio degradable Garden Waste
- **Liquid Waste:** Human liquid waste

### 3. Present Energy Consumption & $\text{CO}_2$ Emission:

No	Parameter/ Variation	Energy Purchased, kWh	$\text{CO}_2$ Emissions, MT
1	Total	60516	54.46
2	Maximum	6868	6.18
3	Minimum	2968	2.67
4	Average	5043	4.54

### 4. Various initiatives taken for Energy Conservation:

- Usage of Energy Efficient BEE STAR Rated Equipment
- Usage of Energy Efficient LED Lighting
- Maximum Usage of Day Lighting
- Installation of Roof Top Solar PV Plant of Capacity 10kWp.

### 5. Usage of Renewable Energy& Reduction in $\text{CO}_2$ Emission:

- The College has installed Roof Top Solar PV Plant of Capacity **10 kWp**.
- The Electrical Energy generated in 21-22 is **12000 kWh**.
- Reduction in  $\text{CO}_2$  Emissions in 2021-22 works out to be **10.8MT**.

### 6. Indoor Air Quality Parameters:

Sr. No.	Parameter/Value	AQI	PM-2.5	PM-10
1	Maximum	126	67	86
2	Minimum	103	61	75

### 7. Indoor Comfort Conditions:

No	Parameter/Value	Temperature, $^{\circ}\text{C}$	Humidity, %	Lux Level	Noise Level, dB
1	Maximum	31.2	41.3	236	52.3
2	Minimum	30.8	40	85	36.3

## 8. Waste Management:

### 8.1 Segregation of Waste at Source:

The Waste is segregated at source and the recyclable waste, like paper, plastic waste is handed over to Authorized Agency for further action.

### 8.2 Organic Waste Management:

The College has installed a Bio Composting Pit and the organic Waste is composted in to Bio Compost which is used in the own garden.

### 8.3 Sanitary Waste Management:

The College has installed Sanitary Waste Incinerator for disposal of Sanitary Waste.

### 8.4 E Waste Management:

The E-Waste is disposed of through Authorized Agency.

## 9. 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.

## 10. Sustainable Initiatives

- Maintenance of Internal Garden
- Provision of Sanitary Waste Incinerator
- Display of Posters on Resource Conservation

## 11. Notes & Assumptions:

1. 1 kWh of Electrical Energy releases **0.9 Kg of CO<sub>2</sub>** into atmosphere
2. **1 kWp** Roof Top Solar PV Plant generates **4 kWh** Electrical Energy per Day
3. Annual Solar Energy Generation Days: **300 Nos.**

## 12. References:

- For CO<sub>2</sub> Emissions: [www.tatapower.com](http://www.tatapower.com)
- For Roof Top Solar Energy generation: [www.solarrooftop.gov.in](http://www.solarrooftop.gov.in)
- For Various Indoor Air Parameters: [www.ishrae.com](http://www.ishrae.com)
- For AQI & Water Quality Standards: [www.cpcb.com](http://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

#### 1.1 Important Definitions:

##### 1.1.1 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

##### 1.1.2. 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"*

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

##### 1.1.4. Relevant Environmental Laws in India: Table No-1

1927	The Indian Forest Act
1972	The Wildlife Protection Act
1974	The Water (Prevention and Control of Pollution) Act
1977	The Water (Prevention & Control of Pollution) Cess Act
1980	The Forest (Conservation) Act
1981	The Air (Prevention and Control of Pollution) Act
1986	The Environment Protection Act
1991	The Public Liability Insurance Act
2002	The Biological Diversity Act
2010	The National Green Tribunal Act

##### 1.1.5. Some Important Environmental Rules in India: Table No-2

1989	Hazardous Waste (Management and Handling) Rules
1989	Manufacture, Storage and Import of Hazardous Chemical Rules
2000	Municipal Solid Waste (Management and Handling) Rules
1998	The Biomedical Waste (Management and Handling) Rules
1999	The Environment (Siting for Industrial Projects) Rules
2000	Noise Pollution (Regulation and Control) Rules
2000	Ozone Depleting Substances (Regulation and Control) Rules
2011	E-waste (Management and Handling) Rules
2011	National Green Tribunal (Practices and Procedure) Rules
2011	Plastic Waste (Management and Handling) Rules

#### 1.1.6 National Environmental Plans & Policy Documents: Table No-3

1.	National Forest Policy, 1988
2.	National Water Policy, 2002
3.	National Environment Policy or NEP (2006)
4.	National Conservation Strategy and Policy Statement on Environment and Development, 1992
5.	Policy Statement for Abatement of Pollution (1992)
6.	National Action Plan on Climate Change
7.	Vision Statement on Environment and Human Health
8.	Technology Vision 2030 (The Energy Research Institute)
9.	Addressing Energy Security and Climate Change (MoEF and Bureau of Energy Efficiency)
10	The Road to Copenhagen; India's Position on Climate Change Issues (MoEF)

### 1.2 Objectives:

1. To study Resource Consumption & CO<sub>2</sub> Emissions
2. To Study CO<sub>2</sub> Emission Reduction
3. To study Indoor Air Quality Parameters
4. To study Indoor Comfort Condition Parameters
5. To Study of Waste Management
6. To Study of Rain Water Harvesting
7. To Study of Sustainable Initiatives

### 1.3 Google Earth Image



College  
Campus

1.4 General Details of College: Table No 4

Sr. No.	Head	Particulars
1	Name of Institution	Jayawant Shikshan Prasarak Mandal's Jayawantrao Sawant College of Pharmacy & Research
2	Address	Handewadi, Hadapsar, Pune (Maharashtra)
3	Affiliation	Savitribai Phule Pune University, Pune

## CHAPTER-II

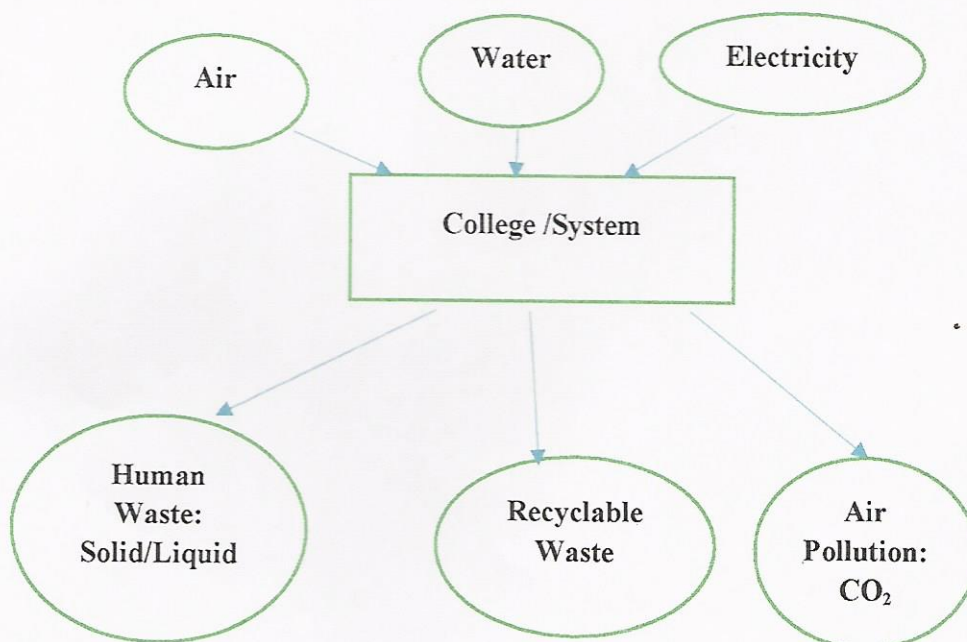
### STUDY OF RESOURCE CONSUMPTION & CO<sub>2</sub> EMISSION

The Institute 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<sub>2</sub> on account of consumption of Electrical Energy.

The basis of Calculation for CO<sub>2</sub> emissions due to Electrical Energy is as under.

- 1 kWh of Electrical Energy releases **0.9 Kg of CO<sub>2</sub>** into atmosphere

**Table No 5: Study of Consumption of Electrical Energy & CO<sub>2</sub> Emissions: 21-22**

No	Month	Energy Purchased, kWh	CO <sub>2</sub> Emissions, MT
1	Apr-21	3422	3.08
2	May-21	3206	2.89
3	Jun-21	2968	2.67
4	Jul-21	3801	3.42
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14	Maximum	6868	6.18
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16	Average	5043	4.54

Chart No 2: Month wise CO<sub>2</sub>Emissions

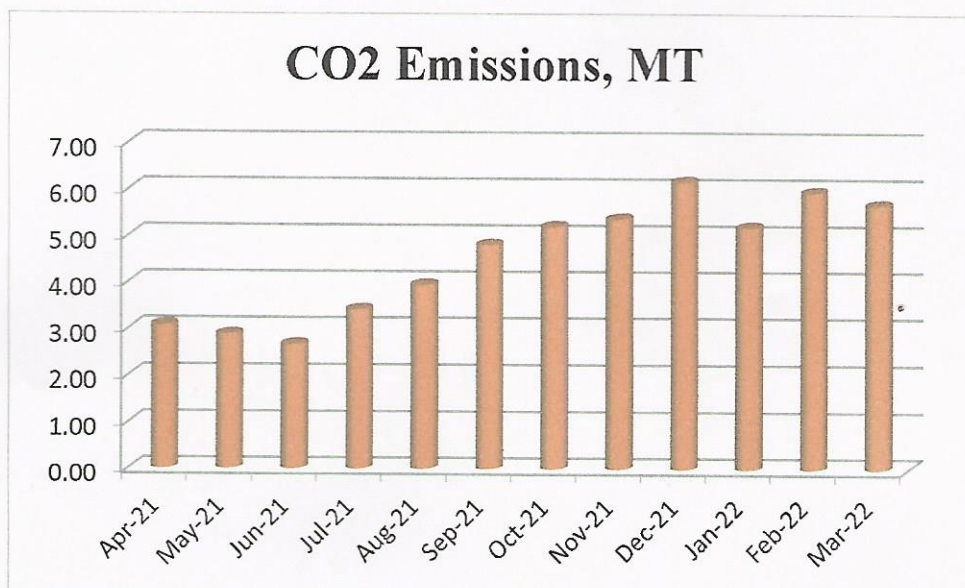


Table No 6: Important Parameters

Sr. No.	Parameter/ Variation	Energy Consumed, kWh	CO <sub>2</sub> Emissions, MT
1	Total	60516	54.46
2	Maximum	6868	6.18
3	Minimum	2968	2.67
4	Average	5043	4.54

### CHAPTER III

## STUDY OF CO<sub>2</sub> EMISSION REDUCTION

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

In the following Table, we compute the Annual Reduction in CO<sub>2</sub> Emissions due to installation of Roof TOP Solar PV Plant.

**Table No 7: Computation of Annual Reduction in CO<sub>2</sub> Emissions:**

Sr. 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: 21-22	12000	kWh
5	1 kWh of Electrical Energy saves	0.9	Kg/kWh
6	Qty of CO <sub>2</sub> Saved by Solar PV Plant $= (4) * (5) / 1000$	10.8	MT of CO <sub>2</sub>

**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.

Rapid urbanization and industrialization has added other elements/compounds to the pure air and thus caused the increase in pollution. In order to prevent, control and abate air pollution, the Air (Prevention and Control of Pollution) Act was enacted in 1981.

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

According to Section 2(b) of Air (Prevention and control of pollution) Act, 1981 '**air pollution**' has been defined as '**the presence in the atmosphere of any air pollutant.**'

As per Section 2(a) of Air (Prevention and control of pollution) Act, 1981 '**air pollutant**' has been defined as '**any solid, liquid or gaseous substance [(including noise)] present in the atmosphere in such concentration as may be or tend to be injurious to human beings or other living creatures or plants or property or environment**

#### 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. The measurement of the AQI requires an **air monitor** and an **air pollutant** concentration over a specified **averaging period**.

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 10micron

Table No 8: Indoor Air Quality Parameters

Sr. No.	Location	AQI	PM-2.5	PM-10
	<b>Ground Floor</b>			
1	6A -001 Animal House Facility	123	66	85
2	6A-001 Pharmacology Lab-III	123	67	86
3	6A-002 Common Room Girls	120	66	85
4	6A-006 Tutorial Room	126	67	86
	<b>First Floor</b>			
1	6A-117 Admission Cell	110	64	81
2	6A-Faculty Room	113	64	85
3	6A-105 Pharmaceutics Lab I PG	120	66	85
4	6A-114 Computer Centre	121	66	84
	<b>Second Floor</b>			
1	6A-202 Training& Placement Office	113	64	84
2	6A-201 Library	110	64	81
3	6A-205 Pharmaceutics Lab II	123	67	86
4	6A-208 Pharmacology Lab I	110	64	81
	<b>Third floor</b>			
1	6A-313 Pharmaceutical Chemistry I	113	63	80
2	6A-314 Preparation Room	103	61	75
3	6A-315 Pharmaceutical Chemistry II	110	62	81
4	6A-Central Instrumentation Room	120	66	82
	Maximum	<b>126</b>	<b>67</b>	<b>86</b>
	Minimum	<b>103</b>	<b>61</b>	<b>75</b>

## 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 No9: Study of Indoor Comfort Condition Parameters

Sr.No.	Location	Temperature, °C	Humidity, %	Lux Level	Noise Level, dB
<b>Ground Floor</b>					
1	6A -001 Animal House Facility	31	41.2	168	36.3
2	6A-001 Pharmacology Lab-III	31.2	41.2	201	45.9
3	6A-002 Common Room Girls	30.8	41.2	105	42
4	6A-006 Tutorial Room	31	41.1	85	46
<b>First Floor</b>					
1	6A-117 Admission Cell	30.9	41.3	105	43
2	6A-Faculty Room	30.9	41	112	46
3	6A-105 Pharmaceutics Lab I PG	31	41.1	116	42.9
4	6A-114 Computer Centre	31	40	96	52.3
<b>Second Floor</b>					
1	6A-202 Training& Placement Office	31.1	40.9	111	38.6
2	6A-201 Library	31.1	41	170	42.3
3	6A-205 Pharmaceutics Lab II	31	41	173	42
4	6A-208 Pharmacology Lab I	31.2	41	102	45.2
<b>Third floor</b>					
1	6A-313 Pharmaceutical Chemistry I	31.2	41	236	42
2	6A-314 Preparation Room	31.2	41	123	45
3	6A-315 Pharmaceutical Chemistry II	31	41	214	52
4	6A-Central Instrumentation Room	31.1	41	214	45
	Maximum	31.2	41.3	236	52.3
	Minimum	30.8	40	85	36.3

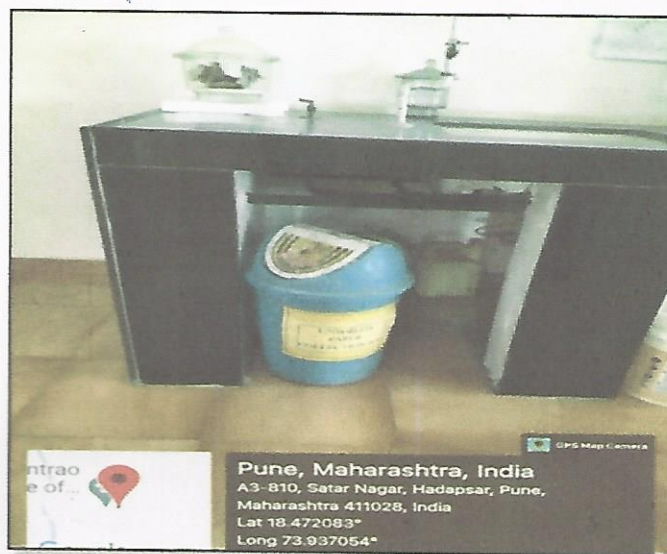
## CHAPTER VI

### STUDY OF WASTE MANAGEMENT

#### 6.1 Solid Waste Management:

The recyclable waste, like paper waste is handed over to authorized waste collecting agent for further recycling.

Photograph of Waste Collection Bin



#### 6.2 Organic Waste Management:

The Bio degradable waste like leafy waste is composted in a Vermi composting Plant.

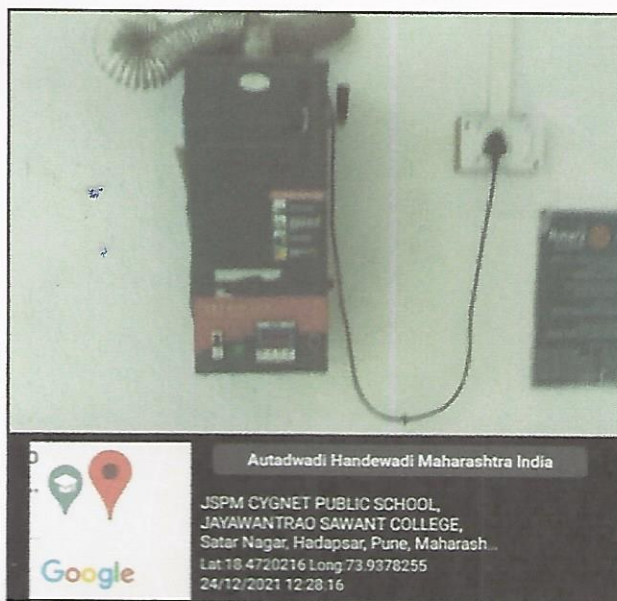
Photograph of Bio Composting Pit



### 6.3 Sanitary Waste Management:

For disposal of Sanitary Waste, a Sanitary Waste Incinerator is installed in the campus.

**Photograph of Sanitary Waste Incinerator**



### 6.4 E Waste Management:

The E-Waste is disposed of through Authorized Agency.

## CHAPTER-VII

### STUDY OF RAIN WATER HARVESTING

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 Harvesting Pipe Section



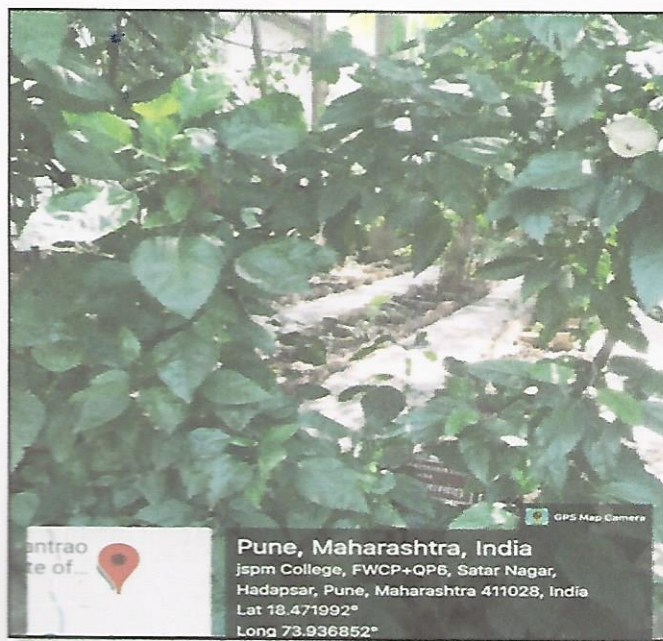
## CHAPTER-VIII

### STUDY OF ENVIRONMENT FRIENDLY INITIATIVES

#### 8.1 Internal Tree Plantation:

The College has well maintained landscaped garden in the campus.

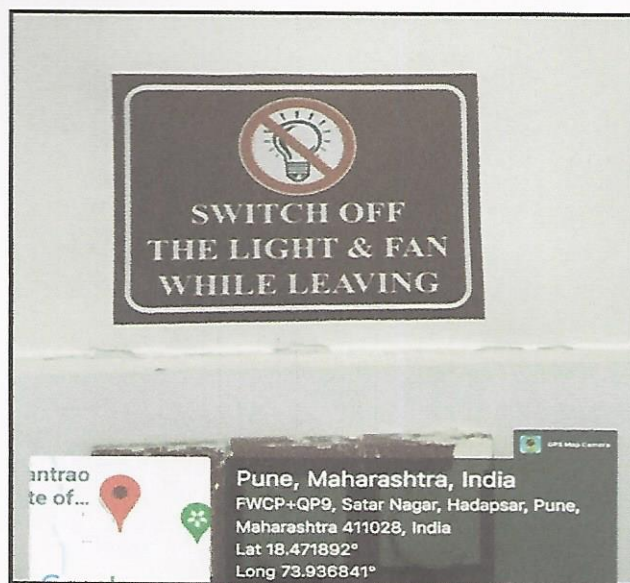
Photograph of Tree plantation



#### 8.2 Creation of Awareness about Energy Conservation:

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

Photograph of Poster on Energy Conservation



## ANNEXURE-I:

### VARIOUS AIR QUALITY, WATER QUALITY, NOISE & INDOOR COMFORT STANDARDS:

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

Sr. 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 Water Quality Standards

Sr. No.	Designated Best Use	Criteria
1	Drinking Water Source without conventional Treatment but after disinfection	pH between 6.5 to 8.5 Dissolved Oxygen 6 mg/l or more
2	Drinking water source after conventional treatment and disinfection	pH between 6 to 9 Dissolved Oxygen 4 mg/l or more
3	Outdoor Bathing (Organized)	pH between 6.5 to 8.5 Dissolved Oxygen 5 mg/l or more
4	Controlled Waste Disposal	pH between 6 to 8.5

### 3. Recommended Noise Level Standards

Sr. 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

### 4. Thermal Comfort Conditions: For Non-conditioned Buildings

Sr. No.	Parameter	Value
1	Temperature	Less Than 33°C
2	Humidity	Less Than 70%