ENGRESS SERVICES

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)

Ref No: ES/PVGCOET/22-23/04 **Date: 7/8/2023**

Comparison of various environmental parameters observed at Pune Vidyarthi Griha's College of Engineering & Technology & G K Pate (Wani) Institute of Management, Vidyanagari, Parvati, Pune wrt Standards:

No	Parameter	Value Measured in Audit		Ideal/Satisfactory Range	Remarks
		Minimum Value	Maximum Value		
A)	**Indoor Air Quality Parameters:**				
1	AQI	56	63	**51 to 100**	Satisfactory
2	PM-2.5	34	37	**31 to 60**	Good
3	PM-10	38	45	**51 to 100**	Good
B)	**Indoor Comfort Condition Parameters:**				
1	Temperature	27.1	27.2	Less Than 33 ^{0}C	Satisfactory
2	Humidity	69	71	Less Than 70 %	Satisfactory
3	Lux Level	105	132	175 Plus	Moderate
4	Noise Level	41.9	45	35 to 45	Satisfactory

Conclusion:

From the above comparison, we find that the overall 7 parameters are in **Moderate, Satisfactory & Good Range** as per the Standards furnished by **CPCB and ASHRAE.**

For Engress Services,

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

ENGRESS SERVICES * PUNE *

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)

Ref No: ES/PVGCOET/22-23/05

Date: 21/8/2023

AUDIT CONDUCTANCE CERTIFICATE

This is to conform that we have conducted: Energy, Green & Environmental Audits at Pune Vidyarthi Griha's College of Engineering & Technology & G K Pate (Wani) Institute of Management, Vidyanagari, Parvati, Pune for 5 Years: 2018-19 to 2022-23.

The Various Initiatives taken for Energy Efficient, Green & Eco Friendly Campus are:

- Usage of Energy Efficient LED Light Fitting
- Maximum Usage of Day Lighting
- Installation of 7.4 kWp Roof Top Solar PV Plant
- Segregation of Waste at source
- Provision of Bio Composting Bed for conversion of Organic Waste
- Provision of Sanitary Waste Incinerator
- Implementation of Rain Water Management Project
- Good Housekeeping Practices
- Tree Plantation in the campus
- Creation of awareness about Resource Conservation by Display of Posters

For Engress Services,

ENGRESS SERVICES PUNE

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

ENERGY AUDIT REPORT

of

PUNE VIDYARTHI GRIHA'S,

College of Engineering and Technology & G K Pate (Wani)

Institute of Management,

Vidyanagari, Parvati, Pune 411 009

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

ENGRESS SERVICES

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/PVGCOET/22-23/01 **Date: 7/8/2023**

This is to certify that we have conducted Energy Audit at Pune Vidyarthi Griha's College of Engineering and Technology& G K Pate (Wani) Institute of Management, Vidyanagari, Parvati, Pune 411 009 in the Academic year 2022-23.

.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 7.4 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-8192 No. 2942

National Productivity Council
(National Certifying Agency)
PROVISIONAL CERTIFICATE

This is to certify that Mr / Ms. *Achyut Yashavant Mehendale*
son / daughter of Mr. *Yashavant*
has passed the National Certification Examination for Energy Auditors in April - 2007, conducted on behalf of the Bureau of Energy Efficiency, Ministry of Power, Government of India.

He / She is qualified as Certified Energy Manager as well as Certified Energy Auditor.

He / She shall be entitled to practice as Energy Auditor under the Energy Conservation Act 2001, subject to the fulfillment of qualifications for the Accredited Energy Auditor and issue of certificate of Accreditation by the Bureau of Energy Efficiency under the said Act.

This certificate is valid till the issuance of an official certificate by the Bureau of Energy Efficiency.

Place : Chennai, India
Date : 20th August 2007

Controller of Examination

AUDITOR CERTIFICATE

MAHARASHTRA ENERGY DEVELOPMENT AGENCY

Maharashtra Energy Development Agency
(Government of Maharashtra Institution)
Aundh Road, Opposite Spicer College Road, Near Commissionerate of Animal Husbandry, Aundh, Pune, Maharashtra 411067
Ph No: 020-35000450
Email: ceo@mahaurja.com, Web: www.mahaurja.com

ECN/2022-23/CR-43/1709 10th 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 Maktangan 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 cancelling the registration, if the information is found incorrect.
- This empanelment is valid till **09th 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 (FC)

MEDA Registration Certificate

Certificate of Registration

This is to Certify that
Quality Management System of

ENGRESS SERVICES

26, YASHASHREE, BLOCK 1, LOKMANYA NAGAR, NIRMAL BAUG SOC, PARVATI, PUNE - 411009, MAHARASHTRA, INDIA

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

CONSULTANCY SERVICES FOR ENERGY AUDIT, GREEN AUDIT & ENVIRONMENTAL AUDIT IN EDUCATIONAL INSTITUTIONS & SUBMISSION OF AUDIT CERTIFICATE AND REPORT

Certificate No	23EQKC13		
Initial Registration Date	27/03/2023	Issuance Date	27/03/2023
Date of Expiry	26/03/2026		
1st Surve. Due	27/02/2024	2nd Surve. Due	27/02/2025

Director

Magnitude Management Services Pvt. Ltd.
B-53, Lower Ground Floor, Sector 02, Noida-201301, U.P. India

ISO: 9001-2015 Certificate

Certificate of Registration

This is to Certify that
Environmental Management System of

ENGRESS SERVICES

26, YASHASHREE, BLOCK 1, LOKMANYA NAGAR, NIRMAL BAUG SOC, PARVATI, PUNE - 411009, MAHARASHTRA, INDIA

has been assessed and found to conform to the requirements of
ISO 14001:2015
for the following scope :

CONSULTANCY SERVICES FOR ENERGY AUDIT, GREEN AUDIT & ENVIRONMENTAL AUDIT IN EDUCATIONAL INSTITUTIONS & SUBMISSION OF AUDIT CERTIFICATE AND REPORT

Certificate No	23EEKW20		
Initial Registration Date	29/03/2023	Issuance Date	29/03/2023
Date of Expiry	28/03/2026		
1st Surve. Due	29/02/2024	2nd Surve. Due	29/02/2025

Director

Magnitude Management Services Pvt. Ltd.
B-53, Lower Ground Floor, Sector 02, Noida-201301, U.P. India

ISO: 14001-2015 Certificate

ENGRESS SERVICES PUNE

INDEX

ACKNOWLEDGEMENT

We Engress Services, Pune, express our sincere gratitude to the management of Pune Vidyarthi Griha's College of Engineering and Technology& G K Pate (Wani) Institute of Management, Vidyanagari, Parvati, Pune 411 009, for awarding us the assignment of Energy 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. Pune Vidyarthi Griha's College of Engineering & Technology & G K Pate (Wani) Institute of Management, Vidyanagari, Parvati, Pune uses Energy in the form of **Electrical Energy;** used for various Electrical Equipment, office & other facilities.

2. Present Connected Load & Energy Consumption:

No	Particulars	Value	Unit
1	Total Connected Load	**224**	kW
2	Annual Energy Purchased		kWh

3. Energy Performance Index:

No	Particulars	Value	Unit
1	Total Annual Energy Purchased	**248776**	kWh
2	Total Built up area of College	**8240**	m^2
3	Energy Performance Index =(1) / (2)	**30.19**	kWh/m^2

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

No	Particulars	Value	Unit
1	Lighting Power Density	**8**	W/m^2
2	% of Usage of LED Lighting to Total Lighting Load	**29.12**	%

5. Renewable Energy & Energy Efficiency Projects:

- Usage of Energy Efficient LED fittings.
- Usage of BEE STAR Rated Equipment.
- Maximum Usage of Day Lighting.
- Installation of 7.4 kWp Roof Top Solar PV Plant.
- Modifications in the Chiller System at the Auditorium.

6. Assumption:

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

7. References:

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

ABBREVIATIONS

LED	:	Light Emitting Diode
MSEDCL	:	Maharashtra State Electricity Distribution Company Limited
PVG	:	Pune Vidyarthi Griha
COET	:	College of Engineering and Technology
IOM	:	Institute of Management
BEE	:	Bureau of Energy Efficiency
FTL	:	Fluorescent Tube Light
PV	:	Photo Voltaic
Kg	:	Kilo Gram
kWh	:	kilo-Watt Hour
CO_2	:	Carbon Di Oxide
MT	:	Metric Ton

CHAPTER-I
INTRODUCTION

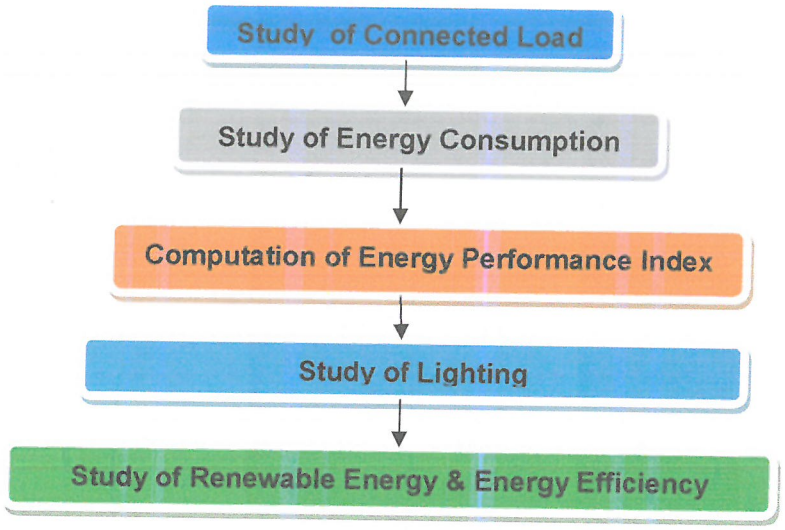
1.1 Introduction:

An Energy Audit is conducted at Pune Vidyarthi Griha's College of Engineering & Technology & G K Pate (Wani) Institute of Management.

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:

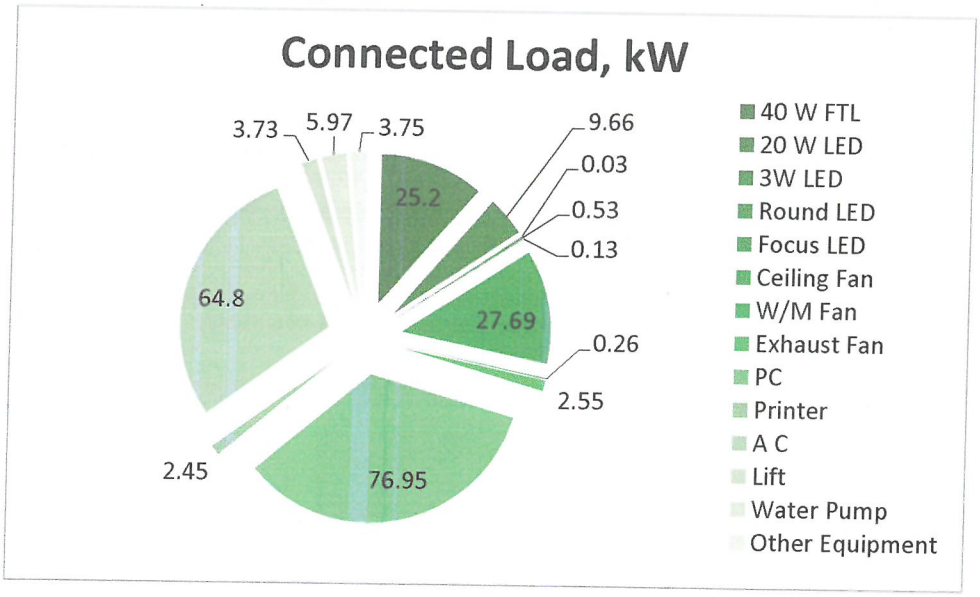
CHAPTER-II
STUDY OF CONNECTED LOAD

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	630	40	25.2
2	20 W LED	483	20	9.66
3	3W LED	11	3	0.03
4	Round LED	33	16	0.53
5	Focus LED	12	11	0.13
6	Ceiling Fan	426	65	27.69
7	W/M Fan	5	52	0.26
8	Exhaust Fan	49	52	2.55
9	PC	513	150	76.95
10	Printer	14	175	2.45
11	A C	36	1800	64.8
12	Lift	1	3730	3.73
13	Water Pump	1	5968	5.97
14	Other Equipment	25	150	3.75
15	**Total**			**224**

Chart No 1: Study of Connected Load:



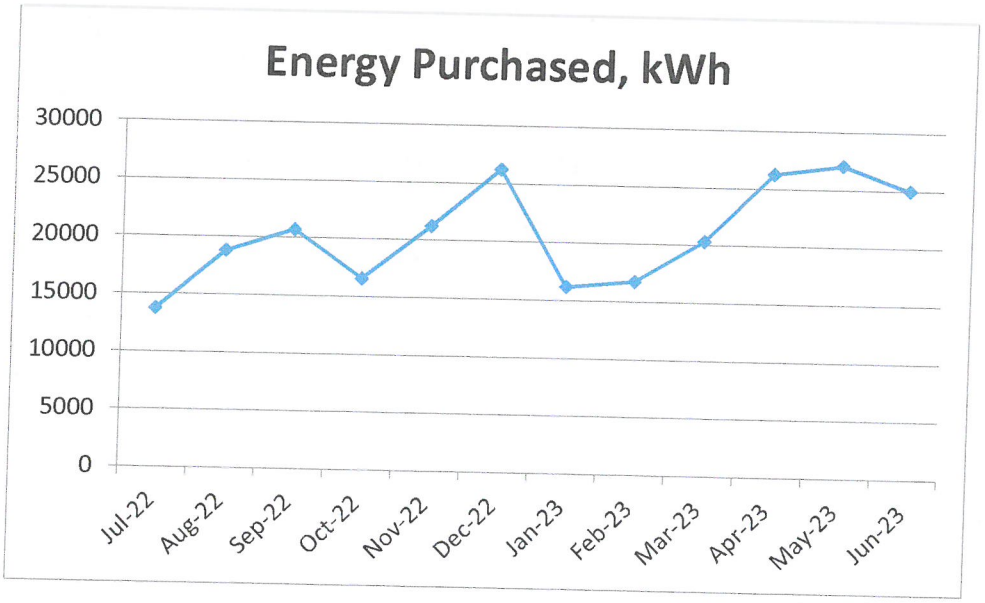
CHAPTER-III
STUDY OF PRESENT ENERGY CONSUMPTION

In this chapter, we present the analysis of last year Electricity Bills

Table No 2: Electrical Bill Analysis- 2022-23:

No	Month	Energy Purchased, kWh	CO_2 Emissions, MT
1	Jul-22	13714	12.34
2	Aug-22	18792	16.91
3	Sep-22	20708	18.64
4	Oct-22	16572	14.91
5	Nov-22	21208	19.09
6	Dec-22	26232	23.61
7	Jan-23	16170	14.55
8	Feb-23	16742	15.07
9	Mar-23	20310	18.28
10	Apr-23	26278	23.65
11	May-23	27068	24.36
12	Jun-23	24982	22.48
13	Total	248776	223.90
14	Maximum	27068	24.36
15	Minimum	13714	12.34
16	Average	20731.33	18.66

Chart No 2: Variation in Monthly Energy Consumption:



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	248776	kWh
2	Total Built up area of College	8240	m^2
3	Energy Performance Index **=(1) / (2)**	**30.19**	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/m²)

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/m²/100 lux) 100 Installed power density (W/m²/100 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: 412:

No	Particulars	Value	Unit
1	Qty of 40 W Fittings in Room No: 412	16	Nos
2	Load of 40 W Fitting	40	W/unit
3	Total Load of 16 Nos, 40 W Fittings	**640**	W
4	Built up area of Class Room: GF-07	**80**	m^2
5	**Lighting Power Density = (3)/(4)**	**8**	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 fittings	630	Nos
2	No of 20 W LED fitting	483	Nos
3	No of 3 W LED Fittings	11	Nos
4	No of 16 W LED Down Lighter	33	Nos
5	No of 11 W Focus LEDs	12	Nos
6	Load/Unit of 40 W FTL fitting	40	W/Unit
7	Load/Unit of 20 W LED fitting	20	W/Unit
8	Load/Unit of 3 W LED fitting	3	W/Unit
9	Load/Unit of 16 W LED fitting	16	W/Unit
10	Load/Unit of 11 W LED fitting	11	W/Unit
11	Load of 40 W FTL fittings	25.2	kW
12	Load of 20 W LED fitting	9.66	kW
13	Load of 3 W LED fitting	0.033	kW
14	Load of 16 W LED fitting	0.528	kW
15	Load of 11 W LED fitting	0.132	kW
16	Total LED Lighting Load **=12+13+14+15**	**10.35**	**kW**
17	Total Lighting Load **=11+12+13+14+15**	**35.55**	**kW**
18	% of LED lights to Total Lighting Demand = **(16)*100/(17)**	**29.12**	%

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 **7.4 kWp**

6.2 Energy Efficiency Measures adopted:

- Usage of Energy Efficient LED fittings.
- Usage of BEE STAR Rated Equipment.
- Maximum Usage of Day Lighting.
- Modifications in the Chiller System at the Auditorium.

Photograph of LED Lighting:

GREEN AUDIT REPORT

of

PUNE VIDYARTHI GRIHA'S,

College of Engineering and Technology & G K Pate (Wani)

Institute of Management,

Vidyanagari, Parvati, Pune 411 009

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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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/PVGCOET/22-23/02 **Date: 7/8/2023**

This is to certify that we have conducted Green Audit at Pune Vidyarthi Griha's College of Engineering and Technology & G K Pate(Wani) Institute of Management, Vidyanagari, Parvati, Pune 411 009 in the Academic year 2022-23.

The College has adopted following Green & Sustainable Practices:

- Usage of Energy Efficient LED Light Fitting
- Installation of 7.4 kWp Roof Top Solar PV Plant
- Maximum Usage of Day Lighting
- Segregation of Waste at source by provision of Bins
- Provision of Bio Composting Bed
- Provision of Sanitary Waste Incinerator
- Implementation of Rain Water management Project
- Good Housekeeping Practices
- 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

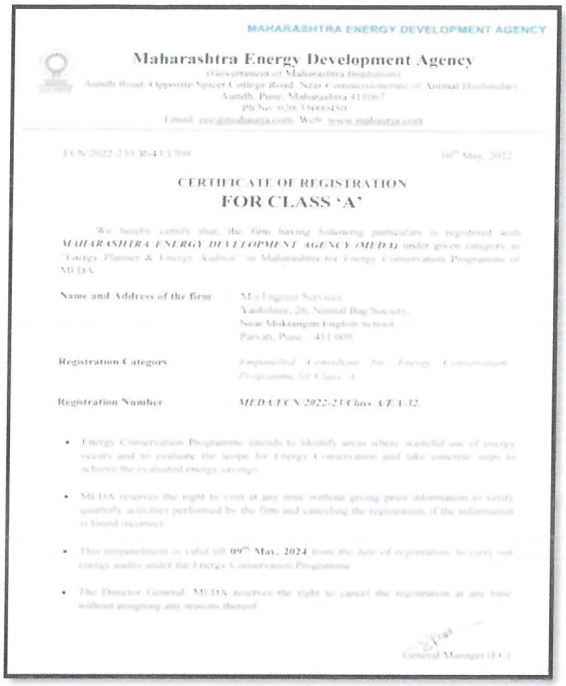
We appreciate the support of Management, involvement of faculty members and students in the process of Energy Conservation & making the campus Green.

For Engress Services,

A Y Mehendale,
Certified Energy Auditor, EA-8192
ASSOCHAM GEM Certified Professional: GEM: 22/788

ENGRESS SERVICES PUNE

REGISTRATION CERTIFICATES



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 411007

Ph No: 020-35000450

Email: mea@mahaurja.com, Web: www.mahaurja.com

ECN/2022-23/E/R-431/709 10th 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'/A-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 09th 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 (ECC)

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

He/She is now eligible to execute the GEM Sustainability Certification Projects.

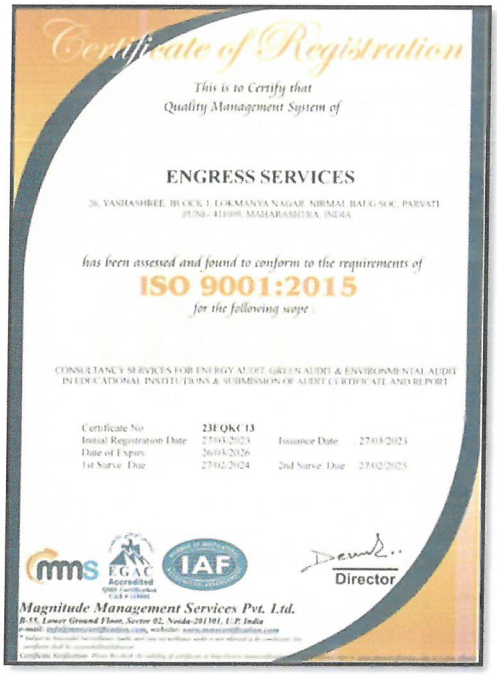
ASSOCHAM feels proud to award the GEM Certified Professional title to him/her.

Pankaj R. Dharkar, Chairman, GEM

GEM CP 22/788

Deepak Sood, Secretary General, ASSOCHAM

ASSOCHAM GEM CP CERTIFICATE



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Director

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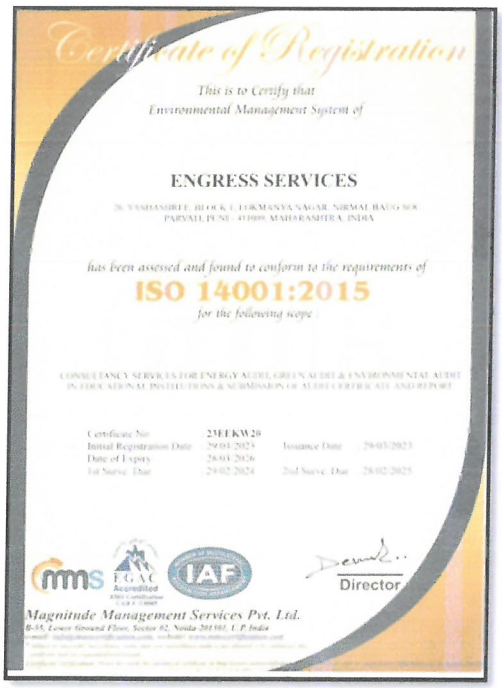
B-55, Lower Ground Floor, Sector 02, Noida-201301, U.P. India

ISO: 9001-2015 CERTIFICATE



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ISO: 14001-2015 CERTIFICATE

ENGRESS SERVICES PUNE

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EXECUTIVE SUMMARY

1. Pune Vidyarthi Griha's College of Engineering & Technology & G K Pate (Wani) Institute of Management, Vidyanagari, Parvati, Pune uses Energy in the form of **Electrical Energy**; used for various Electrical Equipment, office & other facilities.

2. Present Energy Consumption & CO_2 Emission:

No	Particulars	Value	Unit
1	Annual Energy Purchased	**248776**	kWh
2	Annual CO_2 Emissions	**223.90**	MT

3. Usage of Renewable Energy:

- The Institute has installed Roof Top Solar PV Plant of Capacity **7.4 kWp.**

4. Waste Management:

No	Head	Particulars
1	Solid Waste	Segregation of Waste at source
2	Organic Waste Management	Provision of Bio Composting Bed
3	Sanitary Waste	Provision of Sanitary Waste Incinerator
4	E Waste Management	Disposed of through Authorized Agency

5. Rain Water Harvesting:

The Rain water falling on the terrace is collected through Pipes and used for increasing the underground Water Table.

6. Green & Sustainable Practices:

- Good Housekeeping 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. Assumption:

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

8. Reference:

- For CO_2 Emissions: www.tatapower.com

ABBREVIATIONS

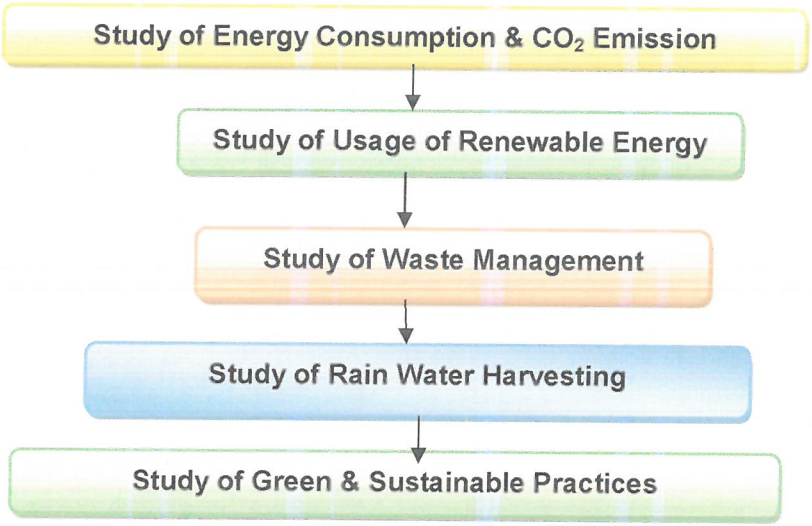
BEE	Bureau of Energy Efficiency
PVG	Pune Vidyarthi Griha
COET	College of Engineering & Technology
IOM	Institute of Management
kWh	Kilo Watt Hour
Kg	Kilo Gram
MT	Metric Ton
CO_2	Carbon Di Oxide
Qty	Quantity

CHAPTER-I
INTRODUCTION

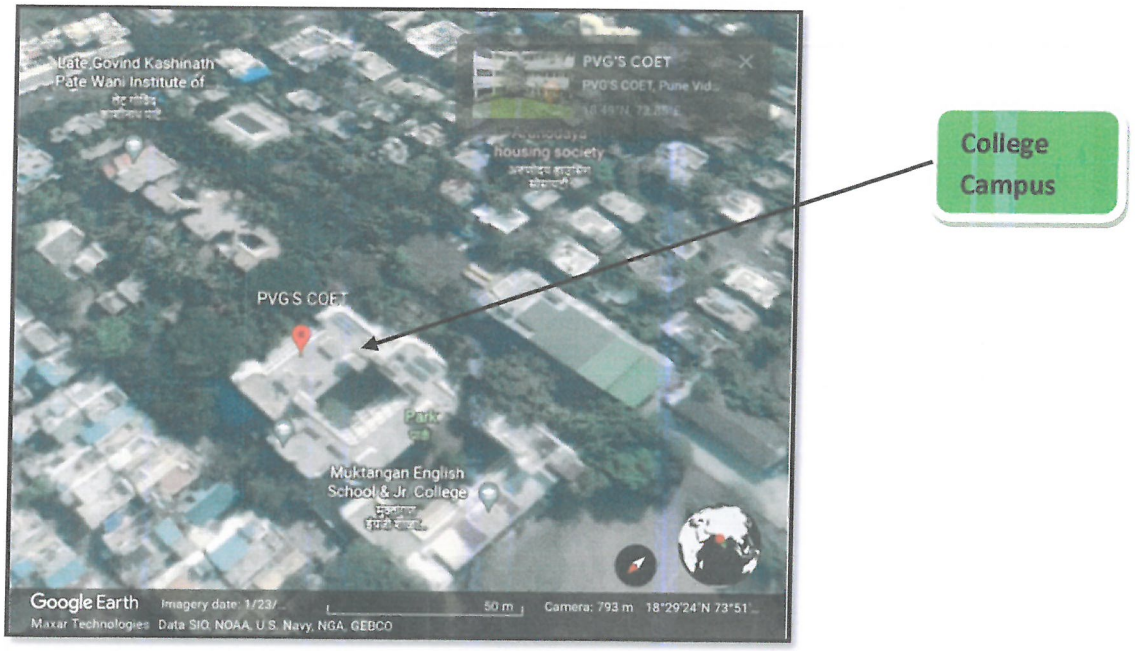
1.1 Introduction:

A Green Audit is conducted at Pune Vidyarthi Griha's College of Engineering & Technology & G K Pate (Wani) Institute of Management

1.2 Audit Procedural Steps:



1.3 Google Earth Image:



CHAPTER-II
STUDY OF ENERGY CONSUMPTION & CO_2 EMISSION

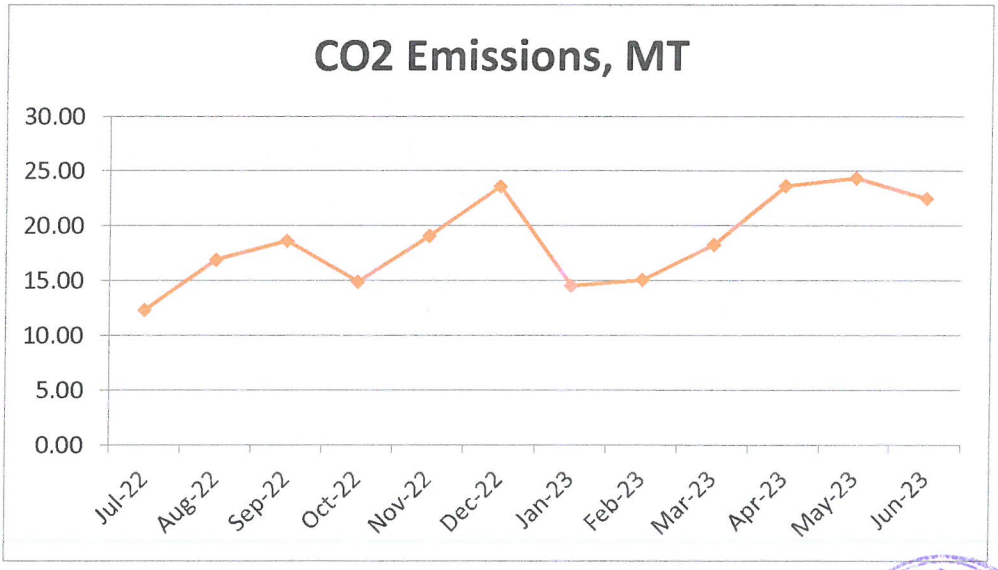
A Carbon Foot print is defined as the Total Greenhouse Gas emissions, emitted due to various activities. In this we compute the emissions of Carbon-Di-Oxide, by usage of the various forms of Energy used by the Institute for performing its day to day activities

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 CO_2 Emissions:

No	Month	Energy Purchased, kWh	CO_2 Emissions, MT
1	Jul-22	13714	12.34
2	Aug-22	18792	16.91
3	Sep-22	20708	18.64
4	Oct-22	16572	14.91
5	Nov-22	21208	19.09
6	Dec-22	26232	23.61
7	Jan-23	16170	14.55
8	Feb-23	16742	15.07
9	Mar-23	20310	18.28
10	Apr-23	26278	23.65
11	May-23	27068	24.36
12	Jun-23	24982	22.48
13	Total	248776	223.90
14	Maximum	27068	24.36
15	Minimum	13714	12.34
16	Average	20731.33	18.66

Chart No 1: Month wise CO_2 Emissions:



CHAPTER III
STUDY OF USAGE OF RENEWABLE ENERGY

The Institute has installed Roof Top Solar PV Plant of Capacity **7.4 kWp**

CHAPTER IV
STUDY OF WASTE MANAGEMENT

4.1 Segregation of Waste at source:

The recyclable waste, like paper, plastic waste is segregated at source by making provision of different waste collection bins. The Plastic Waste is handed over to Authorized Plastic Recyclers.

Photograph of Waste Collection Bin:

4.2 Organic Waste Management:

The Organic Waste like Leafy Waste is composted in a Bio Composting Bed.

Photograph of Bio Composting Bed:

4.3 Sanitary Waste Management:

The College has made provision of Sanitary Waste Incinerator for disposal of Sanitary Waste.

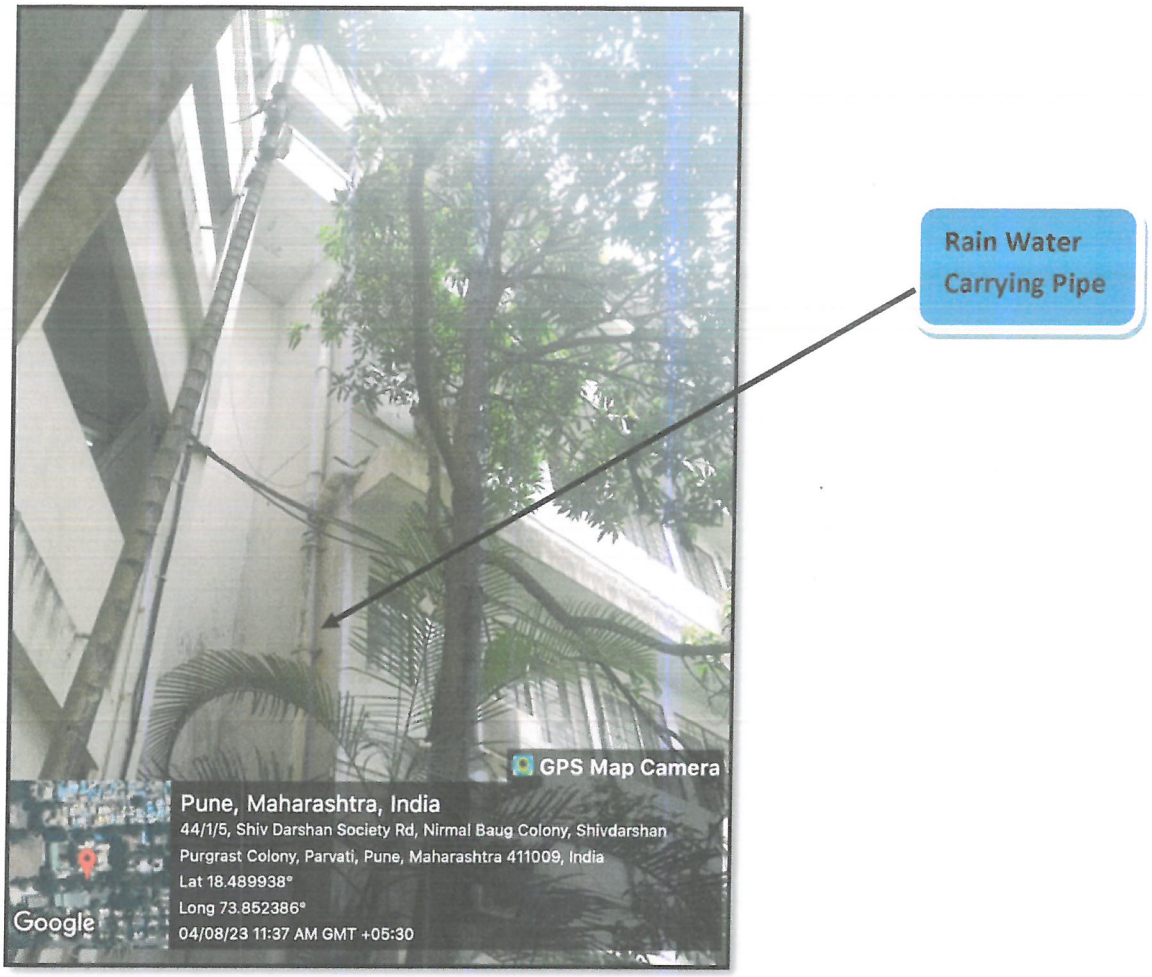
Photograph of Sanitary Waste Incinerator:

4.4 E Waste Management: The E-Waste is disposed of through Authorized Agency.

CHAPTER-V
STUDY OF RAIN WATER MANAGEMENT

The College has installed Pipes from terrace and the rain water from the terrace is used to increase the underground water table.

Photograph of Rain Water Carrying Pipe:



CHAPTER-VI
STUDY OF GREEN & SUSTAINABLE PRACTICES

6.1 Good Housekeeping Practices:

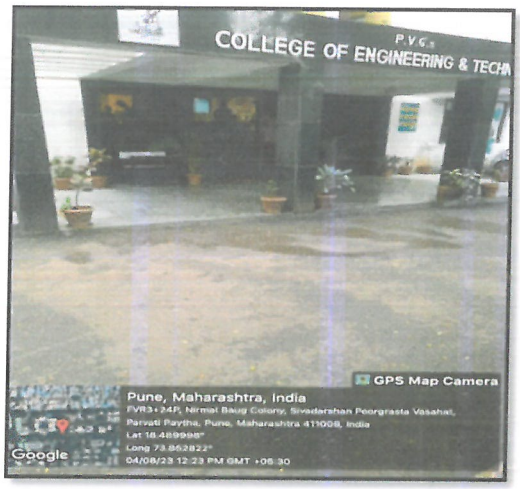
The College has taken following Hygienic initiatives.

- Regular Cleaning of all Wash rooms in Academic & Hostel Blocks
- Appointment of External Agency for Cleaning & Waste Management
- Periodic cleaning of all Water Tanks

6.2 Pedestrian Friendly Road:

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

Photograph of Internal Road:



6.3 Internal Tree Plantation:

The College has well maintained Tree Plantation in the campus. **Heritage Trees** are in the campus.

Photograph of Internal Tree plantation:

6.4 Provision of Ramp:

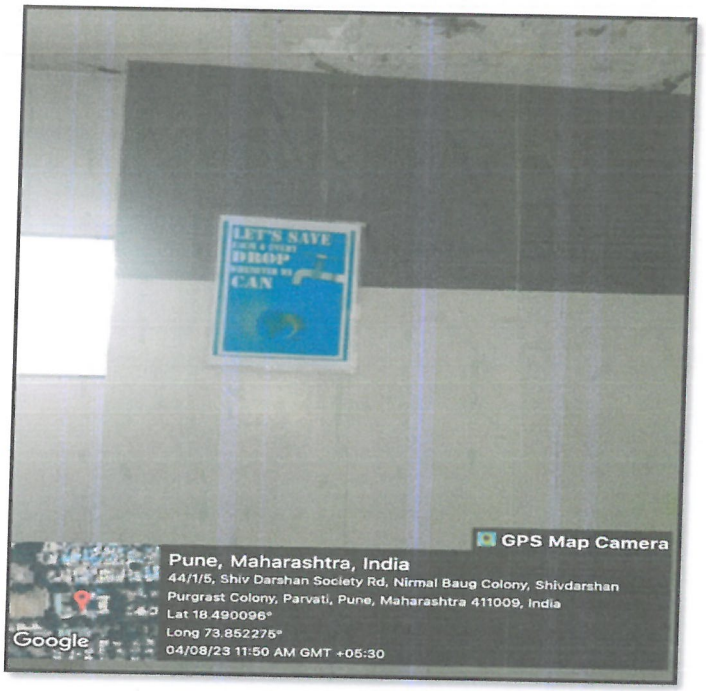
For easy movement of Divyangajan, the College has made provision of Ramp at the main entrance.

Photograph of Ramp:

6.5 Creation of Awareness about Water Conservation:

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

Photograph of Poster on Water Conservation:



ANNEXUREA-I:
LIST OF TREES AND PLANTS

List of Trees:

No	Common Name of Tree	Qty
1	Ashok	64
2	Coconut	45
3	English Chicha	10
4	Fanas	1
5	Mango	8
6	Shevga	1
7	Bel	2
8	Neem	1
9	Sonchampa	4
10	Jamun	6
11	Ramfal	2
12	Gulmohor	17
13	Cheru	1
14	Subabhul	35
15	Kaduneem	25
16	Karanj	3
17	Tabobia	3
18	Bor	5
19	Valava	1
20	Jackranda	3
21	Umbar	6
22	Spalordia	2
23	Bakanlimb	3
24	Raintree	11
25	Kashid	7
26	Fan Palm Tree	1
27	Cyprus Tree	3
28	Parijatak	2
29	Red Champa	2
30	Bamboo Bet	2
31	Putravanti	1
32	Guava	4
33	Shisu	1
34	Bakul	1
35	Supari	6
36	Traveller Palm	2
37	Pestoforum	3
38	Bottle Brush	3
39	Ficus	6
40	Gol	5
41	Kanchan	3

42	Apta	2
43	Bahava	4
44	Booch	2
45	Silver Oak	2
46	Vachava	2
47	White Champa	2
48	Almond	2
49	Hirada	3
50	Amala	2
51	Australian Babhul	4
52	Vad	3
53	Peltoforum	4
54	Karanj	5
55	Sitaranjan	1
56	Arjun	2
57	**Total**	**351**

List of Plants:

No	Common Name
1	Jaswand
2	Duranta
3	Drecena
4	Coleus
5	Saptaparni

ENVIRONMENTAL AUDIT REPORT

of

PUNE VIDYARTHI GRIHA'S,

College of Engineering and Technology & G K Pate (Wani)

Institute of Management,

Vidyanagari, Parvati, Pune 411 009

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

ENGRESS SERVICES

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)

ENVIRONMENTAL AUDIT CERTIFICATE

Certificate No: ES/PVGCOET/22-23/03 **Date: 7/8/2023**

This is to certify that we have conducted Environmental Audit at Pune Vidyarthi Griha's College of Engineering and Technology & G K Pate (Wani) Institute of Management, Vidyanagari, Parvati, Pune 411 009 in the Academic year 2022-23.

The College has adopted following Environment Friendly Practices:

- Usage of Energy Efficient LED Light Fitting
- Maximum Usage of Day Lighting
- Installation of 7.4 kWp Roof Top Solar PV Plant
- Segregation of Waste at source
- Provision of Bio Composting Bed for conversion of Organic Waste
- Provision of Sanitary Waste Incinerator
- Implementation of Rain Water Management Project
- Good Housekeeping Practices
- Tree Plantation in the campus
- Creation of awareness about Water Conservation by Display of Posters

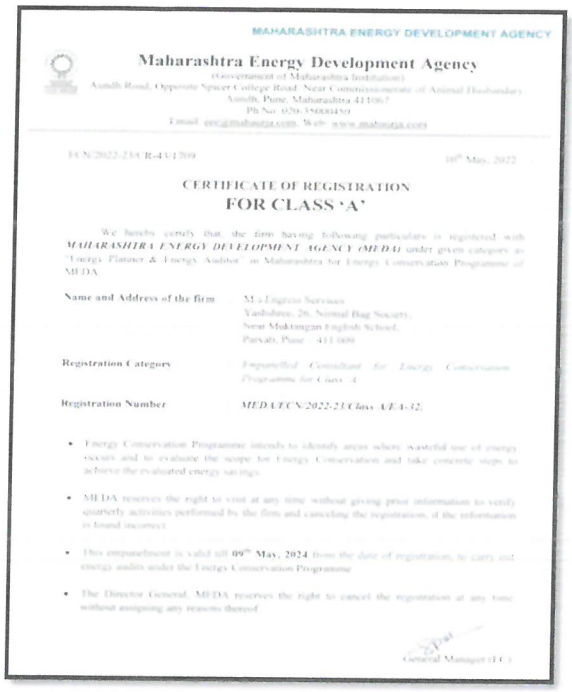
We appreciate the support of Management, involvement of faculty members and students in the process of Energy Conservation & making the campus Green.

For Engress Services,

ENGRESS SERVICES PUNE

A Y Mehendale,
Certified Energy Auditor, EA-8192
ASSOCHAM GEM Certified Professional: GEM: 22/788

REGISTRATION CERTIFICATES



MAHARASHTRA ENERGY DEVELOPMENT AGENCY

Maharashtra Energy Development Agency

(Government of Maharashtra Institution)

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

Ph No: 020-35000450

Email: ..., Web: www.mahaurja.com

MEDA/2022-23/R-43/1709 10th 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/EC/N/2022-23/Class 'A'/A-32*

- Energy Conservation Programme intends to identify areas where manifold 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 09th 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)

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

He/she is now eligible to execute the GEM Sustainability Certification Projects. ASSOCHAM feels proud to award the GEM Certified Professional title to him/her.

Pankaj R. Dharkar, Chairman, GEM

GEM CP 22/788

Deepak Sood, Secretary General, ASSOCHAM

ASSOCHAM GEM CP CERTIFICATE

Certificate of Registration

This is to Certify that Quality Management System of

ENGRESS SERVICES

26, YASHASHREE, BLOCK I, LOKMANYA NAGAR, NIRMAL BAUG SOC, PARVATI, PUNE- 411009, MAHARASHTRA, INDIA

has been assessed and found to conform to the requirements of

ISO 9001:2015

for the following scope :

CONSULTANCY SERVICES FOR ENERGY AUDIT, GREEN AUDIT & ENVIRONMENTAL AUDIT IN EDUCATIONAL INSTITUTIONS & SUBMISSION OF AUDIT CERTIFICATE AND REPORT

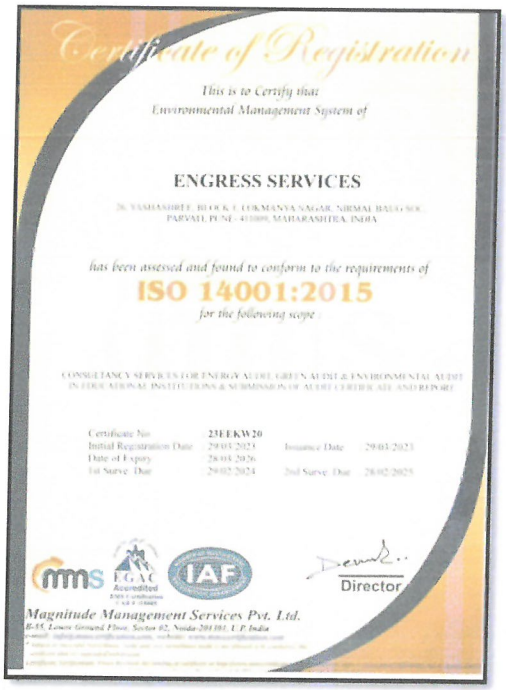
Certificate No	23FQKC13		
Initial Registration Date	27/03/2023	Issuance Date	27/03/2023
Date of Expiry	26/03/2026		
1st Surve. Due	27/02/2024	2nd Surve. Due	27/02/2025

Director

Magnitude Management Services Pvt. Ltd.

B-55, Lower Ground Floor, Sector 02, Noida-201301, U.P. India

ISO: 9001-2015 CERTIFICATE



Certificate of Registration

This is to Certify that Environmental Management System of

ENGRESS SERVICES

26, YASHASHREE, BLOCK I, LOKMANYA NAGAR, NIRMAL BAUG SOC, PARVATI, PUNE- 411009, MAHARASHTRA, INDIA

has been assessed and found to conform to the requirements of

ISO 14001:2015

for the following scope :

CONSULTANCY SERVICES FOR ENERGY AUDIT, GREEN AUDIT & ENVIRONMENTAL AUDIT IN EDUCATIONAL INSTITUTIONS & SUBMISSION OF AUDIT CERTIFICATE AND REPORT

Certificate No	23EEKW20		
Initial Registration Date	29/03/2023	Issuance Date	29/03/2023
Date of Expiry	28/03/2026		
1st Surve. Due	29/02/2024	2nd Surve. Due	28/02/2025

Director

Magnitude Management Services Pvt. Ltd.

B-55, Lower Ground Floor, Sector 02, Noida-201301, U.P. India

ISO: 14001-2015 CERTIFICATE

INDEX

ACKNOWLEDGEMENT

We Engress Services, Pune, express our sincere gratitude to the management of Pune Vidyarthi Griha's College of Engineering and Technology & G K Pate (Wani) Institute of Management, Vidyanagari, Parvati, Pune 411 009, 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. Pune Vidyarthi Griha's College of Engineering & Technology & G K Pate (Wani) Institute of Management, Vidyanagari, Parvati, Pune uses Energy in the form of **Electrical Energy;** 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 & Human Waste
- **Liquid Waste:** Human liquid waste

3. Present Energy Consumption & CO_2 Emissions:

No	Particulars	Value	Unit
1	Annual Energy Purchased	248776	kWh
2	Annual CO_2 Emissions	223.90	MT

4. Usage of Renewable Energy:

- The Institute has installed Roof Top Solar PV Plant of Capacity **7.4 kWp.**

5. Indoor Air Quality Parameters:

No	Parameter/Value	AQI	PM-2.5	PM-10
1	Maximum	63	37	45
2	Minimum	56	34	38

6. Indoor Comfort Condition Parameters:

No	Parameter/Value	Temperature, ^0C	Humidity, %	Lux Level	Noise Level, dB
1	Maximum	27.2	71	132	45
2	Minimum	27.1	69	105	41.9

7. Waste Management Practices:

No	Head	Particulars
1	Solid Waste	Segregation of Waste at source
2	Organic Waste Management	Provision of Bio Composting Bed
3	Sanitary Waste	Provision of Sanitary Waste Incinerator
4	E Waste Management	Disposed of through Authorized Agency

8. Rain Water Management:

The Rain water falling on the terrace is collected through Pipes and used for increasing the underground Water Table.

9. Environment Friendly Initiatives:

- Good Housekeeping Practices
- Maintenance of Internal Garden
- Creation of awareness by display of Posters on Water Conservation

10. Assumption:

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

11. References:

- For CO_2 Emissions: www.tatapower.com
- For Various Indoor Air Parameters: www.ishrae.com
- For AQI &Water Quality Standards: www.cpcb.com

ABBREVIATIONS

Kg	:	Kilo Gram
PVG	:	Pune Vidyarthi Griha
MSEDCL	:	Maharashtra State Distribution Company Limited
MT	:	Metric Ton
kWh	:	kilo-Watt Hour
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:

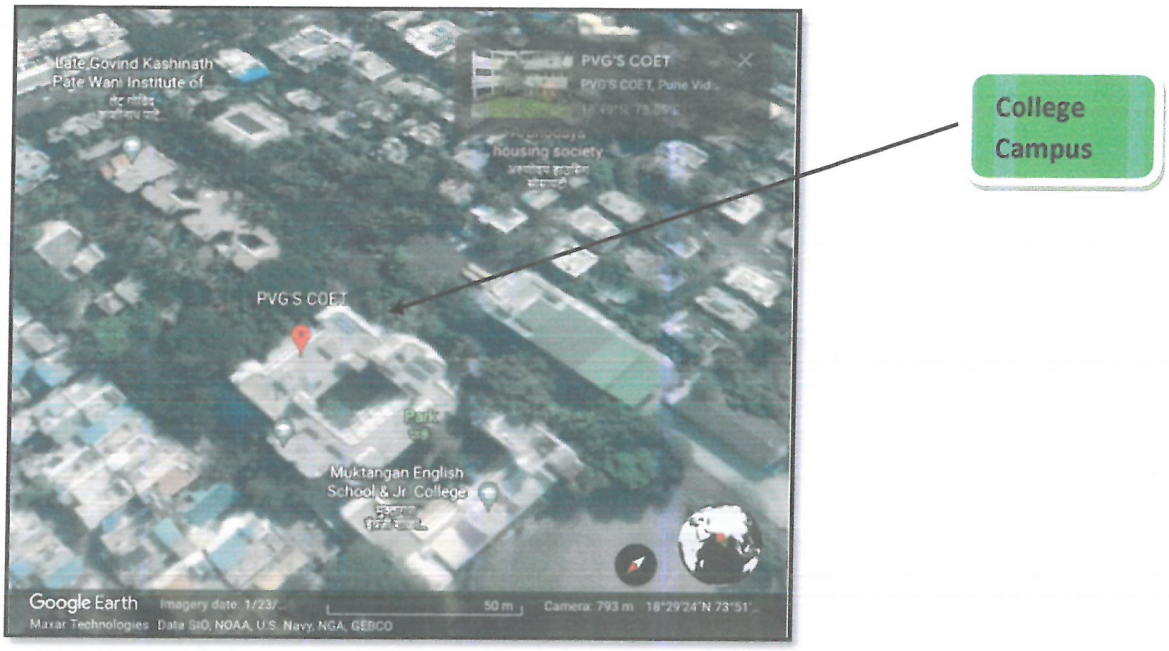
An audit which aims at verification and validation to ensure that various environmental laws are compiled with and adequate care has been taken towards environmental protection and preservation

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 Institute Location Image:



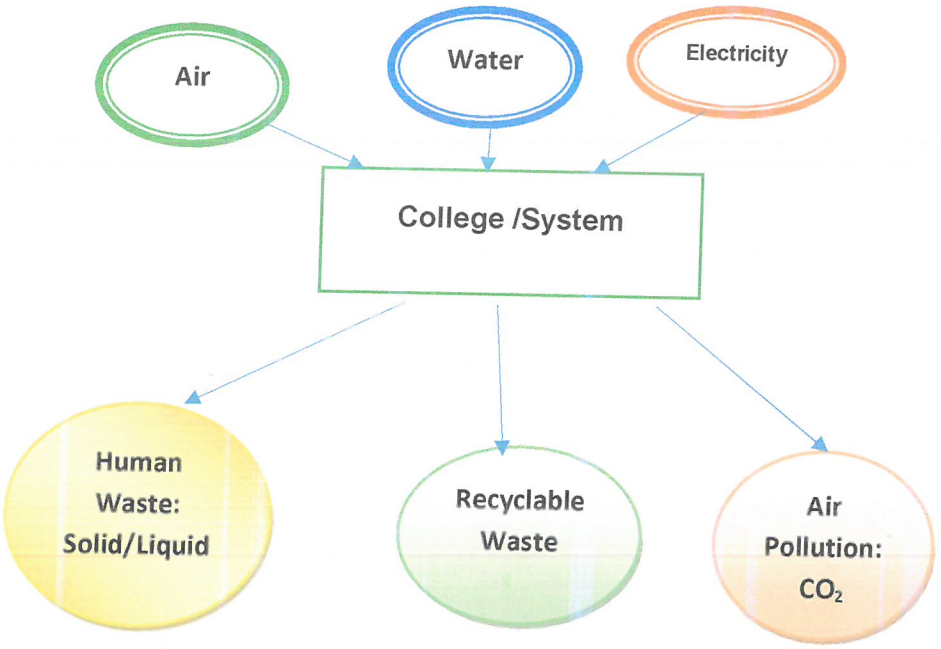
CHAPTER-II
STUDY OF RESOURCE CONSUMPTION & CO_2 EMISSION

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 Consumption of Electrical Energy & CO_2 Emissions: 22-23:

No	Month	Energy Purchased, kWh	CO_2 Emissions, MT
1	Jul-22	13714	12.34
2	Aug-22	18792	16.91
3	Sep-22	20708	18.64
4	Oct-22	16572	14.91
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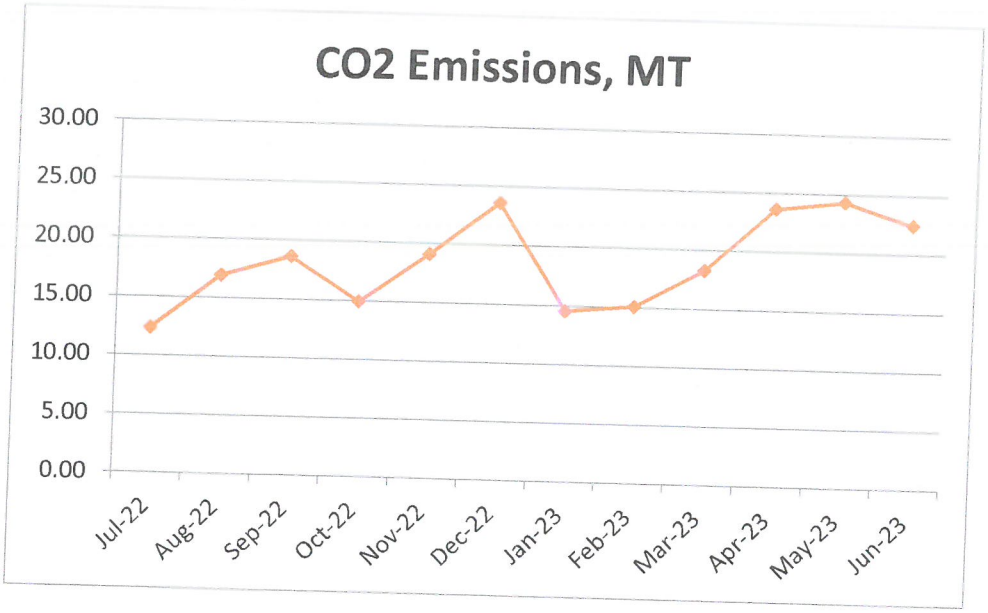
13	Total	248776	223.90
14	Maximum	27068	24.36
15	Minimum	13714	12.34
16	Average	20731.33	18.66

Chart No 2: Month wise CO_2Emissions:



CHAPTER III
STUDY OF USAGE OF RENEWABLE ENERGY

The College has installed Roof Top Solar PV Plant of Capacity 7.4 kWp

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 2: Indoor Air Quality Parameters:

No	Location	AQI	PM-2.5	PM-10
1	Library	61	37	44
2	Principal Office	60	36	38
3	Classroom-1	63	37	45
4	faculty Room	60	34	39
5	Admin Section	56	34	39
6	Electrical Lab	58	35	40
	Maximum	**63**	**37**	**45**
	Minimum	**56**	**34**	**38**

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 3: Study of Indoor Comfort Condition Parameters:

No	Location	Temperature, ^{0}C	Humidity, %	Lux Level	Noise Level, dB
1	Library	27.1	70	124	44.3
2	Principal Office	27.2	69	105	42
3	Classroom-1	27.1	69	132	41.9
4	faculty Room	27.1	71	126	45
5	Admin Section	27.1	70	106	44.2
6	Electrical Lab	27.2	71	112	43.9
	Maximum	**27.2**	**71**	**132**	**45**
	Minimum	**27.1**	**69**	**105**	**41.9**

CHAPTER VI
STUDY OF WASTE MANAGEMENT

6.1 Segregation of Waste at source:

The recyclable waste, like paper, plastic waste is segregated at source by making provision of different waste collection bins. The Plastic Waste is handed over to Authorized Plastic Recyclers.

Photograph of Waste Collection Bin:

6.2 Organic Waste Management:

Organic Waste Management:

The Organic Waste like Leafy Waste is composted in a Bio Composting Bed.

Photograph of Bio Composting Bed:

6.3 Sanitary Waste Management:

The College has made provision of Sanitary Waste Incinerator for disposal of Sanitary Waste.

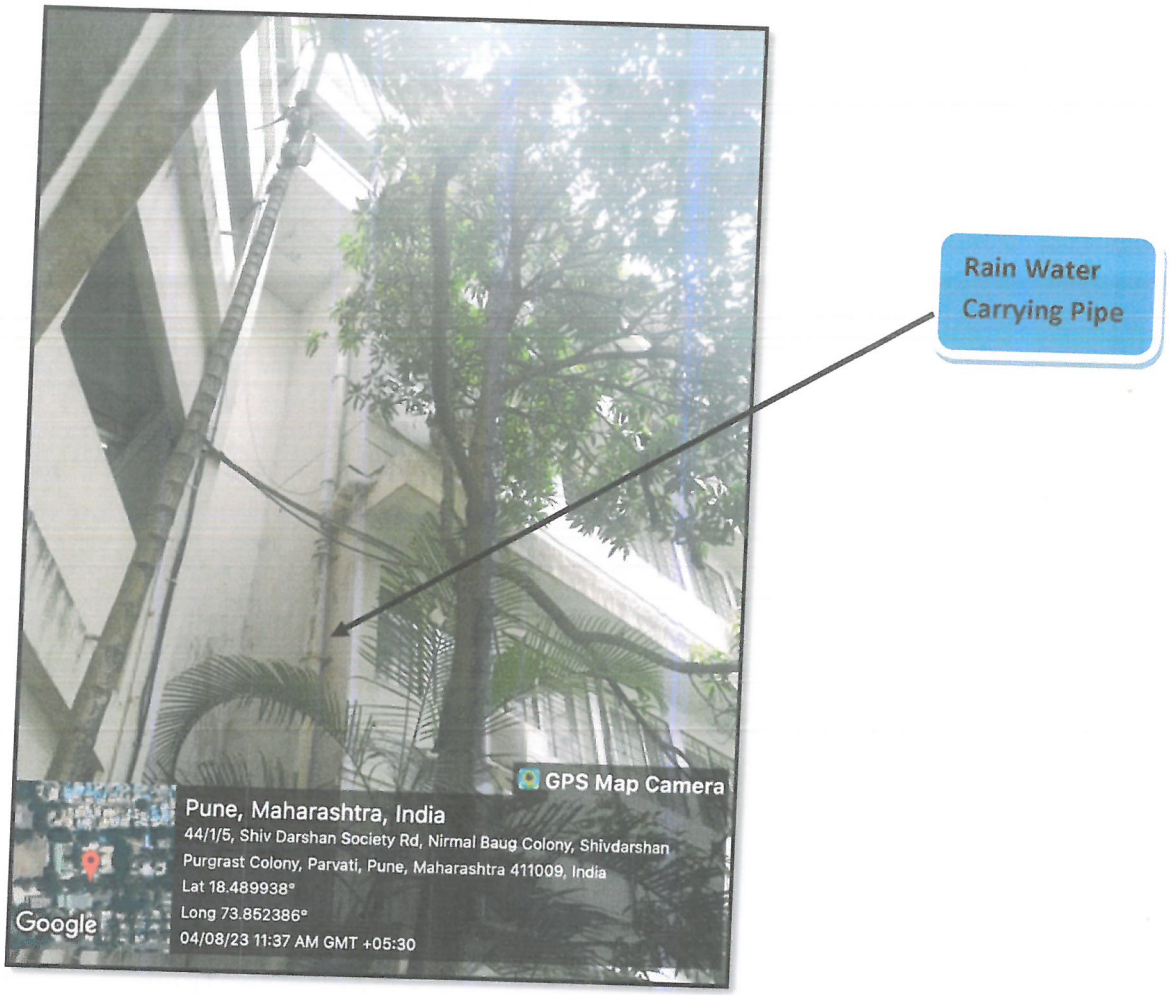
Photograph of Sanitary Waste Incinerator:

6.4 E Waste Management: The E Waste is disposed of through Authorized Agency.

CHAPTER-VII
STUDY OF RAIN WATER MANAGEMENT

The College has installed Pipes from terrace and the rain water from the terrace is used to increase the underground water table.

Photograph of Rain Water Carrying Pipe:



CHAPTER-VIII
STUDY OF ENVIRONMENT FRIENDLY INITIATIVES

8.1 Good Housekeeping Practices:

The College has taken following Hygienic initiatives.

- Regular Cleaning of all Wash rooms in Academic & Hostel Blocks
- Appointment of External Agency for Cleaning & Waste Management
- Periodic cleaning of all Water Tanks

8.2 Internal Tree Plantation:

The College has well maintained Tree Plantation in the campus. **Heritage Trees** are in the campus.

Photograph of Internal Tree plantation:

8.3 Creation of Awareness about Water Conservation:

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

Photograph of Poster on Water Conservation:

ANNEXURE-I:
AIR QUALITY, NOISE & INDOOR 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%