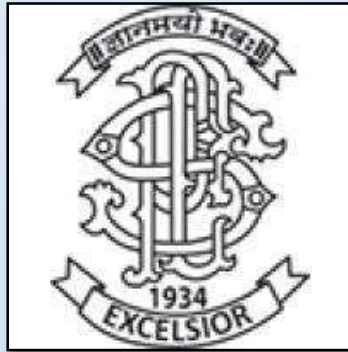


ENERGY AUDIT REPORT

Progressive Education Society's,
**MODERN COLLEGE OF ARTS, SCIENCE &
COMMERCE,**
Ganeshkhind, Pune



Year: 2023-24

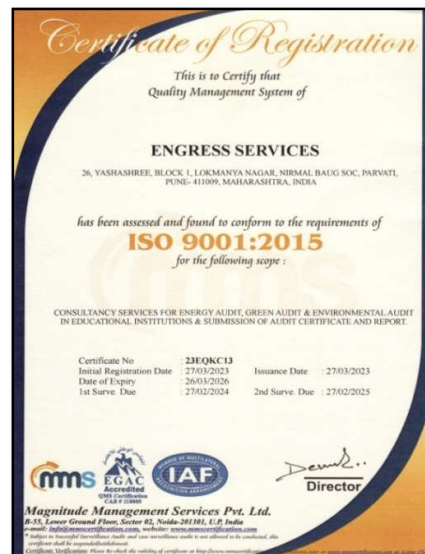
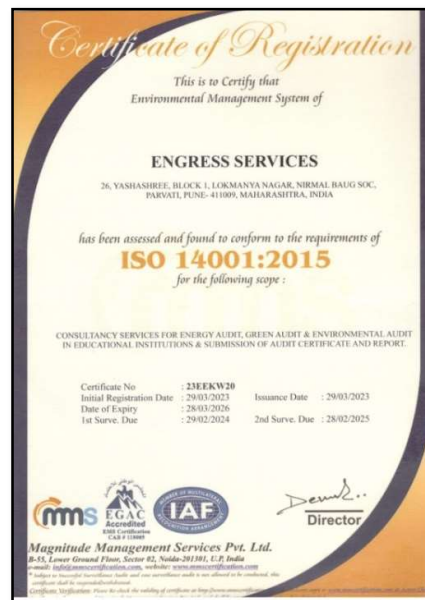
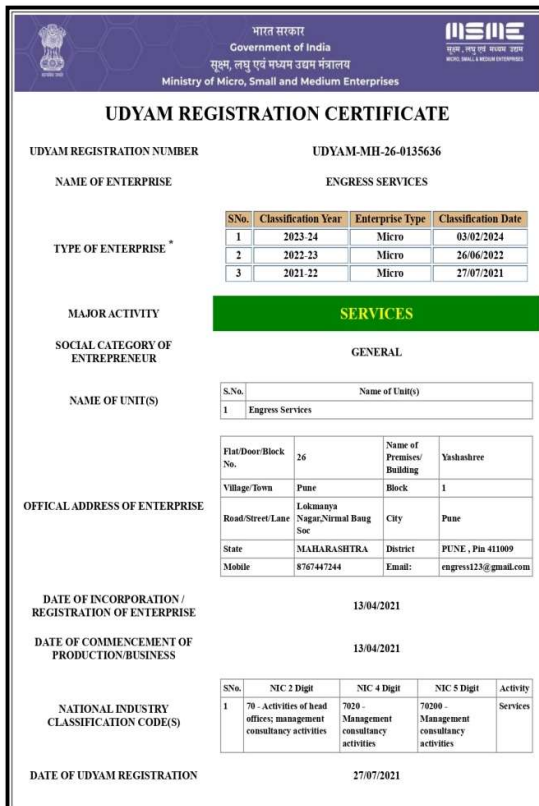
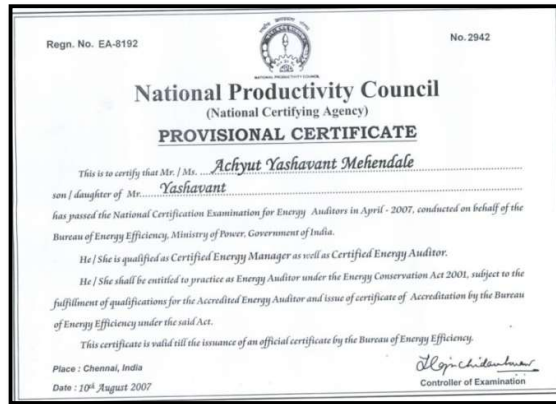
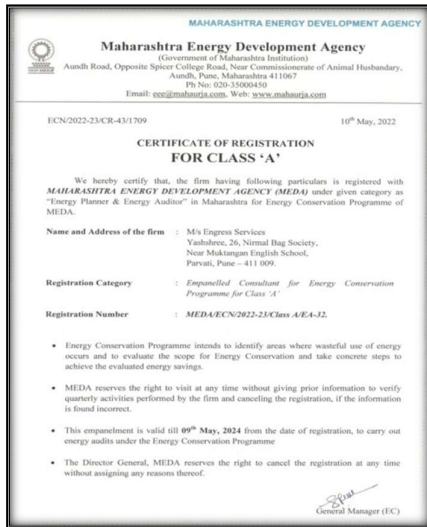
Prepared by:

ENGRESS SERVICES

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



REGISTRATION CERTIFICATES: BEE, UDYAM, MEDA, ISO-9001 & 14001:



INDEX

Sr. No	Particulars	Page No
I	Acknowledgement	4
II	Executive Summary	5
III	Abbreviations	6
1	Introduction	7
2	Study of Connected Load	8
3	Study of Present Energy Consumption	9
4	Study of Per Capita Energy Consumption	10
5	Study of Lighting	11
6	Study of Renewable Energy & Energy Efficiency	12

ACKNOWLEDGEMENT

We at Engress Services, Pune wish to express our sincere gratitude to the management of Progressive Education Society's Modern College of Arts, Science & Commerce, Ganeshkhind, Pune for assigning the work of Energy Audit of Ganeshkhind campus for the Year: 2023-24.

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

EXECUTIVE SUMMARY

1. **Progressive Education Society's Modern College of Arts, Science & Commerce, Ganeshkhind, Pune** uses Electrical Energy; as the source of Energy for various equipment.

2. Present Connected Load & Energy Consumption:

No	Particulars	Value	Unit
1	Total Connected Load	151.81	kW
2	Annual Energy Purchased	197972	kWh

3. Per Capita Energy Consumption:

No	Particulars	Value	Unit
1	Total Annual Energy Purchased	197972	kWh
2	Annual Energy Generated	18000	kWh
3	Annual Energy Consumed=1+2	215972	kWh
4	Total No of Students	4604	Nos
5	Per Capita Energy Consumption =(1) / (2)	46.91	kWh/Annum

4. Study of % Usage of LED Lighting:

No	Particulars	Value	Unit
1	% of Usage of LED Lighting to Total Lighting Load	56.64	%

5. Renewable Energy & Energy Efficiency Projects:

- Usage of Energy Efficient LED Lighting & Usage of BEE STAR Rated Equipment
- Installation of **15 kWp** Roof Top Solar PV Plant.

6. Assumptions:

1. **1 kWh** of Electrical Energy releases **0.93 Kg** of **CO₂** into atmosphere
2. Energy generated by Roof Top Solar PV Plant: **4 kWh/kWp per Day**
3. Annual Solar Energy Generation Days: **300 Nos**
4. Energy generation is considered only by 15 kWp Solar PV Plant.
5. CO₂ Consumption is computed based on Electrical Energy Purchased

7. References:

- Audit Methodology: www.mahaurja.com
- Energy Conservation Building Code: ECBC-2017: www.beeindia.gov.in
- For CO₂ Emissions: www.ccd.gujarat.gov.in
- For Solar PV Energy generation: www.solarrooftop.gov.in

ABBREVIATIONS

LED	:	Light Emitting Diode
MSEDCL	:	Maharashtra State Electricity Distribution Company Limited
BEE	:	Bureau of Energy Efficiency
ECBC	:	Energy Conservation Building Code
MEDA	:	Maharashtra Energy Development Agency
PV	:	Photo Voltaic
Kg	:	Kilo Gram
kWh	:	kilo-Watt Hour
CO ₂	:	Carbon Di Oxide
MT	:	Metric Ton

CHAPTER-I INTRODUCTION

1.1 Introduction:

An Energy Audit is conducted at Progressive Education Society's Modern College of Arts, Science & Commerce, Ganeshkhind, Pune.

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 Key Study Points:

No	Particulars
1	Study of Present Connected Load
2	Study of Present Energy Consumption
3	Study of Per Capita Energy Consumption
4	Study of Lighting
5	Study of Energy Efficiency & Renewable Energy

1.3 College Location Image:



College
Campus

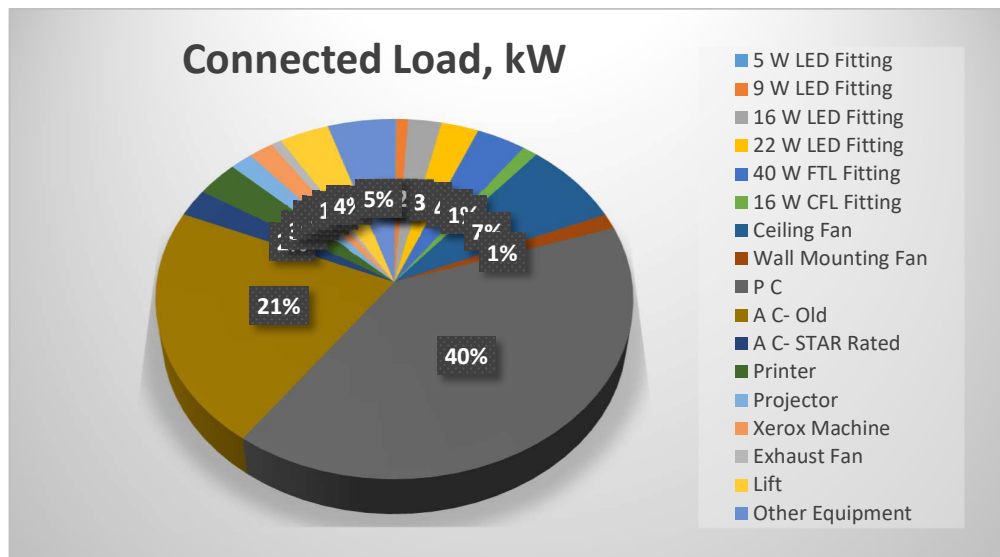
CHAPTER-II STUDY OF CONNECTED LOAD

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	5 W LED Fitting	45	5	0.23
2	9 W LED Fitting	150	9	1.35
3	16 W LED Fitting	250	15	3.75
4	22 W LED Fitting	192	22	4.22
5	40 W FTL Fitting	140	40	5.60
6	16 W CFL Fitting	95	18	1.71
7	Ceiling Fan	175	65	11.38
8	Wall Mounting Fan	40	52	2.08
9	P C	405	150	60.75
10	A C- Old	14	2325	32.55
11	A C- STAR Rated	2	1875	3.75
12	Printer	32	150	4.80
13	Projector	17	150	2.55
14	Xerox Machine	4	700	2.80
15	Exhaust Fan	23	52	1.20
16	Lift	1	5595	5.60
17	Other Equipment	50	150	7.50
18	Total			151.81

Chart No 1: Study of Connected Load:



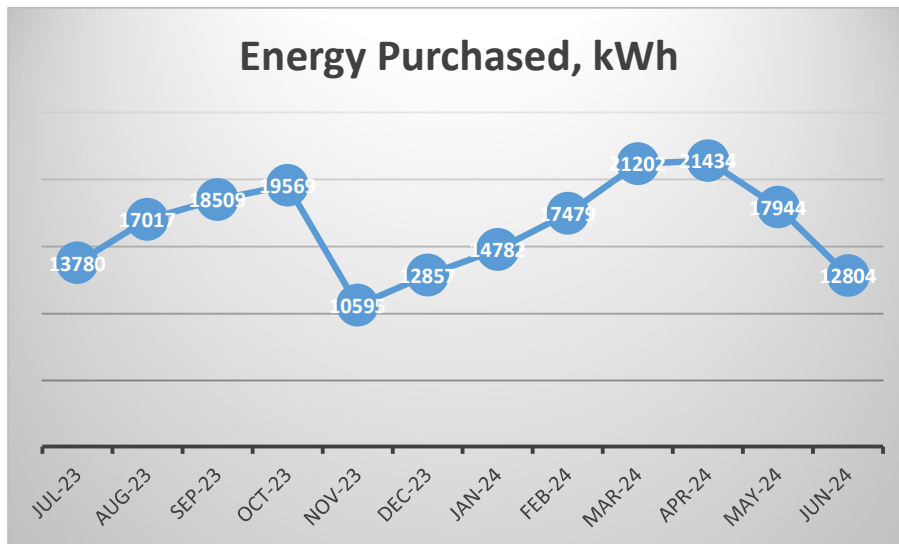
CHAPTER-III STUDY OF PRESENT ENERGY CONSUMPTION

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

Table No 2: Electrical Energy Consumption Analysis- 2023-24:

No	Month	Energy Purchased, kWh	CO ₂ Emissions, MT
1	Jul-23	13780	12.82
2	Aug-23	17017	15.83
3	Sep-23	18509	17.21
4	Oct-23	19569	18.20
5	Nov-23	10595	9.85
6	Dec-23	12857	11.96
7	Jan-24	14782	13.75
8	Feb-24	17479	16.26
9	Mar-24	21202	19.72
10	Apr-24	21434	19.93
11	May-24	17944	16.69
12	Jun-24	12804	11.91
13	Total	197972	184.11
14	Maximum	21434	19.93
15	Minimum	10595	9.85
16	Average	16497.67	15.34

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



CHAPTER-IV

STUDY OF PER CAPITA ENERGY CONSUMPTION

Per Capita Energy Consumption Index: Per Capita Energy Consumption Index of an educational Institute/College is its Annual Energy Consumption in Kilo Watt Hours per student studying in the Institute/College.

It is determined by:

$$\text{Per Capita Energy Consumption Index} = \frac{\text{Annual Energy Consumption in kWh}}{\text{Total No of students studying}}$$

Table No 3: Computation of Per Capita Energy Consumption Index:

No	Particulars	Value	Unit
1	Total Annual Energy Purchased	197972	kWh
2	Annual Energy Generated	18000	kWh
3	Annual Energy Consumed=1+2	215972	kWh
4	Total No of Students	4604	Nos
5	Per Capita Energy Consumption =(1) / (2)	46.91	kWh/Annum

CHAPTER-V STUDY OF LIGHTING

Terminology:

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

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

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

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

5. 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 percentage usage of LED Lighting to total Lighting Load.

Table No 4: Computation of % Usage of LED Lighting to Total Lighting Load:

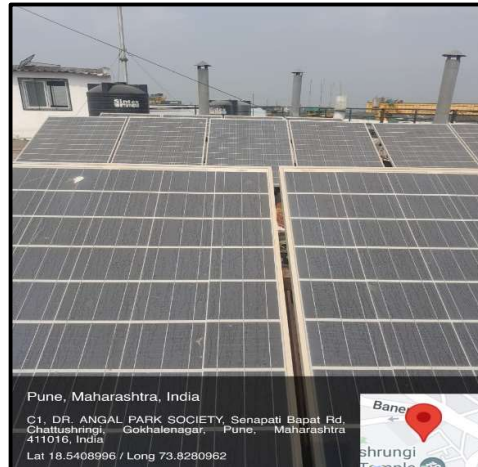
No	Particulars	Value	Unit
1	LED Lighting Load	9.55	kW
2	CFL Lighting Load	1.71	kW
3	FTL Lighting Load	5.60	kW
4	Total Lighting Load =1+2+3	16.86	kW
5	% of LED to Total Lighting Load = $1*100/4$	56.64	%

CHAPTER-VI STUDY OF RENEWABLE ENERGY & ENERGY EFFICIENCY

6.1 Usage of Renewable Energy:

The College has installed Roof Top Solar PV Plant is **15kWp**.

Photograph of 15 kWp Roof Top Solar PV Plant:



6.2 Energy Efficiency Measures Adopted:

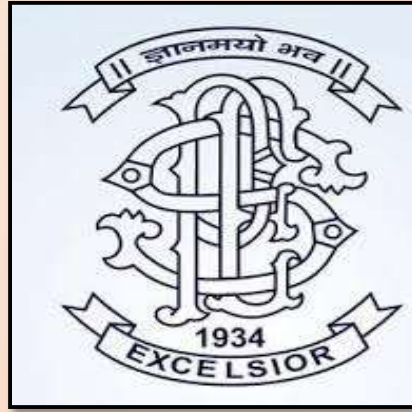
- Usage of Energy Efficient LED Lighting.
- Usage of BEE STAR Rated Energy Efficient Equipment

Photograph of STAR Rated AC & LED Light:



ENVIRONMENTAL AUDIT REPORT

Progressive Education Society's,
**MODERN COLLEGE OF ARTS, SCIENCE &
COMMERCE,**
Pashan Road, Ganeshkhind, Pune



Year: 2023-24


Prepared by:

ENGRESS SERVICES

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



Registration Certificates: UDYAM, MEDA, ASSOCHAM GEM-CP, ISO: 9001 & 14001:


 भारत सरकार
 Government of India
 सूक्ष्म, नपु एवं मध्यम उद्यम विभाग
 Ministry of Micro, Small and Medium Enterprises

UDYAM REGISTRATION CERTIFICATE

UDYAM REGISTRATION NUMBER: UDYAM-MH-26-0135636

NAME OF ENTERPRISE: ENGRESS SERVICES

S.No.	Classification Year	Enterprise Type	Classification Date
1	2023-24	Micro	03/02/2024
2	2022-23	Micro	26/06/2022
3	2021-22	Micro	27/07/2021

TYPE OF ENTERPRISE: SERVICES

MAJOR ACTIVITY: GENERAL

SOCIAL CATEGORY OF ENTREPRENEUR: GENERAL

NAME OF UNIT(S): Engress Services

S.No.	Name of Unit(s)
1	Engress Services

Flat/Door/Block No.	Name of Premises/ Building	Yashashree
26		

Village/Town: Pune, Block: 1

Road/Street/Lane: Lokmanya Nagar/Nirmal Baug Soc, City: Pune

State: MAHARASHTRA, District: PUNE, Pin: 411009

Mobile: 8767447244, Email: engress12@gmail.com

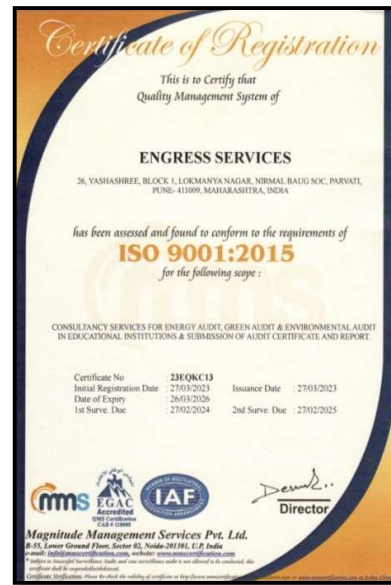
DATE OF INCORPORATION / REGISTRATION OF ENTERPRISE: 13/04/2021

DATE OF COMMENCEMENT OF PRODUCTION/BUSINESS: 13/04/2021

S.No.	NIC 2 Digit	NIC 4 Digit	NIC 5 Digit	Activity
1	79 - Activities of head offices; management consultancy activities	7920 - Management consultancy activities	79200 - Management consultancy activities	Services

NATIONAL INDUSTRY CLASSIFICATION CODE(S):

DATE OF UDYAM REGISTRATION: 27/07/2021




 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@maharaja.com, Web: www.maharaja.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.

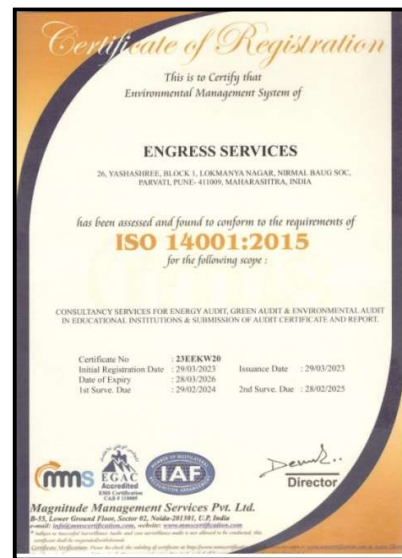
Name and Address of the firm: M/s Engress Services, Yashashree, 26, Nirmal Baug Society, Near Muktaganj English School, Parvati, Pune - 411 009.

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 **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.

Devendra
General Manager (EC)



INDEX

Sr. No	Particulars	Page No
I	Acknowledgement	4
II	Executive Summary	5
III	Abbreviations	7
1	Introduction	8
2	Study of Resource Consumption & CO ₂ Emission	9
3	Study of Usage of Renewable Energy	11
4	Study of Indoor Air Quality	12
5	Study of Indoor Lux & Noise Parameters	13
6	Study of Rain Water Management	14
7	Study of Waste Management	15
8	Study of Eco-Friendly Practices	17

ACKNOWLEDGEMENT

We at Engress Services, Pune wish to express our sincere gratitude to the management of Progressive Education Society's Modern College of Arts, Science & Commerce, Ganeshkhind, Pune for awarding us the assignment of Environmental Audit of their Ganeshkhind campus for the Year: 2023-24.

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

EXECUTIVE SUMMARY

1. **Progressive Education Society's Modern College of Arts, Science & Commerce, Ganeshkhind, Pune** uses Electrical Energy; as the source of Energy for various equipment.

2. Pollution due to College Activities:

- **Air pollution:** Mainly CO₂ on account of Electricity Consumption
- **Solid Waste:** Bio degradable Garden Waste, Paper & Plastic Waste
- **Liquid Waste:** Human liquid waste

3. Present Energy Consumption & CO₂ Emission:

No	Particulars	Value	Unit
1	Annual Energy Consumed	197972	kWh
2	Annual CO ₂ Emissions	184.11	MT

4. Usage of Renewable Energy & Reduction in CO₂ Emissions:

- Energy Generated by **15 kWp** Roof Top Solar Plant in 23-24 is **18000 kWh**
- Reduction in CO₂ Emissions in 23-24 is **16.2 MT**

5. Indoor Air Quality Parameters:

No	Parameter/Value	AQI	PM-2.5	PM-10
1	Maximum	58	37	43
2	Minimum	51	31	37

6. Indoor Lux & Noise Parameters:

No	Parameter/Value	Lux Level	Noise Level, dB
1	Maximum	239	49
2	Minimum	225	44

7. Waste Management:

No	Head	Particulars
1	Solid Waste	Segregation of Waste at source
2	Organic Waste	Provision of Bio Composting Bed
3	Lab Chemical Liquid Waste	Provision of Effluent Treatment Plant
4	Sanitary Waste	Provision of Sanitary Waste Incinerator
5	E Waste	Disposed of through Authorized Agency

8. Rain Water Management:

The College has installed the Rainwater Management project. The rain water falling on the terrace is channelized through Pipe and is used to increase the underground Water Table.

9. Environment Friendly Initiatives:

- Internal tree Plantation
- Awareness creation on Water Conservation by display of posters

10. Assumptions:

1. **1 kWh** of Electrical Energy releases **0.93 Kg of CO₂** into atmosphere
2. Energy generated by Roof Top Solar PV Plant: **4 kWh/kWp per Day**
3. Annual Solar Energy Generation Days: **300 Nos**
4. Energy generation is considered only by 15 kWp Solar PV Plant.
5. CO₂ Consumption is computed based on Electrical Energy Purchased

11. References:

- For CO₂ Emissions: www.ccd.gujarat.gov.in
- For Various Indoor Air Parameters: www.ishrae.com
- For AQI Quality Standards: www.cpcb.com
- For Solar PV Energy generation: www.solarrooftop.gov.in

ABBREVIATIONS

Kg	: Kilo Gram
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:

1.1.1 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:

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 Key Study Points:

No	Particulars
1	Study of Present Resource Consumption & CO ₂ Emission
2	Study of Usage of Renewable Energy
3	Study of Indoor Air Quality
4	Study of Indoor Lux & Noise Level
5	Study of Water Management
6	Study of Waste Management Practices
7	Study of Environment Friendly Practices

1.4 College Location Image:



College
Campus

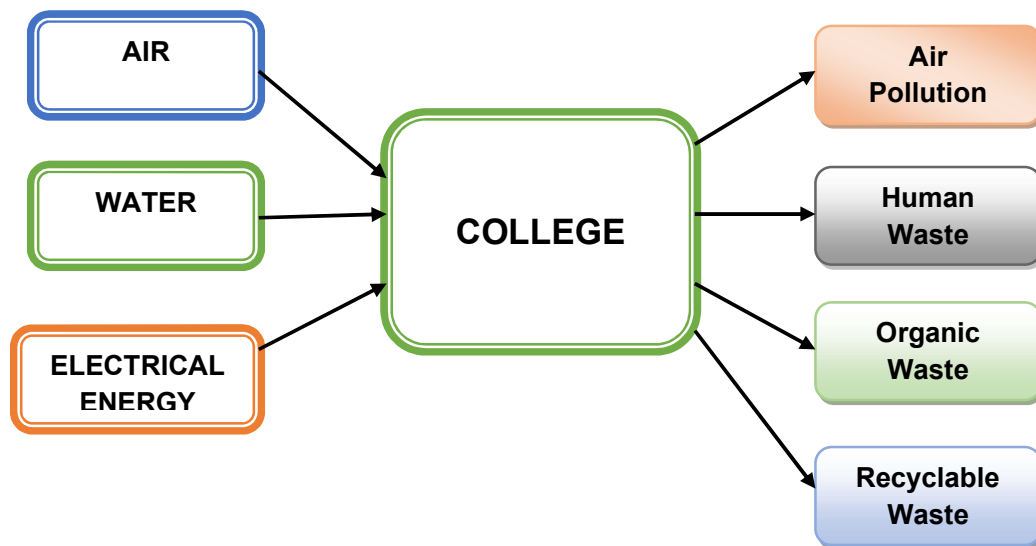
CHAPTER-II STUDY OF RESOURCE CONSUMPTION & CO₂ EMISSION

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 Resource Requirement & Waste of a College:



Now we compute the Generation of CO₂ on account of consumption of Electrical Energy. The basis of Calculation for CO₂ emissions due to Electrical Energy is as under.

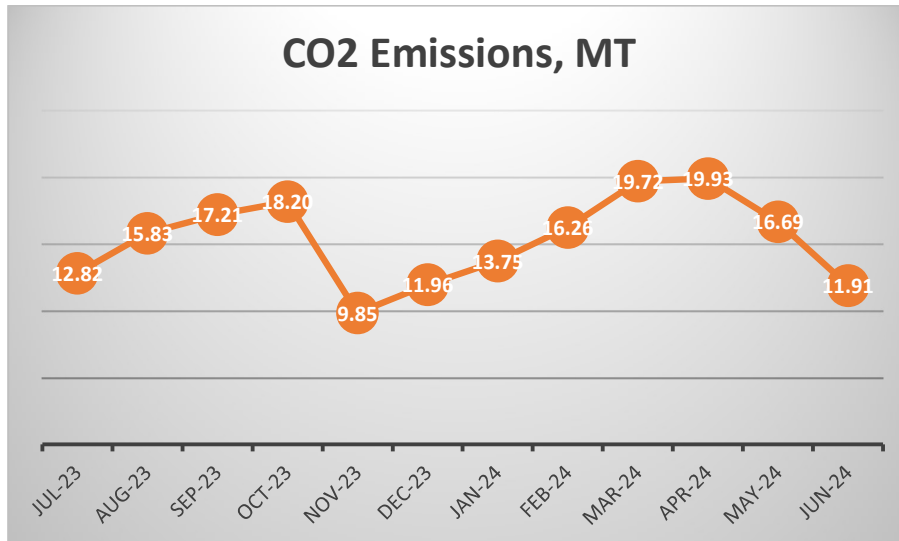
- **1 kWh** of Electrical Energy releases **0.93 Kg of CO₂** into atmosphere

Table No 1: Study of Purchase of Energy & CO₂ Emissions: 23-24:

No	Month	Energy Purchased, kWh	CO ₂ Emissions, MT
1	Jul-23	13780	12.82
2	Aug-23	17017	15.83
3	Sep-23	18509	17.21
4	Oct-23	19569	18.20
5	Nov-23	10595	9.85
6	Dec-23	12857	11.96

7	Jan-24	14782	13.75
8	Feb-24	17479	16.26
9	Mar-24	21202	19.72
10	Apr-24	21434	19.93
11	May-24	17944	16.69
12	Jun-24	12804	11.91
13	Total	197972	184.11
14	Maximum	21434	19.93
15	Minimum	10595	9.85
16	Average	16497.67	15.34

Chart No 2: Month wise CO₂ Emissions:



CHAPTER III

STUDY OF USAGE OF RENEWABLE ENERGY

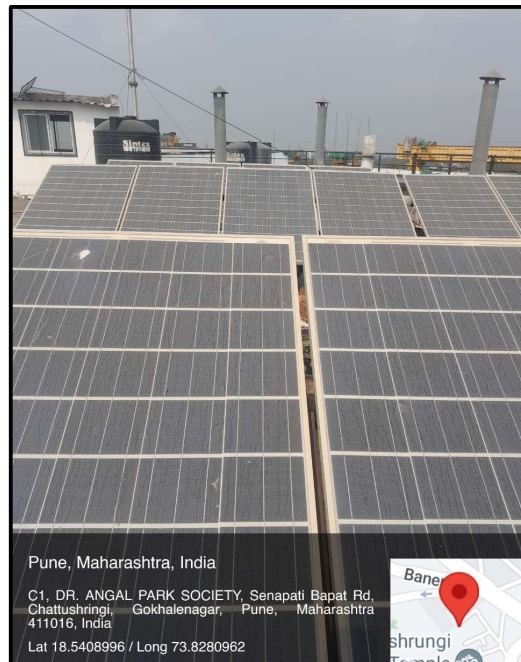
In this Chapter, we study the Usage of Renewable Energy and compute the reduction in Annual CO₂ Emissions.

The College has installed Roof Top Solar PV Plant is **15 kWp**.

Table No 2: Computation of Reduction in CO₂ Emission in 23-24:

No	Particulars	Value	Unit
1	Capacity of Roof Top Solar PV Capacity	15	kWp
2	Average Energy Generated per kWp per Day	4	kWh/kWp
3	Annual Generation Days	300	Nos
4	Annual Solar Energy Generated = 2*3*4	18000	kWh/Annum
5	1 kWh of Electrical Energy is equivalent to	0.93	Kg of CO ₂
6	Reduction in Annual CO ₂ Emission = (4) * (5) /1000	16.74	MT

Photograph of 15 kWp Roof Top Solar PV Plant:



CHAPTER IV STUDY OF INDOOR AIR QUALITY

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

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

3. Air Quality Index: Air Quality Index (AQI) is a number used by government agencies to measure the **Air Pollution** levels and communicate it to the population.

In this Chapter, we present three important Parameters: **AQI-** Air Quality Index, **PM-2.5-** Particulate Matter of Size 2.5 micron and **PM-10-** Particulate Matter of Size 10 micron

Table No 3: Indoor Air Quality Parameters:

No	Location	AQI	PM2.5	PM10
1	Office	51	31	37
2	Staffroom	58	37	43
3	Dept. of Statistics	55	33	39
4	Dept. of Physics	56	34	39
5	Classroom	57	35	40
	Maximum	58	37	43
	Minimum	51	31	37

Table No 4: Air Quality Index Values & Concentration of PM 2.5 & PM10: (By CPCB):

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 +

Conclusion:

From the above measured values, we conclude that the observed values of AQI, PM-2.5 & PM-10 are in the **Satisfactory Range**, as per the guidelines given by Central Pollution Control Board.

CHAPTER V STUDY OF INDOOR LUX & NOISE PARAMETERS

In this Chapter, we present the various Indoor Comfort Parameters measured during the Audit. The Parameters include: **Lux Level and Noise Level.**

Table No 5: Study of Indoor Comfort Condition Parameters:

No	Location	Lux Level,	Noise Level, dB
1	Office	225	45
2	Staffroom	239	46.5
3	Dept. of Statistics	225	44
4	Dept. of Physics	237	45
5	Classroom	229	49
	Maximum	239	49
	Minimum	225	44

Recommended Lux & Noise Level: As per BEE & ISHRAE Guidelines:

A) Noise Level Reference:		
No	Location	Noise Level Range, dB
1	Offices	45-50
2	Occupied Class Room	40-45
3	Libraries	35-40
B) Reference Lux Level, Lumens:		
1	For Class Rooms	200 Plus
2	For Reading Rooms	200 Plus

Conclusion:

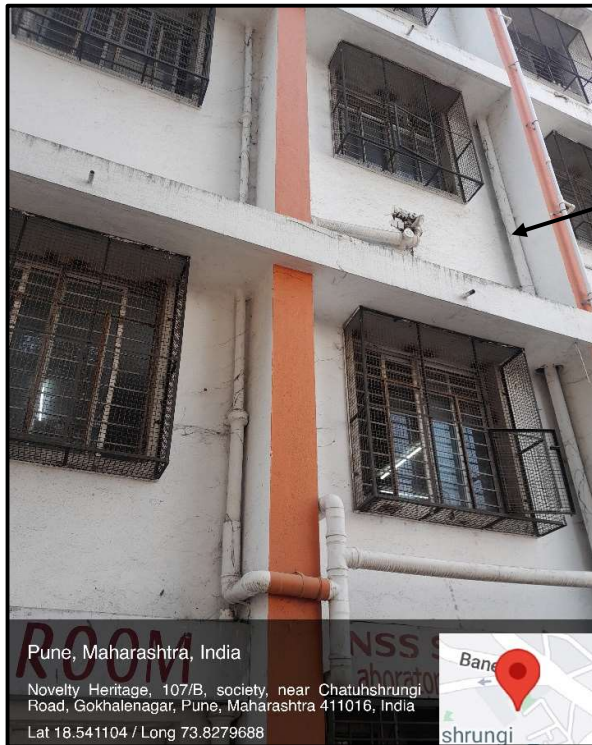
From the above measured values, we conclude that:

- The Noise Level is within the prescribed Limit
- The Lux Level at various locations is Okay

CHAPTER VI STUDY OF RAIN WATER MANAGEMENT

The College has installed Rain Water Management project, wherein the rain water falling on the terrace is collected through pipes and is used to increase the underground water table.

Photograph of Rain Water Collecting Pipe:






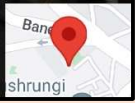

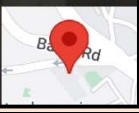
Rain Water
Collecting pipe

CHAPTER-VII STUDY OF WASTE MANAGEMENT

In this Chapter, we present the Waste Management Practices, followed by the College.

Details of Waste Management Practices:

No	Head	Observation	Photograph
1	Solid Waste	Segregation of Waste at Source: Provision of Waste Collection Bins	<p>Waste Collection Bin:</p>  <p>Pune, Maharashtra, India 85/88, Dr. Homi Bhabha Rd, Chaven Nagar, Pashan, Pune, Maharashtra 411008, India Lat 18.5415183 / Long 73.8273401</p>
2	Organic Waste	Provision of Bio Composting Bed for conversion of Bio Degradable Waste	<p>Bio Composting Bed</p>  <p>Pune, Maharashtra, India Novelty Heritage, 107/B, society, near Chatuhsrunji Road, Gokhale Nagar, Pune, Maharashtra 411016, India Lat 18.5410799 / Long 73.8280406</p>

<p>3</p>	<p>Laboratory Chemical Liquid Waste</p>	<p>Provision of Effluent Treatment Plant to treat the Laboratory Liquid Waste</p>	<p>Effluent Treatment Plant:</p>  <p>Pune, Maharashtra, India Novelty Heritage, 107/B, society, near Chaturshrungi Road, Gokhale Nagar, Pune, Maharashtra 411016, India Lat 18.5410977 / Long 73.8279536</p> 
<p>3</p>	<p>Sanitary Waste</p>	<p>Provision of Sanitary Waste Incinerator</p>	<p>Sanitary Waste Incinerator:</p>  <p>Pune, Maharashtra, India Pune Vidhyapeeth Gate Aundh Road, Armament Colony, Ganeshkhind, Pune, Maharashtra 411007, India Lat 18.5439573 / Long 73.8266515</p> 
<p>4</p>	<p>E Waste</p>	<p>Disposal through Authorized Agency</p>	

CHAPTER-VIII STUDY OF ECO-FRIENDLY PRACTICES

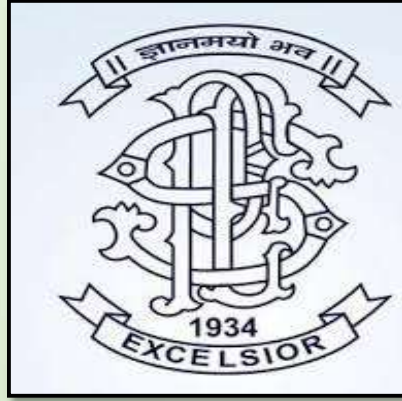
In this Chapter, we present the Eco-Friendly Practices, followed by the College.

Details of Eco-Friendly Practices:

No	Head	Observation	Photograph
1	Tree Plantation	Internal Tree Plantation in the Campus	<p>Internal Tree Plantation:</p> 
2	Creation of Awareness among Stake Holders	Display of Poster on Water Conservation	<p>Poster on Water Conservation:</p> 

GREEN AUDIT REPORT

Progressive Education Society's,
**MODERN COLLEGE OF ARTS, SCIENCE &
COMMERCE,**
Pashan Road, Ganeshkhind, Pune



Year: 2023-24


Prepared by:

ENGRESS SERVICES

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



Registration Certificates: UDYAM, MEDA, ASSOCHAM GEM-CP, ISO: 9001 & 14001:


 भारत सरकार
 Government of India
 सूक्ष्म, नपु एवं मध्यम उद्यम विभाग
 Ministry of Micro, Small and Medium Enterprises

UDYAM REGISTRATION CERTIFICATE

UDYAM REGISTRATION NUMBER: UDYAM-MH-26-0135636

NAME OF ENTERPRISE: ENGRESS SERVICES

S.No.	Classification Year	Enterprise Type	Classification Date
1	2023-24	Micro	03/02/2024
2	2022-23	Micro	26/06/2022
3	2021-22	Micro	27/07/2021

TYPE OF ENTERPRISE: SERVICES

MAJOR ACTIVITY: SERVICES

SOCIAL CATEGORY OF ENTREPRENEUR: GENERAL

NAME OF UNIT(S):

S.No.	Name of Unit(s)
1	Engress Services

OFFICIAL ADDRESS OF ENTERPRISE:

Flat/Door/Block No.	Name of Premises/Building	Village/Town	Block
26	Yashashree	Pune	1

Road/Street/Lane: Lokmanya Nagar, Nirmal Baug Soc
 City: Pune
 State: MAHARASHTRA
 District: PUNE, Pin 411009
 Mobile: 8767447244
 Email: engress12@gmail.com

DATE OF INCORPORATION / REGISTRATION OF ENTERPRISE: 13/04/2021


DATE OF COMMENCEMENT OF PRODUCTION/BUSINESS: 13/04/2021

S.No.	NIC 2 Digit	NIC 4 Digit	NIC 5 Digit	Activity
1	79 - Activities of head offices; management consultancy activities	7920 - Management consultancy activities	79200 - Management consultancy activities	Services

NATIONAL INDUSTRY CLASSIFICATION CODE(S):

DATE OF UDYAM REGISTRATION: 27/07/2021




 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@maharaja.com, Web: www.maharaja.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, Yashashree, 26, Nirmal Baug Society, Near Muktaganj 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 **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.

Deepak Sood
General Manager (EC)



INDEX

Sr. No	Particulars	Page No
I	Acknowledgement	4
II	Executive Summary	5
III	Abbreviations	6
1	Introduction	7
2	Study of Energy Consumption & CO ₂ Emission	8
3	Study of Usage of Renewable Energy	9
4	Study of Waste Management	10
5	Study of Rain Water Management	12
6	Study of Green & Sustainable Practices	13
	Annexure	
I	List of Trees & Plants	15

ACKNOWLEDGEMENT

We at Engress Services, Pune wish to express our sincere gratitude to the management of Progressive Education Society's Modern College of Arts, Science & Commerce, Ganeshkhind, Pune for awarding us the assignment of Green Audit of their Ganeshkhind campus for the Year: 2023-24.

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

EXECUTIVE SUMMARY

1. **Progressive Education Society's Modern College of Arts, Science & Commerce, Ganeshkhind, Pune** uses Electrical Energy; as the source of Energy for various equipment.

2. Present Energy Consumption & CO₂ Emission:

No	Particulars	Value	Unit
1	Annual Energy Consumed	197972	kWh
2	Annual CO ₂ Emissions	184.11	MT

3. Usage of Renewable Energy & Reduction in CO₂ Emissions:

- Energy Generated by **15 kWp** Roof Top Solar Plant in 23-24 is **18000 kWh**
- Reduction in CO₂ Emissions in 23-24 is **16.2 MT**
- .

4. Waste Management:

No	Head	Particulars
1	Solid Waste	Segregation of Waste at source
2	Organic Waste	Provision of Bio Composting Bed
3	Lab Chemical Liquid Waste	Provision of Effluent Treatment Plant
4	Sanitary Waste	Provision of Sanitary Waste Incinerator
5	E Waste	Disposed of through Authorized Agency

5. Rain Water Management:

The Rain water falling on the terrace is used to increase the underground Water Table.

6. Green & Sustainable Practices:

- Maintenance of Good internal road
- Internal Tree Plantation
- Provision of Ramp & Dedicated Wash room for Divyangajan
- Awareness creation on Water Conservation by display of posters

7. Assumptions:

1. **1 kWh** of Electrical Energy releases **0.93 Kg** of CO₂ into atmosphere
2. Energy generated by Roof Top Solar PV Plant: **4 kWh/kWp per Day**
3. Annual Solar Energy Generation Days: **300 Nos**
4. Energy generation is considered only by 15 kWp Solar PV Plant.
5. CO₂ Consumption is computed based on Electrical Energy Purchased

8. References:

- For CO₂ Emissions: www.ccd.gujarat.gov.in
- For Solar PV Energy generation: www.solarrooftop.gov.in

ABBREVIATIONS

BEE	Bureau of Energy Efficiency
kWh	Kilo Watt Hour
LPD	Liters Per Day
Kg	Kilo Gram
MT	Metric Ton
CO ₂	Carbon Di Oxide
Qty	Quantity

CHAPTER-I INTRODUCTION

1.1 Introduction:

An Energy Audit is conducted at Progressive Education Society's Modern College of Arts, Science & Commerce, Ganeshkhind, Pune

1.2 Key Study Points:

No	Particulars
1	Study of Present Energy Consumption & CO ₂ Emission
2	Study of Usage of Renewable Energy
3	Study of Waste Management Practices
4	Study of Rain Water Management
5	Study of Green & Sustainable Initiatives

1.3 College Location Image:



College
Campus

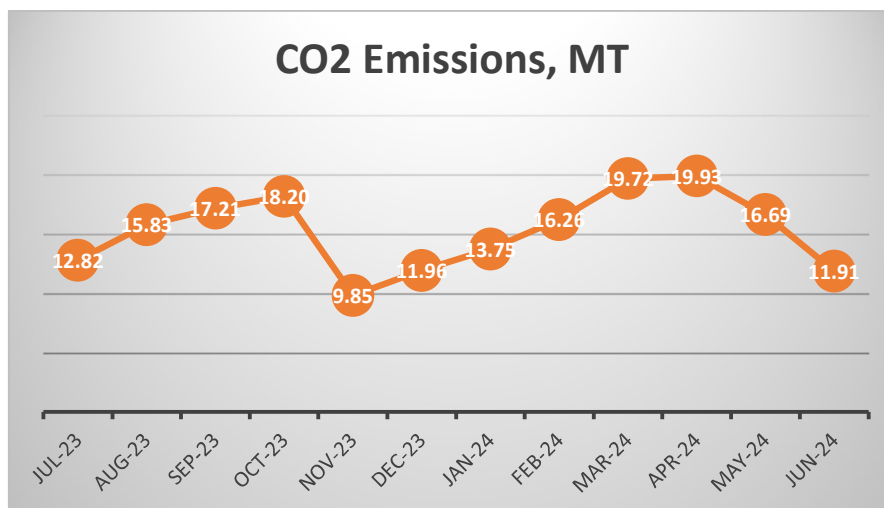
CHAPTER-II STUDY OF ENERGY CONSUMPTION & CO₂ EMISSION

A **Carbon Foot print** is defined as the Total Greenhouse Gas emissions, emitted due to various activities. **Basis for computation of CO₂ Emissions: 1 kWh of Electrical Energy releases 0.93 Kg of CO₂ into atmosphere.**

Table No 1: Month wise Energy Purchased & CO₂ Emissions:

No	Month	Energy Purchased, kWh	CO ₂ Emissions, MT
1	Jul-23	13780	12.82
2	Aug-23	17017	15.83
3	Sep-23	18509	17.21
4	Oct-23	19569	18.20
5	Nov-23	10595	9.85
6	Dec-23	12857	11.96
7	Jan-24	14782	13.75
8	Feb-24	17479	16.26
9	Mar-24	21202	19.72
10	Apr-24	21434	19.93
11	May-24	17944	16.69
12	Jun-24	12804	11.91
13	Total	197972	184.11
14	Maximum	21434	19.93
15	Minimum	10595	9.85
16	Average	16497.67	15.34

Chart No 1: Month wise CO₂ Emissions:



CHAPTER III

STUDY OF USAGE OF RENEWABLE ENERGY

In this Chapter, we study the Usage of Renewable Energy and compute the reduction in Annual CO₂ Emissions.

The College has installed Roof Top Solar PV Plant is **15 kWp**.

Table No 2: Computation of Reduction in CO₂ Emission in 23-24:

No	Particulars	Value	Unit
1	Capacity of Roof Top Solar PV Capacity	15	kWp
2	Average Energy Generated per kWp per Day	4	kWh/kWp
3	Annual Generation Days	300	Nos
4	Annual Solar Energy Generated = $2*3*4$	18000	kWh/Annum
5	1 kWh of Electrical Energy is equivalent to	0.93	Kg of CO ₂
6	Reduction in Annual CO ₂ Emission = $(4) * (5) / 1000$	16.74	MT



Photograph of 15 kWp Roof Top Solar PV Plant:


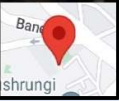




CHAPTER IV STUDY OF WASTE MANAGEMENT

In this Chapter, we present the Waste Management Practices, followed by the College.

Details of Waste Management Practices:

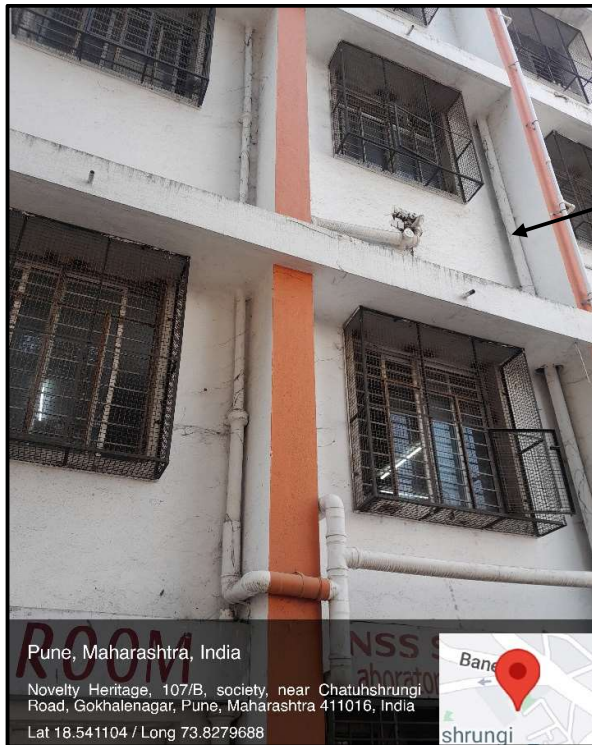
No	Head	Observation	Photograph
1	Solid Waste	Segregation of Waste at Source: Provision of Waste Collection Bins	<p>Waste Collection Bin:</p>  <p>Pune, Maharashtra, India 85/86, Dr Homi Bhabha Rd, Chevan Nagar, Pashan, Pune, Maharashtra 411008, India Lat 18.5415183 / Long 73.8273401</p>
2	Organic Waste	Provision of Bio Composting Bed for conversion of Bio Degradable Waste	<p>Bio Composting Bed</p>  <p>Pune, Maharashtra, India Novelty Heritage, 107/B, society, near Chatuhshrungi Road, Gokhale Nagar, Pune, Maharashtra 411016, India Lat 18.5410799 / Long 73.8280408</p>

<p>3</p>	<p>Laboratory Chemical Liquid Waste</p>	<p>Provision of Effluent Treatment Plant to treat the Laboratory Liquid Waste</p>	<p>Effluent Treatment Plant:</p>  <p>Pune, Maharashtra, India Novelty Heritage, 107/B, society, near Chatuhsrungi Road, Gokhale Nagar, Pune, Maharashtra 411016, India Lat 18.5410977 / Long 73.8279536</p> 
<p>3</p>	<p>Sanitary Waste</p>	<p>Provision of Sanitary Waste Incinerator</p>	<p>Sanitary Waste Incinerator:</p>  <p>Pune, Maharashtra, India Vidhyapeeth Gate Aundh Road, Armament Colony, Ganeshkhind, Pune, Maharashtra 411007, India Lat 18.5439573 / Long 73.8266515</p> 
<p>4</p>	<p>E Waste</p>	<p>Disposed of through Authorized Agency</p>	

CHAPTER-V STUDY OF RAIN WATER MANAGEMENT

The College has installed Rain Water Management project, wherein the rain water falling on the terrace is collected through pipes and is used to increase the underground water table.

Photograph of Rain Water Collecting Pipe:


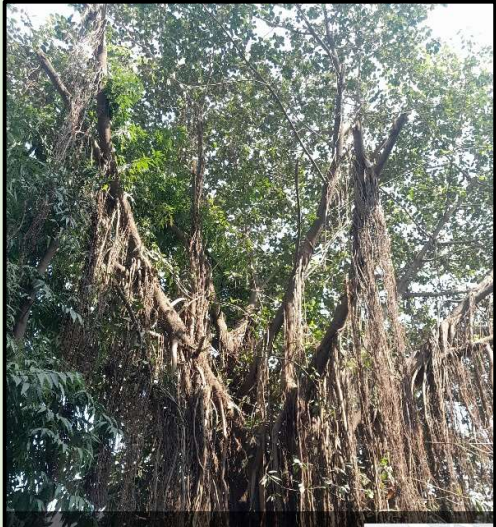


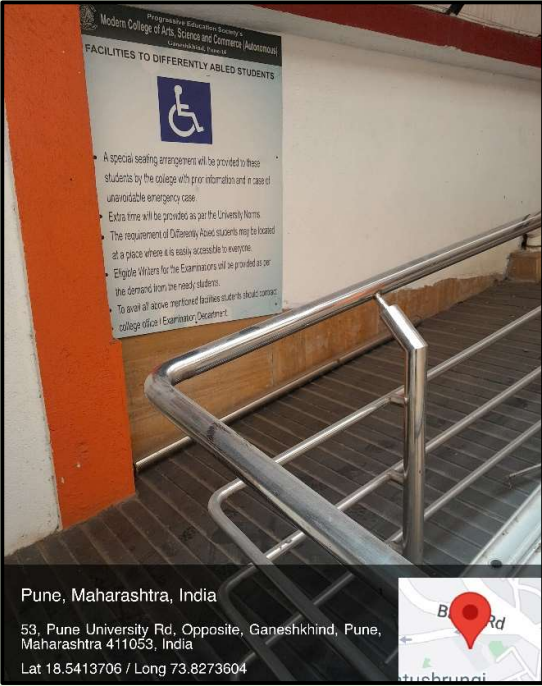
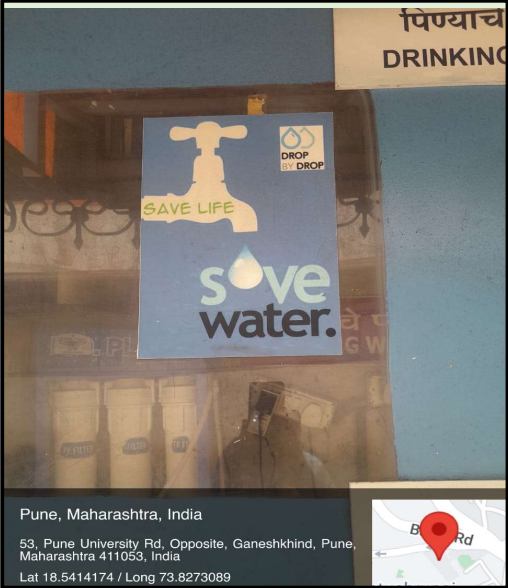
Rain Water
Collecting pipe

CHAPTER-VI STUDY OF GREEN & SUSTAINABLE PRACTICES

In this Chapter, we present the Green & Sustainable Practices followed by the College.

Green & Sustainable Practices:

No	Head	Observation	Photograph
1	Easy Movement of Stake Holders	Provision of Good Internal Road within the Campus	<p>Internal Road:</p>  <p>Pune, Maharashtra, India 53, Pune University Rd, Opposite, Ganeshkhind, Pune, Maharashtra 411053, India Lat 18.5413852 / Long 73.8275281</p>
2	Tree Plantation	Internal Tree Plantation in the Campus	<p>Internal Tree Plantation:</p>  <p>Pune, Maharashtra, India Novelty Heritage - 107/B, society, near Chatunshrungi Road, Gokhale Nagar, Pune, Maharashtra 411016, India Lat 18.5410981 / Long 73.8279678</p>

<p>3</p>	<p>Facilities for Divyangjan</p>	<p>Provision of Ramp & Lift for Divyangjan</p>	<p>Ramp for Divyangjan:</p>  <p>Pune, Maharashtra, India 53, Pune University Rd, Opposite, Ganeshkhind, Pune, Maharashtra 411053, India Lat 18.5413706 / Long 73.8273604</p>
<p>4</p>	<p>Creation of Awareness among Stake Holders</p>	<p>Display of Poster on Water Conservation</p>	<p>Poster on Water Conservation:</p>  <p>Pune, Maharashtra, India 53, Pune University Rd, Opposite, Ganeshkhind, Pune, Maharashtra 411053, India Lat 18.5414174 / Long 73.8273089</p>

ANNEXURE-1: LIST OF TREES & PLANTS:

No.	Name of Tree	Family	Common Name
1.	<i>Aegle marmelos</i> (L.) Correa.	Rutaceae	Bel
2.	<i>Ailanthus excelsa</i> Roxb.	Simaroubaceae	
3.	<i>Albizia julibrissin</i> Durazz.	Fabaceae	
4.	<i>Areca catechu</i> L.	Arecaceae	
5.	<i>Arucaria heterophylla</i> (Salisb.) Franco.	Araucariaceae	
6.	<i>Azadirachta indica</i> A.Juss.	Meliaceae	
7.	<i>Bambusa vulgaris</i> Schrad. ex J.C.Wendl	Poaceae	
8.	<i>Caryota mitis</i> Lour.	Arecaceae	Fishtail palm
9.	<i>Cassia fistula</i> L.	Fabaceae	
10.	<i>Casuarina equisetifolia</i> L.	Casurinaceae	
11.	<i>Citrus limon</i> (L.) Osbeck.	Rutaceae	Lemon/Limbu
12.	<i>Cocos nucifera</i> L.	Arecaceae	
13.	<i>Delonix regia</i> (Boj. ex Hook.) Raf.	Fabaceae	
14.	<i>Dypsis lutescens</i> (H.Wendl.) Beentje & J.Dransf.	Arecaceae	
15.	<i>Erythrina variegata</i> L.	Fabaceae	pangara
16.	<i>Ficus benghalensis</i> L.	Moraceae	Vad
17.	<i>Ficus benjamina</i> L.	Moraceae	Weeping fig
18.	<i>Ficus elastic</i> Roxb. ex <u>Hornem.</u>	Moraceae	
19.	<i>Ficus racemosa</i> L.	Moraceae	
20.	<i>Ficus religiosa</i> L.	Moraceae	Pimpal
21.	<i>Hibiscus rosa-sinensis</i> L.	Malvaceae	
22.	<i>Jacaranda mimosifolia</i> D. Don.	Bignoniaceae	
23.	<i>Lawsonia inermis</i> L.	Lytheraceae	Mehandi
24.	<i>Livistona chinensis</i> (Jacq.) R.Br. ex Mart.	Arecaceae	
25.	<i>Magnolia champaca</i> (L.) Baill. ex Pierre	Magnoliaceae	Pivla Chafa
26.	<i>Mangifera indica</i> L.	Anacardiaceae	
27.	<i>Manilkara zapota</i> (L.) P.Royen	Sapotaceae	Sapota/Chiku
28.	<i>Millingtonia hortensis</i> L.F.	Bignoniaceae	Indian cork tree
29.	<i>Murraya koenigii</i> (L.) Sprengel	Rutaceae	Curry leaf/Godlimb
30.	<i>Phyllanthus emblica</i> L.	Euphorbiaceae	Aavala
31.	<i>Plumeria alba</i> L.	Apocynaceae	
32.	<i>Polyalthia longifolia</i> (Sonn.) Thwaites	Annonaceae	Ashok
33.	<i>Ravenalia madagascarensis</i> Sonn.	Sterlitziaceae	

34.	<i>Roystonea regia</i> (Kunth) O. F. Cook	Arecaceae	
35.	<i>Syzygium cumuni</i> (L.) Skills	Myrtaceae	Jambhul
36.	<i>Tamarindus indica</i> L.	Fabaceae	Chinch
37.	<i>Tecoma stans</i> (L.) Juss. Ex Kunth.	Bignoniaceae	
38.	<i>Terminalia catappa</i> L.	Combretaceae	

Medicinal /Aromatic Plants & Flowering Plants:

MEDICINAL/AROMATIC PLANTS		FLOWERING/ FOLIAGE PLANTS	
No	Name	No	Name
1	<i>Aloe vera</i> Burm	1	Adantum Obseum
2	<i>Asparagus racemosus</i> Willd.	2	<u>Stearn</u>
3	<i>Asparagus densiflorus</i> (Kunth) Jessop	3	<u>Allamanda violacea</u> Gardner
4	<i>Bryophyllum pinnatum</i> (Lam.) Oken	4	<u>Asparagus densiflorus</u> (Kunth) Jessop
5	<i>Catharanthus roseus</i> L.	5	<u>Bryophyllum sp.</u>
6	<i>Centella asiaticatica</i> (L.) Urb.	6	<u>Canna indica</u>
7	<i>Chlorophytum inornatum</i> Ker Gawl.	7	<u>Chlorophytum comosum</u> (Thunb.)
8	<i>Cinnamomum tamala</i> (Buch.-Ham.) T. Nees & Eberm.	8	<u>Chlorophytum comosum</u> (Thunb.) Jacques
9	<i>Cissus quadrangulari</i> L.	9	<u>Clematis triloba</u> Thunb.
10	<i>Costus igneus</i> N.E. Br.	10	<u>Coleus blumei</u> Benth.
11	<i>Cymbopogon citratus</i> DC	11	<u>Crossandra undulaefolia</u> Salisb.
12	<i>Eclipta prostrata</i> (L.) L.	12	<u>Dracaena colorama</u>
13	<i>Euphorbia tirucalli</i> L.	13	<u>Dracaena deremensis</u> Engl
14	<i>Gymnema sylvestre</i> R. Br.	14	<u>Dracaena marginata</u> Hort.
15	<i>Justicia adhatoda</i> L.	15	<u>Euphorbia milli</u> Des Moul.
16	<i>Mentha arvensis</i> L.	16	<u>Euphorbia pulcherrima</u> Will
17	<i>Mimosa pudica</i> L.	17	<u>Hibiscus rosa-sinensis</u> L.
18	<i>Murraya koenigii</i> (L.) Spreng.	18	<u>Ixora chinensis</u> Lam.
19	<i>Ocimum sanctum</i> L.	19	<u>Jatropha integerrima</u> Jacq.
20	<i>Piper nigrum</i> L.	20	<u>Nerium indicum</u> Mill.
21	<i>Spilanthes acmella</i> Dc.	21	<u>Oxalis regnelli</u> Miq.