GREEN AUDIT REPORT

of

MARATHWADA MITRA MANDAL'S COLLEGE OF COMMERCE

202/A, MMCC Complex, Deccan Gymkhana, Pune 411 004

'येथे बहुतांचे हित'
(Welfare of Masses)

Year: 2021-22

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

MAHARASHTRA ENERGY DEVELOPMENT AGENCY

Maharashtra Energy Development Agency

(Government of Maharashtra Institution)
Aundh Road, Opposite Spicer College Road, Near Commissionerate of Animal Husbandary,
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Ph No: 020-35000450
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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 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 **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)

ENGRESS SERVICES PUNE

Engress Services

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

Ref: ES/MMCC/21-22/02 Date: 25/5/2022

CERTIFICATE

This is to certify that we have conducted Green Audit at Marathwada Mitra Mandal's College of Commerce Pune, in the Academic year 2021-22.

The College has adopted following Green Initiatives:

- Usage of Energy Efficient LED Light Fitting
- Maximum Usage of Day Lighting
- Installation of Solar Thermal Water Heating System of Capacity 1500 LPD
- Provision of Separate bins for Dry & Wet Waste
- Installation of Bio Composting Unit for conversion of Organic Waste
- Implementation of Rain Water Management Project.
- Maintenance of good Internal Road
- Tree Plantation in the campus
- Provision of Ramp for Divyangajan
- Provision of Sanitary Waste Incinerator
- Creation of Awareness on Resource Conservation by Display of Posters
- Cleanliness Drive and Participation in Swatcch Bharat Abhiyan

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

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ACKNOWLEDGEMENT

We Engress Services, Pune, express our sincere gratitude to the management of Marathwada Mitra Mandal's College of Commerce Pune, for awarding us the assignment of Green Audit of their Campus for the Academic Year: 21-22.

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

EXECUTIVE SUMMARY

1. Marathwada Mitra Mandal's College of Commerce, Pune consumes Energy in the form of **Electrical Energy** used for various Electrical Equipment, office & other facilities.

2. Present Energy Consumption & CO_2 Emissions:

No	Parameter/ Value	Energy Consumed, kWh	CO_2 Emissions, MT
1	Total	18436	16.59
2	Maximum	2308	2.08
3	Minimum	1023	0.92
4	Average	1536.33	1.38

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 **1500 LPD** Solar Water Heating System

4. Usage of Renewable Energy & CO_2 Emission Reduction:

The College has Solar Thermal Water Heating System of Capacity 1500 LPD. The College has not installed Roof Top Solar PV Plant, as on Date.

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 waste collecting agent for further recycling.

5.2 Organic Waste Management:

The College has installed a Bio Composting Unit and the organic Waste is converted in to Bio compost, which is further used in the own garden as well as sold outside.

5.3 E Waste Management:

The E-Waste is disposed of through Authorized E-Waste collecting agency.

6. Rain Water Management:

The College has installed Rain Water Management Project and the rain water falling on the terrace is channelized to increase the underground water table.

7. Green & Sustainable Initiatives:

- Maintenance of good Internal Road
- Maintenance of Internal Garden

- Provision of Ramp for Divyangajan
- Provision of Sanitary Waste Incinerator
- Creation of Awareness on Resource Conservation by Display of Posters
- Cleanliness Drive and Participation in Swatcch Bharat Abhiyan

8. Notes & Assumptions:

1. 1 kWh of Electrical Energy releases **0.9 Kg** of CO_2into atmosphere

9. Reference:

- For CO_2 Emissions: www.tatapower.com

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 Objectives:

1. To study present Energy Consumption
2. To Study CO_2 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 Table No 1: General Details of College:

No	Head	Particulars
1	Name of Institution	Marathwada Mitra Mandal's College of Commerce
2	Address	202/A ,Deccan Gymkhana,Pune-411004
3	Year of Establishment	1986
4	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 last year Electricity Bills

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

No	Month	Energy Consumed, kWh
1	May-21	1023
2	Jun-21	1324
3	Jul-21	1618
4	Aug-21	1541
5	Sep-21	1572
6	Oct-21	1689
7	Nov-21	1534
8	Dec-21	1363
9	Jan-22	1285
10	Feb-22	1273
11	Mar-22	1906
12	Apr-22	2308
13	Total	18436
14	Maximum	2308
15	Minimum	1023
16	Average	1536.33

Chart No 1: Variation in Monthly Energy Consumption:

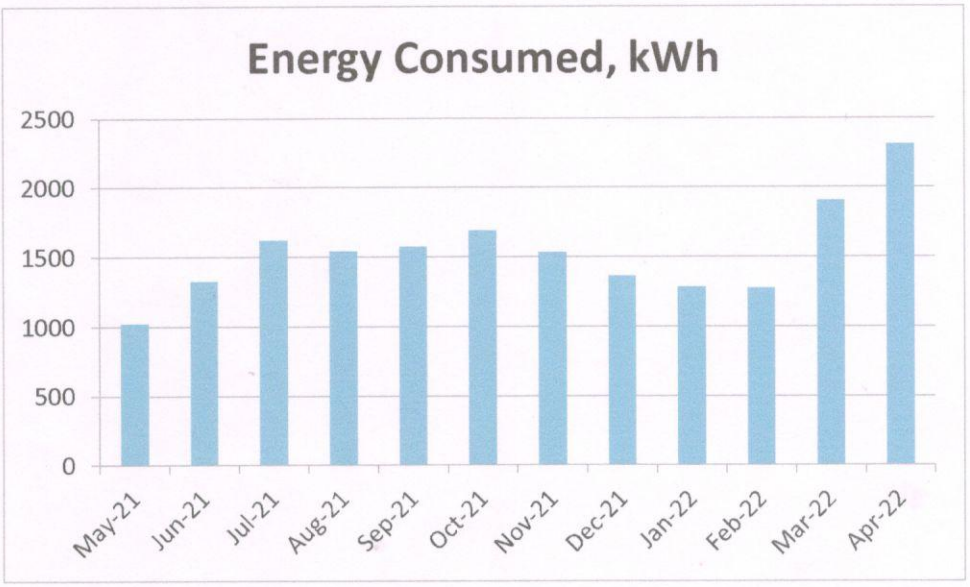


Table No 3: Variation in Important Parameters:

No	Parameter/ Variation	Energy Purchased, kWh
1	Total	18436
2	Maximum	2308
3	Minimum	1023
4	Average	1536.33

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_2 Emissions:

The basis of Calculation for CO_2 emissions due to Electrical Energy are as under

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

Based on the above Data we compute the CO_2 emissions which are being released in to the atmosphere by the College due to its Day to Day operations

Table No 4: Month wise CO_2 Emissions:

No	Month	Energy Consumed, kWh	CO_2 Emissions, MT
1	May-21	1023	0.92
2	Jun-21	1324	1.19
3	Jul-21	1618	1.46
4	Aug-21	1541	1.39
5	Sep-21	1572	1.41
6	Oct-21	1689	1.52
7	Nov-21	1534	1.38
8	Dec-21	1363	1.23
9	Jan-22	1285	1.16
10	Feb-22	1273	1.15
11	Mar-22	1906	1.72
12	Apr-22	2308	2.08
13	Total	18436	16.59
14	Maximum	2308	2.08
15	Minimum	1023	0.92
16	Average	1536.33	1.38

Chart No 2: Month wise CO_2Emissions:

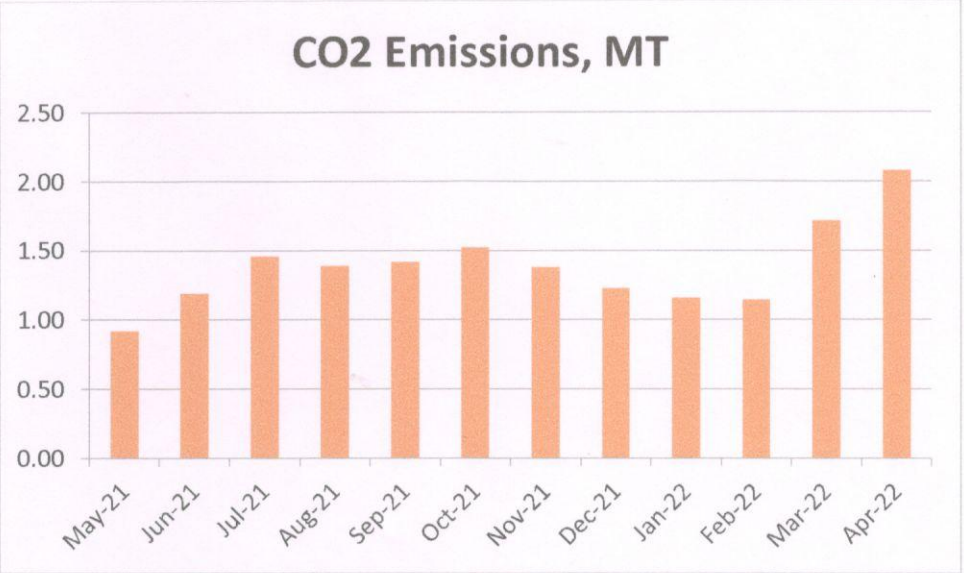


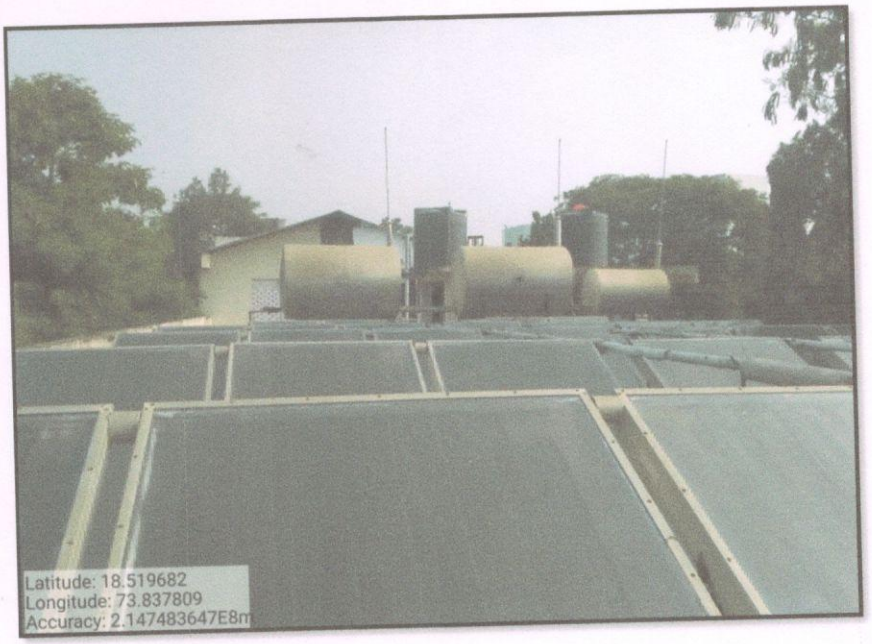
Table No 5: Variation in Important Parameters:

No	Parameter/ Value	Energy Purchased, kWh	CO2 Emissions, MT
1	Total	18436	16.59
2	Maximum	2308	2.08
3	Minimum	1023	0.92
4	Average	1536.33	1.38

CHAPTER IV
STUDY OF USAGE OF RENEWABLE ENERGY

The College has Solar Thermal Water Heating System of Capacity 1500 LPD. The College has not installed Roof Top Solar PV Plant, as on Date.

Photograph of Solar Thermal Water Heating System:



CHAPTER V
STUDY OF WASTE MANAGEMENT

5.1 Segregation of Waste at Source:

The Waste is segregated at source and the recyclable waste, like paper and plastic waste is handed over to authorized waste collecting agent for further recycling.

Photograph of Waste Collection Bins:

5.1.2 Organic Waste Management:

The College has installed a Bio Composting Unit and the organic Waste is converted in to Bio compost, which is further used in the own garden as well as sold outside.

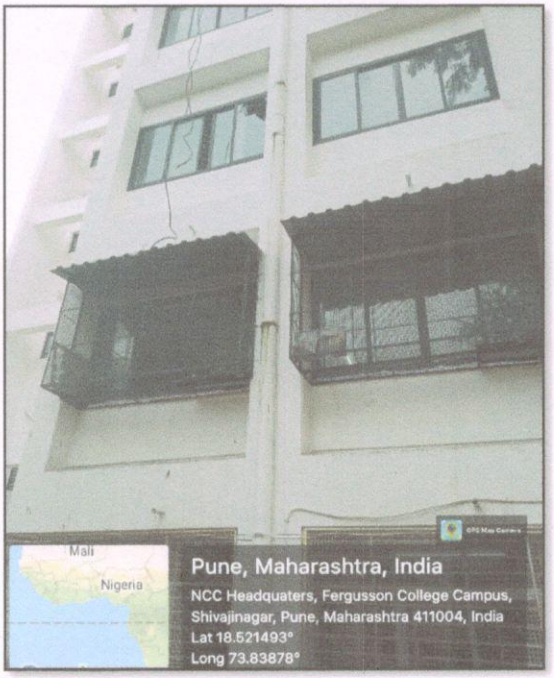
Photograph of Bio Composting Unit:

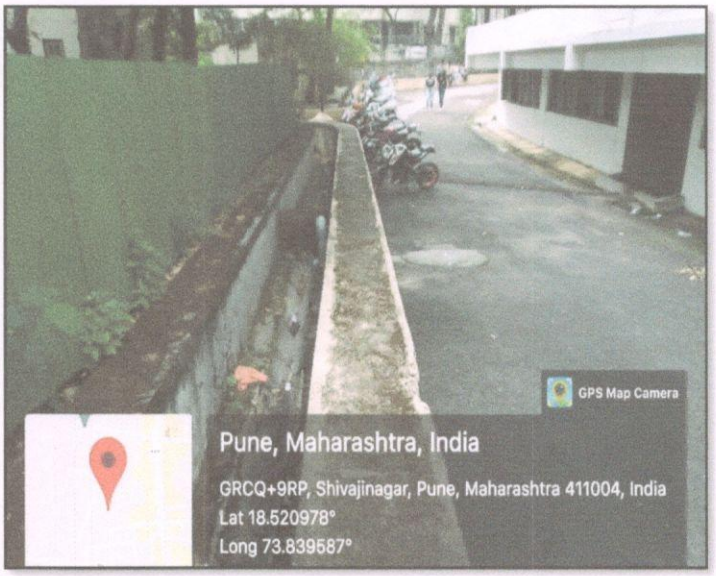
5.3 E Waste Management: The E-Waste is disposed of through Authorized Agency.

CHAPTER-VI
STUDY OF RAIN WATER MANAGEMENT

The College has installed Rain Water Management Project and the rain water falling on the terrace is used to increase the underground water table.

Photograph of Rain water Carrying Pipe and Channel Section:



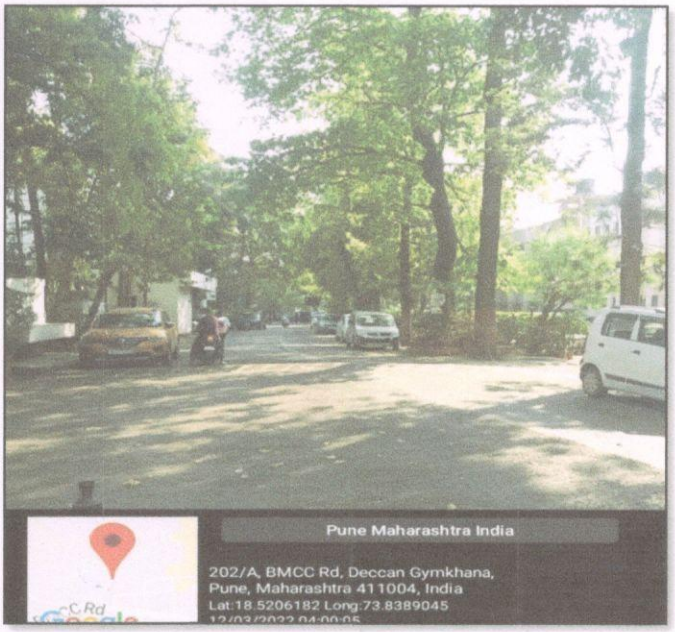


CHAPTER-VII
STUDY OF GREEN & SUSTAINABLE PRACTICES

7.1 Pedestrian Friendly Roads:

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

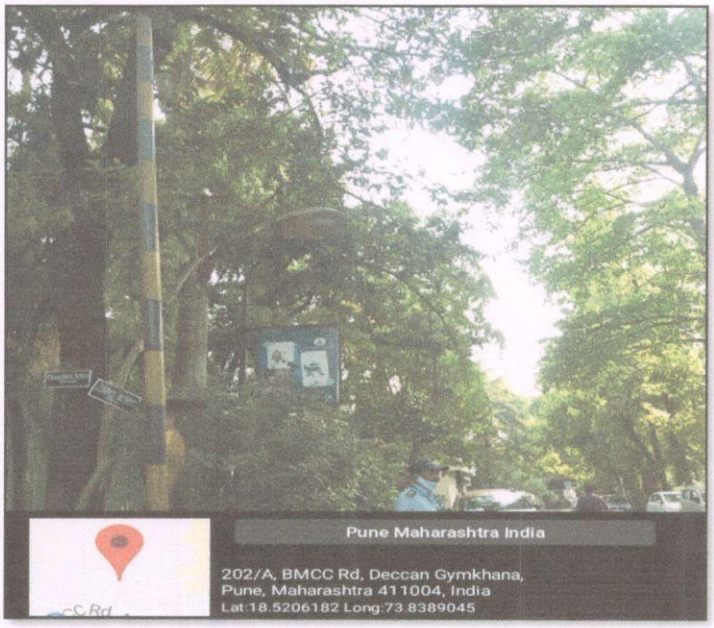
Photograph of Internal Road:



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.

Photograph of Ramp:

7.4 Sanitary Waste Incinerator:

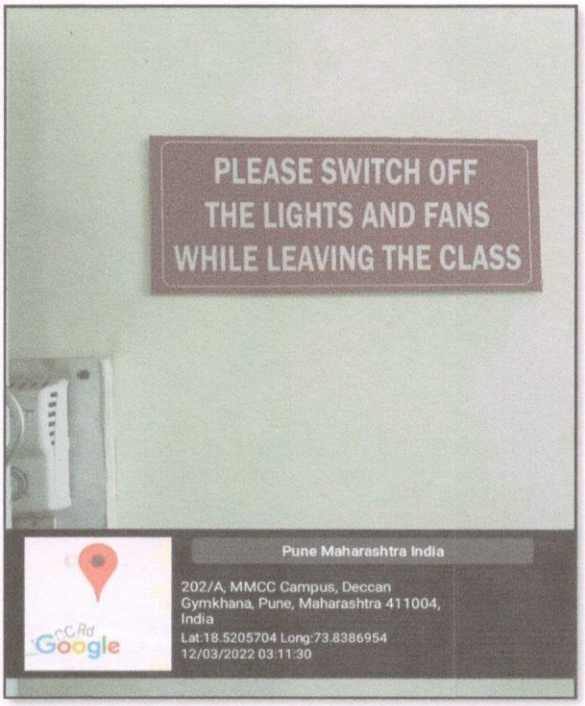
The College has installed Sanitary Waste Incinerator, for disposal of Sanitary Waste

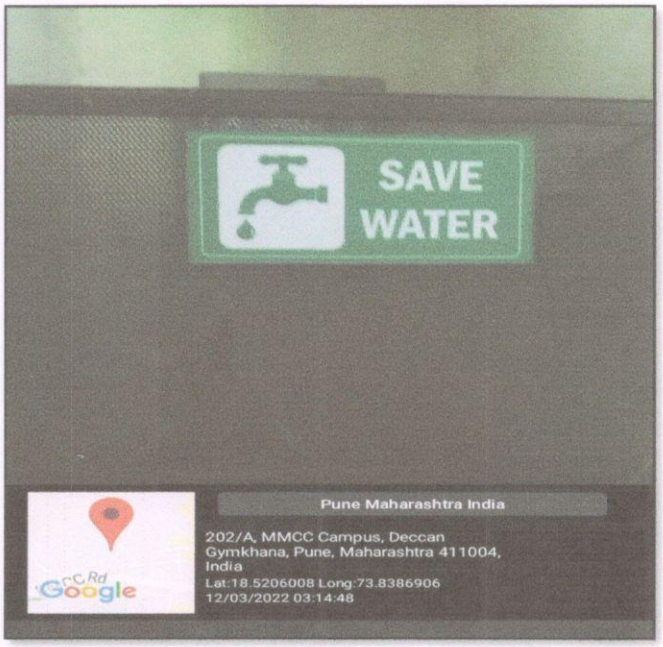
Photograph of Sanitary Waste Incinerator:

7.5 Creation of Awareness on Resource Conservation by Display of Posters:

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

Photograph of Poster on Resource Conservation:

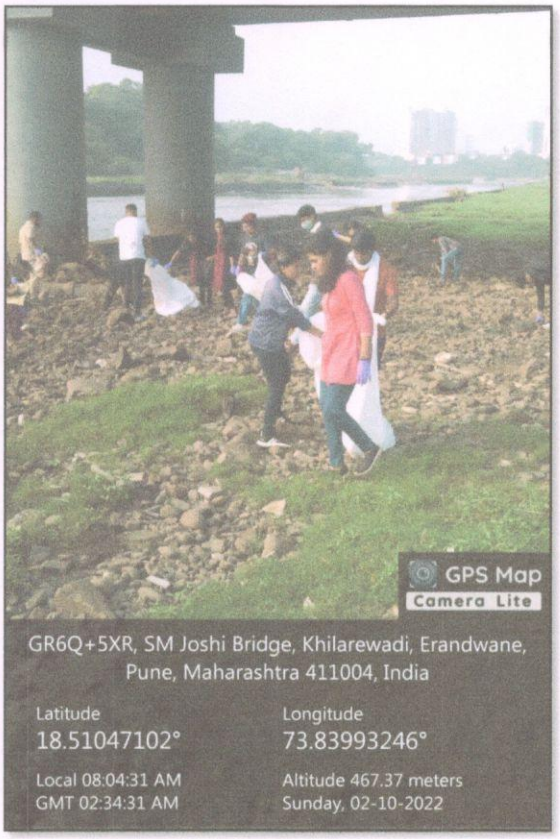




7.6 Cleanliness Drive & Participation in Swatcch Bharat Abhiyan:

The College arranged Cleanliness Drive under the NSS Initiative at S M Joshi Bridge in Pune. Also the College participated in Swatcch Bharat Abhiyan.

Photographs of Tree Plantation Drive & Swatcch Bharat Abhiyan:



ANNEXURE-1:
DETAILS OF TREES& PLANTS:

No	Common Name	Qty
1	Mango	6
2	Silver Oak	4
3	Pichkari	6
4	Coconut	17
5	Jamun	1
6	Ashok	56
7	Guava	6
8	Almond	4
9	Morpankhi	6
10	Lemon	2
11	Phycus	8
12	Areca Palm	101
13	Chrismas Tree	9
14	Sonchampa	5
15	Chikoo	2
16	Rubber	1
17	Shevari	10
18	Kaduneem	1
19	Apta	1
20	**Total**	**246**

ANNEXURE-2:
LIST OF PLANTS:

No	Common Name
1	Hibiscus
2	Rose
3	Cactus
4	Insulin
5	Hemelia
6	Croton
7	Drecena
8	Mogra
9	White Champa
10	Raktaparni
11	Ribbbin Grass
12	Coopia
13	Kardal
14	Lucky Bamboo
15	Money plant
16	Alamanda
17	Madhumalti
18	Jai
19	Jui
20	Shevga
21	Sadafuli
22	Jatropha
23	Touch me not
24	Syngonia
25	Strawbery
26	Song Of India
27	Duranta
28	Alu
29	Bottle brush

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- Implementation of Rain Water Management Project.
- Maintenance of Internal Tree Plantation
- Provision of Sanitary Waste Incinerator
- Creation of awareness about Resource Conservation by displaying posters
- Cleanliness Drive and Participation in Swatcch Bharat Abhiyan

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

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EXECUTIVE SUMMARY

1. Marathwada Mitra Mandal's College of Commerce, Pune 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 CO_2 on account of Electricity Consumption
- **Solid Waste:** Bio degradable Garden Waste
- **Liquid Waste:** Human liquid waste

3. Present Energy Consumption & CO_2 Emission:

No	Parameter/ Value	Energy Purchased, kWh	CO_2 Emissions, MT
1	Total	18436	16.59
2	Maximum	2308	2.08
3	Minimum	1023	0.92
4	Average	1536.33	1.38

4. Various initiatives taken for Energy Conservation:

- Usage of Energy Efficient LED Lighting
- Maximum Usage of Day Lighting
- Installation of Solar Thermal Water Heating System of Capacity **1500 LPD.**

5. Usage of Renewable Energy & Reduction in CO_2 Emission:

The College has Solar Thermal Water Heating System of Capacity 1500 LPD. The College has not installed Roof Top Solar PV Plant, as on Date.

6. Indoor Air Quality Parameters:

No	Parameter/Value	AQI	PM-2.5	PM-10
1	Maximum	96	57	75
2	Minimum	71	40	51

7. Indoor Comfort Conditions:

No	Parameter/Value	Temperature, ^0C	Humidity, %	Lux Level	Noise Level, dB
1	Maximum	28.2	57	353	52
2	Minimum	25.6	41	99	40

8.1 Solid 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 waste collecting agent for further recycling.

8.2 Organic Waste Management:

The College has installed a Bio Composting Unit and the organic Waste is converted in to Bio Compost, which is further used in the own garden as well as sold outside.

8.3 E-Waste Management:

The E-Waste is disposed of through Authorized E-Waste collecting agency.

9. Rain Water Management:

The College has installed Rain Water Management Project and the rain water falling on the terrace is channelized to increase the underground water table.

10. Green & Sustainable Initiatives:

- Maintenance of Internal Garden
- Provision of Sanitary Waste Incinerator
- Creation of Awareness on Resource Conservation by Display of Posters
- Cleanliness Drive and Participation in Swatcch Bharat Abhiyan

11. Notes & Assumptions:

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

12. 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
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_2 Emissions
2. To Study CO_2 Emission Reduction
3. To study Indoor Air Quality Parameters
4. To study Indoor Comfort Condition Parameters
5. To Study Waste Management
6. To Study Rain Water Management
7. To Study Environmental Friendly Initiatives

1.3 Google Earth Image:

1.4 General Details of the College: Table No 4:

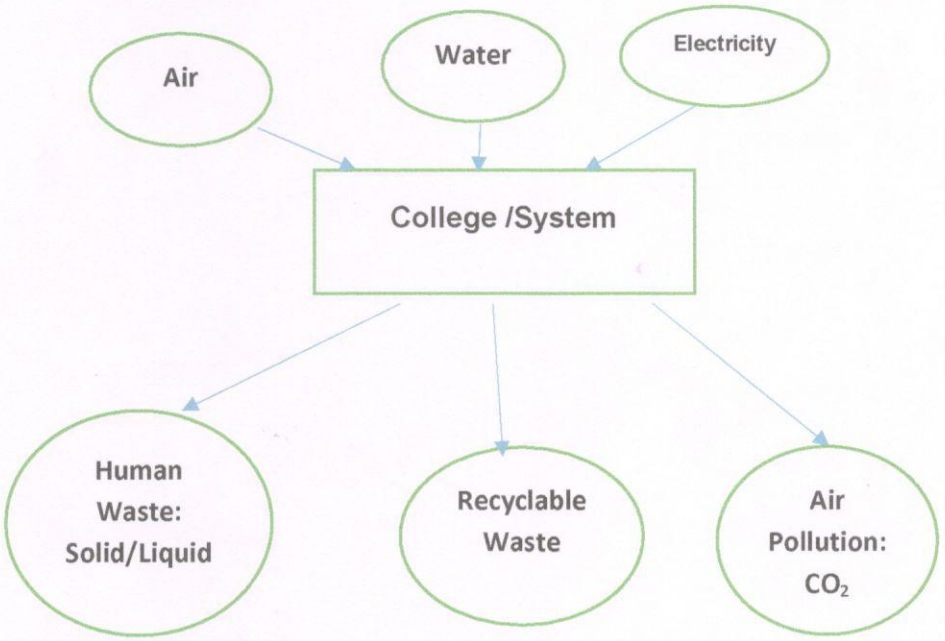
No	Head	Particulars
1	Name of Institution	Marathwada Mitra Mandal's College of Commerce
2	Address	202/A ,Deccan Gymkhana,Pune-411004
3	Year of Establishment	1986
4	Affiliation	Savitribai Phule Pune University

CHAPTER-II
STUDY OF CONSUMPTION OF RECOURCES & CO_2 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_2 on account of consumption of Electrical Energy. The basis of Calculation for CO_2 emissions due to Electrical Energy are as under

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

Table No 5: Study of Consumption of Electrical Energy & CO_2 Emissions: 21-22:

No	Month	Energy Consumed, kWh	CO_2 Emissions, MT
1	May-21	1023	0.92
2	Jun-21	1324	1.19
3	Jul-21	1618	1.46
4	Aug-21	1541	1.39
5	Sep-21	1572	1.41
6	Oct-21	1689	1.52

7	Nov-21	1534	1.38
8	Dec-21	1363	1.23
9	Jan-22	1285	1.16
10	Feb-22	1273	1.15
11	Mar-22	1906	1.72
12	Apr-22	2308	2.08
13	Total	18436	16.59
14	Maximum	2308	2.08
15	Minimum	1023	0.92
16	Average	1536.33	1.38

Chart No 2: Month wise CO_2 Emissions:

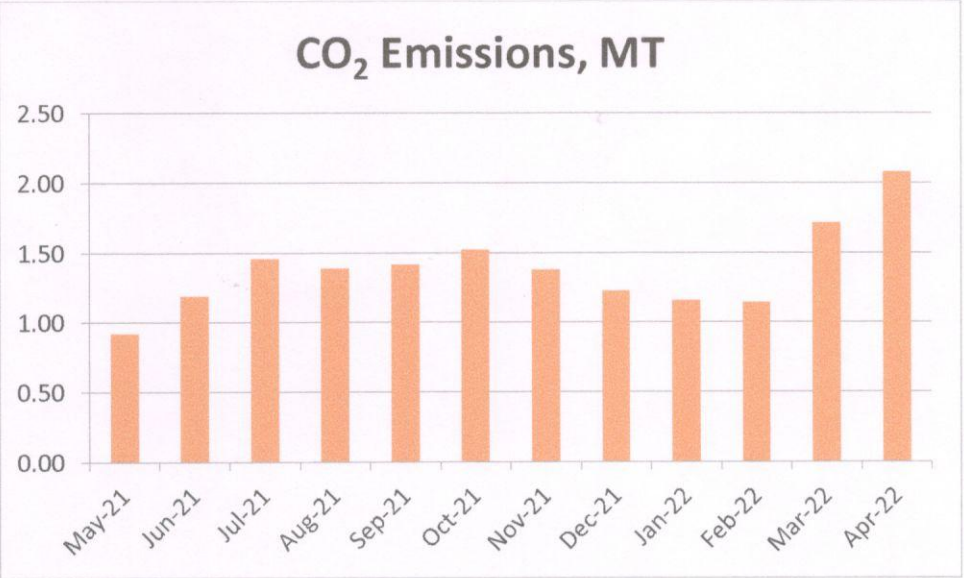


Table No 6: Important Parameters:

No	Parameter/ Value	Energy Purchased, kWh	CO_2 Emissions, MT
1	Total	18436	16.59
2	Maximum	2308	2.08
3	Minimum	1023	0.92
4	Average	1536.33	1.38

CHAPTER III
STUDY OF CO_2 EMISSION REDUCTION

The College has Solar Thermal Water Heating System of Capacity 1500 LPD. The College has not installed Roof Top Solar PV Plant, as on Date.

Photograph of Solar Thermal Water Heating System:

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**.'

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 7: Indoor Air Quality Parameters:

No	Location	AQI	PM-2.5	PM-10
	Ground Floor			
1	Principal's Cabin	63	36	40
2	Office	70	35	45
3	Classroom-2	66	38	46
4	Classroom-1	69	37	46

	First Floor			
1	Computer Lab	82	51	60
2	Ladies Room	81	50	62
3	Record Room	83	51	61
4	PGRC	76	44	55
	Second Floor			
1	Computer Center	81	49	63
2	Faculty Room	76	46	57
3	Lecture Hall-4	73	43	57
4	Lecture Hall-5	76	44	55
	Third Floor			
1	Lecture Hall-6	73	43	57
2	Lecture Hall-7	85	50	64
3	Reading Room	85	52	61
4	Books Section	81	48	61
	Maximum	85	52	64
	Minimum	63	35	40

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 8: Study of Indoor Comfort Condition Parameters:

No	Location	Temperature, 0C	Humidity, %	Lux Level	Noise Level, dB
	Ground Floor				
1	Principal's Cabin	23.1	97	234	56
2	Office	22.9	98	236	43
3	Classroom-2	23	98	259	52
4	Classroom-1	23	98	147	56.9
	First Floor				
1	Computer Lab	23.2	97	186	52.3
2	Ladies Room	23.1	97	171	54.3
3	Record Room	23.1	96	283	56
4	PGRC	23.1	97	246	55
	Second Floor				
1	Computer Center	23.2	97	157	49.6
2	Faculty Room	23.2	97	139	51.2
3	Lecture Hall-4	23.2	96	310	54.3
4	Lecture Hall-5	23.1	98	169	54
	Third Floor				
1	Lecture Hall-6	23	98	215	46.3
2	Lecture Hall-7	22.9	98	259	42.3
3	Reading Room	22.9	97	239	54.1
4	Books Section	23	97	201	51
	Maximum	23.2	98	310	56.9
	Minimum	22.9	96	139	42.3

CHAPTER VI
STUDY OF WASTE MANAGEMENT

6.1 Segregation of Waste at Source:

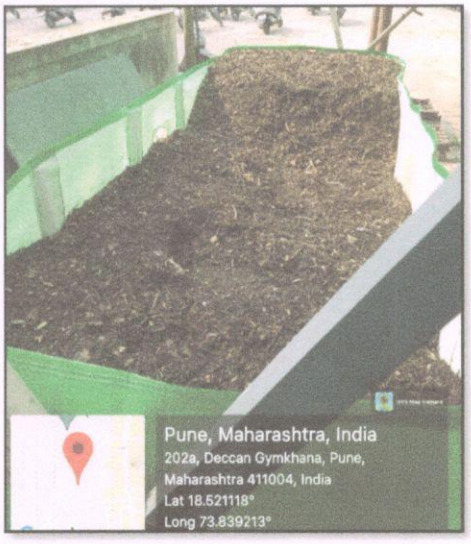
The Waste is segregated at source and the recyclable waste, like paper waste is handed over to authorized waste collecting agent for further recycling.

Photograph of Waste Collection Bins:

6.2 Organic Waste Management:

The College has installed a Bio Composting Unit and the organic Waste is converted in to Bio compost, which is further used in the own garden as well as sold outside.

Photograph of Bio Composting Unit:

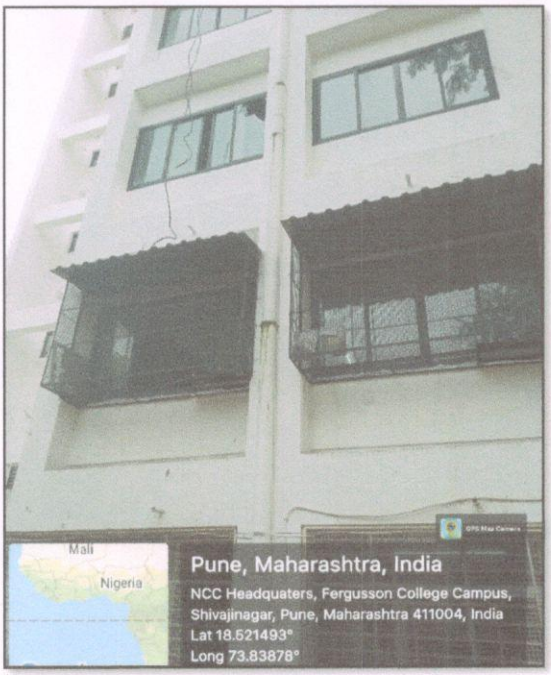


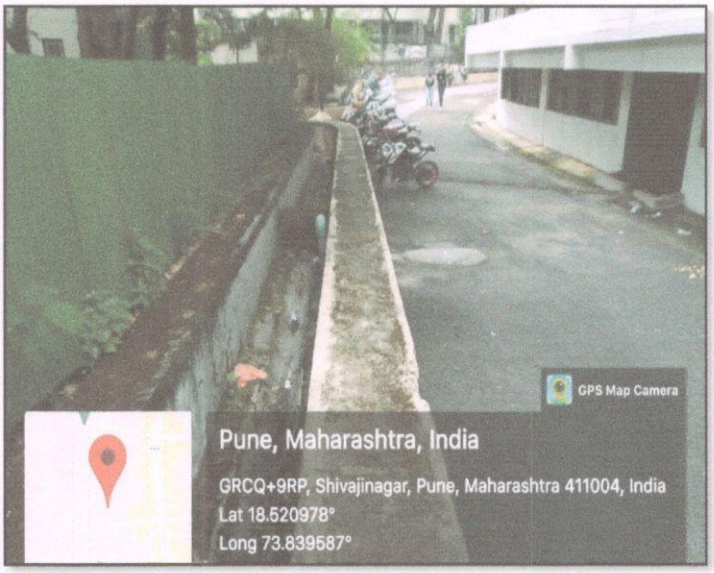
6.3 E Waste Management: The E-Waste is disposed of through Authorized Agency.

CHAPTER-VI
STUDY OF RAIN WATER MANAGEMENT

The College has installed Rain Water Management Project and the rain water falling on the terrace is used to increase the underground water table.

Photograph of Rain water Carrying Pipe and Channel Section:





CHAPTER-VIII
STUDY OF ENVIRONMENT FRIENDLY INITIATIVES

8.1 Internal Tree Plantation:

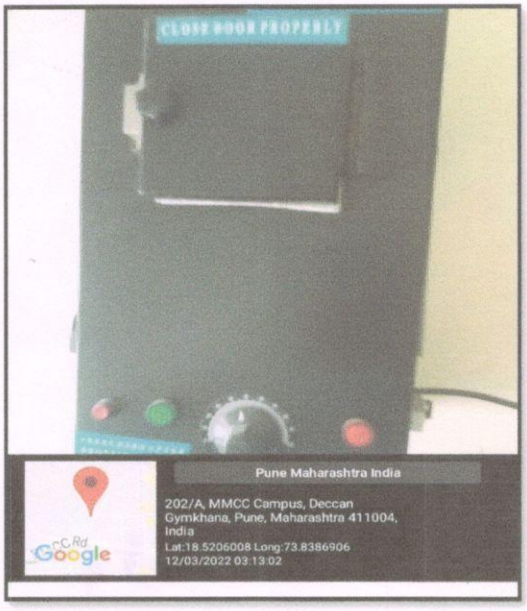
The College has well maintained landscaped garden in the campus.

Photograph of Tree plantation:

8.2 Sanitary Waste Incinerator:

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

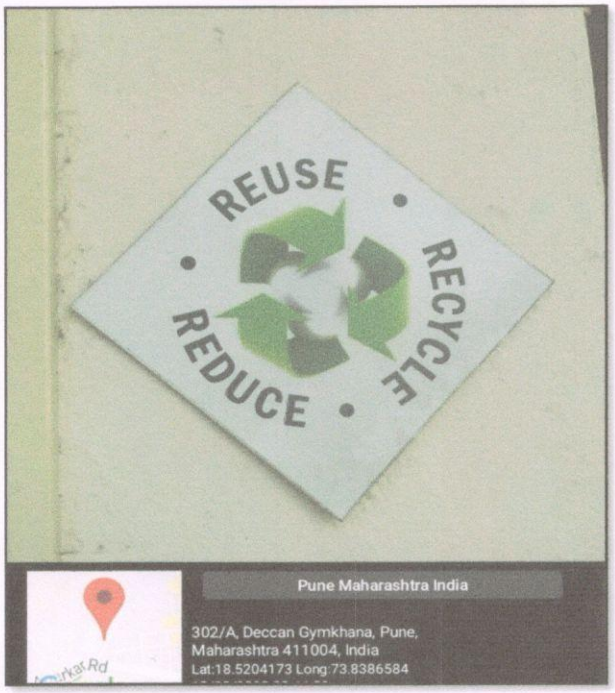
Photograph of Sanitary Waste Incinerator:

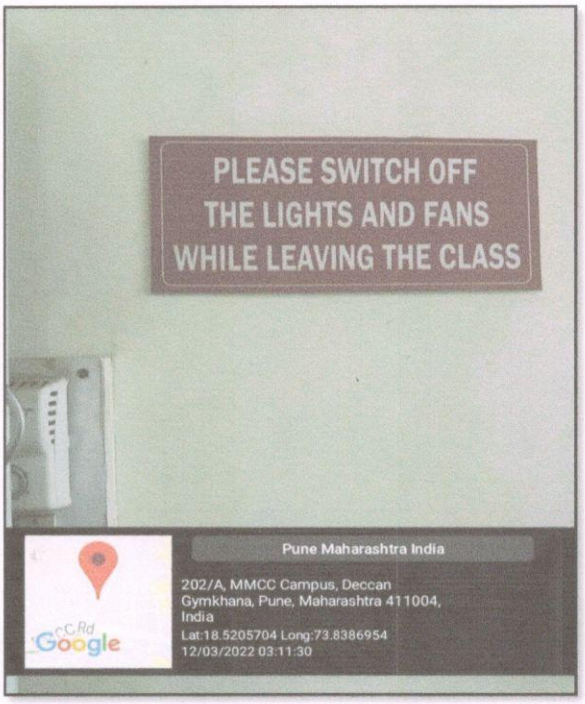


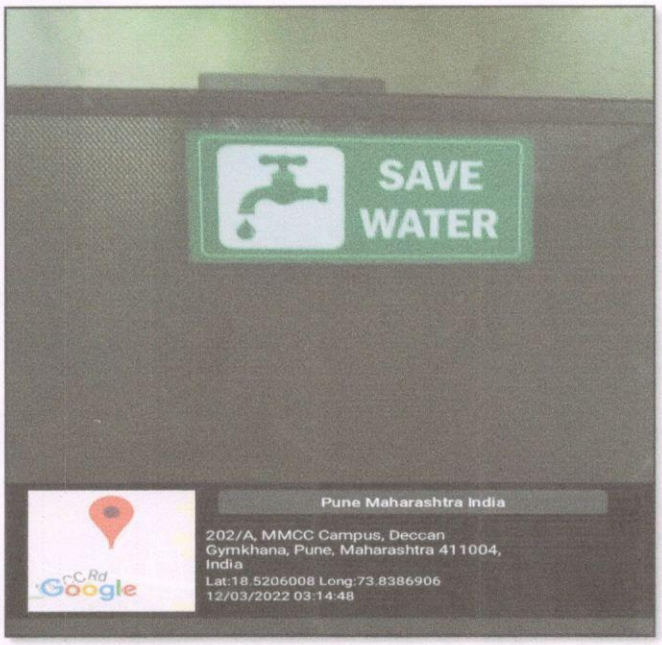
8.3 Creation of Awareness on Resource Conservation by Display of Posters:

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

Photograph of Poster on Energy Conservation:



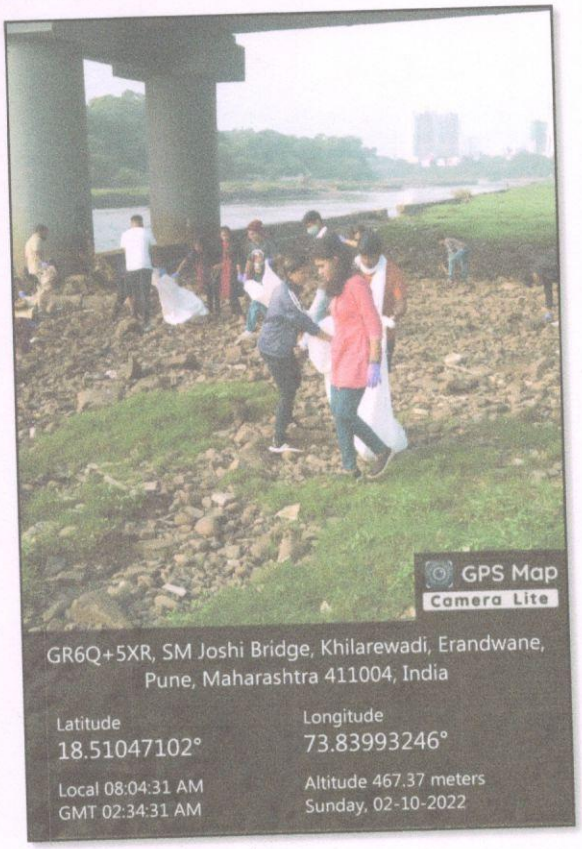




8.4 Cleanliness Drive & Participation in Swatcch Bharat Abhiyan:

The College arranged Cleanliness Drive under the NSS Initiative at S M Joshi Bridge in Pune. Also the College participated in Swatcch Bharat Abhiyan.

Photographs of Tree Plantation Drive & Swatcch Bharat Abhiyan:



ANNEXURE-I:
VARIOUS AIR QUALITY, WATER 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 Water Quality Standards:

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:

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:

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

ENERGY AUDIT REPORT

of

MARATHWADA MITRA MANDAL'S,
COLLEGE OF COMMERCE

202/A, MMCC Complex, Deccan Gymkhana, Pune 411 004

'येथे बहुतांचे हित'
(Welfare of Masses)

Year: 2021-22

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

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, 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 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 **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)

ENGRESS SERVICES PUNE

Engress Services

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

Ref: ES/MMCC/21-22/01 Date: 25/5/2022

CERTIFICATE

This is to certify that we have conducted Energy Audit at Marathwada Mitra Mandal's College of Commerce Pune, in the Academic year 2021-22.

.The College has adopted following Energy Efficient practices:

- Usage of Energy Efficient LED Fittings
- Maximum usage of Day Lighting
- Installation of 1500 LPD Solar Water Heating System at Hostel block.

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	11
4	Carbon Foot Printing	13
5	Study of Usage of Alternate Energy	14
6	Study of LED Lighting	15

ACKNOWLEDGEMENT

We Engress Services, Pune, express our sincere gratitude to the management of Marathwada Mitra Mandal's College of Commerce Pune, for awarding us the assignment of Energy Audit of their Campus for the Academic Year: 21-22.

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

EXECUTIVE SUMMARY

1. Marathwada Mitra Mandal's College of Commerce, Pune consumes Energy in the form of **Electrical Energy** which is used for various Office Equipment and other facilities.

2. Present Energy Consumption& CO_2 Emission:

No	Parameter/ Value	Energy Purchased, kWh	CO_2 Emissions, MT
1	Total	18436	16.59
2	Maximum	2308	2.08
3	Minimum	1023	0.92
4	Average	1536.33	1.38

3. Energy Conservation projects already installed:

- Usage of Energy Efficient LED fittings
- Maximum Usage of Day Lighting
- Installation of **1500 LPD** Solar Water Heating System.

4. Usage of Alternate Energy:

The College has Solar Thermal Water Heating System of Capacity **1500 LPD.** The College has not installed Roof Top Solar PV Plant, as on Date. Hence the % of usage of Alternate Energy as on Date is Nil.

5. Usage of LED Lighting:

- The Total Lighting Load of the College is **2256 kW.**
- The Total LED Lighting Load is **4368 kW.**
- The percentage of LED Lighting to Total Lighting Load is **23.40 %.**

6. Notes and Assumptions:

1. 1 kWh of Electrical Energy releases **0.9 Kg** of CO_2into atmosphere

7. Reference:

- For CO_2 Emissions: www.tatapower.com

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_2	:	Carbon Di Oxide
MT	:	Metric Ton

CHAPTER-I
INTRODUCTION

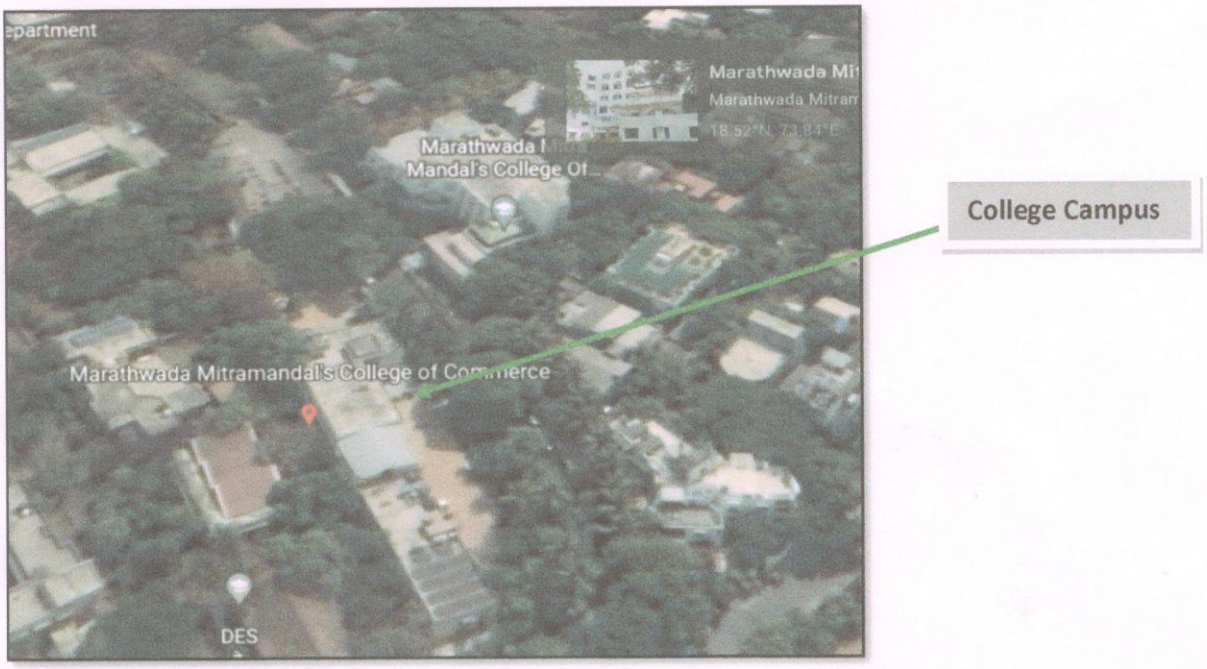
1.1 Objectives:

1. To study Connected Load of the College.
2. To study present Energy Consumption
3. To compute CO_2 Emissions
4. To study usage of Alternate Energy
5. To study usage of LED Lighting

1.2 Table No 1: General Details of the College:

No	Head	Particulars
1	Name of Institution	Marathwada Mitra Mandal's College of Commerce
2	Address	202/A ,Deccan Gymkhana,Pune-411004
3	Year of Establishment	1986
4	Affiliation	Savitribai Phule Pune University

1.3 Google Earth Image:



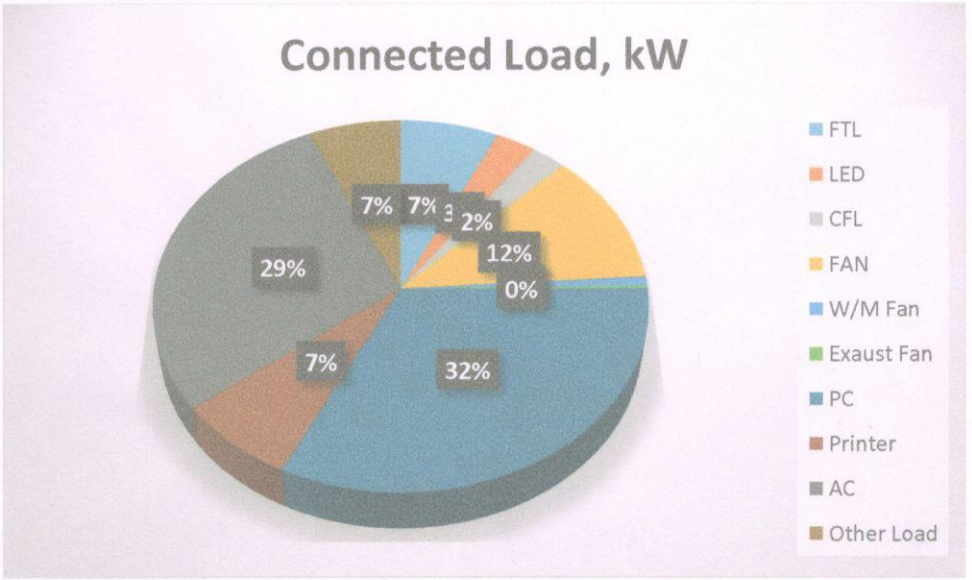
CHAPTER-II
STUDY OF CONNECTED LOAD

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	FTL	80	40	3.2
2	LED	66	20	1.32
3	CFL	35	32	1.12
4	FAN	81	65	5.265
5	W/M Fan	7	52	0.364
6	Exhaust Fan	2	52	0.104
7	PC	98	150	14.7
8	Printer	19	175	3.325
9	AC	7	1875	13.125
10	Other Load	30	100	3
11	**Total**			**46**

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 3: Electrical Bill Analysis- 2021-22:

No	Month	Energy Consumed, kWh
1	May-21	1023
2	Jun-21	1324
3	Jul-21	1618
4	Aug-21	1541
5	Sep-21	1572
6	Oct-21	1689
7	Nov-21	1534
8	Dec-21	1363
9	Jan-22	1285
10	Feb-22	1273
11	Mar-22	1906
12	Apr-22	2308
13	Total	18436
14	Maximum	2308
15	Minimum	1023
16	Average	1536.33

Chart No 2: Variation in Monthly Energy Consumption:

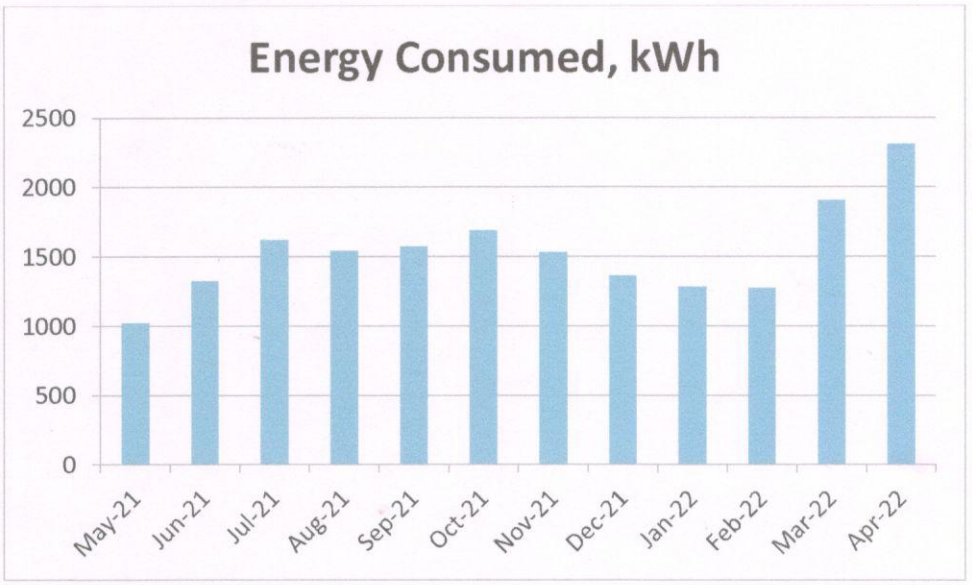


Table No 4: Variation in Important Parameters:

No	Parameter/ Variation	Energy Consumed, kWh
1	Total	18436
2	Maximum	2308
3	Minimum	1023
4	Average	1536.33

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_2 Emissions:

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

Based on the above Data we compute the CO_2 emissions which are being released in to the atmosphere by the College due to its Day to Day operations

Table No 5: Month wise CO_2 Emissions:

No	Month	Energy Consumed, kWh	CO_2 Emissions, MT
1	May-21	1023	0.92
2	Jun-21	1324	1.19
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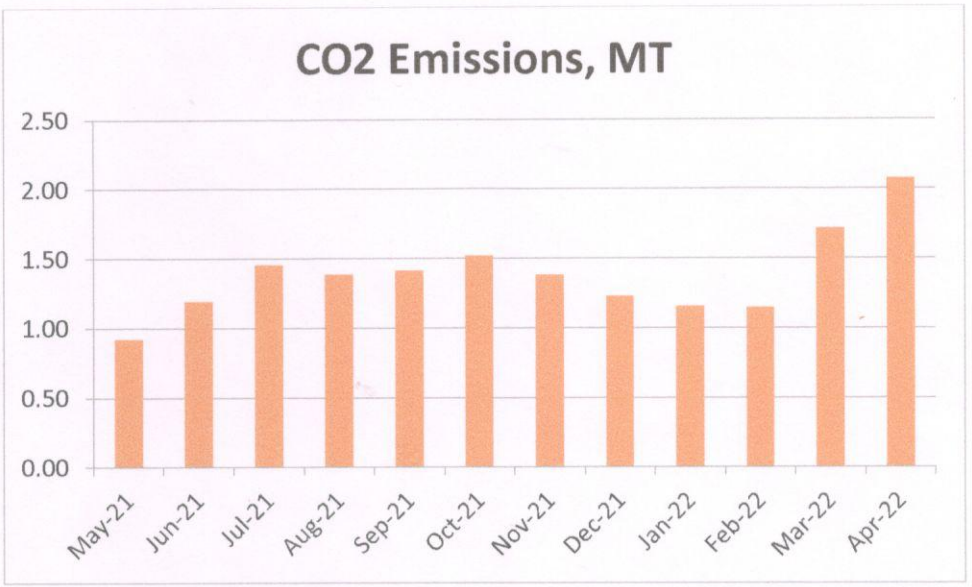

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No	Parameter/ Variation	Energy Purchased, kWh	CO_2 Emissions, MT
1	Total	18436	16.59
2	Maximum	2308	2.08
3	Minimum	1023	0.92
4	Average	1536.33	1.38

CHAPTER-V
STUDY OF USAGE OF ALTERNATE ENERGY

The College has Solar Thermal Water Heating System of Capacity 1500 LPD. The College has not installed Roof Top Solar PV Plant, as on Date. Hence the % of usage of Alternate Energy as on Date is Nil.

Photograph of Solar Thermal Water Heating System:

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 7: Computation of Percentage of Usage of LED Lighting to Annual Lighting Load:

No	Particulars	Value	Unit
1	No of 40 W FTL Fittings	80	Nos
2	Demand of 40 W FTL Fitting	40	W/Unit
3	Total Electrical Load of 40 W FTL Fittings	**3.2**	kW
4	No of 20 W LED Tube Lights	66	Nos
5	Demand of 20 W LED Tube Light	20	W/Unit
6	Total Electrical Load of 20 W LED Fittings	**1.32**	kW
7	No of CFL Fittings	35	Nos
8	Demand of CFL Fittings	32	W/Unit
9	Total Electrical Load of CFL Fittings	**1.12**	kW
10	Total Lighting Load=**3+6+9**	**5.64**	kW
11	Total LED Lighting Load= **6**	**1.32**	kW
12	**Annual Lighting Requirement met by LED= 11*100/10**	**23.40**	%