ENVIRONMENTAL 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: 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/MMCC/22-23/03 **Date: 24/8/2023**

This is to certify that we have conducted Environmental Audit at Marathwada Mitra Mandal's College of Commerce Pune, in the Academic year 2022-23.

The College has adopted following Environmental Friendly Practices:

- 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
- Provision of Sanitary Waste Incinerator
- Implementation of Rain Water Management Project.
- Tree Plantation in the campus
- Creation of Awareness on Reducing Carbon Footprints by Display of Posters

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

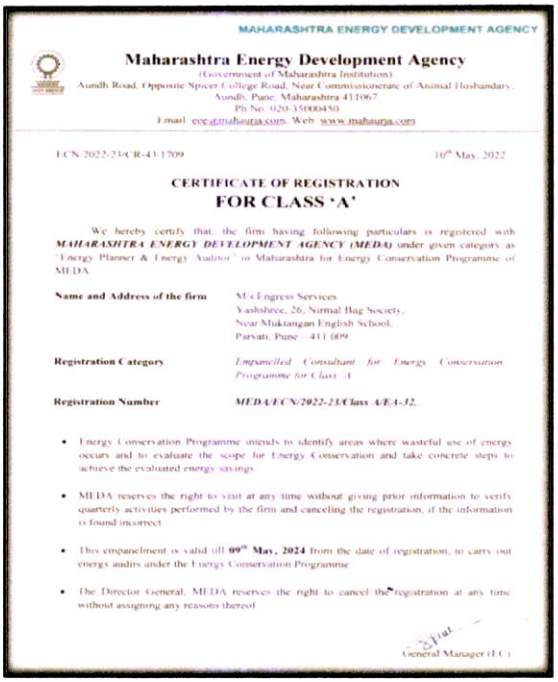
For Engress Services,

Mehendale

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

ENGRESS SERVICES PUNE

REGISTRATION CERTIFICATES



MAHARASHTRA ENERGY DEVELOPMENT AGENCY

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: eec@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 Baug 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.*

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- 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
Ideate. Innovate. Impact.

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 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 :

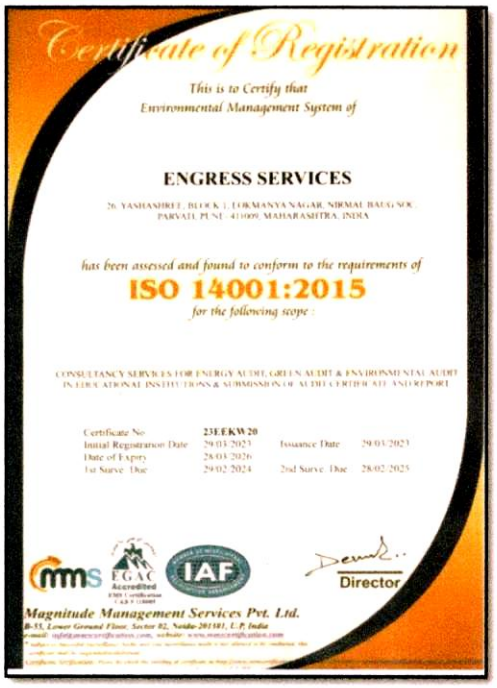
CONSULTANCY SERVICES FOR ENERGY AUDIT, GREEN AUDIT & ENVIRONMENTAL AUDIT IN EDUCATIONAL INSTITUTIONS & SUBMISSION OF AUDIT CERTIFICATE AND REPORT

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

ISO: 9001-2015 Certificate



Certificate of Registration

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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	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

ENGRESS SERVICES PUNE

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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 Environmental Audit of their Campus for the Academic Year: 22-23.

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. Pollution due to College Activities:

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

3. Present Energy Consumption & CO_2 Emission:

No	Particulars	Value	Unit
1	Annual Energy Consumption	**25657**	kWh
2	Annual CO_2 Emissions	**23.09**	MT

4. Various initiatives taken for Environmental Conservation:

- Usage of Energy Efficient LED fittings
- Installation of Solar Thermal Water Heating System.
- Bio Composting Unit installation

5. Indoor Air Quality Parameters:

No	Parameter/Value	AQI	PM-2.5	PM-10
1	Maximum	**56**	**34**	**40**
2	Minimum	**41**	**25**	**27**

6. Indoor Comfort Conditions:

No	Parameter/Value	Temperature, ^0C	Humidity, %	Lux Level	Noise Level, dB
1	Maximum	**26.2**	**83**	**125**	**45**
2	Minimum	**26.1**	**82**	**96**	**42.1**

7. Waste Management Initiatives:

No	Head	Particulars
1	Solid Waste Management	Segregation of waste at source.
2	Organic Waste	Arrangement of Bio Composting unit.
3	Sanitary Waste	Provision of Sanitary Waste Incinerator
4	E Waste Management	Disposed through authorized agency.

8. 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.

9. Eco Friendly Initiatives:

- Maintenance of Landscaped garden
- Creation of Awareness on Reducing Carbon Footprints by Display of Posters

10. Assumption:

1. 1 Unit 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 Standards: www.cpcb.com

ABBREVIATIONS

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

CHAPTER-I
INTRODUCTION

1. Important Definitions:

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

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

1.2. Environmental Audit: Definition:

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

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

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

1.4 Audit Procedural Steps:

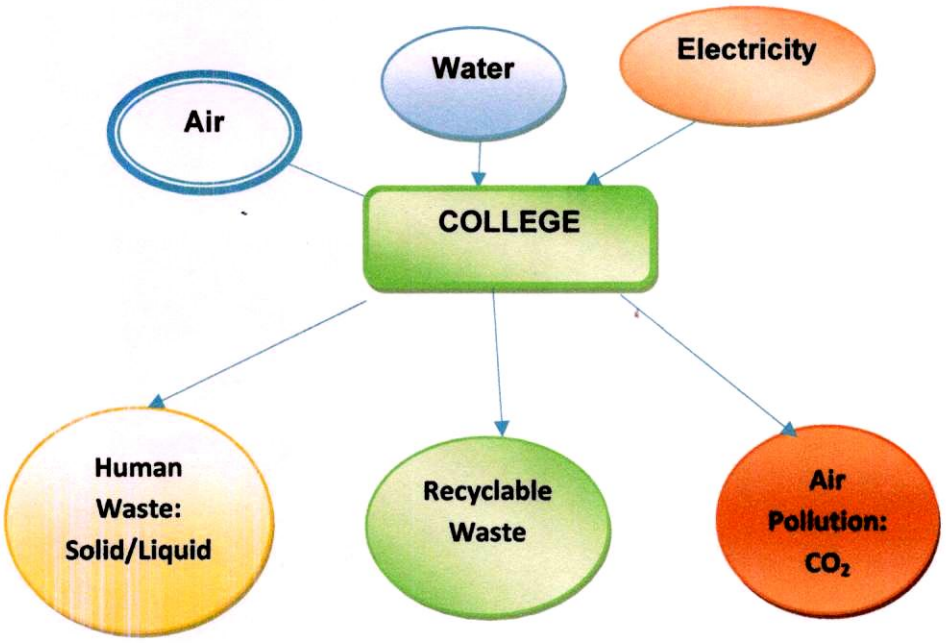
1.5 Google Earth Image:

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.

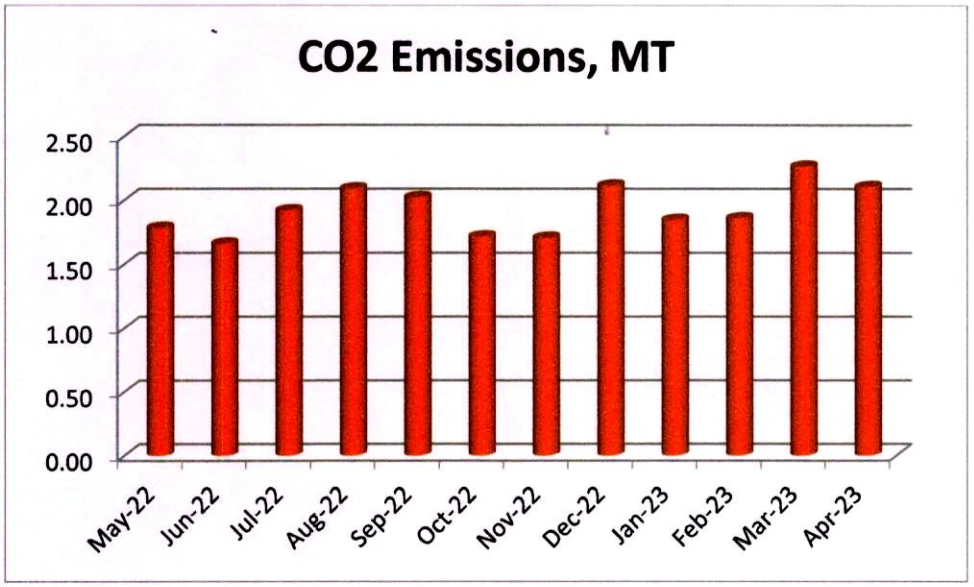
- **1 kWh** of Electrical Energy releases **0.9 Kg of CO_2** into atmosphere

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

No	Month	Energy Consumed, kWh	CO_2 Emissions, MT
1	May-22	1982	1.78
2	Jun-22	1846	1.66
3	Jul-22	2134	1.92
4	Aug-22	2323	2.09
5	Sep-22	2248	2.02
6	Oct-22	1907	1.72

7	Nov-22	1896	1.71
8	Dec-22	2349	2.11
9	Jan-23	2051	1.85
10	Feb-23	2066	1.86
11	Mar-23	2516	2.26
12	Apr-23	2339	2.11
13	Total	25657	23.09
14	Maximum	2516	2.26
15	Minimum	1846	1.66
16	Average	2138.08	1.92

Chart No 2: Month wise CO_2 Emissions:



CHAPTER III
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.

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.

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. 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 10 micron

Table No 2: Indoor Air Quality Parameters:

No	Location	AQI	PM-2.5	PM-10
1	Lecture Hall	56	34	40
2	Office	50	30	32
3	Lecture Hall-03	41	25	27
4	Ladies Room	46	28	36
5	Faculty Room	46	27	31
6	Lecture Hall 04	41	25	34
7	Library	43	26	32
8	Lecture Hall 07	46	28	36
	Maximum	**56**	**34**	**40**
	Minimum	**41**	**25**	**27**

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:

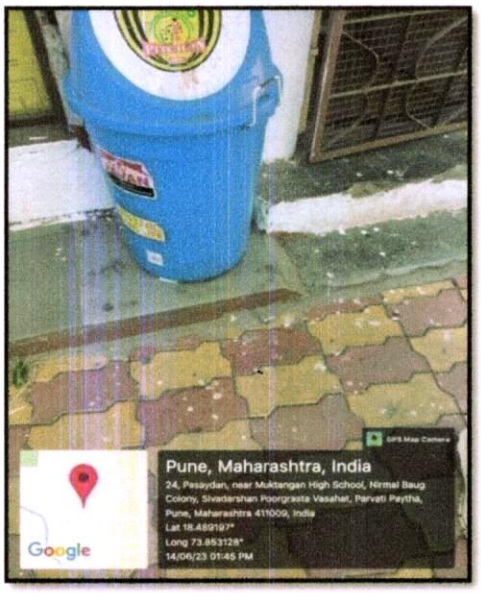
No	Location	Temperature, ^0C	Humidity, %	Lux Level	Noise Level, dB
1	Lecture Hall	26.1	83	102	45
2	Office	26.1	83	112	44.9
3	Lecture Hall-03	26.1	82	103	44
4	Ladies Room	26.1	82	98	43.6
5	Faculty Room	26.2	82	96	42.3
6	Lecture Hall 04	26.2	82	103	42.1
7	Library	26.2	83	114	44
8	Lecture Hall 07	26.2	83	125	44.1
	Maximum	**26.2**	**83**	**125**	**45**
	Minimum	**26.1**	**82**	**96**	**42.1**

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 and plastic waste is handed over to authorized waste collecting agent for further recycling.

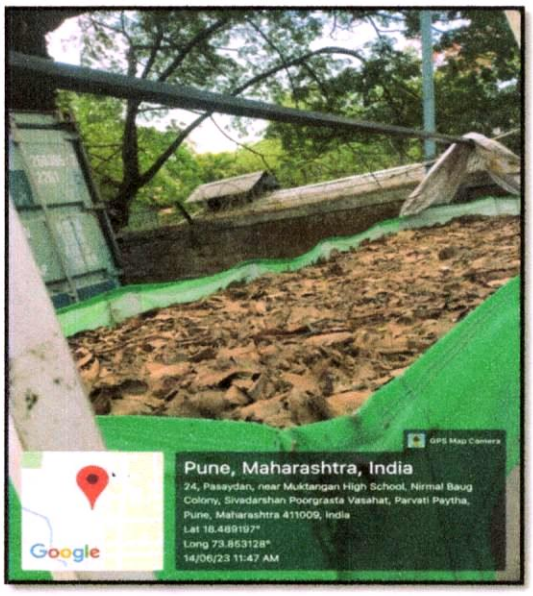
Photograph of Waste Collection Bins:



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.

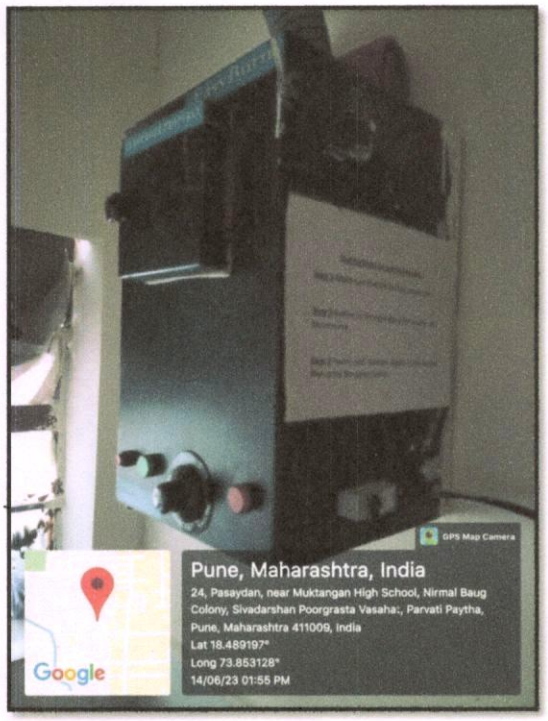
Photograph of Bio Composting Unit:



6.3 Sanitary Waste Management:

The College has installed Sanitary Waste Incinerator, to dispose of the Sanitary Waste.

Photograph of Sanitary Waste Incinerator:



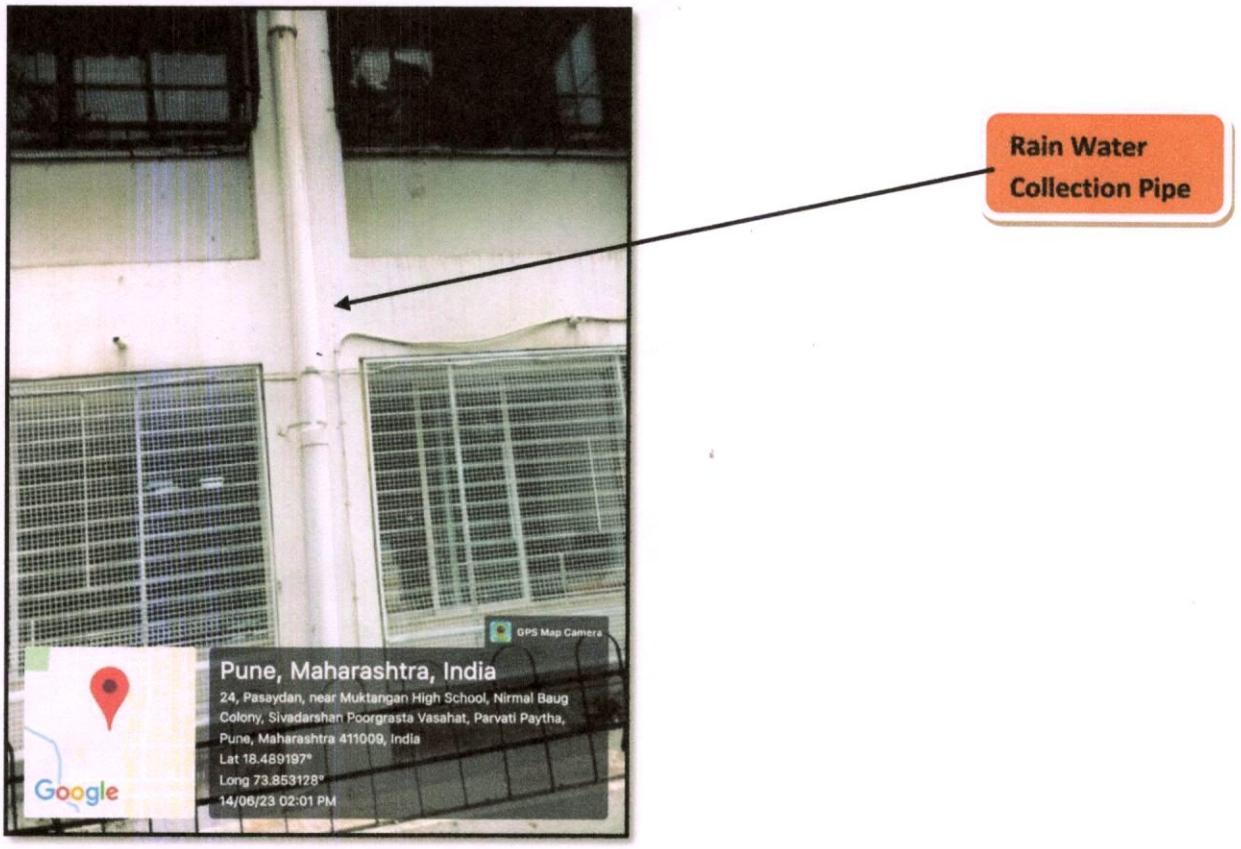
6.4 E Waste Management:

The E-Waste is disposed of through Authorized Agency.

CHAPTER-VII
STUDY OF RAIN WATER MANAGEMENT

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

Photograph of Rain Water Management Pipe:

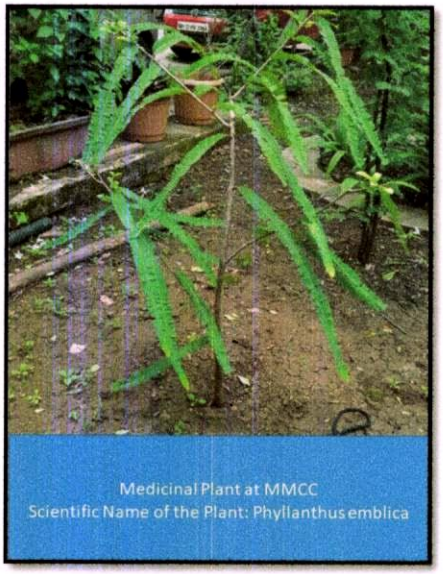


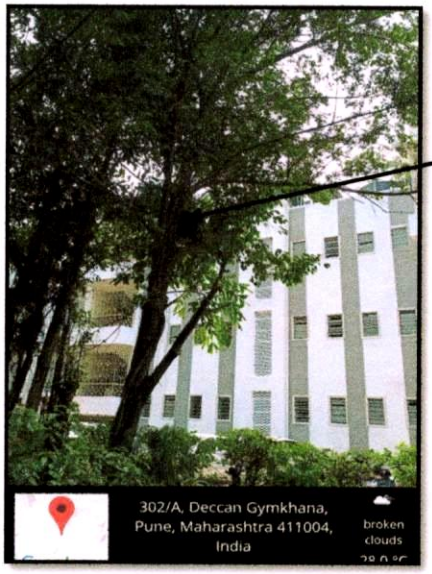
CHAPTER-VIII
STUDY OF ECO FRIENDLY INITIATIVES

8.1 Internal Tree Plantation:

The College has well maintained landscaped garden in the campus.

Photograph of Medicinal plant, Tree with Bird Nest:

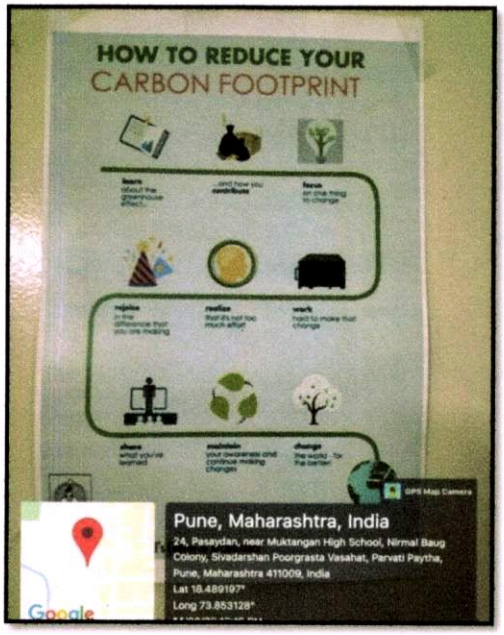




8.2 Creation of Awareness on Reducing Carbon Footprint by Display of Posters:

The College has displayed posters emphasizing on importance of reducing carbon footprint.

Photograph of Poster on Reducing Carbon Footprint:



ANNEXURE-I:
VARIOUS 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%

ENVIRONMENTAL 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:

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Yashashree, 26, Nirmal Bag Society,
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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
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Engress Services

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Tel: 09890444795 Email: engress123@gmail.com

Ref: ES/MMCC/21-22/03 Date: 25/5/2022

CERTIFICATE

This is to certify that we have conducted Environmental 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
- Usage of BEE STAR Rated Energy Efficient Equipment
- Maximum Usage of Day Lighting
- Installation of 1500 LPD Solar Thermal Water Heating System.
- 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 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.

For Engress Services,

A Y Mehendale,
Certified Energy Auditor
EA-8192

ENGRESS SERVICES PUNE

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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:

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- For Various Indoor Air Parameters: www.ishrae.com
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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:

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

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4.	National Conservation Strategy and Policy Statement on Environment and Development, 1992
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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:

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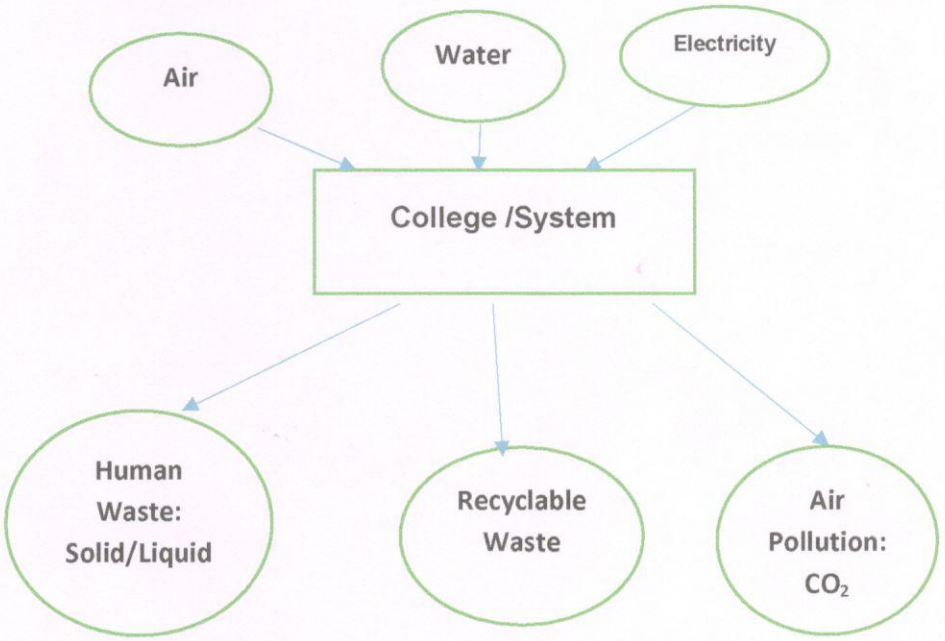
1	Name of Institution	Marathwada Mitra Mandal's College of Commerce
2	Address	202/A ,Deccan Gymkhana,Pune-411004
3	Year of Establishment	1986
4	Affiliation	Savitribai Phule Pune University

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:

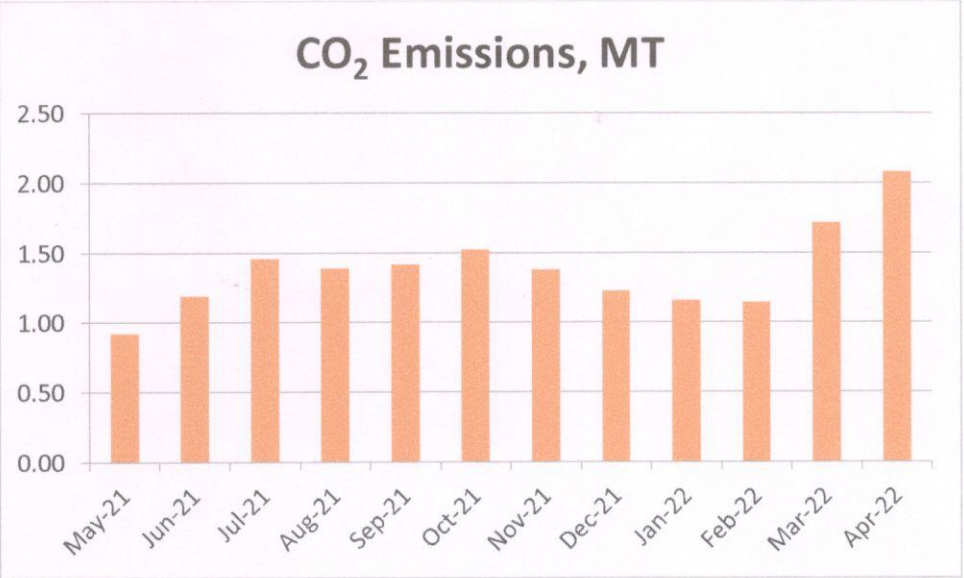


Table No 6: Important Parameters:

No	Parameter/ Value	Energy Purchased, kWh	CO_2 Emissions, MT
1	Total	18436	16.59
2	Maximum	2308	2.08
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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:

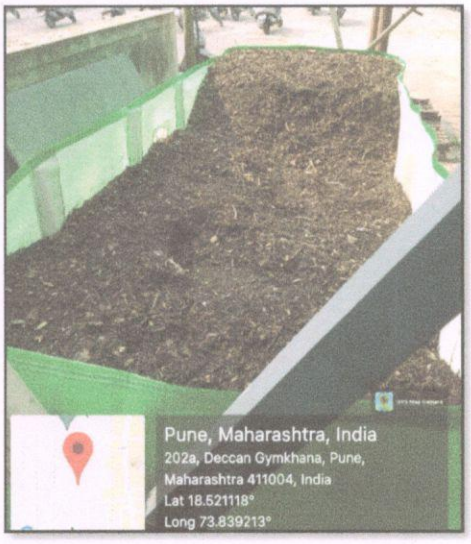
The Waste is segregated at source and the recyclable waste, like paper waste is handed over to authorized waste collecting agent for further recycling.

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:

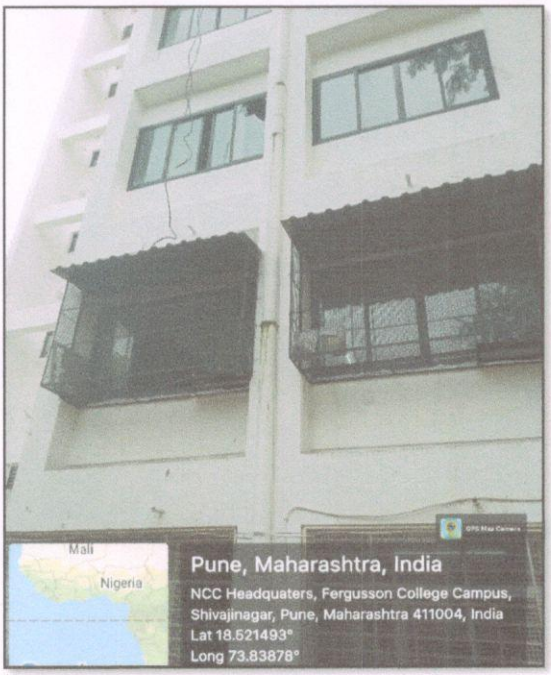


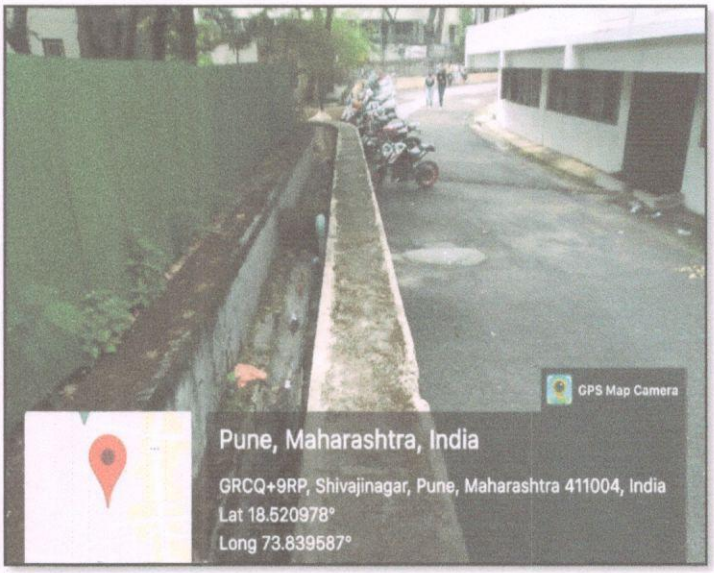
6.3 E Waste Management: The E-Waste is disposed of through Authorized Agency.

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:

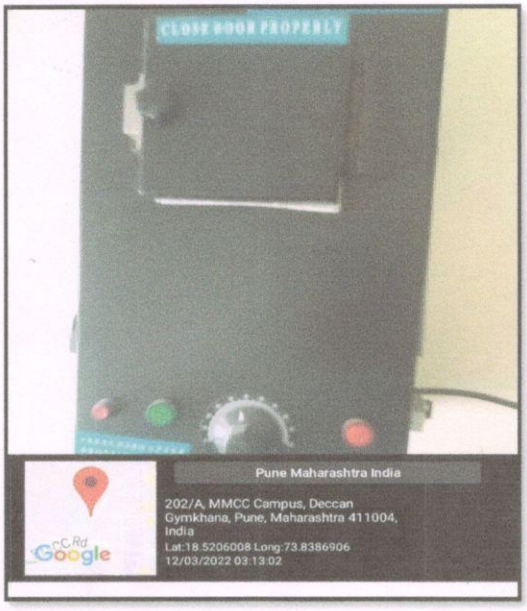
The College has well maintained landscaped garden in the campus.

Photograph of Tree plantation:

8.2 Sanitary Waste Incinerator:

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

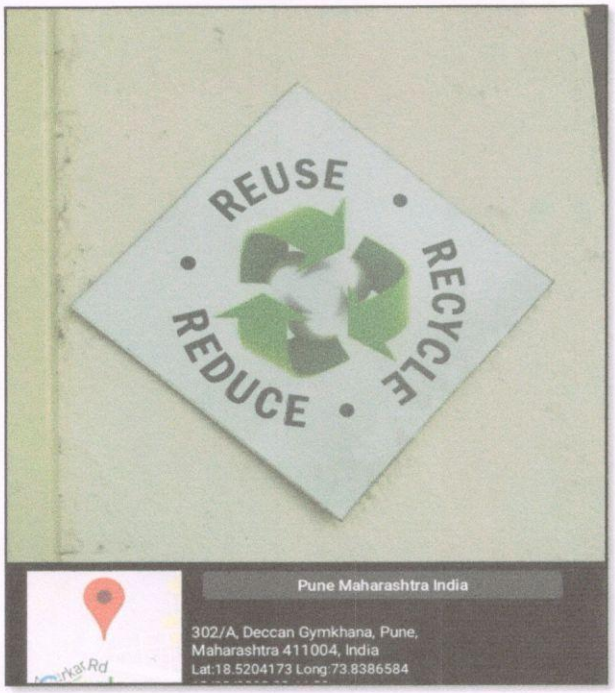
Photograph of Sanitary Waste Incinerator:

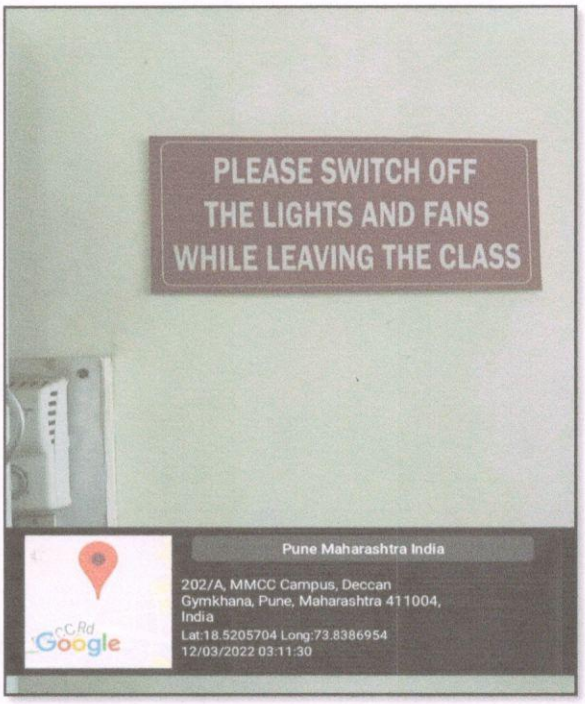


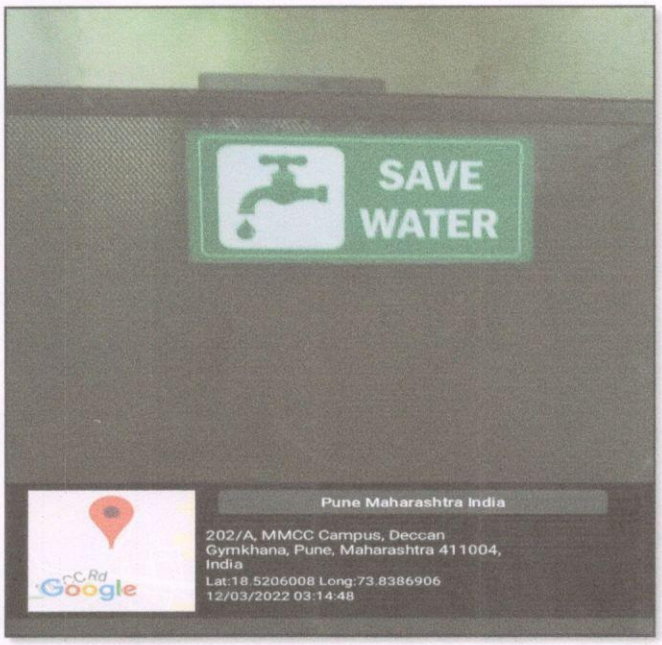
8.3 Creation of Awareness on Resource Conservation by Display of Posters:

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

Photograph of Poster on Energy Conservation:



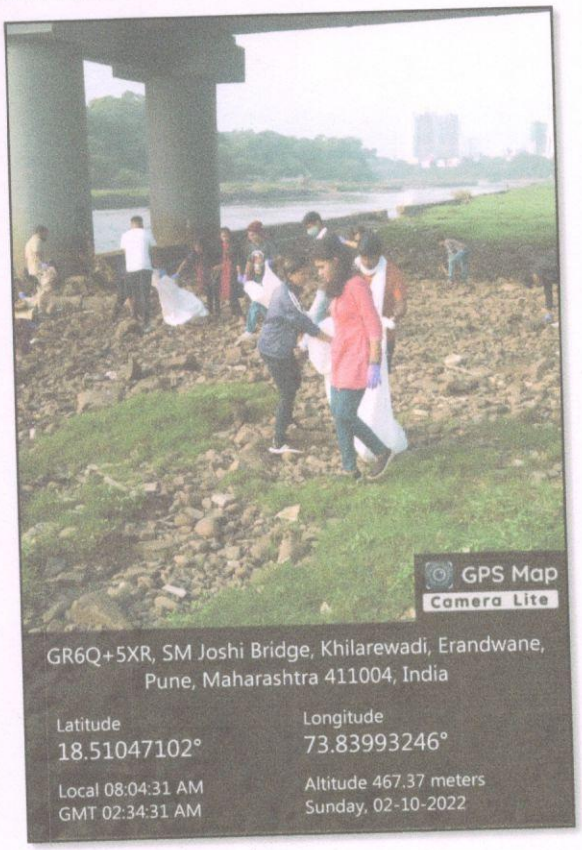




8.4 Cleanliness Drive & Participation in Swatcch Bharat Abhiyan:

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%

ENVIRONMENTAL 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: 2019-20

Prepared by:

Enrich Consultants

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

ENRICH CONSULTANTS Pune

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Tel: 09890444795 Email: enrichcons@gmail.com

Ref: EC/MMCC/19-20/03

Date: 20/8/2020

CERTIFICATE

This is to certify that we have conducted Environmental Audit at Marathwada Mitra Mandal's, College of Commerce Pune, in the Academic year 2019-20.

The College has adopted following Environment Friendly Practices:

- Usage of Energy Efficient LED Light Fitting
- Usage of BEE STAR Rated Energy Efficient Equipment
- Maximum Usage of Day Lighting
- Installation of 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 Harvesting Project for recharging the bore well.
- Maintenance of Internal Tree Plantation
- Provision of Sanitary Waste Incinerator
- Creation of awareness about Resource Conservation by displaying posters
- Tree Plantation Drive under NSS Initiative

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

For Enrich Consultants,

ENRICH CONSULTANTS Pune

A Y Mehendale,
Certified Energy Auditor
EA-8192

INDEX

ACKNOWLEDGEMENT

We Enrich Consultants, Pune, express our sincere gratitude to the management of Marathwada Mitra Mandal's College of Commerce Pune, for awarding us the assignment of Environmental Audit of their Campus for the Academic Year: 19-20.

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. Various 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	22696	20.43
2	Maximum	2228	2.01
3	Minimum	1375	1.2375
4	Average	1891.33	1.70

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 installed Solar Water Heating Plant of Capacity **1500 LPD.**
- Equivalent Electrical Energy saved by Solar Thermal System in 19-20 is **12329 kWh**
- The reduction in Annual CO_2 Emissions in 19-20 is **11 MT.**

6. Solid Waste Management:

6.1 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.

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.

6.3 E-Waste Management:

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

7. Rain Water Management:

The College has installed Rain Water Harvesting Project and the rain water falling on the terrace is used to recharge the bore well.

8. Green & Sustainable Initiatives

- Maintenance of Internal Garden
- Provision of Sanitary Waste Incinerator
- Creation of Awareness on Resource Conservation by Display of Posters
- Tree Plantation Drive under NSS Initiative

9. Notes & Assumptions:

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

10. References:

- For CO_2 Emissions: www.tatapower.com
- For Electrical Energy saved by Solar Thermal System: www.mahaurja.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

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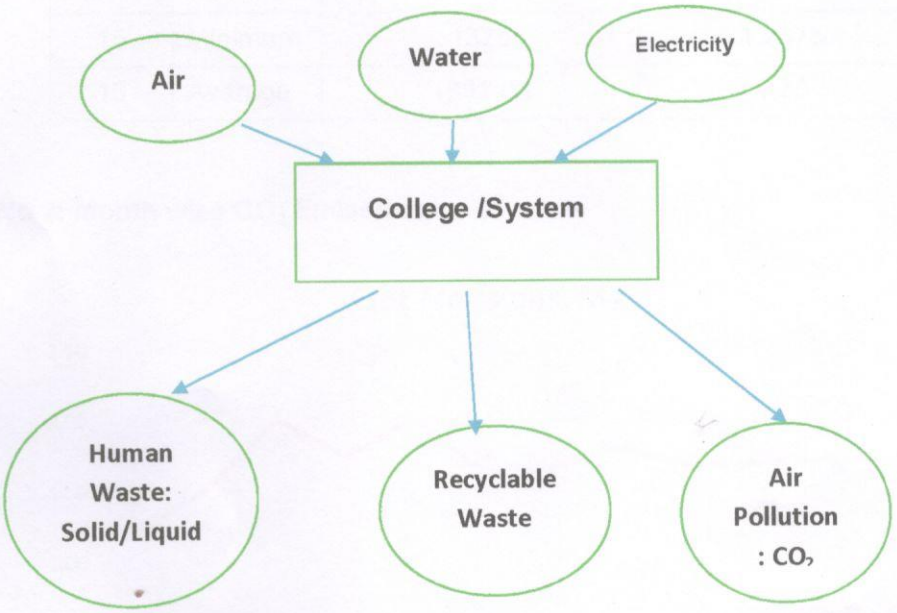

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The basis of Calculation for CO_2 emissions due to Electrical Energy are as under

- **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: 19-20:

No	Month	Energy Purchased, kWh	CO_2 Emission, MT
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2	Jul-19	1710	1.54
3	Aug-19	2226	2.00
4	Sep-19	1940	1.75
5	Oct-19	2228	2.01

6	Nov-19	1840	1.66
7	Dec-19	1825	1.64
8	Jan-20	2006	1.81
9	Feb-20	1872	1.68
10	Mar-20	1872	1.68
11	Apr-20	1901	1.71
12	May-20	1901	1.71
13	Total	22696	20.43
14	Maximum	2228	2.01
15	Minimum	1375	1.2375
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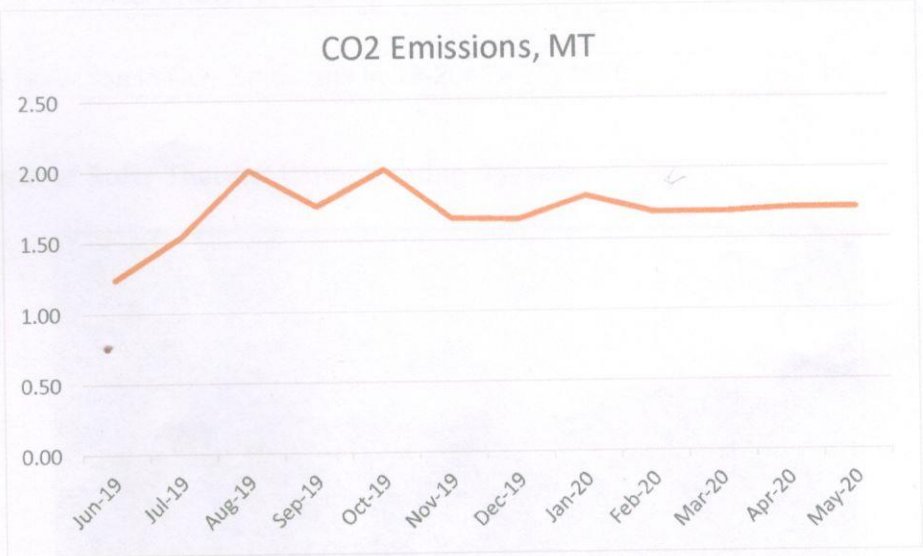
Chart No 2: Month wise CO_2 Emissions:



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4	Average	1891.33	1.70

CHAPTER III
STUDY OF CO_2 EMISSION REDUCTION

The College has installed Solar Thermal Water Heating System of Capacity **1500 LPD.**

100 LPD Roof Top Solar Thermal Water Heating System saves 1500 kWh of Electrical Energy per year.

In the following table, we compute the Energy saved by usage of 1500 LPD System and the reduction in Annual CO_2 Emissions.

Table No 7: Computation of Reduction in Annual CO_2 Emissions:

No	Particulars	Value	Unit
1	Solar Water Heating System at Hostel Block	1500	LPD
2	Energy Saved by 100 LPD Solar Thermal System in 365 Days	1500	kWh
3	Energy saved by 1500 LPD System in 1 Year = 1500*1500/100	22500	kWh
4	Actual Usage Period in 19-20	200	Nos
5	Energy saved in 200 Days of operation in 19-20 = 200*22500/365	**12329**	kWh
6	1 kWh of Electrical Energy is equal to	**0.9**	Kg of CO_2
7	Annual reduction in CO_2 Emissions in 19-20=(6)*(7)/1000	**11**	MT of CO_2

Photograph of Solar Thermal Water Heating System:

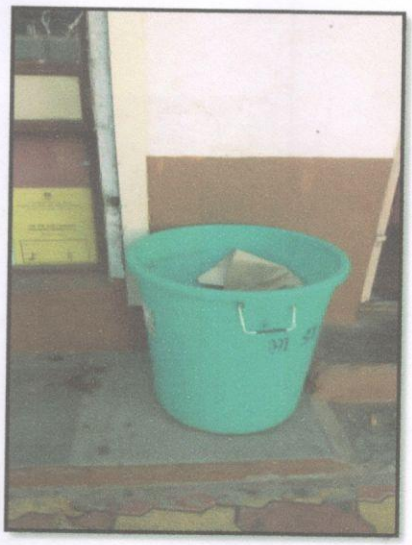
CHAPTER IV
STUDY OF WASTE MANAGEMENT

4.1 Solid Waste Management:

4.1.1 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:



4.1.2 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.

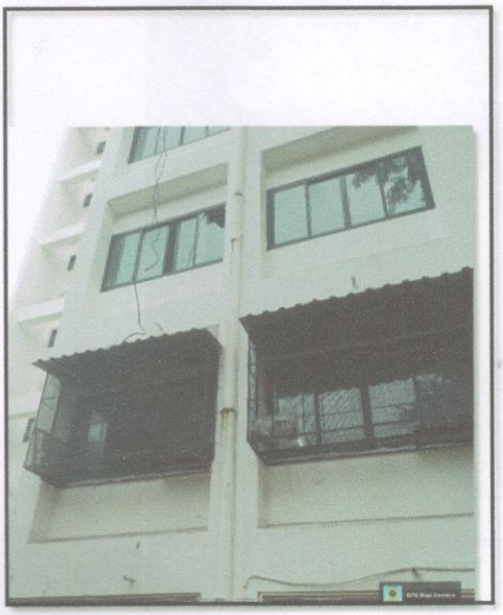
Photograph of Bio Composting Unit:

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

CHAPTER-V
STUDY OF RAIN WATER MANAGEMENT

The College has installed Rain Water Harvesting Project and the rain water falling on the terrace is used to recharge the bore well.

Photograph of Rain water Carrying Pipe and Channel Section:

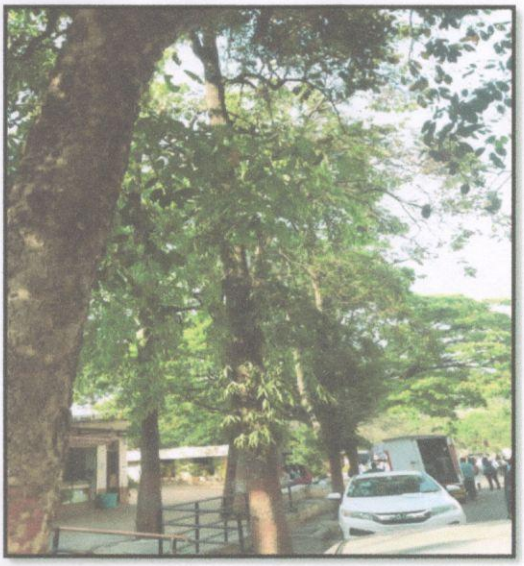


CHAPTER-VI
STUDY OF ENVIRONMENT FRIENDLY INITIATIVES

6.1 Internal Tree Plantation:

The College has well maintained landscaped garden in the campus.

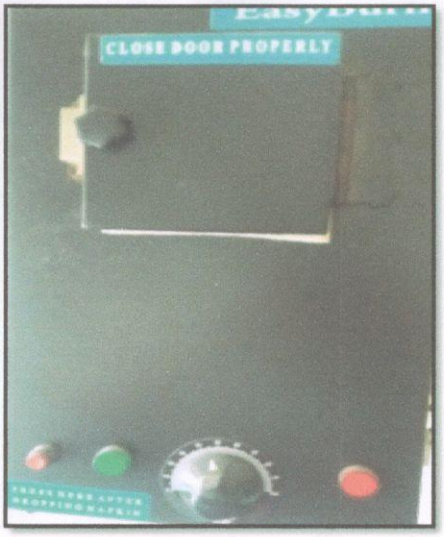
Photograph of Tree plantation:



6.2 Sanitary Waste Incinerator:

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

Photograph of Sanitary Waste Incinerator:



6.3 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 Resource Conservation:

6.4 Tree Plantation Drive:

The College arranged Tree Plantation Drive under the NSS Initiative.

Photographs of Tree Plantation Drive: