(वाणिज्य महाविद्यालय, यवतमाळ ट्रस्ट रजि. क्र. ई-३२ द्वारा संचालित)

BABAJI DATEY KALA ANI VANIJYA MAHAVIDYALAYA, YAVATMAL.

Shivaji Nagar, Yavatmal, Pin- 445 001 (MH)

Affiliated to Sant Gadge Baba Amravati University, Amravati.

principal@dateycollege.edu.in www.dateycollege.edu.in 07232- 244053 9423866402

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

Green Audit

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GREEN AUDIT REPORT

of

Babaji Datey Kala & Vanijya Mahavidyalaya,

Shivaji Nagar, Yavatmal 445 001

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

(17)

ENGRESS SERVICES

Yashashree, 26, Nirmal Bag Society, Near Muktangan English School,
Parvati, Pune 411 009Tel: 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)

GREEN AUDIT CERTIFICATE

Certificate No: ES/BDC/22-23/02 **Date: 26/10/2023**

This is to certify that we have conducted Green Audit at Babaji Datey Kala & Vanijya Mahavidyalaya, Yavatmal, in the Year 2022-23.

The Institute has adopted following Energy Efficient & Green Practices:

- Usage of Energy Efficient LED Light Fitting
- Installation of 15 kWp Capacity Roof Top Solar PV Plant
- Segregation of Waste at Source
- Installation of Bio Composting Pit
- College has installed septic tanks and it cleans periodically
- Installation of Rain Water Management Project
- Maintenance of good Internal Road
- Tree Plantation in the Campus
- Provision of Ramp for Divyangajan
- Creation of awareness by display of Posters on Resource Conservation

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

(18)

REGISTRATION CERTIFICATES


Maharashtra Energy Development Agency

CERTIFICATE OF REGISTRATION
FOR CLASS 'A'

MEDA Registration Certificate


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

Pankaj R. Dhirkar
GEM CP 22/786
Deepak Sood

GEM Certified Professional Certificate


Certificate of Registration

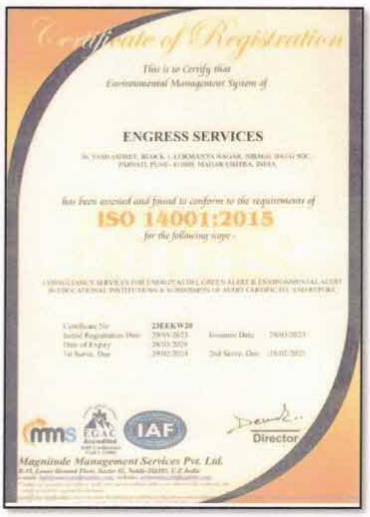
This is to Certify that
Quality Management System of

ENGRESS SERVICES

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

Director

ISO: 9001-2015 Certificate


Certificate of Registration

This is to Certify that
Environmental Management System of

ENGRESS SERVICES

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

Director

ISO: 14001-2015 Certificate

ENGRESS SERVICES PUNE

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ACKNOWLEDGEMENT

We Engress Services, Pune, express our sincere gratitude to the management of Babaji Datey Kala & Vanijya Mahavidyalaya, Yavatmal for awarding us the assignment of Green Audit of their Campus for the Year: 2022-23.

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

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EXECUTIVE SUMMARY

1. Babaji Datey Kala & Vanijya Mahavidyalaya, Yavatmal consumes Energy in the form of Electrical Energy; used for various Electrical Equipment, office & other facilities.

2. Present Energy Consumption& CO_2 Emission:

No	Particulars	Value	Unit
1	Annual Energy Consumption	**17084**	kWh
2	Annual CO_2 Emissions	**15.37**	MT

3. Renewable Energy & Energy Efficiency Projects:

- Usage of Energy Efficient LED Fittings
- Maximum usage of Day Lighting
- Installation of 15 KWp Solar Power Plant

4. Waste Management:

5.1 Segregation of Waste at Source:

The Waste is segregated at source in separate Waste Bins & is handed over for further action.

5.2 Bio Composting Pit:

The Institute has a Bio Composting Pit, to convert the Leafy Waste into Bio Compost.

5.3 Liquid Waste Management:

The Institute has installed Septic Tank and it cleans periodically.

5.4Sanitary Waste Management:

The Institute has installed Sanitary Waste Incinerator, for disposal of the Sanitary Waste.

5.5 E-Waste Management:

It is recommended to dispose of the E Waste through Authorized Agency.

6. Rain Water Management:

The Institute has installed the Rainwater Management project; the rain water falling on the terrace is collected through pipes and is used for recharging the land water table.

7. Green & Sustainable Practices:

- Maintenance of good Internal Road
- Provision of Ramp and Lift for Divyangajan
- Creation of awareness on Resource Conservation Display of Posters

ENGRESS SERVICES * PUNE *

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8. Assumption:

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

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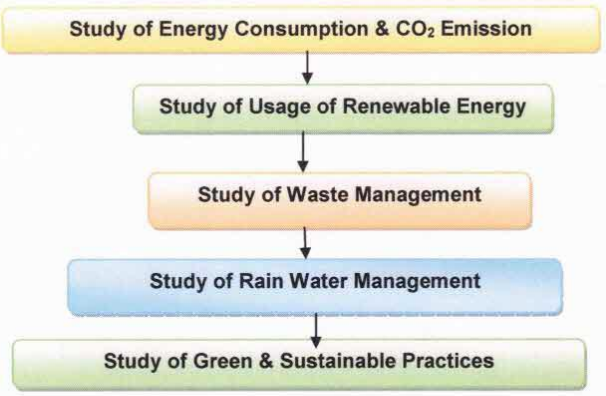
CHAPTER-I
INTRODUCTION

1.1 Introduction:

A Green Audit is conducted at College of Management & Computer Science, Yavatmal.

1.2 Audit Procedural Steps:



1.3 Institute Location Image:

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CHAPTER-II
STUDY OF ENERGY CONSUMPTION & CO_2 EMISSION

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

The Institute 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 is 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 Institute due to its Day to Day operations

Table No1: Month wise CO_2 Emissions:

Month	Energy Consumed M-291	Energy Consumed M-231	Energy Consumed M-885	Total Energy Consumed kWh	CO2 Emissions, MT
Apr-22	420	368	152	940	0.846
May-22	1378	376	121	1875	1.687
Jun-22	1253	381	186	1820	1.638
Jul-22	1128	381	180	1689	1.520
Aug-22	1255	801	162	2218	1.996
Sep-22	1409	289	370	2068	1.861
Oct-22	268	289	236	793	0.713
Nov-22	96	740	167	1003	0.902
Dec-22	621	347	223	1191	1.071
Jan-23	1123	368	222	1713	1.541
Feb-23	465	264	116	845	0.760
Mar-23	630	271	28	929	0.836
Total	10046	4875	2163	17084	15.375
Maximum	1409	801	370	2580	1.996
Minimum	96	264	28	388	0.713
Average	837.16	406.25	180.25	1423.66	1.281

Chart No 1: Month wise CO_2 Emissions:

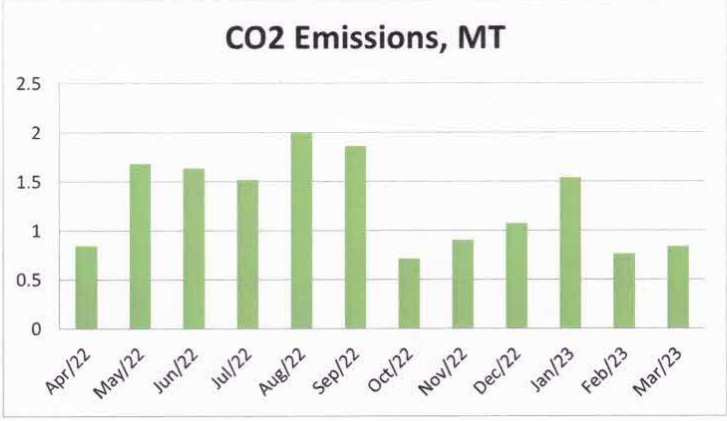

Table No2: Important Parameters:

No	Parameter/ Variation	Energy Consumed M-291	Energy Consumed M-231	Energy Consumed M-885	Total Energy Consumed kWh	CO_2 Emissions, MT
1	Total	10046	4875	2163	17084	15.375
2	Maximum	1409	801	370	2580	1.996
3	Minimum	96	264	28	388	0.713
4	Average	837.16	406.25	180.25	1423.66	1.281

CHAPTER III
STUDY OF USAGE OF RENEWABLE ENERGY

The Institute has installed a **15 kWp** capacity Roof top Solar PV Plant this year.
Now we compute the Percentage of Alternate Energy to Annual Energy demand:

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

No	Particulars	Value	Unit
1	Energy Purchased from MSEDCL	17084	kWh
2	Installed Roof Top Solar PV Plant Capacity	15	kWp
3	Average Daily Energy Generated	4	kWh/kWp
4	Annual Generation Days	300	Nos
5	Annual Solar Energy Generated	18000	kWh
6	Total Energy Demand = (1) + (5)	35084	kWh
7	Expecting % of Usage of Alternate Energy to Total Annual Energy Demand for Current Year Consumption= (5)*100/ (6)	51.30	%

Photograph of Roof Top Solar PV Plant:

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CHAPTER IV
STUDY OF WASTE MANAGEMENT

4.1 Segregation of Waste at Source:

The Waste is segregated at source in separate Waste Bins & is handed over for further action.

Photograph of Waste Collection Bins:

4.2 Bio Composting Pit:

The Institute has a Bio Composting Pit, to convert the Leafy Waste into Bio Compost.

Photograph of Bio Composting Pit:

4.3Liquid Waste Management:

The Institute has installed Septic Tanks it cleans periodically.

4.4 Sanitary Waste Management:

The Institute has installed Sanitary Waste Incinerator, for disposal of the Sanitary Waste.

4.5 E Waste Management:

It is recommended to dispose of the E Waste through Authorized Agency.

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CHAPTER V
STUDY OF RAIN WATER MANAGEMENT

The Institute has implemented the Rain Water Management Project. The Institute has installed Pipes from the terrace and the Rain water falling on the terrace is gathered and is used for recharging the land water table and gardening purpose.

Photograph of Rain Water Management & Pipe Section:

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CHAPTER VI
STUDY OF GREEN & SUSTAINABLE PRACTICES

6.1 Internal Pedestrian:

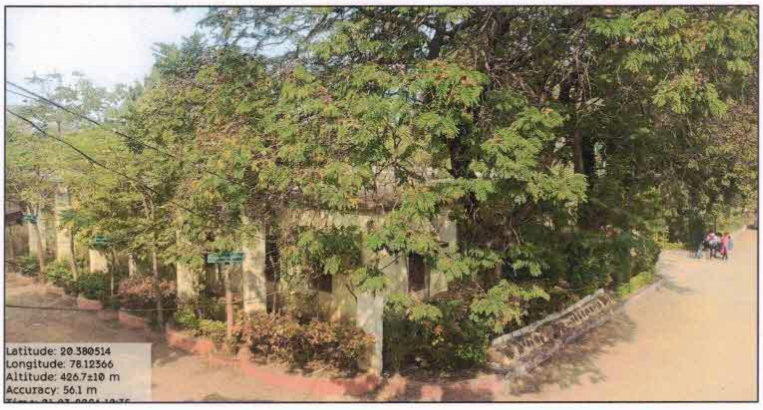
The College has well maintained internal Pedestrian to facilitate the easy movement of the students within the campus.

Photograph of Internal Pedestrian:

6.2 Internal Tree Plantation:

The College has well maintained landscaped garden in the campus.

Photograph of Tree plantation:



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6.3 Provision of Ramp for Divyangajan:

For easy movement of Divyangajan, the Institute has made provision of Ramp.

Photograph of Ramp:

6.3 Creation of Awareness about Energy Conservation:

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

Photograph of Poster on Energy Conservation:

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ANNEXURE-I

LIST OF TREES & PLANTS IN THE CAMPUS

Presently the College Campus has more than 100 trees:

Sr.No.	Name of Plants	Quantity
1	Azadirachta Indica	27
2	Millettia Pinnata	08
3	Eucalyptus	7
4	Sapindus Mukorossi	01
5	Indian Cork Tree	04
6	Ficus Religiosa	04
7	Mimusops Elengi	04
8	Delonix Regia	09
9	Syzygium Cumini	03
10	Polyath	7
11	Phyallanthus Emblica	01
12	Manila Tamarind	01
13	Peltophorum Pterocarpum	01
14	Tecoma Stans	6
15	Senna Auriculata	3

Energy Audit

ENERGY AUDIT REPORT

of

Babaji Datey Kala & Vanijya Mahavidyalaya,

Shivaji Nagar, Yavatmal 445 001

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
Yashashree, 26, Nirmal Bag Society, Near Muktangan English School, Parvati, Pune 411 009
Tel: 09890444795 Email: engress123@gmail.com
MEDA Registration No: ECN/2022-23/CR-43/1709
ISO: 9001-2015 Certified (Cert No: 23EQKC13)
ISO: 14001-2015 Certified (Cert No: 23EEKW20)

ENERGY AUDIT CERTIFICATE

Certificate No: ES/BDC/22-23/01 **Date: 26/10/2023**

This is to certify that we have conducted an Energy Audit at College of Babaji Datey Kala & Vanijya Mahavidyalaya, Yavatmal, in the Year 2022-23.

.The Institute has adopted following Energy Efficient practices:

- Usage of Energy Efficient LED Fittings
- Maximum usage of Day Lighting
- Installation of 15 kWp Solar PV Plant

We appreciate the support of Management, involvement of faculty members and students in the process of making the Campus Energy Efficient.

For Engress Services,

A Y Mehendale,
B E-Mechanical, M Tech- Energy
BEE Certified Energy Auditor, EA-8192

ENGRESS SERVICES PUNE

(3)

Registration Certificates

Regn. No. EA-8192 No. 2942

National Productivity Council
(National Certifying Agency)
PROVISIONAL CERTIFICATE

This is to certify that Mr / Ms. Achyut Yashavant Mehendale
son / daughter of Mr. Yashavant
has passed the National Certification Examination for Energy Auditors on April - 2007, conducted on behalf of the Bureau of Energy Efficiency, Ministry of Power, Government of India.
He / She is qualified as Certified Energy Manager as well as Certified Energy Auditor.
He / She shall be entitled to practice as Energy Auditor under the Energy Conservation Act 2001, subject to the fulfilment of qualifications for the Accredited Energy Auditors and issue of certificate of Accreditation by the Bureau of Energy Efficiency under the said Act.
This certificate is valid till the issuance of an official certificate by the Bureau of Energy Efficiency.

Place : Chennai, India
Date : 20th August 2007

Controller of Examination

AUDITOR Certificate

MAHARASHTRA ENERGY DEVELOPMENT AGENCY

Maharashtra Energy Development Agency
(Government of Maharashtra Institution)
Aundh Road, Opposite Spicer College Road, Near Commissionerate of Animal Husbandry, Aundh, Pune, Maharashtra 411 067
Ph No: 020-35000450
Email: ..., Web: www.mahaurja.com

MEDA/ECN/2022-23/RC-EA/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 Mukiangan 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)

MEDA Registration Certificate

Certificate of Registration

This is to Certify that
Quality Management System of

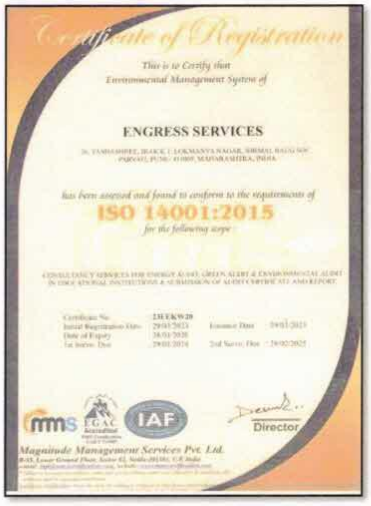
ENGRESS SERVICES

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

Director

Magnitude Management Services Pvt. Ltd.

ISO: 9001-2015 Certificate



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Magnitude Management Services Pvt. Ltd.

ISO: 14001-2015 Certificate

ENGRESS SERVICES PUNE

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3	Study of Present Energy Consumption	10
4	Study of Energy Performance Index	11
5	Study of Lighting	12
6	Study of Renewable Energy & Energy Efficiency	14

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

6

EXECUTIVE SUMMARY

1. Babaji Datey Kala & Vanijya Mahavidyalaya, Yavatmal consumes Energy in the form of Electrical Energy; used for various Electrical Equipment, office & other facilities.

2. Present Connected Load & Annual Energy Consumption:

No	Particulars	Value	Unit
1	Total Connected Load	62	kW
2	Annual Energy Consumption	17084	kWh
3	Annual CO_2 Emissions	15.37	MT

3. Energy Performance Index:

No	Particulars	Value	Unit
1	Total Annual Energy Consumed	17084	kWh
2	Total Built up area of Institute	9209.54	m^2
3	Energy Performance Index =(1) / (2)	**1.85**	kWh/m^2

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

No	Particulars	Value	Unit
1	Lighting Power Density	**1.06**	W/m^2
2	% of Usage of LED Lighting to Total Lighting Load	**100**	%

5. Renewable Energy & Energy Efficiency Projects:

- Usage of Energy Efficient LED Fittings
- Maximum usage of Day Lighting
- Installation of 15 KWp Solar Power Plant

6. Assumption:

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

7. References:

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

ABBREVIATIONS

LED	:	Light Emitting Diode
MSEDCL	:	Maharashtra State Electricity Distribution Company Limited
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

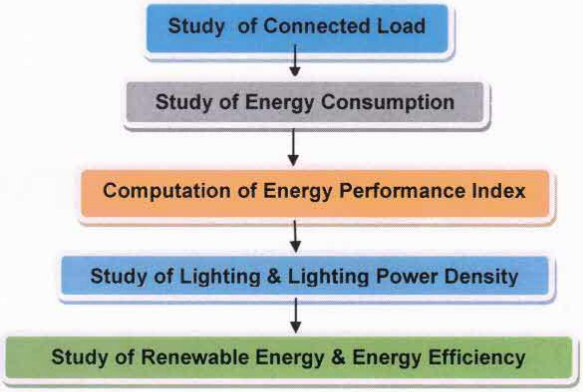
CHAPTER-I
INTRODUCTION

1.1 Introduction:

An Energy Audit is conducted at Babaji Datey Kala & Vanijya Mahavidyalaya, Yavatmal.The guidelines followed for conducting the Energy Audit are:

- BEE India's Energy Conservation Building Code: ECBC-2017
- Maharashtra Energy Development Agency (www.mahaurja.com)
- Tata Power: www.tatapower.com

1.2 Audit Procedural Steps:



1.3 Institute Location Image:

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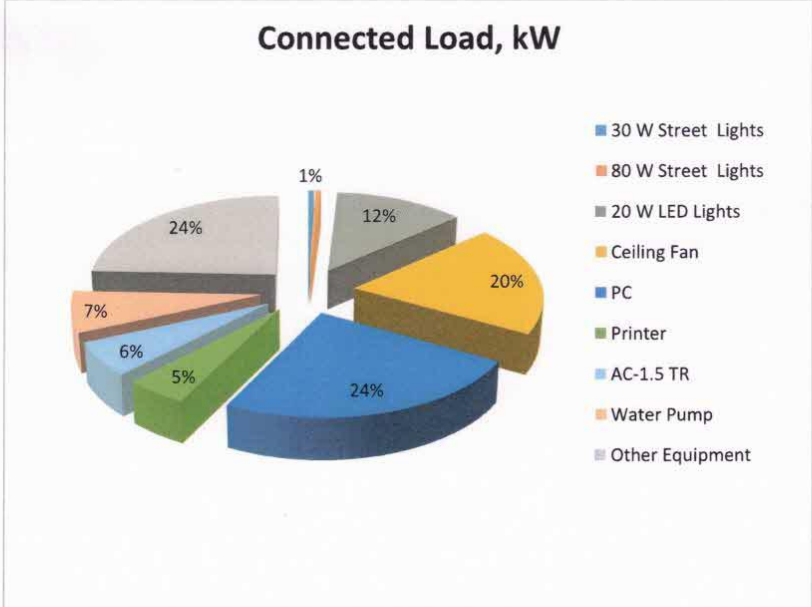
CHAPTER-II
STUDY OF CONNECTED LOAD

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

Table No 1: Study of Equipment wise Connected Load:

No	Equipment	Qty	Load, W/Unit	Load, kW
1	30 W Street Lights	11	30	0.33
2	80 W Street Lights	4	80	0.32
3	20 W LED Lights	385	20	7.7
4	Ceiling Fan	186	65	12.09
5	PC	100	150	15
6	Printer	20	150	3
7	AC-1.5 TR	2	1875	3.75
8	Water Pump	2	2238	4.476
9	Other Equipment	100	150	15
10	**Total**			**62**

Chart No 1: Study of Connected Load:



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CHAPTER-III
STUDY OF PRESENT ENERGY CONSUMPTION

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

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

Month	Energy Consumed M-291	Energy Consumed M-231	Energy Consumed M-885	Total Energy Consumed kWh
Apr-22	420	368	152	940
May-22	1378	376	121	1875
Jun-22	1253	381	186	1820
Jul-22	1128	381	180	1689
Aug-22	1255	801	162	2218
Sep-22	1409	289	370	2068
Oct-22	268	289	236	793
Nov-22	96	740	167	1003
Dec-22	621	347	223	1191
Jan-23	1123	368	222	1713
Feb-23	465	264	116	845
Mar-23	630	271	28	929
Total	10046	4875	2163	17084
Maximum	1409	801	370	2580
Minimum	96	264	28	388
Average	837.16	406.25	180.25	1423.66

Chart No 2: Variation in Monthly Energy Consumption:

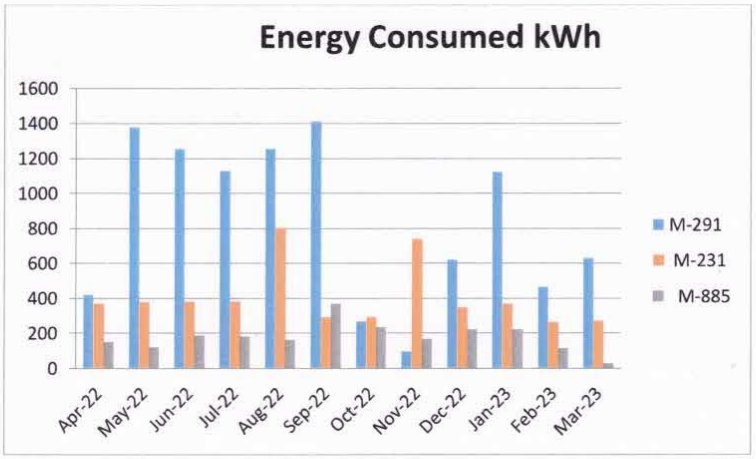

Table No 3: Important Parameters:

No	Parameter/ Variation	Energy Consumed M-291	Energy Consumed M-231	Energy Consumed M-885	Total Energy Consumed kWh
1	Total	10046	4875	2163	17084
2	Maximum	1409	801	370	2580
3	Minimum	96	264	28	388
4	Average	837.16	406.25	180.25	1423.66

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CHAPTER-IV
STUDY OF ENERGY PERFORMANCE INDEX

Energy Performance Index: Energy Performance Index of a Building is its Annual Energy Consumption in Kilo Watt Hours per square meter of the Building

It is determined by:

$$EPI = \frac{\text{(Annual Energy Consumption in kWh)}}{\text{(Total Built-up area in m}^2\text{)}}$$

Now we compute the EPI for the Institute as under:

Table No4: Computation of Energy Performance Index:

No	Particulars	Value	Unit
1	Total Annual Energy Consumed	17084	kWh
2	Total Built up area of Institute	9209.54	m^2
3	Energy Performance Index =(1) / (2)	**1.85**	kWh/m^2

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CHAPTER V
STUDY OF LIGHTING

Terminology:

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

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

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

4. Installed Load Efficacy is the average maintained illuminance provided on a horizontal working plane per circuit watt with general lighting of an interior. Unit: lux per watt per square metre (lux/W/m²)

5. Lamp Circuit Efficacy is the amount of light (lumens) emitted by a lamp for each watt of power consumed by the lamp circuit, i.e. including control gear losses. This is a more meaningful measure for those lamps that require control gear. Unit: lumens per circuit watt (lm/W)

6. Installed Power Density. The installed power density per 100 lux is the power needed per square metre of floor area to achieve 100 lux of average maintained illuminance on a horizontal working plane with general lighting of an interior
Unit: watts per square metre per 100 lux (W/m²/100 lux) 100 Installed power density (W/m²/100 lux)

7. Lighting Power Density: It is defined as Total Lighting Load in a room divided by the Area of that Room in square meters.

In this Chapter we compute: Lighting Power Density of a Class Room. We also compute the percentage usage of LED Lighting to total Lighting Load of the Institute.

Table No 5: Computation of Lighting Power Density:

No	Particulars	Value	Unit
1	No of 20 W LED Tube Lights in Class Room	04	Nos
2	Demand of 20 W LED Tube Light	20	W/Unit
3	Total Lighting Load in the Class Room= **(1) * (2)**	**80**	W
4	Area of Class Room	50	m^2
5	Lighting Power Density = **(3)/ (4)**	**1.6**	W/m^2

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Now, we compute the usage of LED Lighting to Total Lighting Load, as under.

Table No 6: Percentage Usage of LED Lighting to Annual Lighting Load:

No	Particulars	Value	Unit
1	No of 20 W LED Tube Lights	385	Nos
2	Demand of 20 W LED Tube Light	20	W/Unit
3	Total Electrical Load of 20 W LED Fittings	**7.7**	kW
4	No of 30 W Street Light Fittings	11	Nos
5	Demand of 30 W Street Light Fitting	30	W/Unit
6	Total Electrical Load of 30 W Street Light Fittings	**0.33**	kW
7	No of 80 W Street Light Fittings	4	Nos
8	Demand of 80 W Street Light Fitting	80	W/Unit
9	Total Electrical Load of 80 W Street Light Fittings	**0.32**	kW
10	Total Lighting Load=3+6+9	**8.35**	kW
11	Total LED Lighting Load= 10	**8.35**	kW
12	Lighting Requirement met by LED= 11*100/10	**100**	%

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CHAPTER-VI
STUDY OF RENEWABLE ENERGY & ENERGY EFFICIENCY

The Institute has installed a **15 kWp** capacity Roof top Solar PV Plant this year.
Now we compute the Percentage of Alternate Energy to Annual Energy demand:

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

No	Particulars	Value	Unit
1	Energy Purchased from MSEDCL	17084	kWh
2	Installed Roof Top Solar PV Plant Capacity	15	kWp
3	Average Daily Energy Generated	4	kWh/kWp
4	Annual Generation Days	300	Nos
5	Annual Solar Energy Generated	18000	kWh
6	Total Energy Demand = (1) + (5)	35084	kWh
7	Expecting % of Usage of Alternate Energy to Total Annual Energy Demand for Current Year Consumption= (5)*100/ (6)	51.30	%

Photograph of Roof Top Solar PV Plant:

Environment Audit

ENVIRONMENTAL AUDIT REPORT

of

Babaji Datey Kala & Vanijya Mahavidyalaya,

Shivaji Nagar, Yavatmal 445 001

Year: 2022-23

Prepared by:

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

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ENGRESS SERVICES

Yashashree, 26, Nirmal Bag Society, Near Muktangan English School,
Parvati, Pune 411 009Tel: 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/BDM/22-23/03 **Date: 26/10/2023**

This is to certify that we have conducted Environmental Audit at Babaji Datey Kala & Vanijya Mahavidyalaya, Yavatmal in the Year 2022-23.

The Institute has adopted following Energy Efficient& Green Practices:

- Usage of Energy Efficient LED Light Fitting
- Installation of 15 kWp Roof Top Solar PV Plant
- Segregation of Waste at Source
- Installation of Sanitary Waste Incinerator
- Installation of Bio Composting Pit
- College has installed septic tanks and it cleans periodically
- Installation of Rain Water Management Project
- Maintenance of good Internal Road
- Tree Plantation in the Campus
- Creation of awareness by display of Posters on Resource Conservation

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

For Engress Services,

ENGRESS SERVICES * PUNE *

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

REGISTRATION CERTIFICATES


Maharashtra Energy Development Agency

CERTIFICATE OF REGISTRATION
FOR CLASS "A"

MEDA Registration Certificate


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

Pankaj R. Dharkar — GEM CP 22/786 — Deepak Sood

GEM Certified Professional Certificate


Certificate of Registration

This is to Certify that Quality Management System of

ENGRESS SERVICES

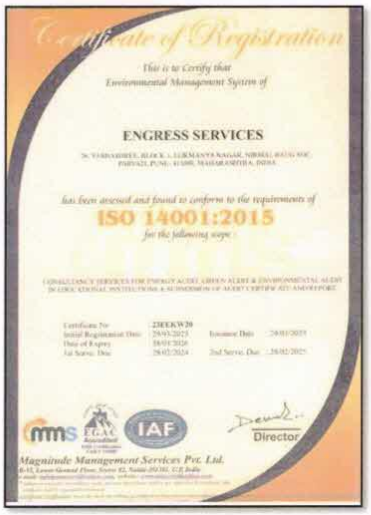
has been assessed and found to conform to the requirements of

ISO 9001:2015

for the following scope:

Director

ISO: 9001-2015 Certificate


Certificate of Registration

This is to Certify that Environmental Management System of

ENGRESS SERVICES

has been assessed and found to conform to the requirements of

ISO 14001:2015

for the following scope:

Director

ISO: 14001-2015 Certificate

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ACKNOWLEDGEMENT

We Engress Services, Pune, express our sincere gratitude to the management of Babaji Datey Kala & Vanijya Mahavidyalaya, Yavatmal for awarding us the assignment of Environmental Audit of their Campus for the Year: 2022-23.

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

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EXECUTIVE SUMMARY

1. Babaji Datey Kala & Vanijya Mahavidyalaya, Yavatmal consumes Energy in the form of Electrical Energy; used for various Electrical Equipment, office & other facilities.

2. Pollution due to Institute 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	17084	kWh
2	Annual CO_2 Emissions	15.37	MT

4. Various initiatives taken for Environmental Conservation:

- Usage of Energy Efficient LED fittings
- Bio Composting Pit Installation
- Installation of 15 kWp Capacity Roof Top Solar PV Plant

5. Indoor Air Quality Parameters:

No	Parameter/Value	AQI	PM-2.5	PM-10
1	Maximum	129	71	85
2	Minimum	101	58	72

6. Indoor Comfort Conditions:

No	Parameter/Value	Temperature, °C	Humidity, %	Lux Level	Noise Level, dB
1	Maximum	31	47	250	41
2	Minimum	29	42	141	36

7. Waste Management:

7.1 Segregation of Waste at Source:

The Waste is segregated at source in separate Waste Bins & is handed over for further action.

7.2 Bio Composting Pit:

The Institute has a Bio Composting Pit, to convert the Leafy Waste into Bio Compost.

7.3 Liquid Waste Management:

The Institute has installed Septic Tank and it cleans periodically.

7.4 Sanitary Waste Management:

The Institute has installed Sanitary Waste Incinerator, for disposal of the Sanitary Waste.

7.5 E Waste Management:

It is recommended to dispose of the E Waste through Authorized Agency.

8. Rain Water Management:

The Institute has installed the Rainwater Management project; the rain water falling on the terrace is collected through pipes and is used for recharging the land water table and gardening purpose.

9. Environment Friendly Initiatives:

- Display of Posters on Resource Conservation
- Tree Plantation drive NSS Cell.

10. Assumption:

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

11. References:

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

ABBREVIATIONS

Kg	:	Kilo Gram
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

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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:

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1.5 Institute Location Image:

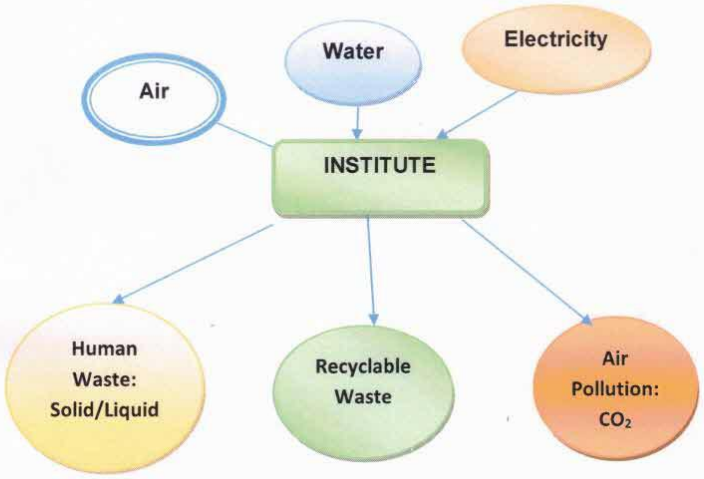
CHAPTER-II
STUDY OF RESOURCE CONSUMPTION& CO_2 EMISSION

The Institute consumes following basic/derived Resources:

1. Air
2. Water
3. Electrical Energy

We try to draw a schematic diagram for the Institute System & Environment as under.

Chart No 1: Representation of Institute 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 5: Study of Consumption of Electrical Energy & CO_2 Emissions: 22-23:

Month	Energy Consumed M-291	Energy Consumed M-231	Energy Consumed M-885	Total Energy Consumed kWh	CO2 Emissions, MT
Apr-22	420	368	152	940	0.846
May-22	1378	376	121	1875	1.687
Jun-22	1253	381	186	1820	1.638
Jul-22	1128	381	180	1689	1.520
Aug-22	1255	801	162	2218	1.996
Sep-22	1409	289	370	2068	1.861
Oct-22	268	289	236	793	0.713
Nov-22	96	740	167	1003	0.902

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Dec-22	621	347	223	1191	1.071
Jan-23	1123	368	222	1713	1.541
Feb-23	465	264	116	845	0.760
Mar-23	630	271	28	929	0.836
Total	10046	4875	2163	17084	15.375
Maximum	1409	801	370	2580	1.996
Minimum	96	264	28	388	0.713
Average	837.16	406.25	180.25	1423.66	1.281

Chart No 2: Month wise CO_2Emissions:

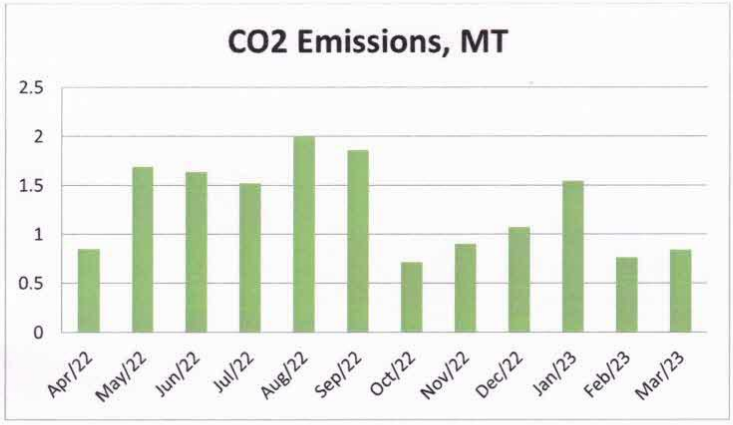

Table No 6: Important Parameters:

No	Parameter/ Variation	Energy Consumed M-291	Energy Consumed M-231	Energy Consumed M-885	Total Energy Consumed kWh	CO_2 Emissions, MT
1	Total	10046	4875	2163	17084	15.375
2	Maximum	1409	801	370	2580	1.996
3	Minimum	96	264	28	388	0.713
4	Average	837.16	406.25	180.25	1423.66	1.281

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CHAPTER III
STUDY OF USAGE OF RENEWABLE ENERGY

The Institute has installed a **15 kWp** capacity Roof top Solar PV Plant this year.
Now we compute the Percentage of Alternate Energy to Annual Energy demand:

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

No	Particulars	Value	Unit
1	Energy Purchased from MSEDCL	17084	kWh
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5	Annual Solar Energy Generated	18000	kWh
6	Total Energy Demand = (1) + (5)	35084	kWh
7	Expecting % of Usage of Alternate Energy to Total Annual Energy Demand for Current Year Consumption= (5)*100/ (6)	51.30	%

Photograph of Roof Top Solar PV Plant:

CHAPTER IV
STUDY OF INDOOR AIR QUALITY

4.1 Importance of Air Quality:

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

By volume, Dry Air contains 78.09% Nitrogen, 20.95% Oxygen, 0.93% Argon, 0.039% carbon dioxide, and small amounts of other gases.

On average, a person inhales about **14,000 liters** of air every day. Therefore, poor air quality may affect the quality of life now and for future generations by affecting the health, the environment, the economy and the city's livability.

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 10micron

Table No7: Indoor Air Quality Parameters:

No	Locations	AQI	PM2.5	PM10
1	Computer Laboratory	102	61	81
2	B.Com Class room	109	67	80
3	NSS Room	114	70	79
4	Physical Education Room	129	66	81
5	Room No.11	121	67	82
6	Administrative Block	119	71	85
7	NAAC Room	101	58	85
8	Library	105	69	80
9	NCC Office	109	61	72
10	Exam Control Room	106	69	78
11	Girls Hostel	106	67	79
12	Maximum	129	71	85
13	Minimum	101	58	72

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, °C	Humidity, %	Lux Level	Noise Level, dB
1	Computer Laboratory	31	42	220	37
2	B.Com Class room	30.1	44	240	39.2
3	NSS Room	30.1	44	210	37
4	Physical Education Room	30.2	44	230	40
5	Room No.11	29.8	47	141	39.2
6	Administrative Block	29.6	44	244	38.2
7	NAAC Room	29	47	142	38
8	Library	30.1	45	156	41
9	NCC Office	30	46	241	42
10	Exam Control Room	30	46	250	41
11	Girls Hostel	30	45	240	41
12	**Maximum**	**31**	**47**	**250**	**41**
13	**Minimum**	**29**	**42**	**141**	**36**

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CHAPTER VI
STUDY OF WASTE MANAGEMENT

6.1 Segregation of Waste at Source:

The Waste is segregated at source in separate Waste Bins & is handed over for further action.

Photograph of Waste Collection Bins:

6.2 Bio Composting Pit:

The Institute has a Bio Composting Pit, to convert the Leafy Waste into Bio Compost.

Photograph of Bio Composting Pit:

6.3 Liquid Waste Management:

The Institute has installed Septic Tanks it cleans periodically.

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6.4 Sanitary Waste Management:

The Institute has installed Sanitary Waste Incinerator, for disposal of the Sanitary Waste.

6.5 E Waste Management:

It is recommended to dispose of the E Waste through Authorized Agency.

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CHAPTER-VII
STUDY OF RAIN WATER MANAGEMENT

The Institute has implemented the Rain Water Management Project. The Institute has installed Pipes from the terrace and the Rain water falling on the terrace is gathered and is used for recharging the land water table and gardening purpose.

Photograph of Rain Water Management & Pipe Section:

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CHAPTER-VIII
STUDY OF ECO FRIENDLY INITIATIVES

8.1 7.1 Internal Tree Plantation:

The College has internal Tree Plantation.

Photograph of Internal Tree Plantation:

8.2 Creation of Awareness about Energy Conservation:

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

Photograph of Poster on Energy Conservation:

ANNEXURE-I:
VARIOUS AIR QUALITY, WATER QUALITY, NOISE & INDOOR COMFORT STANDARDS:

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

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

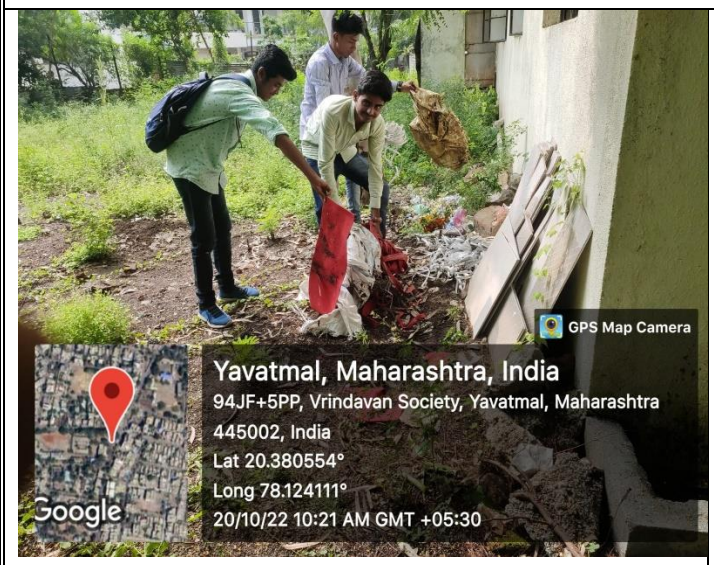
4. Thermal Comfort Conditions: For Non-conditioned Buildings:

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

Beyond the Campus Environmental Promotional Activities

Plastic Eradication Awareness Campaign

Date: 20/10/2022



Seedball Workshop

Date: 05/06/2022

Prayas Shramadan

Date: 08/05/2022