

# ENVIRONMENTAL AUDIT REPORT

of

**YASHWANTRAO CHAVAN MAHARASHTRA  
OPEN UNIVERSITY,**

**Dnyangangotri, Near Gangapur Dam,  
Nashik 422 222**



Year: 2021-22

Prepared by:

## **ENGRESS SERVICES**

Yashashree, 26, Nirmal Bag Society,  
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**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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ECN/2022-23/CR-43/1709 10<sup>th</sup> 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.

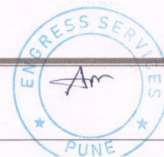
**Name and Address of the firm** : M/s Engress Services  
Yashshree, 26, Nirmal Bag Society,  
Near Muktagan English School,  
Parvati, Pune - 411 009.

**Registration Category** : *Empanelled Consultant for Energy Conservation Programme for Class 'A'*

**Registration Number** : *MEDA/ECN/2022-23/Class AEA-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 **09<sup>th</sup> 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

Yashashree, 26, Nirmal Bag Society,  
Near Mukhtangan English School, Parvati, Pune 411 009  
Tel: 09890444795 Email: [engress123@gmail.com](mailto:engress123@gmail.com)

Ref: ES/YCMOU/21-22/03

Date: 11/6/2022

## CERTIFICATE

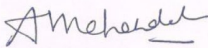
This is to certify that we have conducted Environmental Audit at Yashwantrao Chavan Maharashtra Open University, Dnyangangotri, Near Gangapur Dam, Nashik in the year 2021-22.

The University has adopted following Environmentally Friendly Practices:

- Usage of Energy Efficient LED Fittings
- Maximum Usage of Day Lighting in the campus
- Installation of 13625 LPD Solar Thermal Water Heating System.
- In process Installation of 55 kWp off Grid Solar PV Plant
- Segregation of Waste at source
- Installation of a Bio Gas Plant, for conversion of Food Waste
- Installation of Sanitary Waste Incinerator
- Construction of Internal Bandhara of Capacity 26.2 Million Liters
- Construction of Farm pond
- Rain Water Harvesting project for making use of rain water falling on terrace
- Tree Plantation in the campus
- Plastic Free Campus Initiatives
- Paperless Campus Initiatives
- Construction of an Eco Friendly and Low Cost Model Bamboo House

We appreciate the support of Management and involvement of faculty members and staff members in the process of making the campus Energy Efficient and Environment Friendly.

For Engress Services,



A Y Mehendale,

Certified Energy Auditor, EA-8192

ASSOCHAM GEM Certified Professional: GEM: 22/788



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## **ACKNOWLEDGEMENT**

We Engress Services, Pune, express our sincere gratitude to the management of Yashwantrao Chavan Maharashtra Open University, Dnyangangotri, Near Gangapur Dam, Nashik 422 222 for awarding us the assignment of Environmental Audit of their Nashik Campus, for the Year: 2021-22.

We are thankful to:

- Prof. Dr. P. G. Patil, Vice Chancellor
- Dr. Dinesh Bhonde, Registrar
- Dr. Surya Gunjal, CIQA Director
- Shri Kiran Hire, Junior Engineer
- Shri Nandakumar Jadhav, Electrician
- Shri Sandeep Bhagwat, Farm Manager

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

## EXECUTIVE SUMMARY

1. Yashwantrao Chavan Maharashtra Open University, Nashik Energy in three forms, namely: Electrical Energy, Diesel and LPG.

### 2. Present Consumption of Various Resources & CO<sub>2</sub> Emission:

| No | Parameter/ Value | Energy Purchased, kWh | Diesel Consumed, Liters | CO <sub>2</sub> Emissions, MT |
|----|------------------|-----------------------|-------------------------|-------------------------------|
| 1  | Total            | 501718                | 28700                   | 528.46                        |
| 2  | Maximum          | 52466                 | 2560                    | 54.08                         |
| 3  | Minimum          | 33359                 | 2090                    | 35.62                         |
| 4  | Average          | 41809.83              | 2391.67                 | 44.04                         |

### 3. Pollution caused due to Day-to-Day Activities:

- **Air pollution:** Mainly CO<sub>2</sub> on account of Electricity, LPG & Diesel Consumption
- **Solid Waste:** Bio degradable Kitchen Waste, Garden Waste, Recyclable Waste and Human Waste
- **Liquid Waste:** Human liquid waste

### 4. Various Environmental Friendly Projects implemented:

- Usage of Energy Efficient LED fittings
- Usage of Maximum Day Lighting
- Installation of **13625 LPD** Solar Thermal Water Heating System.
- Under Installation of Off Grid Solar PV Plant of Capacity **55 kWp**.

### 5. Usage of Renewable Energy:

1. The University has installed a **13625 LPD** Solar Thermal Water Heating System.
2. The University is also installing Off Grid Solar PV Plants which include: Roof Top Plants, Solar Outdoor Lighting and Solar PV based Water Pump.
3. The Total Solar PV Plant capacity is **55 kWp**.

### 6. Indoor Air Quality Parameters:

| No | Parameter/Value | AQI | PM-2.5 | PM-10 |
|----|-----------------|-----|--------|-------|
| 1  | Maximum         | 96  | 66     | 79    |
| 2  | Minimum         | 90  | 52     | 64    |

### 7. Indoor Comfort Condition Parameters:

| No | Parameter/Value | Temperature, °C | Humidity, % | Lux Level | Noise Level, dB |
|----|-----------------|-----------------|-------------|-----------|-----------------|
| 1  | Maximum         | 30.1            | 41          | 210       | 45              |
| 2  | Minimum         | 29.9            | 40          | 98        | 39.6            |

## 8. Waste Management:

### 8.1 Segregation of Waste at Source:

The recyclable Waste, like paper, plastic waste is segregated at source and is handed over to Authorized Agency.

### 8.2 Vermi-Composting:

The University has Vermi-composting facility & about 100 MT of Vermi compost is produced annually and is used in the own campus.

### 8.3 Biogas Plant:

The University has installed a Biogas plant at the Yash Inn facility, to convert the kitchen waste into bio gas, which in turn is used for cooking.

### 8.4 Sanitary Waste Management:

The University has installed a Sanitary Waste Incinerator, for disposal of Sanitary Waste generated.

### 8.5 Liquid Waste Management:

It is recommended to install a Sewage Treatment Plant, for treatment of Liquid Waste.

### 8.6 E Waste Management:

For E-Waste management, the University follows the Methodology, as per the Government Regulations & it is disposed of by calling the tenders.

## 9. Rain Water Harvesting:

The University has installed Rain Water Harvesting Project in three ways:

- Construction of **Yashwant Bandhara** of storage capacity **26.2 Million Liters**,
- Farm Pond
- Rain Water Harvesting and usage for bore well recharge.

## 10. Eco Friendly Initiatives:

1. Tree Plantation in the campus
2. Plastic Free Campus Initiatives
3. Paperless Office Initiatives
4. Construction of Low Cost and Eco Friendly Model Bamboo House

## 11. Assumptions:

1. **1 kWh** of Electrical Energy releases **0.9 Kg of CO<sub>2</sub>** into atmosphere
2. **1 Liter of Diesel** releases **2.68 Kg of CO<sub>2</sub>** into atmosphere.

## 12. References:

- For CO<sub>2</sub> Emissions: [www.tatapower.com](http://www.tatapower.com)
- For Various Indoor Air Parameters: [www.ishrae.com](http://www.ishrae.com)
- For AQI & Water Quality Standards: [www.cpcb.com](http://www.cpcb.com)



## ABBREVIATIONS

|                 |                         |
|-----------------|-------------------------|
| kWh             | Kilo Watt Hour          |
| kWp             | Kilo Watt Peak          |
| Kg              | Kilo Gram               |
| MT              | Metric Ton              |
| CO <sub>2</sub> | Carbon Di Oxide         |
| LPD             | Liters per Day          |
| LPG             | Liquefied Petroleum Gas |
| LED             | Light Emitting Diode    |
| Qty             | Quantity                |
| m               | Meters                  |
| L               | Length                  |
| B               | Breadth                 |
| H               | Height                  |

## 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 University)                                  |
| 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)                 |

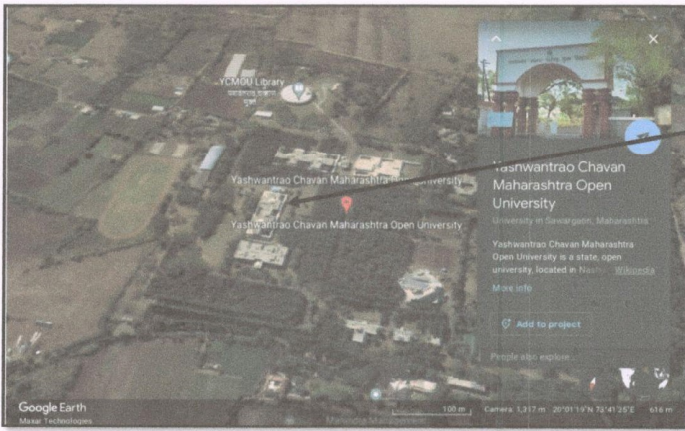
**1.2 Audit Methodology:**

1. Study of University as System
2. Study of present Resource Consumption and CO<sub>2</sub> Emission
3. Study of CO<sub>2</sub> Emission Reduction
4. Study of Indoor Air Quality
5. Study of Indoor Comfort Parameters
6. Study of Waste Management
7. Study of Rain Water Harvesting
8. Study of Environment Friendly Initiatives

**1.2 Table No 4: General Details of the University:**

| No | Head                      | Particulars                                      |
|----|---------------------------|--|
| 1  | Name of Institution       | Yashwantrao Chavan Maharashtra Open University   |
| 2  | Address                   | Dnyangangotri, Near Gangapur Dam, Nashik 422 222 |
| 3  | Year of Establishment     | 1989   |
| 4  | Academic Programs Offered | 200 Plus   |

1.4 Google Earth Image:



University  
Campus



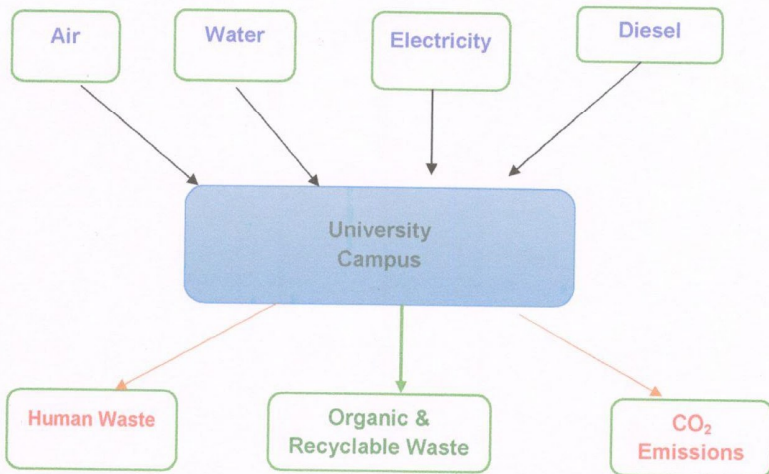
## CHAPTER-II STUDY OF CONSUMPTION OF VARIOUS RESOURCES

2.1 The University consumes following Natural/derived Resources:

1. Air
2. Water
3. Electrical Energy
4. Diesel

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

2.2 Chart No: 1: Representation of University as System:



The University uses two forms of Energy namely: Electrical Energy for various Electrical gadgets and Diesel.

**Basis for computation of CO<sub>2</sub> Emissions:**

The basis of Calculation for CO<sub>2</sub> emissions due to Electrical Energy & Diesel is as under

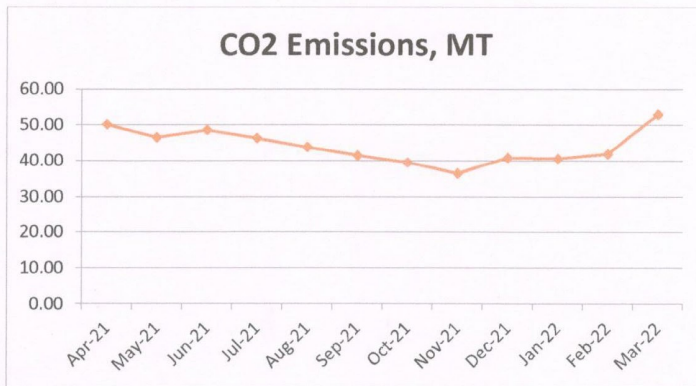
- 1 Unit (kWh) of Electrical Energy releases **0.9 Kg** of CO<sub>2</sub> into atmosphere
- 1 Liter of Diesel releases **2.68 Kg** of CO<sub>2</sub> into atmosphere.

Based on the above Data we compute the CO<sub>2</sub> emissions which are being released in to the atmosphere by the University due to its Day to Day operations

**Table No 5: Month wise Energy Consumption & CO<sub>2</sub> Emissions:**

| No | Month   | Energy Purchased, kWh | Diesel Consumed, Liters | CO <sub>2</sub> Emissions, MT |
|----|---------|-----------------------|-------------------------|-------------------------------|
| 1  | Apr-21  | 48321                 | 2449                    | 50.05                         |
| 2  | May-21  | 44012                 | 2540                    | 46.42                         |
| 3  | Jun-21  | 46867                 | 2360                    | 48.51                         |
| 4  | Jul-21  | 44528                 | 2280                    | 46.19                         |
| 5  | Aug-21  | 41360                 | 2416                    | 43.70                         |
| 6  | Sep-21  | 38444                 | 2560                    | 41.46                         |
| 7  | Oct-21  | 36614                 | 2430                    | 39.47                         |
| 8  | Nov-21  | 33359                 | 2390                    | 36.43                         |
| 9  | Dec-21  | 37795                 | 2540                    | 40.82                         |
| 10 | Jan-22  | 37578                 | 2510                    | 40.55                         |
| 11 | Feb-22  | 40374                 | 2090                    | 41.94                         |
| 12 | Mar-22  | 52466                 | 2135                    | 52.94                         |
| 13 | Total   | 501718                | 28700                   | 528.46                        |
| 14 | Maximum | 52466                 | 2560                    | 54.08                         |
| 15 | Minimum | 33359                 | 2090                    | 35.62                         |
| 16 | Average | 41809.83              | 2391.67                 | 44.04                         |

**Chart No 2: Representation of Month wise CO<sub>2</sub> Emissions:**



**Table No 6: Variation in Important Parameters:**

| No | Parameter/ Value | Energy Purchased, kWh | Diesel Consumed, Liters | CO <sub>2</sub> Emissions, MT |
|----|------------------|-----------------------|-------------------------|-------------------------------|
| 1  | Total            | 501718                | 28700                   | 528.46                        |
| 2  | Maximum          | 52466                 | 2560                    | 54.08                         |
| 3  | Minimum          | 33359                 | 2090                    | 35.62                         |
| 4  | Average          | 41809.83              | 2391.67                 | 44.04                         |

### CHAPTER-III STUDY OF CO<sub>2</sub> EMISSION REDUCTION

The University has installed Solar Thermal Water Heating System. The details of installation are as under.

The University is in process of Installation of Off Grid Solar PV Plant for various Applications like: Outdoor Lighting, Water pump etc.

Table No 7: Details of Solar Thermal Water Heating System:

| No | Location        | Capacity in LPD |
|----|-----------------|-----------------|
| 1  | Yash Inn Centre | 8625            |
| 2  | Godavari Hostel | 2500            |
| 3  | Abhyagat Niwas  | 2500            |
| 4  | Total           | 13625           |

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 litres** 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.'

As per Section 2(a) of Air (Prevention and control of pollution) Act, 1981 'air pollutant' has been defined as 'any solid, liquid or gaseous substance [(including noise)] present in the atmosphere in such concentration as may be or tend to be injurious to human beings or other living creatures or plants or property or environment

### 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 8: Indoor Air Quality Parameters:**

| No | Location          | AQI | PM-2.5 | PM-10 |
|----|-------------------|-----|--------|-------|
|    | Academic Building |     |        |       |
|    | Ground Floor      |     |        |       |



|    |                                |    |    |    |
|----|--------------------------------|----|----|----|
| 1  | School of Continuing Education | 90 | 54 | 67 |
| 2  | School of Agricultural Science | 93 | 56 | 70 |
| 3  | School of Health Science       | 95 | 57 | 73 |
|    | <b>First Floor</b>             |    |    |    |
| 4  | Academic Series Division       | 93 | 55 | 68 |
| 5  | School of Education            | 93 | 56 | 69 |
|    |                                |    |    |    |
|    | <b>Main Building</b>           |    |    |    |
|    | <b>Ground Floor</b>            |    |    |    |
| 6  | Registration Centre            | 90 | 52 | 67 |
| 7  | Establishment Section          | 96 | 66 | 79 |
| 8  | Registrar Office               | 91 | 55 | 67 |
|    | <b>First Floor</b>             |    |    |    |
| 9  | Jr. Engineer Office            | 90 | 52 | 64 |
| 10 | Finance Department             | 93 | 55 | 68 |
| 11 | Asstt. Registrar Office        | 96 | 56 | 72 |
|    |                                |    |    |    |
| 12 | Krishi Vigyan Bhavan           | 91 | 58 | 68 |
|    | Maximum                        | 96 | 66 | 79 |
|    | Minimum                        | 90 | 52 | 64 |

## 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 9: Study of Indoor Comfort Condition Parameters:**

| No | Location                       | Temperature, °C | Humidity, % | Lux Level | Noise Level, dB |
|----|--------------------------------|-----------------|-------------|-----------|-----------------|
|    | <b>Academic Building</b>       |                 |             |           |                 |
|    | <b>Ground Floor</b>            |                 |             |           |                 |
| 1  | School of Continuing Education | 29.9            | 41          | 163       | 43.6            |
| 2  | School of Agricultural Science | 29.9            | 41          | 139       | 42              |
| 3  | School of Health Science       | 30              | 41          | 98        | 41.9            |
|    | <b>First Floor</b>             |                 |             |           |                 |
| 4  | Academic Series Division       | 29.9            | 40          | 142       | 45              |
| 5  | School of Education            | 30              | 41          | 174       | 39.6            |
|    |                                |                 |             |           |                 |
|    | <b>Main Building</b>           |                 |             |           |                 |
|    | <b>Ground Floor</b>            |                 |             |           |                 |
| 6  | Registration Centre            | 30              | 40          | 164       | 40.6            |
| 7  | Establishment Section          | 30              | 40          | 203       | 42.1            |
| 8  | Registrar Office               | 30.1            | 41          | 210       | 43              |
|    | <b>First Floor</b>             |                 |             |           |                 |
| 9  | Jr. Engineer Office            | 30.1            | 41          | 195       | 41.3            |
| 10 | Finance Department             | 30              | 41          | 185       | 43.2            |
| 11 | Asstt. Registrar Office        | 30              | 40          | 149       | 44.1            |
|    |                                |                 |             |           |                 |
| 12 | Krishi Vigyan Bhavan           | 30.1            | 40          | 164       | 45              |
|    | Maximum                        | 30.1            | 41          | 210       | 45              |
|    | Minimum                        | 29.9            | 40          | 98        | 39.6            |

## CHAPTER VI STUDY OF WASTE MANAGEMENT

### 6.1 Segregation of Waste at Source:

The recyclable Waste, like paper, plastic waste is segregated at source and is handed over to Authorized Agency.

#### Photograph of Waste collection Bin:



### 6.2 Vermi Composting Plant:

The University has Vermi-composting facility & about 100 MT of Vermi compost is produced annually and is used in the own campus.

#### Photograph of Vermi Composting Plant:



### 6.3 Bio Gas Plant:

The University has installed a Biogas plant at the Yash Inn facility, to convert the kitchen waste into bio gas, which in turn is used for cooking.

#### Photograph of Bio Gas Plant:



### 6.4 Sanitary Waste Management:

The University has installed a Sanitary Waste Incinerator, for disposal of Sanitary Waste generated.

#### Photograph of Sanitary Waste Incinerator:



### 6.5 Liquid Waste Management:

It is recommended to install a Sewage Treatment Plant, for treatment of Liquid Waste.

### 6.6 E Waste Management:

For E-Waste management, the University follows the Methodology, as per the Government Regulations & it is disposed of by calling the tenders.

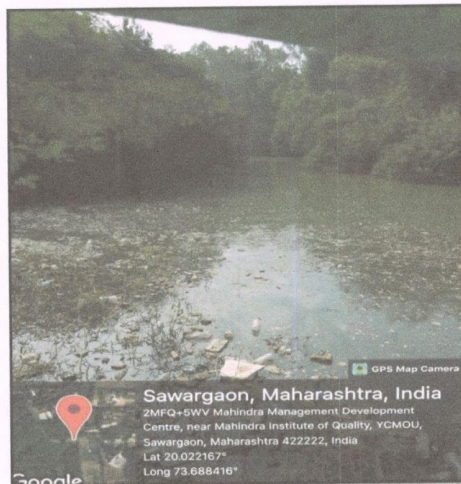
## CHAPTER-VII STUDY OF RAIN WATER HARVESTING

The University has implemented the Rain Water Harvesting Project by three ways, namely:

1. Yashwant Bandhara
2. Farm Pond and
3. Collecting the rain water from terrace & using the same for Bore well recharging.

**7.1 Yashwant Bandhara:** The Water Storage capacity is about **26.2 Million Liters.**

**Photograph of Yashwant Bandhara:**



### 7.2 Farm Pond:

The University has a farm pond which can store approximately -- million liters of Water. This farm pond has helped the nearby farmers, as the underground water level has increased substantially due to this farm pond.

### 7.3 Rain water harvesting from Terrace at Main Building:

The University has laid pipes to collect the Rain Water collected on the terrace of the University buildings. Separate water channels are built to further store this collected Water to Yashwant Dam.

#### Photograph of Rain Water Collecting Pipe from Terrace:

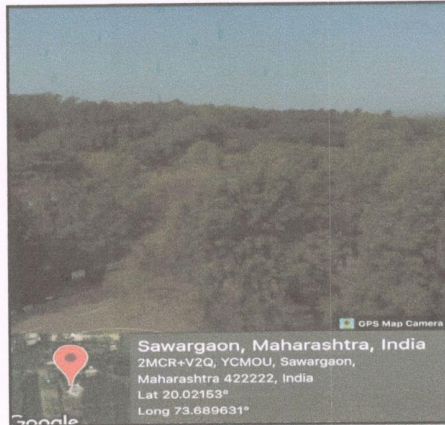


## CHAPTER-VIII STUDY OF ENVIRONMENT FRIENDLY PRACTICES

### 8.1 Internal Tree Plantation:

Out of total area of 140 Acres, almost 90 % of the Area is under Green Cover.

Photograph of Tree Plantation:



### 8.2 Plastic Free Campus Initiatives:

The University is taking strict measures to keep the campus Plastic Free. At prominent places, boards are displayed to keep the campus Plastic Free. The Water Bottles for all Staff members are of Glass.

Photograph of Display board displaying Plastic Free campus at the main entrance:



### 8.3 Paperless Office Initiatives:

The University is taking various measures to make the Day-to-Day operations Paper less. There about Thirteen sections/operations wherein software based solutions are adopted are:

- ✓ E-Books Down load
- ✓ YCMOU Regional Centers
- ✓ Finance
- ✓ Admission
- ✓ Results
- ✓ Migration
- ✓ Grievances
- ✓ Scanned copy of Mark list, to name a few
- ✓ Revaluation of Answer Book
- ✓ E-Tenders

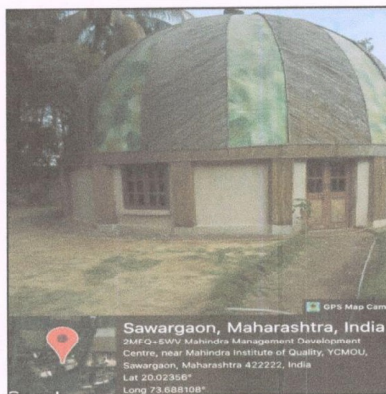
### 8.4 Low Cost Energy Efficient Model Bamboo House:

In order to build a small house with minimum usage of external items and maximum use of Eco friendly and readily available Agro material, the University has built a Model Bamboo house in the University campus.

The major highlights of this House are:

- Eco friendly Bamboo material usage
- Readily Availability of Material
- Usage of Bamboo for Columns, Beams, Foundation& Walls
- Non usage of Steel & Cement
- Green Building
- Low cost & Low Energy Usage during Construction Phase

### Photograph of Model Bamboo House:





## **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<br>Dissolved Oxygen 6 mg/l or more |
| 2  | Drinking water source after conventional treatment and disinfection         | pH between 6 to 9<br>Dissolved Oxygen 4 mg/l or more     |
| 3  | Outdoor Bathing (Organized)   | pH between 6.5 to 8.5<br>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 <sup>0</sup> C |
| 2  | Humidity    | Less Than 70%               |