ENVIRONMENTAL AUDIT REPORT

of

Shiksha Mandal's

Bajaj College of Science, Wardha

(Formerly known as Jankidevi Bajaj College of Science)

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)

ENVIRONMENTAL AUDIT CERTIFICATE

Certificate No: ES/BSC/22-23/03 Date: 05/04/2023

This is to certify that we have conducted Environmental Audit at Bajaj College of Science, Wardha, in the Year 2022-23.

The Institute has adopted following Energy Efficient & Green Practices:

- Usage of Energy Efficient LED Light Fitting
- Installation of 50 kWp Roof Top Solar PV Plant
- Segregation of Waste at Source
- Installation of Sanitary Waste Incinerator
- Installation of Bio & Vermi Composting Pit
- College has installed septic tanks and it cleans periodically
- Installation of Rain Water Harvesting 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 Eco Friendly.

For Engress Services,

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

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

GEM 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

Magnitude Management Services Pvt. Ltd.

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

Magnitude Management Services Pvt. Ltd.

ISO: 14001-2015 Certificate

ENGRESS SERVICES PUNE

INDEX

ACKNOWLEDGEMENT

We Engress Services, Pune, express our sincere gratitude to the management of Bajaj College of Science, Wardha 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.

EXECUTIVE SUMMARY

1. Bajaj College of Science, Wardha 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	**90942**	kWh
2	Annual CO_2 Emissions	**72.75**	MT

4. Various initiatives taken for Environmental Conservation:

- Usage of Energy Efficient LED fittings
- Installation of 50 kWp Roof Top Solar PV Plant
- Bio & Vermi Composting Pit installation

5. Indoor Air Quality Parameters:

No	Parameter/Value	AQI	PM-2.5	PM-10
1	Maximum	50	31	42
2	Minimum	33	20	26

6. Indoor Comfort Conditions:

No	Parameter/Value	Temperature, ^0C	Humidity, %	Lux Level	Noise Level, dB
1	Maximum	33.1	46	310	43
2	Minimum	31.9	42	137	39

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 & Vermi Composting Pit:

The Institute has a Bio Composting & Vermi 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 Bio Medical Waste Management:

The Bio Medical Waste is collected in a separate bin and is disposed of through Authorized agency.

7.6 E Waste Management:

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

8. Rain Water Harvesting:

The Institute has installed the Rainwater harvesting project; the rain water falling on the terrace is collected through pipes and is used for recharging the bore well.

9. Environment Friendly Initiatives:

- Maintenance of Internal Garden: About **100 Plus** Trees in the campus.
- Display of Posters on Resource Conservation

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

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:

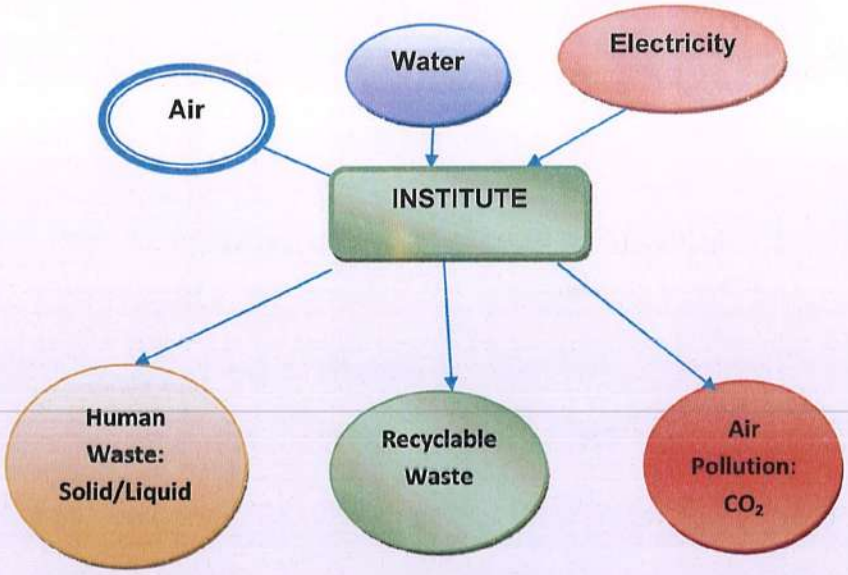
1.5 Institute Location Image:

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:

No	Month	Energy Generated (kWh)=A	Energy Purchased (kWh)=B	Energy Exported (kWh)=C	Net Energy Consumption (kWh) A+B-C	CO2 Emissions MT
1	Mar-22	18531	4951	4564	18918	15.134
2	Apr-22	6407	5089	4754	6742	5.393
3	May-22	6377	4446	4996	5827	4.661
4	Jun-22	5936	3667	4696	4907	3.925
5	Jul-22	6400	4545	5151	5794	4.635
6	Aug-22	4771	4594	3619	5746	4.596
7	Sep-22	4229	5974	2780	7423	5.938

8	Oct-22	4673	4491	3502	5662	4.529
9	Nov-22	3192	5875	2273	6794	5.435
10	Dec-22	4365	5301	3281	6385	5.108
11	Jan-23	5693	5029	4225	6497	5.197
12	Feb-23	6413	7696	3862	10247	8.197
13	Total	76987	61658	47703	90942	72.753
14	Maximum	18531	7696	5151	18918	15.134
15	Minimum	3192	3667	2273	4907	3.925
16	Average	6415.58	5138.16	3975.25	7578.5	6.062

Chart No 2: Month wise CO_2 Emissions:

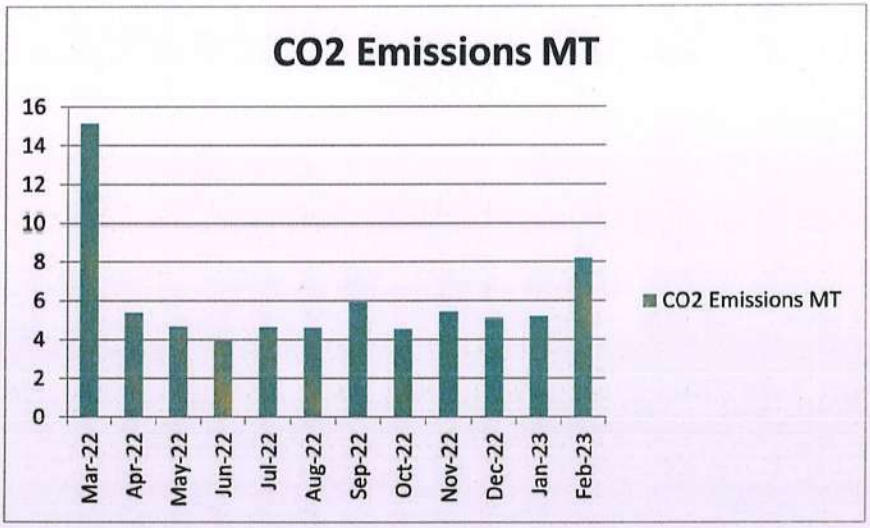


Table No 6: Important Parameters:

No	Parameter/ Value	Net Energy Consumption (kWh)	CO2 Emissions MT
1	Total	90942	72.753
2	Maximum	18918	15.134
3	Minimum	4907	3.925
4	Average	7578.5	6.062

CHAPTER III
STUDY OF USAGE OF RENEWABLE ENERGY

The College has installed Roof Top Solar PV Plant of Capacity **50 kWp**.

In the following Table, we compute the Annual Reduction in CO_2 Emissions due to installation of Roof TOP Solar PV Plant.

Table No6: Computation of Annual Reduction in CO_2 Emissions:

No	Particulars	Value	Unit
1	Installed Capacity of Roof Top Solar PV Plant Capacity	50	kWp
2	Energy Generated in per kWp	4	kWh/kWp
3	Annual Solar Energy generation Days	300	Nos
4	Energy Generated in the Year: 22-23	60000	kWh
5	1 kWh of Electrical Energy saves	0.9	Kg/kWh
6	**Qty of CO_2 Saved by Solar PV Plant =(4)*(5) /1000**	**54**	**MT of CO_2**

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 7: Indoor Air Quality Parameters:

No	Location	AQI	PM-2.5	PM-10
1	Principal Office	46	30	32
2	Admin Office	46	27	42
3	Conference Hall	50	30	42
4	Department of Chemistry	46	28	42
5	Department of Physics	35	21	26
6	Department of Zoology	45	23	37
7	Department of Sport	45	23	37
8	Library	50	31	42
9	Language Dept.	35	21	27
10	Department of Math	36	22	26
11	Department of NSS	33	20	30
12	Computer Hall	46	28	39
13	Seminar Hall	48	27	34
14	Class Room 1	33	20	28

15	Class Room 2	41	24	31
16	Class Room 3	40	25	31
17	Class Room 4	41	27	33
18	Class Room 5	40	28	32
19	Maximum	50	31	42
20	Minimum	33	20	26

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	Principal Office	32	42	137	41
2	Admin Office	32.2	44	240	41.2
3	Conference Hall	32.3	44	210	41.3
4	Department of Chemistry	32	44	230	40
5	Department of Physics	33	45	245	41
6	Department of Zoology	32.2	44	244	43
7	Department of Sport	32.4	44	310	43
8	Library	32.3	45	305	39
9	Language Dept.	33	46	289	42
10	Department of Math	33.1	46	250	43
11	Department of NSS	32	44	220	41
12	Computer Hall	32	44.8	225	40
13	Seminar Hall	31.9	44.8	244	41
14	Class Room 1	32	44	240	41
15	Class Room 2	32	44	230	40
16	Class Room 3	33	43.9	245	41
17	Class Room 4	32	43.5	250	40
18	Class Room 5	32	44	250	40
19	Maximum	33.1	46	310	43
20	Minimum	31.9	42	137	39

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 & Vermi Composting Pit:

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

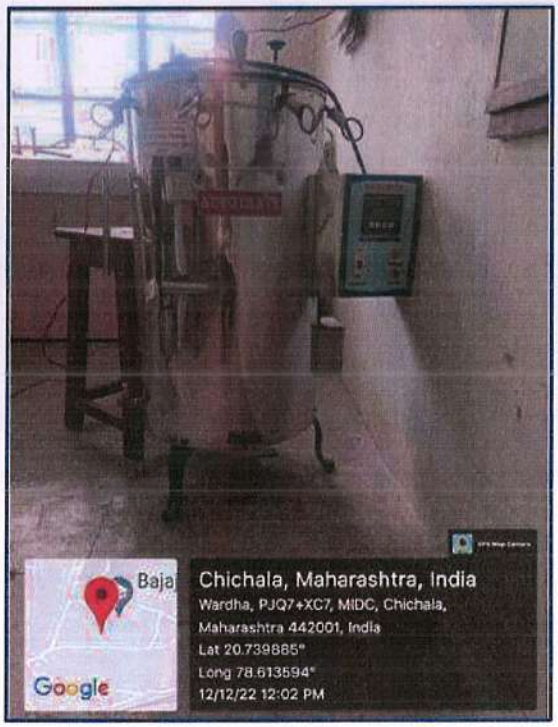
Photograph of Bio Composting & Vermi Composting Pit:

6.3 Liquid Waste Management:
The Institute has installed Septic Tanks it cleans periodically.

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

6.5 Bio Medical Waste Management:

The Bio Medical Waste is collected in a separate bin and is disposed of through Authorized agency.



6.6 E Waste Management:

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

CHAPTER-VII
STUDY OF RAIN WATER HARVESTING

The Institute has implemented the Rain Water Harvesting 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 bore well.

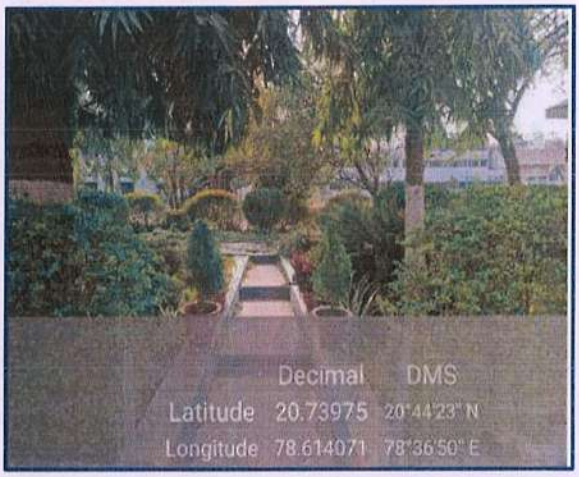
Photograph of Rain Water Harvesting & Bore well Recharge Section:

CHAPTER-VIII
STUDY OF ECO FRIENDLY INITIATIVES

8.1 Internal Tree Plantation:

The Institute has well maintained landscaped garden in the campus.

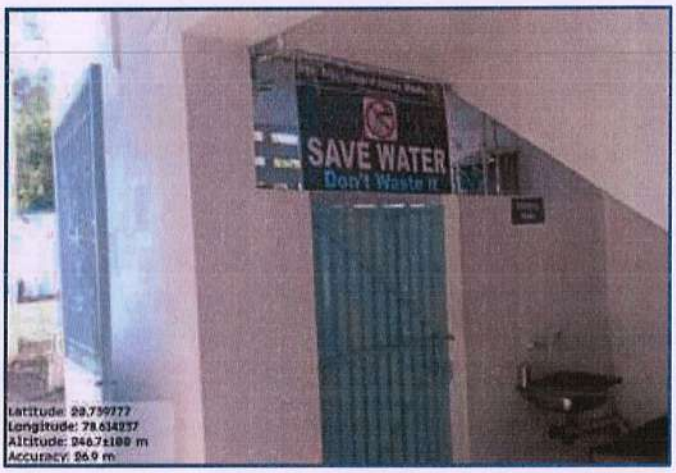
Photograph of Tree plantation:



8.2 Creation of Awareness about Plastic Ban Water Conservation:

The Institute has displayed posters emphasizing on importance of Plastic Ban and Water Conservation.

Photograph of Poster on Plastic Ban and Water 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%