ENERGY AUDIT REPORT

of

AJEENKYA D Y PATIL UNIVERSITY,

Charholi Budruk, Via Lohegaon, Pune 412 105

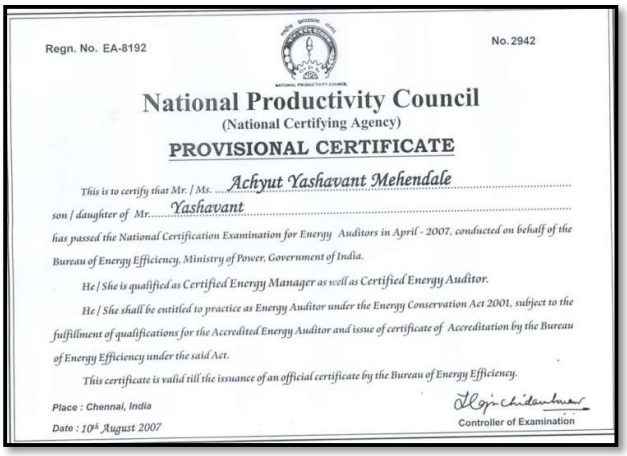
Year: 2022-23

Prepared by

ENGRESS SERVICES

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

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 in 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 fulfillment of qualifications for the Accredited Energy Auditor 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 : 10th 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 Husbandary, Aundh, Pune, Maharashtra 411067
Ph No: 020-35000450
Email: eee@mahaurja.com, Web: www.mahaurja.com

ECN/2022-23/CR-43/1709 10th May, 2022

CERTIFICATE OF REGISTRATION
FOR CLASS 'A'

We hereby certify that, the firm having following particulars is registered with ***MAHARASHTRA ENERGY DEVELOPMENT AGENCY (MEDA)*** under given category as "Energy Planner & Energy Auditor" in Maharashtra for Energy Conservation Programme of MEDA.

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

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

Registration Number : ***MEDA/ECN/2022-23/Class A/EA-32.***

- Energy Conservation Programme intends to identify areas where wasteful use of energy occurs and to evaluate the scope for Energy Conservation and take concrete steps to achieve the evaluated energy savings.
- MEDA reserves the right to visit at any time without giving prior information to verify quarterly activities performed by the firm and canceling the registration, if the information is found incorrect.
- This empanelment is valid till **09th May, 2024** from the date of registration, to carry out energy audits under the Energy Conservation Programme
- The Director General, MEDA reserves the right to cancel the registration at any time without assigning any reasons thereof.

General Manager (EC)

MEDA Registration 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 :

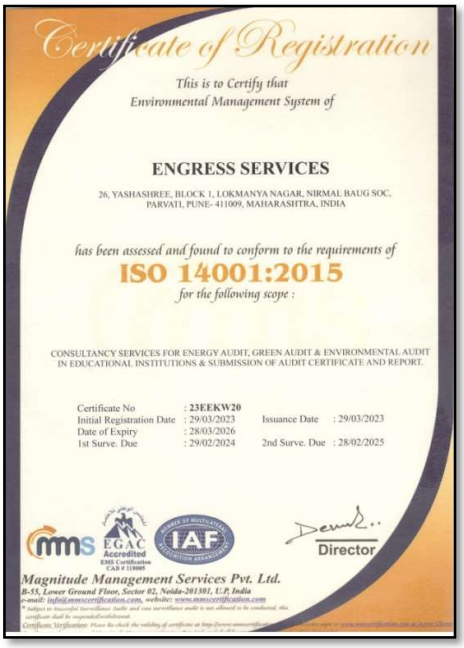
CONSULTANCY SERVICES FOR ENERGY AUDIT, GREEN AUDIT & ENVIRONMENTAL AUDIT IN EDUCATIONAL INSTITUTIONS & SUBMISSION OF AUDIT CERTIFICATE AND REPORT.

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
e-mail: info@mmscertification.com, website: www.mmscertification.com

ISO: 9001-2015 Certificate



Certificate of Registration

This is to Certify that
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
e-mail: info@mmscertification.com, website: www.mmscertification.com

ISO: 14001-2015 Certificate

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ACKNOWLEDGEMENT

We at Engress Services, Pune, express our sincere gratitude to the management of Ajeenkya D Y Patil University, Charholi Budruk Pune 412 105 for awarding us the assignment of Energy Audit of their Charholi campus for the Academic Year: 2022-23.

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

EXECUTIVE SUMMARY

1. Ajeenkya D Y Patil University, Charholi Budruk, Pune 412 105 consumes Energy in the form of **Electrical Energy** used for various gadgets, Office & other facilities.

2. Present Connected Load & Energy Consumption:

No	Particulars	Value	Unit
1	Total Connected Load	**374.11**	kW
2	Annual Energy Purchased	**548048**	kWh

3. Energy Performance Index:

No	Particulars	Value	Unit
1	Total Annual Energy Purchased	5480048	kWh
2	Annual Energy Generated	960000	kWh
3	Annual Energy Consumed=1+2	**1508048**	kWh
4	Total Built up area of university	**22845.85**	m^2
5	Energy Performance Index **= (3) / (4)**	**66.01**	kWh/m^2

4. Study of % Usage of LED Lighting:

No	Particulars	Value	Unit
1	% of Usage of LED Lighting to Total Lighting Load	**73.49**	%

5. Renewable Energy & Energy Efficiency Projects:

- Usage of Energy Efficient LED fittings & BEE STAR Rated Equipment
- Installation of **800 kWp** Roof Top Solar PV Plant

6. Assumptions:

1. Energy consumption is computed based on Load Utilization Factor
2. **1 kWh** of Electrical Energy releases **0.9 Kg** of **CO_2** into atmosphere
3. Energy generated by Roof Top Solar PV Plant: **4 kWh/kWp per Day**
4. Annual Solar Energy Generation Days: **300 Nos**

7. References:

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

ABBREVIATIONS

AC	:	Air conditioner
MSEDCL	:	Maharashtra Energy Distribution Company Limited
LED	:	Light Emitting Diode
kWh	:	kilo-Watt Hour
Qty	:	Quantity
W	:	Watt
kW	:	Kilo Watt
PC	:	Personal Computer
MT	:	Metric Ton

CHAPTER-I
INTRODUCTION

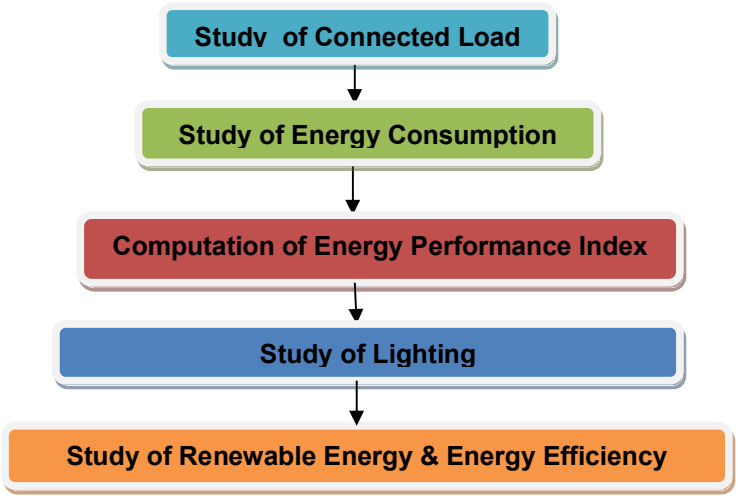
1.1 Introduction:

An Energy Audit is conducted at Ajeenkya D Y Patil University, Charholi Budruk Pune.

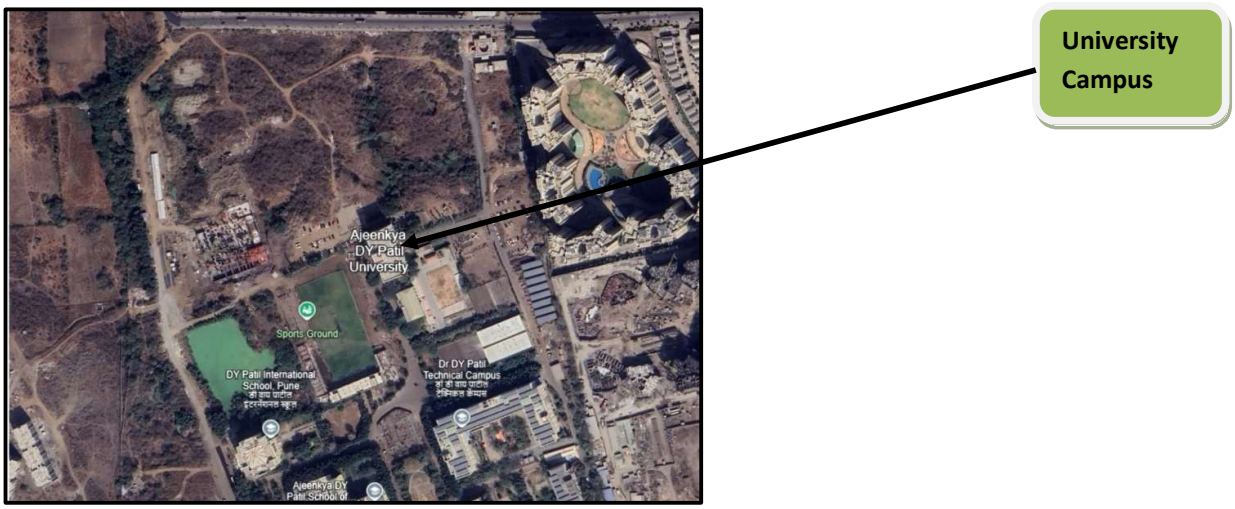
The guidelines followed for conducting the Energy Audit are:

- 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 University Location Image:



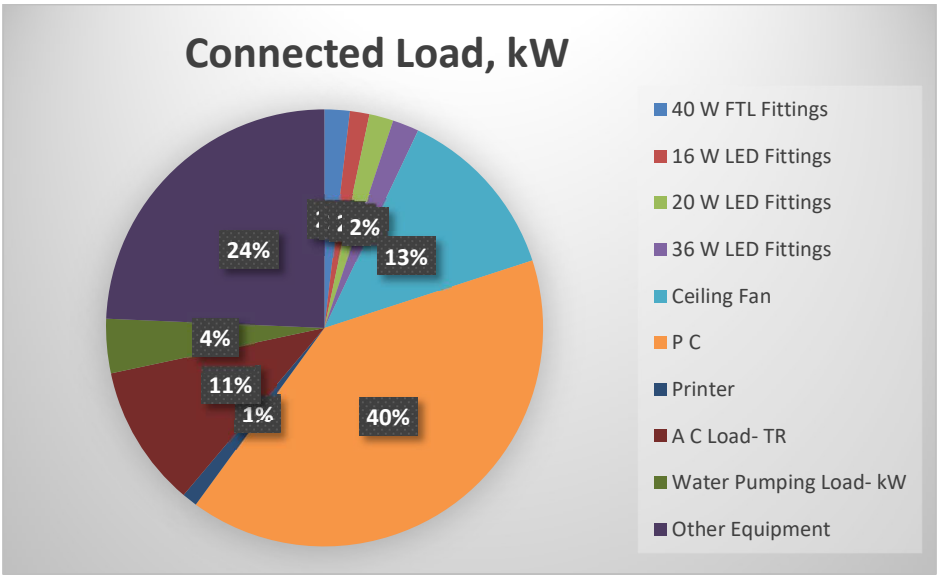
CHAPTER-II
STUDY OF CONNECTED LOAD

In this chapter, we present the details of various Electrical loads as under

Table No 2: Details of Overall Connected Load:

No	Equipment	Qty	Load, W/Unit	Load, kW
1	40 W FTL Fittings	175	40	7
2	16 W LED Fittings	335	16	5.36
3	20 W LED Fittings	337	20	6.74
4	36 W LED Fittings	203	36	7.308
5	Ceiling Fan	745	65	48.425
6	P C	998	150	149.7
7	Printer	24	175	4.2
8	A C Load- TR	35	1125	39.375
9	Water Pumping Load- kW	15	1000	15
10	Other Equipment	260	350	91
11	**Total**			**374.11**

Chart No 1: Total Connected Load:



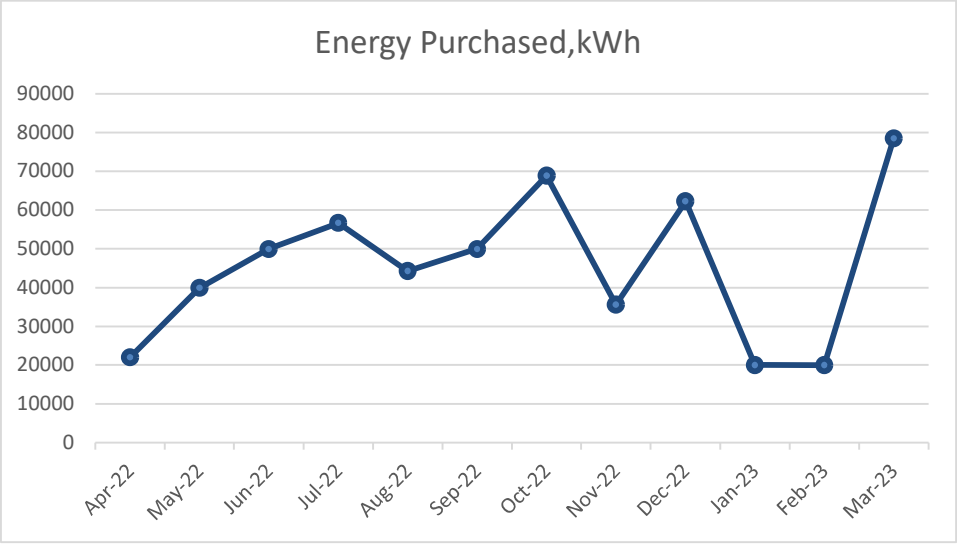
CHAPTER-III
STUDY OF PRESENT ENERGY CONSUMPTION

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

Table No 2: Electrical Energy Purchase Analysis- 2022-23:

No	Month	Energy Purchased, kWh	CO_2 Emissions, MT
1	Apr-22	21985	19.79
2	May-22	39905	35.91
3	Jun-22	49985	44.99
4	Jul-22	56697	51.03
5	Aug-22	44252	39.83
6	Sep-22	49987	44.99
7	Oct-22	68874	61.99
8	Nov-22	35569	32.01
9	Dec-22	62287	56.06
10	Jan-23	20015	18.01
11	Feb-23	19987	17.99
12	Mar-23	78505	70.65
13	Total	548048	493.2432
14	Maximum	78505	70.6545
15	Minimum	19987	17.9883
16	Average	45670.67	41.10

Chart No 2: To study the variation in Monthly Energy Purchased, kWh:



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:

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

Now we compute the EPI for the University as under:

Table No 3: Computation of Energy Performance Index:

No	Particulars	Value	Unit
1	Total Annual Energy Purchased	5480048	kWh
2	Annual Energy Generated	960000	kWh
3	Annual Energy Consumed=1+2	**1508048**	kWh
4	Total Built up area of university	**22845.85**	m^2
5	Energy Performance Index **= (3) / (4)**	**66.01**	kWh/m^2

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 the percentage usage of LED Lighting to total Lighting Load of the University.

Table No 4: Percentage Usage of LED Lighting to Total Lighting Load:

No	Particulars	Value	Unit
1	No of 40 W FTL Fittings	175	Nos
2	Load/unit of 40 W FTL Fitting	40	W/unit
3	Total Load of 40 W FTL Fitting	**7**	kW
4	No of 16 W LED Fittings	335	Nos
5	Load/unit of 16 W LED Fitting	16	W/unit

6	Total Load of 16 W LED Fitting	**5.36**	kW
7	No of 20 W LED Fittings	337	Nos
8	Load/unit of 20 W LED Fitting	20	W/unit
9	Total Load of 20 W LED Fitting	**6.74**	kW
10	No of 16 W LED Fittings	203	Nos
11	Load/unit of 16 W LED Fitting	36	W/unit
12	Total Load of 16 W LED Fitting	**7.308**	kW
13	Total LED Lighting Load =6+9+12	**19.408**	kW
14	Total LED Lighting Load =3+6+9+12	**26.408**	kW
15	% of Usage of LED to Total Lighting Load=13*100/14	**73.49**	%

CHAPTER-VI
STUDY OF RENEWABLE ENERGY & ENERGY EFFICIENCY

6.1 Usage of Renewable Energy:

The University has installed:

- Roof Top Solar PV Plant of Capacity 800 kWp

Photograph of Roof Top Solar PV Plant:

6.2 Energy Efficiency Measures adopted:

- The University has Energy Efficient LED Fittings & BEE STAR Rated Equipment

Photographs of LED Lighting: