ENERGY AUDIT REPORT

of

SHREE L. R. TIWARI COLLEGE OF LAW,

Shree L. R. Tiwari Educational Campus, Mira Road (East) Thane 401 107

PIONEERING EDUCATION
SINCE 1992

Year: 2022-23

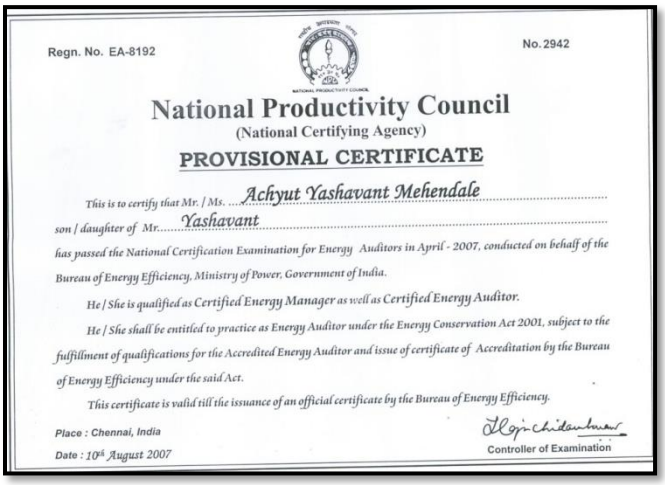
Prepared by:

ENGRESS SERVICES

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

ENGRESS SERVICES PUNE

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 :

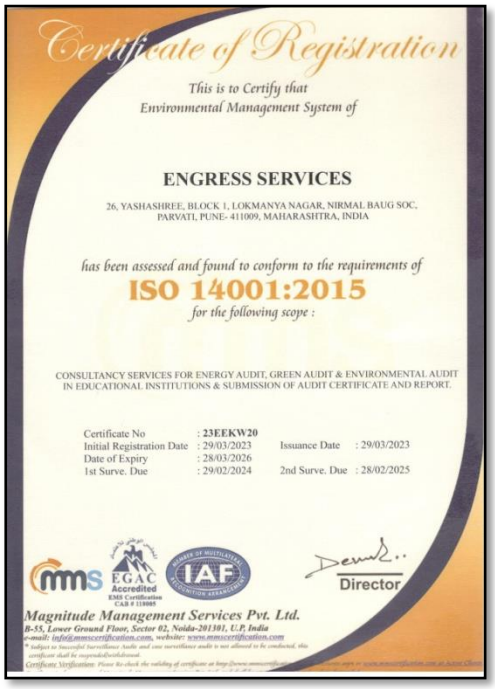
CONSULTANCY SERVICES FOR ENERGY AUDIT, GREEN AUDIT & ENVIRONMENTAL AUDIT IN EDUCATIONAL INSTITUTIONS & SUBMISSION OF AUDIT CERTIFICATE AND REPORT.

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

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

ISO: 14001-2015 Certificate

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ACKNOWLEDGEMENT

We Engress Services, Pune, express our sincere gratitude to the management Shree L. R. Tiwari College of Law, Shree L. R. Tiwari Educational Campus, Mira Road (East) Thane 401 107, for awarding us the assignment of Energy Audit of their Campus for the Year: 2022-23.

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

EXECUTIVE SUMMARY

1. Shree L. R. Tiwari College of Law, Mira Road, consumes Energy in the form of **Electrical Energy;** used for various Electrical Equipment.

2. Present Connected Load & Energy Consumption:

No	Particulars	Value	Unit
1	Total Connected Load	**95.76**	kW
2	Annual Energy Consumed	**66301**	kWh

3. Energy Performance Index:

No	Particulars	Value	Unit
1	Total Annual Energy Consumed	**38018**	kWh
2	Total Built up area of college	**3010**	m^2
3	Energy Performance Index **= (1) / (2)**	**12.63**	kWh/m^2

4. Study of % Usage of LED Lighting:

No	Particulars	Value	Unit
1	% of Usage of LED Lighting to Total Lighting Load	**100**	%

5. Renewable Energy & Energy Efficiency Projects:

- Usage of Energy Efficient LED fittings
- Usage of BEE STAR Rated Energy Efficient Equipment

6. Assumptions:

1. **1 kWh** of Electrical Energy releases **0.9 Kg** of **CO_2** into atmosphere
2. Energy Consumption is computed based on Load Utilization Factor

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
BEE	:	Bureau of Energy Efficiency
FTL	:	Fluorescent Tube Light
CFL	:	Compact Fluorescent Light
PV	:	Photo Voltaic
Kg	:	Kilo Gram
kWh	:	kilo-Watt Hour
CO_2	:	Carbon Di Oxide
MT	:	Metric Ton

CHAPTER-I
INTRODUCTION

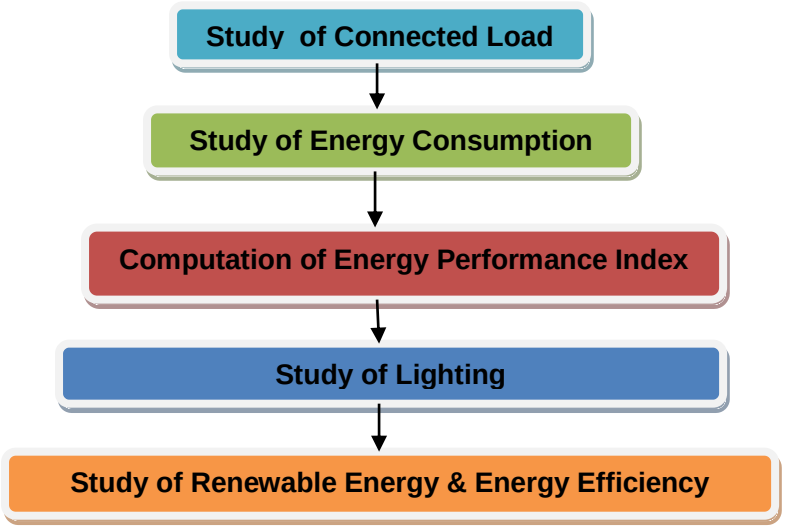
1.1 Introduction:

An Energy Audit is conducted at Shree L. R. Tiwari College of Law, Mira Road (East) Thane 401 107.

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 Google Earth Image:

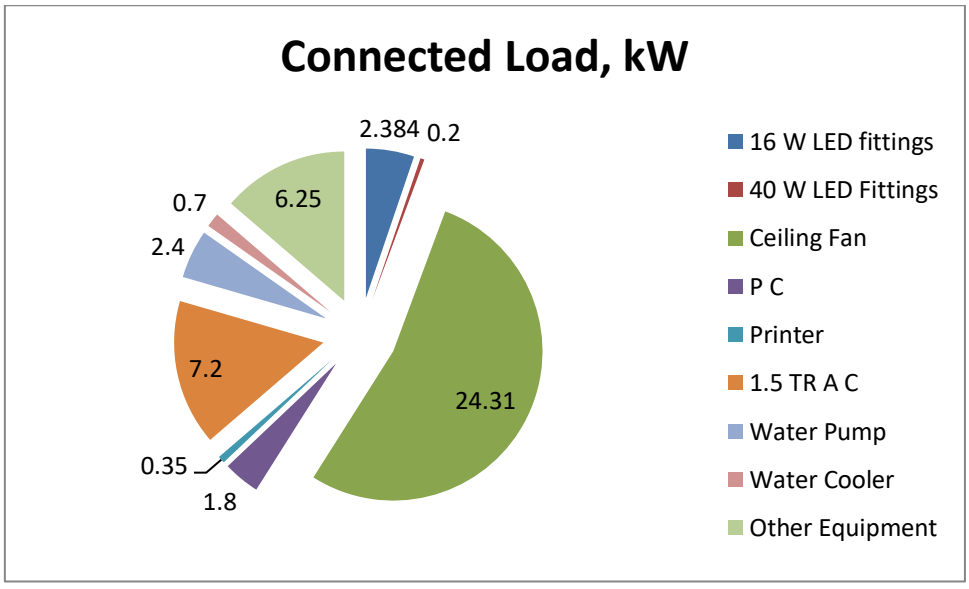
CHAPTER-II
STUDY OF CONNECTED LOAD

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

Table No 1: Study of Equipment wise Connected Load:

No	Equipment	Qty	Load, W/unit	Load, kW
1	16 W LED fittings	149	16	2.384
2	40 W LED Fittings	5	40	0.2
3	Ceiling Fan	374	65	24.31
4	P C	12	150	1.8
5	Printer	2	175	0.35
6	1.5 TR A C	4	1800	7.2
7	Water Pump	1	2400	2.4
8	Water Cooler	2	350	0.7
9	Other Equipment	25	250	6.25
10	**Total**			**45.59**

Chart No 1: Study of Connected Load:



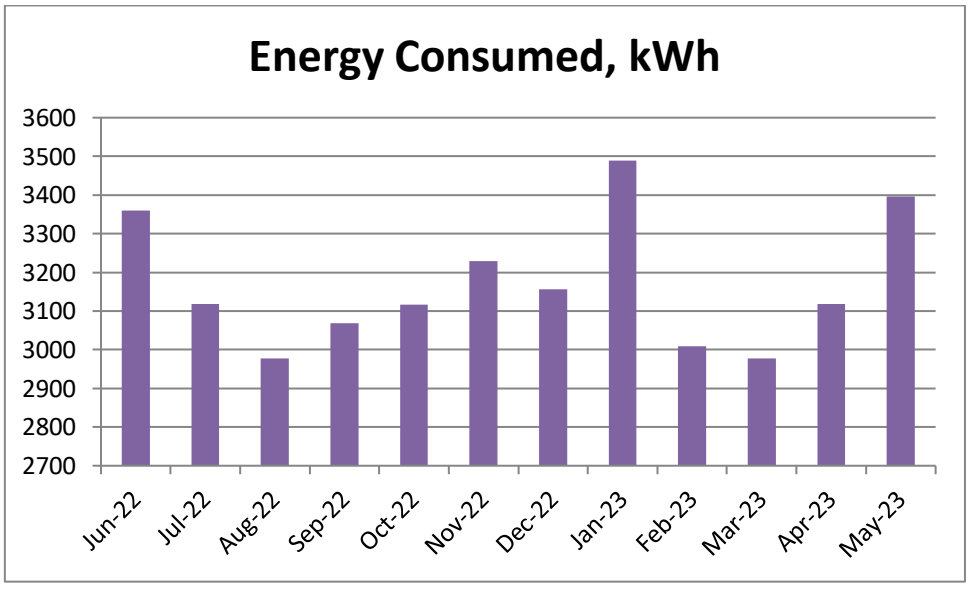
CHAPTER-III
STUDY OF PRESENT ENERGY CONSUMPTION

In this chapter, we present the analysis of last year Electricity Bills

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

No	Month	Energy Consumed, kWh	CO_2 Emissions, MT
1	Jul-22	3360	3.02
2	Aug-22	3118	2.81
3	Sep-22	2978	2.68
4	Oct-22	3069	2.76
5	Nov-22	3116	2.80
6	Dec-22	3229	2.91
7	Jan-23	3157	2.84
8	Feb-23	3489	3.14
9	Mar-23	3009	2.71
10	Apr-23	2978	2.68
11	May-23	3118	2.81
12	Jun-23	3397	3.06
13	Total	38018	34.22
14	Maximum	3489	3.14
15	Minimum	2978	2.68
16	Average	3168.17	2.85

Chart No 2: Variation in Monthly Energy Consumption:



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:

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

Now we compute the EPI for the College as under:

Table No 3: Computation of Energy Performance Index:

No	Particulars	Value	Unit
1	Total Annual Energy Purchased	**38018**	kWh
2	Total Built up area of College	**3010**	m^2
3	Energy Performance Index **= (1) / (2)**	**12.63**	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/m^2)

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/m^2/100 lux) 100 Installed power density (W/m^2/100 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 College.

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

No	Particulars	Value	Unit
1	No of 16 W LED Fittings	630	Nos
2	Load of 16 W LED Fitting	16	W/unit
3	Total Load of 16 W LED Fittings	**10.08**	kW
4	No of 40 W LED Fittings	5	Nos
5	Load of 40 W LED Fitting	40	W/unit

6	Total Load of 40 W LED Fittings	**0.2**	kW
7	Total LED Lighting Load= 3+6	**10.28**	kW
8	Total Lighting Load= 3+6	**10.28**	kW
9	% of LEDs to Total Lighting Load =**7*100/8**	**100**	%

CHAPTER-V
STUDY OF RENEWABLE ENERGY & ENERGY EFFICIENCY

5.1 Usage of Renewable Energy:

- The College has yet to install Roof Top Solar PV Plant

5.2 Energy Efficiency Projects:

- Usage of Energy Efficient LED Lighting
- Usage of Energy Efficient BEE STAR Rated Equipment

Photographs of LED Lighting & STAR Rated AC: