



**Energy Audit Report
Arvindbabu Deshmukh Mahavidyalaya
Bharsingi, Dist. Nagpur**



**ENERGY AUDIT REPORT
CONSULTATION**



Arvindbabu Deshmukh Mahavidyalaya
Bharsingi, Tah. Narkhed, Dist. Nagpur
Year-2021-22

PREPARED BY

EMPIRICAL EXERGY PRIVATE LIMITED

Flat No. 201, OM Apartment, 214 Indrapuri Colony,
Bhawarkuan, Indore – 452 001 (M. P.), India
0731-4948831, 7869327256
Email ID: eempirical18@gmail.com
www.eeplgroups.com
(2021-22)



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ACKNOWLEDGEMENT

Empirical Exergy Private Limited (EEPL), Indore (M.P) takes this opportunity to appreciate & thank the management of **Arvindbabu Deshmukh Mahavidyalaya, Bharsingi, Dist. Nagpur** for giving us an opportunity to conduct energy audit for the college.

We are indeed touched by the helpful attitude and co-operation of all faculties and technical staff, who rendered their valuable assistance and co-operation the course of study.




Rajesh Kumar Singadiya

(Director)

M.Tech (Energy Management), PhD (Research Scholar)
Accredited Energy Auditor [AEA-0284]
Certified Energy Auditor [CEA-7271]
(BEE, Ministry of Power, Govt. of India)
Empanelled Energy Auditor with MPUVN, Bhopal M.P.
Lead Auditor ISO50001:2011 [EnMS) from FICCI, Delhi
Certified Water Auditor (NPC, Govt of India)
Chartered Engineer [M-1699118], The Institution of Engineers (India)
Member of ISHRAE [58150]




Certificate of Accreditation

 **BUREAU OF ENERGY EFFICIENCY**

Examination Registration No.: **EA- 7271**

Accreditation Registration No.: **AEA-284**



Certificate of Accreditation

This is to certify that Mr./Ms. **Shri. Rajesh Kumar Singadiya** having its trade/registered office at has been given accreditation as accredited energy auditor. The certificate shall be effective from **9th** day of **May, 2018**


The certificate is subject to the provisions of the Bureau of Energy Efficiency (Qualifications for Accredited Energy Auditors and Maintenance of their List) Regulations, 2010.

This certificate shall be valid until it is cancelled under regulation 9 of the Bureau of Energy Efficiency (Qualifications for Accredited Energy Auditors and Maintenance of their List) Regulations, 2010.

On cancellation, the certificate of accreditation shall be surrendered to the Bureau within fifteen days from the date of receipt of order of cancellation.

Your name has been entered at AEA No. **284** in the register of list of accredited energy auditors. Your name shall be liable to be struck out on the grounds specified in regulation 8 of the Bureau of Energy Efficiency (Qualifications for Accredited Energy Auditors and Maintenance of their List) Regulations, 2010.

Given under the seal of the Bureau of Energy Efficiency, Ministry of Power, this **5th** day of **October, 2018**


Secretary,
Bureau of Energy Efficiency
New Delhi



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The Audit Team

The study team constituted of the following senior technical executives from **Empirical Exergy Private Limited**,

- ✚ **Mr. Rajesh Kumar Singadiya** [Director & Accredited Energy Auditor AEA-0284]
- ✚ **Mr. Rakesh Pathak**, [Director & Electrical Expert]
- ✚ **Mrs. Laxmi Raikwar Singadiya** [Chemical Engineer]
- ✚ **Mr. Sachin Kumawat** [Sr. Project Engineer]
- ✚ **Mr. Charchit Pathak** [Asst.Project Engineer]
- ✚ **Mr. Aakash Kumawat** [Junior Engineer]
- ✚ **Mr. Ajay Nahra** [Sr. Accountant & admin]
- ✚ **Mr. Mohan Choudhary** [Sr. Electrician]



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Green Monitoring Committee


 Prakash Pawar Officiating Principal	STD : 07105 NAAC Re-accredited with 'B' Grade VSPM Academy of Higher Education ARVINDBABU DESHMUKH MAHAVIDYALAYA BHARSINGI, Dist. Nagpur - 441305	Ph : 233329																																	
Ref. No. : ADM/2022/346		Date 13/09/22																																	
Energy, Environment & Green audit committee																																			
Energy, Environment & Green audit committee consist of following members.																																			
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		 Off. Principal Arvindbahu Deshmukh Mahavidyalaya, Bharsingi Dist. Nagpur																																	
REDMI NOTE 8 PRO AI QUAD CAMERA e-mail : admv_bharsingi@rediffmail.com website : www.adm.edu.in, Ph : 07105-233533, 233330																																			



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Integrated Policy

 Dr. Prakash Pawar Officiating Principal	STD : 07105 NAAC Re-accredited with 'B' Grade VSPM Academy of Higher Education ARVINDBABU DESHMUKH MAHAVIDYALAYA BHARSINGI, Dist. Nagpur - 441305	Ph : 233329
Ref.No. : ADM/2022/346		Date : 13/09/22
Integrated Energy, Environment & Green Policy		
<p>Management of our institution is committed to go green for making our nation to Atma-Nirbhar (Self-Sustainable) in area of energy and environment.</p>		
<p>Our emphasis is to:-</p> <ul style="list-style-type: none">• Ensure continuous enhancement in our energy and water conservation and usage.• Continuous monitoring the energy consumption pattern through periodic reviews and using latest informative system.• Procure and use energy efficient equipment's and products.• Create awareness regarding necessity of energy conservation and making environment pollution free to all the stakeholders by arranging awareness activity such as seminar, webinar, rallies and guest lectures etc.• Carry out regular energy, environment and green audit by certified auditors to identify the areas for improvement.		
 Off. Principal Arvindbabu Deshmukh Mahavidyalaya, Bharsingi Dist. Nagpur		
<p>REDMI NOTE 8 PRO AI QUAD CAMERA e-mail : admv_bharsingi@rediffmail.com website : www.adm.edu.in, Ph : 07105-233533, 233330</p>		



EXECUTIVE SUMMARY

The executive summary of the energy audit report furnished in this section briefly gives the identified energy conservation measures and other recommendations during the project that can be implemented in a phased manner to conserve energy and increase productivity inside the college campus.

ENERGY MANAGEMENT INITIATIVE TAKEN BY COLLEGE

✚ SOLAR SYSTEM (10 KWp)

College has installed 10 KWp solar system. Total unit generation is 8139 units time period of July-21 to June-22 **Its appreciable .**

ENERGY AUDIT RECOMMENDATION: -

✚ CEILING FAN

Replacement of conventional ceiling fan (80 Watt) by energy efficient star rated fan or BLDC based energy efficient fan (28 Watt) in class rooms, laboratories and faculties cabin have great potential for energy saving.

✚ TIMER CONTROLLED STREET LIGHTS

It is recommended to installation of “Timer control on street lighting” in the collage campus.

✚ MOTION SENSOR

It is recommended to installation of motion sensor in faculty cabins, offices toilet and non working areas to conserve energy.

✚ ENERGY MANAGEMENT WORKSHOP AND TRAINING

Conduct awareness, training programs, seminars, workshops, exhibitions for faculty, management and nonteaching staff.



CHAPTER-1

INTRODUCTION

1.1 About College

Arvindbabu Deshmukh College of Arts, Science and Commerce also well known as AD College, was established in 1986. In its journey during the past 35 years it has grown in strength from 75 students from its inception to a total strength of 2000 students today. Also there are 1300 students studying in YCMOU through this college. Under the affiliation of Rashtrasant Tukadoji Maharaj University of Nagpur. College offers undergraduate and post graduates programs like B.A., B.Com. From 1986 and later in 2008 B.Sc. and M.A. has been started. The college is also identified as community college under scheme of UGC and running a skill oriented diploma course in Welding and Fabrication. Beside that the college also runs as-on courses like Fashion designing and Communicative English. Listed in first top ten for the graduation course in mass media. College having units such as N.S.S. of 250 students, college awarded with best college for N.S.S. by R.T.M.N.U., Nagpur. College having very active sport department. Every year students are performed at National, State, University level and received Gold, Silver and bronze medal. Our college organized International, National, State and University level Conferences, Seminars and Workshops in various subjects. College is popular for its cultural, sports and drama activities and infrastructural facilities.

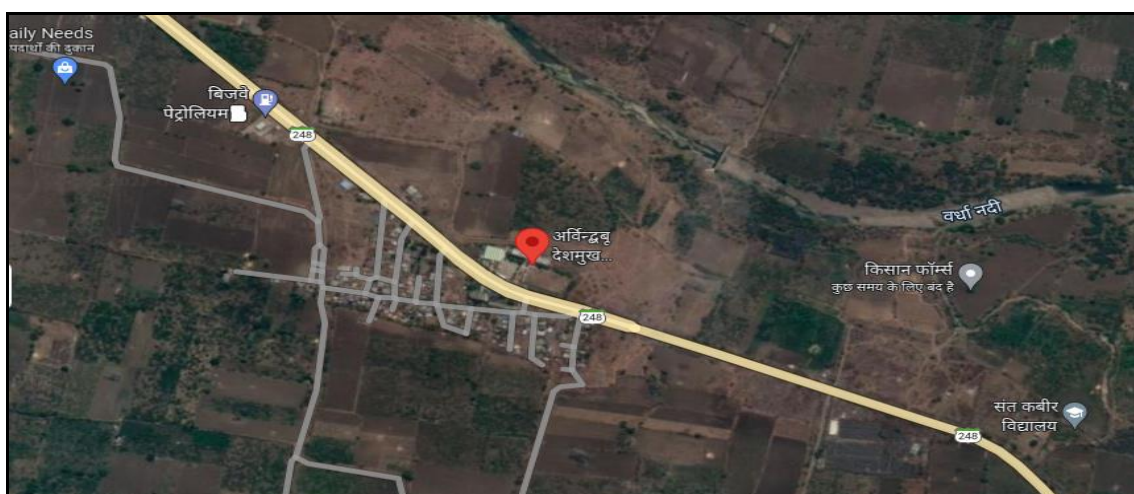


Figure 1.1: - Satellite Image of Arvindbabu Deshmukh Mahavidyalaya



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Vision and Mission:-

VISION

To become a centre of quality education by promoting high academic and social pursuit and competencies of students of rural region for all round development

MISSION

- To impart higher education for all round development of students of rural area and provide them an opportunity to made them competent for development in society
- The priority of the institution is to bring academic excellence along with personality development to compete with the rest of the world.
- The institution is located in the remote area so maximum students belong to backward communities and socio – economically weaker section so provide them opportunity to make themselves competent.
- To provide opportunity in future by providing them quality education, skilled base programme, competitive examination guidance, sports facility etc.

Sr. No.	Floor	Department
1.	Ground floor	Administration office, Principal cabin, Classrooms
2.	First floor	Examination cell, IQAC room, Classrooms, Computer lab
3.	Second Floor	Science Laboratory, Audio visual hall, classroom, Girls common room
4.	Third floor	Classrooms, Boys common room
5.	Indoor stadium area	Indoor stadium, gymnasium, college canteen,
6.	Girls hostel	Hostel rooms, Canteen, warden room
7.	Playground	Playground, Basketball court, parking



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Name of Buildings in campus and Build up area of Buildings

Sr. No.	Building	Department
1.	Main Building	3033.115 Sq. M.
2.	Indoor	1176. 15 Sq. M.
3.	Hostel	1458.114 Sq. M.
4.	Canteen	140 Sq. M.

Number of courses:-04

Name of courses: - Bachelor of Arts, Bachelor of Science, Bachelor of Commerce, Master of Arts (Marathi)

Sr. No.	Name of teaching Departments
1	Department of Marathi
2	Department of English
3	Department of History
4	Department of Political science
5	Department of Economics
6	Department of Music
7	Department of Home-economics
8	Department of Chemistry
9	Department of Botany
10	Department of Zoology
11	Department of Physics
12	Department of Mathematics
13	Department of Commerce



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1.2 About Energy Audit

An energy audit helps to understand more about the ways energy is used in any college and helps in identifying areas where waste may occur and scope for improvement exists. The overall energy efficiency from generation to the final consumer becomes 50%. Hence one unit saved in the end user is equivalent to two units generated in the power plant.

An energy audit is the most efficient way to identify the strength and weaknesses of energy management practices and to find a way to solve problems. An energy audit is a professional approach to utilizing economic, financial, social, and natural resources responsibly. Energy audits “adds value” to management control and are a way of evaluating the system.

Empirical Exergy Private Limited (EEPL), Indore M.P. carried out the “Energy Audit” at the site to find gaps in the energy consumption pattern for “**Arvindbabu Deshmukh Mahavidyalaya, Bharsingi, Dist. Nagpur**” A technical report is prepared as per the need and the requirement of the project.

1.3 Objectives of Energy Auditing

An energy audit provides a vital information base for an overall energy conservation program covering essentially energy utilization analysis and evaluation of energy conservation measures. It aims at:

- Identifying the quality and cost of various energy inputs.
- Assessing the present pattern of energy consumption in different cost centers of operations.
- Relating energy inputs and production output.
- Identifying potential areas of the thermal and electrical energy economy.
- Highlighting wastage in major areas.
- Fixing of energy-saving potential targets for individual cost centers.
- Implementation of measures for energy conservation & realization of savings.



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1.4 Methodology

The methodology adopted for achieving the desired objectives viz.: Assessment of the current operational status and energy savings includes the following:

- ✚ Discussions with the concerned officials for identification of major areas of focus and other related systems.
- ✚ A team of engineers visited the site and had discussions with the concerned officials/supervisors to collect data/information on the operations and load distribution within the plant and the same for the overall premises. The data were analyzed to arrive at a baseline energy consumption pattern.
- ✚ Measurements and monitoring with the help of appropriate instruments including continuous and/or time-lapse recording, as appropriate and visual observations were made to identify the energy usage pattern and losses in the system.
- ✚ Trend analysis of costs and consumptions.
- ✚ Capacity and efficiency test of major utility equipments, wherever applicable.
- ✚ Estimation of various losses
- ✚ Computation and **in-depth analysis** of the collected data, including utilization of computerized analysis and other techniques as appropriate, were done to draw inferences and to evolve suitable energy conservation plan's for improvements/reduction in specific energy consumption.

1.5 College Present Energy Scenario

College uses energy in the form of electricity purchased from MHSEDCL grid. The college has contract demand 10 KW. College has 10 KW solar system. Annual energy consumption 8,139 unit. All units are generated from solar system. Time period from Jul-2021 to Jun-2022.



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**CHAPTER- 2
POWER SUPPLY SYSTEM**

2.1 Transformer Details.

College has meter connection from Maharashtra State Electricity Distribution Co. Ltd.

Details are given following table

Consumer No.	426660318591
Consumer Name	Smt.Arvindbabu Deshmukh Mahavidhyalaya
Tariff	052 LT II Comm 3 Ph <20KW
Sanctioned Load	10 KW
Feeder Voltage (KV)	11
Meter No.	055- Y0362174



Photograph of transformer



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2.2 DG Set

There is one DG set in the college campus in case of power failure college has used DG set.



DG set in college

Observation

- ✚ DG set is used only in case of power failure.
- ✚ There are requirement of energy and fuel monitoring meter for energy and fuel consumption.



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2.3:- SOLAR PHOTOVOLTAIC SYSTEM (10 KWp)

There is 10 KWp solar photovoltaic roof top systems installed on collage building.

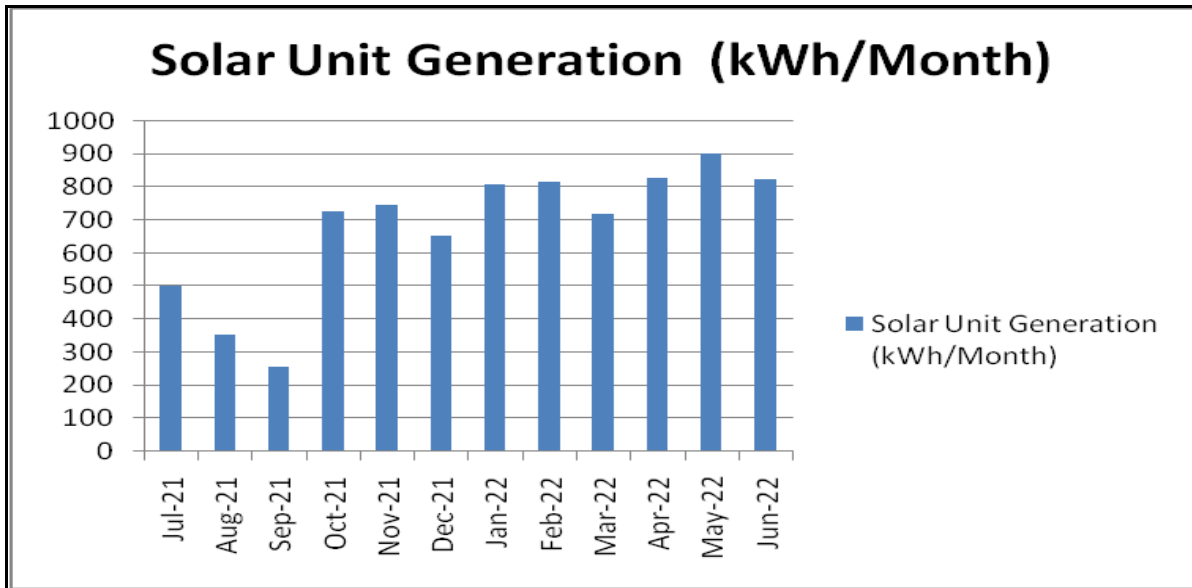


10 KWp solar plant and Inverter systems.

Month	Solar Unit Generation (kWh/Month)
Jul-21	501
Aug-21	354
Sep-21	255
Oct-21	727
Nov-21	749
Dec-21	652
Jan-22	809
Feb-22	818
Mar-22	719
Apr-22	829
May-22	901
Jun-22	825
Total	8139



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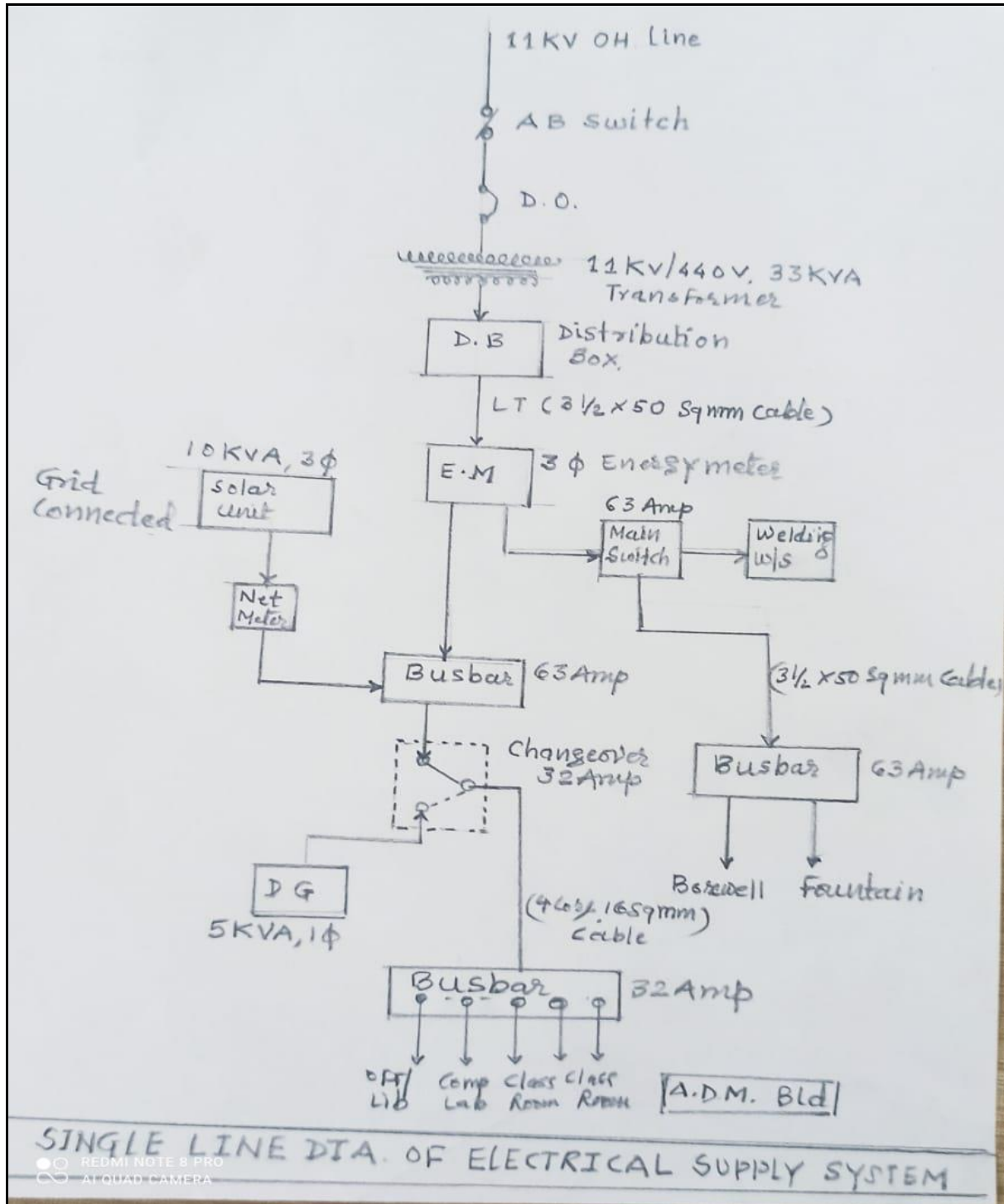


Observation:

- ✚ It is recommended to update system as per MP Roof Top Grid connected policy. And install Cloud based Energy monitoring system on existing plants. So that management can monitor daily basis energy generation (Units per day) by the system.
- ✚ It is also recommended to require cleaning on system regular basis.



Single Line Diagram (SLD)



Single line daigram of college campus



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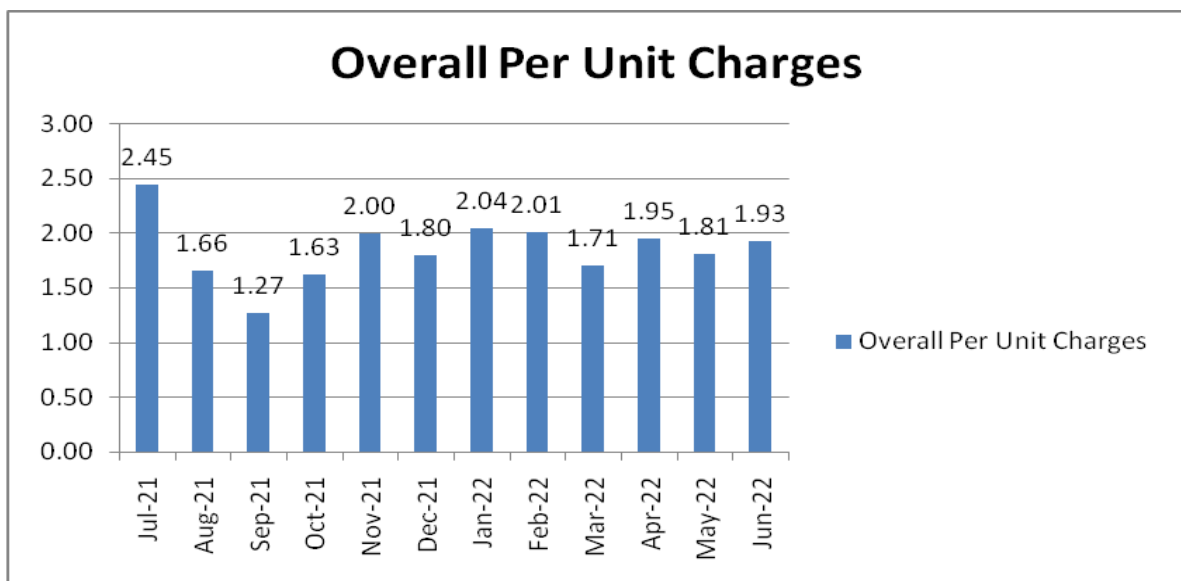
CHAPTER- 3

Electricity BILL ANALYSIS

3.1 Monthly Electrical Energy Consumption 2021-22

The monthly electrical consumption for the college is given in the table.

Sr . No.	Month/ Year	Export Unit	Import Unit	Total Generation	Billing Amount	Overall Per Unit Charges Rs/kWh
1	Jul-21	501	190	691	465	2.45
2	Aug-21	354	250	604	415	1.66
3	Sep-21	255	327	582	415	1.27
4	Oct-21	727	255	982	415	1.63
5	Nov-21	749	207	956	415	2.00
6	Dec-21	652	230	882	415	1.80
7	Jan-22	809	203	1012	415	2.04
8	Feb-22	818	206	1024	415	2.01
9	Mar-22	719	244	963	417	1.71
10	Apr-22	829	219	1048	427	1.95
11	May-22	901	236	1137	427	1.81
12	Jun-22	825	221	1046	427	1.93
	Total	8139	2788	10927	5068	1.86





Chapter- 4
CONNECTED LOAD

4.1 Connected Load detail of College

Admin Building

Sr. No	Type of Electrical Equipment	Quantity No.
1	Tube Light (40W)	140
2	LED Tube (20W)	30
3	Ceiling Fan(80W)	133
4	Exhaust Fan(150W)	5
5	PC(75W)	66
6	Laptop(35W)	2
7	Printer(75W)	9
8	Photocopy M/c(550W)	3

Indoor Stadium

Sr. No	Type of Electrical Equipment	Quantity No.
1	Tube Light (40W)	18
2	LED Tube (20W)	4
3	Ceiling Fan(80W)	14
4	Exhaust Fan(150W)	0
5	PC(75W)	0
6	Laptop(35W)	0
7	Printer(75W)	0
8	Photocopy M/c(550W)	0

P.G. Building

Sr. No	Type of Electrical Equipment	Quantity No.
1	Tube Light (40W)	31
2	LED Tube (20W)	23
3	Ceiling Fan(80W)	56
4	Split AC(2000W)	0
5	PC(75W)	0
6	Laptop(35W)	0
7	Printer(75W)	0
8	Photocopy M/c(550W)	0



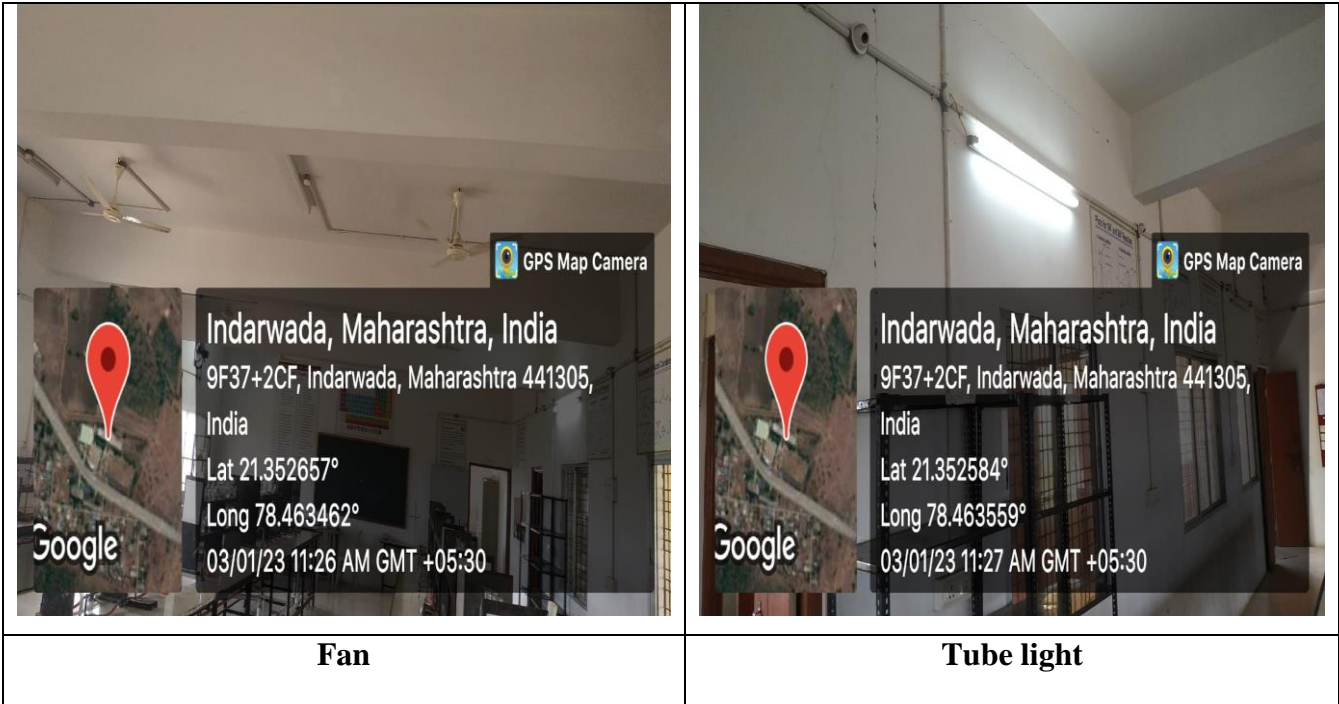
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Campus Street Light

Sr.No.	Electrical Equipment	Quantity
1	LED street ight (100W)	5

Some photograph of electrical equipment's



PC & Printer



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**END OF THE REPORT
THANKS**