

Govt. College Khertha, Distt.- Balod (C.G.)

**GREEN AUDIT REPORT**  
**2020-2021**



**Member Of Green Audit Committee**

Shri Umesh kumar Pathak

Assistant Professor



Miss Yamini Sahu  
(M.Sc. Botany)

Assistant Professor



Smt. Devprabha Sahu  
(M.Sc. Botany)

Lab Technician




**External Expert – Green Audit Committee**

Dr. Dharmendra Singh

Assistant Professor,  
Department of Commerce, Govt. N.C.J.  
College Dallirajhara.




  
**Principal,  
Govt. College, Khertha  
Distt. Balod (C.G.)**

## Introduction:-

The term "Green" means eco-friendly or not damaging the environment. This can acronymically is called as "Global Readiness in Ensuring Ecological Neutrality" (GREEN). Green accounting can be defined as systematic identification quantification, recording, reporting & analysis of components of ecological diversity & expressing the same in financial or social terms. "Green Auditing", an umbrella term, is known by another name "Environmental Auditing". There is a provision of green audit in college campus. A committee has been formed to monitor the proper conservation and plantation of the plants in the campus. As per the suggestions made by IQAC, botany department is given the responsibility to do green audit with cooperation of the environmental experts of the state. A report on green audit has been prepared by department of botany Govt. College Khertha Distt.- Balod (C.G.). This college was established in 2008. Total area of the college main campus is **9.78** acres, of which 30 percent is covered by herbs, shrubs and trees. The plants have been systematically identified by the green audit committee. There are more than **48** plant species were audited. The green audit report has been discussed with environmental experts. Extra efforts have been taken by the college to create environment consciousness amongst students. One major step in this regard is the extensive plantation program organized by NSS, UG students of botany and Teaching Staff. Plantation is encouraged by principal and faculties of all departments to increase greenery and reduce carbon emission effects. Renovation of the garden at the entrance was done with financial support from Jan Bhagidari Samiti. Extension programs also organized to create environment awareness and conservation of biodiversity amongst the students and public.



  
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**Activities organized to create greenery and its conservation at college campus is as follows-**

- Plantation of diversified species
- Uses of medicinal plants
- Identification of plants species

### **Plantation of diversified species:**

To create- green cover, eco-friendly atmosphere, pure oxygen at the college campus, plantation program is organized every year with involving all students, principal, and all departments faculty members. In this session van mahotsav program was organized and about 100 ornamental, avenue, medicinal plant with rare and exotic beautiful trees was planted in botanical garden and other parts of college campus. To keep the greeneries in the campus, we regularly maintain the gardens which are looked after by paid staff under the guidance of garden committee members. Moreover, every year we try to plant new trees. Seasonal flower garden is also a unique feature of this college.


### **Uses of medicinal plants:**

There are many medicinal plants are planted in college botanical garden. The plants have medicinal value but students don't have knowledge how to use and they can't identify the particular plants, so therefore faculty members of botany department help them to identify with scientific name and give information about medicinal uses of the plants.

### **Identification of plant species:**

There are so many plant species are present at college campus. The faculty member of the botany department audited and identified of various plant species with the help of flora.




  
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## List of the Audited Plants

S.No.	Scientific Name of Plant	Local Name	Family	Nos
1.	Polyanthia longifolia	Ashok	Annonaceae	10
2.	Azadiracta indica	Neem	Meliaceae	16
3.	Zizyphus jujube	Ber	Rhamnaceae	7
4.	Cocos nucifera	Narial	Palmaceae	1
5.	Dalbergia sissoo	Sheesham	Papilionaceae	17
6.	Delonix regia	Gulmohar	Caesalpinaceae	5
7.	Emblia officinalis	Amala	Euphorbiaceae	1
8.	Ficus bengalensis	Bargad	Moraceae	2
9.	Leucaena leucocephala	Shubabul	Mimosaceae	1
10.	Mangifera indica	Aam	Anacardiaceae	4
11.	Moringa oleifera	Munaga	Moringaceae	3
12.	Pongamia pinnata	Karanj	Papilionaceae	13
13.	Syzygium cuminii	Jamun	Myrtaceae	6
14.	Pithecolobium dulce	Ganga Emli	Mimosaceae	1
15.	Citrus limon	Nibu	Rutaceae	2
16.	Punica granatum	Anar	Punicaceae	1
17.	Citrus Sinensis	Orange	Rutaceae	1
18.	Psidium guajava	Amrud (Guava)	Myrtaceae	12
19.	Artocarpus hulero phyllus	Jack fruit	Moraceae	2
20.	Annona squamosa	Custard fruit (Sita phal)	Annonaceae	4
21.	Vachellia nilotica	Babul	Fabaceae	40
22.	Manilkara zapota	Chiku	Sapotaceae	2
23.	Gmelina arborea	Khamhar	Lamiaceae	1



  
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24.	Jatropha curcas	Ratanjot	Euphorbiaceae	1
25.	Morus alba	Shahtut	Moraceae	1
26.	Bauhinia variegata	Kachnar	Fabceae	1
27.	Butea monosperma	Palas (Parsa)	Fabceae	4
28.	Terminalia arjuna	Arjun tree	Combretaceae	4
29.	Aegle marmelos	Bael	Rutaceae	1
30.	Anacardium occidentale	Kaaju	Anacardiaceae	3
31.	Ficus religiosa	Pipal	Moraceae	2
32.	Hibiscus rosa sinensis	Gulhar	Malvaceae	1
33.	Callistemon	Bottlebrush	Myrtaceae	2
34.	Bixa orellana	Sinduri	Bixaceae	1
35.	Cordia dichotoma	Bohar	Boraginaceae	1
36.	Musa acuminata	Banana(Kela)	Mosaceae	1

### Medicinal Plants

S.No.	Scientific Name of Plant	Local Name	Family	Nos
1.	Aloe vera	Ghee Kwar	Liliaceae	1
2.	Catharanthes roseus	Sada Suhagan	Apocynaceae	2
3.	Tinospora cordifolia	Giloey	Menispermaceae	1
4.	Kalanchoe pirmata	Pattharchatta	Crassuaceae	5
5.	Mentha piperita	Mint	Lamiaceae	
6.	Ocimum tenuiflorum	Tulsi	Lamiaceae	1
7.	Murraya koenigii	Meetha neem	Rutaceae	1
8.	Calotropis gigantea	Fudahar	Apocynaceae	
9.	Eclipta prostrata	Bhringraj	Asteraceae	
10.	Cassia tora	Charota	Fabaceae	
11.	Solanum virginianum	Nili cateri	Solanaceae	
12.	Phyllanthus niruri	Bhui amla	Phyllanthaceae	



  
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**Polyanthia longifolia (Ashok)**



**Psidium guajava (Amrud)**



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**Artocarpus hulero phyllus**



**Emblica officinalis(Amala)**



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**Zizyphus jujube (Ber)**



**Morus alba (Shahtut)**



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**Citrus Sinensis (Orang)**



**Mangifera indica (Aam)**



*Darius*  
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**Callistemon**



**Kalanchoe pinnatifida (Patthachtta)**



*Dinesh*  
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**Ficus bengalensis(Bargad)**



**Syzygium cuminii (Jamun)**



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**Catharanthes roseus (Sadasuhagan)**



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OFFICE OF THE PRINCIPAL  
GOVT. COLLEGE KHERTHA DISTT. BALOD (C.G.)

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<http://www.govtcollegekhertha.in>

**CIRCULAR FOR MAINTENANCE OF GREEN CAMPUS**

In view of the recommendations by green Audit committee in the Internal green Audit Report of College, the college has decided to implement several policy decisions for the upkeep and maintenance of greenery inside the college premises. The point-wise initiatives for maintenance of green campus are as follows:

- Landscaping of college premises with trees and plants through regular plantation of saplings.
- Plantation of saplings of medicinal importance and air purifying properties.
- Formation of Green Army – a group of students dedicated towards clean and green campus initiatives.
- Establishment of Green Zone, Oxy Zone, Plastic-free Zone inside the college campus.
- Display of messages for environment protection, water conservation and saving trees.
- Use of Plastic bags and other use & throw plastic items to be banned inside the college premises.
- outside traffic shall be completely restricted inside the college campus while the vehicles of outsiders / visitors to be allowed conditionally and occasionally.
- Speed of more than 10 km /h for vehicles playing inside the college campus shall not be entertained.
- Students and staff to be encouraged for use of bicycles, Zero/ low emission vehicles and public transport.


**Green campus committee:**

- Dr. Sudha Soni** - Convener  
**Mr. Umesh Pathak** - Coordinator  
**Smt. Sudha Sharma** - Member  
**Smt. Devprabha sahu** - Member

  
Principal

Govt College , Khertha  
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## **Suggestion for Future Development of Green & Clean Campus**

1. Improve the greenery up to 50% by plantation like trees and medicinal plants in the campus.
2. Plantation of water harvesting plants.
3. Eco-friendly management.
4. Development of medicinal garden.
5. Organic farming for the support of nature and environment.
6. Development of pollution free zone
7. Awareness about cleanliness and maintenance of flora and fauna.



*Duni*  
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Govt. College, Khertha  
Distt. Balod (C.G.)**



**ENERGY AUDIT REPORT**  
**OF**  
**GOVT. COLLEGE KHERTHA, BALOD,**  
**CHHATTISGARH**



**ADDRESS: - KHERTHA BAZAR ROAD, KHERTHA, CHHATTISGARH**  
**KHERTHA, BALOD (C.G.)-491771**

**Prepared By -**



**AUDITTECH**

**Audittech Industrial Services Private Limited**

**Opps. Mahavir Bhawan, Tikrapara, Balod, Chhattisgarh-491226**

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**Email- [info@audittech.co.in](mailto:info@audittech.co.in) Website- [www.audittech.co.in](http://www.audittech.co.in)**

**AUGUST-2021**

## Contents

<b>ACKNOWLEDGEMENT</b> .....	<b>3</b>
<b>ENERGY AUDITOR CERTIFICATE</b> .....	<b>4</b>
<b>1. EXECUTIVE SUMMARY</b> .....	<b>5</b>
1.1 Need for Energy Audit .....	7
1.2 Introduction .....	7
1.3 Energy Audit Objectives .....	8
1.4 Source of Energy .....	8
1.5 Indirect Benefits of Energy Audit .....	8
1.6 Introduction of Auditing Firm .....	9
1.7 Energy audit team .....	10
1.8 List of Instruments .....	10
1.9 Methodology of Energy Audit .....	11
<b>2. ELECTRICAL SYSTEM</b> .....	<b>12</b>
2.1 Electricity Bill Summary .....	12
2.2 Transformer Load Profile .....	14
2.3 Voltage Unbalance of Transformer .....	15
<b>3. LIGHTING SYSTEM</b> .....	<b>21</b>
3.1 Introduction .....	21
3.2 Basic Terms in Lighting System and Features .....	21
3.3 Light Details .....	22
3.4. Lux Level: .....	24
<b>4. SOLAR POWER GENERATION SYSTEM</b> .....	<b>28</b>
4.1 Introduction .....	28
4.2 Salient Benefits of Solar Energy .....	28
4.3 Proposed Solar Power Plant .....	29
<b>5. GENERAL TIPS FOR ENERGY CONSERVATION IN DIFFERENT UTILITIES SYSTEMS</b> .....	<b>31</b>
<b>6. ENERGY MANAGEMENT STRATEGY</b> .....	<b>33</b>
6.1 IDENTIFY A STRATEGIC CORPORATE APPROACH .....	33
6.2. DESIGNATE AN ENERGY MANAGER .....	33
6.3. SET UP AN ENERGY MONITORING AND REPORTING SYSTEM .....	33
6.4. IMPLEMENT A STAFF AWARENESS AND TRAINING PROGRAM .....	33

## ACKNOWLEDGEMENT

We express our sincere gratitude to **M/s. Govt. College Khertha, Balod** for giving us the opportunity to be a part of their mission towards Energy Conservation.

We are thankful to all officers and employees of **M/s. Govt. College Khertha, Balod** with whom we interacted during the field study for their whole hearted support in undertaking measurements and eagerness to assess the system/equipment efficiencies and saving potential. The willingness of these key personnel to participate in this program and acknowledge the call for energy efficiency is more than half the issues received.



Signature:

**Date: AUG 2021**

**Mr. Aashish Bafna, Director**

**Place: Raipur**

**Certified Energy Auditor**

## Energy Auditor Certificate

Reg No.: EA-28916



Certificate No.: 9780/19

# National Productivity Council

(National Certifying Agency)

## PROVISIONAL CERTIFICATE

**AASHISH BAFNA**

This is to certify that Mr./Mrs./Ms. ....  
son / daughter of Mr. **ASHOK BAFNA** ..... has passed the National certification Examination for Energy Auditors held in September 2018, 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 Accredited Energy Auditor and issuance of certificate of Accreditation by the Bureau of Energy Efficiency under the said Act.

This certificate is valid till the Bureau of Energy Efficiency issues an official certificate.

Digitally Signed by K V R RAJU  
Mon Apr 22 16:23:39 IST 2019  
Controller of Examination, NPC AIP Chennai

Place : Chennai, India

Date : 22nd April, 2019

  
Controller of Examination

**1.**

## **EXECUTIVE SUMMARY**

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An Energy Audit is a study of a Plant or facility to do determine how & where energy is used and to identify methods for Energy Savings. There is now a Universal recognition of the fact that new Technologies and much greater use of some that already exist provide the most hopeful prospects for the future. The Opportunities lie in the use of existing Renewable Energy Technologies, greater efforts at Energy Efficiency and the dissemination of these Technologies and Options.

This report is just one step, a mere Mile Marker towards our destination of Achieving Energy Efficiency and we would like to emphasize that an Energy Audit is a Continuous Process. We have compiled a list of Possible actions to Conserve and Efficiently utilize our scarce Resources and identified their Savings Potential. The next step would be to prioritize their Implementation.

We look forward with Optimism that the College Authorities, staffs and students shall ensure the maximum execution of the recommendations and the success of this work.

### **Govt. College Khertha Facility**

Government college, Khertha affiliated to Hemchand Yadav Vishwavidyalaya comes under higher education department of Chhattisgarh government in district Balod. This college was established in the year 2008. This college was established to provide higher education to young and deserving students. Arts, science, commerce faculties are functioning in this College. The co-curricular and sports activities are organized to stimulate the creativity and to maintain physical fitness of the students. The units of National Service Scheme and Youth Red Cross Society create a sense of social responsibility among the students. Career counselling and coaching classes for entering into various services are also organized under the banner of Career guidance scheme.

### **Electrical power:**

The establishment has a dedicated 11 KV connection from Chhattisgarh state power distribution company Ltd. The facility also installed a Dedicated 25 KVA Transformer for College.

SN	Energy saving measures	Investment Rs. Lakhs	Yearly energy savings				Cost saving /year (Rs.Lakhs)	Payback Period (Year)
			Oil	Gas	Coal (MT)	Electricity (kWh)		
1	2	3	4	5	6	7	9	10
1	Replacement of Tube Light of 40W + 15 W(Choke) with Energy Efficient 20W LED Tube	0.08	.....	.....	.....	1837	0.143	0.52
2	Replacement of Ceiling Fan of 80W With EESL Energy Efficient 35W BLDC Ceiling Fan	3.00	.....	.....	.....	11340	0.88	3.39
3	Installation of 20 kW Solar Power Generation Unit in Roof Top	10.00	.....	.....	.....	30000	2.34	4.20
	<b>Total</b>	<b>13.08</b>	.....	.....	.....	<b>43177</b>	<b>3.37</b>	<b>3.88</b>

<b>Total implementation cost proposed</b>	<b>13.08</b>	<b>Rs. Lakhs</b>
<b>Total Energy saving Potential identified (in kWh)</b>	<b>0.43</b>	<b>Lakhs kWh</b>
<b>Total cost Saving Potential</b>	<b>3.37</b>	<b>Rs. Lakhs</b>
<b>Simple Pay Back Period</b>	<b>3.88</b>	<b>Yrs.</b>

Note: Consider Electricity unit rate- Rs. 7.80/kWh

## 1.1 Need for Energy Audit

In any Educational Institute, the three top operating expenses are often found to be Energy, Manpower, Operational Expenses. If one were to relate to the manageability of the cost or potential cost savings in each of the above components, Energy would invariably emerge as a Key Component, and thus Energy Management function constitutes a strategic area for cost reduction. Energy Audit will help to understand more about ways Energy and Fuel are used in any identity, and help in identifying the areas where waste occurs and where scope for improvement-exists.

The Energy Audit would give a Positive Orientation to the Energy cost reduction, preventive maintenance and quarterly Central Programmes which are vital for production and utility activities. Such an Audit Programme will help to keep focus on variations which occur in the Energy costs, availability and reliability of supply of Energy, decide on approximate Energy mix, identify Energy Conservation Technologies, retrofit for Energy Conservation Equipment etc.

In General, Energy Audit is the translation of conservative ideas into realities, by lending Technically feasible solutions with economic and other Organizational considerations within a specified time frame.

The Primary Objective of Energy Audit is to determine ways to reduce Energy Consumption per unit of Product Output or to lower Operating costs. Energy Audit provides a "Benchmark" for managing Energy in the Organization and also provides the basis for Planning a more effective use of Energy throughout the Organization.

## 1.2 Introduction

This Project is the vision to make Govt. College Khertha Energy Efficient. Govt. College Khertha campus Energy bill keeps up around **INR 0.70 Lakhs per year**. This amount is huge and thus naturally attracts attention when we understand that quite a lot of energy is being wasted, which in turn would mean that huge amount of Financial resources is being wasted.

Making the Campus Energy Efficient will not only help the College reduce its expenses but also helps us fulfil our moral responsibility of not wasting this precious resource, which is scarcely available to rest of the people of the country.

We are confident that the results that will come out of this exercise are bound to be of interest to everyone and can be the first step to make Govt. College khertha campus energetically the most efficient campus in India.

### 1.3 Energy Audit Objectives

**Primary: -**

- 1) The first objective is to acquire and analyze data and finding the necessary consumption pattern of these facilities.
- 2) The second objective will be to calculate the wastage pattern based on the results of the first objective.
- 3) The final objective is to find and implement solutions that are acceptable and feasible.

**Secondary: -**

- 1) This would be our first exposure to this field hence experience gain would be vital.
- 2) This project will precede many follow up projects and hence helps to gain technical and management exposure required for future energy projects.
- 3) It is sure to help create a repertoire of vital contacts hence will develop interaction with alumni, faculty and students.

### 1.4 Source of Energy

Govt. College Khertha uses Energy in Following Forms:

- a. Electricity from CSPDCL

The Following are the Major consumers of Electricity in the facility

- a. Lightning
- b. Fans
- c. Computers
- d. Other Lab Equipment

### 1.5 Indirect Benefits of Energy Audit

Every time the Energy Audit is carried out it rekindles the interest in Energy Conservation as an important function. Energy Auditors sharing their experience and knowledge with the Plant Personnel, helps in fuelling the innovative ideas for further action of reduction in Specific Power consumption (SPC). Any loose connections or heating of cables come to timely vision. For an external agency due to unbiased vision, a few points for Energy Conservation may be visible each time they perform the audit and this would help in achieving further saving. Inform any irregularities in Energy meter CT connections for rectification.



## 1.6 Introduction of Auditing Firm

**M/s. Audittech Industrial Services Private Limited** is an empanelled Accredited Energy Audit Firm from Bureau of Energy Efficiency, Ministry of Power, Government of India. It is one of the fast growing Energy Audit & Energy services providing company executed several projects covering all the energy Intensive Sectors & states of India. The directors and associate team members are very well experienced in the field of Energy Audit and executed more than 150 no's Detailed Energy Audit so far.

The associate team and expert are highly qualified and experienced in the field of Energy Audit and Services. Individual credential of each member in the field of Energy Audit is very rich due to their past association with very reputed organization of Energy Audit Services.

<b>Name of Firm:</b>	<b>Audittech Industrial Services Private Limited</b>
<b>Address:</b>	<b>Opps. Mahavir Bhawan, Tikarapara, Balod, Chhattisgarh-491226</b>
<b>Contact details:</b>	<b>9827143100 / 9407702444, Email id: <a href="mailto:info@audittech.co.in">info@audittech.co.in</a>, <a href="mailto:aispl.rpr@gmail.com">aispl.rpr@gmail.com</a></b>

Company have Head office at Balod (C.G.) & Branch offices at Durg, Bhopal, Mumbai & Delhi.

### Directors Details

Sr. No.	Name	Designation / Technical Experience	Technical Experience /Qualification
1	Mr. Aashish Bafna	Managing Director - 10yrs	B.E (E&I)., MBA(Energy Management), Certified Energy Auditor, Surveyor & Loss Assessor
2	Mr. Rakesh Khichariya	Director- 25Yrs	B.E (Elect.), Accredited Energy Auditor
3	Mr. Ramesh Patel	Director- 25Yrs	B.E.(Mtech), Govt Approved Valuer, Competent Person for Factory Act
4	Mr. Isshant Chainani	Director- 10 Yrs	B.E. (Elect & telecom)
5	Mrs. Shikha Golchha	Director- 8 yrs	B.E., MBA (Finance)

### 1.7 Energy audit team

Following are the team involved in the Energy Audit of the Govt. College Khertha

SN	Name	Designation/ Qualification	Experience	Contact Details
1	Mr. Rakesh khichariya	Accredited Energy Auditor (AEA-0295)	25 yrs.	9827411444
2	Mr. Aashish Bafna	Certified Energy Auditor (EA-28916)	10 yrs.	9827143100
3	Mr. Isshant Chainani	Certified Energy Manager (EA-29062)	10 yrs.	9407702444
4	Mr. Dhaleshwar Prasad	Certified Energy Manager (EA-27299)	9 yrs.	9179294953
5	Mr. Sumit Singh Thakur	Certified Energy Manager (EA-28549)	9 yrs.	8770632688
6	Mr. Mahaveer Bafna	Energy Engineer	3 yrs	8962369293
7	Mr. Tukeshwar Yadav	Energy Engineer	1 yrs	6260997416

### 1.8 List of Instruments

Following are the instrument used at the time of the Energy Audit.

Sr.No.	Instrument	Make/Sr.No.
1	Power & Harmonics Analyser, 1 Set (With CT, PT) LT	Krykard ALM 31/ 123673RCH
2	Power & Harmonics Analyser, 1 Set (With CT, PT) LT	Krykard ALM 20/ 28107280
3	Ultrasonic Flow meter, 1 Set (With 3Sized Transducer & Pressure gauge	Chinese/ 28107280
4	Lux Meter 1Set (Digital Lux Meter)	MECO G 930P/201704004601

### 1.9 Methodology of Energy Audit

The purpose of the Audit was to ensure that the practices followed in the campus with the criteria, methods and recommendations used in the audit were based on the identified risks. The methodology includes: preparation and filling up of questionnaire, Physical inspection of the campus, observation and review of the document, interviewing responsible persons and data analysis, measurements and recommendations. The methodology adopted for this Audit was a three-step process comprising of:

1. **Data Collection** - In preliminary data collection phase, exhaustive data collection was performed using different tools such as observation, survey communicating with responsible persons and measurements. Following steps were taken for data collection:

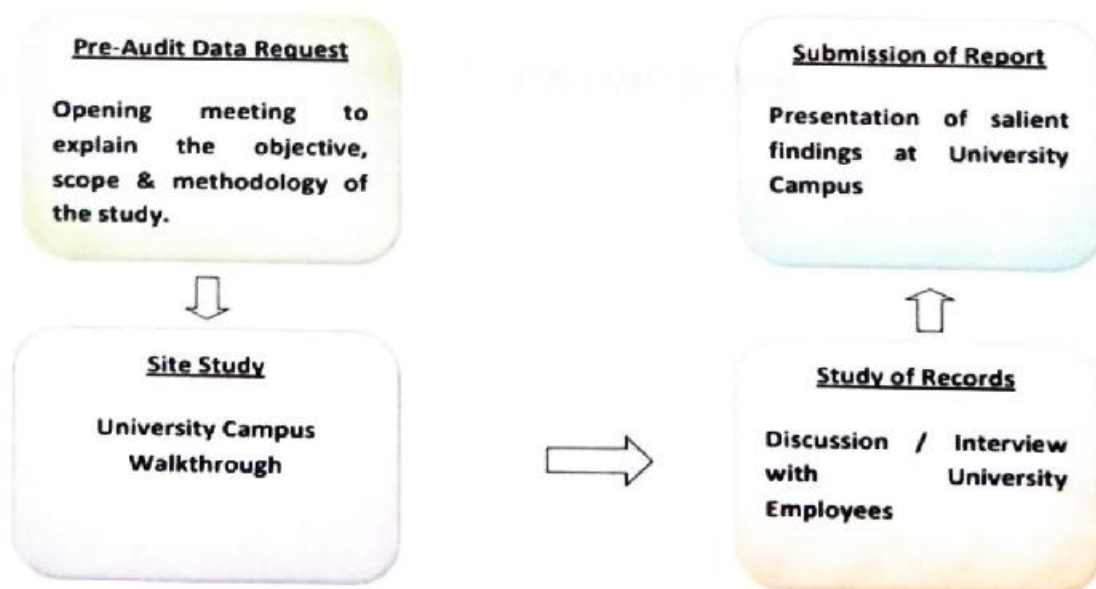
The team went to each department, centres, Library, canteen, Student Blocks, labs, etc.

Data about the general information was collected by observation and interview.

The power consumption of appliances was recorded by taking an average value in some cases.

2. **Data Analysis** - Detailed analysis of data collected include: calculation of energy consumption, analysis of latest electricity bill of the campus, understanding the tariff plan provided by the. Chhattisgarh State Power Distribution Company (CSPDCL). Data related to water usages were also analysed using appropriate methodology.

3. **Recommendation /Suggestions** - On the basis of results of data analysis and observations, some steps for reducing power and water consumption were recommended. Proper treatments for waste were also suggested. Use of fossil fuels has to be reduced for the sake of community health.



**AUDIT FLOW CHART**

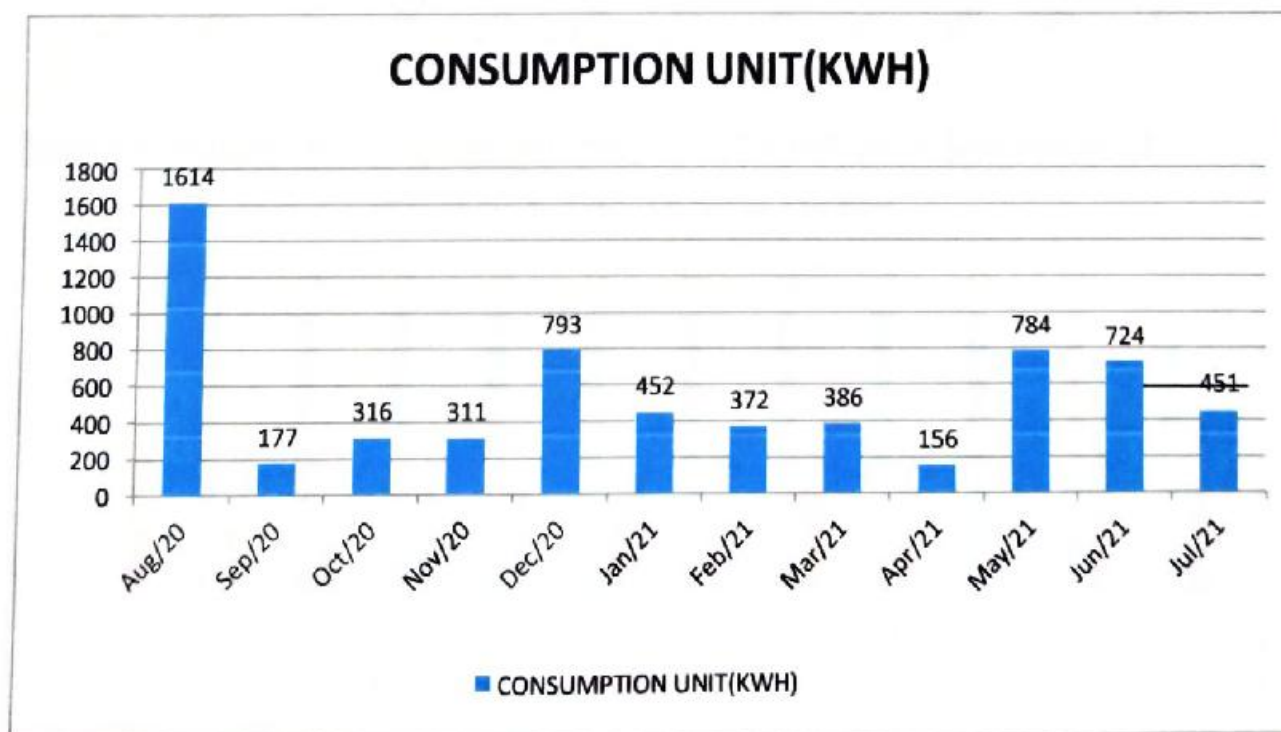
## 2.ELECTRICAL SYSTEM

### 2.1 Electricity Bill Summary-

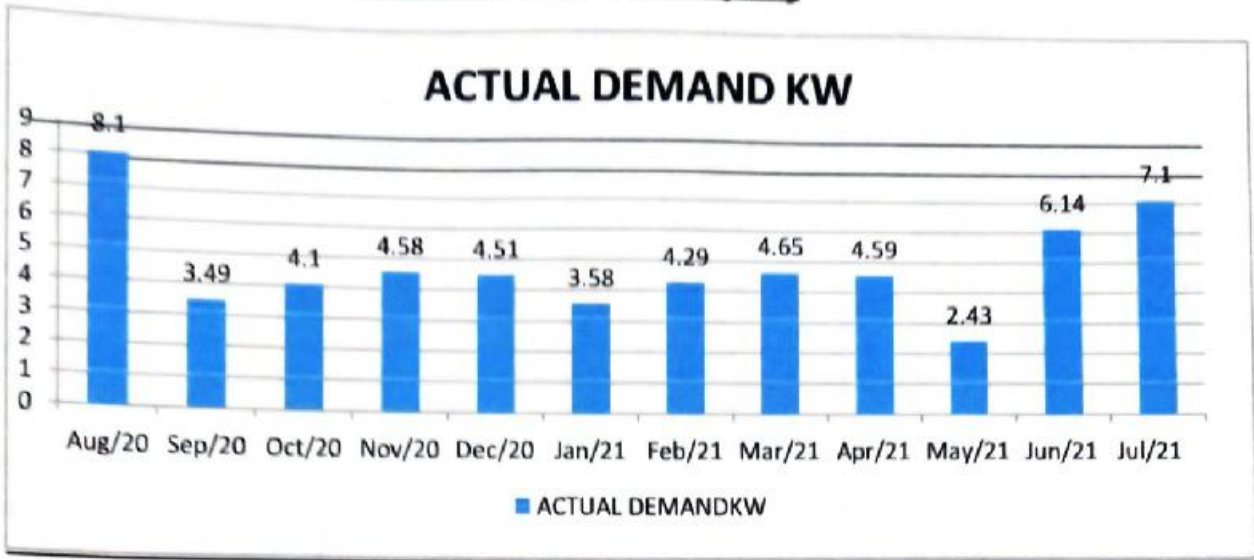
This table shows the Electricity Bill of last 12 Months From August 2020 to July 2021.

Govt. College Khertha Electricity Consumption Details						
Bill Month	Consumption Unit(kWH)	Contract Demand (kW)	Actual Demand (kW)	Amount (In Rs.)	Power Factor	Unit Cost (in Rs.)
Aug-20	1614	12	8.10	18760.00	0.69	7.80
Sep-20	177	12	3.49	2300.00	0.75	6.50
Oct-20	316	12	4.10	3240.00	0.86	6.50
Nov-20	311	12	4.58	3190.00	0.78	6.50
Dec-20	793	12	4.51	6920.00	0.72	7.80
Jan-21	452	12	3.58	4220.00	0.69	7.80
Feb-21	372	12	4.29	3630.00	0.71	7.80
Mar-21	386	12	4.65	6616.89	0.73	7.80
Apr-21	156	12	4.59	4450.45	0.74	7.80
May-21	784	12	2.43	751.49	0.82	7.80
Jun-21	724	12	6.14	5590.00	0.82	7.80
Jul-21	451	12	7.10	9850.00	0.83	7.80
<b>Total</b>	<b>6536</b>	<b>--</b>	<b>--</b>	<b>69518.83</b>	<b>--</b>	<b>--</b>
<b>Average</b>	<b>544.67</b>	<b>12</b>	<b>4.80</b>	<b>5793.24</b>	<b>0.76</b>	<b>7.48</b>
<b>Max</b>	<b>1614</b>	<b>12</b>	<b>8.10</b>	<b>18760</b>	<b>0.86</b>	<b>7.80</b>
<b>Min</b>	<b>156</b>	<b>12</b>	<b>2.43</b>	<b>751.49</b>	<b>0.69</b>	<b>6.50</b>

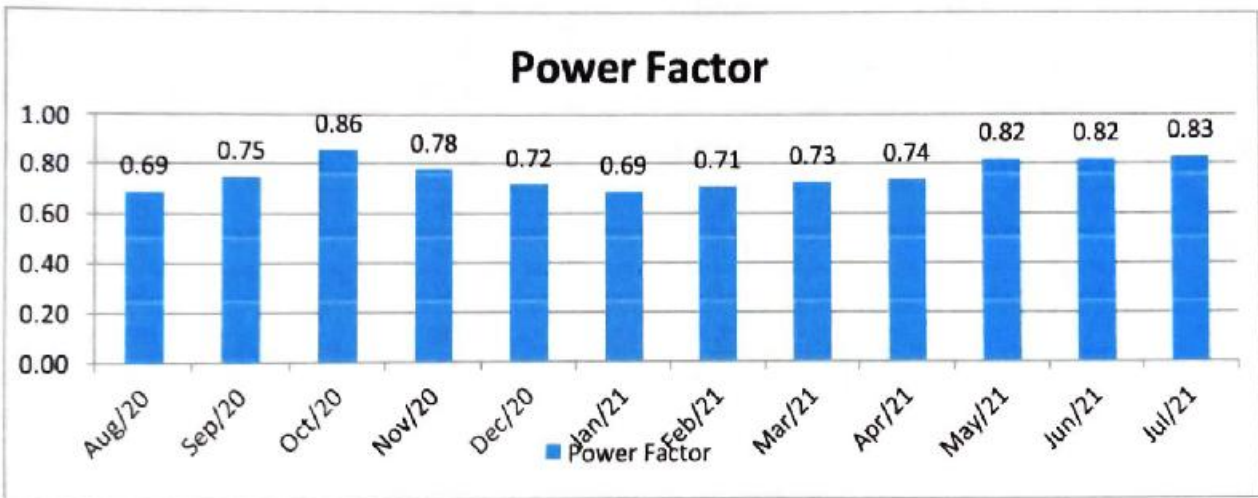
### Graphical Representation of Consumption Unit (KWH)



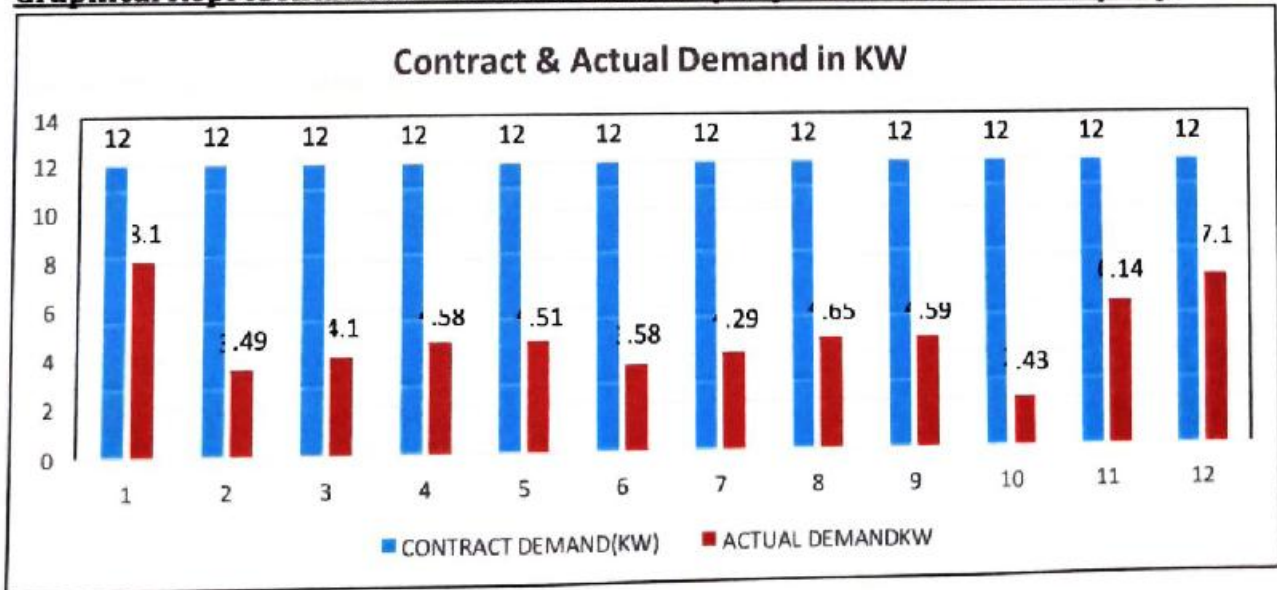
**Graphical Representation of Actual Demand (KW)**



**Graphical Representation of Power Factor**



**Graphical Representation of Contract Demand (KW) and Actual Demand (KW)**



## 2.2 Transformer Load Profile-

The Below Table Shows the Transformer Load Profile of Govt. College Khertha.

Parameter	Unit	Min	Max	Average
R RMS Voltage	V	406.3	430.7	424
Y RMS Voltage	V	430.4	439.3	433.89
B RMS Voltage	V	410.2	439.7	425.78
R RMS Current	Amp	0.3	11.96	10.98
Y RMS Current	Amp	0.65	26.43	18.8
B RMS Current	Amp	5.44	17.76	12.95
L1 PF	-	0.204	0.999	0.974
L2 PF	-	0.416	0.999	0.966
L3 PF	-	0.892	0.991	0.974
R Active Power	KW	0.066	2.908	2.597
Y Active Power	KW	0.066	6.352	4.634
B Active Power	KW	1.263	4.38	3.167
<b>Total Active Power</b>	<b>KW</b>	<b>1.395</b>	<b>13.64</b>	<b>10.398</b>
R Apparent Power	KVA	0.063	2.913	2.62
Y Apparent Power	KVA	0.159	6.526	4.791
B Apparent Power	KVA	1.372	4.426	3.243
<b>Total Apparent Power</b>	<b>KVA</b>	<b>1.594</b>	<b>13.865</b>	<b>10.654</b>
R THD Voltage	%	1.8	3.2	2.14
Y THD Voltage	%	1.6	2.1	1.92
B THD Voltage	%	2.1	2.6	2.42
R THD Current	%	4.3	25.2	6.44
Y THD Current	%	2.7	20	5.67
B THD Current	%	9.1	42.1	15.99

Note: Total Load profile of Transformer is enclosed in Annexure-1

### Observation:

1. All the electrical Parameters shown in above table are within acceptable Limit.

### 2.3 Voltage Unbalance of Transformer -

The Below Table Shows the Voltage Unbalance of Transformer, Govt. College Khertha

S.No.	Rated voltage	Voltage Unbalance of Main Transformer									
		Measured Voltage			Average Voltage	Calculated Unbalance			Maximum unbalance	% Voltage Unbalance	%Temperature rise
		R	Y	B		R	Y	B			
1	440.00	420.80	417.50	419.00	419.10	1.70	1.60	0.10	1.70	0.41	0.33
2	440.00	420.90	417.50	419.00	419.13	1.77	1.63	0.13	1.77	0.42	0.36
3	440.00	420.80	417.50	418.90	419.07	1.73	1.57	0.17	1.73	0.41	0.34
4	440.00	420.80	417.40	418.90	419.03	1.77	1.63	0.13	1.77	0.42	0.36
5	440.00	420.70	417.40	418.80	418.97	1.73	1.57	0.17	1.73	0.41	0.34
6	440.00	420.50	417.20	418.40	418.70	1.80	1.50	0.30	1.80	0.43	0.37
7	440.00	420.50	417.20	418.30	418.67	1.83	1.47	0.37	1.83	0.44	0.38
8	440.00	420.40	417.10	418.30	418.60	1.80	1.50	0.30	1.80	0.43	0.37
9	440.00	420.60	417.30	418.30	418.73	1.87	1.43	0.43	1.87	0.45	0.40
10	440.00	420.60	417.70	418.40	418.90	1.70	1.20	0.50	1.70	0.41	0.33
11	440.00	420.70	417.80	418.50	419.00	1.70	1.20	0.50	1.70	0.41	0.33
12	440.00	420.70	417.80	418.60	419.03	1.67	1.23	0.43	1.67	0.40	0.32
13	440.00	420.80	417.80	418.50	419.03	1.77	1.23	0.53	1.77	0.42	0.36
14	440.00	420.80	417.90	418.50	418.20	2.60	0.30	0.30	2.60	0.62	0.77
15	440.00	420.40	417.50	418.30	418.73	1.67	1.23	0.43	1.67	0.40	0.32
16	440.00	420.50	417.60	418.40	418.83	1.67	1.23	0.43	1.67	0.40	0.32
17	440.00	420.50	417.70	418.40	418.87	1.63	1.17	0.47	1.63	0.39	0.30
18	440.00	420.60	417.70	418.50	418.93	1.67	1.23	0.43	1.67	0.40	0.32
19	440.00	420.50	417.70	418.40	418.87	1.63	1.17	0.47	1.63	0.39	0.30
19	440.00	420.50	417.70	418.40	418.87	1.63	1.17	0.47	1.63	0.39	0.30
19	440.00	420.40	417.60	418.30	418.77	1.63	1.17	0.47	1.63	0.39	0.30
20	440.00	420.40	417.60	418.30	418.77	1.63	1.17	0.47	1.63	0.39	0.30
21	440.00	420.30	417.50	418.30	418.70	1.60	1.20	0.40	1.60	0.38	0.29

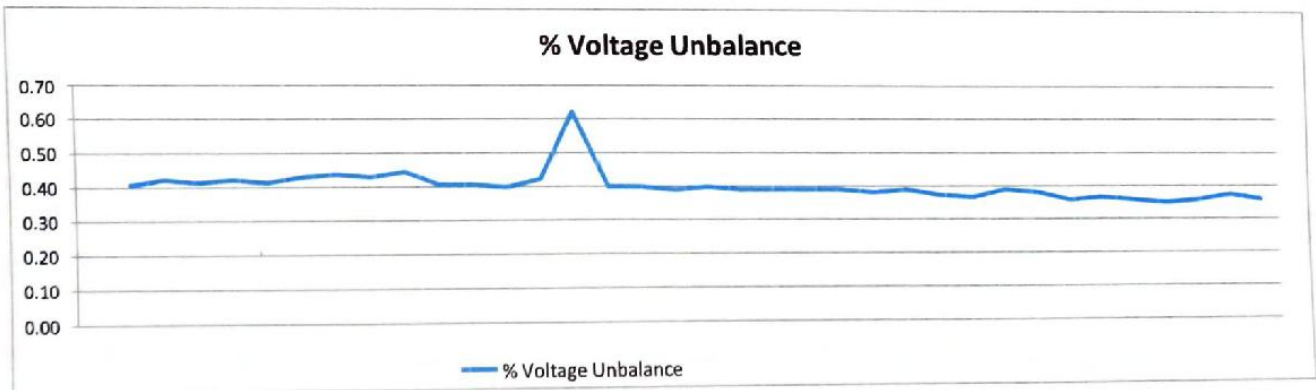
**Energy Audit of Govt. College Khertha, Balod, CG**

22	440.00	420.40	417.60	418.30	418.77	1.63	1.17	0.47	1.63	0.39	<b>0.30</b>
23	440.00	420.50	417.70	418.60	418.93	1.57	1.23	0.33	1.57	0.37	<b>0.28</b>
24	440.00	420.50	417.70	418.70	418.97	1.53	1.27	0.27	1.53	0.37	<b>0.27</b>
25	440.00	420.60	417.70	418.60	418.97	1.63	1.27	0.37	1.63	0.39	<b>0.30</b>
26	440.00	420.40	417.50	418.50	418.80	1.60	1.30	0.30	1.60	0.38	<b>0.29</b>
27	440.00	420.20	417.50	418.40	418.70	1.50	1.20	0.30	1.50	0.36	<b>0.26</b>
28	440.00	420.30	417.50	418.50	418.77	1.53	1.27	0.27	1.53	0.37	<b>0.27</b>
29	440.00	420.20	417.50	418.40	418.70	1.50	1.20	0.30	1.50	0.36	<b>0.26</b>
30	440.00	420.10	417.30	418.50	418.63	1.47	1.33	0.13	1.47	0.35	<b>0.25</b>
31	440.00	420.20	417.30	418.60	418.70	1.50	1.40	0.10	1.50	0.36	<b>0.26</b>
32	440.00	420.30	417.30	418.60	418.73	1.57	1.43	0.13	1.57	0.37	<b>0.28</b>
33	440.00	420.10	417.20	418.50	418.60	1.50	1.40	0.10	1.50	0.36	<b>0.26</b>

**Observation: -**

1. It is Observed that the voltage unbalance is not Exceed 1%, and the Voltage Unbalance as per above Table is within acceptable range

**Graphical Representation of Percentage Voltage Unbalance**







Transformer

## 2.4 Power Quality

### Power Quality & Harmonics

Equipment based on frequency conversion techniques generates harmonics. With the increased use of such equipment's, harmonics related problems have enhanced.

The harmonic currents generated by different types of loads, travel back to the source. While traveling back to the source, they generate harmonic voltages, following simple Ohm's Law. Harmonic voltages, which appear on the system bus, are harmful to other equipment connected on the same bus. In general, sensitive electronic equipment connected on this bus, will be affected.

The Harmonics Level on the LT side of the Transformers was measured, details of which is as under:-

- Maximum Individual Frequency Voltage Harmonic: 3%
- Total Harmonic Distortion of the Voltage: 5%

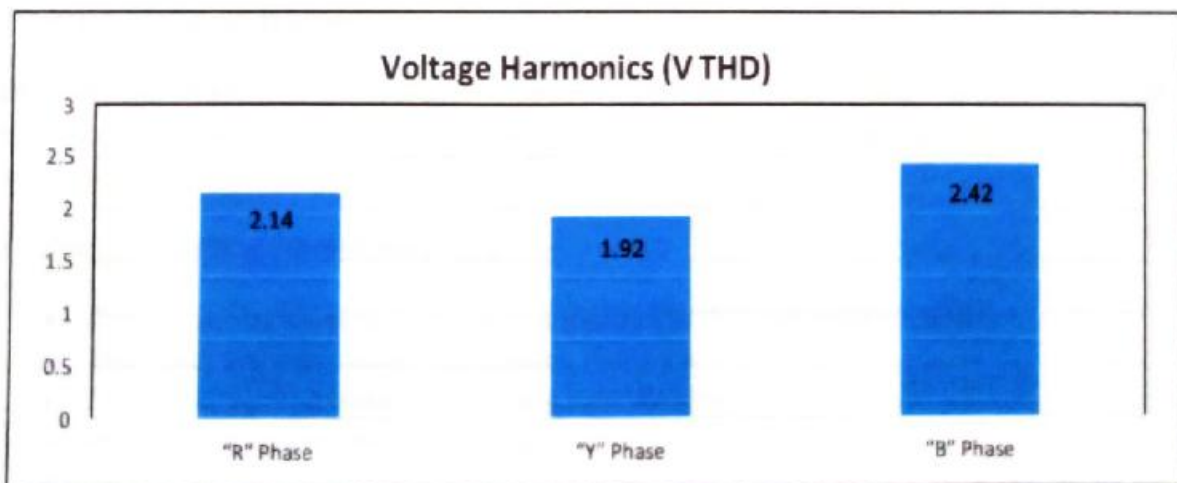
#### harmonic current limitations

Maximum Harmonic Current Distortion in Percent of IL 120 Volt through 69 KV						
Individual Harmonic Order (Odd Harmonics)						
ISC/IL	h<11	11<h<17	17<h<23	23<h<35	35<h	TDD
<20*	4.0	2.0	1.5	0.6	0.3	5.0
20<50	7.0	3.5	2.5	1.0	0.5	8.0
50<100	10.0	4.5	4.0	1.5	0.7	12.0
100<1000	12.0	5.5	5.0	2.0	1.0	15.0
>1000	15.0	7.0	6.0	2.5	1.4	20.0

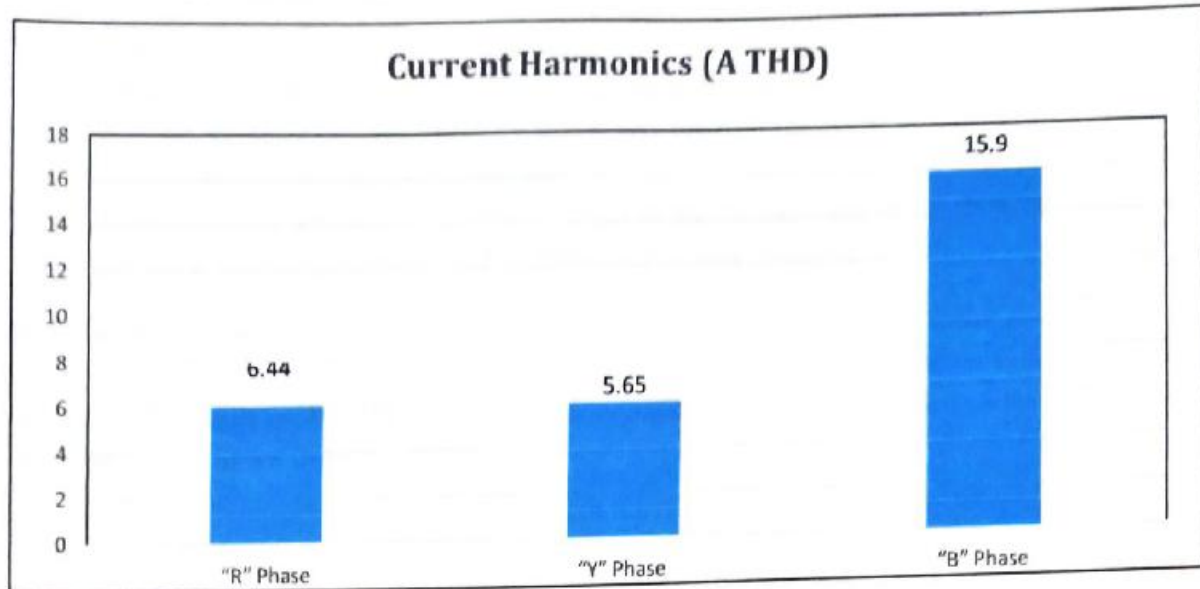
Even harmonics are limited to 25% of the odd harmonic limits  
 TDD refers to Total Demand Distortion based on the average demand current at the fundamental frequency and measured at the PCC (Point of Common Coupling)  
 \*All power generation equipment is limited to these values of current distortion regardless of ISC/IL value.  
 ISC = Maximum short-circuit current at PCC.  
 IL = Maximum demand load current (fundamental) at the PCC.  
 h = Harmonic number.

Particulars	TR
<b>Overall</b>	
<b>Voltage Harmonics (V THD)</b>	
"R" Phase	2.14
"Y" Phase	1.92
"B" Phase	2.42
<b>Current Harmonics (A THD)</b>	
"R" Phase	6.44
"Y" Phase	5.65
"B" Phase	15.9

### Graphical Representation of Voltage Harmonics (V THD)



### Graphical Representation of Current Harmonics (A THD)



#### **OBSERVATIONS & SUGGESTIONS:**

As detailed above, the voltage harmonics levels were around 1.92-2.42 % and the current harmonics levels were 5.65-15.9%. **The Overall harmonics are within limits.**

If Harmonics level is on higher side then appropriate harmonic filters may have to be installed in the system.

Different technologies are available mitigating the harmonics from the system. These include: **Detuned or broadband harmonic filters:** these filter banks are tuned to a frequency just below the predominant harmonic frequency. If the predominant harmonic frequency is say, 5<sup>th</sup>, it is normal practice to tune the filters to 189 Hz, or 3.78<sup>th</sup> harmonic, in 50 Hz systems.

**Active Harmonic Filters:** these units are designed in such manner that, they will inject harmonic frequencies in the system, which will be in anti-phase of the load harmonic frequencies. This will effectively free the source being loaded due to harmonics.

#### **MAJOR CAUSES OF HARMONICS**

Devices that draw non-sinusoidal currents when a sinusoidal voltage is applied create harmonics. Frequently these are devices that convert AC to DC. Some of these devices are listed below:

##### Electronic Switching Power Converters

- Computers, Uninterruptible power supplies (UPS), Solid-state rectifiers
- Electronic process control equipment, PLC's, etc.
- Electronic lighting ballasts, including light dimmer
- Reduced voltage motor controllers
- Arcing Devices
- Discharge lighting, e.g. Fluorescent, Sodium and Mercury vapor

- Arc furnaces, Welding equipment, Electrical traction system, Ferromagnetic Devices
- Transformers operating near saturation level
- Magnetic ballasts (Saturated Iron core)
- Induction heating equipment, Chokes, Motors, Appliances
- TV sets, air conditioners, washing machines, microwave ovens
- Fax machines, photocopiers, printers
- These devices use power electronics like SCRs, diodes, and thyristors, which are a growing percentage of the load in industrial power systems.

Many problems can arise from harmonic currents in a power system. Some problems are easy to detect; others exist and persist because harmonics are not suspected. Higher RMS current and voltage in the system are caused by harmonic currents, which can result in any of the problems listed below:

Blinking of Incandescent Lights	Transformer Saturation
Capacitor Failure	Harmonic Resonance
Circuit Breakers Tripping	Inductive Heating and Overload
Conductor Failure	Inductive Heating
Electronic Equipment Shutting down	Voltage Distortion
Flickering of Fluorescent Lights	Transformer Saturation
Fuses Blowing for No Apparent Reason	Inductive Heating and Overload
Motor Failures (overheating)	Voltage Drop
Neutral Conductor and Terminal Failures	Additive Triplen Currents
Electromagnetic Load Failures	Inductive Heating
Overheating of Metal Enclosures	Inductive Heating
Power Interference on Voice Communication	Harmonic Noise
Transformer Failures	Inductive Heating

## 3.LIGHTING SYSTEM

### 3.1 Introduction

Lighting is an essential service in all the industries, Universities, Hospitals, Malls etc. Innovation and continuous improvement in the field of lighting, has given rise to tremendous energy saving opportunities in this area. Lighting is an area, which provides a major scope to achieve energy efficiency at the design stage, by incorporation of modern energy efficient lamps, luminaries and gears, apart from good operational practices.

### 3.2 Basic Terms in Lighting System and Features

#### • Lamps

Lamp is equipment, which produces light. The most commonly used lamps are described briefly as follows:

#### • Incandescent lamps:

Incandescent lamps produce light by means of a filament heated to incandescence by the flow of electric current through it. The principal parts of an incandescent lamp, also known as GLS (General Lighting Service) lamp include the filament, the bulb, the fill gas and the cap.

#### • Reflector lamps:

Reflector lamps are basically incandescent, provided with a high quality internal mirror, which follows exactly the parabolic shape of the lamp. The reflector is resistant to corrosion, thus making the lamp maintenance free and output efficient.

#### • Gas discharge lamps:

The light from a gas discharge lamp is produced by the excitation of gas contained in either a tubular or elliptical outer bulb. The most commonly used discharge lamps are as follows:

- Fluorescent tube lamps (FTL)
- Compact Fluorescent Lamps (CFL)
- Mercury Vapour Lamps
- Sodium Vapour Lamps
- Metal Halide Lamps

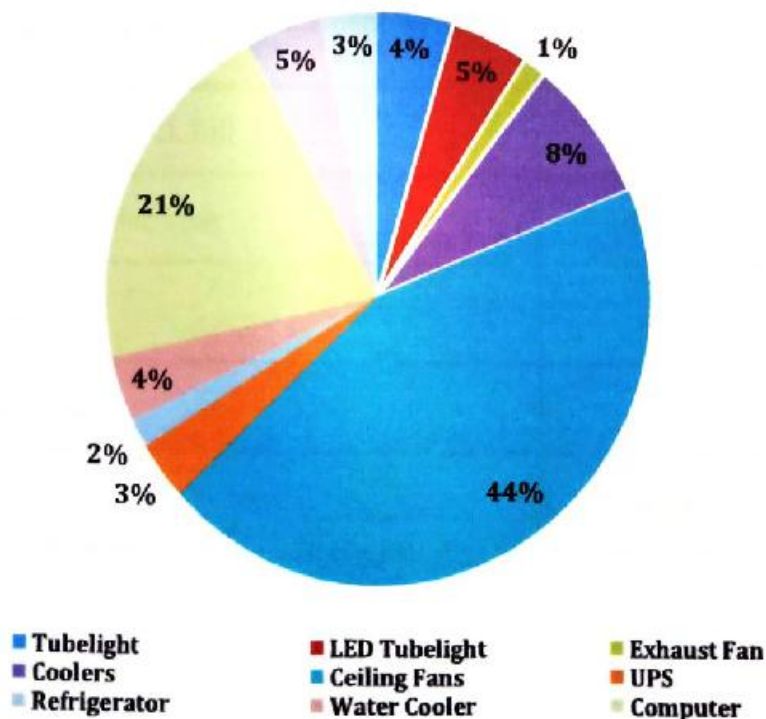
### 3.3 Light Details

Audit team done the Inventory with Wattage analysis of different type of lighting installed in the across the campus. Below table shows the overall fixtures install in the College.

Inventory Details				
S.No.	Lighting Details/Type of light	Quantity	Wattage	Total load (Watt)
1	Tubelight	25	40	1000
2	LED Tubelight	50	20	1012
3	Exhaust Fan	2	150	300
4	Coolers	4	450	1800
5	Ceiling Fans	120	80	9600
Some other Energy Consuming Equipments				
6	UPS	2	360	720
7	Refrigerator	1	350	350
8	Water Cooler	1	800	800
9	Computer	15	300	4500
10	Oven	1	1000	1000
11	Submersible Pump	1	746	746

### Representation of Percentage Wattage Consumption

**% Wattage Consumption**



**Observation:**

1. It is Observed from above table there are unconventional Tube Lights and fans are Installed in College Premises.

**Recommendation:**

1. It is Recommended to Replace all unconventional 40 Watt + 15 W (Choke) Tubelights Lights
2. It is Recommended to Replace inefficient Fans with BLDC Energy Efficient Fans.

**Energy Saving Potential**

The Below Table Shows the Energy Saving Potential of Govt. College Khertha.

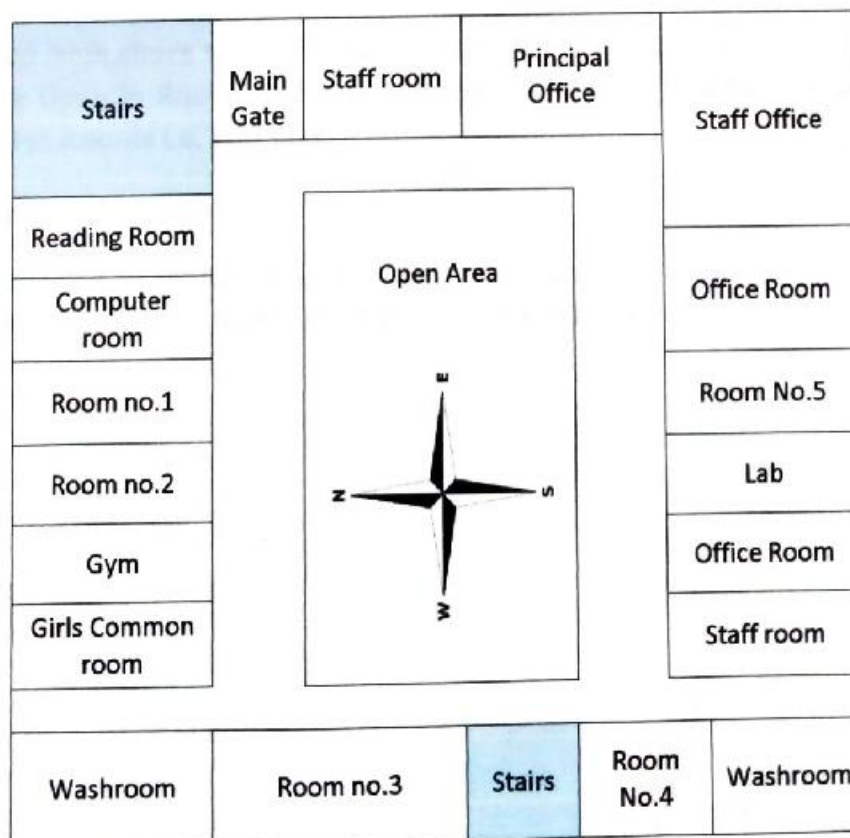
<b>Replacement of Tube Light of 40W+15 W (choke) with 20W LED Tube</b>		
<b>Particulars</b>	<b>Value</b>	<b>Units</b>
Total Number of 55 Watt Tube Light	25	Nos.
Measured Watt	55	Watts
Total Watts	1375	Watts
Proposed watt after replacement	20	Watts
Total Watt After Replacement	875	Watts
Operating Hours in a day	7	Hours
Estimated Energy Saving after Replacement Annual KWH	1837.5	KWH
Per Unit Cost as Per CSPDCL Bill	7.8	Rs/kWh
Estimated Cost Saving Per Year	14332.5	Rs
Cost of Per Fixtures	300	Rs
Total Investment Cost	7500	Rs
Payback	0.52	Year

Replacement of Ceiling Fan of 80W With EESL Energy Efficient BLDC 35W Ceiling Fan		
Particulars	Value	Units
Total Number of 80 Watt	120	No.s
Measured Watt	80	Watts
Total Watts	9600	Watts
Proposed watt after replacement	35	Watts
Total Watt After Replacement	5400	Watts
Operating Hours in a day	7	Hours
Estimated Energy Saving after Replacement Annual KWH	11340	KWH
Per Unit Cost as Per CSPDCL Bill	7.80	Rs/kWh
Estimated Cost Saving Per Year	88452	Rs
Cost of Per Fixtures	2500	Rs
Total Investment Cost	300000	Rs
Payback	3.39	Year

### 3.4. Lux Level: -

**Lux** is a standardised unit of measurement of light level intensity, which is commonly referred to as "illuminance" or "illumination". A measurement of **1 lux is equal to the illumination of a one metre square surface** that is one metre away from a single candle.

### Ground Floor Layout





**Ground Floor**

This table Shows the Average value of Lux

Location	Average Lux level with Open Window & Light	Average Lux level with Open Window only	Average Lux level with Light Only
Reading Room	661	553	132
Computer room	658	551	129
Room No.1	660	555	135
Room No.2	665	553	131
Gym	659	549	127
Girls Common Room	663	554	124
Room No.3	664	546	136
Room No.4	602	545	140
Staff Room	850	932	175
Office Room	848	929	169
Lab	850	935	171
Room No.5	855	927	177
Office Room	845	936	166
Principal Office	853	933	159
Staff Room	856	925	179

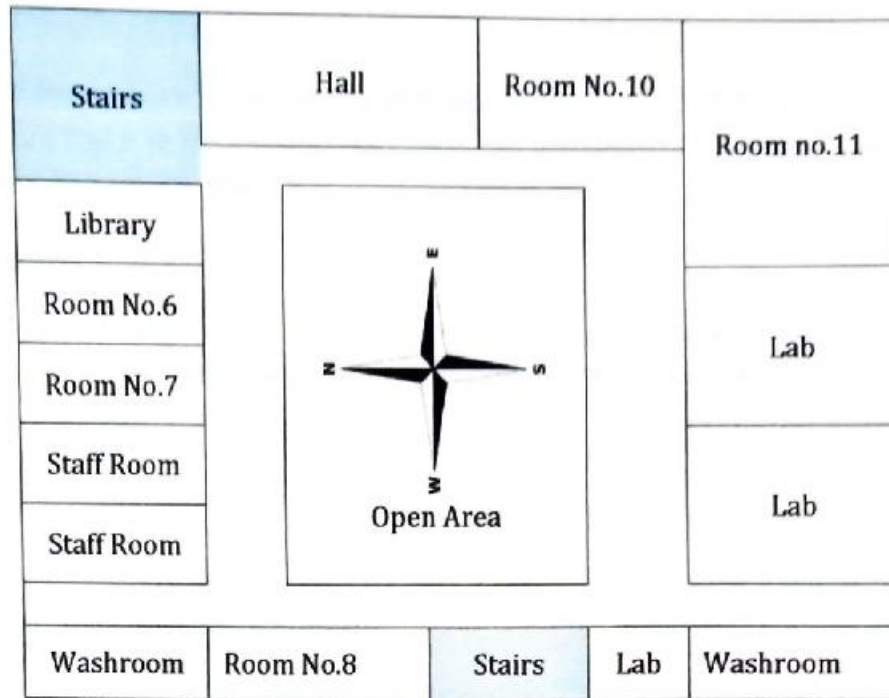
**Observation:**

1. It is observed from above table that the Average LUX Level is between 500 to 925 when all Windows are Open in Rooms and No Lights are Switched ON, **which is above Standard Level for Class Rooms i.e. 300 LUX.**

**Recommendation:**

1. It is recommended to switch off all the Lights during day time or off the half of the Total Lights of the Rooms if Required, which can save too Much Energy.

### First Floor Layout



### First Floor

This Table Shows the Average Value of Lux

Location	Average Lux level with Open Window & Light	Average Lux level with Open Window only	Average Lux level with Light Only
Library	653	557	136
Room No.6	658	551	129
Room No.7	669	559	135
Store Room	659	549	127
Store Room	663	554	124
Room No.8	664	546	138
Lab	602	545	140
Lab	620	932	175
Lab	627	938	169
Room No.11	850	935	171
Conference Hall	855	933	159

**Observation:**

1. It is Observed from above table that the Average LUX Level is between 500 to 925 with only all Windows are Open in Rooms and No Lights are Switched ON, **which is above Standard Level for Class Rooms i.e. 300 LUX.**

**Recommendation:**

1. It is Recommended that Switch off all the Lights during day time or Can Switch ON Half of the Lights of the Rooms if Required, which can save too Much Energy.

## **4.SOLAR POWER GENERATION SYSTEM**

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### **4.1 Introduction**

Solar energy is the energy obtained by capturing heat and light from the Sun. Energy from the Sun is referred to as solar energy. Technology has provided a number of ways to utilize this abundant resource. It is considered a green technology because it does not emit greenhouse gases. Solar energy is abundantly available and has been utilized since long both as electricity and as a source of heat.

Solar technology can be broadly classified as –

- **Active Solar** – Active solar techniques include the use of photovoltaic systems, concentrated solar power and solar water heating to harness the energy. Active solar is directly consumed in activities such as drying clothes and warming of air.
- **Passive Solar** – Passive solar techniques include orienting a building to the Sun, selecting materials with favorable thermal mass or light-dispersing properties, and designing spaces that naturally circulate air.

### **4.2 Salient Benefits of Solar Energy**

1. Energy Saving
2. Reduce Operating Cost
3. Provides Unlimited and reliable Energy
4. A clean, silent and eco-friendly source of power
5. Energy Independence
6. Available throughout the year
7. Protection against future escalation of energy costs
8. Solar modules convert sunlight into electricity without pollution
9. Modular design and easily expandable

### 4.3 Proposed Solar Power Plant

There is a proposed plan for on-grid solar power plant of 10kwp at Govt. College Khertha

Benefits of on-grid Solar power System

1. Huge Reduction in Electricity Bill
2. Easy Maintenance
3. Synchronize with other source of Power
4. Huge Saving in Energy
5. Generated more power than other solar system



**Proposed Site for 10kwp Solar Power Plant**

College Proposed around 10000 Sq.ft. Space at roof of Govt. College Khertha for Installation of Maximum 20kwp on-grid solar power plant.

#### **Our Suggestion -**

During Energy Audit we have measured the electrical power at different blocks of Govt. College Khertha and we observed that the proposed site for the solar power plant has more than connected load.

We Suggest to install Solar power plant at the roof of college because the maximum load of College has connected in the said building.

Generally as a thumb rule, the solar module of 1kW generate approximately 4-5 kWh per day which requires 100 sq.ft area for installation.

### Energy Audit of Govt. College Khertha, Balod, CG

The potential capacity of Solar module is depend upon the availability of shadow free area. Considering all the above points and present scenario of energy, there is potential of installation of capacity upto 10 kW. However considering the CAPEX issue, it is advisable to Installed Solar module Phase wise. Initially on pilot project basis, 5 KW modules can be installed and after desirable result, the management can look forward to install the Maximum capacity considering Techno-Economic Viability.

The suitable operating day considered for Govt. College Khertha is 300 days.

The resultant monitory benefit has been worked out as follows:

Installation cost	Rs. 10.00 Lakhs
Daily Power generation	20 kW
Daily estimated power generation Hours	100 kwh
Annual estimated power generation (300 Days)	0.30 Lakh kWh
Electricity Cost per unit	Rs. 7.80
Annual cost saving	Rs. 2.34 Lakhs
Simple Payback period	4.2 Years

### List of Solar Energy System Suppliers

Name	Contact Details
1. Shankheshwar Energies	Sai Plaza , 2 <sup>nd</sup> floor , Beside National Convent School, Kushalpur Chowk, Raipur. HIG-C/1, infront of HDFC Bank, Shailendra Nagar , Raipur. Mo.-9755020202
2. Avarnaa Alliance,LLP.	C-31 Rameshwaram Delux, Baghmugaliya , Bhopal-462043. Mail:- <a href="mailto:support@avarnaalliance.in">support@avarnaalliance.in</a> , Contact:-Mr. Arpan -9977176764 (Director), <a href="http://www.avarnaalliance.in">www.avarnaalliance.in</a> .
3. API Corporations.	Ward No.-4 Marar Para Balod , Dist-Balod Pin-491226, Chhattisgarh. Contact:- Pradeep Kumar Shrishrimal (Director) , Mo:-9685424400 , 9644443000 , Mail:- <a href="mailto:niknet16@gmail.com">niknet16@gmail.com</a>

## 5. GENERAL TIPS FOR ENERGY CONSERVATION IN DIFFERENT UTILITIES SYSTEMS

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### 5.1 ELECTRICITY

- ❖ Schedule your operations to maintain a high load factor
- ❖ Minimize maximum demand by tripping loads through a demand controller
- ❖ Use standby electric generation equipment for on-peak high load periods.
- ❖ Correct power factor to at least 0.99 under rated load conditions.
- ❖ Set transformer taps to optimum settings.
- ❖ Shut off unnecessary computers, printers, and copiers at night.

### 5.2 FANS

- ❖ Use smooth, well-rounded air inlet cones for fan air intakes.
- ❖ Avoid poor flow distribution at the fan inlet.
- ❖ Minimize fan inlet and outlet obstructions.
- ❖ Clean screens, filters, and fan blades regularly
- ❖ Use aerofoil-shaped fan blades.
- ❖ Minimize fan speed.
- ❖ Use low-slip or flat belts.
- ❖ Check belt tension regularly.
- ❖ Eliminate variable pitch pulleys.
- ❖ Use variable speed drives for large variable fan loads.
- ❖ Use energy-efficient motors for continuous or near-continuous operation
- ❖ Eliminate leaks in ductwork.
- ❖ Minimize bends in ductwork
- ❖ Turn fans off when not needed

### 5.3 PUMPS

- ❖ Operate pumping near best efficiency point.
- ❖ Modify pumping to minimize throttling.
- ❖ Adapt to wide load variation with variable speed drives or sequenced control of smaller units.
- ❖ Stop running both pumps -- add an auto-start for an on-line spare or add a booster pump in the problem area.
- ❖ Use booster pumps for small loads requiring higher pressures.
- ❖ Increase fluid temperature differentials to reduce pumping rates.
- ❖ Repair seals and packing to minimize water waste.
- ❖ Balance the system to minimize flows and reduce pump power requirements.
- ❖ Use siphon effect to advantage: don't waste pumping head with a free-fall (gravity) return.

## **5.4 LIGHTING**

- ❖ Reduce excessive illumination levels to standard levels using switching, delamping, etc. (Know the electrical effects before doing delamping.)
- ❖ Aggressively control lighting with clock timers, delay timers, photocells, and/or occupancy sensors.
- ❖ Install efficient alternatives to incandescent lighting, mercury vapor lighting, etc.
- ❖ Efficiency (lumens/watt) of various technologies range from best to worst approximately as follows: low pressure sodium, high pressure sodium, metal halide, fluorescent, mercury vapor, incandescent.
- ❖ Select ballasts and lamps carefully with high power factor and long-term efficiency in mind.
- ❖ Upgrade obsolete fluorescent systems to Compact fluorescents and electronic ballasts
- ❖ Consider lowering the fixtures to enable using less of them.
- ❖ Consider day lighting, skylights, etc.
- ❖ Consider painting the walls a lighter color and using less lighting fixtures or lower wattages.
- ❖ Use task lighting and reduce background illumination.
- ❖ Re-evaluate exterior lighting strategy, type, and control. Control it aggressively.
- ❖ Change exit signs from incandescent to LED.

## **5.5. WATER & WASTE WATER**

- ❖ Recycle water, particularly for uses with less-critical quality requirements.
- ❖ Recycle water, especially if sewer costs are based on water consumption.
- ❖ Balance closed systems to minimize flows and reduce pump power requirements.
- ❖ Eliminate once-through cooling with water.
- ❖ Use the least expensive type of water that will satisfy the requirement.
- ❖ Fix water leaks.
- ❖ Test for underground water leaks. (It's easy to do over a holiday shutdown.)
- ❖ Check water overflow pipes for proper operating level.
- ❖ Automate blowdown to minimize it.
- ❖ Provide proper tools for wash down -- especially self-closing nozzles.
- ❖ Install efficient irrigation.
- ❖ Reduce flows at water sampling stations.
- ❖ Eliminate continuous overflow at water tanks.
- ❖ Promptly repair leaking toilets and faucets.
- ❖ Use water restrictors on faucets, showers, etc.
- ❖ Use self-closing type faucets in restrooms.
- ❖ Use the lowest possible hot water temperature.



## **6. ENERGY MANAGEMENT STRATEGY**

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Energy Management should be seen as a continuous process. Strategies should be reviewed annually and revised as necessary. The key activities suggested have been outlined below:

### **6.1 IDENTIFY A STRATEGIC CORPORATE APPROACH**

The starting point in energy management is to identify a strategic corporate approach to energy management. Clear accountability for energy usage needs to be established, appropriate financial and staffing resources must be allocated and reporting procedures initiated. An energy management program requires commitment from the whole organization in order to be successful. A record of Energy consumption must be kept and monitored on regular basis, to optimize the Energy consumption. For this, various meters may have to be installed.

### **6.2. DESIGNATE AN ENERGY MANAGER**

An Energy Manager must be identified and time bound responsibility must be given to him in getting implemented the findings of the Energy Audit points, which the Plant Establishment has planned to implement.

### **6.3. SET UP AN ENERGY MONITORING AND REPORTING SYSTEM**

Successful energy management requires the establishment of a system to collect/analyze and report the energy costs and consumption pattern. This will enable an overview of energy use and its related costs, as well as facilitating the identification of savings that might otherwise not be detected. The system needs to record both historical and ongoing energy use, as well as cost information from billing data, and capable of producing summary reports on a regular basis. This information will provide the means by which trends can be analyzed and reviewed for corrective measures.

### **6.4. IMPLEMENT A STAFF AWARENESS AND TRAINING PROGRAM**

A key ingredient to the success of an energy management program is maintaining a high level of awareness among staff. This can be achieved in a number of ways, including formal training, newsletters, posters and publications. It is important to communicate program plans and case studies that demonstrate savings, and to report results at least at 12-month intervals. Staff may need training from specialists on energy saving practices and equipments.

**List of Energy Efficient Equipment Suppliers**

Product/ Equipment	Contact Details
Automation, Panel Meters	Conzerv System 44P Electronic City Phase -II, East Hosur Road, Bangalore - 560100 Ph: 080-51189700 <a href="http://www.conzerv.com">www.conzerv.com</a>
Automation, Panel Meters	Selec controls Pvt Ltd E - 121, Ansa Industrial Estate, Saki Vihar Road, Mumbai 400072 Ph: 022-28471882, 28476443 <a href="http://www.selecindia.com">www.selecindia.com</a>
Plant Automation, sensors,	Electro Art Plot No K-11, MIDC Area, Ambad, Nashik -422010, Ph: 0253-5603954, 2380918 <a href="http://www.electronicswitchesindia.com">www.electronicswitchesindia.com</a>
Capacitors	Asian Electronics Ltd. Plot 68, MIDC, Satpur, Nasik, Nashik - 422 007
Capacitors	Shreem Capacitors Pvt. Ltd. 7/39, Vikram Vihar, Lajpat Nagar-IV, New Delhi - 110 024
Capacitors and APFC Panels	Matrix Controls & Engineers Pvt Ltd Rajeev Batra 9811624440, Rajeev@matrixcapacior.com E- 725 DSIDC, Industrial Complex, Narela, GT Road, Delhi - 110040 Ph: 01127786945 / 46 / 47 <a href="http://www.matrixcapacitor.com">www.matrixcapacitor.com</a>
Capacitors and APFC Panels	Standard Capacitors B-70/43, DSIDC Complex, Lawrence road Industrial Area, Delhi - 110035 Ph: 011 -27181490, 27151027 <a href="http://www.standardcapacitors.com">www.standardcapacitors.com</a>
Capacitors and APFC Panels	Saif Electronics 174, Hira Plant, 1 <sup>st</sup> Floor, Carnac Road, Opposite Police Commissioner office , Mumbai - 400002 Ph : 022 - 22064626 , 22086613 <a href="http://www.saifel.com">www.saifel.com</a>
LED lighting	Synergy Solar (P) ltd SCO 133, sector 28D, Chandigarh Ph 0172- 6451133 <a href="http://www.synergysolars.com">www.synergysolars.com</a>
Lighting Systems	Philips India Ltd Regional office-North, 9th floor Ashoka Estate, 24, Barakhamba Road New Delhi - 110 001 Telephone No.: 3353280, 3317442, Fax No.: 3314332
Lighting Systems	Crompton Greaves Ltd. Lighting Business Group, 405, Concorde, RC Dutt Road, Baroda - 390 007
Lighting Systems	OSRAM India Ltd. Signature Towers, 11th Floor, Tower B, South City-I, Gurgaon 122001,

*Energy Audit of Govt. College Khertha, Balod, CG*

<b>Product/ Equipment</b>	<b>Contact Details</b>
Lighting Systems	Fax: 0124- 6526184 Asian Electronics Surya Place, First Floor, K-185/1, Sarai
Lighting Systems	Julena, New Friends Colony, New Delhi - 110 025 Asian Electronics Surya Place, First Floor, K-185/1, Sarai
Lighting Systems	Julena, New Friends Colony, New Delhi - 110 025 Philips India Limited , Technopolis Knowledge Park, Nelco Complex, Mahakali Caves Road, Chakala, Andheri (East), Mumbai 400 093. Tel : 022 56912000
Lighting Systems	Surya Roshni Ltd. Padma Tower-I, Rajendra Palace, New Delhi 110 006.
Lighting Systems	Wipro Limited Sco 196-197, Sector 34-A, Chandigarh - 160 022
Lighting Systems	OSRAM India Ltd. Signature Towers, 11th Floor, Tower B, South City-I, Gurgaon 122001, Haryana Tel: 0124- 6526175, 6526178, 6526185 Fax: 0124- 6526184

Note: - The suppliers mentioned above are not the only ones or the best in the market. The management may contact other suppliers for competitive rates/ specifications.

**Load Profile of TR with Normal Load**

Annexure1

Date:24.08.2021

Time:	Voltage			Current			Load (KW)			Total Load		Power factor
	R-phase	Y-phase	B-Phase	R-phase	Y-phase	B-Phase	R-phase	Y-phase	B-Phase	PT (KW)	ST (KVA)	
01:05:00 PM	409.7	439.3	411	0.3	1.66	5.63	0.07	0.41	1.31	1.78	1.91	0.93
01:05:01 PM	409.5	439.3	411	0.3	1.66	5.59	0.07	0.41	1.30	1.78	1.90	0.94
01:05:02 PM	409.7	439.1	410.9	0.3	1.66	7.28	0.07	0.41	1.66	2.14	2.32	0.92
01:05:03 PM	409.5	439.3	410.8	0.3	1.66	6.65	0.07	0.41	1.55	2.03	2.16	0.94
01:05:04 PM	409.4	439.2	410.6	0.3	1.66	6.6	0.07	0.41	1.54	2.01	2.15	0.94
01:05:05 PM	409.4	439	410.6	0.3	1.66	6.6	0.07	0.41	1.54	2.02	2.15	0.94
01:05:06 PM	409.4	438.9	410.6	0.3	1.66	6.51	0.07	0.41	1.52	1.99	2.13	0.94
01:05:07 PM	409.1	438.7	410.3	0.3	1.66	5.75	0.07	0.41	1.33	1.81	1.94	0.93
01:05:08 PM	409	438.6	410.2	0.3	1.66	5.52	0.07	0.41	1.28	1.76	1.88	0.94
01:05:09 PM	409.5	438.9	410.6	0.3	1.86	5.53	0.07	0.42	1.28	1.77	1.93	0.92
01:05:10 PM	409.8	439.3	410.8	0.3	1.68	5.54	0.07	0.41	1.29	1.76	1.89	0.93
01:05:11 PM	409.8	439.2	410.9	0.3	1.67	5.56	0.07	0.41	1.29	1.77	1.89	0.93
01:05:12 PM	409.4	439	410.6	0.3	1.67	5.52	0.07	0.41	1.28	1.76	1.88	0.93
01:05:13 PM	409.2	439	410.4	0.3	1.67	5.51	0.07	0.41	1.28	1.75	1.88	0.93
01:05:14 PM	409.1	439	410.3	0.3	1.67	5.53	0.07	0.41	1.28	1.76	1.88	0.93
01:05:15 PM	409.2	439.1	410.5	0.3	1.67	5.55	0.07	0.41	1.29	1.76	1.89	0.93
01:05:16 PM	409.1	439	410.5	0.3	1.67	5.49	0.07	0.41	1.27	1.75	1.87	0.93
01:05:17 PM	415.1	438.7	416.7	0.41	1.67	5.47	0.09	0.41	1.27	1.76	1.89	0.93
01:05:18 PM	424.1	438.7	429.9	1.8	1.67	5.48	0.12	0.41	1.27	1.79	2.24	0.80
01:05:19 PM	429.9	438.6	438.6	2.43	1.66	6.13	0.13	0.41	1.42	1.95	2.57	0.76
01:05:20 PM	429.8	438.5	438.5	2.43	1.66	6.19	0.13	0.41	1.45	1.98	2.58	0.77
01:05:21 PM	429.9	438.5	438.4	2.43	1.66	6.21	0.13	0.41	1.45	1.99	2.59	0.77
01:05:22 PM	430	438.6	438.6	2.43	1.66	6.09	0.12	0.41	1.42	1.95	2.56	0.76
01:05:23 PM	429.9	438.7	438.9	2.43	1.66	5.51	0.12	0.41	1.28	1.81	2.41	0.75
01:05:24 PM	430	438.9	439.2	2.43	1.66	5.55	0.12	0.41	1.29	1.82	2.43	0.75
01:05:25 PM	430.4	439	439.5	2.43	1.66	5.47	0.12	0.41	1.27	1.80	2.41	0.75

01:05:26 PM	430.5	439	439.7	2.43	1.66	5.49	0.12	0.41	1.27	1.80	2.41	0.75
01:05:27 PM	430.6	438.9	439.5	2.43	1.66	5.48	0.12	0.41	1.27	1.80	2.41	0.75
01:05:28 PM	430.7	439.1	439.5	2.43	1.66	5.44	0.13	0.41	1.26	1.79	2.40	0.75
01:05:29 PM	430.5	438.9	439.3	2.43	1.66	5.45	0.13	0.41	1.26	1.79	2.40	0.75
01:05:30 PM	430.4	438.9	439.3	2.43	1.66	5.53	0.13	0.41	1.28	1.81	2.42	0.75
01:05:31 PM	430.4	439.1	439.6	2.44	1.66	5.5	0.13	0.41	1.28	1.81	2.42	0.75
01:05:32 PM	429.8	439.1	438.3	2.59	1.66	6.04	0.21	0.41	1.36	1.97	2.59	0.76
<b>Total</b>	<b>418</b>	<b>439</b>	<b>422</b>	<b>1.18</b>	<b>1.67</b>	<b>5.78</b>	<b>0.09</b>	<b>0.41</b>	<b>1.34</b>	<b>1.84</b>	<b>2.17</b>	<b>0.86</b>

**Load Profile with Full load**

Date:24.08.2021

Time:	Voltage			Current			Load (KW)			Total Load		Power factor
	R-phase	Y-phase	B-Phase	R-phase	Y-phase	B-Phase	R-phase	Y-phase	B-Phase	PT (KW)	ST (KVA)	PFT
01:10:01 PM	426.9	435.3	428	11.93	20.06	9.91	2.899	4.801	2.409	10.108	10.405	0.971
01:10:11 PM	427.1	435.3	428.4	11.94	20.12	9.94	2.903	4.818	2.416	10.137	10.433	0.972
01:10:21 PM	426.6	434.7	427.5	11.92	20.02	11.53	2.898	4.788	2.822	10.508	10.794	0.974
01:10:31 PM	426.8	434.8	427.2	11.94	20.1	13.64	2.901	4.811	3.327	11.039	11.346	0.973
01:10:41 PM	426.9	434.9	427.4	11.93	20.04	12.74	2.901	4.799	3.118	10.818	11.11	0.974
01:10:51 PM	426.9	435	427.3	11.93	20.06	12.04	2.899	4.804	2.945	10.647	10.936	0.974
01:11:01 PM	426.6	434.8	426.7	11.91	20.06	13.7	2.891	4.806	3.34	11.037	11.343	0.973
01:11:11 PM	426.8	434.9	426.5	11.92	20.08	15.57	2.896	4.812	3.811	11.519	11.82	0.975
01:11:21 PM	426.8	434.7	426.7	11.93	20.04	14.78	2.9	4.801	3.612	11.313	11.612	0.974
01:11:31 PM	427.2	434.9	426.8	11.93	20.04	15.49	2.902	4.802	3.792	11.496	11.796	0.975
01:11:41 PM	427.4	435.1	427.2	11.94	20.04	14.76	2.907	4.806	3.612	11.325	11.626	0.974
01:11:51 PM	426.7	434.7	426.5	11.91	20.02	14.77	2.894	4.797	3.61	11.301	11.598	0.974
01:12:01 PM	426.3	434.4	426	11.9	20.02	15.32	2.886	4.793	3.74	11.419	11.721	0.974
01:12:11 PM	426.9	434.8	426.4	11.92	20.05	14.76	2.894	4.806	3.609	11.31	11.608	0.974
01:12:21 PM	426.8	434.7	426.4	11.91	20.01	14.76	2.893	4.795	3.609	11.297	11.595	0.974

01:12:31 PM	427	434.9	426.5	11.91	20.01	15.57	2.893	4.798	3.813	11.503	11.801	0.975
01:12:41 PM	427	434.6	426.5	11.91	20.03	14.76	2.896	4.799	3.606	11.301	11.598	0.974
01:12:51 PM	426.8	434.4	426.3	11.9	20.07	14.77	2.89	4.811	3.609	11.31	11.604	0.975
01:13:01 PM	426.3	434.2	426.1	11.9	19.97	14.79	2.888	4.782	3.629	11.299	11.576	0.976
01:13:11 PM	426.4	434	426.5	11.9	20	14.12	2.891	4.788	3.464	11.143	11.418	0.976
01:13:21 PM	425.7	434	425.9	11.88	19.95	14.75	2.879	4.773	3.618	11.27	11.546	0.976
01:13:31 PM	425.5	433.9	425.9	11.88	19.97	14.11	2.878	4.778	3.461	11.117	11.389	0.976
01:13:41 PM	425.3	433.8	425.6	11.91	19.94	14.09	2.883	4.771	3.454	11.108	11.38	0.976
01:13:51 PM	424.8	433.6	425.1	11.86	19.95	14.62	2.87	4.772	3.584	11.225	11.495	0.977
01:14:01 PM	425	433.7	425.3	11.86	19.92	14.08	2.869	4.763	3.45	11.082	11.352	0.976
01:14:11 PM	424.9	433.6	425	11.87	21.28	14.7	2.872	5.102	3.605	11.579	11.845	0.978
01:14:21 PM	426.1	434.5	426	11.89	19.96	14.08	2.885	4.783	3.456	11.123	11.396	0.976
01:14:31 PM	425.7	434.3	425.8	11.89	19.96	14.09	2.88	4.781	3.456	11.118	11.388	0.976
01:14:41 PM	425.5	433.8	425.7	11.89	22.85	14.07	2.881	5.518	3.454	11.853	12.092	0.98
01:14:51 PM	425.8	434.4	425.8	11.89	19.99	14.07	2.879	4.789	3.454	11.123	11.392	0.976
01:15:01 PM	424.5	434.1	425.3	11.88	19.96	14.64	2.872	4.775	3.594	11.24	11.508	0.977
01:15:11 PM	425.2	434.2	425.7	11.87	19.99	14.05	2.875	4.786	3.447	11.108	11.375	0.977
01:15:21 PM	424.7	433.8	425.3	11.86	19.91	14.02	2.869	4.763	3.439	11.071	11.336	0.977
01:15:31 PM	424.8	433.9	425.2	11.86	19.95	14.64	2.869	4.774	3.591	11.235	11.499	0.977
01:15:41 PM	424	433.4	424.7	11.85	19.89	14.02	2.86	4.753	3.436	11.049	11.311	0.977
01:15:51 PM	424.2	433.7	424.8	11.85	19.91	14.02	2.862	4.761	3.437	11.06	11.323	0.977
01:16:01 PM	423.9	433.8	424.7	11.83	19.9	14.04	2.854	4.758	3.443	11.055	11.318	0.977
01:16:11 PM	423.7	433.5	424.2	11.82	19.94	14.03	2.849	4.768	3.437	11.054	11.315	0.977
01:16:21 PM	423.6	433.5	424	11.83	19.87	14.53	2.852	4.75	3.56	11.161	11.424	0.977
01:16:31 PM	423.1	433	423.4	11.82	19.87	15.51	2.845	4.748	3.782	11.375	11.65	0.976
01:16:41 PM	423	433.2	423.6	11.83	19.88	14.01	2.845	4.751	3.429	11.025	11.283	0.977
01:16:51 PM	422.9	433	423.3	11.82	19.85	14.64	2.844	4.741	3.582	11.167	11.427	0.977
01:17:01 PM	423	433.1	423.6	11.82	19.84	14.07	2.844	4.741	3.442	11.028	11.286	0.977
01:17:11 PM	423.3	433.3	423.6	11.82	19.91	14.96	2.847	4.761	3.632	11.24	11.529	0.975
01:17:21 PM	423.5	433.1	423.9	11.83	19.86	14.02	2.849	4.747	3.431	11.027	11.285	0.977

01:17:31 PM	424	431.9	424.4	11.85	19.79	14.05	2.866	4.713	3.442	11.021	11.271	0.978
01:17:41 PM	424	432	424.1	11.84	19.77	14.45	2.863	4.709	3.538	11.11	11.363	0.978
01:17:51 PM	424	431.8	424.1	11.85	19.75	15.26	2.867	4.702	3.706	11.274	11.559	0.975
01:18:01 PM	424.4	432.2	424.8	11.87	19.77	14.02	2.874	4.71	3.44	11.024	11.273	0.978
01:18:11 PM	423.5	432.2	424.6	11.87	19.8	14.68	2.869	4.714	3.602	11.184	11.434	0.978
01:18:21 PM	423.5	432.5	424.6	11.86	19.75	14.02	2.866	4.704	3.442	11.013	11.261	0.978
01:18:31 PM	423.4	432.3	424.4	11.86	19.72	14.04	2.864	4.697	3.444	11.005	11.251	0.978
01:18:41 PM	423.1	432.3	424.1	11.83	19.72	14.04	2.855	4.696	3.443	10.994	11.24	0.978
01:18:51 PM	424.1	432.1	424.7	11.86	19.74	14.05	2.87	4.705	3.445	11.02	11.267	0.978
01:19:01 PM	424.2	432.3	424.5	11.86	19.76	14.51	2.869	4.713	3.552	11.135	11.387	0.978
01:19:11 PM	424.3	431.9	424.4	11.86	19.8	14.04	2.87	4.723	3.439	11.032	11.276	0.978
<b>Total</b>	<b>425.153</b>	<b>433.753</b>	<b>425.457</b>	<b>11.877</b>	<b>19.979</b>	<b>14.107</b>	<b>2.876</b>	<b>4.778</b>	<b>3.453</b>	<b>11.106</b>	<b>11.380</b>	<b>0.976</b>

### Load Profile With Full Load & Pump

Date-24-08-2021

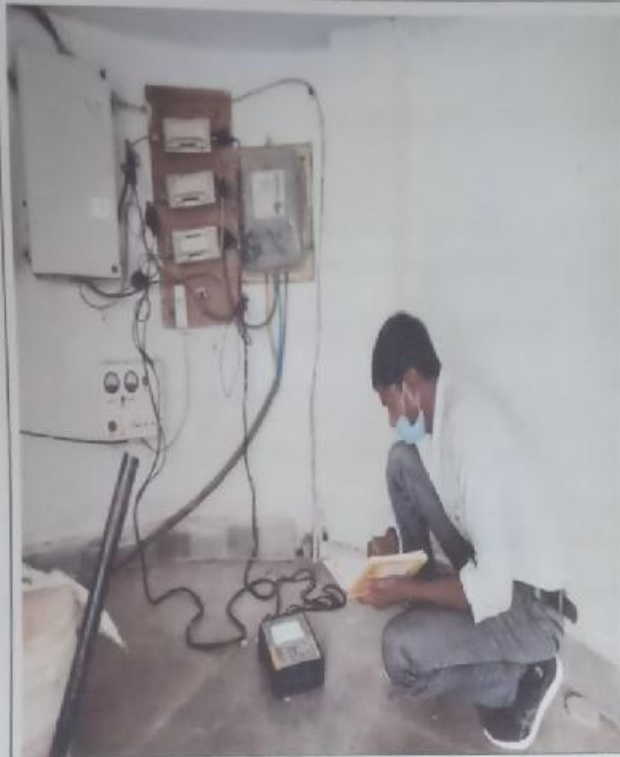
Time:	Voltage			Current			Load (KW)			Total Load		Power factor
	R-phase	Y-phase	B-phase	R-phase	Y-phase	B-phase	R-phase	Y-phase	B-phase	PT (KW)	ST (KVA)	PFT
01:19:26 PM	424.1	432.4	424.5	11.85	21.51	14.02	2.865	4.919	3.437	11.22	11.695	0.959
01:19:36 PM	424	432.4	424.4	11.84	26.37	14.58	2.862	6.343	3.57	12.78	13.034	0.98
01:19:46 PM	423.5	432	423.9	11.82	26.34	13.68	2.854	6.33	3.368	12.55	12.784	0.982
01:19:56 PM	423.7	432.3	424.1	11.85	26.36	13.69	2.861	6.337	3.372	12.57	12.802	0.982
01:20:06 PM	423.4	432.1	423.9	11.84	26.35	13.68	2.856	6.333	3.369	12.56	12.788	0.982
01:20:16 PM	423.4	431.9	423.7	11.82	26.35	13.65	2.852	6.334	3.361	12.55	12.777	0.982
01:20:26 PM	423	431.5	423.2	11.82	26.31	14.37	2.848	6.319	3.532	12.70	12.929	0.982
01:20:36 PM	423.4	431.9	423.9	11.83	26.34	13.64	2.855	6.331	3.358	12.54	12.773	0.982
01:20:46 PM	423.5	431.8	423.5	11.82	26.34	15.18	2.855	6.332	3.714	12.90	13.154	0.981

01:20:56 PM	423.4	431.7	423.8	11.83	26.33	13.68	2.856	6.324	3.366	12.55	12.774	0.982
01:21:06 PM	423.1	431.5	423.5	11.83	26.31	13.63	2.854	6.317	3.353	12.53	12.752	0.982
01:21:16 PM	423.2	431.1	423.4	11.83	26.33	14.25	2.855	6.321	3.502	12.68	12.905	0.982
01:21:26 PM	422.7	431.2	423	11.83	26.3	15.22	2.852	6.312	3.71	12.87	13.132	0.98
01:21:36 PM	423.4	431.6	423.6	11.83	26.32	14.25	2.857	6.325	3.504	12.69	12.915	0.982
01:21:46 PM	423.5	431.5	423.6	11.82	26.3	13.64	2.856	6.319	3.354	12.53	12.754	0.982
01:21:56 PM	424.3	432.1	424.3	11.83	26.36	13.66	2.862	6.34	3.363	12.57	12.795	0.982
01:22:06 PM	424.4	432.2	424.5	11.84	26.35	15.35	2.867	6.339	3.776	12.98	13.22	0.982
01:22:16 PM	423.8	431.7	424.1	11.82	26.3	13.63	2.856	6.32	3.355	12.53	12.758	0.982
01:22:26 PM	423.8	431.6	424	11.81	26.32	13.86	2.855	6.326	3.408	12.59	12.817	0.982
01:22:36 PM	423.8	431.8	424.2	11.83	26.31	14.41	2.859	6.326	3.545	12.73	12.961	0.982
01:22:46 PM	423.9	432	424.5	11.84	26.32	13.66	2.863	6.33	3.366	12.56	12.785	0.982
01:22:56 PM	423.2	430.8	423.3	11.82	26.25	15.31	2.854	6.304	3.755	12.91	13.144	0.982
01:23:06 PM	423	431.5	423.9	11.82	26.26	13.63	2.852	6.306	3.354	12.51	12.737	0.982
01:23:16 PM	423.2	431.4	424	11.83	26.26	13.66	2.859	6.307	3.361	12.53	12.749	0.983
01:23:26 PM	423.7	431.2	424.3	11.83	26.27	13.63	2.862	6.311	3.354	12.53	12.749	0.983
01:23:36 PM	423.5	431.4	424.2	11.83	26.26	13.63	2.86	6.309	3.356	12.53	12.746	0.983
01:23:46 PM	423.2	430.6	423.9	11.83	26.23	13.63	2.859	6.295	3.35	12.50	12.723	0.983
01:23:56 PM	423.5	430.6	424.1	11.81	26.24	13.83	2.857	6.299	3.396	12.55	12.776	0.983
01:24:06 PM	423.9	431.1	424.8	11.84	26.26	13.65	2.868	6.308	3.36	12.54	12.757	0.983
01:24:16 PM	424.3	430.6	424.5	11.85	26.25	13.63	2.871	6.306	3.35	12.53	12.747	0.983
01:24:26 PM	423.8	430.8	424.3	11.82	26.25	13.68	2.861	6.305	3.363	12.53	12.75	0.983
01:24:36 PM	424.4	431.3	424.9	11.84	26.26	13.6	2.869	6.313	3.347	12.53	12.752	0.983
01:24:46 PM	423.5	430.8	424.4	11.83	26.24	13.6	2.863	6.299	3.347	12.51	12.727	0.983
01:24:56 PM	424.2	431.5	425.3	11.84	26.29	13.67	2.87	6.321	3.369	12.56	12.782	0.983
01:25:06 PM	424.6	432.2	425.9	11.86	26.28	13.63	2.878	6.324	3.364	12.57	12.789	0.983
01:25:16 PM	424.2	432	425.5	11.84	26.28	13.61	2.87	6.323	3.358	12.55	12.772	0.983
<b>Total</b>	<b>423.642</b>	<b>431.589</b>	<b>424.133</b>	<b>11.831</b>	<b>26.236</b>	<b>13.977</b>	<b>2.860</b>	<b>6.303</b>	<b>3.438</b>	<b>12.601</b>	<b>12.830</b>	<b>0.982</b>



Site Photograph

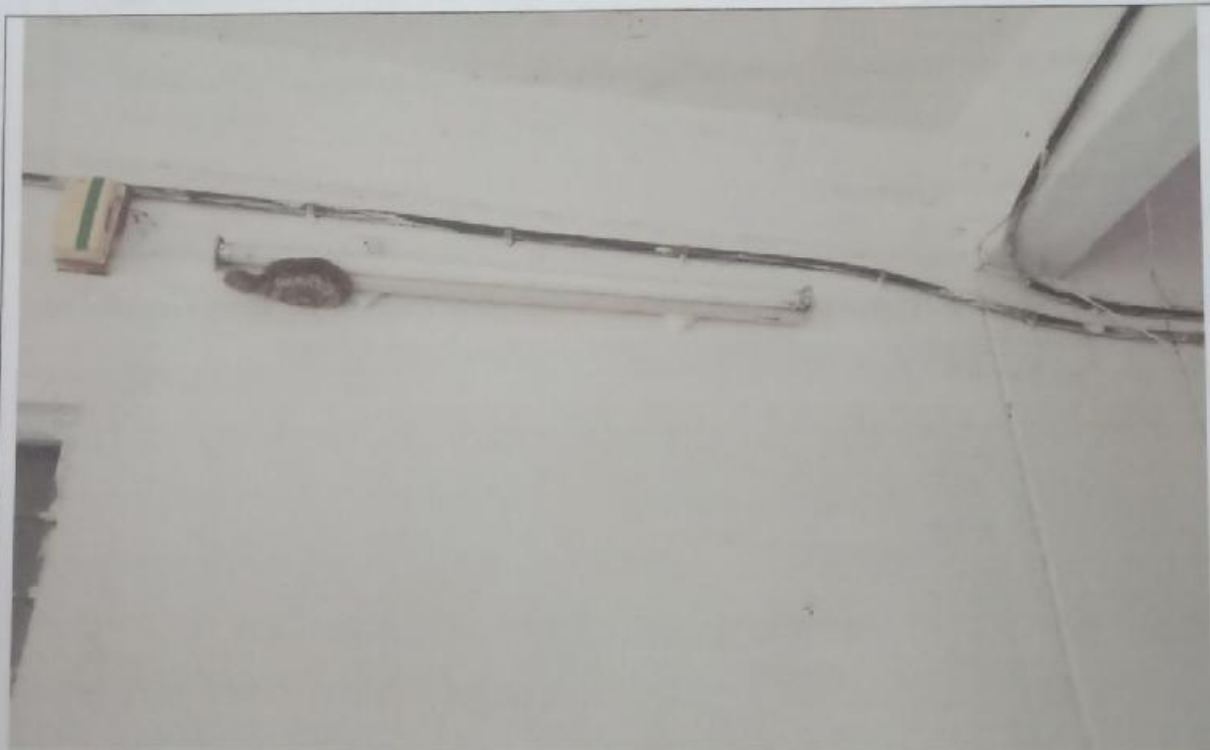
Annexure-2



Electrical Data Logging



Measuring Lux Level



Tubelight



# BUREAU OF ENERGY EFFICIENCY

Examination Registration No.: **EA-5514**  
Accreditation Registration No.: **AEA-0295**



## Certificate of Accreditation

This is to certify that Mr./Ms. **Rakesh Khichariya** having its trade/registered office at **Bhilai** has been given accreditation as accredited energy auditor. The certificate shall be effective from **11<sup>th</sup>** day of **February, 2019**.

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.

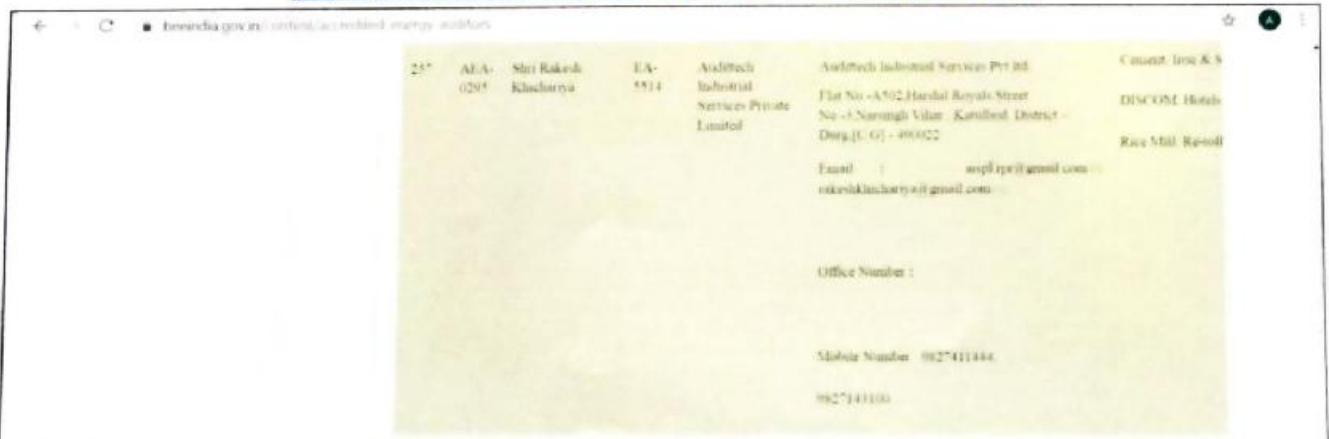
Your name has been entered at AEA No. **0295** in the register of list of accredited energy auditors. Your name shall be liable to be struck out on the grounds specified in regulation 8 of the Bureau of Energy Efficiency (Qualifications for Accredited Energy Auditors and Maintenance of their List) Regulations, 2010.

Given under the seal of the Bureau of Energy Efficiency, Ministry of Power, this **19<sup>th</sup>** day of **March, 2019**

  
Secretary,  
Bureau of Energy Efficiency  
New Delhi

Accreditation details can be check in the BEE official website (Check S.No. 257). Please click below link

<https://beeindia.gov.in/content/accredited-energy-auditors>



S.No.	AEA	Name	EA	Category	Address	Contact
257	AEA-0295	Shri Rakesh Khichariya	EA-5514	Avi@tech Industrial Services Private Limited	Avi@tech Industrial Services Pvt Ltd Flat No -A/02,Haridra Royals Street No -1 Narainji Vihar -Kamlied District - Distt.(S. G) - 483022	Contact: 092411444 DISCOM: Batsel Ravi Moh. Bansal

Email : [aspl.rpl@gmail.com](mailto:aspl.rpl@gmail.com)  
[rakeshkhichariya@gmail.com](mailto:rakeshkhichariya@gmail.com)

Office Number :  
Mobile Number : 0927411444  
0927411440



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खेरथा, दिनांक 06/10/2020

// ग्रीन आर्मी //

पंजीकृत छात्र - छात्राओं की सूची

क्रं.	नाम	मोबाइल नं.	क्रं.	नाम	मोबाइल नं.
1	कु. अम्बे	6268157871	19	राजश्री	9407959102
2	अंकिता	6264053854	20	रूपा	7771044153
3	धनेश्वरी	6268046920	21	जितेन्द्र	6268128712
4	चन्द्रकला	9669327065	22	कामेन्द्र	9407908170
5	चित्ररेखा	8719933936	23	योगेन्द्र	7724858154
6	दिव्या	9302057188	24	गोपी राम	6232267349
7	हूलसी देवांगन	6268580960	25	नितिश	6267803069
8	जानकी साहू	9926833465	26	हिरमेश	6268776083
9	किर्ती	7772842636	27	मीरा	6268055658
10	चन्द्रिका	6268179838	28	खोमलता	8224808836
11	दामिनी	6267605203	29	कोमल राम	8349071730
12	जयन्ती	6268851138	30	भोला राम	6268515980
13	कविता	6268944420	31	आषिश कुमार	7224931721
14	अनिमा	9752295250	32	चन्द्र कुमार	9009930897
15	बबिता	6268878731	33	निखिल कटझरे	9340885296
16	भूमिका	6268354688	34	रुखमणी	6268887048
17	किरण	6268764245	35	गोदावरी	6265934079
18	प्रतिभा	6268162634	36	बीरझा	6264308823



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जिला - बालोद (छ.ग.)



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दूरभाष : 07748.288280



दिनांक 23/09/2019

महाविद्यालय के प्रभारी प्राचार्य श्री यासर कुरैशी के मार्गदर्शन में दिनांक 23/09/2019 को निम्नलिखित छात्र - छात्राओं को लेकर एक्वा क्लब /जलशक्ति अभियान टीम का गठन किया गया है। जिसके प्रभारी सहायक प्राध्यापक श्री उमेश पाठक (भूगोल विभाग) है।

## एक्वा क्लब सदस्यों के नाम

क्रं.	नाम	कक्षा	मोबाइल नं
1	पुजा	बी.एस.सी. भाग - I	6260015563
2	वंदना	बी.एस.सी. भाग - I	6267928625
3	सोहद्रा	बी.एस.सी. भाग - I	9301908973
4	हुलसी	बी.एस.सी. भाग - III	9179502566
5	रोशन लाल	बी.एस.सी. भाग - III	8817741404
6	पुष्पांजली	बी.एस.सी. भाग - III	9617076960
7	रश्मि	बी.एस.सी. भाग - III	9617516187
8	नमिता	बी.एस.सी. भाग - III	9617681595
9	मंजू	बी.एस.सी. भाग - III	9630342800
10	डामन लाल	बी.एस.सी. भाग - III	8719807379
11	ओम कुमारी	बी.एस.सी. भाग - III	7746918210
12	किरण प्रजापती	बी.एस.सी. भाग - III	96447992753
13	भूषण लाल	बी.एस.सी. भाग - III	7771965197

उक्त टीम water conservation से संबंधित कार्यों एवं गतिविधियों की मॉनिटरिंग करने के साथ - साथ समूह चर्चा एवं "singal use plastic" के उपयोग पर एवं इसके उपयोग के दुष्परिणाम के संबंध में जागरूकता की दि. 11 में कार्य करेगी।

श्री उमेश पाठक  
भूगोल विभाग

  
प्राचार्य

शासकीय महाविद्यालय, खेरथा  
जिला - बालोद (छ.ग.)



  
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खेरथा, दिनांक 06/10/2020

// ग्रीन आर्मी //

पंजीकृत छात्र - छात्राओं की सूची

क्रं.	नाम	मोबाइल नं.	क्रं.	नाम	मोबाइल नं.
1	कु. अम्बे	6268157871	19	राजश्री	9407959102
2	अंकिता	6264053854	20	रूपा	7771044153
3	धनेश्वरी	6268046920	21	जितेन्द्र	6268128712
4	चन्द्रकला	9669327065	22	कामेन्द्र	9407908170
5	चित्ररेखा	8719933936	23	योगेन्द्र	7724858154
6	दिव्या	9302057188	24	गोपी राम	6232267349
7	हूलसी देवांगन	6268580960	25	नितिश	6267803069
8	जानकी साहू	9926833465	26	हिरमेश	6268776083
9	किर्ती	7772842636	27	मीरा	6268055658
10	चन्द्रिका	6268179838	28	खोमलता	8224808836
11	दामिनी	6267605203	29	कोमल राम	8349071730
12	जयन्ती	6268851138	30	भोला राम	6268515980
13	कविता	6268944420	31	आषिश कुमार	7224931721
14	अनिमा	9752295250	32	चन्द्र कुमार	9009930897
15	बबिता	6268878731	33	निखिल कटझरे	9340885296
16	भूमिका	6268354688	34	रुखमणी	6268887048
17	किरण	6268764245	35	गोदावरी	6265934079
18	प्रतिभा	6268162634	36	बीरझा	6264308823



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दिनांक 12/09/2016

// ग्रीन आर्मी //

## पंजीकृत छात्र - छात्राओं की सूची

क्र.	नाम	पिता का नाम	क्र.	नाम	पिता का नाम
1	कु. भुनेश्वरी	सुग्रीव राम	18	कु. रीना	दीनदयाल
2	कु. हेमलता	सहिस राम	19	कु. धनेश्वरी	रामचरण
3	कु. भारती	गैद सिंह	20	कु. दामिनी	रुखम लाल
4	कु. वमेली	उमैद सिंह	21	कु. निकेता	विदेशराम
5	कु. आरती	पुरुषोत्तम लाल	22	कु. पार्वती	जोहरीत
6	कु. डिलेश्वरी	नोहर दास	23	कु. रश्मी	हेन्त लाल
7	कु. अजली	शिव कुमार	24	कु. वीणा	भोजराम
8	कु. अन्नपूर्णा	दिलीप कुमार	25	कु. युवती	कार्तिक राम
9	कु. दिपिका	हेमलाल	26	कु. जितेश्वरी	दोमल लाल
10	कु. कामिनी	फूल सिंह	27	कु. कमलेश्वरी	भुवन
11	कु. किरण	बासुग राम	28	कु. तेजस्वी	डोमार सिंह
12	कु. लीना यदु	दुलेश कुमार	29	कु. वंदना	बसंत कुमार
13	कु. चंद्रसीमा	तेजराम	30	अनिल कुमार	रोहित कुमार
14	कु. चित्ररेखा	टेकराम	31	भुपेन्द्र कुमार	रामदुलार
15	कु. हेमपुष्पा	केशव राम	32	चेतन दास	कामता प्रसाद
16	कु. मनीषा	युवराज	33	जयराम	गणेश राम
17	कु. पुष्पा साहू	बिहारी लाल	34	नीलकंठ	यादव राम



*Arumisha*  
प्राचार्य

शासकीय महाविद्यालय, खेरथा  
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दिनांक 18/09/2017

// ग्रीन आर्मी //

## पंजीकृत छात्र - छात्राओं की सूची

क्रं.	नाम	कक्षा	क्रं.	नाम	कक्षा
1	कु अनिता	बी.ए. भाग - III	19	कु. सारिका	बी.एस.सी. भाग - II
2	भुपेन्द्र कुमार	बी.ए. भाग - III	20	कु. वेदिका	बी.एस.सी. भाग - II
3	डीकेश्वरी	बी.ए. भाग - III	21	विजय कुमार	बी.एस.सी. भाग - II
4	कु. डिलेश्वरी	बी.ए. भाग - III	22	आदित्य प्रजापति	बी.ए. भाग - II
5	कु. आस्था	बी.ए. भाग - I	23	कु. चांदनी	बी.ए. भाग - II
6	अतुल कुमार	बी.ए. भाग - I	24	देवेन्द्र कुमार	बी.ए. भाग - II
7	कु. दिव्या	बी.ए. भाग - I	25	खिलेश्वरी	बी.ए. भाग - II
8	कु ज्योति	बी.ए. भाग - I	26	कु. कविता	बी.ए. भाग - II
9	बेदेश्वरी	बी.ए. भाग - I	27	कु. आराधना	बी.कॉम. भाग - II
10	चंद्रकांत	बी.ए. भाग - I	28	कु. हिना	बी.कॉम. भाग - II
11	कु. धनेश्वरी	बी.ए. भाग - I	29	सुरज कुमार	बी.कॉम. भाग - II
12	कु. अमृत	बी.एस.सी. भाग - II	30	कु. खोमेश्वरी	बी.कॉम. भाग - II
13	कु. चुनिता	बी.एस.सी. भाग - II	31	कमलेश कुमार	बी.एस.सी. भाग - III
14	कु. गितिका	बी.एस.सी. भाग - II	32	कु. मनीषा	बी.एस.सी. भाग - III
15	हितेश्वरी	बी.एस.सी. भाग - II	33	कु. रीना	बी.एस.सी. भाग - III
16	ईश्वरी	बी.एस.सी. भाग - II	34	कु. पुष्पा साहू	बी.एस.सी. भाग - III
17	कुसुम	बी.एस.सी. भाग - II	35	डामन लाल	बी.एस.सी. भाग - II
18	कु. किरण	बी.एस.सी. भाग - II	36	गिरधर लाल	बी.एस.सी. भाग - II



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दिनांक 27/08/2018

महाविद्यालय परिसर में हरियाली बनाये रखने एवं पहले से लगाये हुए पेड़ - पौधों के संरक्षण हेतु दिनांक 27/08/2018 को छात्र छात्राओं का एक समूह ग्रीन आर्मी के रूप में गठित किया गया है इस समूह में निम्न छात्र छात्राएं कार्य कर रही हैं :-

क्रं.	छात्र छात्राओं का नाम	कक्षा
1	कु. दिव्या	बी.कॉम. भाग - I
2	गुनीता	बी.कॉम. भाग - I
3	कु. आरती	बी.ए. भाग - II
4	कु. अंजु	बी.ए. भाग - II
5	अंजली	बी.ए. भाग - II
6	कु. हेमलता	बी.ए. भाग - II
7	अनिता	बी.एस.सी. भाग - II
8	अंकित कुमार	बी.एस.सी. भाग - II
9	डिलेश कुमार	बी.एस.सी. भाग - II
10	हिमांशू	बी.एस.सी. भाग - II
11	कु. चांदनी	बी.ए. भाग - III
12	कु. चमेली	बी.ए. भाग - III
13	कु. चंचल	बी.एस.सी. भाग - III
14	कु. डामिन	बी.एस.सी. भाग - III
15	कु. आराधना	बी.कॉम. भाग - III
16	चेतन दास	बी.कॉम. भाग - III
17	पुनेश कुमार	बी.कॉम. भाग - III



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दिनांक 09/09/2019


// ग्रीन आर्मी //

पंजीकृत छात्र - छात्राओं की सूची

क्रं.	छात्र छात्राओं का नाम	पिता का नाम	कक्षा
1	ऐश्वर्य	कौशल राम	बी.एस.सी. भाग - I
2	कु. भुनेश्वरी	यादव राम	बी.एस.सी. भाग - I
3	डाकेश कुमार	तोरन लाल	बी.एस.सी. भाग - I
4	इन्द्रजीत साहू	पुहुप राम	बी.एस.सी. भाग - I
5	कु. भुमिका	हेमलाल	बी.कॉम. भाग - I
6	भूपेश कुमार	परदेशी राम	बी.कॉम. भाग - I
7	गायत्री	हेमसिंह	बी.कॉम. भाग - I
8	कु. मोनिका	सुखचंद	बी.कॉम. भाग - I
9	भारती	मंथाराम	बी.एस.सी. भाग - II
10	गोदावरी	नोहरू	बी.एस.सी. भाग - II
11	गरुड साय	दुर्गत साय	बी.एस.सी. भाग - II
12	प्रतिभा	अंकालू राम	बी.कॉम. भाग - II
13	सुषमा	रामाधार	बी.कॉम. भाग - II
14	अंजु	मिथलेश	बी.ए. भाग - III
15	आरती	धरम सिंह	बी.ए. भाग - III
16	द्रोपती	मिलाप सिंह	बी.ए. भाग - III
17	दीपिका	अनिरुद्ध	बी.एस.सी. भाग - III
18	गुनिता	खेमलाल	बी.एस.सी. भाग - III
19	गीतांजली	भोभन लाल	बी.एस.सी. भाग - III
20	हिमां जु	रामरतन	बी.एस.सी. भाग - III
21	कीर्ति	सत्यवान	बी.एस.सी. भाग - III
22	पेमिन	विजय कुमार	बी.कॉम. भाग - II
23	निलिमा	लोकेश कुमार	बी.कॉम. भाग - II
24	भिनेश्वरी	भयाम लाल	बी.एस.सी. भाग - I
25	छबिला	हिरामन लाल	बी.एस.सी. भाग - I



  
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