



**SARIYA COLLEGE ,SURIYA**

# ENERGY AUDIT REPORT

2022-2023

PREPARED BY  
EHS ALLIANCE SERVICES

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# CERTIFICATE



## CERTIFICATE

PRESENTED TO

### SARIYA COLLEGE, SURIYA

Hazaribag Road Rly. stn., P.O.- Suriya, Dist.- Giridih, Jharkhand, PIN- 825320

Has been assessed by EHS Alliance Services for the comprehensive study of Energy Audit on institutional working framework to fulfill the requirement of

## ENERGY AUDIT

**ACADEMIC YEAR 2022-23**

The energy-saving initiatives carried out by the institution have been verified in the report submitted and were found to be satisfactory.

The efforts taken by management and faculty towards all types of energy used in the institution and sustainability are highly appreciated and noteworthy.

  
SIGNATURE



10.02.2024  
DATE OF AUDIT

EHS ALLIANCE SERVICES, PLOT A-72, SURYA VIHAR, GURUGRAM, 122001  
WWW.EHSALL.IN | BUSINESS@EHSALL.IN | EHSALLIANCE@GMAIL.COM

# ACKNOWLEDGEMENT

EHS Alliance Services would like to thank the management of Sariya College, Suriya for assigning this important work of Energy Audit. We appreciate the co-operation to the teams for completion of assessment.

First of all, we would like to thank **Mr. Manohar Singh Bagga- Secretary and Dr. Santosh Kumar Lal - Principal** for giving us an opportunity to evaluate the environmental performance of the campus.

We would also like to thank **Mr. Pramod Kumar - Assistant Professor and Audit Coordinator**, for his continuous support and guidance, without which the completion of the project would not have been possible. We are also thankful to other staff members who were actively involved while collecting the data and conducting field measurements.

We are also thankful to

*Mr. Asit Diwakar - Assistant Professor*

*Mr. Ashish Kumar Singh - Assistant Professor*

*Mr. Sitaram Suman - Accountant*



# DISCLAIMER

EHS Alliance Services Energy Audit Team has prepared this Energy Audit Report for Sariya College, Suriya based on input data submitted by the representatives of college complemented with the best judgment capacity of the expert team.

While all reasonable care has been taken in its preparation, details contained in this report have been compiled in good faith based on information gathered.

It is further informed that the conclusions are arrived following best estimates and no representation, warranty or undertaking, express or implied is made and no responsibility is accepted by Audit Team in this report or for any direct or consequential loss arising from any use of the information, statements or forecasts in the report.

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**Vijay Singh**  
Lead Auditor EMS & Energy



**Dr. Uday Pratap**  
Co-Auditor EMS & Energy

# ABBREVIATION

<b>A</b>	<b>Amps</b>
<b>AC</b>	<b>Air Conditioner</b>
<b>AC</b>	<b>Alternating Current</b>
<b>AMET</b>	<b>Academy of Maritime Education and Training</b>
<b>CFL</b>	<b>Compact fluorescent lamp</b>
<b>CIP</b>	<b>Comprehensive Inspection Programme</b>
<b>DC</b>	<b>Direct Current</b>
<b>HSD</b>	<b>High Speed Diesel</b>
<b>Hz</b>	<b>Hertz</b>
<b>kg</b>	<b>Kilogram</b>
<b>kVA</b>	<b>kilo-volt-ampere</b>
<b>kW</b>	<b>kilo Watts</b>
<b>kWh</b>	<b>kilowatt hour</b>
<b>kWp</b>	<b>Kilowatt peak</b>
<b>LED</b>	<b>Light Emitting Diode</b>
<b>LPG</b>	<b>Liquefied Petroleum Gas</b>
<b>MMS</b>	<b>Module mounting structure</b>
<b>MPPT</b>	<b>Maximum Power Point Tracker</b>
<b>NAAC</b>	<b>The National Assessment and Accreditation Council</b>
<b>SEC</b>	<b>Specific Energy Consumption</b>
<b>SPV</b>	<b>Solar Photovoltaic</b>
<b>STC</b>	<b>Standard Test Condition</b>
<b>TV</b>	<b>Television</b>
<b>V</b>	<b>Volts</b>
<b>W</b>	<b>Watts</b>
<b>W/m<sup>2</sup></b>	<b>watt per square metre</b>



# OVERVIEW OF THE COLLEGE

Sariya College, Suriya a premier institution for Co- education at Sariya, Giridih District in the State of Jharkhand. It is a Permanently Affiliated. College of Vinoba Bhave University, Hazaribag. It was founded in the year 1984 with an aim to impart higher education to the rural students. The dreams of the poor students who are deprived of higher education have been translated into reality by this glorious institution. Our College caters to the academic and professional needs of boys & girls not only from Sariya but also from adjoining rural areas and nearby states.

The college initially started functioning with only 14 students in the Arts and Commerce Stream and had few teaching staffs. The State Govt. and the university provided temporary affiliation in Arts, and Commerce faculties from the session 1984-85 then from the session 2011-14 the State Govt. and Vinoba Bhave University, Hazaribag provided Permanent Affiliation to the college in the faculty of Arts(General), and Commerce up to Honours & General level. Sariya College is registered under society registration act- and is also registered under section 2(F) and 12(b) of UGC of Govt. of India.



# MISSION, VISION & VALUES

## **MISSION**

- To build the nation by creating a class of moral, intellectual and committed citizens
- To strengthen the human resources
- To provide Indian knowledge and values along with modern knowledge and values
- To intellectual academic excellence, social responsibility, moral uprightness and team spirit
- To train students physically intellectually, socially, morally, emotionally, vocationally to attain
- To contribute to society through the pursuit of education, learning at the highest levels of excellence.
- To provide quality education through academic cultural and physical activities and prepare the students as responsible and useful citizens.

## **VISION**

- To be recognized as a premier institute that Practices quality education, Providing a vibrant environment for the holistic development of students.
- Enriching the capacity of students to learn and lead with integrity and wisdom
- Installing human values and a sense of responsibility towards the society.
- To cater to the educational needs of the area and mould the students into responsible citizens of the country.
- To modernize the society through education
- To promote synthesis of knowledge with special emphasis on unity of scientific and spiritual pursuits to revitalized our country's rich heritage.

## **VALUES**

Sariya college , Suriya in a process of self and community reflection that would lead us to recognize and heighten awareness of the higher values we and our institution have already practiced and articulated, to seek agreement about those values, and to develop an institutional culture that holds itself accountable to those values.



## Geo Location

Geo Coordinates from Google maps:  
24.1498943, 85.8747263



## AUDIT PARTICIPANTS

On behalf of Sariya College, Suriya

Name	Designation
<b>Mr. Manohar Singh Bagga</b>	Secretary
<b>Dr. Santosh Kumar Lal</b>	Principal
<b>Mr. Pramod Kumar</b>	Assistant Professor and Audit Coordinator
<b>Mr. Asit Diwakar</b>	Assistant Professor
<b>Mr. Ashish Kumar Singh</b>	Assistant Professor
<b>Mr. Sitaram Suman</b>	Accountant

On behalf of EHS Alliance Services

Name	Position	Qualifications
<b>Dr. Uday Pratap</b>	Lead Auditor	Ph.D. , PDIS, QCI – WASH, Lead Auditor ISO 14001:2015
<b>Ms. Pooja Kaushik</b>	Co-Auditor	M.Sc., Field Expert, QCI – WASH

# EXECUTIVE SUMMARY

The purpose of this Energy Audit was to seek opportunities to improve the energy efficiency of the Sariya College, Suriya. Reducing the energy consumption despite improving the human comfort, health and safety were of primary concern.

Beyond just identifying the energy consumption pattern, this audit sought to detect and categorize the most energy efficient appliances. Additionally, some daily practices relating common appliances have been shared which may help reducing the energy consumption. Data collection for energy audit of the campus was carried out by the EHS Alliance Team. The Energy Audit Report accounts for the energy consumption patterns of the institution on actual survey and detailed analysis during the audit.

The work comprehends the area wise consumption traced using suitable equipment. The analysis was carried out by our team with the support of the staff members from Sariya College, Suriya. The report provides a list of possible actions to preserve and efficiently access the available source, resources and their saving potential was also identified. We look forward towards optimization that the authorities, students and staff members would follow the recommendations in the best possible way. The report is based on certain generalizations including the approximations wherever necessary. The views conveyed may not reveal the general opinion. They merely represent the opinion of the team guided by the interviews of clients. We are happy to submit this Energy audit report to the Sariya College, Suriya.

## ENERGY AUDIT - ANALYSIS

### 1. ENERGY CONSUMPTION

To understand the Energy Consumption trends and for analyzing the average monthly consumption we have collected electricity energy bills from July 2022 to June 2023

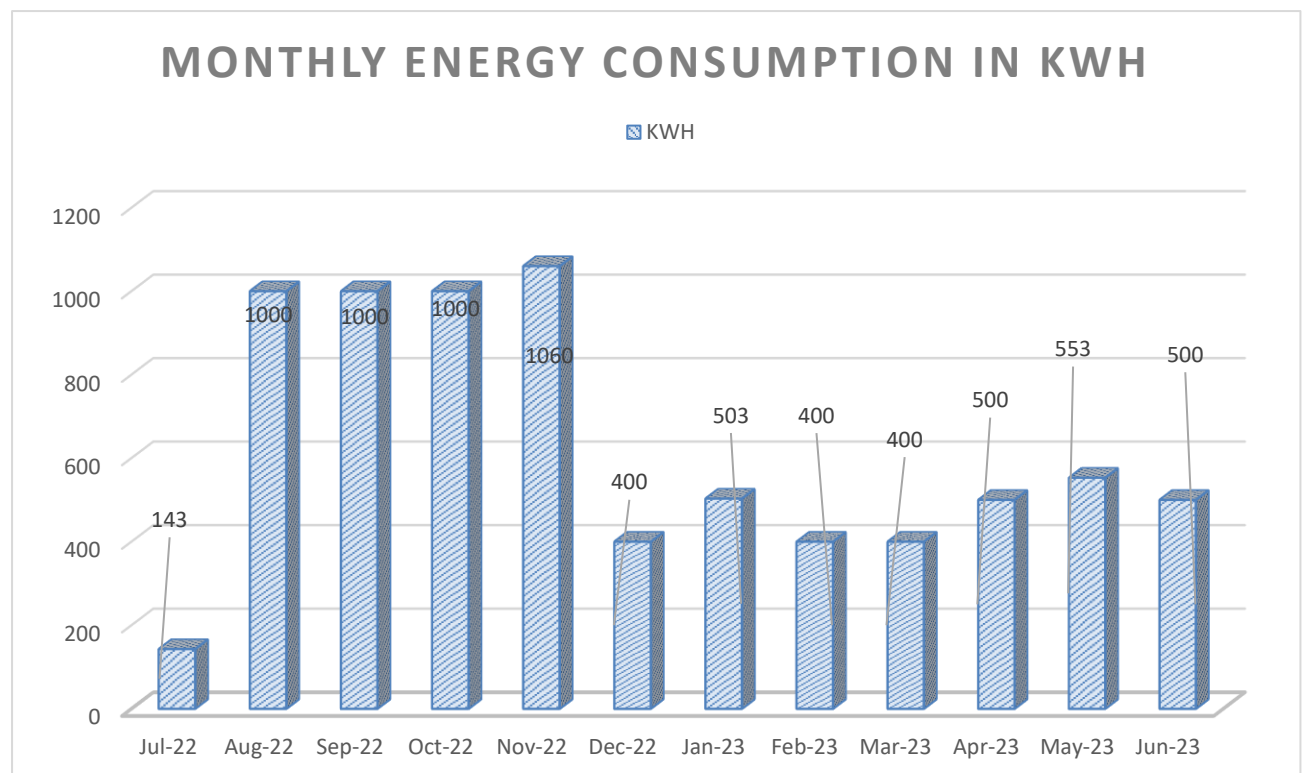
The details of “**Meter Connection**” at “**Sariya College, Suriya**” are as follows-

Name	-	Sariya College, Suriya
CA No.	-	1720240000

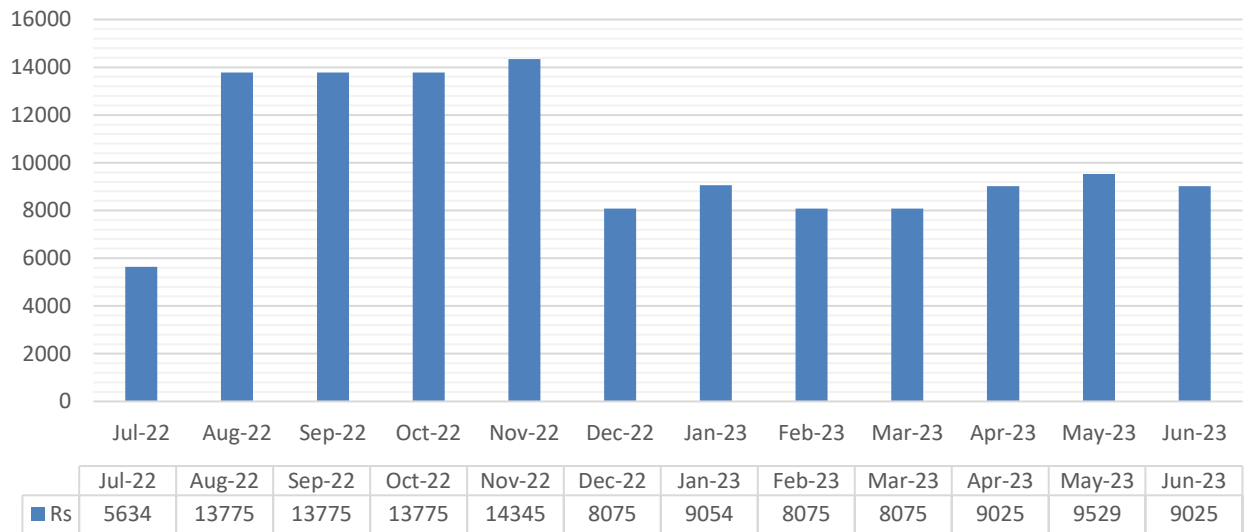
#### 1.1 Summary of Monthly Electricity Consumption and Total Bill Amount

To understand the Energy consumption trend and for developing the baseline parameter we have collected monthly energy bill for the 12 months i.e. from July 2022 to June 2023

Month	Grid Billing	Solar PV	Total Readings	Rate INR	Amount in INR
Jul-22	143	450	593	9.50	5,634
Aug-22	1000	450	1450	9.50	13,775
Sep-22	1000	450	1450	9.50	13,775
Oct-22	1000	450	1450	9.50	13,775
Nov-22	1060	450	1510	9.50	14,345
Dec-22	400	450	850	9.50	8,075
Jan-23	503	450	953	9.50	9,054
Feb-23	400	450	850	9.50	8,075
Mar-23	400	450	850	9.50	8,075
Apr-23	500	450	950	9.50	9,025
May-23	553	450	1003	9.50	9,529
Jun-23	500	450	950	9.50	9,025
<b>SUM</b>	<b>7459</b>	<b>5,400</b>	<b>12,859</b>		<b>122161</b>



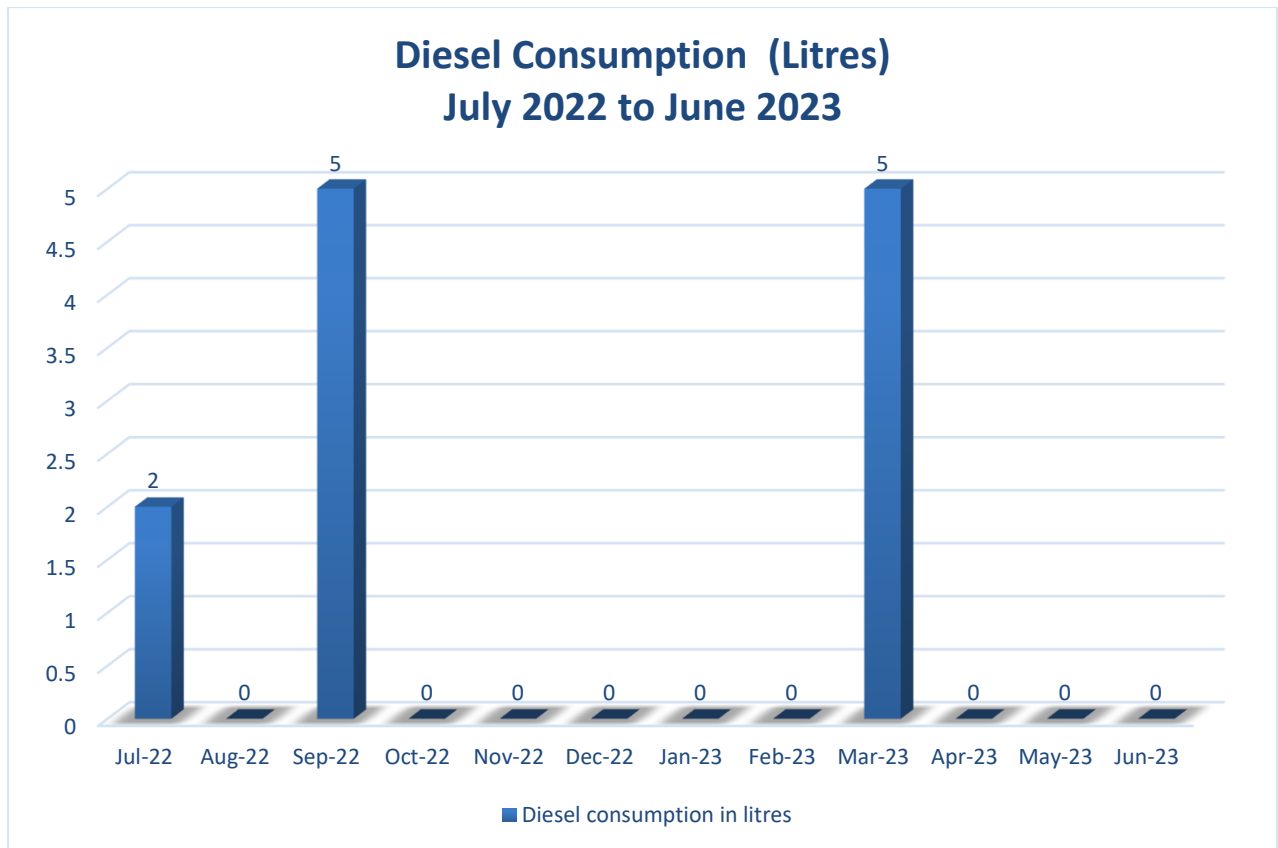
## Monthly Consumption - from July 2022 to June 2023



## 2. DIESEL CONSUMPTION

Below is the diesel consumption details in litres from July 2022 to June 2023.

Period	Diesel consumption (in litres)
Jul-22	2
Aug-22	0
Sep-22	5
Oct-22	0
Nov-22	0
Dec-22	0
Jan-23	0
Feb-23	0
Mar-23	5
Apr-23	0
May-23	0
Jun-23	0
<b>Total</b>	<b>12.00</b>



### 3. ANALYSIS OF DG SETS

In the campus, there is only one Diesel Generator (DG) set for its electrical power needs in case of Grid power failure. DG sets capacity is 5 kVA.

DG Set Design Details		
<i>Description</i>	<i>Unit</i>	<i>DG at Station 1</i>
Rated capacity	kVA	5
Hz		50
Sl No.		1500889
Make		Kirloskar
Volts	Volts	220
PF		0.8
Phase		1
RPM		1200
Amps	Amps	21.7
Mfg.		Sep-15



DG Set Operation details		
Operating hours during testing	Hours	0.50
% Loading	%	73.76
Energy Generation	kWh	37.21
Load	kVA	92.50
Fuel consumption during testing	Litre	1
Specific energy generation	kWh/litre	3.19

**Observation and Suggestions: -**

Soundproof silent generators are an efficient tool to keep both noise and vibration at low levels. For the power backup of the institution, the soundproof model is installed near the herbal garden of the institution.

As per the trial taken during the energy audit the percentage loading of DG set is 73.76% which is ok and the specific energy consumption of DG Sets is 2.19 kWh/Litre which is satisfactory because as per manufacturer recommendation, best practices for SEC in DG sets range from 3.0 to 3.5 kWh/Litre and above.

We recommend college to initiate a periodic maintenance schedule and stack monitoring of DG set through an authorized lab.



## 4. FANS ANALYSIS

In the Sariya College, Suriya, there are 75 fans installed, out of which 72 ceiling fans are of 70W. The observation and suggestion are provided following the inventory.

Sl No.	Location/ Identification	Ceiling Fan (Simple) 70W	Ceiling Fan (BLDC) 30W
1	NAAC OFFICE-1	1	
2	NSS Office	1	
3	Geography Class Room	3	
4	Sociology Class Room	3	
5	Boys Common Room	2	
6	Exam. Room	1	
7	Staff Common Room	3	1
8	IQAC Room		1
9	Principal Chamber	2	1
10	Zoology Class Room	4	
11	History Class Room	4	
12	Political Sc. Class Room	4	
13	Economics Class Room	4	
14	Hindi Class Room	4	
15	Girls Common Room	2	
16	Commerce Class Room	2	
17	English Class Room	2	
18	Botny Class Room	2	
19	Smart Class Room	5	
20	Library Room	7	
21	Computer Lab	2	
23	Fee Counter	2	
24	Auditorium	7	
26	JSOU Office	1	
27	Geography Lab	1	
28	Science Lab	1	
29	Physics Class Room	1	
30	Math. Class Room	1	
	<b>TOTAL</b>	<b>72</b>	<b>3</b>

### Observation and Suggestions: -

<b>Total no of Ceiling Fans (70W)</b>	Nos.	72
<b>Total wattage of 50W Ceiling Fans</b>	Watt	0
<b>Total wattage of 70W Ceiling Fans</b>	Watt	5040
<b>Total wattage of BEE 5 Star rated Fans (30W)</b>	Watt	2160

<b>Total saving in Wattage after replacement</b>	Watt	2880
<b>Operating hours per day</b>	Hours	7
<b>Operating days per annum</b>	Days	223
<b>Energy charges per unit in Rs.</b>	INR	10
<b>Saving in Rs./annum</b>	INR	44957
<b>Investment INR</b>	INR	180000
<b>Payback period:- Months</b>	YEARS	4.00

In the college, mostly ceiling fans are of 70 W but BEE 5 Star Rated of 30W Ceiling Fans are present in the market. We recommend to replace to BEE 5 Star rated 30W fans.

**Note:-** Energy saving will increase or decrease if operating hours of machine /equipment will be increased or decreased and payback period will also increase or decrease if cost of investment (Cost of machine/equipment/accessories of machine) will increase or decrease because cost of investment is taken on tentative basis.

## 5. ANALYSIS OF LIGHTING SYSTEM

### 5.1 Brief description of existing system

For assessing the energy efficiency of lighting system, Inventory of the Lighting System has been noted / collected, with the aid of a lux meter, measurement and documentation of the lux levels at various locations at working level has been done.

### 5.2 Inventory of Lighting

Sl. No.	Location/ Identification	9W-LED High Mast	50W LED (High Voltage)
1	NAAC OFFICE-1	2	
2	NSS Office	2	
3	Geography Class Room	5	
4	Sociology Class Room	5	
5	Electricity Room	2	
6	Boys Common Room	4	
7	Exam. Room	2	
8	Staff Common Room	4	
9	IQAC Room	2	
10	Principal Chamber	5	
11	Common Area	6	
12	Zoology Class Room	6	
13	History Class Room	6	
14	Political Sc. Class Room	6	
15	Economics Class Room	6	

16	Hindi Class Room	6	
17	Girls Common Room	8	
18	Commerce Class Room	4	
19	English Class Room	5	
20	Botny Class Room	4	
21	Smart Class Room	9	
22	Store Room	2	
23	Library Room	15	
24	Computer Lab	4	
25	Canteen	4	
26	Fee Counter	8	
27	Auditorium	44	
28	JSOU Office	4	
29	Geography Lab	4	
30	Science Lab	8	
31	Physics Class Room	3	
32	Math. Class Room	3	
33	Common Area	16	
34	Principal Chamber Toilet Room	1	
35	Staff Toilet Room	1	
36	Toilet for Boys and Girls	10	
37	Campus		6
	TOTAL	226	6

### 5.3 Lux Measurement

Description	Lux	Remark
<b>Class Rooms</b>	120 to 235	Acceptable
<b>Offices</b>	130 to 240	Acceptable
<b>Corridors</b>	35 to 90	Acceptable
<b>Washrooms</b>	45 to 76	Acceptable
<b>Outdoor</b>	36 to 95	Acceptable
<b>Computer Lab</b>	150 to 289	Acceptable
<b>Parking area</b>	45 to 94	Acceptable
<b>Canteen</b>	69 to 185	Acceptable

## Observation

The college has initiated an LED-based lighting solution, which helps to reduce electricity consumption and reduce carbon footprints. LEDs save energy, the life span is much greater, and emit virtually no heat.

We recommend installing motion sensor-based lights in common areas such as libraries, washrooms, corridors, etc. We also recommend using solar lights for open areas like parking, ground, street lights, etc. The table below shows the performance characteristics comparison of all luminaries.

Table - Luminous Performance Characteristics of Commonly Used Luminaries					
Type of Lamp	Lumens/Watt		Colour Rendering Index	Typical Application	Typical Life
	Range	Avg.			
<b>Incandescent</b>	8-18	14	Excellent (100)	Homes, restaurants, general lighting emergency lighting	1000
<b>Fluorescent lamps</b>	46-60	50	Good w.r.t coating (67-77)	Offices, shops, hospitals, homes	5000
<b>Compact fluorescent Lamps (CFL)</b>	40-70	60	Very Good (85)	Hotels, shops, homes, offices	8000-10000
<b>High-pressure mercury (HPMV)</b>	44-57	50	Fair (45)	General lighting in factories, garages, and car parking. floodlighting	5000
<b>Halogen lamps</b>	18-24	22	Excellent (100)	Display, flood lightening, stadium exhibition grounds, construction areas	2000 - 4000
<b>High-pressure sodium (HPSV) SON</b>	67-121	90	Fair (22)	General lighting in warehouses, factories, street lighting	6000 - 12000
<b>Low-pressure sodium (LPSV) SOX</b>	101-175	150	Poor (10)	Roadways, tunnels, canals, street lighting	6000 - 12000
<b>Metal halide lamps</b>	75-125	100	Good (70)	Industrial bays, spotlighting, floodlighting, retail stores	8000
<b>LED Lamps</b>	30-50	40	Good (70)	Reading lights, desk lamps, night lights, spotlights, security lights, signage lights.	40000 - 100000



## 6. OTHER POWER CONSUMPTION

### 6.1 Inventory of IT Infrastructure

Sl No.	Location/ Identification	Desktop	Laptop	Printers	Scanners	LCD Projector	Digital Interactive Panel
1	Principal Room	1	1	1	1		
2	IQAC Room	1	1	1	1		
3	Examination Room	1					
4	Library	1		1	1		
5	Computer Lab	20					
6	Fee Counter	3		2			
7	Smart Class Room	1				1	1
8	Hindi Class Room					1	
9	English Class Room					1	
10	Multipurpose Hall						1
11	Pol. Sc. Class Room					1	
12	Science Lab					1	
13	Commerce Class Room					1	
	<b>TOTAL</b>	<b>28</b>	<b>2</b>	<b>5</b>	<b>3</b>	<b>6</b>	<b>2</b>

### 6.2 Water pump details

Sr. No.	Description	Unit	Pump No.-1	Pump No.-2
1	Rated Power of Motor	KW	0.746	0.746
2	Motor Eff.	%	0.8	0.8
3	Discharge Head	m	10	10
4	Suction Head	m	15	15
5	Pump Type	Submersible/Monoblock /Centrifugal Etc.	Submersible	Submersible

### 6.3 Exhaust fan details

Sl No.	Location/Identification	60W Exhaust Fan
1	Principal Chamber Toilet Room	1

## ANALYSIS

There should be a regular maintenance schedule of equipment like pumps, exhaust fans and IT equipment. We recommend college to install exhaust fans in boys and girl's washrooms for better hygiene.

Electronics such as computers, printers, scanners, etc. more than 3 years or 5 years (as per their life) should be replaced with new computers/laptops. Ideal Temperature should be maintained for all electronic appliances.



\*\*\*\*\* **END OF THE REPORT** \*\*\*\*\*