

2024



SHRI DIGAMBER JAIN ACHARYA SANSKRIT MAHAVIDYALAY

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ENERGY AUDIT REPORT

Conducted By

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ACKNOWLEDGEMENT

We express our sincere gratitude to the “Shri Digamber Jain Acharya Sanskrit Mahavidyalay” for giving us the opportunity for Energy Audit. We thankfully acknowledge the support and guidance provided by all concerned officials during the conduct of this exercise.

We are also thankful for their positive support in undertaking this intricate task of Audit. The field studies would not have been completed on time without their interaction and timely support. We are grateful for their co-operation during field studies and provision of data for the study.

“Shri Digamber Jain Acharya Sanskrit Mahavidyalay”

Shri N.K. Sethi	:-	President
Shri M.C. Jain	:-	Secretary
Dr. A.K. Jain	:-	Principal

M/s Kanak Automation: -

Er. Rajesh Kumar Goyal	:-	Electrical Consultant & Certified Energy Auditor
Mr. Sayantan Das	:-	B. Tech Electrical Engineer

Last but not the least we are thankful to all officers and employees with whom we interacted during the field studies for their wholehearted support in undertaking measurements and eagerness to assess the system / equipment efficiencies and saving potential.

We would like to specially acknowledge the support and co-operation extended to us during our visit by the staff.

For KANAK AUTOMATION

**RAJESH
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Dated: - 02nd July 2024



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“Energy conservation is not possible in a system when defects are there in Sub-systems, first correct the defect and then only proceed towards energy efficiency.

When safety fails, Conservation fails, Safety should also optimize not compromised to achieve energy efficient loading parameters and backed by condition monitored maintenance.”



INTRODUCTION

ABOUT THE COLLEGE

Shri Digamber Jain Acharya Sanskrit Mahavidyalaya, Jaipur, is one of the oldest Institutions of Sanskrit Education in Rajasthan. Established before Independence in the year 1885, the Institution has never ceased to spawn literary luminaries, cultural icons and academic stalwarts. The College is located in the capital city of Rajasthan. The Institution is running under the aegis of Shri Digamber Jain Sanskrit Shiksha Samiti, a committee formed by the members of Jain society. Mr. N.K. Sethi, a retired IAS officer is presently the President of this committee. The Institution is set up with the aim of imparting education from XI to Ph.D. level.

The College is committed to the welfare of the student community as well as the larger society and every possible measure is taken to realize the objective.

The Electricity connection is taken from JVVNL 11KV pole, followed by HT metering Kiosk, RMU & transformer. DG set of capacity 125KVA is present.

The building has dedicated panels:

- Auto mains failure panel for total load
- Main distribution panel with bypass facility and APFC.
- Auditorium panel.
- Basement Admin building panel

All the panels in panel room are equipped with smart meters for monitoring and recording of electrical parameters including power quality.



ENERGY AUDIT

ENERGY AUDIT METHODOLOGY

The methodology adopted for this audit was formation of audit team comprises of Certified Energy Auditors who checked the connected load and performance assessment of the various electrical loads like lighting systems, coolers & fans, air conditioners, etc.

Following activities are used:

- A. Visual inspection and data collection
- B. Observations on the general condition of the facility and equipment and quantification
- C. Identification / verification of energy Usage and other parameters by measurements
- D. Detailed calculations, analyses and assumptions
- E. Validation
- F. Potential energy saving opportunities

**EXECUTIVE SUMMARY****OBSERVATION & RECOMMENDATION****TRANSFORMER NAMEPLATE DETAILS**

Make – Uttam (Bharat) Electricals Private Limited

- KVA: **160**
 - Volts: HV – 11 KV, LV – 0.433 KV
 - Ampere: HV – 8.40 A, LV – **213.34 A**
 - Impedance volt: 4.5%
 - Tapings: OFF load tap Changeover
 - Frequency: 50Hz
 - Type of cooling: ONAN
 - Serial no.: 230172
 - Winding: Aluminium
 - EEL: **Level Two**
- Average running loading on transformer of the 160 KVA is around 20%.
 - Actual Transformer Loss of 160 KVA at 20% loading: -

$$\text{No load loss} + \left(\frac{\text{KVA load}}{\text{Rated KVA}} \right)^2 \times (\text{full load loss})$$

$$0.431 + \left(\frac{47}{160} \right)^2 \times (1.700) = 0.577 \text{ KW/hr}$$

- Average running time of building considered @266days for 10 hours. Therefore, working hours is 2660 and non-working hours is ((99*24) + 3724) = 6100.
- Average Energy Consumption by the transformer, during 20% loading condition, in year (0.577 X 2660) = 1537.82 KWH
- Average Energy Consumption by the transformer, during no-loading condition, in year (0.431 X 6100) = 2629.1 KWH
- Total loss by transformer in a year is 4166.92 KWH
- Total Energy Consumed by one Transformer is Rs. 36877.242 in a year @8.85/-unit.
- Efficiency of Transformer at actual Load: -

Efficiency at actual load

$$= \left(\frac{\text{output power at actual load}}{\text{output power at actual load} + \text{total losses at actual load}} \right) \times 100\%$$

$$\text{Efficiency at actual load} = \left(\frac{41}{41 + 0.577} \right) \times 100\% = \mathbf{98.61\%}$$

- Efficiency of Transformer at full Load: -

Efficiency at full load

$$= \left(\frac{\text{output power at full load}}{\text{output power at full load} + \text{total losses at full load}} \right) \times 100\%$$



$$\text{Efficiency at full load} = \left(\frac{160}{160 + 1.700} \right) \times 100\% = \mathbf{98.94\%}$$

- ✓ Average monthly Power factor, as per Electricity bill, for last 06 months is 0.94 whereas 0.88 was for last 01 year. **Penalty** paid for a duration of **01 year Rs. 3990.4**. Maintain Power factor over 0.9.
- ✓ Current is in unbalance condition for admin building panel. Recommend to distribute load properly on all three phases.
- ✓ On all three phases, recorded Average $V_{\text{thd}} = 1.9\%$ & $I_{\text{thd}} = 20\%$, particularly on the auditorium feeder, for smooth running of system it should be maintained below $V_{\text{thd}} = 1\%$ & $I_{\text{thd}} = 10\%$.
- ✓ **Active Dynamic VAR Compensator** needs to be installed on this feeder of minimum capacity **30KVAR, 415 Volt, three-layer topology** for improving both power factor and limiting the harmonic content in the system. It will reduce Harmonics levels and improve power factor with power quality of the system, thereby increasing the **life & performance of the system**.

**Conditions for installing – to buy good quality Advanced filters, good installation & workmanship during connection as per recommendations.*

- ✓ Recommend to install Solar of minimum capacity 30KW.
- ✓ Remove all tube lights, when non-operational, and replace them with 18W LED lights.
- ✓ Use BLDC fans in all classrooms to optimize the motor speed and conserve electricity, resulting up to 50% as compared to regular fans.
- ✓ Buy only 5 star rated products for fans, ACs, refrigerators, etc.
- ✓ All heating and cooling equipment shall be temperature controlled. Where a unit provides both heating and cooling, controls shall be capable of providing a temperature dead band of 30°C (50F) within which the supply of heating and cooling energy to the zone is shut off or reduced to a minimum. Where separate heating and cooling equipment serve the same temperature zone, thermostats shall be interlocked to prevent simultaneous heating and cooling.
- ✓ The automatic door closure and door gaps sealing arrangement should be provided in all air conditioned rooms.

Automatic Lighting Shutoff

- ✓ Interior lighting systems in buildings larger than 500 m² (5,000ft²) shall be equipped with an automatic control device. Within these buildings all office areas less than 30 M² (300ft²) enclosed by walls or ceiling height partitions, all meeting and conference rooms ,all school classrooms, and all storage spaces shall be equipped with occupancy sensors. For others spaces, this automatic control device shall function on either,-



- ✓ Scheduled basis at specific programmed times. An independent program schedule shall be provided for areas of no more than 2,500 m² (25,000 ft²) and not more than one floor; or
- ✓ Occupancy sensors that shall turn the lighting off within 30 minutes of an occupant leaving the space. Light fixtures controlled by occupancy sensors shall have a wall-mounted, manual switch capable of turning off lights when the space is occupied
- ✓ Luminaires in day lighted areas greater than (25 ft²) shall be equipped with either
- ✓ A manual or automatic control device that is capable reducing the light output of the luminaires in the day lighted areas by at least 50%; and control only the luminaires located entirely within the day lighted area.



Recommendations on Energy Saving Measures

Based on the energy audit carried out, following Energy Saving Measures are hereby recommended for implementation:

Recommendation – 1:

Title of Recommendation	:	Replace all the 4 feet T12 (40 W) lamps and fixtures with 4 foot LED lamp and fixtures
Description of Existing System and its operation	:	Where 4 feet T12 (40 W) with magnetic choke (12 W) are being used.
Description of Proposed system and its operation	:	These should be replaced with 4 feet LED tube fixture of 18 watt having electronic choke
Energy consumption of a normal 4 feet T12 with magnetic choke	:	52 watts
Energy consumption of a 4 feet LED having electronic choke	:	18 watts
Energy saving per single replacement	:	34 watts
Approximate nos.	:	15
Average use per day	=	10 hrs
Average use in days of the year	=	266 days of the year
Cost Benefits		
Annual Energy Saving Potential	=	$(34 \times 15 \times 10 \times 266 / 1000)$ units
	=	1356.6 units
Annual Cost Savings @Rs. 8.85/- per unit	=	Rs. 12005.91
Investment (with labour cost)	=	Rs. 800/- per fitting
	=	Rs. 12000/- for all 15 fittings
Simple Payback period	=	01 year

Recommendation – 2:

Title of Recommendation	:	Replace all Incandescent Bulb light with LED Bulb
Description of Existing System and its operation	:	There is incandescent bulb (A type 60 W), which is inefficient lighting.
Description of Proposed system and its operation	:	We have proposed to replace one incandescent light (A type 60 W) with LED bulb (10 W)
Energy consumption of an incandescent bulb	:	60 watts
Energy consumption of a LED bulb	:	10 watts
Energy saving per single replacement	:	50 watts
Approximate nos.	:	10
Average use per day	=	08 hrs
Average use in days of the year	=	266 days of the year
Cost Benefits		
Annual Energy Saving Potential	=	$(50 \times 10 \times 08 \times 266 / 1000)$ units
	=	1064 units
Annual Cost Savings @Rs. 8.85/- per unit	=	Rs. 9416.40
Investment (with labour cost)	=	Rs. 150/- per fitting
	=	Rs. 1500/- for all 10 fittings
Simple Payback period	=	02 months

**Recommendation – 3:**

Title of Recommendation	:	Replace the Metal Halide lamp (250 W) with LED - Exterior Lighting
Description of Existing System and its operation	:	There are one (2) Halide lamps of 250 watts.
Description of Proposed system and its operation	:	We have proposed to replace all One (2) Halide (250 W) with newer LED (60 W)
Energy consumption of an incandescent bulb	:	280 watts
Energy consumption of a LED	:	60 watts
Energy saving per single replacement	:	230 watts
Approximate nos.	:	02
Average use per day	=	09 hrs
Average use in days of the year	=	280 days of the year
Cost Benefits		
Annual Energy Saving Potential	=	(230 X 02 X 09 X 280 / 1000) units
	=	1159.20 units
Annual Cost Savings @Rs. 8.85/- per unit	=	Rs. 10258.92
Investment (with labour cost)	=	Rs. 5500/- per fitting
	=	Rs. 11000/- for all 02 fittings
Simple Payback period	=	01 year 02 months

Recommendation – 4:

Title of Recommendation	:	Install occupancy sensors in Wash Room locations.
Description of Existing System and its operation	:	Whenever a Personnel's leaves his/her cabin/room for some time, he/she are supposed to switch OFF the lights and Exhaust Fan to avoid the wastage of electricity.
Description of Proposed system and its operation	:	With the installation of occupancy sensors, the electrical appliances installed in the cabin/room/toilets will get switched off automatically after a pre-set time when no activity in the area is sensed. Type A – Up to 5 Amp load (suitable only where lighting and fan are required to be controlled).
Energy consumption	:	3000 watts for 07 washrooms
Energy saving	:	03 hrs
Approximate nos.	:	07
Average use per day	=	09 hrs
Average use in days of the year	=	266 days of the year
Cost Benefits		
Annual Energy Saving Potential	=	(3000 X 03 X 266 / 1000) units
	=	2394 units
Annual Cost Savings @Rs. 8.85/- per unit	=	Rs. 21186.90
Investment (with labour cost)	=	Rs. 4500/- per fitting
	=	Rs. 31500/- for all 07 fittings
Simple Payback period	=	01 year 05 months

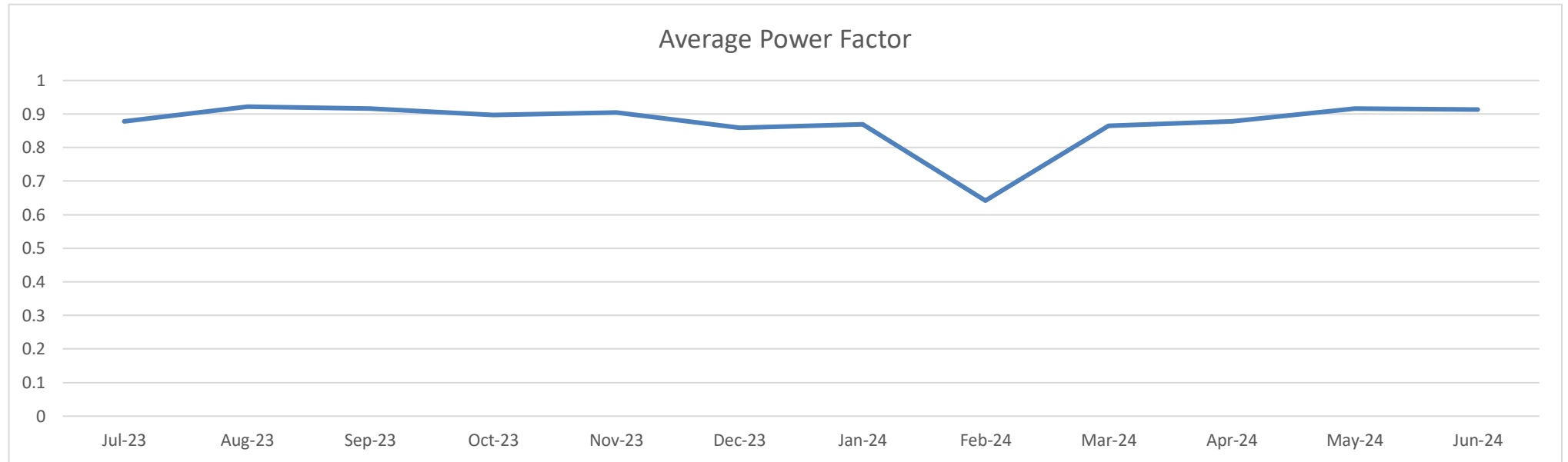
**ELECTRICITY BILL ANALYSIS**

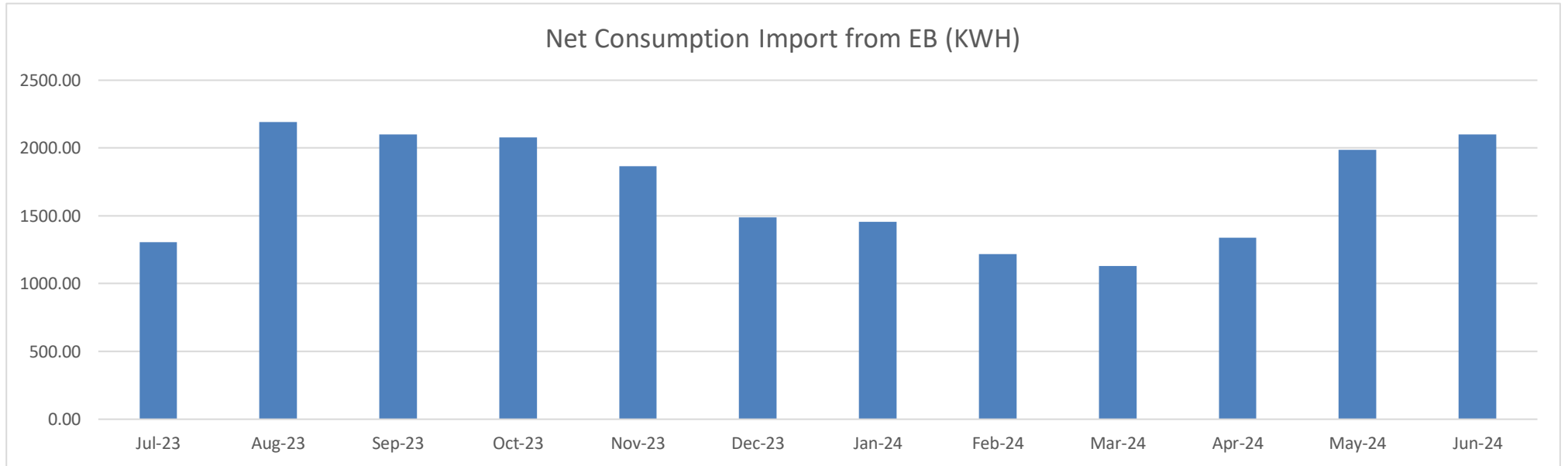
Analysis of total load for the period of 01year.

Name & address of Consumer:																		
Digamber Jain Sanskrit Shiksha Samiti		Sanctioned connected load (KW)	Contract Demand (KVA)	Billing Demand (KVA)	KWH Tariff (Rs.)	Fixed Charge Tariff (Rs.)	Category	Urban/rural	Tariff code	Feeder Code	Meter No.	Account no.	K no.	Billing Year				
Jain nasiya road		100	86	64.5	8.85	270	NDS-HT	Urban	2011XA	1030948	9918133	53140	210463016543	2023-24				
										A	B	C	E	G	H	I	Sum (A to I)	
Sr. no.	Month	Previous Consumption Import from EB (KWH)	Current Consumption Import from EB (KWH)	Net Consumption Import from EB (KWH)	Net Consumption Import from EB (KVA)/MDI	Net Consumption Import from EB (KVAH)	Average Power Factor	MF	Consumption [KWH] (As per Ledger)	Electricity Charges (Rs.)	Fixed Charges (Rs.)	Fuel surcharge (Rs.)	Power factor surcharge/Incentive (Rs.)	Electricity Duty (Rs.)	Urban cess (Rs.)	Water Conservation Cess (Rs.)	Arrears (Rs.)	Electricity Bill Amount (Rs.)
1	Jul-23	21223.80	22528.95	1305.15	64.50	2229.15	0.878	1.5	1957.73	17325.87	17415	468.44	381.17	783.09	293.66	195.77	0.00	36863.00
2	Aug-23	22528.95	24721.15	2192.20	64.50	3564.97	0.922	1.5	3288.30	29101.46	17415	2176.36	0	1315.22	493.25	328.83	0.00	50830.12
3	Sep-23	24721.15	26822.50	2101.35	64.50	3439.13	0.916	1.5	3152.03	27895.42	17415	2107.49	0	1260.81	472.80	315.2	0.00	49466.72
4	Oct-23	26822.50	28899.00	2076.50	64.50	3468.83	0.897	1.5	3114.75	27565.54	17415	2088.11	82.7	1245.90	467.21	311.48	0.00	49175.94
5	Nov-23	28899.00	30764.05	1865.05	64.50	3094.65	0.904	1.5	2797.58	24758.54	17415	1923.8	0	1119.03	419.64	279.76	0.00	45915.77
6	Dec-23	30764.05	32251.65	1487.60	64.50	2595.30	0.859	1.5	2231.40	19747.89	17415	1628.69	809.51	892.50	334.69	223.13	0.00	41051.41
7	Jan-24	32251.65	33709.10	1457.45	64.50	2515.35	0.869	1.5	2186.18	19347.65	17415	1459.09	648.33	874.33	318.00	327.6	0.00	40390.00
8	Feb-24	33709.10	34928.70	1219.60	64.50	2171.48	0.642	1.5	1829.40	16190.19	17415	1419.73	939.03	731.76	182.94	274.41	0.00	37153.06
9	Mar-24	34928.70	36059.60	1130.90	64.50	1960.43	0.865	1.5	1696.35	15012.70	17415	1350.54	525.44	678.54	254.45	169.63	0.00	35406.30
10	Apr-24	36059.60	37399.90	1340.30	64.50	2289.08	0.878	1.5	2010.45	17792.48	17415	1519.87	604.18	604.18	301.57	201.04	0.00	38438.32
11	May-24	37399.90	39387.70	1987.80	64.50	3252.98	0.916	1.5	2981.70	26388.04	17415	2018.92	0	1192.68	447.25	298.17	0.00	47760.06
12	Jun-24	39387.70	41487.60	2099.90	64.50	3448.05	0.913	1.5	3149.85	27876.17	17415	2169.52	0	1260.06	472.52	315.02	0.00	49508.29
										269001.9	208980.0		3990.4	11958.1	4458.0	3240.0		521959.0

- You have paid Rs. 3990.4 in penalty to JVVNL for power factor.
- Average monthly Demand during summer season is 54.5 and during winter is 20KVA. Demand is taken in consideration of auditorium load.
- Average monthly net KWH consumption is 3000 units.

GRAPHICAL REPRESENTATION:





**Minimum Visible Transmission (VLT) of Glazing for Vertical Fenestration**

Vertical fenestration product shall have the minimum Visual Light Transmittance (VLT), defined as function of Window Wall Ratio (WWR), where Effective Aperture > 0.1, equal to or greater than the Minimum VLT requirements of Table

Minimum VLT Requirements:

Window Wall Ratio	Minimum VLT
0-0.3	0.27
0.31-0.4	0.20
0.41-0.5	0.16
0.51-0.6	0.13

Skylights

Skylights shall comply with the maximum U factor and maximum SHGC Requirements of Table 3.6 Skylight area are limited to a maximum of 5% of the gross roof area for the prescriptive requirement.

Climate	Maximum U – factor		Maximum SHGC	
	With Curb	W/o Curb	0-2% SRR	2.1-5% SRR
Composite	11.24	7.71	0.40	0.25
Hot and Dry	11.24	7.71	0.40	0.25
Warm and Humid	11.24	7.71	0.40	0.25
Moderate	11.24	7.71	0.61	0.4
Cold	11.24	7.71	0.61	0.4

SRR=Skylight roof ratio which is the ratio of the total skylight area of the roof, Measured to the outside of the frame, to the gross exterior roof.

**EARTH**

Sr. No.	Description	Connected to	Earth Value	Remarks
1.	HT METERING CUBICLE	Body 1	1.05Ω	Ok
2.		Body 2	1.12Ω	Ok
3.	RMU	Body 1	1.08Ω	Ok
4.		Body 2	1.6Ω	Ok
5.	TRANSFORMER	Body 1	1.65Ω	Ok
6.		Body 2	1.57Ω	Ok
7.		Neutral	1.95Ω	Ok
8.	AMF PANEL	Body	2.3Ω	Ok
9.	LT DISTRIBUTION PANEL	Body	2.1Ω	Ok
10.	AUDITORIUM PANEL	Body	1.65Ω	Ok
11.	DG SET	Body 1	1.84Ω	Ok
12.		Body 2	1.92Ω	Ok
13.		Neutral	2.3Ω	Ok

Note:

- Use earthing mat in front of panels in LT panel room and basement panel of admin building.
- Keep panel rooms and HT meter room dust free.
- Do not allow untrained electricians or personnel to enter into the panel rooms.

SAFETY

Safety is necessary in every business activity from following aspects:

- ✓ To save lives of personnel engaged in work including self, colleagues, general public & animals.
- ✓ To protect the departmental and public property
- ✓ To reduce loss of revenue
- ✓ To reduce the loss of service due to non-availability of men, machines and services.
- ✓ To reduce loss due to reduction in productivity due to loss of man hours & equipment failure etc.
- ✓ To discharge social commitment of responsible industry.

Operating conditions of an electricity distribution & supply undertaking pose a larger scope for accidents. Electricity is a loyal servant but never excuses. If used carelessly, electricity can burn, shock or even kill. Electricity must be treated with respect. Safety precautions are necessary when working with or near electricity so as to significantly reduce the risk of electrical injury to self and others. Looking into the risks and dangers arising from dealing with installation, maintenance or use of electricity, various safety related provisions are enacted & regulations are made.



Sr. No.	DO'S	Sr. No.	DO NOT
1.	Before replacing a lamp or handling a Fan; make sure that the supply is switched off.	1.	Do not connect single pole switch or fuse in a neutral circuit, but always connect in the live or phase wire.
2.	Place Safety Tagging or other warning boards on main switch before Commencing work.	2.	Do not close any switch, unless you are familiar with the circuit which it controls and know the reason for its Being open.
3.	Before working on any circuit or apparatus, make sure that the controlling Switches are open and locked.	3.	Do not touch or tamper with any electrical gear or conductor, unless you have made sure that it is dead and earthed. High voltage apparatus may give leakage shock or flash over even without touching.
4.	Always treat circuit as live until you have proved them to be dead, the insulation of the conductor may be defective.	4.	Do not work on live circuit without the orders of the authorized person. Make certain that all safety precautions have been taken.
5.	Cultivate the habit or turning your face away whenever the flash or an arc may Occur.	5.	Do not disconnect earthing connection or render it ineffective of the safety gadgets installed on mains and apparatus.
6.	Guard against arcs as well as high Voltage; remember that burns from arc are very severe.	6.	Do not tamper with the meter board and cut-outs, unless you are authorized to do so.
7.	See that all the splices and connections are securely made.	7.	Do not expose your eyes to an electrical arc. Painful injury may result even with short exposure.
8.	Use extreme care when breaking an inductive circuit as dangerously high Voltage is likely to result.	8.	Do not close or open a switch slowly or hesitatingly. Do it quickly and positively.
9.	Thoroughly discharge to earth all cables before working on cores.	9.	Do not place any part of your body in circuit either to ground or across the terminal when making a Connection or doing operation.
10.	Test rubber gloves periodically.	10.	Do not touch an electrical circuit when your hands are wet, bleeding from a cut or have an abrasion.
11.	Place rubber mats in front of electrical switchboard.	11.	Do not work on energized circuit without taking extra precautions, such as the use of rubber gloves. Do not Use metal case flash light around apparatus which is energized.
12.	Preach and practice safety at all the time. Good work can be spoiled by an accident.	12.	Do not wear loose clothing, metal watch straps, bangles or finger rings while working on appliances. Do not hang clothes and such other things on electric fittings. Do not touch the circuit with bare fingers or Hand or other makeshift devices to determine whether or not it is live.
13.	Work deliberately and carefully. Haste causes many accidents. Be sure of what You are doing.	13.	Do not work on pole or any elevated position if there is a live part on it, without the safety belt and rubber Gloves and unless the authorized person stand on the site.



APPENDIX – 1: LIGHTNING PROTECTION SYSTEM OF BUILDING

Lightning Protection System (LPS)

A Lightning Protection System (LPS) is designed to protect a structure or building and contents from damage caused by the intensely high voltage currents of a lightning strike (often exceeding a 1,000,000,000 Volt Amps). Lightning protection systems act like a Faraday Cage for buildings. Protecting the building and its contents from external electric fields by migrating that energy around the cage instead of through its contents. A lightning protection system offers a lightning strike a low resistance path to ground where the enormous energy is then safely dispersed. A typical lightning protection system includes lightning rods, metal conductors and ground electrodes designed to offer a low resistance path to ground and to take any high voltage currents from a lightning strike away from the structure of the building.

The low resistant path offered by a lightning protection system is very important as high voltage currents from a lightning strike will always take a path of least resistance to ground.

Without lightning protection any grounded object that provides a path to earth will emit fingers of electrical charge called positive streamers upwards into the sky. These positive streamers intercept the downward negative leaders from a thunder storm so creating a channel of plasma air for the giant voltage currents of a lightning strike to travel along. If the grounded object is a building the high voltage currents will then travel along any low resistant paths within that building's structure causing heat damage. Lightning energy may even jump through the air to reach a better conductive path.

With a lightning protection system, lightning rods or air terminals are strategically sited on a structure to increase the chances of intercepting a lightning strike before it hits the property being protected. The highly conductive lightning rods of a lightning protection system are normally made of copper or aluminium and are designed to emit positive streamers into the air instead of the structure they are protecting. These positive streamers from the rods intercept the negative leaders of a lightning strike drawing the high voltage currents safely into the lightning protection system and away from the building's structure. A lightning protection system significantly increases a building safekeeping from the damage caused by lightning and not its probability of being struck.

Lightning can be unpredictable and a well-designed lightning protection system will take this into consideration. It will be designed so even if lightning does strike the building's structure first, its large voltage currents will be drawn into the lightning protection system before any serious damage or harm can be done. It will be designed to draw the huge energy away from parts of the building not able to safely carry such large current loads, while at the same time safely utilizing other parts that can. Some buildings require a large re-enforced metal framework in their construction. If suitable additional grounding can be provided at its base so it can be utilized as a low resistance conductor able to carry large currents safely to earth.

Roof Damage Caused By A Lightning Strike:-

Without a lightning protection system structural materials of a building that share the immense loads from lightning strike can be damaged and this damage is not always immediately apparent. If there is no low resistance path offered by a lightning protection system the high voltage current from a strike will divide to follow every conductive path to ground it can find. The extremely large voltage currents will pass through materials normally considered insulators instantly generating large amounts of heat. Due to rapid heating any porous materials like masonry can shatter violently as the air inside it expands with supersonic speed. Any materials containing moisture from humidity or rain can explode with even more volatility as its water content is flashed to steam. Other materials may suffer different forms of heat damage, become melted or even burst into flames. These events can cause secondary damage to the building's human inhabitants or contents.

A correctly installed lightning protection system will be designed to prevent "side-flashes" to and from highly conductive parts of the building. High voltage currents travelling through the bonding conductor of



a lightning protection system can create large electric potentials when compared to objects near to the bonding conductor. Side jumps to and from objects of different potential can cause damage and fire hazards especially if the building houses flammable or explosive materials. This can be avoided by maintaining the electrical continuity of such objects to a bonding conductor so zeroing any potential difference and allowing any voltage changes to occur in tandem.

Proper grounding is essential for efficiently and safely dispersing the large amounts of energy from a lightning strike. Failure to provide adequate grounding will cause a lightning protection system to be ineffective resulting in property damage and risk to human life. Standard earthing provided to a building by a utility supplier is not satisfactory for grounding a lightning protection system. Different techniques or additional earthing is used to ensure a lightning protection system has strong electrical connection to ground. These include using additional grounding rods, plates, meshes or an Upper Grounding system (concrete earthing plate with an embedded steel conductor).

Is Lightning Protection Still As Important Today As It Used To Be:-

It is even more important today than it used to be. Today's competitive businesses are demanding more sophisticated electrical systems and communication infrastructures. A lightning strike to an unprotected building today can cause greater destruction even if it is not visually apparent like structural damage or fire. Even an indirect lightning strike on a building or nearby utility can cause thousands of rupees of damage as its current radiates out from the strike zone.

With the global climate also changing, it is predicted that India will experience more thunderstorms and lightning strikes in the future.

British Standards used within our lightning protection services B.S.6651:- Lightning Conductors

Lightning Safety:-

There are three different ways of being struck by lightning:

1. Direct strike: *the lightning hits you and goes to earth through you.*
2. Jumped: *the lightning hits another object and jumps sideways to hit you.*
3. Ground strike: *the lightning strikes the ground then travels through it hitting you on the way.*

30/30 Rule:-

Research indicates that people are typically struck by lightning when they think they are safe from the peak effects of a thunderstorm. This is normally just before and just after a thunderstorm passes. When a thunderstorm is observed, think about its proximity, the possibility of a lightning strike and not the occurrence of rain. Using the following 30/30 rule is a good way of improving your level of personal safety during a thunderstorm. If the length between the lightning flash and the sound of thunder is 30 seconds in length or less (i.e. less than 6 miles away) you should seek shelter immediately. Lightning has been estimated to travel over 10 miles through the air. Staying inside shelter is also advised until 30 minutes after the last thunder clap has been heard. By doing this you are reducing the risk of being struck at the beginning of the storm or from the trailing end of the storm as it passes.

Improving Your Safety during A Thunder Storm:-

- Seek shelter inside a large building, preferably one with a lightning protection system installed.
- Get inside a motor vehicle, (avoiding soft top convertibles). Cars are safer than standing outside due to the metal body of the car acting as a Faraday Cage conducting the electricity away from you before it is safely earthed to the ground through the tyres. Tyres are not good insulators when considering the enormous high voltage currents from a lightning strike.



- Move away from wide open spaces or exposed hilltops.
- If you are in water, get onto land or a boat as quickly as possible. The impurities in water can transmit the damaging effects from a lightning strike further away.
- Move away from the open space of the shore or beach. Studies have shown that proximity to water is a common factor in lightning strikes.
- If you are on a large enough boat or water vessels with a cabin, take shelter inside if you cannot make it to safety on shore. If you are in an open top boat, keep as low as possible in while making your way safely to land. Boats can also be fitted with lightning protection to safely disperse the energy from a lightning strike into the water.
- If you are exposed to the elements with nowhere to shelter try to make yourself as small as possible by crouching down with your feet together, hands on knees and head tucked in. This technique keeps as much of you off the ground as possible as lightning will not necessary target the highest object in an area, but the object providing a path with the least resistant to ground. Try to do this in an area that provides the best protection for you, e.g. golfers who cannot make it back to the club house should move away from their clubs and into shallow ground like a sand bunker. DO NOT lie down and DO NOT stand in shallow water. If you feel your hair stand on end, drop into the position described above immediately. Your body contains a lot of moisture and is relatively a good conductor, it is therefore important to keep your feet together to minimize any current flow caused by radial energy from the strike zone passing through your body.
- Do NOT stand under tall or isolated trees. It has been estimated that 25% of people struck by lightning were so as a result of taking shelter under these types of trees. Trees contain about 20% moisture content compared with humans who have 65% moisture content. As lightning always takes the path of least resistance, you may become that path for any lightning jumps or radial energy from a strike.
- Before doing any activity which may leave you in exposed situation e.g. hill top walking, sailing, check the weather forecast. Try to avoid such activities if thunderstorms are predicted in the region of your activity.
- If you know a thunderstorm is predicted, learn what places in your area offer you the best protection before it arrives.
- When camping, avoid placing your tent at the highest point in the area, especially if thunderstorms are expected over night. If you are in a tent during a storm avoid touching or being close to tent poles if possible.
- Be aware of objects that can attract or conduct a lightning strike, if possible avoid touching or using such items and move away if necessary.eg. Inside: bathroom taps, central heating radiators, light switches, telephones, computer systems or any mains powered appliance. e.g. outside: umbrellas, metal fences, golf clubs, bikes, fishing rods, sailing boat masts, antennas.
- Be aware of any objects that can conduct electricity inside a building as these will provide an easy path for lightning to travel along on its way to ground. Buildings lightning protection systems are designed to migrate the immense current of a lightning strike away from a building's internal systems. Even with lightning protection installed it is advised you avoid using any electrical system unnecessarily e.g. your telephone (including mobiles), computers, television. Avoid touching any metal objects inside a building, e.g. Like metal pipe work, radiators, metal railing, unless your safety depends in it.



- During a thunderstorm it is advised you do not use any corded phones next to your ear. Especially if you are in a building that does not have satisfactory lightning protection installed to protect its occupants and communication equipment.
- Doctors advised people to stay off mobile phones during a thunderstorm. When struck by lightning your skin's high resistance will cause most of the charge to pass over the body in a process called "external flashover". Any skin in contact with liquids or metal objects, like a mobile phone, will encourage the charge from a lightning strike to enter and pass through the body instead of travelling its exterior as an "external flashover". As it travels through the body it causes major damage to internal organs on the way, more damage than occurs if it passes as an "external flashover".

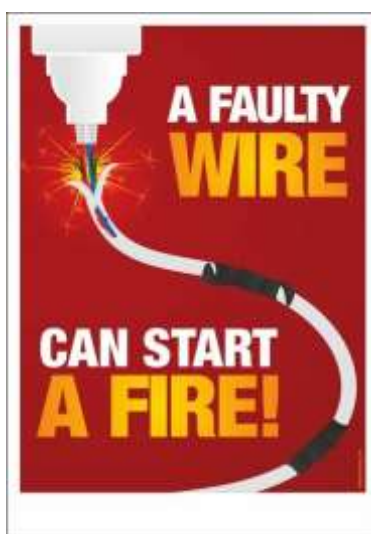
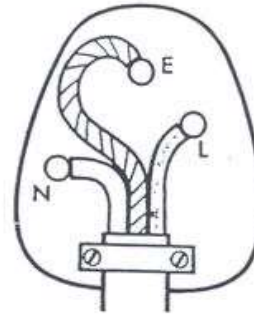
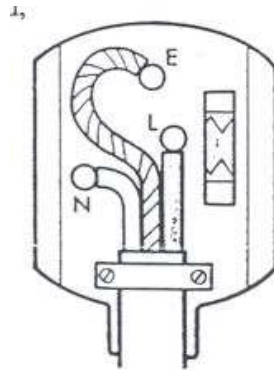
In Case of Emergency:-

If someone is hit by lightning, call emergency services immediately, as they will need help as soon as possible. Ensure your safety next by making sure the lightning strike has not placed you in any danger, or will put you in danger when you offer assistance. You will be less likely to help anyone if you also get injured yourself. If the only source of electricity was from the lightning strike you will not receive a electric shock from touching them. A lightning strike is not usually instantly fatal; however a victim's heart or breathing (or both) may have stopped. A quick assessment and possible application of CPR may be required to save their life. People who are struck by lightning often suffer from severe burns and shock, both must be treated for with extreme care

APPENDIX – 2: STICKERS & POSTERS FOR ELECTRICAL SAFETY

Stickers & Poster for Electrical safety

Photo: - Tag following types of stickers at relevant places.





10 RULES FOR WORKPLACE SAFETY

1. YOU ARE RESPONSIBLE FOR YOUR OWN SAFETY AND FOR OTHERS.
2. ALL ACCIDENTS ARE PREVENTABLE.
3. DO NOT TAKE SHORTCUTS, FOLLOW THE RULES.
4. USE THE RIGHT TOOLS AND EQUIPMENT'S AND USE THEM THE RIGHT WAY.
5. ASSESS THE RISK BEFORE YOU APPROACH THE WORK.
6. NEVER WEAR LOOSE FIT CLOTHES OR SLIPPERY FOOTWEAR AT WORKSTATION.
7. DO NOT INDULGE IN HORSEPLAY WHILE WORKING.
8. PRACTICE APPROPRIATE HOUSEKEEPING.
9. ALWAYS WEAR PPE KIT.
10. PROPERLY CLOSE ALL AVAILABLE DIRECT ACCESS TO LIVE PARTS AFTER COMPLETION OF WORK.



KANAK AUTOMATION

SAFETY STARTS WITH ME

1. Wear Safety Helmet [as per IS standard (IS 2925: 1984)]always at work.		2. Wear Protective Gloves [as per IS standard (IS 4770: 1991)]before work.	
3. Wear Safety Jacket [as per IS standard (IS 4501: 1981)]at work.		4. Wear Safety Shoes [as per IS standard (IS 15298 : 2002)]always at work.	
5. Wear Safety Belt and Harness [as per IS standard (IS 3521: 1999)]at work.		6. Wear Miner Safety Goggles [as per IS standard (IS 14352: 1996)]at work.	
7. Maintain First Aid Kit near to workstations.		8. Keep Co2 Fire Extinguishers near to workstations and check expiry dates.	

KANAK AUTOMATION

ELECTRICAL SAFETY MEASURES

 Pull the plug, not the wire.	 Don't expose wet hands to any live source.
 Be careful with conductor.	 Don't put pressure over improper socket.
 Don't overload any circuit.	 Replace and not repair any faulty wires, sockets, etc.

Your safety is important to us. Be careful and keep others safe.

BE SAFE WITH ELECTRICITY

BROKEN/LEAKED


ELECTROCUTION

SHORT CIRCUIT

ARC FLASH/BLAST

FIRE

EXPLOSIONS





APPENDIX – 3: LICENSE CERTIFICATE

ENERGY AUDITOR CERTIFICATE

Regn. No. EA-5166  No. 3098

National Productivity Council
(National Certifying Agency)
PROVISIONAL CERTIFICATE

This is to certify that Mr. / Ms. Rajesh Kumar Goyal
son / daughter of Mr. Shree Raghuber Dayal Gupta
has passed the National Certification Examination for Energy Auditors in November - 2007, conducted on behalf of the Bureau of Energy Efficiency, Ministry of Power, Government of India.

He / She is qualified as Certified Energy Manager as well as Certified Energy Auditor.

He / She shall be entitled to practice as Energy Auditor under the Energy Conservation Act 2001, subject to the fulfilment of qualifications for the Accredited Energy Auditor and issue of certificate of Accreditation by the Bureau of Energy Efficiency under the said Act.

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

Place : Chennai, India 
Controller of Examination

Date : 18th February 2008

राष्ट्रीय उत्पादकता परिषद
NATIONAL PRODUCTIVITY COUNCIL
Department of Industrial Policy & Promotion (DIPP)
Ministry of Commerce & Industry, Government of India.

 श्री अशोक मेनन
A. Ashok Menon, Joint Secretary (EC),
अणु-शक्ति - 800 006
Dr. ASHOKHAR INSTITUTE OF PRODUCTIVITY
8, ASHIM DAIRY ROAD, ANSATUR INDUSTRIAL ESTATE (NORTH)
AMBATTUR, CHENNAI - 600 086.

No. AIP / BEE / FC / 13
Date : 28th March 2013

Dear Candidates,

Sub : Issue of Certified Energy Manager Certificate to all qualified CEMs and CEAs
As directed by the Bureau of Energy Efficiency and as per the Gazette Notification dated 15-10-2010 (Certification Procedure for Energy Manager), please find enclosed certificate for 'Certified Energy Manager', which is being issued to all qualified CEAs and CEMs.


The Energy Auditor Certificate to all qualified CEA will be sent after the notification of the relevant Regulation under Clause 13(2)(f) of the EC Act (amended in 2010). Till that time provisional certificate issued by NPC to all Certified Energy Auditor is valid to meet all the statutory requirements.

Please acknowledge receipt.



Controller of Examination

Phone : 044-28291808, 38255216 Fax : 044-36254904, 38255012 E-mail : aipnpc@vsnl.com Website : www.aipnpc.com
Head Quarters : UTPADAKTA BHAVAN, LODI ROAD, NEW DELHI - 110 003.
Office at : Bangalore, Bhopal, Bhubaneswar, Kolkata, Chandigarh, Chennai, Gandhi Nagar, Guwahati, Hyderabad, Jaipur, Kanpur, Mumbai, Patna





BUREAU OF ENERGY EFFICIENCY



Examination Registration No. : **EA-5166** Serial Number: **4618**
 Certificate Registration No. : **4618**

Certificate For Certified Energy Manager

This is to certify that Mr./Mrs./Ms. **Rajesh Kumar Goyal** Son/Daughter of Mr./Mrs. **Shree Raghuber Dayal Gupta** who has passed the National Examination for certification of energy manager held in the month of **November 2007** is qualified as certified energy manager subject to the provisions of Bureau of Energy Efficiency (Certification Procedures for Energy Managers) Regulations, 2010.


This certificate shall be valid for five years with effect from the date of award of this certificate and shall be renewable subject to attending the prescribed refresher training course once in every five years.

His /Her name has been entered in the Register of certified energy manager at Serial Number **4618** being maintained by the Bureau of Energy Efficiency under the aforesaid regulations.


Mr./Mrs./Ms. **Rajesh Kumar Goyal** is deemed to have qualified for appointment or designation as energy manager under clause (f) of Section 14 of the Energy Conservation Act, 2001 (Act No.52 of 2001).


Given under the seal of the Bureau of Energy Efficiency, this **7th** day of **February, 2013**

Digitally Signed: RAKESH KUMAR RAI
Sun Mar 01 11:00:11 IST 2020
Secretary, BEE New Delhi




Secretary
Bureau of Energy Efficiency
New Delhi

Dates of attending the refresher course	Secretary's Signature	Dates of attending the refresher course	Secretary's Signature
15.12.2019			



ऊर्जा दक्षता ब्यूरो



परीक्षा रजिस्ट्रेशन सं. : **EA-5166** क्रम सं. **4618**
 प्रमाणपत्र रजिस्ट्रेशन सं. : **4618**

प्रमाणित ऊर्जा प्रबंधक के लिए प्रमाणपत्र


यह प्रमाणित किया जाता है कि श्री / श्रीमती / सुश्री **राजेश कुमार गोयल** जो श्री / श्रीमती **श्री रघुबीर दयाल गुप्त** के पुत्र / पुत्री हैं जिन्होंने वर्ष **2007** मास **नवंबर** में आयोजित ऊर्जा प्रबंधक प्रमाणन के लिए राष्ट्रीय परीक्षा उत्तीर्ण की है, ऊर्जा दक्षता ब्यूरो (ऊर्जा प्रबंधकों के लिए प्रमाणन प्रक्रिया) विनियम 2010 के उपबंधों के अधीन रहते हुए प्रमाणित ऊर्जा प्रबंधक के रूप में अर्हक हैं।

यह प्रमाणपत्र, प्रदान किए जाने की तारीख से पांच वर्षों के लिए विधिमाम्य होगा और प्रत्येक पांच वर्षों में एक बार विहित पुनर्चर्चा प्रशिक्षण पाठ्यक्रम में उपस्थित रहने के अधीन रहते हुए पुनः नवीकरण किया जाएगा। उनके नाम को पूर्वोक्त विनियमों के अधीन ऊर्जा दक्षता ब्यूरो द्वारा अद्वितीय क्रम संख्या **4618** पर प्रमाणित ऊर्जा प्रबंधक के रजिस्टर में प्रविष्ट कर दिया गया है।


श्री / श्रीमती / सुश्री **राजेश कुमार गोयल** ऊर्जा संरक्षण अधिनियम 2001 (2001 का अधिनियम संख्यांक 52) की धारा 14 के खंड (f) के अधीन ऊर्जा प्रबंधक के रूप में नियुक्ति या पदनाम के लिए अर्हक समझे गए हैं।

2013 मास **फरवरी** दिन **7** को ऊर्जा दक्षता ब्यूरो के अधीन दिया गया है।

Digitally Signed: RAKESH KUMAR RAI
Sun Mar 01 11:00:11 IST 2020
Secretary, BEE New Delhi



सचिव
ऊर्जा दक्षता ब्यूरो
नई दिल्ली

पुनर्चर्चा पाठ्यक्रम में उपस्थित रहने की तारीखें	सचिव के हस्ताक्षर	पुनर्चर्चा पाठ्यक्रम में उपस्थित रहने की तारीखें	सचिव के हस्ताक्षर
15.12.2019			



THANK YOU



**KANAK
AUTOMATION**

Our service speaks for itself

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2023



SHRI DIGAMBER JAIN ACHARYA SANSKRIT MAHAVIDYALAY

Virodaya Nagar, Jain Nasiyan road, Sanganer, Jaipur 302029



ENERGY AUDIT REPORT

Conducted By

KANAK AUTOMATION

ELECTRICAL CONSULTANT, CERTIFIED ENERGY AUDITOR FROM B.E.E.
"A" CLASS ELECTRICAL CONTRACTOR & CPRI APPROVED PANEL BUILDER

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48/71, MOTI PATH,
NEAR RAJAT PATH, MANSAROVAR, JAIPUR, RAJASTHAN 302020



ACKNOWLEDGEMENT

We express our sincere gratitude to the "Shri Digamber Jain Acharya Sanskrit Mahavidyalay" for giving us the opportunity for Energy Audit. We thankfully acknowledge the support and guidance provided by all concerned officials during the conduct of this exercise.

We are also thankful for their positive support in undertaking this intricate task of Audit. The field studies would not have been completed on time without their interaction and timely support. We are grateful for their co-operation during field studies and provision of data for the study.

"Shri Digamber Jain Acharya Sanskrit Mahavidyalay"

Shri N.K. Sethi	:-	President
Shri M.C. Jain	:-	Secretary
Dr. A.K. Jain	:-	Principal

M/s Kanak Automation: -

Er. Rajesh Kumar Goyal	:-	Electrical Consultant & Certified Energy Auditor
Mr. Sayantan Das	:-	B. Tech Electrical Engineer

Last but not the least we are thankful to all officers and employees with whom we interacted during the field studies for their wholehearted support in undertaking measurements and eagerness to assess the system / equipment efficiencies and saving potential.

We would like to specially acknowledge the support and co-operation extended to us during our visit by the staff.

For KANAK AUTOMATION



Authorized Signatory

Er. Rajesh Kumar Goyal

Electrical Consultant, Certified Energy Auditor from BEE (EA-5166)

Contact – 94140 70811

Dated: - 07th June 2023



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INTRODUCTION

ABOUT THE COLLEGE

Shri Digamber Jain Acharya Sanskrit Mahavidyalaya, Jaipur, is one of the oldest Institutions of Sanskrit Education in Rajasthan. Established before Independence in the year 1885, the Institution has never ceased to spawn literary luminaries, cultural icons and academic stalwarts. The College is located in the capital city of Rajasthan. The Institution is running under the aegis of Shri Digamber Jain Sanskrit Shiksha Samiti, a committee formed by the members of Jain society. Mr. N.K. Sethi, a retired IAS officer is presently the President of this committee. The Institution is set up with the aim of imparting education from XI to Ph.D. level.

The College is committed to the welfare of the student community as well as the larger society and every possible measure is taken to realize the objective.

The Electricity connection is taken from JVVNL 11KV pole, followed by HT metering Kiosk, RMU & transformer. DG set of capacity 125KVA is present.

The building has dedicated panels:

- Auto mains failure panel for total load
- Main distribution panel with bypass facility and APFC.
- Auditorium panel.
- Basement Admin building panel

All the panels in panel room are equipped with smart meters for monitoring and recording of electrical parameters including power quality.



ENERGY AUDIT

ENERGY AUDIT METHODOLOGY

The methodology adopted for this audit was formation of audit team comprises of Certified Energy Auditors who checked the connected load and performance assessment of the various electrical loads like lighting systems, coolers & fans, air conditioners, etc.

Following activities are used:

- A. Visual inspection and data collection
- B. Observations on the general condition of the facility and equipment and quantification
- C. Identification / verification of energy Usage and other parameters by measurements
- D. Detailed calculations, analyses and assumptions
- E. Validation
- F. Potential energy saving opportunities

**EXECUTIVE SUMMARY****OBSERVATION****BUILDING CONNECTED LOAD**

S.NO	DESCRIPTION	Qty.	Unit KW	Total Load
1	LED Lights	300	0.015	4.5
2	Tube light	10	0.04	0.4
3	Fan	40	0.06	2.4
4	water Cooler	2	0.5	1
5	Deseret Cooler	4	0.25	1
6	Lift	1	5	5
7	Air Conditioner Load	1	60	60
8	Water Pump Load	2	1	2
9	Power Plug	30	0.5	15
10	Auditorium light load	15	1	15
	Total Connected Load			106.3
	Overall Diversity @60%			63.78
	KVA Rating K.W/P.F(0.9)			70.87
	Add 15% extra Load for future			10.63
	Total KVA			81.50
	Size of Transformer			160KVA

Year	Energy Consumption/Year (KWH)	Max Demand consumption/ year LOAD (KW)@0.878 PF	SPECIFIC ENERGY CONSUPTION (KWH/KW)
2022-23	22528.95	47.1	478.32

Average working hours in 08 Hours /day.

TRANSFORMER NAMEPLATE DETAILS

Make – Uttam (Bharat) Electricals Private Limited

- KVA: **160**
- Volts: HV – 11 KV, LV – 0.433 KV
- Ampere: HV – 8.40 A, LV – **213.34 A**
- Impedance volt: 4.5%
- Tapings: OFF load tap Changeover
- Frequency: 50Hz
- Type of cooling: ONAN
- Serial no.: 230172
- Winding: Aluminium
- EEL: Level Two



RECOMMENDATION

- ✓ Eliminate or reduce reheat whenever possible before operating HVAC systems.
- ✓ Clean HVAC unit coils and fins periodically, reduce humidification or dehumidification where possible.
- ✓ Do not oversize cooling units, conduct heat load study before installation.
- ✓ Put HVAC units on timers and seal all leaky areas.
- ✓ Replace single-pane glass with insulating glass. Use landscaping to advantage.
- ✓ Recommend to install Solar of minimum capacity 30KW.
- ✓ Use BLDC fans in all classrooms to optimize the motor speed and conserve electricity, resulting up to 50% as compared to regular fans.
- ✓ Provide training to staff and faculty members to sue natural cooling inside classrooms and switch off equipment's when not in use. Consider day lighting.
- ✓ Admin building panel room is filled with waste, no source of light for illumination during maintenance work. Clean the unwanted waster from in front of the panel.
- ✓ Optimize DG Set loading.
Install 05KVA Online UPS with 01hour backup for Admin load to cope with the frequent power cuts and refrain from using DG set for small load.
- ✓ **Active Dynamic VAR Compensator** needs to be installed on this feeder of minimum capacity **30KVAR, 415 Volt, three-layer topology** for improving both power factor and limiting the harmonic content in the system. It will reduce Harmonics levels and improve power factor with power quality of the system, thereby increasing the **life & performance of the system.**

**ELECTRICITY BILL ANALYSIS**

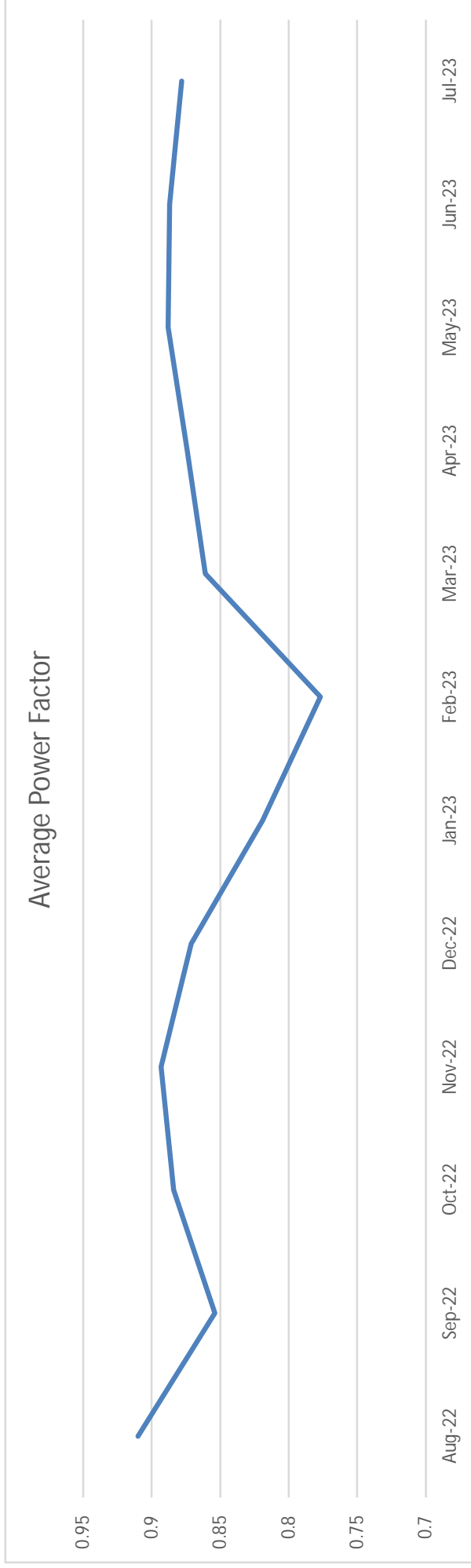
Analysis of total load for the period of 01year.

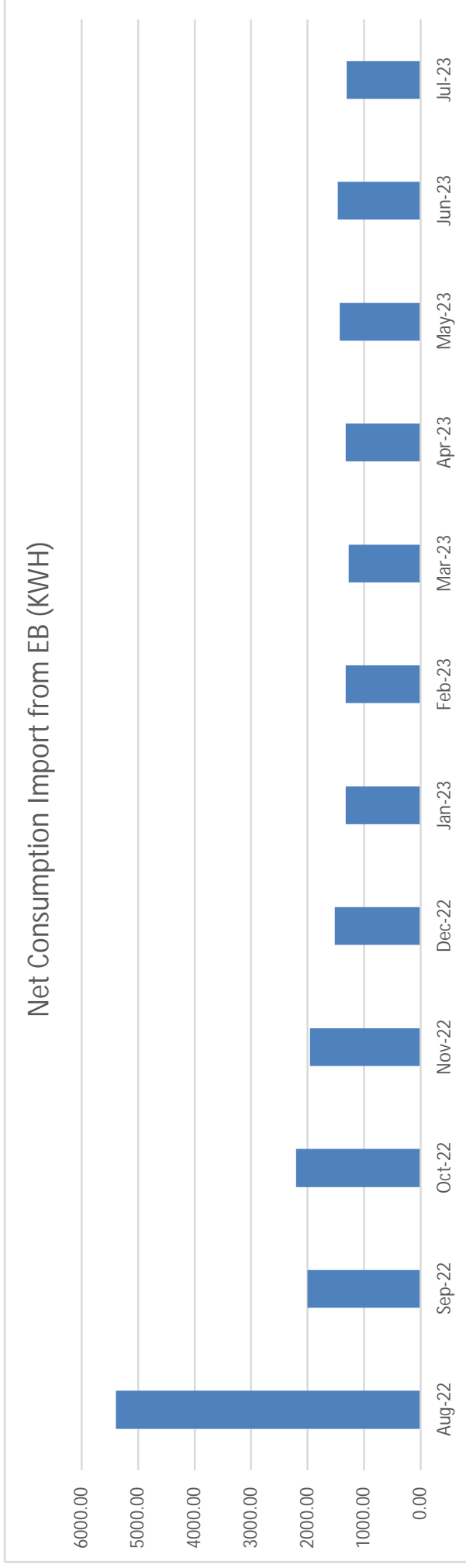
Name & address of Consumer:																	
Digamber Jain Sanskrit Shiksha Samiti																	
Jain nasiya road																	
Sr. no.	Month	Previous Consumption Import from EB (KWH)	Current Consumption Import from EB (KWH)	Net Consumption Import from EB (KVA)/MDI	Net Consumption Import from EB (KVAH)	Average Power Factor	MF	Consumption [KWH] (As per Ledger)	A	B	C	E	G	H	I	Sum (A to I)	
									Electricity Charges (Rs.)	Fixed Charges (Rs.)	Fuel surcharge (Rs.)	Power factor surcharge/inc entive (Rs.)	Electricity Duty (Rs.)	Urban cess (Rs.)	Water Conservati on Cess (Rs.)	Arrears (Rs.)	Electricity Bill Amount (Rs.)
1	Aug-22	0.00	5389.60	61.50	8923.13	0.91	1.5	8084.40	71546.94	16605	959.3	0	3234.16	1212.81	808.54	0.00	94366.75
2	Sep-22	5389.60	7390.20	72.00	3513.75	0.854	1.5	3000.90	26557.97	19440	819.6	1221.67	1200.36	450.14	300.09	0.00	49989.83
3	Oct-22	7390.20	9598.00	63.15	3742.50	0.884	1.5	3311.70	29308.55	17050.5	468.44	468.94	1324.68	496.75	331.17	0.00	49449.03
4	Nov-22	9598.00	11557.35	74.70	3287.55	0.893	1.5	2939.03	26010.37	20169	859.99	182.07	1175.61	440.85	293.9	0.00	49131.79
5	Dec-22	11557.35	13079.05	1521.70	2620.05	0.871	1.5	2282.55	20200.57	17415	859.99	585.82	913.02	342.38	228.26	0.00	40545.04
6	Jan-23	13079.05	14408.00	1328.95	2432.33	0.819	1.5	1993.43	17641.81	17415	468.44	1428.99	797.37	299.01	199.34	0.00	38249.96
7	Feb-23	14408.00	15734.35	1326.35	2557.73	0.777	1.5	1989.53	17607.30	17415	468.44	2165.7	795.81	298.43	198.95	0.00	38949.63
8	Mar-23	15734.35	17006.70	1272.35	2215.28	0.861	1.5	1908.53	16890.45	17415	468.44	658.73	763.41	286.28	190.85	0.00	36673.16
9	Apr-23	17006.70	18327.35	1320.65	2264.85	0.874	1.5	1980.98	17531.63	17415	2590	455.82	792.39	297.15	198.1	0.00	39280.09
10	May-23	18327.35	19761.35	1434.00	2420.48	0.888	1.5	2151.00	19036.35	17415	1799.54	228.52	860.70	525.95	215.18	0.00	40081.24
11	Jun-23	19761.35	21223.80	1462.45	2469.98	0.887	1.5	2193.68	19414.02	17415	5918.04	252.3	877.17	328.94	219.29	0.00	44424.76
12	Jul-23	21223.80	22528.95	1305.15	2229.15	0.878	1.5	1957.73	17325.87	17415	468.44	381.17	783.09	293.66	195.77	0.00	36863.00
									299071.8	212584.5			8029.7	13517.8	5272.4	3379.4	558004.3

- You have paid Rs. 8029.7 in penalty to JVVNL for power factor.
- Demand rise of 72KVA due to use of auditorium for September 2022 & November 2022.
- Maximum demand reached after that is 47.1KVA.
- Average monthly net KWH consumption is 1500 units.



GRAPHICAL REPRESENTATION:





**EARTH RESISTANCE**

Sr. No.	Description	Connected to	Earth Value	Remarks
1.	HT METERING CUBICLE	Body 1	0.92Ω	Ok
2.		Body 2	0.99Ω	Ok
3.	RMU	Body 1	0.85Ω	Ok
4.		Body 2	1.1Ω	Ok
5.	TRANSFORMER	Body 1	0.96Ω	Ok
6.		Body 2	1.35Ω	Ok
7.		Neutral	1.23Ω	Ok
8.	AMF PANEL	Body	1.86Ω	Ok
9.	LT DISTRIBUTION PANEL	Body	1.46Ω	Ok
10.	AUDITORIUM PANEL	Body	1.08Ω	Ok
11.	DG SET	Body 1	1.35Ω	Ok
12.		Body 2	1.9Ω	Ok
13.		Neutral	1.98Ω	Ok

Note:

- Use earthing mat in front of panels in LT panel room and basement panel of admin building.
- Keep panel room dust free.
- Do not allow untrained electricians or personnel to enter into the panel rooms.

SAFETY**ACCIDENT PREVENTION METHODS:****General observations on accidents:**

1. Accidents are caused they do not happen.
2. If proper attention is given to the safety aspects and the laid down procedure, majority accidents and consequential damages to the personnel and property can be avoided.
3. Safety is studied at the start of training and forgotten subsequently.
4. Safe work practices have not been accepted to be a force habit.
5. Laxity on the part of personnel actually engaged in the work.
6. Not following safety instructions.
7. Complacent approach of supervisory personnel.
8. Non availability and improper maintenance of safety gadgets.

Causes of accidents:

1. Snapping of Conductors.
2. Accidental contact with live electric wire / equipment.
3. Violation / neglect of safety measures / lack of supervisions.
4. Defective appliances / apparatus / tools.
5. Inadequate / lack of maintenance.
6. Unauthorized work / Sub-standard construction.



TIPS FOR ENERGY EFFICIENCY IN ELECTRICAL UTILITIES

DG SETS:-

1. Use jacket and heat cooling water for process needs
2. Clean air filters regularly
3. Maintain diesel engines regularly.
4. A poorly maintained injection pump increases fuel consumption by 4Gms/KWH.
5. A faulty nozzle increases fuel consumption by 2Gms/KWH.
6. Blocked filters increase fuel consumption by 2Gms/KWH.
7. A continuously running DG set can generate 0.5 Ton/Hr of steam at 10 to 12 bars from the residual heat of the engine exhaust per MW of the generator capacity.
8. Measure fuel consumption per KWH of electricity generated regularly. Take corrective action in case this shows a rising trend

Buildings:

1. Seal exterior cracks/openings/gaps with caulk, gas kiting, weather-stripping, etc.
2. Consider new thermal doors, thermal windows, roofing insulation, etc.
3. Install windbreaks near exterior doors.
4. Replace single-pane glass with insulating glass.
5. Consider covering some window and skylight areas with insulated wall panels inside the building.
6. If visibility is not required but light is required, consider replacing exterior windows with insulated Glass block.
7. Consider tinted glass, reflective glass, coatings, awnings, overhangs, draperies, blinds, and Shades for sunlit exterior windows
8. Use landscaping to advantage.
9. Add vestibules or revolving doors to primary exterior personnel doors.
10. Consider automatic doors, air curtains, strip doors, etc. at high-traffic passages between Conditioned and non-conditioned spaces. Use self-closing doors if possible
11. Use intermediate doors in stairways and vertical passages to minimize building stack effect
12. Use dock seals at shipping and receiving doors.

Lighting:

1. Reduce excessive illumination levels to standard levels using switching.
2. Aggressively control lighting with clock timers, delay timers, photocells, and / or occupancy sensors.
3. Install efficient alternatives to incandescent lighting, mercury vapor lighting, etc.
4. 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.
5. Select ballasts and lamps carefully with high power factor and long-term efficiency in mind.
6. Upgrade obsolete fluorescent systems to compact fluorescents and electronic ballasts
7. Consider day lighting, skylights, etc.
8. Consider painting the walls a lighter color and using less lighting fixtures or lower wattages.
9. Use task lighting and reduce background illumination.
10. Re-evaluate exterior lighting strategy, type and control. Control it aggressively.
11. Change exit signs from incandescent to LED.
12. Consider using high-intensity discharge (also called HID) or low - pressure sodium lights.
13. Turn off decorative outdoor natural gas lamps; just eight such lamps burning year-round use as much natural gas as it takes to heat an average-size home during an entire winter.
14. Use outdoor lights with a photocell unit or a motion sensor so they will turn on only at night or when someone is present. A combined photocell and motion sensor will increase your energy savings even more.



15. Take advantage of daylight by using light-colored, loose-weave curtains on your windows to allow daylight to penetrate the room while preserving privacy. Also, decorate with lighter colors that reflect daylight.
16. Use LEDs in all the portable table and floor lamps in your home & office.
17. Consider three-way lamps; they make it easier to keep lighting levels low when brighter light is not necessary.
18. Use task lighting; instead of brightly lighting an entire room, focus the light where you need it. For example, use fluorescent under-cabinet lighting for kitchen sinks and countertops under cabinets.
19. Turn off the lights in any room you're not using, or consider installing timers, photocells, or occupancy sensors to reduce the amount of time your lights are on.
20. Install task lighting – such as under-counter kitchen lights or bathroom mirror lights – to reduce the need for ambient lighting of large spaces.
21. Use dimmers, motion sensors, or occupancy sensors to automatically turn on or off lighting as needed and prevent energy waste.
22. Use ENERGY STAR® labelled lighting fixtures.
23. Consider light wall colours to minimize the need for artificial lighting.
24. Turn your lights off when you leave a room. Standard, incandescent light bulbs should be turned off whenever they are not needed. Fluorescent lights should be turned off whenever you'll be away for 15 minutes or more.
25. During winter, open curtains on your south-facing windows during the day to allow sunlight to naturally heat your home, and close them at night to reduce the chill you may feel from cold windows
26. Installing a skylight can provide your home with day lighting and warmth. When properly selected and installed, an energy - efficient skylight can help minimize your heating, cooling, and lighting costs.



APPENDIX – 1: LIGHTNING PROTECTION SYSTEM OF BUILDING

Lightning Protection System (LPS)

A Lightning Protection System (LPS) is designed to protect a structure or building and contents from damage caused by the intensely high voltage currents of a lightning strike (often exceeding a 1,000,000,000 Volt Amps). Lightning protection systems act like a Faraday Cage for buildings. Protecting the building and its contents from external electric fields by migrating that energy around the cage instead of through its contents. A lightning protection system offers a lightning strike a low resistance path to ground where the enormous energy is then safely dispersed. A typical lightning protection system includes lightning rods, metal conductors and ground electrodes designed to offer a low resistance path to ground and to take any high voltage currents from a lightning strike away from the structure of the building.

The low resistant path offered by a lightning protection system is very important as high voltage currents from a lightning strike will always take a path of least resistance to ground.

Without lightning protection any grounded object that provides a path to earth will emit fingers of electrical charge called positive streamers upwards into the sky. These positive streamers intercept the downward negative leaders from a thunder storm so creating a channel of plasma air for the giant voltage currents of a lightning strike to travel along. If the grounded object is a building the high voltage currents will then travel along any low resistant paths within that building's structure causing heat damage. Lightning energy may even jump through the air to reach a better conductive path.

With a lightning protection system, lightning rods or air terminals are strategically sited on a structure to increase the chances of intercepting a lightning strike before it hits the property being protected. The highly conductive lightning rods of a lightning protection system are normally made of copper or aluminum and are designed to emit positive streamers into the air instead of the structure they are protecting. These positive streamers from the rods intercept the negative leaders of a lightning strike drawing the high voltage currents safely into the lightning protection system and away from the building's structure. A lightning protection system significantly increases a building safekeeping from the damage caused by lightning and not its probability of being struck.

Lightning can be unpredictable and a well-designed lightning protection system will take this into consideration. It will be designed so even if lightning does strike the building's structure first, its large voltage currents will be drawn into the lightning protection system before any serious damage or harm can be done. It will be designed to draw the huge energy away from parts of the building not able to safely carry such large current loads, while at the same time safely utilizing other parts that can. Some buildings require a large re-enforced metal framework in their construction. If suitable additional grounding can be provided at its base so it can be utilized as a low resistance conductor able to carry large currents safely to earth.

Roof Damage Caused By A Lightning Strike:-

Without a lightning protection system structural materials of a building that share the immense loads from lightning strike can be damaged and this damage is not always immediately apparent. If there is no low resistance path offered by a lightning protection system the high voltage current from a strike will divide to follow every conductive path to ground it can find. The extremely large voltage currents will pass through materials normally considered insulators instantly generating large amounts of heat. Due to rapid heating any porous materials like masonry can shatter violently as the air inside it expands with supersonic speed. Any materials containing moisture from humidity or rain can explode with even more volatility as its water content is flashed to steam. Other materials may suffer different forms of heat damage, become melted or even burst into flames. These events can cause secondary damage to the building's human inhabitants or contents.

A correctly installed lightning protection system will be designed to prevent "side-flashes" to and from highly conductive parts of the building. High voltage currents travelling through the bonding conductor of a lightning protection system can create large electric potentials when compared to objects near to the



bonding conductor. Side jumps to and from objects of different potential can cause damage and fire hazards especially if the building houses flammable or explosive materials. This can be avoided by maintaining the electrical continuity of such objects to a bonding conductor so zeroing any potential difference and allowing any voltage changes to occur in tandem.

Proper grounding is essential for efficiently and safely dispersing the large amounts of energy from a lightning strike. Failure to provide adequate grounding will cause a lightning protection system to be ineffective resulting in property damage and risk to human life. Standard earthing provided to a building by a utility supplier is not satisfactory for grounding a lightning protection system. Different techniques or additional earthing is used to ensure a lightning protection system has strong electrical connection to ground. These include using additional grounding rods, plates, meshes or an Upper Grounding system (concrete earthing plate with an embedded steel conductor).

Is Lightning Protection Still As Important Today As It Used To Be:-

It is even more important today than it used to be. Today's competitive businesses are demanding more sophisticated electrical systems and communication infrastructures. A lightning strike to an unprotected building today can cause greater destruction even if it is not visually apparent like structural damage or fire. Even an indirect lightning strike on a building or nearby utility can cause thousands of rupees of damage as its current radiates out from the strike zone.

With the global climate also changing, it is predicted that India will experience more thunderstorms and lightning strikes in the future.

British Standards used within our lightning protection services B.S.6651:- Lightning Conductors

Lightning Safety:-

There are three different ways of being struck by lightning:

1. Direct strike: *the lightning hits you and goes to earth through you.*
2. Jumped: *the lightning hits another object and jumps sideways to hit you.*
3. Ground strike: *the lightning strikes the ground then travels through it hitting you on the way.*

30/30 Rule:-

Research indicates that people are typically struck by lightning when they think they are safe from the peak effects of a thunderstorm. This is normally just before and just after a thunderstorm passes. When a thunderstorm is observed, think about its proximity, the possibility of a lightning strike and not the occurrence of rain. Using the following 30/30 rule is a good way of improving your level of personal safety during a thunderstorm. If the length between the lightning flash and the sound of thunder is 30 seconds in length or less (i.e. less than 6 miles away) you should seek shelter immediately. Lightning has been estimated to travel over 10 miles through the air. Staying inside shelter is also advised until 30 minutes after the last thunder clap has been heard. By doing this you are reducing the risk of being struck at the beginning of the storm or from the trailing end of the storm as it passes.

Improving Your Safety during A Thunder Storm:-

- Seek shelter inside a large building, preferably one with a lightning protection system installed.
- Get inside a motor vehicle, (avoiding soft top convertibles). Cars are safer than standing outside due to the metal body of the car acting as a Faraday Cage conducting the electricity away from you before it is safety earthed to the ground through the tyres. Tyres are not good insulators when considering the enormous high voltage currents from a lightning strike.
- Move away from wide open spaces or exposed hilltops.



- If you are in water, get onto land or a boat as quickly as possible. The impurities in water can transmit the damaging effects from a lightning strike further away.
- Move away from the open space of the shore or beach. Studies have shown that proximity to water is a common factor in lightning strikes.
- If you are on a large enough boat or water vessels with a cabin, take shelter inside if you cannot make it to safety on shore. If you are in an open top boat, keep as low as possible in while making your way safely to land. Boats can also be fitted with lightning protection to safely disperse the energy from a lightning strike into the water.
- If you are exposed to the elements with nowhere to shelter try to make yourself as small as possible by crouching down with your feet together, hands on knees and head tucked in. This technique keeps as much of you off the ground as possible as lightning will not necessary target the highest object in an area, but the object providing a path with the least resistant to ground. Try to do this in an area that provides the best protection for you, e.g. golfers who cannot make it back to the club house should move away from their clubs and into shallow ground like a sand bunker. DO NOT lie down and DO NOT stand in shallow water. If you feel your hair stand on end, drop into the position described above immediately. Your body contains a lot of moisture and is relatively a good conductor, it is therefore important to keep your feet together to minimize any current flow caused by radial energy from the strike zone passing through your body.
- Do NOT stand under tall or isolated trees. It has been estimated that 25% of people struck by lightning were so as a result of taking shelter under these types of trees. Trees contain about 20% moisture content compared with humans who have 65% moisture content. As lightning always takes the path of least resistance, you may become that path for any lightning jumps or radial energy from a strike.
- Before doing any activity which may leave you in exposed situation e.g. hill top walking, sailing, check the weather forecast. Try to avoid such activities if thunderstorms are predicted in the region of your activity.
- If you know a thunderstorm is predicted, learn what places in your area offer you the best protection before it arrives.
- When camping, avoid placing your tent at the highest point in the area, especially if thunderstorms are expected over night. If you are in a tent during a storm avoid touching or being close to tent poles if possible.
- Be aware of objects that can attract or conduct a lightning strike, if possible avoid touching or using such items and move away if necessary.eg. Inside: bathroom taps, central heating radiators, light switches, telephones, computer systems or any mains powered appliance. e.g. outside: umbrellas, metal fences, golf clubs, bikes, fishing rods, sailing boat masts, antennas.
- Be aware of any objects that can conduct electricity inside a building as these will provide an easy path for lightning to travel along on its way to ground. Buildings lightning protection systems are designed to migrate the immense current of a lightning strike away from a building's internal systems. Even with lightning protection installed it is advised you avoid using any electrical system unnecessarily e.g. your telephone (including mobiles), computers, television. Avoid touching any metal objects inside a building, e.g. Like metal pipe work, radiators, metal railing, unless your safety depends in it.
- During a thunderstorm it is advised you do not use any corded phones next to your ear. Especially if you are in a building that does not have satisfactory lightning protection installed to protect its occupants and communication equipment.



- Doctors advised people to stay off mobile phones during a thunderstorm. When struck by lightning your skin's high resistance will cause most of the charge to pass over the body in a process called "external flashover". Any skin in contact with liquids or metal objects, like a mobile phone, will encourage the charge from a lightning strike to enter and pass through the body instead of travelling its exterior as an "external flashover". As it travels through the body it causes major damage to internal organs on the way, more damage than occurs if it passes as an "external flashover".

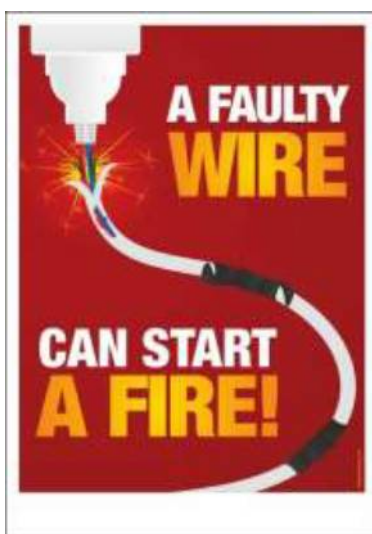
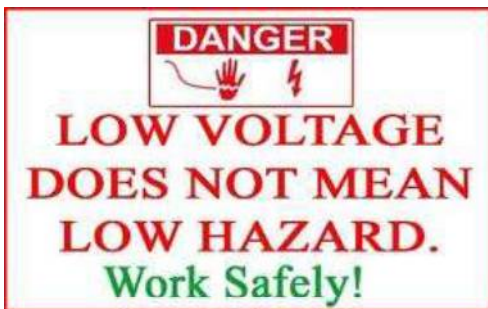
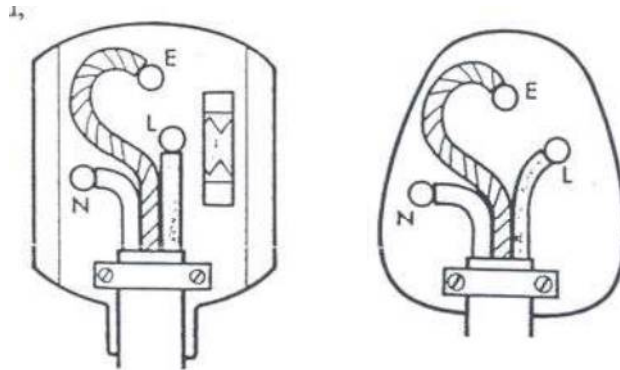
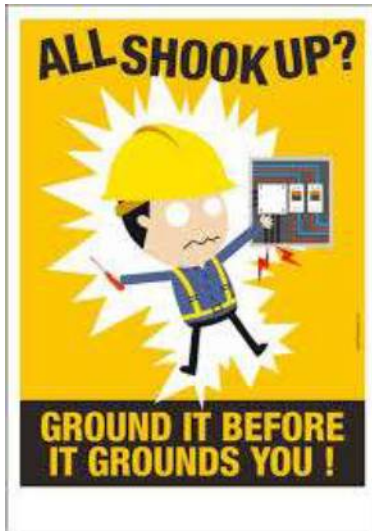
In Case of Emergency:-

If someone is hit by lightning, call emergency services immediately, as they will need help as soon as possible. Ensure your safety next by making sure the lightning strike has not placed you in any danger, or will put you in danger when you offer assistance. You will be less likely to help anyone if you also get injured yourself. If the only source of electricity was from the lightning strike you will not receive a electric shock from touching them. A lightning strike is not usually instantly fatal; however a victim's heart or breathing (or both) may have stopped. A quick assessment and possible application of CPR may be required to save their life. People who are struck by lightning often suffer from severe burns and shock, both must be treated for with extreme care

APPENDIX – 2: STICKERS & POSTERS FOR ELECTRICAL SAFETY

Stickers & Poster for Electrical safety

Photo: - Tag following types of stickers at relevant places.





10 RULES FOR WORKPLACE SAFETY

1. YOU ARE RESPONSIBLE FOR YOUR OWN SAFETY AND FOR OTHERS.
2. ALL ACCIDENTS ARE PREVENTABLE.
3. DO NOT TAKE SHORTCUTS, FOLLOW THE RULES.
4. USE THE RIGHT TOOLS AND EQUIPMENT'S AND USE THEM THE RIGHT WAY.
5. ASSESS THE RISK BEFORE YOU APPROACH THE WORK.
6. NEVER WEAR LOOSE FIT CLOTHES OR SLIPPERY FOOTWEAR AT WORKSTATION.
7. DO NOT INDULGE IN HORSEPLAY WHILE WORKING.
8. PRACTICE APPROPRIATE HOUSEKEEPING.
9. ALWAYS WEAR PPE KIT.
10. PROPERLY CLOSE ALL AVAILABLE DIRECT ACCESS TO LIVE PARTS AFTER COMPLETION OF WORK.





KANAK AUTOMATION

SAFETY STARTS WITH ME

1. Wear Safety Helmet [as per IS standard (IS 2925: 1984)]always at work.		2. Wear Protective Gloves [as per IS standard (IS 4770: 1991)]before work.	
3. Wear Safety Jacket [as per IS standard (IS 4501: 1981)]at work.		4. Wear Safety Shoes [as per IS standard (IS 15298 : 2002)]always at work.	
5. Wear Safety Belt and Harness [as per IS standard (IS 3521: 1999)]at work.		6. Wear Miner Safety Goggles [as per IS standard (IS 14352: 1996)]at work.	
7. Maintain First Aid Kit near to workstations.		8. Keep Co2 Fire Extinguishers near to workstations and check expiry dates.	

KANAK AUTOMATION

ELECTRICAL SAFETY MEASURES

 Pull the plug, not the wire.	 Don't expose wet hands to any live source.
 Be careful with conductor.	 Don't put pressure over improper socket.
 Don't overload any circuit.	 Replace and not repair any faulty wires, sockets, etc.

Your safety is important to us. Be careful and keep others safe.

BE SAFE WITH ELECTRICITY

BROKEN/LEAKED

ELECTROCUTION

SHORT CIRCUIT

ARC FLASH/BLAST

FIRE

EXPLOSIONS



APPENDIX – 3: LICENSE CERTIFICATE

ENERGY AUDITOR CERTIFICATE

Regn. No. EA-5166  No. 3098

National Productivity Council
(National Certifying Agency)
PROVISIONAL CERTIFICATE

This is to certify that Mr. / Ms. Rajesh Kumar Goyal
son / daughter of Mr. Shree Raghuber Dayal Gupta
has passed the National Certification Examination for Energy Auditors in November - 2007, conducted on behalf of the Bureau of Energy Efficiency, Ministry of Power, Government of India.

He / She is qualified as Certified Energy Manager as well as Certified Energy Auditor.

He / She shall be entitled to practice as Energy Auditor under the Energy Conservation Act 2001, subject to the fulfillment of qualifications for the Accredited Energy Auditor and issue of certificate of Accreditation by the Bureau of Energy Efficiency under the said Act.

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

Place : Chennai, India 
Controller of Examination

Date : 18th February 2008

சென்னை உற்பத்தியூக்கல் மையம்
राष्ट्रीय उत्पादकता परिषद
NATIONAL PRODUCTIVITY COUNCIL
(Department of Industrial Policy & Promotion (DIPP),
Ministry of Commerce & Industry, Government of India)



சென்னை உற்பத்தியூக்கல் மையம்
E. டீபாக் சாலை, அமைதி பூங்கா வீதி (நகர்),
அமைதி பூங்கா - 600 036
Dr. AMBAKAR INSTITUTE OF PRODUCTIVITY
E. AMIN SARDAR ROAD, AMBATTUR INDUSTRIAL ESTATE (NORTH),
AMBATTUR, CHENNAI - 600 086

No. AIP / BEE / FC / 13
Date : 28th March 2013

Dear Candidate,

Sub : Issue of Certified Energy Manager Certificate to all qualified CEMs and CEAs
As directed by the Bureau of Energy Efficiency and as per the Gazette Notification dated 15-10-2010 (Certification Procedure for Energy Manager), please find enclosed certificate for "Certified Energy Manager", which is being issued to all qualified CEAs and CEMs.


The Energy Auditor Certificate to all qualified CEA will be sent after the notification of the relevant Regulation under Clause 13(2)(f) of the EC Act (amended in 2010). Till that time provisional certificate issued by NPC to all Certified Energy Auditor is valid to meet all the statutory requirements.

Please acknowledge receipt.



Controller of Examination

Phone : 044-26291808, 26253216 Fax : 044-26254904, 26255013 E-mail : apnpc@vsnl.com Website : www.apnpc.com
Head Quarters : UTPADAKTA BHAVAN, LODI ROAD, NEW DELHI - 110 003.
Office at : Bangalore, Bhopal, Bhubaneswar, Kolkata, Chandigarh, Chennai, Gandhi Nagar,
Durgamchilli, Hyderabad, Jaipur, Kanpur, Mumbai, Patna





BUREAU OF ENERGY EFFICIENCY



Examination Registration No. : **EA-5166** Serial Number **4618**
 Certificate Registration No. : **4618**

Certificate For Certified Energy Manager

This is to certify that Mr./Mrs./Ms. **Rajesh Kumar Goyal** Son/Daughter of Mr./Mrs. **Shree Raghuber Dayal Gupta** who has passed the National Examination for certification of energy manager held in the month of **November 2007** is qualified as certified energy manager subject to the provisions of Bureau of Energy Efficiency (Certification Procedures for Energy Managers) Regulations, 2010.


This certificate shall be valid for five years with effect from the date of award of this certificate and shall be renewable subject to attending the prescribed refresher training course once in every five years.

His /Her name has been entered in the Register of certified energy manager at Serial Number **4618** being maintained by the Bureau of Energy Efficiency under the aforesaid regulations.


Mr./Mrs./Ms. **Rajesh Kumar Goyal** is deemed to have qualified for appointment or designation as energy manager under clause (f) of Section 14 of the Energy Conservation Act, 2001 (Act No 52 of 2001).


Given under the seal of the Bureau of Energy Efficiency, this **7th** day of **February, 2013**

Digitally Signed: RAKESH KUMAR RAI
 Sat Mar 01 11:00:11 IST 2020
 Secretary, BEE New Delhi




Secretary
 Bureau of Energy Efficiency
 New Delhi

Dates of attending the refresher course	Secretary's Signature	Dates of attending the refresher course	Secretary's Signature
15.12.2019			



ऊर्जा दक्षता ब्यूरो



परीक्षा रजिस्ट्रेशन सं. : **EA-5166** प्रम सं. **4618**
 प्रमाणपत्र रजिस्ट्रेशन सं. : **4618**

प्रमाणित ऊर्जा प्रबंधक के लिए प्रमाणपत्र


यह प्रमाणित किया जाता है कि श्री / श्रीमती / सु. **राजेश कुमार गोयल** जो श्री / श्रीमती **श्री रघुबीर दयाल गुप्त** के पुत्र / पुत्री हैं जिन्होंने वर्ष **2007** मास **नवंबर** में आयोजित ऊर्जा प्रबंधक प्रमाणन के लिए राष्ट्रीय परीक्षा उत्तीर्ण की है, ऊर्जा दक्षता ब्यूरो (ऊर्जा प्रबंधकों के लिए प्रमाणन प्रक्रिया) विनियम 2010 के उपबंधों के अधीन रहते हुए प्रमाणित ऊर्जा प्रबंधक के रूप में अर्हक हैं।

यह प्रमाणपत्र, प्रदान किए जाने की तारीख से पांच वर्षों के लिए विधिवान्मय होगा और प्रत्येक पांच वर्षों में एक बार विहित पुनर्धर्मा कार्यक्रम में उपस्थित रहने के अधीन रहते हुए पुनः नवीकरण किया जाएगा। उनके नाम को पूर्वोक्त विनियमों के अधीन ऊर्जा दक्षता ब्यूरो द्वारा अनुसूचित क्रम संख्या **4618** पर प्रमाणित ऊर्जा प्रबंधक के रजिस्टर में प्रविष्ट कर दिया गया है।


श्री / श्रीमती / सु. **राजेश कुमार गोयल** ऊर्जा संरक्षण अधिनियम 2001 (2001 का अधिनियम संख्याक 52) की धारा 14 के खंड (f) के अधीन ऊर्जा प्रबंधक के रूप में नियुक्ति या पदनाम के लिए अर्हित समझे गए हैं।

2013 मास **फरवरी** दिन **7** को ऊर्जा दक्षता ब्यूरो के अधीन दिया गया है।

Digitally Signed: RAKESH KUMAR RAI
 Sat Mar 01 11:00:11 IST 2020
 Secretary, BEE New Delhi



सचिव
 ऊर्जा दक्षता ब्यूरो
 नई दिल्ली

पुनर्धर्मा कार्यक्रम में उपस्थित रहने की तारीखें	सचिव के हस्ताक्षर	पुनर्धर्मा कार्यक्रम में उपस्थित रहने की तारीखें	सचिव के हस्ताक्षर
15.12.2019			



THANK YOU



**KANAK
AUTOMATION**

Our service speaks for itself

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GREEN AUDIT REPORT

FOR



SHRI DIGAMBER JAIN ACHARYA SANSKRIT MAHAVIDYALAY

Virodaya nagar, Jain Nasiyan road,
, Jaipur, Rajasthan 302029

Date of Submission: July 03rd, 2024

BY

KANAK AUTOMATION
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ACKNOWLEDGEMENT

We express our sincere gratitude to the “Shri Digamber Jain Acharya Sanskrit Mahavidyalay” for giving us the opportunity for Green Audit. We thankfully acknowledge the support and guidance provided by all concerned officials during the conduct of this exercise.

We are also thankful for their positive support in undertaking this intricate task of Audit. The field studies would not have been completed on time without their interaction and timely support. We are grateful for their co-operation during field studies and provision of data for the study.

“Shri Digamber Jain Acharya Sanskrit Mahavidyalay”

Shri N.K. Sethi	:-	President
Shri M.C. Jain	:-	Secretary
Dr. A.K. Jain	:-	Principal

M/s Kanak Automation: -

Er. Rajesh Kumar Goyal	:-	Electrical Consultant & Certified Energy Auditor
Mr. Sayantan Das	:-	B. Tech Electrical Engineer

Last but not the least we are thankful to all officers and employees with whom we interacted during the field studies for their wholehearted support in undertaking measurements and eagerness to assess the system / equipment efficiencies and saving potential.

We would like to specially acknowledge the support and co-operation extended to us during our visit by the staff.

For KANAK AUTOMATION

**RAJESH
KUMAR GOYAL**

Digitally signed by
RAJESH KUMAR GOYAL
Date: 2024.07.11
14:44:38 +05'30'

Authorized Signatory

Er. Rajesh Kumar Goyal
Electrical Consultant, Certified Energy Auditor from BEE (EA-5166)
Contact – 94140 70811
Dated: - 03rd July 2024



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INTRODUCTION

ABOUT THE COLLEGE

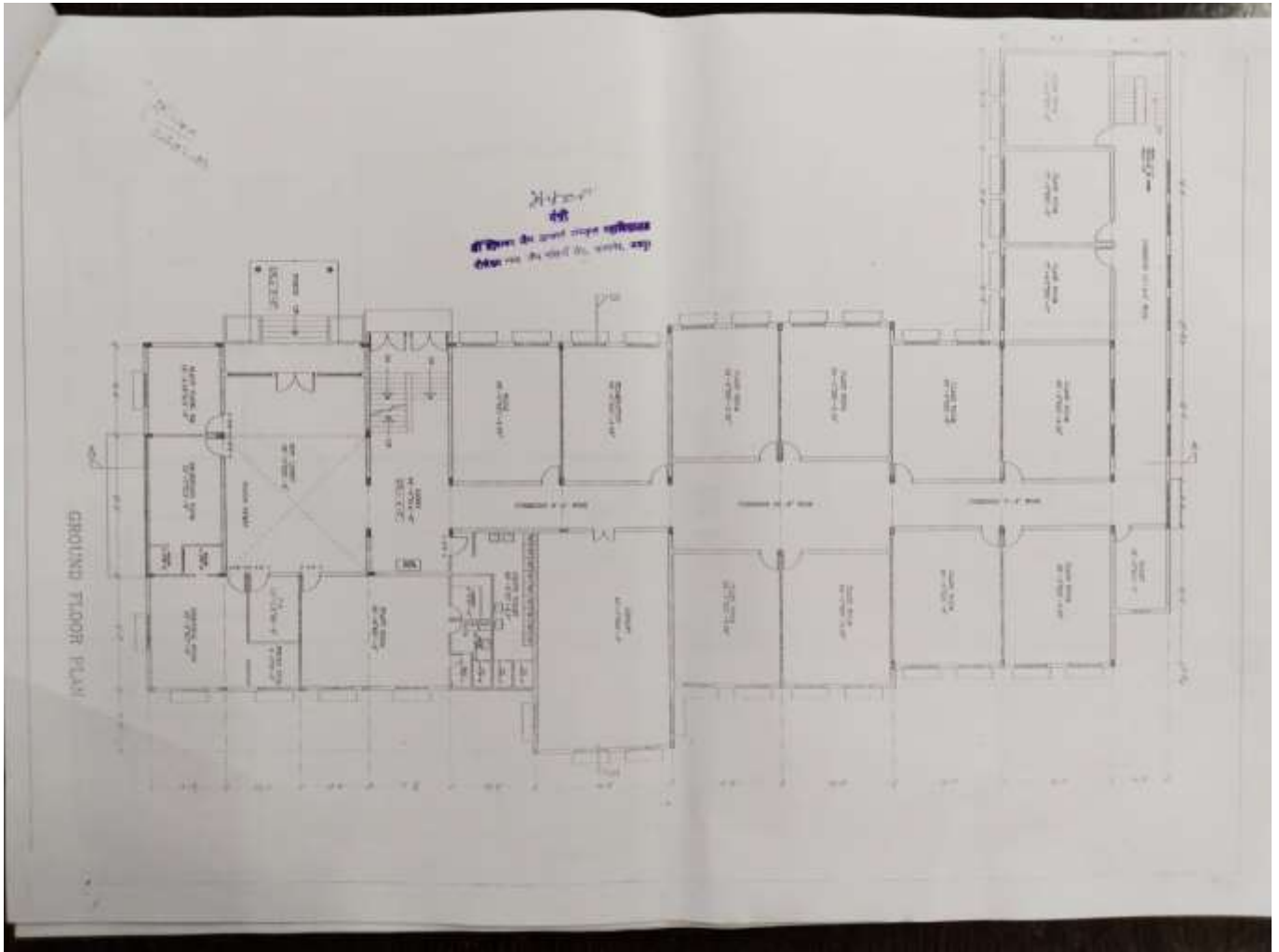
Shri Digamber Jain Acharya Sanskrit Mahavidyalaya, Jaipur, is one of the oldest Institutions of Sanskrit Education in Rajasthan. Established before Independence in the year 1885, the Institution has never ceased to spawn literary luminaries, cultural icons and academic stalwarts. The College is located in the capital city of Rajasthan. The Institution is running under the aegis of Shri Digamber Jain Sanskrit Shiksha Samiti, a committee formed by the members of Jain society. Mr. N.K. Sethi, a retired IAS officer is presently the President of this committee. The Institution is set up with the aim of imparting education from XI to Ph.D. level.

The College is committed to the welfare of the student community as well as the larger society and every possible measure is taken to realize the objective.

The college is built-up in an area of 0.43hectares around 4300sqmtr.



MAIN BUILDING - GROUND FLOOR PLAN





GREEN AUDIT

INTRODUCTION

Green audit is defined as systematic identification, quantification, recording, reporting and analysis of components of environmental diversity which will have an impact on the eco-friendly ambience. It was initiated with the motive of inspecting the work conducted within the organizations whose exercises can cause risk to the health of inhabitants and the environment. The Green Audit supports to the Criteria 7 – GREEN AUDIT of NAAC, National Assessment and Accreditation Council which is a self-governing organization of India which declares the institutions as Grade A, B or C according to the scores assigned during the accreditation.

OBJECTIVES OF THE STUDY

The main objective of the green audit is to promote the Environment Management and Conservation in the College Campus. The purpose of the audit is to identify, quantify, describe and prioritize framework of Environment Sustainability incompliance with the applicable regulations, policies and standards. The main objectives are:

- I. To introduce and aware students to serious concerns of environment and its sustainability.
- II. To secure the environment and cut down the threats posed to human health by analyzing the pattern and extent of resource use of the campus.
- III. To establish a baseline data to assess future sustainability by avoiding the interruptions in environment that are more difficult to handle and their corrections requiring high cost.
- IV. To bring out a status report on environmental compliance.



WATER AUDIT AND CONSERVATION:

DEFINITION:

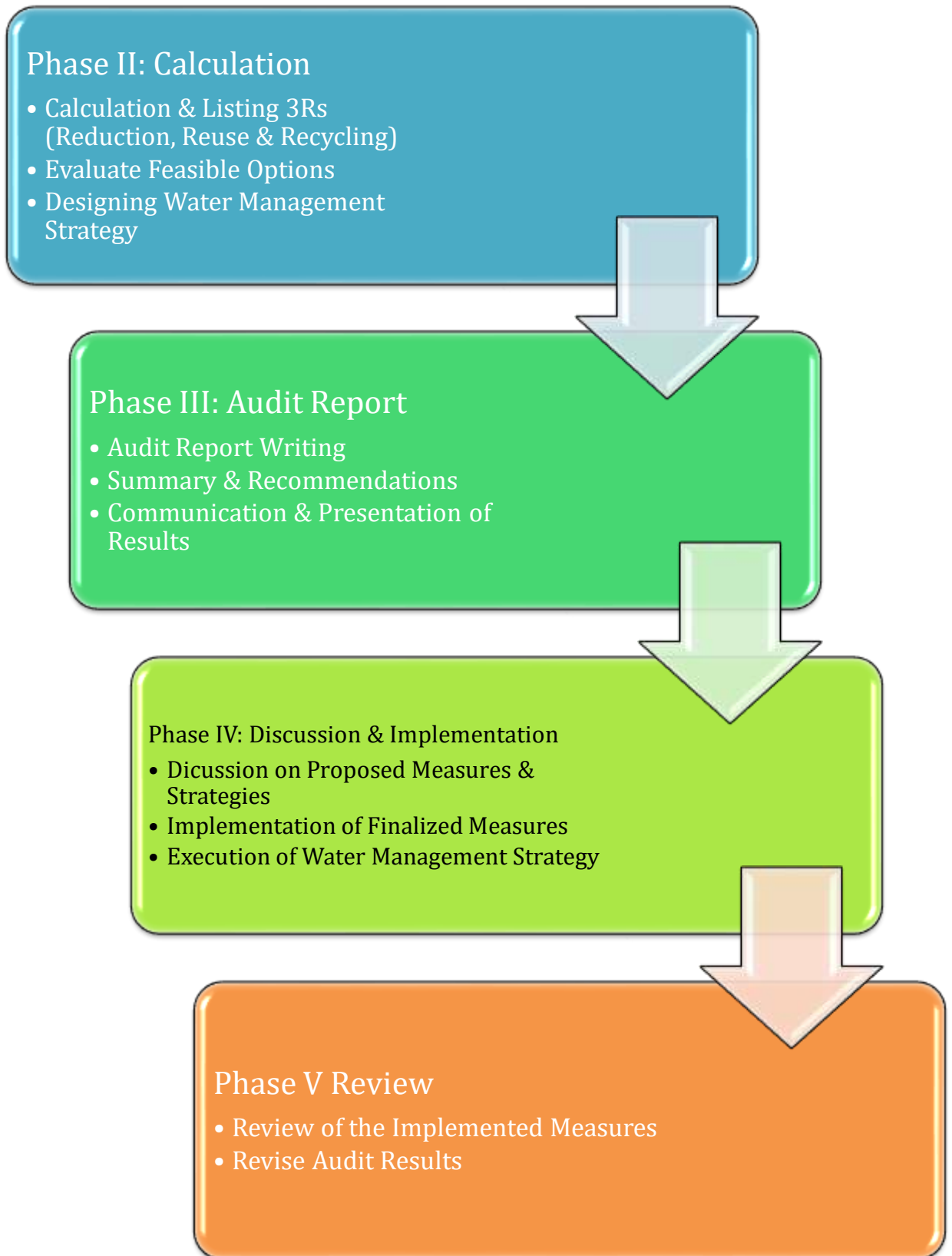
Water auditing is a method of quantifying water flows and quality in simple or complex systems, with a view to reducing water usage and often saving money on otherwise unnecessary water use. It provides the deviation existing in the actual water supply to the minimum required water in the respective premises. Norms for water consumption as per national building code 2018 are 45 liters/day for day scholars and 135 liters/day for hostellers in an educational institution. Water auditing is a mechanism for conserving water, which will grow in significance in the future as demand for water increases.

OBJECTIVE OF THE AUDIT:

- I. The objective of water audit is to assess the following:
- II. Water Required (in accordance with National and/or State Bye Laws)
- III. Water Used (as per the Existing Fixtures & Equipment)
- IV. Physical & Non-physical Losses
- V. To identify and priorities areas which need immediate attention for control

Procedure:

The different stages of the water audit has been depicted in form of flow chart in Figure 1. The whole procedure is divided into five phase starting from the site inspection to review of the implemented measures.





PHASE I: CONDUCTION OF AUDIT

At the beginning of water audit, it is must to observe the supply, storing & consuming facilities are provided on the site. The water audit team commits to:

1. Conduct site visit to locate the water points & Map them
2. Locate the water usage areas
3. Take samples at various location to define water quality
4. Mark storage tanks
5. Compile the findings during visit
6. Notice conditions of fixtures (dirty, stuck, leaking etc.)

PHASE II: CALCULATION

After completion of site visit, the audit team performed calculation to analyze the acquired data with reference to local bye laws (in India: NBC 2018) as base line. This enables to determine whether the premise is consuming surplus water or not. The results will helps to calculate the amount of water wasted or misused. Following goals are kept in mind during the calculation;

1. Estimating water use from different areas and activities of a building.
2. Estimate rate of flow of water from different outlets and inlets.
3. Determine the rate of flow of water for faucets and shower head.
4. Estimating shortage or surplus with reference to NBC.

Based on the calculation, the water management strategies have to be defined and implement in the respective premises.

PHASE III: AUDIT REPORT

The team prepares detailed report based on procedure mentioned above. The audit report consists:

1. Observations done during audit
2. All the measurements, calculations
3. Overview of the current working of water supply system
4. Summary and conclusions based on the calculations

PHASE IV: DISCUSSION & IMPLEMENTATION

After formation of audit report, the audit team will hold meeting with the respective project team to discuss the current and future scenario towards the water management. The key discussion points are:

1. Possible water conservation measures & their implementation.
2. Areas where water can be conserved & wastage of water can be minimized.

Later, the project team will implement the measure that are finalized in accordance to the discussion and meetings held with audit team.

PHASE V: REVIEW

After the implementation of measures, the review and maintenance of the same is much needed. Because, the continuous monitoring of the measures can only justify and revise the water savings occurring in the premises.



The formation of “Sustainable Cell” in the premises will help in proper & continuous execution of the measures. This cell is also responsible to educate the occupants regarding effects of water management along with the finding and installing any new techniques at the project site.

Water – Use

This addresses water consumption, water sources, irrigation, storm water, appliances and fixtures. A water analysis is an on-site survey and assessment to determine the water use and hence improving the efficiency of its use.

Observations

The study observed that the Water is taken out from underground from Tube wells through submersible pumps installed at one location in the campus. The pumps are of 5HP pumps. The pump was run for 01 hr only on 01st of June as no water was used for gardening. Hence the present water consumption by staff for drinking and toilet purpose is only 3500 liters. This matches with the water consumption of approximately 45liters/day for staff present in the campus. (This is matching with the standard of National Building Code.)

Water is used for drinking purpose, toilets and gardening. The waste water from the RO water purifier is not being used now and can be put into a well or can be pumped to propose STP. The recycled water of STP could be used for gardening purposes. The fresh water which is being used for gardening will be reduced.

*****During the Audit, no loss of water was observed, neither by any leakages nor by over flow of water from overhead tanks.***

Details of Underground Tanks (rain water harvesting): -

Sr. No.	Tank Capacity	No. of Tanks	Place
1.	10000 litre	01	Underground in lawn area

Details of Overhead Tanks: -

Sr. No.	Tank Capacity	No. of Tanks	Place
2.	1000 litre	05	Rooftop of College building

The total capacity of water storage is 5000 liters which is sufficient for 25 days when the college is operating in full capacity. *(Now only limited staffs are coming to college) On an average the college consumes 35 Liters of Water per day.*



Rain water harvesting pit



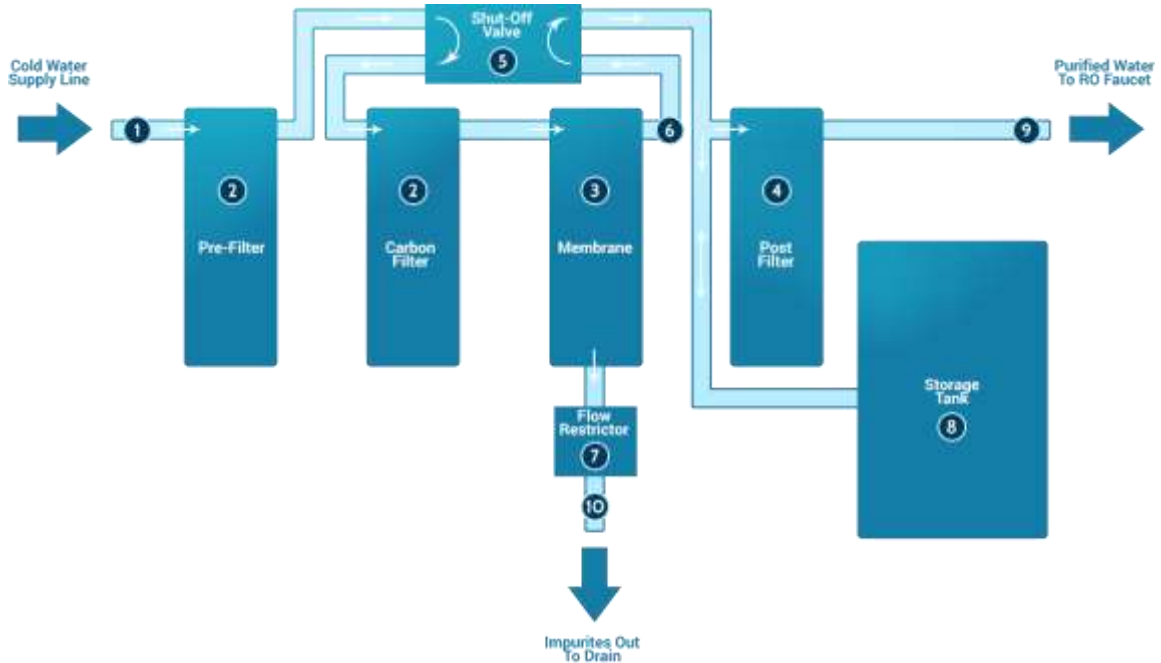
Proposed STP Plant design:





REVERSE OSMOSIS

Reverse Osmosis Plant - Reverse osmosis (RO) is a membrane separation process, driven by a pressure gradient, in which the membrane separates the solvent (generally water) from other components of a solution. The membrane configuration is of cross-flow.



The water quality of tube well is moderate and RO is needed. We should buy only RO having maximum waste water of 20% (May be little costlier but water is precious)

Water Cooler: There are 01 water cooler to make water cold and are in good working. We have measured their current value and these are all working good. The temperature setting of all these coolers were found to be 25°C to 30°C and are good.

Total number of RO plants in the premise is 03 nos., 25liters - 02nos & 50liters - 01nos.Periodic maintenance of the RO plant & cooler is also done.

CCTV & SURVEILLANCE

Close Circuit TV Cameras: CCTV Cameras are installed in 49 places for safety and are working usefully. The CCTV will be integrated with newly purchased Online UPS.

**INDOOR AIR QUALITY:**

Indoor Air Quality (IAQ) refers to the air quality within and around buildings and structures, as it relates to the health and comfort of building occupants. Some common indoor pollutant is listed as below:

- Molds and other allergens - This may arise from water seeping into the Building envelope or skin, plumbing leaks, condensation due to improper Ventilation, or from ground moisture penetrating a building part
- Carbon monoxide Sources of carbon monoxide are incomplete Combustion of fossil fuels.
- Volatile organic compounds (VOCs) - VOCs are emitted by paints and Lacquers, paint strippers, pesticides, office equipment such as copiers and Printers, correction fluids and carbonless copy paper, graphics and craft Materials including glues and adhesives, permanent markers, and Photographic solutions etc.
- Carbon dioxide - Due to human respiration.
- Particulate matter - Due to construction and maintenance activities.

Sr. No.	PARAMETER	UNIT	RESULT	SPECIFICATION/LIMIT
1.	PM10	$\mu\text{g}/\text{m}^3$	68.9	For 24 hours = 100
2.	PM2.5	$\mu\text{g}/\text{m}^3$	28.7	For 24 hours = 80
3.	Sulphur Dioxide	$\mu\text{g}/\text{m}^3$	12.6	For 24 hours = 80
4.	Nitrogen Dioxide	$\mu\text{g}/\text{m}^3$	17.3	For 24 hours = 80
5.	Carbon Monoxide	mg/m^3	0.06	For 01 hour = 04
6.	Lead	$\mu\text{g}/\text{m}^3$	NA	For 24 hours = 1.0
7.	Ozone	$\mu\text{g}/\text{m}^3$	28	For 01 hour = 180
8.	Ammonia	$\mu\text{g}/\text{m}^3$	NA	For 24 hours = 400
9.	Benzo Pyrene	ng/m^2	NA	For Annual = 01
10.	Nickel	ng/m^2	NA	For Annual = 20
11.	Benzene	$\mu\text{g}/\text{m}^3$	NA	For Annual = 05
12.	Arsenic	ng/m^2	NA	For Annual = 06

From the above table data, we found that the indoor air quality is good.

**GREEN AUDIT - QUESTIONNAIRE**

A. Which of the following are available in your institute?

Sr. No.	DESCRIPTION	REMARKS
13.	Garden Area	Available
14.	Playground	Available
15.	Kitchen	Not Available
16.	Toilets	Available
17.	Garbage or Waste stone yard	Not Available
18.	Laboratory	Available – Computer
19.	Canteen	Not Available
20.	Hostel Facility	Not Available
21.	Guest house	Not Available

B. Which of the following are found near your institute?

Sr. No.	DESCRIPTION	REMARKS
1.	Municipal dump yard	Not in the vicinity of college
2.	Garbage heap	Not Available
3.	Public Convenience	Connecting transport to near stoppages
4.	Sewer line	College have internal sewer line which is finally connected to Nagar Nigam line
5.	Stagnant water	No stagnant water
6.	Open drainage	Yes, backside of college
7.	Industry	Not Available
8.	Bus/railway station	Local Bus Station and Railway Station is away.
9.	Market/ Shopping complex/ Public halls	Not Available

C. Waste Minimization and Recycling

- ✓ Since there is no Canteen, mess, kitchen available in the College, waste generation is minimal.
- ✓ Paper are reused and recycled.
- ✓ Staff & Students are trained to recycle and reuse.

Zero-garbage is not yet achieved but can be achieved through proper management and more planning.

D. Greening the Campus:

Sr. No.	DESCRIPTION	REMARKS
1.	Is there a garden in your institute?	Yes, about 40% of Campus area is developed and maintained as green spaces
2.	Do students spend time in the garden?	2-4 Hours during winters
3.	Is the college campus have any Horticulture Department?	No, but one Gardener is kept on contract basis
4.	Number of Tree Plantation Drives organized by College per annum.(If Any)	Yes, one Tree Plantation drive is organized Annually. 100 trees and 20 shrubs planted



5.	Plant Distribution Program for Students and Community	No
6.	Plant Ownership Program	No

E. Animal Welfare:

Sr. No.	DESCRIPTION	REMARKS
1.	List the animals (wild and domestic) found on the campus (dogs, cats, squirrels, birds, insects, etc.)	Birds and Squirrels are commonly found in campus. A variety of birds species and other flora and fauna available but these are not harmful to human.
2.	How many dogs in your area have undergone Animal Birth Control - Anti Rabies (ABC - AR)?	One present inside the campus, but kept away from students reach.
3.	Does your institute have a Biodiversity Program?	No

F. Clean Air:

Sr. No.	DESCRIPTION	REMARKS
1.	Are the Rooms in Campus are well ventilated?	Yes, ambient cooling is present.
2.	Window floor ratio of the Rooms	Sufficient.
3.	Air Quality Monitoring Program	Presently not being done and not required.
4.	Students suffer from Respiratory ailments? (If Any)	No.
5.	GENSET pollution prevention	Not required.

**RECOMMENDATIONS:**

1. In campus premises electricity should be shut-down from main building supply after occupancy time, to prevent power loss.
Every classroom and laboratory with central switch board can have a diagram linking location of a tube light, fan etc. with corresponding switch. This will ensure that correct fitting is switched on/off and can save time and unnecessary operation.
2. College is procuring LED lights and electrical equipment with star ratings. SOPs should be prepared and followed for purchasing green equipment, equipment star rating and eco-friendly materials.
3. Cleaning of tube-lights/bulbs to be done periodically, to remove dust over it.
4. For protecting the newly growing plants, tree guards can be used.
5. A full time gardener should be appointed for taking care of all the greenery of the college and thereby also increasing it.
6. A bio-medical waste disposal machine for pads should be installed.
7. Waste water from Drinking Water Coolers should be diverted to the gardens for utilizing it.
8. Paper napkin use should be stopped as these are produced by cutting trees.

Possible Water Conservation Measures-General

Sr. No.	Description	Remarks
1.	Water Metering	Directly affect the daily usage by representing the daily water usage and monitoring consumption
2.	Use of Aerators in Hostel, School & University Premises	38 % of total consumption of building occupant water usage
3.	Use of Low Flow fixtures in current Kitchen space	46 % savings
4.	Install pre-rinse spray valves	66 % savings
5.	Use of Irrigation System (Drip and sprinkler)	40 % savings in landscaping water usage
6.	Prevention of minimal leakages in building taps	100 % Savings in leakages

Waste minimization & Recycling

Sr. No.	Description	Remarks
1.	Does the institute generate any waste? If so, what are they?	Yes, Solid waste, paper & plastic
2.	What is the approximate amount of waste generated per day?	Biodegradable: 4Kg Non-biodegradable: >1Kg Hazardous: >200gm Others: >1Kg



3.	How is the waste generated in the institute managed?	Compositing is being done. Reuse of one side printed Paper for internal communication. Sewage water is discharged to public Sewer. Domestic Waste is given to Municipal Corporation. Three types of Waste bins should be provided at campus for biodegradable, non-biodegradable waste & electronics.
4.	Do you use recycled paper in institute?	Yes
5.	Do you use reused paper in institute?	Yes
6.	How would you spread the message of recycling to others in the community?	Students and staff are trained to recycle and reuse.
7.	Can you achieve zero garbage in your Institute?	Not yet achieved
8.		

Definition:-

1. **"solid waste"** means and includes solid or semi-solid domestic waste, sanitary waste, commercial waste, institutional waste, catering and market waste and other nonresidential wastes, street sweepings, silt removed or collected from the surface drains, horticulture waste, agriculture and dairy waste, treated bio-medical waste excluding industrial waste, bio-medical waste and e-waste, battery waste, radio-active waste generated in the area under the local authorities.
2. **"Vermi composting"** means the process of conversion of bio-degradable waste into compost using earth worms.
3. **"residual solid waste"** means and includes the waste and rejects from the solid waste processing facilities which are not suitable for recycling or further processing;
4. **"Sanitary land filling"** means the final and safe disposal of residual solid waste and inert wastes on land in a facility designed with protective measures against pollution of ground water, surface water and fugitive air dust, wind-blown litter, bad odor, fire hazard, animal menace, bird menace, pests or rodents, greenhouse gas emissions, persistent organic pollutants slope instability and erosion.
5. **"Sanitary waste"** means wastes comprising of used diapers, sanitary towels or napkins, tampons, condoms, incontinence sheets and any other similar waste.
6. **"Treatment"** means the method, technique or process designed to modify physical, chemical or biological characteristics or composition of any waste so as to reduce its volume and potential to cause harm.
7. **"Dry waste"** means waste other than bio-degradable waste and inert street sweepings and includes recyclable and non-recyclable waste, combustible waste and sanitary napkin and diapers, etc.
8. **"biodegradable waste"** means any organic material that can be degraded by micro-organisms into simpler stable compounds;
9. **"bio-methanation"** means a process which entails enzymatic decomposition of the organic matter by microbial action to produce methane rich biogas.
10. **"Combustible waste"** means non-biodegradable, non-recyclable, non-reusable, non-hazardous solid waste having minimum calorific value exceeding 1500 kcal/kg and excluding chlorinated materials like plastic, wood pulp, etc.
11. **"Domestic hazardous waste"** means discarded paint drums, pesticide cans, CFL bulbs, tube lights, expired medicines, broken mercury thermometers, used batteries, used needles and syringes and contaminated gauge, etc., generated at the household level.



ANNEXURE – TREE PLANTATION







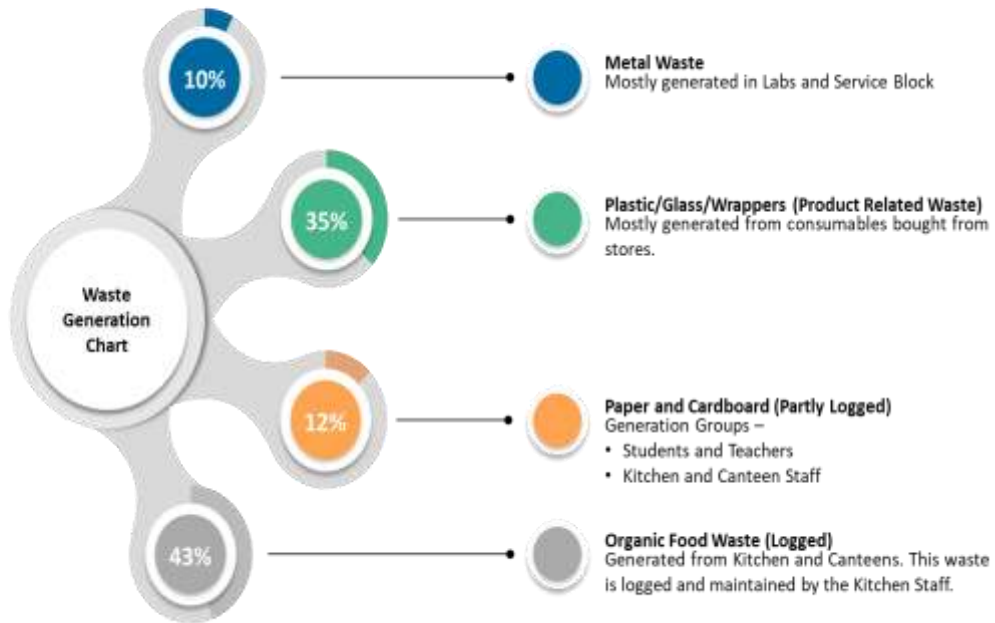
ANNEXURE – LIST OF PLANT/SHRUBS/TREES

List of some plant species present in the campus

1. Kadam Tree (*Mitragyna parvifolia*)
2. Cluster Fig Tree (*Ficus racemosa*)
3. Bael Tree (*Aegle marmelos*)
4. Ashoka Tree (*Polyalthia longifolia*)
5. Shisham Tree (*Dalbergia sissoo*)
6. Neem Tree (*Azadirachta indica*)
7. Rose (*Rosa indica*)
8. Amla (*Phyllanthus emblica*)
9. Snake plant (*Sansevieria trifasciata*)
10. Yellow oleander (*Thevetia peruviana*)
11. Champa (*Plumeria sp*)
12. Jessamine (*Murraya paniculata*)
13. Ribbon plant (*Dracaena sanderiana*)
14. Lemon (*Citrus sp.*)
15. Tulsi (*Ocimum sanctum*)
16. Aloe (*Aloe vera*)

APPENDIX – 1: WASTE MANAGEMENT

Waste Categories



01

BIOGAS Plant

Cost (1000 Kg) : INR 30,00,000/-*
LPG Generation: 70 kg/ day
Energy Consumption : 40 kWh/day



Producing biogas gives many advantages for the environment, companies and people involved. The advantages are: Biogas is a green energy source in form of electricity and heat for the local grid. Considerable environmental advantages - less emission of the greenhouse gasses methane, CO2 and nitrous oxide



02

Plastic Waste Converter

Cost – INR 4,55,600 /-



ZELENO- reverse vending machine allows you to easily dispose of your plastic PET bottles and Aluminum/steel cans of different sizes. The machine automatically accepts the trash and crushes them to be recycled later.



ZELENO-RVM generates an instant reward for the trash disposed and creates a receipt, which can be redeemed at the chosen outlets.

* Might vary based on actual requirement



Do you want to dispose your e-waste?

If you have more than 10kgs of e-waste to dispose then write to us on **e-waste pickup request form** or call us at **7349737586** between 9:30am and 6pm (Monday to Saturday) else drop it at our e-waste collection centres. List of **e-waste drop boxes**



03

Association with Recycling/ Feed the Need Organizations



Formed to facilitate recycling of all kinds of packaging waste and thus contribute towards cleaner and greener environment. We specialize in collection and aggregation of all packaging waste in a professional and organized manner backed by technology and we offer Pan India services.

04

Waste Segregation



Waste segregation is included because it is much easier to recycle. Effective segregation of wastes means that less waste goes to landfill which makes it cheaper and better for people and the environment. It is also important to segregate for public health.

05

Composting



Organic waste converter which helps convert your segregated organic waste to good quality compost. It can be smart, compact, efficient and aesthetically appealing. Its robust, functional and user-friendly design.

06

Placement of additional bins (10 DB)

Cost (INR) : 1000-1500/ DB



This will reduce the waste spilling which was observed in Football ground, landscapes and near canteen areas.



APPENDIX – 2: CERTIFICATE

Energy Auditor Certificate:

Regn. No. EA-5166		No. 3098
National Productivity Council (National Certifying Agency) PROVISIONAL CERTIFICATE		
<p>This is to certify that Mr. / Ms. <u>Rajesh Kumar Goyal</u></p> <p>son / daughter of Mr. <u>Shree. Raghuber. Dayal Gupta</u></p> <p>has passed the National Certification Examination for Energy Auditors in November - 2007, conducted on behalf of the Bureau of Energy Efficiency, Ministry of Power, Government of India.</p> <p>He / She is qualified as Certified Energy Manager as well as Certified Energy Auditor.</p> <p>He / She shall be entitled to practice as Energy Auditor under the Energy Conservation Act 2001, subject to the fulfilment of qualifications for the Accredited Energy Auditor and issue of certificate of Accreditation by the Bureau of Energy Efficiency under the said Act.</p> <p>This certificate is valid till the issuance of an official certificate by the Bureau of Energy Efficiency.</p>		
Place : Chennai, India		 Controller of Examination
Date : 18 th February 2008		



THANK YOU



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