Detailed Energy Audit Report

Submitted to

Nehru Memorial Government College, Mansa

Prepared and Submitted by

Indona Innovative Solutions

8/W-11, Railway Road, Dinanagar,
Punjab- 143531

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GLOSSERY

APFC	Automatic Power Factor Correction Capacitor
DBT	Dry Bulb Temperature
DG	Diesel Generator
EL	Electronics
HSD	High speed diesel
HT	High Tension
HV	High Voltage
LT	Low Tension
LV	Low Voltage
MDI	Maximum Demand Index
PA	Power Analyzer
PBP	Payback Period
PSPCL	Punjab State Power Corporation limited
RH	Relative Humidity
SB	Stand By
SDA	State Designated Agency
SPV	Solar Photo Voltaic
THD	Total Harmonics Distortion
VFD	Variable Frequency Drive
WBT	Wet Bulb Temperature

ASSUMPTIONS FOR CALCULATIONS

Description	Value
Operating days per annum	300
Average Operating hours per day	6.0
Unit Cost, Rs./kVAh	6.63

ACKNOWLEDGEMENT

Indona Innovative Solutions is thankful to Nehru Memorial Government College for providing an opportunity to conduct Detailed Energy Audit Study at college campus located at Barnala Road, District Mansa, Punjab - 151505.

We take the opportunity to express our profound gratitude towards Mrs. Lovleen (Principal) for award of work. We are also very thankful to her for her advice and valuable support extended to this project.

We are also grateful to Mr. Sukhdeep Singh (Professor Punjabi Department) for his valuable time and actively participation in discussion with audit team with tremendous patience and understanding

Our sincere thanks to all respondents from different departments for clearing our doubts with tremendous patience and understanding.

The Following Officers /representative from Indona Innovative Solutions under the guidance of Shri Devinder Singh have carried out the energy on 15/05/2023.

Name	Role
Shri Devinder Singh	Team Leader
Shri Yogesh Kumar	Consultant
Shri Kamaljeet	Field Engineer

We do hope that management will find the recommendations given in this report useful in energy conservation as well as improvement in system performance. We have made every attempt to adhere to high quality standards, in both data collection and analysis. We would welcome any suggestions from your side as to how we can improve further.

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Certified Energy Auditor
Indona Innovative Solutions

EXECUTIVE SUMMARY

Nehru Memorial Government College, Mansa awarded the Detailed Energy Audit study to Indona Innovative Solutions with a target to identify the energy reduction key areas and submission of report. The facility is getting grid supply from Punjab State Power Corporation Limited (PSPCL). The contract demand of the college is 112kVA. The campus has load variation due to occupancy and seasonal variation. The facility has consumed 55,548kVAh during one year (Apr- 22 to Mar- 23).

The intensive energy audit is conducted by the energy audit team of M/S Indona Innovative Solutions on 15/05/2023 to understand the energy consumption pattern and found there is huge energy saving potential. Based upon the site visit and performance assessment of utilities, recommendations are given to capture energy saving potential. The various measures have been given in below table based upon the sample payback period:

Sr. No.	Description	Energy saving, kWh	Annual Saving, Rs.	Investment, Rs.	Simple Payback Period, months
1	Reduction in Contract Demand From 112kVA To 55kVA to reduce the fixed charges	0.0	59,384	Nil	Immediate
2	Installation of capacitor bank for maintaining power factor from average power factor of 0.959 close to 0.99 and reduction in energy consumption	9,324	59,952	45,000	9.0
3	Ensuring switching off the lights when there is no occupancy in the respective class room or office areas	2,728	18,089	16,200	10.7
4	Replacement of the conventional lights FTL- 12 with new (20W LED) energy efficient lights	4,640	29,835	45,000	18.1
5	Replacement of old ceiling fans with new 35W energy efficient BLDC fans	3,780	25,061	1,20,000	57.5
6	Installation of 45.0kWp capacity Grid connected Solar PV System for lighting load and other load	45,455	3,01,364	17,32,500	69.0

Table 1: List of Energy Conservation Measures

The energy saving from the installation of SPV is more than the energy saving from all the measurement. The installation of SPV will lead to huge energy saving and will cover the energy savings from all other measures. There are few other measures which can be implemented for energy saving and will improve energy accounting system:

- Installation of Energy Monitoring System for benchmarking and targeted energy reduction can help in further reduction in energy consumption.
- Maximize the use of natural light to reduce the energy consumption in artificial light.
- Keep AC unit set point close to 25°C.
- Always switch off the lights while going out of the classrooms.
- Use of float valve for water overheat tank so that the water energy saving can be achieved by avoiding overflow.

1. INTRODUCTION

1.1. INTRODUCTION ABOUT GOVT. RIPUDAMAN COLLEGE, NABHA

The foundation stone of the College building was laid by Late Comrade Ram Kishen, the then Chief Minister of Punjab, on 18th August 1965. Later in 1997, college was taken over by the Punjab Government and Late Sardar Beant Singh, the then Chief Minister of Punjab, who was largely instrumental in the Punjab Govt. taking over the College, graced the College with his presence at a function marking the inauguration of the College as Govt. College on 21st March, 1994. This institute has been catering the educational needs of the area is backed by liberal grants by the Punjab Government from time to time. Sardar Parkash Singh Badal, the then Chief Minister of Punjab, laid the foundation stone of the new (present) building on 7th August, 1997 Govt. The main building of the college is surrounded by beautiful shady trees. A vast majority of the students belong to the surrounding rural areas. The college has steadily grown, fulfilling its aims and goals. It offers various undergraduate, post graduate and PGDCA courses in Arts and commerce. The Arial view of the campus is as below:

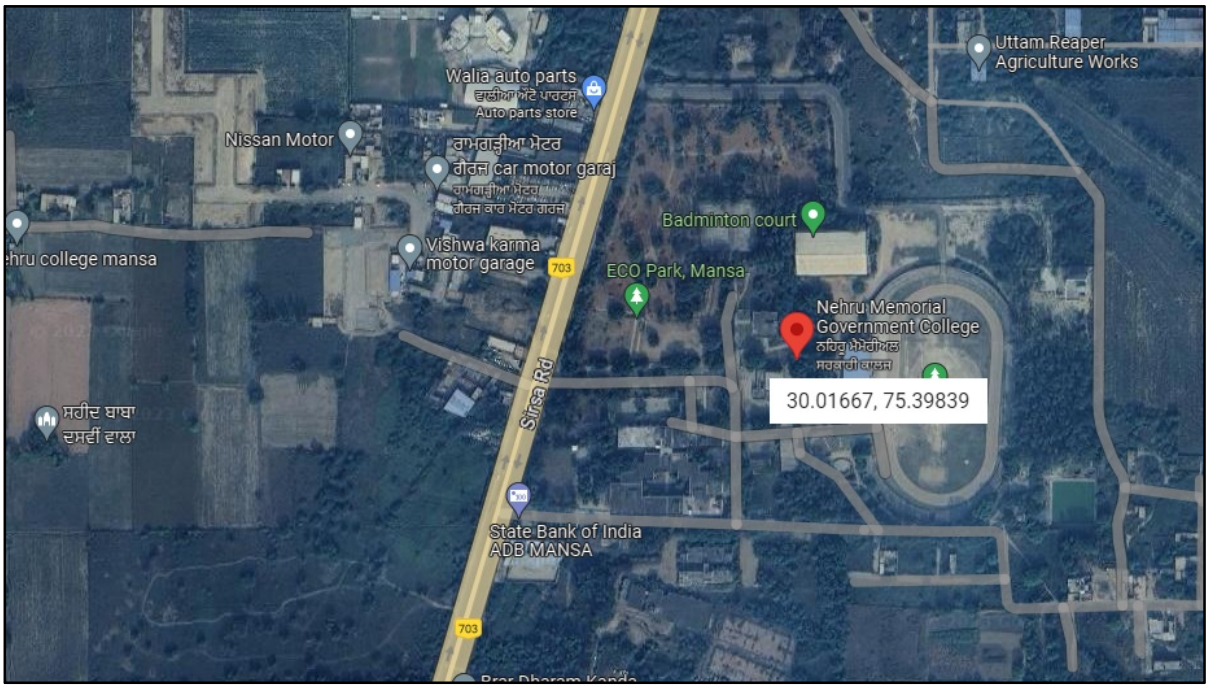


Figure 1: Arial view of the Campus

1.2. CLIMATE CONDITION OF MANSA

The climate in the area is typical semi-arid type with distinct wet and dry seasons. The climate of Mansa district is classified as subtropical steppe, semi-arid and hot which is mainly dry except in rainy months and characterized by intensely hot summer and cold winter. The normal average annual rainfall of the district is 378.2 mm. The rainfall occurs due to southwest monsoon which sets in the last week of June and withdraws towards end of September. During three months of monsoon season from July to September the district experiences high humidity, cloudiness and good monsoon rainfall. The period from October to November Constitutes post monsoon season. The cold weather season prevails from December to February followed by hot weather season or Pre monsoon season which ends up to the last week of June.

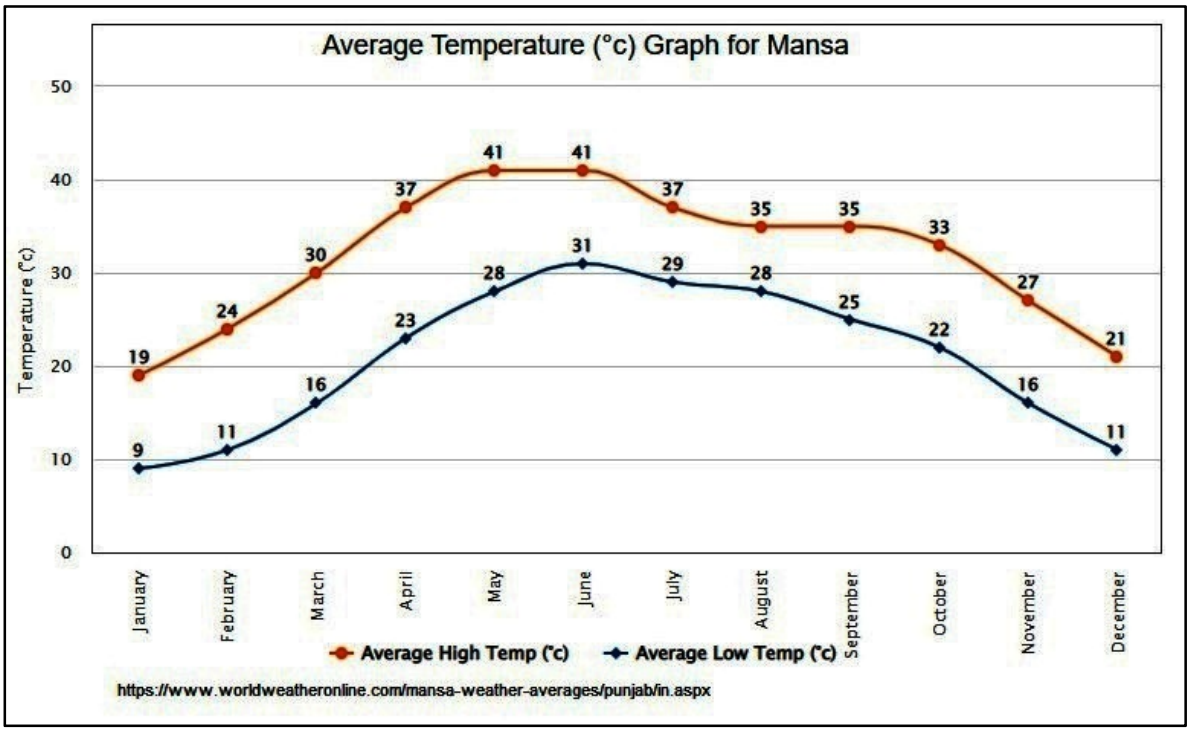


Figure 2: Annual temperature profile of Mansa

The temperature profile contributes towards the trend of energy consumption. During extreme summer, the energy consumption increase as the running of AC units, fans etc. adds into the normal running load. While in winter the AC units and fans don't run so the energy consumption during winter will be lesser as compared to the summer.

1.3. MAJOR ENERGY USE AREAS

In Nehru Memorial Government College, Mansa Electricity is the only source of energy in the entire campus to run day to run operations. In annual energy bill, major contribution is due to Electrical Energy only. The connected load in the entire campus is 104.67kW. The detail of the connected load is as below:

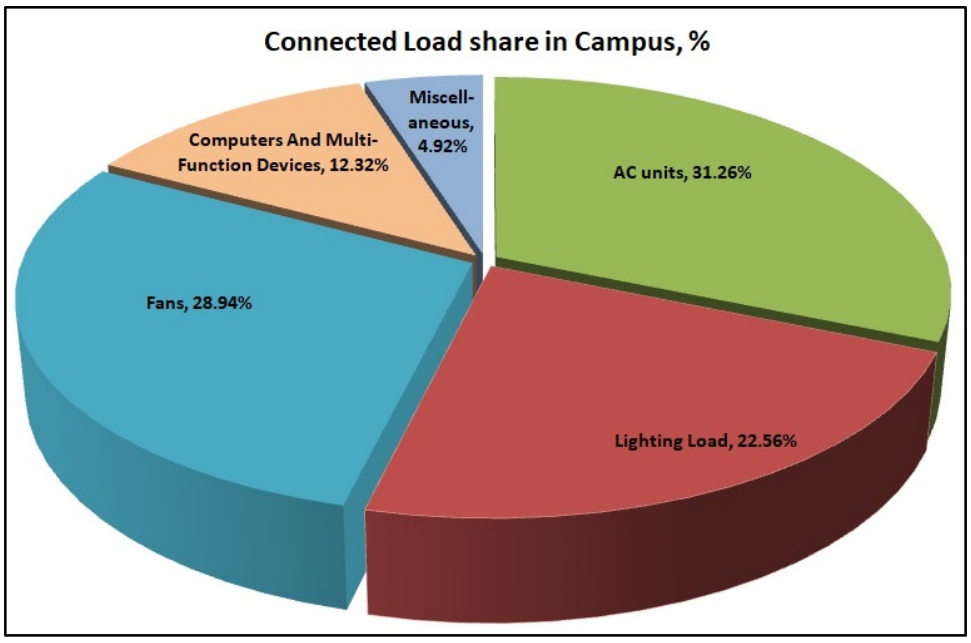


Figure 3: Percentage share of different loads

Description	Percentage share, %	Connected Load, kW
AC units	31.26%	32.72
Lighting Load	22.56%	23.615
Fans	28.94%	30.29
Computers And Multi-Function Devices	12.32%	12.9
Miscellaneous	4.92%	5.15
Total		**104.67**

Table 2: Connected load in the campus

The percentage shown in figure above is based upon the connected load. To run the connected load, the college is getting 0.415kV supply from PSPCL. The major contribution is from fan 20.28% (20.72kW) however the running load of fan depends upon the weather condition and occupancy.

1.4. KEY INITIATIVE TAKEN BY COLLEGE TOWARDS ENERGY CONSERVATION

The college management knows its responsibility towards energy conservation and many initiatives taken as below:

1. Installation of LED Lights whenever there is replacement.
2. Use of star rated equipments.
3. Capacity building of the students through awareness sessions and various competitions on energy conservation so that the energy conservation habit is developed in the students.

Figure 4: Glimpse of Energy Conservation activities

2. ENERGY AUDIT APPROACH AND METHODOLOGY

2.1 APPROACH

A team of Energy Auditors was involved in carrying out the study, the general scope of which was as follows:

- Conduct energy performance evaluation of the various utilities.
- Conduct efficiency test of equipment and make recommendations for replacement (if required) by more efficient equipment with projected benefits
- Suggest improved operation & maintenance practices
- Provide details of investment for all the proposals for improvement.
- Evaluate benefits that accrue through investment and payback period
- Discuss with the respective personnel, the individual Energy Saving Projects (ESPs) for agreement for implementation.
- Analyze various energy conservation measures and to prioritize based on the maximum energy saving & investment i.e. short, medium and long term.

Prioritization	Payback Period
Short Term Project	Less than 1 year
Medium Term Project	Between 1 and 3 years
Long Term Project	More than 3 years

Table 3: Type of Project Category and PBP

2.2 MEHODOLOGY

The general methodology followed is captured in the following figure:

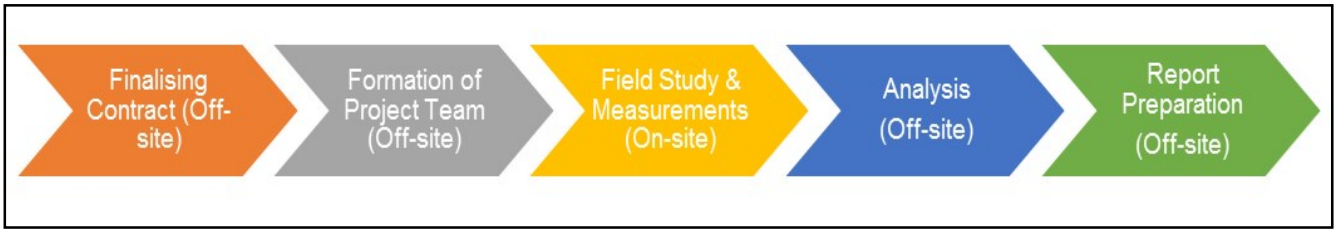


Figure 5: Methodology for Energy Audit

2.3 INSTRUMENTS USED FOR ENERGY AUDIT

The following portable instruments were used for data measurement:

- 3 – phase Power Analyzer
- Single phase Power Analyzer
- Ultrasonic Water Flow Meter
- Anemometer
- Hygrometer
- Digital Thermometer
- Infrared Thermometer
- Pressure gauge
- Lux Meter

3. ELECTRICAL SYSTM AND BILL ANALYSIS

3.1. ELECTRICAL SYSTEM

This facility is receiving 0.415kV power supply from Punjab State Power Corporation Limited (PSPCL). The direct power supply is coming at main LT panel installed in the Electrical Room. There is one DG Set also to cater the energy supply during power failure in exam. The change over switch is provided in the LT panel to switch over the power supply based upon the requirement.

Figure 6: LT Panel Installed in NMC, Mansa

There are few observations and recommendation based upon the observation which can help in reduction in energy loss and improved reliability.

1. It is recommended to provide the insulation mat to safeguard the manpower during operations/maintenance.
2. There should be no cable joints or unwanted cables on the floor. This leads to energy loss and can also lead to unsafe working condition.
3. Electrical room should be identified with proper marking and danger signage.
4. There should be fire extinguisher in the electrical panel room to stop fire to propagate.
5. The electrical room should be free from any type of unwanted material.

3.2. ELECTRICITY BILL ANALYSIS

Nehru Memorial Government College, Mansa is getting electricity supply from PSPCL having account number 3002309341. As per tariff order, facility falls under "DS rate category for DS>100kW DPC type. The sanctioned load for the campus is 101.2kW and contract demand is 112.4kVA. This facility is billed on two-part tariff structure. One part for capacity or demand drawn basis i.e. fixed Charges and the second part for actual energy drawn during the billing cycle. Fixed Charges are calculated based upon the MDI. Actual Energy Consumption is calculated based upon the Meter reading. The following components are the part of tariff structure as per latest tariff order:

Sr. No.	Components	Description	Charges
1	Fixed Demand Charges	Charges for Fixed/Maximum demand registered during the month/billing period	Rs.125/ kVA
2	Energy Charges	Billed on drawn kWh units.	Rs. 6.63/kVAh
3	Total Rent with Tax		Rs. 1491.52/month
4	Total Surcharge		Variable
5	Total Rebates		Variable
6	Subsidy		Not Applicable
7	Electricity Duty		12.7% of Energy and fixed charges

Table 4: Energy Bill Components

The electricity bill analysis is done for one year and various values for billing are as below:

Month	MDI, kVA	Billable Demand, kVA	kWh	kVAh	Power Factor	Energy Charges, Rs	Fixed Charges, Rs	Bill Amount, Rs, RS
Apr-22	26.74	89.96	5,581	6,845	0.82	45,382	12,199	2,52,580
May-22	27.86	89.96	5,397	6,094	0.89	40,403	11,090	2,18,090
Jun-22	21.56	89.96	3,023	3,376	0.90	22,383	8,133	2,76,790
Jul-22	28.65	89.96	5,235	5,854	0.89	38,812	11,090	65,910
Aug-22	33.54	89.96	5,393	6,099	0.88	40,436	11,090	1,30,800
Sep-22	39.28	89.96	7,089	7,978	0.89	52,894	11,830	2,12,340
Oct-22	21.49	89.96	2,310	2,901	0.80	19,234	7,763	2,67,020
Nov-22	13.88	89.96	2,366	3,571	0.66	23,676	11,830	44,700
Dec-22	11.10	89.96	2,214	3,002	0.74	19,903	11,090	37,080
Jan-23	14.17	89.96	2,620	3,458	0.76	22,927	11,090	41,460
Feb-23	15.08	89.96	2,516	3,395	0.74	22,509	11,830	41,850
Mar-23	13.43	89.96	2,018	2,975	0.68	19,724	6,349	36,830
Total			**45,762**	**55,548**	**9.637**	**3,68,283**	**1,25,384**	
Maximum	**39.28**	**89.96**	**7,089**	**7,978**	**0.895**	**52,894**	**12,199**	
Average	**22.23**	**89.96**	**3,814**	**4,629**	**0.803**	**30,690**	**10,449**	
Minimum	**11.10**	**89.96**	**2,018**	**2,901**	**0.663**	**19,234**	**6,349**	

Table 5: Major Components of Electricity Bill

The major outcomes of the bill analysis are as below:

- Total Annual Energy consumption for this facility from grid is 55,548kVAh (45,762) kWh and the energy charges are Rs 3.68Lakh.
- The maximum energy consumption (7,978kVAh) is observed during September- 2022 and minimum during October- 2022 (2,901kWh). Annual average Electricity consumption on monthly basis is 3,814kVAh.
- The reason for the variation in the electricity energy consumption is climate condition in the region and occupancy.
- The bill amount is very high compared to the energy consumption in few months because the bill was not paid in the previous months. Due to non-payment of the bills during payment period, penalty is imposed in the next month bills.

3.3.1 MAXIMUM DEMAND PATTERN

The contract demand for facility is 112kVA and minimum billable demand is 80% (89.96kVA) of the contract demand as per tariff order till March 2023.Maximum Demand Indicator (MDI) is another component mentioned in the electricity bill. MDI is maximum demand value in one month during one particular time reached during the billing period (this average time may vary depending on the country/DISCOM). The monthly MDI should not exceed the contract demand; otherwise customer will pay a penalty on the electricity bill as defined in Tariff Order. The month wise MDI is as below:

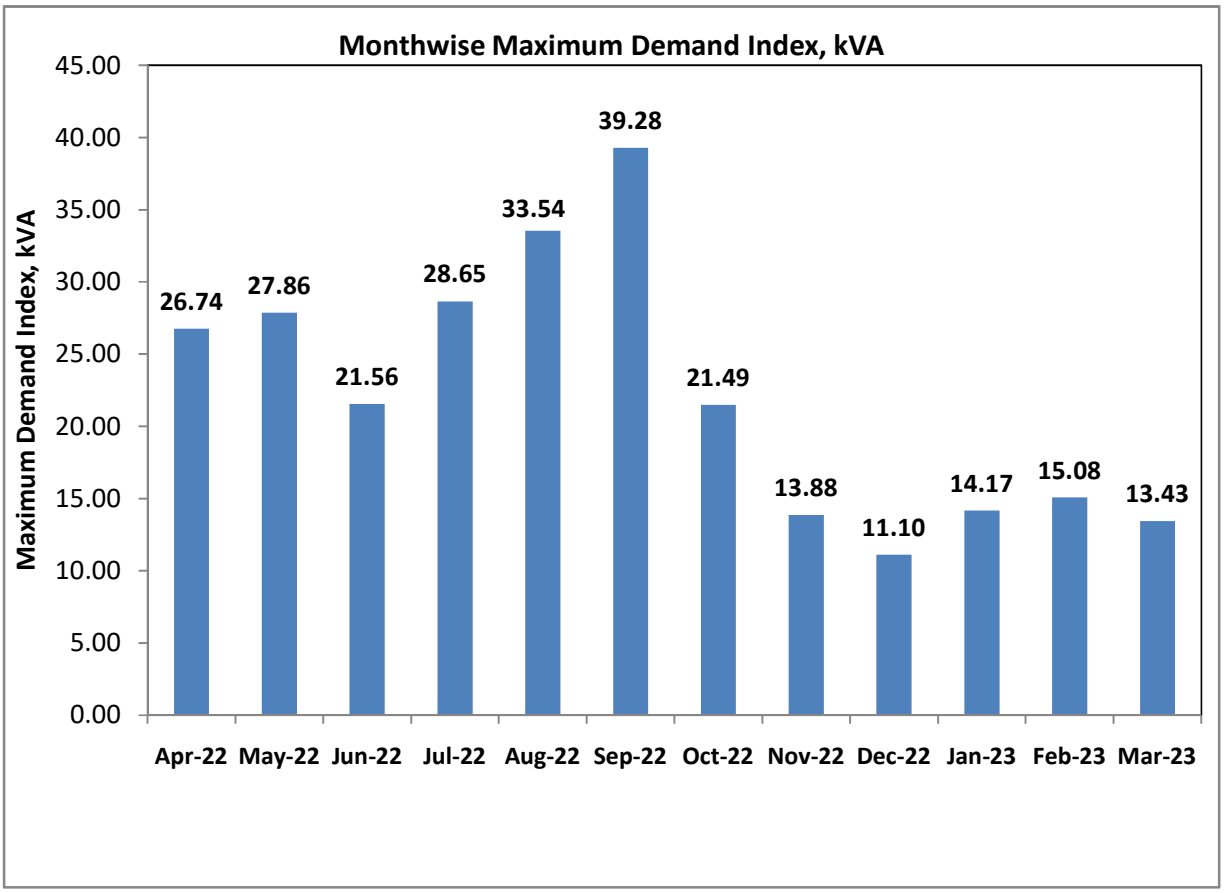


Figure 7: Month wise Maximum recorded demand

As per electricity bill, MDI is varying from 11.10kVA to 39.28kVA in one year which means MDI in one year Electricity bill has not even exceeded the minimum billable demand (89.96kVA) at which campus is charged as fixed charges.

3.3.2 ENERGY CONSUMPTION PATTERN

There is huge variation in energy consumption in one year. Month wise energy consumption is as below:

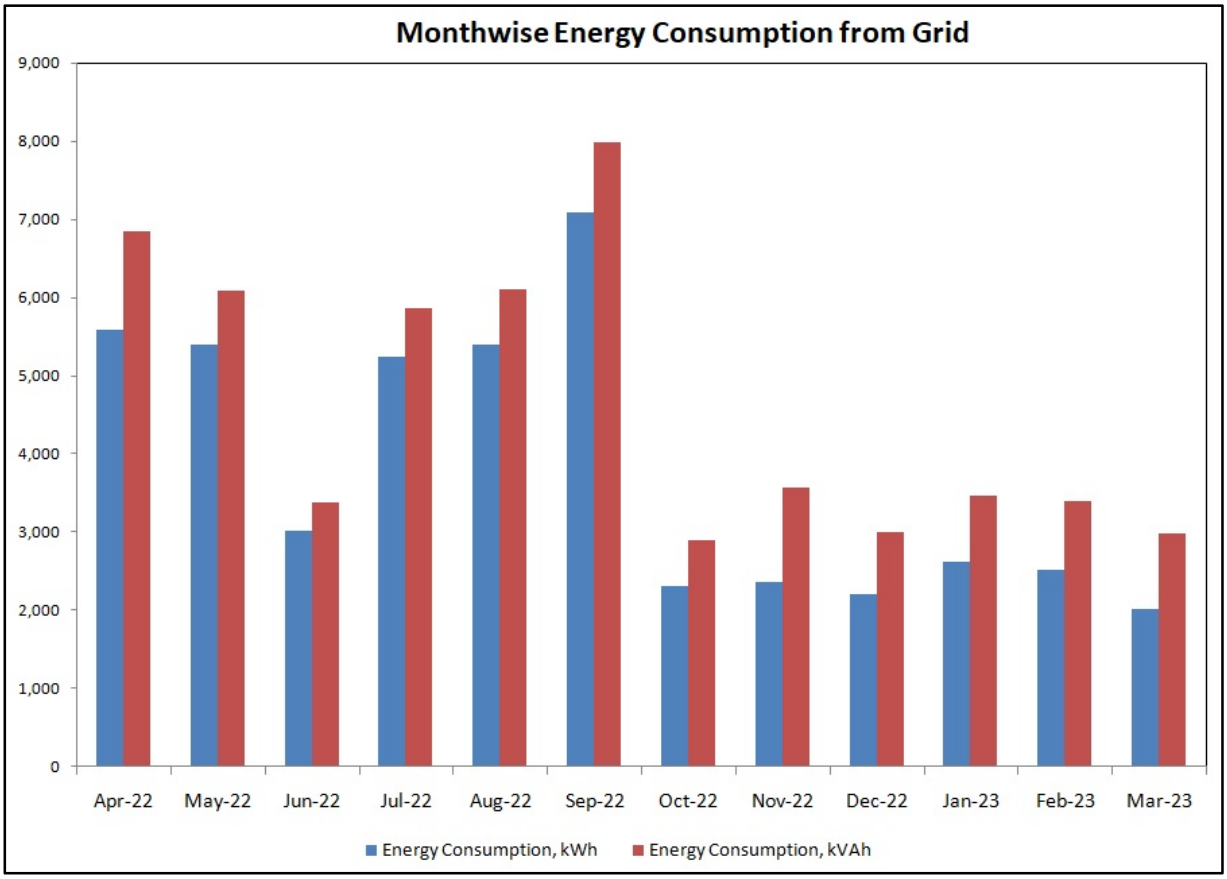


Figure 8: Month wise Energy Consumption kWh and kVAh

The billing for this Institute is in Rs/kVAh and the analysis of energy consumption in both kWh and kVAh is important. The difference in energy consumption in kWh and kVAh is due to the power factor variation. For unity power factor, kWh and kVAh will be equal while if power factor is poor, higher difference in kWh and kVAh values are observed. The maximum energy consumption (7,978kVAh) is observed during September- 2022 and minimum during October-2022 (2,901kWh). Annual average Electricity consumption on monthly basis is 3,814kVAh.

3.3.3 POWER FACTOR PATTERN

The month wise power Factor Graph as per energy bill is as below:

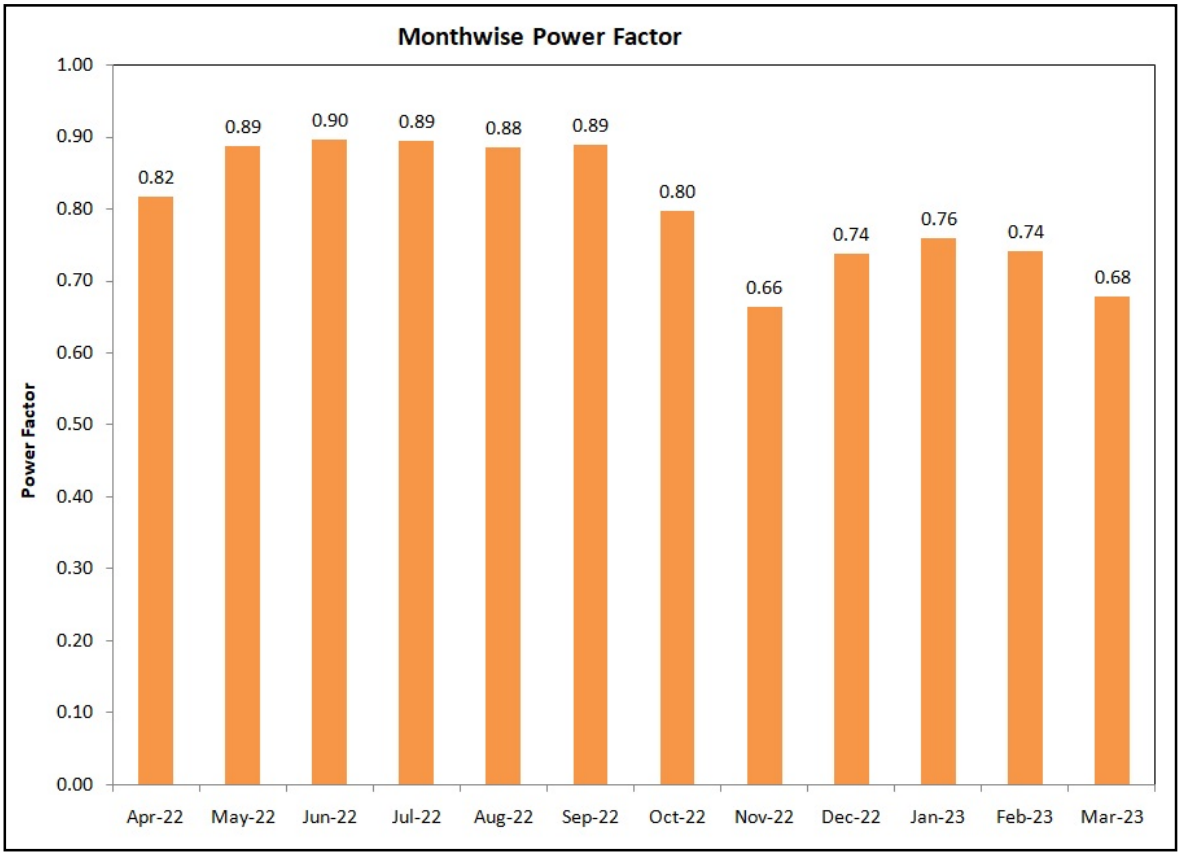


Figure 9: Month wise Power Factor

The major observations from the Power factor graph are as below:

1. The power factor in the facility is very low. It is varying from 0.66 to 0.90. On comparing energy consumption with power factor, it is observed that when energy consumption is low, power factor is also low.

2. The lower power factor lead to higher reactive energy demand from the system and thus it leads to the higher apparent power.

4. Performance Assessment of Utilities

4.1 MAIN INCOMER SUPPLY

There is huge load variation based upon the occupancy in the class room, different office areas, library and running of pumps. Three phase power analyzer has been used for recording of parameters at main incomer. The location of Power Analyzer is as below:

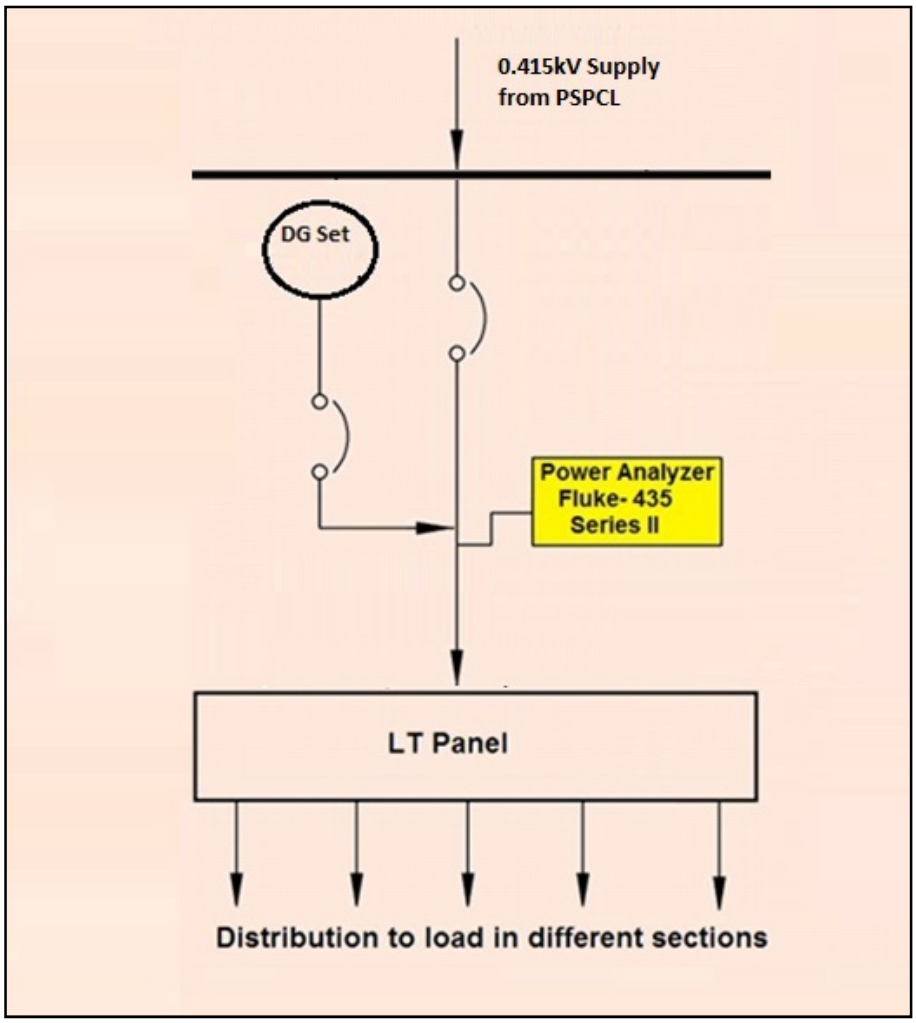


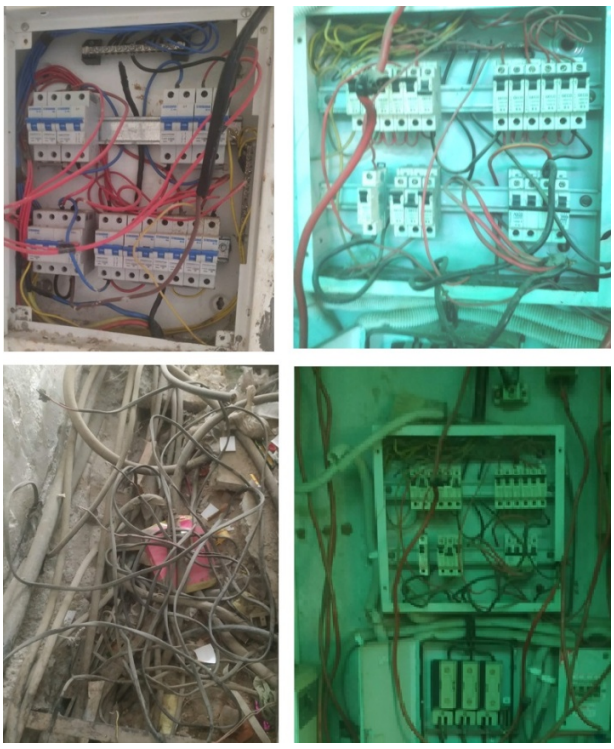
Figure 10: Position of Power Analyzer

Based upon the recorded parameters and physical inspection of the entire electrical distribution system

1. Quality of electrical distribution system
2. Power quality

4.2 QUALITY OF ELECTRICAL DISTRIBUTIONS SYSTEM

The visual inspection of electrical installation in the premises including Electrical room, Low tension switch gear panel, Distribution boards, lighting installations, earthing arrangements. During visual inspection all the observations, which are either dangerous or non compatible to the standard engineering practice are noted and potential corrective actions are made toimprove the safety level of the electrical installation.The detailed testing and inspection results are tabulated as below:



Observations

- Poor management of wires/cable and no mechanically protection provided.
- Lugs and glands are not found.
- Dressing/ terminations of wires not done properly.
- Conditions of cabling carried out in the Premises are very poor and at many place, cable joints are found.
- The number of cable with joints are lying on floor in Electrical Panel Room

Recommendations

- Use lugs and glands at end terminations to protect ingress of water, vermin and dust.
- New Fuse units should be provided.
- All final circuits should be provided with individual overload and short- circuit protection.
- Cables/wires should have mechanical protection (means always to run inside the pipes) and should be adequately supported throughout their run.
- Avoid lose wires and joints in the wiring system.

4.3 POWER QUALITY

Power quality determines the fitness of electrical power to consumer devices. There are many ways in which electric power can be of poor quality such as voltage unbalance, harmonics etc. **Fluke make Power Analyzer** is used to check power quality of the system. Under Power Quality, the various parameters measured and calculated are as below:

1. Load Variation
2. Voltage Unbalance
3. Power factor variation
4. Harmonics level

The power analyzer is put at main incomers at LT panel to record data. Based upon the recorded parameters are described as below:

4.2.1 LOAD VARIATION

Since this is not a fully 24x7 operational facility so load behavior is different and depends upon the occupancy and weather condition. The activities which are performed continuously lead to continuously contribution towards energy consumption. The load trend on main incomers is as below:

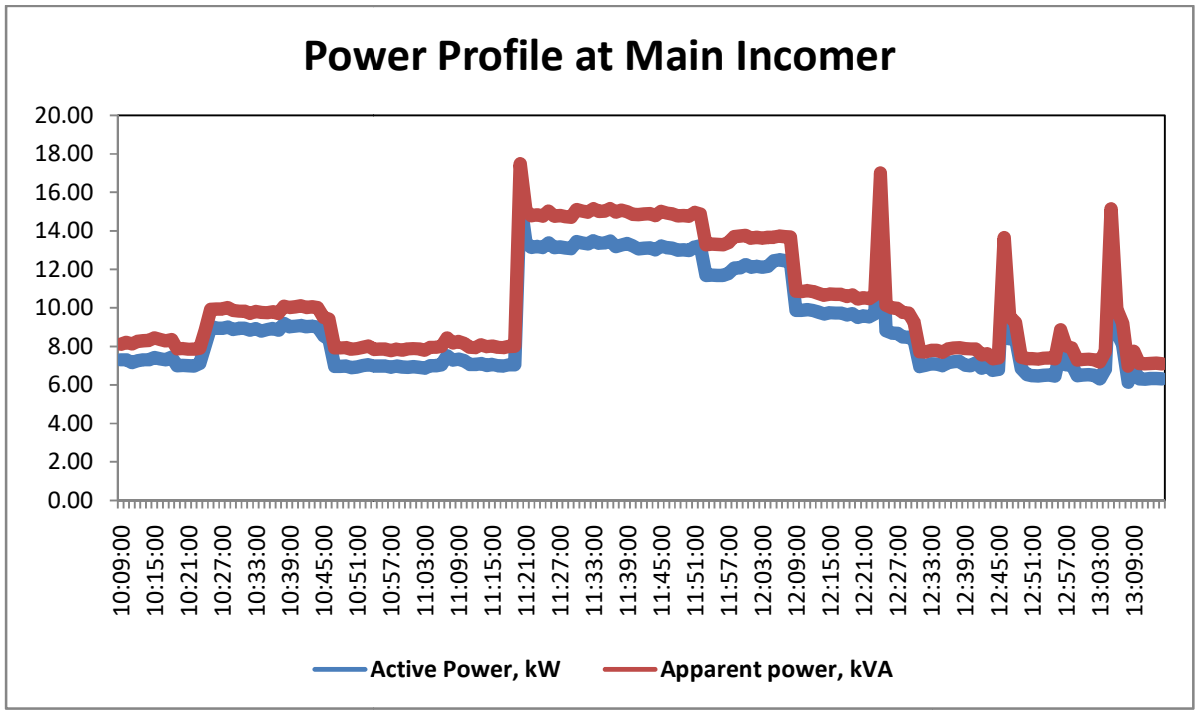


Figure 11: Trend of Load variation at main incomer

From trend it is clear the maximum power is 17.5kVA (15.6kW) observed during data logging. It is the running power at normal operating hours. The jerk in the load trends are corresponding to switch on/off of the additional loads. The college was running at partial load due to which measured maximum load is less than the maximum demand.

4.2.2 VOLTAGE UNBALANCE

Voltage unbalance occurs when the RMS line voltages on a poly-phase system are unequal. Voltages are seldom perfectly balanced between phases, but when this unbalance becomes excessive, it can create problems for poly-phase motors. Many of the newer induction motors are now more sensitive to unbalance than the older designs, and furthermore, adjustable speed drives can be even more vulnerable than standard motors. According to ANSI (American National standards Institute) codes voltage unbalance should be within 1%.

The main effect of voltage unbalance is motor damage from excessive heat. Voltage unbalance can create a current unbalance 6 to 10 times the magnitude of voltage unbalance. Consequently, this current unbalance creates heat in the motor windings that breaks down motor insulation causing cumulative and permanent damage to the motor. The relationship is exponential, and approximately increases by twice the square of the percent of voltage unbalance. Figure below, shows the percentage of temperature rise as related to the voltage unbalance:

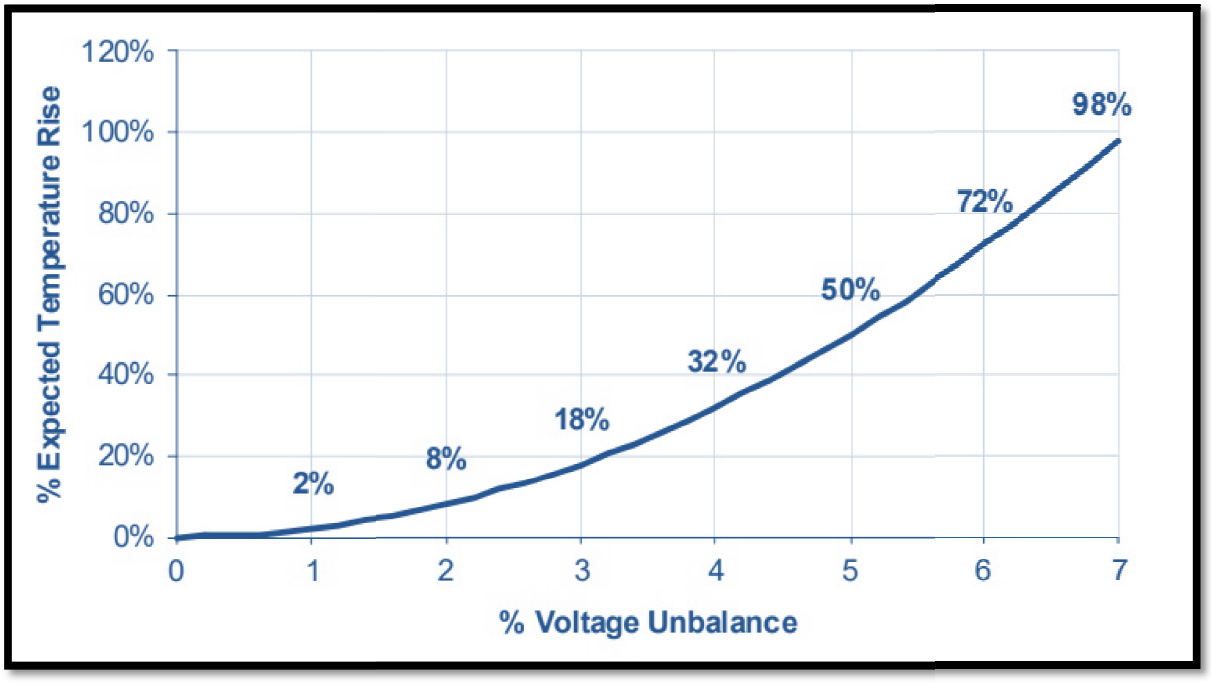


Figure 12: Relation between Voltage Unbalance and Temperature rise

There is huge load variation and also there is load shifting based upon requirement and there were chances of voltage unbalance. To verify the trend of voltage unbalance, data for voltage unbalance is recorded and trend is also attached.

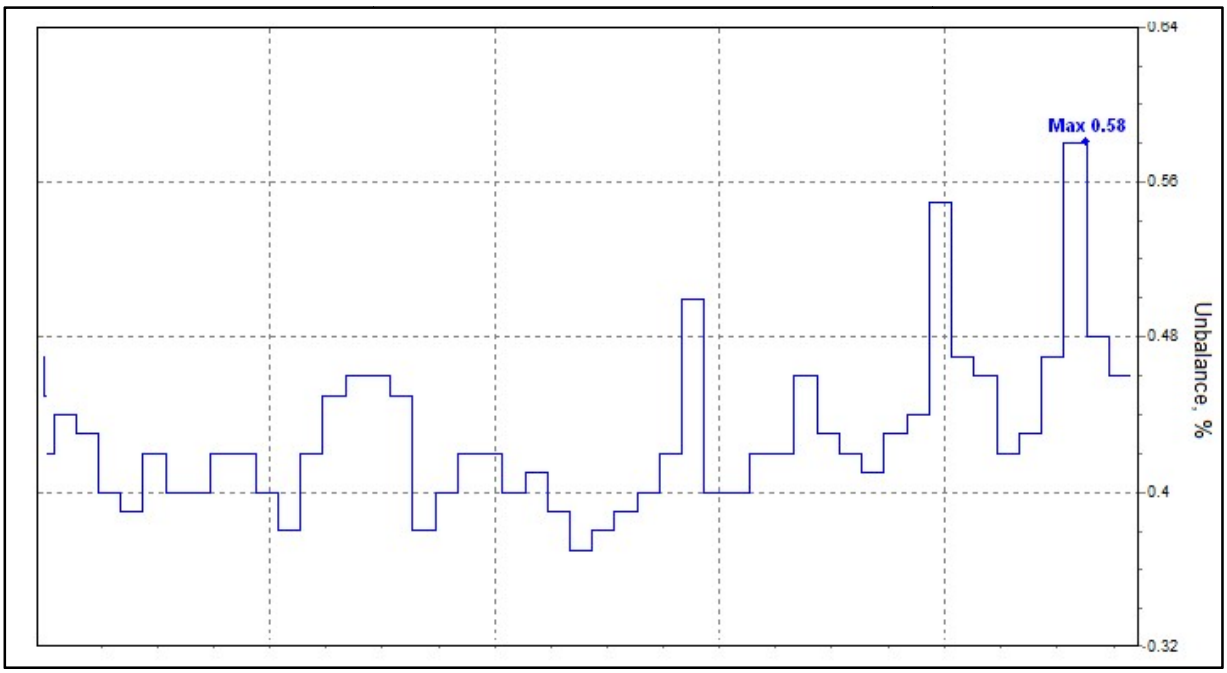


Figure 13: Trend of Voltage Unbalance at main incomer

It is clear that maximum recorded voltage unbalance 0.58% is within limit of 1%. This indicates that the electrical load is equally distributed.

4.2.3 CURRENT UNBALANCE

For a three-phase supply, current unbalance is defined as the maximum deviation of any current phase from the average current, divided by the average current, often expressed as a percentage. A current unbalance will generate excess heat which can melt insulation, leading to stator winding faults. Unbalance will also result in an uneven torque being produced by the electric motor, reducing its efficiency and increasing vibration. The trend of current unbalance at running load is as below:

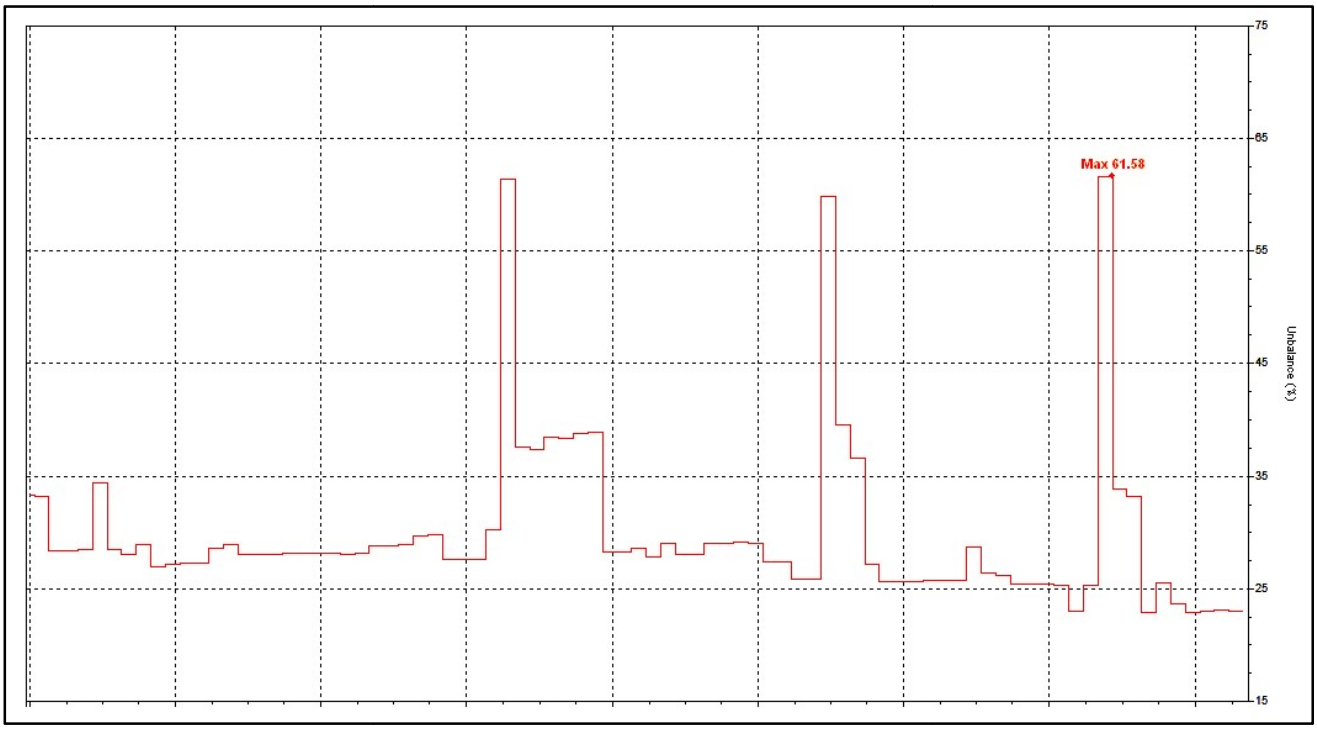


Figure 14: Trend of the current unbalance

In entire campus, single phase load is installed. The running load depends upon the occupancy and weather condition. The unequal distribution of loads between the three phases and thus the unbalance is observed. The current unbalance of the system can lead to unbalanced voltage drops on the electric lines. This increases neutral current which cause line and thus energy losses. To mitigate this problem, proper load distribution is recommended at full load condition.

4.2.4 POWER FACTOR VARIATION

The power factor is also recorded at running load and trend of power factor variation at main incomer is as below:

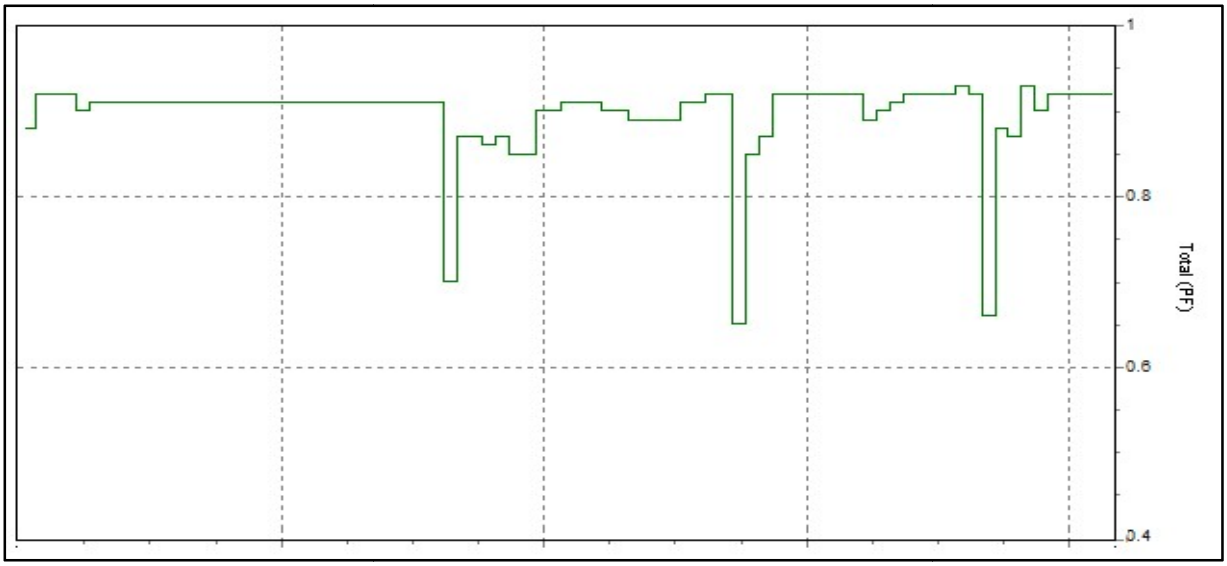


Figure 15: Power factor measurement at main incomer

The maximum power factor 0.92 is observed at running load while during jerk load, power factor comes down up to 0.63.

4.2.5 HARMONICS LEVEL

Harmonics are currents or voltages with frequencies that are integer multiples of the fundamental power frequency. Ideally, voltage and current waveforms are perfect sinusoids. However, due to the increased popularity of electronic and other non-linear loads, these waveforms get distorted. This deviation from a perfect sine wave can be represented by harmonics—sinusoidal components having a frequency that is an integral multiple of the fundamental frequency. Thus, a pure voltage or current sine wave has no distortion and no harmonics, and a non-sinusoidal wave has distortion and harmonics. To quantify the distortion, the term total harmonic distortion (THD) is used. The term expresses the distortion as a percentage of the fundamental (pure sine) of voltage and current waveforms.

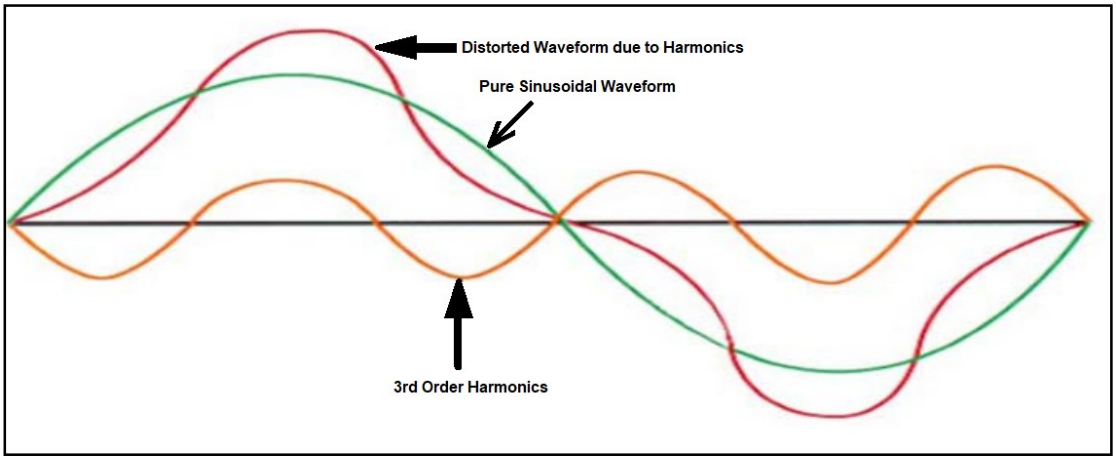


Figure 16: Harmonic distortion of the Waveform

When harmonic frequencies are prevalent, electrical power panels and transformers become mechanically resonant to the magnetic fields generated by higher frequency harmonics. When this happens, the power panel or transformer vibrates and emits a buzzing sound for the different harmonic frequencies. Harmonic frequencies from the 3rd to the 25th are the most common range of frequencies measured in electrical distribution systems.

Harmonics provides a mathematical analysis of distortions to a current or voltage waveform. Based on Fourier series, harmonics can describe any periodic wave as a summation of simple sinusoidal waves which are integer multiples of the fundamental frequency. These are steady-state distortions to current and voltage waves and repeat every cycle. They are different from transient distortions to power systems such as spikes, dips and impulses.THD is a common measurement of the level of harmonic distortion present in power systems.

THD can be related to either current harmonics or voltage harmonics, and it is defined as the ratio of total harmonics to the value at fundamental frequency times 100%. Harmonics are created from equipment's containing electronics that control other apparatus, e.g. variable speed drives, soft starters, static compensators, rectifiers and heating furnaces, etc. The harmonic analysis is carried out based upon the data recorded in power analyzer and it is observed that and Current THD% is not within the permissible limits as per IEEE-519, 1992 of main incomer is highlighted in below table.

Description			Main incomer
Measured % of THD at maximum demand load (Fundamental) current (I_L)	Voltage	R	1.65
		Y	1.47
		B	1.44
	Current	R	3.93
		Y	3.91
		B	3.89

Table 6: THD parameters measured at main incomer

Both the current and the voltage harmonics distortion is within the limit of 3%, indicates that there is no problems of the harmonics.

4.3 DIESEL GENEARTING SETS

There are few general recommendations for DG Set as below:

1. The maximum permissible percentage unbalance in phase loads on DG sets is 10%.
2. Lower power factor of a DG set demands higher excitation currents.
3. Calibrate fuel injection pumps frequently and Improve air filtration.
4. Consider fuel oil additives in case they benefit fuel oil properties for DG set usage.
5. Ensure fuel oil storage, handling and preparation as per manufacturers.
6. Ensure compliance with maintenance checklist.
7. In case of a base load operation, consider waste heat recovery system adoption for steam.

The loading of DG Sets can be improved with automation in which all DG Sets can be connected with PLC system and the DG Sets will start based upon the loading of Master DG set. The monitoring if generation and fuel consumption of DG Set on regular basis also helps in taking corrective measure on time for improvement in DG Set Performance. The sample data sheet which can be used for DG Set Performance on monthly basis is as below:

Description	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Generation, kWh												
Fuel Consumption in Generation, lit												
SFC, lit/kWh												
Generation, kWh/lit												

Figure 17: Sample Performance Assessment Sheet for DG Set

4.4 AC UNITS

There are 22 number of AC units installed in the campus and the connected load is around 32.72kW however the running load is only 9.22kW. The running load was also instantaneous only because these areas were not occupied. The computer lab new is not in operation so the AC load is not contributing towards the running load. The connected load of AC units is as below:

Area	Type	Number	Connected Load, kW	Running Load, kW
Principal Room	AC Split	2	2.90	2.175
Finishing School Lab- 1	AC Split	2	3.00	2.25
Finish Lab- 2	AC Split	2	3.00	
Punjabi Language	AC Split	2	3.10	2.32
Computer Lab New	AC Split	7	10.15	
Computer Science Lab- 1	AC Window	3	4.65	1.12
Computer Science Lab- 2 & 3	AC Window	4	5.92	1.35
Total		22	32.72	9.22

Table 7: Connected load of AC units

The measured maximum power of the AC unit is less than rated power. The AC units are switching on/off based upon the temperature setting. There are few tips to Use Air Conditioner Effectively all around the season:

- Check and Change the Air Filter.
- Use Smart Thermostat or AC Controllers.
- Don’t Let Your Thermostat Take the Heat.
- Try to fix the AC unit in air sealed room to the extent possible.
- Avoid Steep Temperature Changes and try to run AC unit at 25°C

4.5 LIGHTING

The total connected lighting load in the entire campus is around 23.615kW. Total lighting load is sum of connected rated power of each luminary. The Mix different types of LED fittings, CFL, T- 8, FTL- 12, T- 5 etc. are installed in the campus. The details of the connected load are as below:

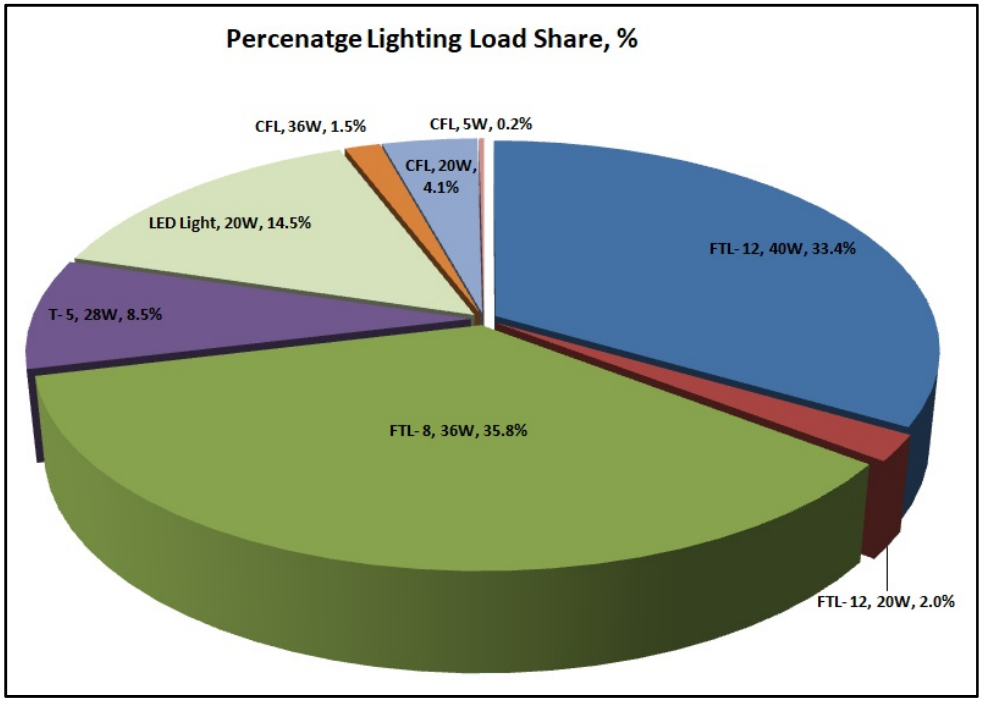


Figure 18: Percentage share of different lighting

Type of Lights	Number of lights	Connected Load, kW
FTL- 12, 40W	146	7.884
FTL- 12, 20W	16	0.48
FTL- 8, 36W	192	8.448
T- 5, 28W	61	2.013
LED Light, 20W	171	3.42
CFL, 36W	10	0.36
CFL, 20W	48	0.96
CFL, 5W	10	0.05
Total	**654**	**23.615**

Table 8: Connected Lighting Load

Most interior lighting requirements are for meeting average luminance on a horizontal plane, either throughout the interior, or in specific areas within the interior combined with general lighting of lower value. For assessing energy efficiency of lighting system, Inventory of the Lighting System is noted and the lux levels measurement at working level has been done with help of lux meter. The various values of lux levels based upon measurements are as below:

Area	Maximum Lux	Average Lux	Minimum Lux	Remarks
Admin Block	278	200	145	
Principal Room	479	299	158	Natural light Available
Finishing School Lab- 1	175	151	124	
Photocopy Room	112	103	86	
Physical Room	117	91	63	
Bursar Room	128	114	105	
Gym	87	79	69	Additional Light is required
English Department	164	148	132	
Punjabi	175	154	133	
Commerce	94	86	73	Additional Light is required
Political Science	132	124	114	
Storage Room	85	75	62	Additional Light is required
Corridor	111	99	87	
Economics	221	208	197	
Library	278	238	212	
Store Library	112	105	96	
Corridor	123	116	110	
Computer Science Lab- 1	130	98	68	Additional Light is required
Computer Science Lab- 2&3	125	113	98	Additional Light is required
1st Floor Room- 1	150	117	83	
EDUSAT	129	108	74	Additional Light is required
1st Floor Room- 4	268	234	210	
1st Floor Room- 5	210	171	143	
Room - 09	165	135	111	
Finish Lab- 2	198	169	140	
Chemistry Lab- 1	179	152	121	
Chemistry Lab- 2	210	185	154	
Punjabi Language	240	187	141	
Auditorium	201	168	144	
Girls Common Room	170	152	136	
Canteen	232	203	167	

Area	Maximum Lux	Average Lux	Minimum Lux	Remarks
Theatre- 1	219	187	160	
Theatre- 2	176	141	102	
Theatre - 3	181	143	120	
Theatre - 4	193	156	126	
Room - 01	154	140	130	
Room- 02	180	145	114	
Room - 03	191	168	145	
Room - 04	201	160	114	
Room- 05	162	145	119	
Room - 07	128	117	108	
Room - 08	160	147	130	
Room - 09	214	163	126	
Room - 10	210	168	125	
Room - 11	194	159	124	
Room- 12	143	135	127	
Room - 13	154	138	129	
Room - 14	133	126	120	
Room- 15	162	152	145	
Room - 16	164	157	145	
PTU Block	265	233	210	
Computer Lab New	208	182	159	

Table 9: Measured Lux level

The major observations based upon the lux level measurement are as below:

- The number of lights in most of the areas is sufficient but the output from the luminaries is low due to which lux level is low.
- The Lux level in computer labs is very low due to non-functional fittings.
- At many rooms, additional lights need to be installed to improve the lux level.
- Many lights were not working due to which the lux level is low.

4.6 FANS

The ceiling fans are more affordable than air conditioners and the right size can make a difference. The summers are very hot in the region so the energy consumption by the fans adds into the energy consumption in summer. Apart from ceiling fans, exhaust fans and wall fans are installed to

maintain the required ambient temperature. The connected load of the fans is 30.29 and is tabulated as below:

Description	Number	Average Rated Power, W	Connected Load, kW
Ceiling Fans	372	70	26.04
Wall Fans, 50W	6	50	0.3
Wall Fans, 250W	11	250	2.75
Exhaust	8	150	1.2
Total	**397**		**30.29**

Table 10: Connected Fan Load

4.7 COMPUTERS AND MULTI-FUNCTION DEVICES

These devices are installed in the staff room, labs and the office areas for the supporting and main stream activities. The connected load of these devices is around 12.9kW.

Description	Number	Connected load, kW
Computers	42	6.3
Printer	8	5.2
Projector	2	0.8
Scanner	3	0.6
Total	**67**	**12.9**

Table 11: Details of water cooler

4.8 MISCALANEOUS LOAD

These devices are installed in the staff room, labs and the office areas for the supporting and main stream activities. The connected load of miscellaneous load is 5.4kW.

Description	Number	Connected Load, kW
Refrigerator	2	0.7
Air Cooler	1	0.35
Induction Plate	2	1.0
Hot Kettle	1	0.35
Heater	2	2.0
Pump	1	0.75
Total	**8**	**5.15**

Table 12: Details of miscellaneous load

5. ENERGY EFFICIENCY MEASURES

5.1 REDCUCTION IN CONTRACT DEMAND FROM 112KVA TO 55KVA TO REDUCE THE FIXED CHARGES

Observations

From annual electricity bill, it is clear that maximum demand recorded in one year is 39.2kVA which is only 35% of the contract demand while the least is only 10% of the contract demand. The unit is being charged for 80% of the contract demand.

Recommendation

It is recommended to reduce the contract demand from 112.0kVA to 55kVA. The recommended demand is almost 40% higher than the maximum recorded demand.

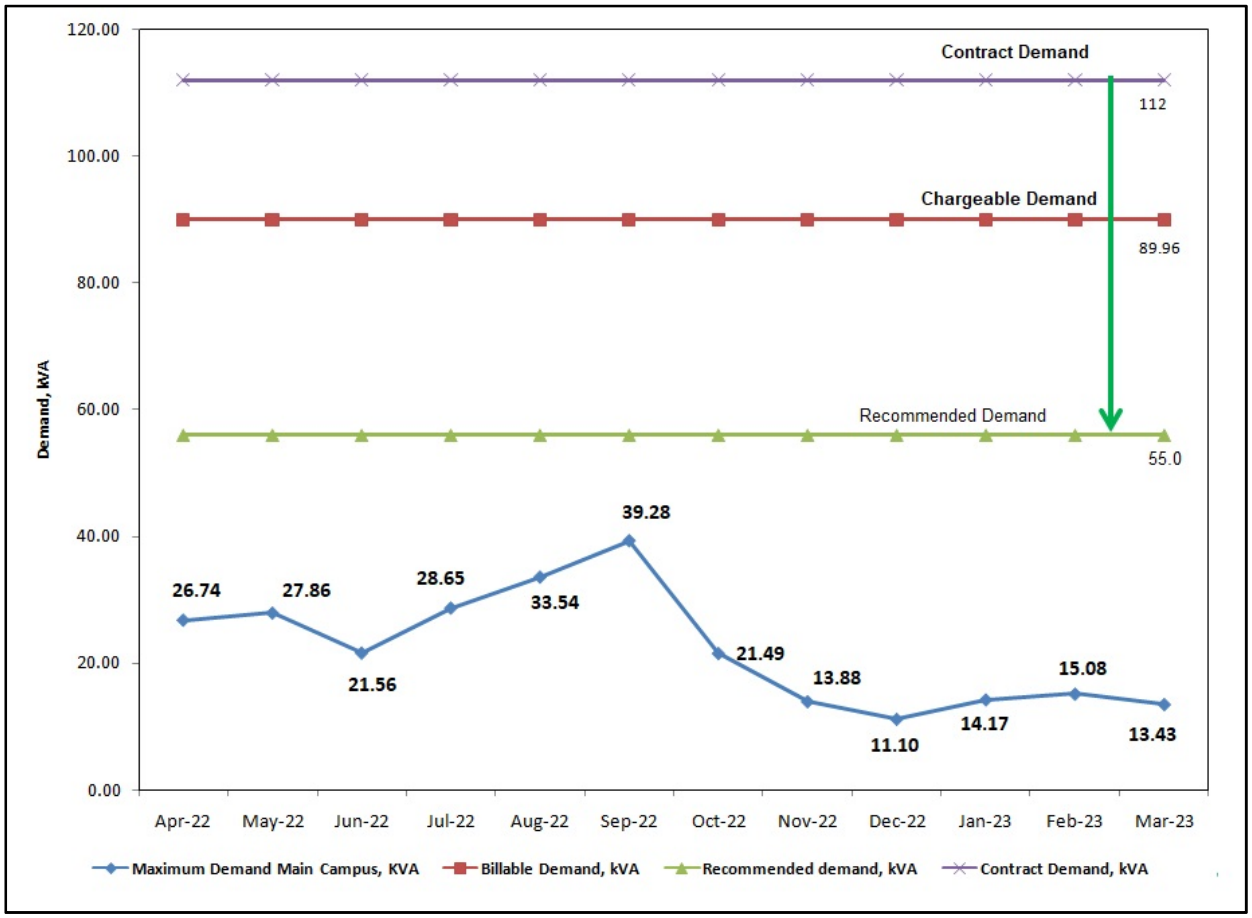


Figure 19: Reduction in contract demand

The installation of the APFC and the installation of the energy efficient appliance will give additional margin to the demand. The reduction in demand will lead to direct reduction in the energy bill. The calculated saving in energy bill is as below:

Description	UoM	Values
Contract Demand as per latest Bill	kVA	112
Minimum Billable demand at present scenario	kVA	89.96
Recommended Contract Demand	kVA	55
Annual billed fixed charges at present contract demand	Rs.	1,25,384
Annual billed fixed charges at recommended contract demand	Rs.	66,000
Annual monetary saving	Rs.	59,384
Investment	Rs.	Nil
Payback period	months	Immediate

5.2 IMPROVEMENT IN ANNUAL AVERAGE POWER FACTOR FROM 0.80 TO 0.99 BY INSTALLING 40KVAR APFC AT MAIN INCOMER

Observation

The annual average power factor as per electricity bill is 0.80 while the power factor varies from 0.66 to 0.89. There is indirect penalty if power factor is less than unity as billing is in Rs/kVAh. At present there is no provision for improvement in power factor for the facility.

Recommendation

The recommended to install 40kVA APFC to maintain power factor for the facility close to unity. The trend of running and recommended power factor is as below:

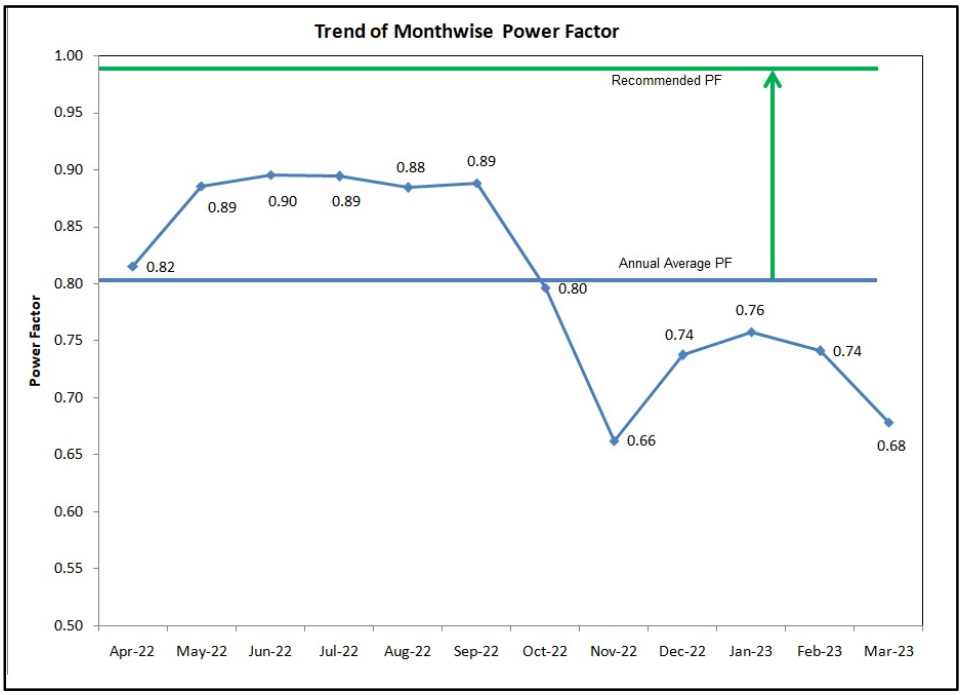


Figure 20: Improvement in Power Factor

APFC is an automatic power factor control panel which is used to improve the power factor, whenever required, by switching ON and OFF the required capacitor bank units automatically. It becomes very much important to reduce on electrical consumption for reducing expenditure and economizing the utility expenses by harnessing electrical utility by operation at desired power factor to curtail unwanted electricity penalty rising because of power factor drop. It also helps us to keep reactive power consumption low from the system and thus keeping MDI low. The calculated saving from implementation of measures is as below:

Description	UoM	Values
Annual Average Power Factor		0.803
Recommended Power Factor		0.99
Annual billed energy consumption at present Power Factor	kVAh	55,548
Annual energy consumption	kWh	45,762
Annual billed energy consumption at improved Power Factor	kVAh	46,224
Annual Energy saving at improved power factor	kVAh	9,324
Annual monetary saving	Rs.	59,952
Investment (inspection and installation of 40kVAr APFC)	Rs.	45,000
Payback period	months	9.0

5.3 ENSURING SWITCHING OFF THE LIGHTS WHEN THERE IS NO OCCUPANCY IN THE RESPECTIVE CLASS ROOM OR OFFICE AREAS

Observations

During lux level measurement, it was observed that many rooms were locked but the ceiling fans and lights were running in the area. During college closing time, the running load was around 11.0kW which indicates that load was running considering minimum 50% (5.5kW) necessary running load, 50% load was which can be switched off.

Recommendation

The lighting controls such as motion detectors or timers and dimmers can help reduce your energy consumption by automatically controlling your lights efficiently. The turning off the lights when leaving the classrooms/office is a cost-effective way to reduce wasted energy. It can be achieved by capacity building of the students through training, awareness on energy conservation through different competitions and lectures and giving them the role of energy warriors to ensure that no lights/fans etc. is running when room are empty. This can lead to energy saving of 50- 60 units on daily basis. The saving calculations are as below:

Description	Units	Value
Running load considered for the measures	kW	3.6
Load which is non-essential and can be switched off automatically	kW	1.4
Annual operating days		300
Operating hours	hours	6
Annual energy saving after capturing non-essential load	kVAh	2,728
Annual monetary saving	Rs.	18,089
Investment	Rs.	16,200
Payback period	months	10.7

5.4 REPLACEMENT OF THE CONVENTIONAL LIGHTS (FTL- 12 AND T- 8) WITH NEW (20W LED) ENERGY EFFICIENT LIGHTS

Observations

The FTL and T- 8 fittings are considered for the replacement. The connected load of these lights is around connected load of the conventional lights is around 16.8kW (354nos).

Recommendation

It is recommended to replace the conventional lights with LED lights. Both types of fittings can be replaced with 20W LED lights. LED lighting is far more energy efficient; it will reduce electricity consumption and lower utility bill. Since all the lights are not working condition, only 100no of lights which are installed in commonly used areas are considered for replacement. The saving calculations are as below:

Description	Units	Value
Approximate Connected of lights considered for replacement	kW	5.4
Number of lights considered for replacement		100
Rated power of the LED lights considered for replacement	W	20
Annual energy consumption at present scenario	kWh	7,776
Annual energy consumption after implementation of measure	kWh	3,600
Annual energy saving	kVAh	4,640
Annual monetary saving	Rs.	29,835
Investment@ Rs 450/fitting	Rs.	45,000
Payback period	months	18.1

Based upon the results, the rest of FTL- 12, 8 and T-5 can also be replaced with energy efficient LED lights.

5.5 REPLACEMENT OF 50 NUMBER OF OLD CEILING FANS WITH NEW 35W ENERGY EFFICIENT BLDC FANS

Observations

The connected load of the 50 old ceiling fans is around 3.5kW. These fans are very old, heavy and consume huge energy.

Recommendation

BLDC motor is used in the BLDC ceiling fan as compared to induction motor in normal ceiling fan. The lifespan of these fans is more than a normal ceiling fan because there is no heat generated in BLDC Motor hence its increases lifespan of ceiling fan bearings. There are fewer chances for the winding failure due to the use of high thickness copper wire in the winding. BLDC fan can save 60% electricity in the ceiling fan. The saving calculations are as below:

Description	Units	Value
Approximate Connected considered for replacement	kW	3.5
Number of fans to be replaced		50
Rated power of the new fans	W	35
Annual energy consumption at present scenario	kWh	6,930
Annual energy consumption after implementation of measure	kWh	3,150
Annual energy saving	kWh	3,780
Annual monetary saving	Rs Lakh	25,061
Investment@ Rs 2400/fan	Rs Lakh	1,20,000
Payback period	months	57

5.6 INSTALLATION OF 45.0KWP CAPACITY GRID CONNECTED SOLAR PV SYSTEM FOR LIGHTING LOAD AND OTHER LOAD

Observation

The contract demand for the college campus as per electricity bill is 112kVA. This region of Punjab has immense potential for quality solar irradiation, harnessing of this resource can be best suited to meet the energy requirements. Punjab is endowed with vast potential of solar energy with over 300 days of sunshine in a year. The data source derived from website of Punjab Energy Development Agency and from a PVGIS satellite station indicates that insolation level varying between 4- 7 kWh/m^2. There is enough space on roof top in facility where SPV can be installed. The SDA in this region has notification for promoting Renewable energy sources.

Recommendation

It is recommended to put Grid connected Solar PV System. The recommended rated power for the SPV system is 45.0kWp. In Grid connected Solar Rooftop PV system the DC power generated from SPV panel is converted to AC power using power conditioning unit. Generated Power by this system during the day time is utilized fully for powering captive loads and excess power is fed to the Grid. Grid connected Solar Rooftop system is operational so long as grid is available. In case, where solar power is not sufficient due to cloud cover etc., the captive loads are served by drawing power from the grid. The Advantages of Grid-Connected Rooftop Solar System is as below:

1. Electricity generation at the consumption point therefore Savings in transmission and distribution losses.
2. Low gestation time.
3. No requirement of additional land.
4. Improvement of tail-end grid voltages and reduction in system congestion with higher self-consumption of solar electricity.
5. Local employment generation.

The facility can also plan for system with battery back-up to shift lighting load from main power supply to solar power during day time. It will be a Hybrid system in which the battery bank could be charged both from Main, DG Set and SPV. The diagram for Hybrid System is as below:

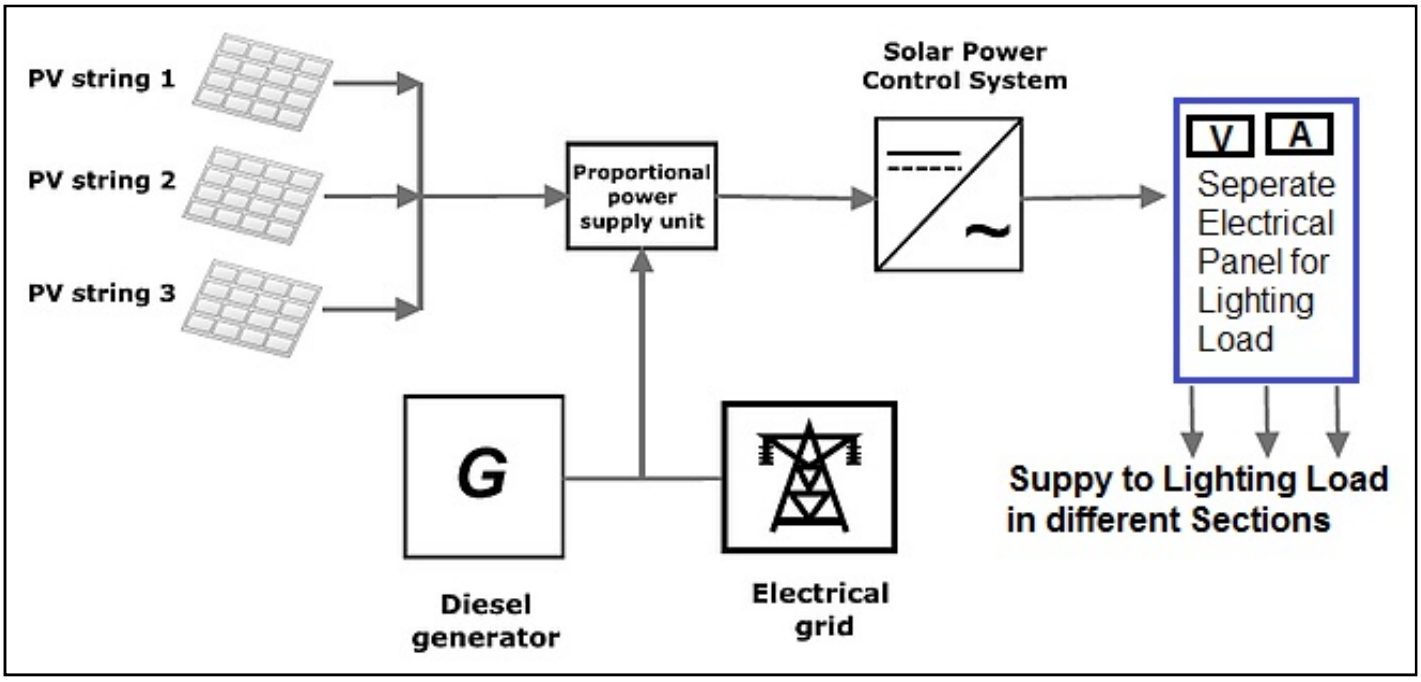


Figure 21: Grid Connected Hybrid SPV System

The saving calculation is done based upon grid connected system and cost is taken as per MNRE website. The detailed calculations are as below:

Description	Units	Value
Sanctioned load of Unit	kVA	112
Recommended capacity of SPV considering load reduction	kWp	45
Expected annual generation from SPV	kWh	45,000
Annual energy consumption at present scenario	kWh	45,762
Annual energy consumption after installation of SPV based upon energy bill	kWh	762
Annual energy saving based upon the present energy consumption scenario	kVAh	45,455
Annual monetary saving	Rs.	3,01,364
Investment @Rs. 38,500/kWp	Rs.	17,32,500
Payback period	months	69

5.7 INSTALLATION OF ENERGY MONITORING SYSTEM

Observation

In present scenario month wise energy bill is monitored however the season wise, section wise, power outage, in-house power generation is not monitored. The facility has one PSPCL energy meter to monitors the month wise energy consumption.

Recommendation

Considering all above facts we recommend the installation of Energy Monitoring System. Energy Monitoring System come with different software and parameters (regular and tailor made both) to best capture the process behavior. It has all the standard reports that one would expect from an EMS with following parameters:

- Real-time views & trends
- Historical views & trends
- Energy Reports
- Alarm Reports

The detail presentations of the parameters at standard screens and features make system understanding very easy. Once data is recorded, next time directly parameter will be captured for same quantity and material. This will lead to minimum variation of energy consumption with better control of parameter without human intervention. The one snapshot of report prepared is as below:

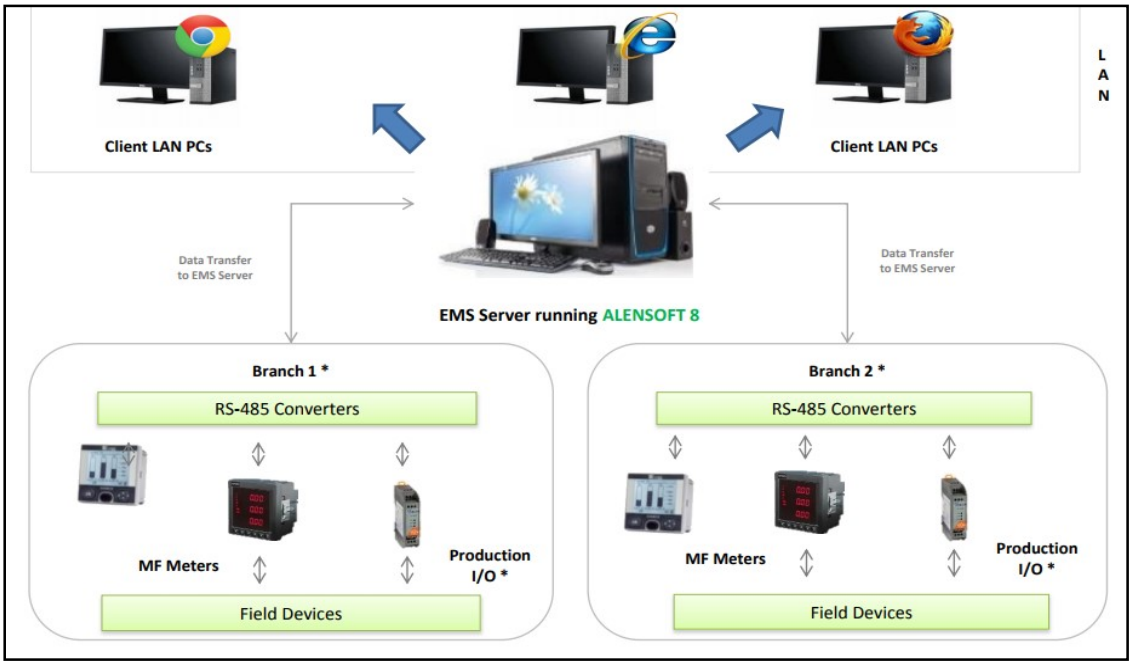


Figure 22: EnMS Report Snapshot

6. ANNEXURE

6.1 COPY OF ELECTRICITY BILL

PSEB Head Office, The Mall, Patiala | Tel. No. : 1912 | GSTIN - 03AAFCP5120Q1ZC
E-Mail : 1912@pspcl.in | CIN : U40109PB2010SGC033813 | Website: www.pspcl.in

3002309341030420230304202300036830000739001846O

Invoice Cum Bill Of Supply — Page No: 1

DS Category:Rate Category for DS>100KWA DPC
Original for Recipient Duplicate for Supplier

Circle	Division	Sub-Division	Bill Cycle	Bill Date	Bill No.
BHATINDA	MANSA DIVISION	SUBURBAN SUB DIVISION	03/2023	22.03.2023	50020747752

Due Date of Payment (By Cash/Online):03.04.2023
Payment by Local Cheque/DD can be made Upto:03.04.2023

To,
M/s NEHRU MEMORIAL COLLE
GE
COLLEGE ROAD
MANSA-151505-INDIA
Date of Connection :01.01.2000
Consumer GSTIN : State : Punjab Code : 03
Nature of Industry: MISCELLANEOUS (OTHERS)

Admissible Voltage (KV)	Supply Voltage (KV)	Metering Voltage (KV)	Contract Account No.: 3002309341 OLD: B45GC4500004
11.000	11.000	11.000	

	LOAD(KW)	Date	CD(KVA)	Date
SANCTIONED			112.444	
Intensive(Arc Furnace)				
Intensive(IND.FUR. & OTHERS)				
Ice Factory/Candy/Cold Store				
General/Mush. Prd.	101.200	03.04.2015		
Seasonal				
Total	101.200			

Place of Supply : PB Reverse Charge : N | Meter Make: L&T | Capacity: 5-10

Reading Dates (New)	Reading Dates (Old)	Period of Bill(Days)	Feeder Code	Name Of Feeder	Meter Equip Security	ACD	Interest on ACD & Security
22.03.2023	22.02.2023	28	FDC0000000826	College Road-F05L Conn To S/S DB10	20	81445	

MeterNo.Owner	Meter Status		Meter Reading New Status	Meter Reading Old Status	Meter Multiplier	Line CTR	MTR Ratio	Mtr.Volt. Ratio	Overall Multiplier	MMTS Correction	Addl.Supply Units	Consumption
19363713-PSPCL	O											
Last MCO Date	New Meter	MDI	6.714	7.538	1.00000	10/5	5/5	11000/110	2.00000			13.429
		KVAH	110041.900	108554.300					2.00000			2975
CTPT 10288-PSPCL 10288-PSPCL		KWH	91687.100	90678.200					2.00000			2018
	Old Meter	MDI										
Last SJO Date 21.02.2023 ZMSC		KVAH										
		KWH										

Total KWH: 2018 | Total KVAH: 2975 | MDI: 13.429 | PF : 0.68 | TOD on peak: 0 | TOD Off Peak : 0

(A) Fixed Charges

Contract Demand (L)KVA	Actual Demand KVA(A)	80% of (L)KVA(B)	A or B whichever greater (C) KVA	Rate per KVA/month (R)	Billing Days(D)	Fixed Charge= C*R*D*12/365 or 366	Amount Fixed Charge Amount(Rs.)
General	General	General	General	General		General	
112.444	13.429	89.96	89.96	125.00	28	10351	**10351**

(B) Energy Charges

Total KVAH	Tariff Rate	Amount	Energy Charges (Rs.)
	General	General	
2975	6.63	19724	**19724**

(C) Fuel Cost Adj Charges

KVAH Consumption	Rate of FCA/KVAH	Amount	FCA (Rs.)
		0	**0**

(D) Additional Surcharge***

KVAH Consumption	Rate	Amount	Add. Surcharge Amount
		0	**0**

(E) Rentals

Meter + CT/PT Rent for PSPCL Meter	MCB unit rental	Rent for any other Equipment	Total rent	SGST	CGST	Total Rent with Tax	Total Rent (Rs.)
1264	000		1,264.00	113.76	113.76	1,491.52	**1,491.52**

(F) Surcharges

Voltage Surcharge: Admissible Voltage	Voltage Surcharge: Actual Supply Voltage	Voltage Surcharge: Surcharge Rate	Voltage Surch. Amount	Demand Surcharge: Demand in Excess	Demand Surcharge: Rate of Demand surch	Demand Surcharge: Amount of Demand surch	TOD Surcharge: Peak Hours (6 PM to 10PM)	TOD Surcharge: Rate	TOD Surcharge: Amount	Total Surcharge (Rs.
11.000	11.000				0.00				0	**0**

(G) Rebates

Voltage Rebate: Units	Voltage Rebate: Rate	Voltage Rebate: HT/EHT Rebate	1P supply Rebate	Threshold Rebate: KVAH eligible for Rebate	Threshold Rebate: Rate	Threshold Rebate: Amount	TOD Rebate: Non Peak Hours (10PM to 6AM)	TOD Rebate: Rate	TOD Rebate: Amount	Total Rebate (Rs.)
2975	0.20-	595	0.00						0	**595.00**

6.2 REGISTRATION OF FIRM WITH BEE

ऊर्जा दक्षता ब्यूरो
(भारत सरकार, विद्युत मंत्रालय)
BUREAU OF ENERGY EFFICIENCY
(Government of India, Ministry of Power)

15 YEARS OF CELEBRATING THE MAHATMA

17/05/ESCO/22-23/ ५३५१ -५२०

15th September,2022

Shri Hardeep Kaur
Partner
Indona Innovative Solutions
8/W-11, Railway Road,
Opposite Onkar Feed Store Dinanagar,
District Gurdaspur, Punjab- 143531

Sub: Empanelment of Energy Service Company (ESCO)

Dear Sir,

This has reference to your application for empanelment/ re-empanelment as an Energy Service Company with BEE in response to our advertisement for re-empanelment and fresh empanelment of ESCOs in the month of May, 2022.

Consequent to scrutiny and evaluation of your documents by SEBI accredited Grading Agencies CRISIL/CARE Advisory/ICRA Analytics/SMERA/ IRR Advisory in terms of the approved parameters for evaluation, BEE is pleased to inform that your company **Indona Innovative Solutions** has qualified for empanelment with BEE as a **Grade 3** Energy Service Company (ESCO). This empanelment would be effective from 16th August, 2022 and will be valid till 15th August, 2024.

Further, the list of all the empanelled ESCOs along with grade assigned is uploaded on its website (www.beeindia.gov.in) for use by State/Central government/Public Sector agencies as well as by any other agency interested in implementing energy efficiency projects on ESCO mode. Please acknowledge your acceptance to this letter.

Yours faithfully,

(Arijit Sengupta)
Director

स्वहित एवं राष्ट्रहित में ऊर्जा बचाएँ Save Energy for Benefit of Self and Nation

चौथा तल, सेवा भवन, आर० के० पुरम, नई दिल्ली–110 066, वेबसाईट/Website : www.beeindia.gov.in
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6.3 ISO CERTIFICATE OF THE FIRM

CERTIFICATE

This is to Certify that the Management System of

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IAF Code: 34, 37 NACE Code: 74.90, 85.59

:: Certificate No :: IN121298A

Date of initial registration	Date of this Certificate	Surv. audit on or before / Certificate expiry	Recertification Due
08 December 2022	08 December 2022	07 December 2023	07 December 2025

This Certificate remains valid subject to satisfactory surveillance audits.

Director

QMS

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6.4 LIST OF VENDORS

For Interlocking and Automation

- Monaco Energy
- Indona Innovative Solutions
- ENCON India Pvt. Limited

For Energy Efficient Lighting

- EESL
- RL Consumer Products
- Philips India Limited
- Avni Energy Solutions Pvt Ltd

For Energy Efficient Lighting

- EESL
- Sawhney Electrical Works
- M.G Engineers

For SPV

- Azure Power India Private Limited
- Acme Roof Top Systems Private Limited
- Ujaas Energy Limited
- M/S Mittal Machines Pvt Ltd

6.5 ONSITE MEASUREMENTS

----------End of Report----------

Nehru Memorial Govt. College, Mansa

Report on

Environmental Audit
10 September 2023

SCO 97, Bhattan Street. Nabha, Dist. Patiala, Punjab-147201
Website: www.revolutionary.co.in; Contact: 7888752963 / 9988064638

RC/ENV-AU18; Rev: 00

Vinay Kumar Jham
Lead Assessor

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ACKNOWLEDGEMENT

REVOLUTIONARY CONSULTANTS, Patiala, Punjab takes this opportunity to appreciate & thank the management of Nehru Memorial Govt. College; Mansa for giving us an opportunity to conduct environmental audit for the campus of the college.

- Placement and Admission Cell
- Education dept including Labs
- Canteen, Library & Toilets
- Lawn, Parking, Admin Block, Auditorium

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

Audit Team:

Name: ***Vinay Kumar Jham*** (Lead Assessor)

Qualification: -BSc Hons Chemistry – Delhi University

-Msc in Chemistry in 1972 – Delhi University

-PG Diploma Sales & Marketing 1973 FMS, Delhi University

Experience: -Worked in PSU – Andrew Yule & Company from 1972 till 2007

-After retirement; completed Lead Auditor Course in ISO standards 9001, 14001, 45001, 21001.

-Completed 2000 man- days as second- & third-party auditor Also a Lead tutor for auditing process and auditing awareness.

Vinay Kumar Jham

Lead Assessor

REVOLUTIONARY CONSULTANTS PUNJAB

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Name: ***Ankur Singla*** (Auditor)

Qualification: -B.tech (M.E.) – PTU, Jalandhar

Experience: -Working in ISO systems from 01 decade

-LA in ISO 9001, 14001, 45001, 21001, ISO 50001

-Completed 1000 man- days as second- & third-party auditor

Vinay Kumar Jharo
Lead Assessor

Environmental Audit is a systematic process of identification, quantification, recording, reporting and analysis of components of environmental diversity of various establishments. Environmental audit was initiated with the beginning of 1970s 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 objective of Environmental audit

- To determine usage/wastage of energy or water or other resources;
- Implement changes to ascertain optimum usage of resources and make savings.
- To evaluate type, quality and quantity of waste generated in premises.
- To determine waste handling and processing practices to reduce, recove and recycle the generated waste.
- To promote health consciousness and environmental awareness, values and ethics among stake holders of organization.

Globalization with rapid urbanization has led to socio economic and environmental crises. To tackle these issues and impart awareness among generations it is highly important to adopt the system of the Green Campus for the institutes. This may lead for sustainable development and at the same time reduce a sizable amount of atmospheric greenhouse gases from the environment.

Vinay Kumar Jham
Lead Assessor

The aim of the environmental Audit is to review the overall environment management systems. Depending on the types of standards and the focus of the audit, there are different types of environmental audits.

Organizations now recognize the importance of environmental matters and accept that their environmental performance should be scrutinized to understand its impact and to take remedial measures to lessen it.

Environmental auditing is used to

- Investigate
- Understand and
- Identify

These are then used to help in improving existing human activities, with the aim of reducing the adverse effects of these activities on the environment.

An environmental auditor studies an organization's environmental effects in a systematic and documented manner and produces an environmental audit report.

Environmental audit for the university has examined the following systems

- Water Management
- Waste Management
- Health and safety management
- Sanitation management
- Adopted Green practices
- Biodiversity

Vinay Kumar Jham
Lead Assessor

General Details

Project site: Nehru Memorial Govt. College; Mansa

Project Team: **Vinay Kumar Jham & Ankur Singla**

Lead Auditor & Sr. Consultant (IMS), Member of QCI & NSC, India, Revolutionary Consultants

1. About Project site

It was to realize India's first Prime Minister Pandit Jawaharlal Nehru's dream of an educationally rich and vibrant India that Advocate, Late Sh. Des Raj, former Health Minister, Punjab and Member, Punjab Public Service Commission, and some of his friends established this institution of higher learning in 1965 in Pandit Nehru's memory.

Lovingly known as Babu Des Raj to one and all, he was a visionary fired with missionary zeal to dispel the darkness of ignorance by spreading the light of knowledge. His untiring efforts and those of his friends, who shared his ideas and his concern for the people of this predominantly rural area, bore fruit in the form of this College.

The foundation stone of the College building was laid by Late Comrade Ram Kishen, the then Chief Minister of Punjab, on 18th August 1965. The old building had a small administrative block, three laboratories, and five classrooms; out of these five, one doubled as a library also.

Vinay Kumar Jham
Lead Assessor

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Mansa, then a Tehsil of Bathinda, was educationally one of the most impoverished areas of the Malwa region of Punjab. Under the able guidance of founder President of the College Managing Committee Babu Des Raj, and very competent leadership provided by Sh. B. P. Mohan, the founder Principal of the College, Nehru Memorial College happened to be the first coeducational College which catered to the educational needs of the area for about three decades before being taken over by the Govt. of Punjab on March 18, 1994; it was then rechristened as Nehru Memorial Government College. The taking over of the College by the Punjab Govt. was a defining moment for the College in many ways.

Principal Message:

ਪਿਆਰੇ ਵਿਦਿਆਰਥੀਓ !

ਯੁਵਾ ਸ਼ਕਤੀ ਕਿਸੇ ਵੀ ਕੌਮ ਦੀ ਸਭ ਤੋਂ ਵੱਡੀ ਤਾਕਤ ਹੁੰਦੀ ਹੈ। ਨੌਜਵਾਨ ਵਰਗ ਦੇਸ਼ ਦੇ ਵਿਕਾਸ ਦੀ ਨੀਂਹ ਹੁੰਦਾ ਹੈ। ਜਿਹੜੇ ਨੌਜਵਾਨਾਂ ਦੇ ਦਿਲਾਂ 'ਚ ਅੱਗੇ ਵੱਧਣ ਦੀ ਤਾਂਘ, ਅੱਖਾਂ 'ਚ ਸੁਨਹਿਰੀ ਭਵਿੱਖ ਦੇ ਸੁਪਨੇ, ਮਨ 'ਚ ਇਕਾਗਰਤਾ, ਸੋਚ 'ਚ ਪ੍ਰਗਤੀਸ਼ੀਲਤਾ, ਵਿਚਾਰਾਂ 'ਚ ਨਿਵੇਕਲਾਪਣ, ਸਰੀਰ 'ਚ ਤਾਕਤ, ਹਿੰਮਤ, ਫੁਰਤੀਲਾਪਣ ਆਦਿ ਹੋਣ, ਉਹ ਨੌਜਵਾਨ ਸੁਨਿਸ਼ਚਿਤ ਹੀ ਇੱਕ ਸੁਚੱਜਾ, ਨਰੋਆ ਨਿੱਖਰਿਆ ਅਤੇ ਸਿਹਤਮੰਦ ਸਮਾਜ ਸਿਰਜ ਸਕਦੇ ਹਨ। ਪਰ ਇਹ ਸਭ ਤਾਂ ਹੀ ਸੰਭਵ ਹੈ ਜੇਕਰ ਨੌਜਵਾਨਾਂ ਦੀਆਂ ਸਰੀਰਕ, ਮਾਨਸਿਕ ਭਾਵਨਾਤਮਕ ਅਤੇ ਸਮਾਜਿਕ ਬਿਰਤੀਆਂ ਨੂੰ ਸਹੀ ਦਿਸ਼ਾ ਪ੍ਰਦਾਨ ਕੀਤੀ ਜਾਵੇ। ਇਹ ਸਹੀ ਦਿਸ਼ਾ ਵਿੱਦਿਆ ਰਾਹੀਂ ਹੀ ਸੰਭਵ ਹੈ, ਜਿਸ ਵਿੱਚ ਚੰਗੇ ਵਿੱਦਿਅਕ ਅਦਾਰਿਆਂ ਦੀ ਅਹਿਮ ਭੂਮਿਕਾ ਹੈ।

ਨਹਿਰੂ ਮੈਮੋਰੀਅਲ ਸਰਕਾਰੀ ਕਾਲਜ ਮਾਨਸਾ ਜ਼ਿਲ੍ਹੇ ਦਾ ਅਜਿਹਾ ਹੀ ਇੱਕ ਸਿਰਮੌਰ ਵਿੱਦਿਅਕ ਅਦਾਰਾ ਹੈ, ਜੋ ਲੰਮੇ ਸਮੇਂ ਤੋਂ ਵਿਦਿਆਰਥੀਆਂ ਦੇ ਸਰਵਪੱਖੀ ਵਿਕਾਸ ਲਈ ਪ੍ਰਗਤੀਸ਼ੀਲ ਰਿਹਾ ਹੈ। ਇਸ ਸੰਸਥਾ ਨੇ ਉੱਚ ਕੋਟੀ ਦੇ ਪ੍ਰੋਫੈਸਰ, ਪੱਤਰਕਾਰ, ਅਧਿਆਪਕ, ਡਾਕਟਰ, ਵੀਕਲ, ਖਿਡਾਰੀ, ਕਲਾਕਾਰ, ਨੇਤਾ ਅਤੇ ਸਮਾਜ ਸੇਵੀ ਸਮਾਜ ਦੀ ਝੋਲੀ ਪਾਏ ਹਨ। ਇਹਨਾਂ ਵੱਖ-ਵੱਖ ਪੱਦਵੀਆਂ 'ਤੇ ਸੁਸੋਭਿਤ ਵਿਦਿਆਰਥੀਆਂ ਨੇ ਜਿੱਥੇ ਸੰਸਥਾ ਦਾ ਨਾਂ ਰੋਸ਼ਨ ਕੀਤਾ ਹੈ, ਉਥੇ ਇਹ ਵਿਦਿਆਰਥੀ ਆਪਣੀਆਂ ਅਗਲੀਆਂ ਪੀੜ੍ਹੀਆਂ ਤੇ ਨਵੇਂ ਵਿਦਿਆਰਥੀਆਂ ਲਈ ਚੰਗੇ ਮਾਰਗ ਦਰਸ਼ਕ ਅਤੇ ਆਦਰਸ਼ ਬਣੇ ਹੋਏ ਹਨ।

ਅੱਜ ਦੀ ਤੀਬਰ ਰਫ਼ਤਾਰ ਅਤੇ ਕਠਿਨ ਮੁਕਾਬਲੇ ਦੇ ਦੌਰ 'ਚ ਵਿਦਿਆਰਥੀਆਂ ਨੂੰ ਆਤਮ-ਨਿਰਭਰ ਕਾਬਿਲ ਅਤੇ ਯੋਗ ਬਣਾਉਣ ਲਈ ਅਤੇ ਉਹਨਾਂ ਦੇ ਸਰਵਪੱਖੀ ਵਿਕਾਸ ਲਈ ਇਹ ਕਾਲਜ ਆਧੁਨਿਕ ਵਿਸ਼ਿਆਂ ਦੀ ਸਿੱਖਿਆ, ਖੇਡਾਂ, ਸੱਭਿਆਚਾਰਕ ਅਤੇ ਸਾਹਿਤਕ ਗਤੀਵਿਧੀਆਂ, ਐਨ.ਐਸ.ਐਸ, ਯੁਵਕ ਭਲਾਈ ਗਤੀਵਿਧੀਆਂ, ਲੀਗਲ ਲਿਟਰੇਸੀ, ਰੈਡ ਕਰਾਸ, ਕੈਰੀਅਰ ਗਾਈਡੈਂਸ, ਕੰਪਿਊਟਰ ਸਿੱਖਿਆ ਅਤੇ ਅਨੇਕਾਂ ਹੋਰ ਉਸਾਰੂ ਸਰਗਰਮੀਆਂ ਦਾ ਪਲੇਟਫਾਰਮ ਪ੍ਰਦਾਨ ਕਰਦਾ ਹੈ। ਆਪਣੇ ਭਵਿੱਖ ਪ੍ਰਤੀ ਸੁਚੇਤ, ਈਮਾਨਦਾਰ, ਮਿਹਨਤੀ ਤੇ ਲਗਨ ਵਾਲੇ ਵਿਦਿਆਰਥੀ ਸਮਾਜ 'ਚ ਅਹਿਮ ਸਥਾਨ ਅਤੇ ਪਹਿਚਾਣ ਬਣਾ ਲੈਂਦੇ ਹਨ ਅਤੇ ਸਫ਼ਲਤਾ ਦੇ ਸਿਖ਼ਰਾਂ ਤੀਕ ਉਡਾਰੀਆਂ ਲਾਉਂਦੇ ਹਨ।

ਮੈਨੂੰ ਪੂਰੀ ਉਮੀਦ ਹੈ ਕਿ ਇਸ ਕਾਲਜ ਦੇ ਵਿਦਿਆਰਥੀ ਕਾਲਜ ਦੇ ਨਿਯਮਾਂ ਦਾ ਪਾਲਣ ਕਰਦੇ ਹੋਏ ਅਨੁਸ਼ਾਸਨ ਵਿੱਚ ਰਹਿਕੇ ਆਪਣੇ ਸਰਵਪੱਖੀ ਵਿਕਾਸ ਲਈ ਹਮੇਸ਼ਾ ਯਤਨਸ਼ੀਲ ਰਹਿਣਗੇ ਅਤੇ ਕਾਲਜ ਦਾ ਨਾਂ ਰੋਸ਼ਨ ਕਰਨਗੇ। ਮੈਂ ਵਿਦਿਆਰਥੀਆਂ ਦੀ ਸਫ਼ਲਤਾ ਅਤੇ ਸੁਨਹਿਰੀ ਭਵਿੱਖ ਲਈ ਦੁਆ ਕਰਦਾ ਹਾਂ।

Some of the evidences of the college are attached in annexures.

Vinay Kumar Jham

Lead Assessor

REVOLUTIONARY CONSULTANTS PUNJAB

Nehru Memorial Govt. College; Mansa

2. Buildings and other allied Facilities

Sr. No.	Particulars	Space
1	Administration Building	Spacious
2	B.A, B.Com, B.Sc, M.A & M.Com	Spacious
3	Certificate Courses Integrated	Spacious and Creative
4	BCA, PGDCA, M.Sc, PG diploma	Spacious
5	Labs	Spacious and Creative
6	Sports Building	Spacious and Creative
7	Auditorium	Spacious and Creative
8	Library & closed Sports facility	Spacious
9	Toilet Blocks	Spacious
10	Parking Area	Spacious
11	Canteen	Spacious
12	Internal connecting Roads	Well maintained
13	Gardens	Spacious and Creative
14	In campus & transportation facility	Well maintained

Vinay Kumar Dham
Lead Assessor

REVOLUTIONARY CONSULTANTS PUNJAB

Aim:

To perform Environmental Audit of Nehru Memorial Govt. College; Mansa

Objectives:

To undertake comprehensive environmental sustainability assessment of an institutional campus with respect to

1. Water resources and management
2. Biodiversity and ecological assessment
3. Waste generation and management
4. Health and Safety management
5. Sanitation

Methodology

Primary data collection was done through

1. Direct field observations taken by audit team.
2. Semi structured interviews of students, teaching staff and administrative staff.
3. Photo documentation.

Secondary data was acquired from administrative office of the college

Vinay Kumar Dham
Lead Assessor

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A. **Assessment of building infrastructure**

Sr. No.	Particulars	Space	Ventilation	Natural Light	Cleanliness	Remark
1	Administration	Spacious	Good	Good	Good	
2	B. A, B. Com, BSC, M. A & M. Com	Spacious	Good	Good	Good	
3	Certificate Courses Integrated	Spacious	Good	Good	Good	
4	BCA, PGDCA, M.Sc, PG diploma	Spacious	Good	Moderate	Good	
5	Library & closed sports facility	Library Less Spacious	Good	Good	Good	
6	Canteen	Spacious	Good	Good	Good	
7	Toilet Blocks	Spacious	Good	Poor	Good	
8	Parking Area	Spacious	Good	Good	Good	
9	Staircases	Spacious	Good	Good	Good	

Vinay Kumar Dham
Lead Assessor

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B. **Water Resources & Management**:

Water source and storage

Bore well is the sole source that provides water to the whole campus of college. There are 01 big water tanks one, located in college.

Total storage capacity of these tanks is 22,000 litre. The tanks are filled daily. It has a pressurized pumping system. This big borewell operated by the water department established by the state government. Its maintenance, cleanliness is the responsibility of the employees of the concerned water department, who Deployed on duty by the department.

Because of sound water use planning, the campus is almost self-sufficient when it comes to clean water.

Water consumption

Water from water tanks goes to various water coolers/chillers, taps daily and is used, so the average water consumption of the institute can be considered as 22,000 litters per day. (as per secondary data)

Note: Total water consumption estimation was not under the scope of this audit.

There are no glasses for drinking water on water filters except in international school premises. Steel glasses should be kept on the filters.

Vinay Kumar Dham
Lead Assessor

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Water Harvesting Potential

There is a huge potential for rain water harvesting on the roof. The total roof area is estimated to have a water harvesting capacity of about 11,22,43 litres.

As reported by the management staff, in summer usually 15000 to 20000 litres are required to meet the daily water needs for one and a half months.

In the backdrop of water scarcity during the summer season, harnessing this rooftop water potential would be extremely beneficial.

C. Waste Generation & Management

1. Waste water Generation and Treatment

Sr. No.	Waste category	Method of disposal
1	From toilets	Closed drainage system
2	From Canteens & other buildings	Closed drainage systems

Sewerage water in the form of waste water mainly comes from college premises, canteens and toilets. All this water goes without stopping through the sewerage installed by the local municipal corporation. A committee has also been formed for proper management of water.

Vinay Kumar Dham
Lead Assessor

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2. Solid Waste

Sr. No.	Waste category	Method of disposal
1	Dry Waste	Disposed off in bins and taken away by MC
2	Wet waste and Garden waste	Composting in the campus
3	Biomedical waste	Disposed in separate bins and taken away by MC
4	E waste	No considerable E-waste has been generated as the institution took shape recently

Separate Dustbins for wet and dry waste

Vinay Kumar Dham
Lead Assessor

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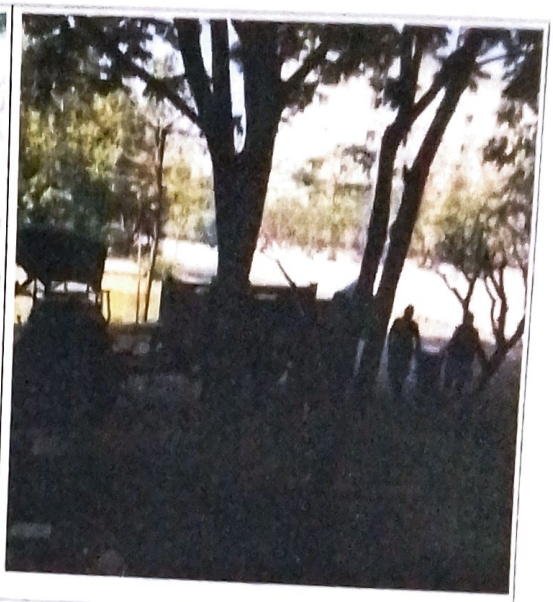

Garbage Collection

Compost Pit

Vinay Kumar Jham
Lead Assessor

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Observations –

1. Separate dust bins for dry waste and wet waste have been kept on all appropriate locations in campus like in each classroom, administrative building, and library buildings and in toilets. These small dust bins are emptied daily in bigger dust bins kept on each floor near toilet blocks. The waste from big sized dustbins are taken alternate days by MC. Cleanliness is satisfactorily maintained in the campus. Cleaning is properly and regularly done by appointed contractor's worker team.

2. A machine for destroying used sanitary napkins was arranged in the women's common room on the ground floor. All instructions are given on how to use this machine. Additionally, small rectangular dustbins are also provided for disposal of sanitary napkins, although they are not labeled as such.

3. They should be labeled indicating the dustbin for disposal of sanitary napkins.

D. Biodiversity

Name of Trees in Nehru Memorial College, Mansa

List of plants at college; Mansa

S. No.	Fruit plants	Medicinal plants	Shady plants	Ornamental plants
1	*Mangifera indica* Mango -1	*Ocimum tenuiflorum* (Tulsi) - 10	*Azadirachta indica* Neem -200	*Saraca asoca* Ashoka – 30
2	*Psidium guajava*	*Trminalia chebula* (harad)-1	*Terminalia arjuna*	*Hyphorbe lagenicaulis* Bottale palm -10

	Guava – 1		Arjun -500	
3	*Syzygium cumini* Jamun – 20	*Phyllanthus emblica* (Amla) -100	*Melia azedarach* Dek-500	Hibiscus – 50
4	*Musa balbisiana* Banana – 3	*Carissa carandas* (Kronda/Karanda)-2	*Tectona grandis* Teak (Sagwan) -8	*Dypsis lutescens* Erica palm-10
5	*Prunus avium* Cherry-5	*Moronia oleifera* (Drumstick tree) 400	*Neolamarckia cadamba* Kadam tree – 11	*Casurina equisetifolia* Casurina-1
6	Manilkara zapota Sapota-5	*Bauhinia varigeta* (Kachnar) -400	*Cassia fistula* Golden shower -7	*Clerodendrum splendens* Pgoda/-6
7	*Citrus limon* Lemon-500	*Punica granatum* Pomegranate -1	*Delonix regia* Flame of forest -100	*Bamboosa bamboosa* Bamboo plant – 10
8	*Ziziphus zuzuba* Ber-2	*Murraya koenigii* (Curry tree) -10	*Swietenia mahgoni* American mahogany-19	*Callistemon spp.* Bottle Brush-3
9	Bil-1	*Nyctanthes arbour-tristis* Tree of sadness-1	*Polyalthia longifolia* Mast tree – 6	*Alstonia scholaris* Satpatia-15
10		*Terminalia bellirica* (Bahera plant)-400	*Ficus religiosa* Pipal-20	*Chukrasia tabularis* Chukrasia-12

Vijay Kumar Gautam
Lead Assessor

REVOLUTIONARY CONSULTANTS PUNJAB

11		*Sapindus mukorossi* (Reetha plant) -1	Dalbergia sissoo Shisham-(Tahli) - 10	*Mimusops elengi* Monsari- 12
12		*Mimoso pudica* Touch me not- *2*	*Ficus bengalensis* Bohar-10	*Delonix regia* Gulmohar-20
13			*Eucalyptus terreticornis* Safeda-(200)	*Cassia fistula* Amaltas-20
14			*Carissa opacca* Garna-10	*Jacaranda mimosifolia* Jacaranda -10
15			Dhak-100	
Total	538	1328	1701	209

TOTAL – 3776

List of plants in front of College Building; Mansa

S. No.	Fruit plants	Medicinal plants	Shady plants	Ornamental plants
1	*Mangifera indica* Mango -2	*Azatirachita indica* Neam 15	*Melia azedarach* Dek 16+10	*Alstonia scholaris* Satpatia-6
2	*Psidium guajava*	*Murraya koenigii*	*Morus alba*	*Cassia fistula*

Vinay Kumar Jham
Lead Assessor

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	Guava – 3+3	(Curry tree) -1	Toot 3+3	Amaltas-1
3	*Syzygium cumini* Jamun – 4	*Ficus carica* Anjeer-1	*Carissa opacca* Garna-6	*Adhatoda indica* Bans-45
4	*Coleus ambonicusp* Bil-1	*Grewia asiatica* Phalsa-1		*Ficus benjamina* Ficus-8
5	*Prunus avium* Cherry-1	*Carissa carandas* Karonda-2		*Hibiscus indica* China Rose-1
6	Manilkara zapota Sapota-1	*Phyllanthus emblica* (Amla) -2		*Jasmine spp.* Jaismin-1
7	*Citrus limon* Lemon-2	*Moringa oleifera* Sohanjna-1		*Saraca asoca* Ashoka -76
8	*Ziziphus zuzuba* Ber-2			*Cestrum nocturnum* Night blooming-1
9	Pomegranate-3			*Hyphorbe lagenicaulis* Bottale palm -3
10	Peach-1			*Araucaria heterophyylla* *chrismis tree 5*
11	*Citrus spp.* Kinno 2			*Rosa indica* Rose 17
12	*Eribotrya*			

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Lead Assessor

	japonica Loquat 2			
Total	27	12	38	164

TOTAL – 241

Organization has various types of trees including: -

ਆਮਲਾ 100

ਅਰਜਨ 500

ਬਹੇੜਾ 400

ਬੇਰੀ 150

ਕਾਲੀ ਸਰੀਂਹ 25

ਦੇਸੀ ਕਿੱਕਰ 200

ਢੱਕ 100

ਲਸੂੜਾ 100

ਮਹਿੰਦੀ 75

ਜਾਮਣ 600

ਜੰਡ 200

ਜੰਗਲ਼ ਜਲੇਬੀ 200

ਕਚਨਾਰ 400

ਸੁਖਚੈਨ 600

ਖ਼ੈਰ 25

ਮੌਲਸਰੀ 50

ਵਣ 100

ਨਿੰਮ 200

ਪਿੱਪਲ20

ਪਿਲਖਨ 50

ਰਜੈਣ 600

ਰੇਰੂ 25

ਰਹੂੜਾ 100

ਸੋਹੰਜਨਾ 400

ਤੂਤ 25

ਕਨੇਰ ਪੀਲੀ 25

ਹਮੇਲੀਆਂ 25

ਡੇਕ 500

- Apart from this, some other plants are also in progress and many other aspects related to greenery are also present.

Vinay Kumar Jham
Lead Assessor

REVOLUTIONARY CONSULTANTS PUNJAB

Birds

List of birds at Mansa College,

SN	Common Name	Scientific Name
1	Red Collared Dove (M / F)	Streptopelia tranquebarica
2	Laughing Dove (M / F)	Spilopelia senegalensis
3	Green bee eater	Merops orientalis
4	Black Crowned Night heron	Nycticorax nycticorax
5	Common Tailor Bird (M)	Orthotomus sutorius
6	Purple Sunbird (M/F)	Leptocoma zeylonica
7	Purple Rumped Sunbird	Leptocoma zeylonica
8	Common Myna	Acridotheres tristis
9	Red vented Bulbul	Pycnonotus cafer
10	Red whiskered Bulbul	Pycnonotus jocosus
11	Ashy Prinia	Prinia socialis
12	Plain Prinia	Prinia inornata
13	Common Kingfisher	Alcedo atthis
14	Scaly breasted munia	Lonchura punctulata
15	House sparrow	Passer domesticus
16	Jungle Crow	Corvus culminatus
17	Common Swift	Apus apus
18	Eurasian Collared Dove	Streptopelia decaocto
19	Spotted Owlet	*Athene brama*
20	Indian Robin	Copsychus fulicatus
21	Yellow-wattled Lapwing	Vanellus malabaricus
22	Jungle Babbler	Argya striata
23	Asian Green Bee-eater	*Merops orientalis*
24	Yellow-footed Green Pigeon	Treron phoenicopterus)
25	Indian Peacock	(*Pavo cristatus*
26	Indian Hoopoe	*Upupa epops*
27	Parrot	Psittaciformes

Vinay Kumar Sharma
Lead Assessor

Insects

List of insects at Mansa College

Sr. No.	Common Name	Scientific Name
	Butterflies	
1	Mottled Emigrant	Catopsilia pyranthe
2	Common Crow	Euploea core
3	Common tiger	Danaus genutia
4	Common Pierrot	Castalius rosimon
5	Common grass yellow	Eurema hecabe
6	Lemmon Pancy	Junonia lemonias
	Flies	
1	Ditch Jewell	Brachythemis contaminata (Fam – Libillulidae)
2	Ruddy marsh skimmer	Crocothemis servilia (Fam –Labillulidae)
3	Wandering glider / Common Globe skimmer	Pantala flavescens (Fam – Libillulidae)
4	Crimson marsh glider	Trithemis aurora (Fam – Libillulidae)
5	Slender blue skimmer	Orthetrum luzonicum (Fam –Libillulidae)
	Millipede	
1	Yellow spotted millipede	Harpaphe haydeniana (Fam – Xystodesmidae)

Reptiles

List of reptiles at Mansa; College

Sr. No.	Common Name	Scientific Name
1	Common Indian Skink	Lampropholis guichenoti
2	Common garden lizard	Calotes versicolor

Mammals

List of mammals at Mansa College

Sr.No.	Common Name	Scientific Name
1	Three striped Palm Squirrel	Funambulus palmarum
2	Indian flying fox (Vatavaghul)	Pteropus giganteus

Scarlet marsh glider

Yellow spotted millipede

Common Indian skink

Common Pierrot

Plain Tiger

Baya Nest colony

Persicaria glabra

Santalum album

Lantana sp

F. Sanitation management

1. Refreshment Units were all observed clean and neat
2. A small separate dustbin has been kept for disposal of sanitary napkins however they are not labeled depicting 'dustbins for sanitary napkins disposal'

Observations

Regular cleaning of college campus and toilets is done by the cleaning staff. This involves dusting, floor cleaning and toilets cleaning. Garden and parking area is also kept clean.

Cleaning equipment's and washing liquids is provided to the cleaning staff monthly.

Safety gears have been provided to cleaning staff

A separate bin for sanitary waste disposal

G. Health and Safety Management

1. Fire extinguishers have been installed at various places in the campus. No incident of fire has been reported so far. Students should be trained to use a fire extinguisher.

2. The facility of first aid kit has been ensured under Red Cross in the campus.

3. The cleaning staff of the girls' toilet reported that they had found used sanitary napkins in the commode a couple of times. Therefore, girls should be encourage to destroy sanitary napkins.

Chapter 4

Green practices by college management

1. Boards displaying green messages like 'Save every drop of water' and 'Keep the campus clean' have been pasted at relevant places.

2. Traditional rain water harvesting practices adopted in the campus for ground water recharge.

3. Campus Movement has taken steps towards carbon neutrality in the main campus by prohibiting any vehicle facility from going beyond the parking facility.

4. Non-conventional energy sources like solar energy were promoted in the campus.

5.Leading to proper solid waste separation and disposal facilities in the premises.

6. Buildings have adequate amount of natural light and ventilation.

7. Separate dustbins have been kept for disposal of sanitary napkins. This is a good initiative towards separating biomedical synthetic waste. Although there should be such a label on the box.

8. Drip irrigation has been installed to water the plants.

9. Very good cleanliness is maintained in all the institutional college buildings. Cleaning has been outsourced and a stringent cleaning regime is maintained

Water management

- Waste water should be recycled for flushing and sweeping purposes with proper treatment.
- To increase the seepage of rain water into the ground, leak proof drains should be constructed along the paved ground area.

Waste management

• While composting for garden waste has been adopted, there is still a need for quantification and proper practices for waste composting to ensure recovery of compost from waste management.

• Waste water should be used for flushing and cleaning purposes.

• Discarded furniture, wires etc. should be audited and handed over to the scrap dealer.

• Discarded furniture etc. has been stored, but the area should be labeled as "Scrap Yard".

• Students are explained about waste management at the time of orientation. This should be done regularly as an induction programme.

• Disposable thermocol plates which are non-biodegradable are not used for college events. Since events are regular in the college, washable steel plates, Melamine crockery and biodegradable leaf plates (Patravali) are used keeping in mind a green sustainable practice.

• Adequate dustbins were kept for dry waste. For paper and plastic they should be labelled separately as both can be recycled.

3. Sanitation management

- Doormats should be put on toilet doors to avoid rooms getting dust and muck
- Separate bins kept for disposal of sanitary napkins should be labelled.

4. Health and safety management

• Along with updating the safety sign boards, mock drills should be conducted.

• Drinking water filters are kept away from toilets.

• Staff and students should be trained to use fire extinguishers.

• In the event of an accident, emergency exits in the building should be directed.

• SOPs of fire safety equipment have been displayed at appropriate places but their number should be increased.

5. Biodiversity

• Plantation of exotic bushes was observed for beautification of the campus. However some species of this exotic variety are weeds and can dominate the growth of local varieties.

• More importance should be given to the use of indigenous trees for landscaping the campus. Native trees host a variety of birds, insects and will help other native species thrive. Planting native trees with large canopies can also provide shade while keeping the area comparatively cooler.

• The institute campus has a rich animal diversity, especially of birds. To maintain and increase this diversity of birds and insects, the number of native fruit and flowering trees should be increased.

6. Other recommendations

- Green Roofs: College has a huge roof top area. Composted garden waste can be utilized for greening roofs. Roofs can be utilized for growing fruits and vegetables. This will not only provide food, aesthetic value but also will have cooling effect.
- The work of water harvesting systems should be completed soon to conserve rain water in the college campus.
- To further reduce the pollution caused by the use of generators, the smoke silencer should be made higher.
- Green initiative should be continued continuously.

Waste Management

Waste Management:

Quarter No.	Solid Waste	Liquid Waste	Biomedical Waste	E- Waste
Quarter 1	40.5 KG/DAY (Approx.)	4000 LIT/DAY (Approx.)		2
Quarter 2	41.2 KG/DAY (Approx.)	4000 LIT/DAY (Approx.)		1
Quarter 3	42.3 KG/DAY (Approx.)	1200 LIT/DAY (Approx.)		3
Quarter 4	48.4 KG/DAY (Approx.)	3000 LIT/DAY (Approx.)		2

(Quarters- Q1- June- Aug, Q2- Sept-Nov., Q3-Dec-Feb, Q4-March-May)
(Data in [KG & Litres] approximate average)

Composition

The composition of garbage in India indicates lower organic matter and high ash or dust contents. It has been estimated that recyclable content in solid wastes varies from 13 to 20% and combustible material is about 80-85%.

A typical composition of municipal solid waste is given below.

Description	Percent by weight
Leaves/Vegetable	20.15 (Approx.)
Grass	3.8 (Approx.)
Paper	1.81 (Approx.)
Plastic	0.62 (Approx.)
Glass, ceramics	0.44 (Approx.)
Metal	0.64 (Approx.)
Stones, ashes	2.81 (Approx.)
Miscellaneous	9.73 (Approx.)

PAPER WASTE MANAGEMENT:

Being an academic institution, waste paper is one of the main solid wastes generated in the premises. College has taken steps to minimize and avoid paper usage.

a) Prints and photocopies are taken on both sides of the paper to avoid excess paper usage. Rather than photocopy, digitalization (scanning) is practiced.

b) College has one floor library with 30K+ books; journals, magazines, newspapers are also available in the library. Library has an e-book facility having 2000+ e-journals. Four computers are provided in the library to access online services.

c) Internal notices and communications are through e-mail/ WhatsApp. College has a Learning Management System (LMS) where notices are sent, exam results are displayed.

d) Paper recycled is used for laboratory work. Remaining paper waste is sent to local vendor for recycling. The dissertation reports, journals and answer papers are stored as per the University.

PLASTIC WASTE:

College strictly follows the guidelines regarding plastic usage and has prohibited the use of single use plastic e.g. carry-bags, glasses, spoons etc., in the campus. staff members always conduct the awareness program to use only jute bags.

b) As per the College guidelines, Canteen Contractor is prohibited to use plastic cutlery, instead paper plates and wooden spoons are used.

ENVIRONNEMENTAL MONITORING: Environmental Awareness
Course: This is compulsory course introduced by SUS Govt. College, Sunam for second year students for all faculties. Under this course students learn to be environmentally friendly. They are made aware of

- Renewable and Non-renewable energy sources.
- Energy conservation.
- E-waste management.

AIR MONITORING: - Air quality in the academic institute is very important for health of the students, faculty and staff of the institute. The air pollution sources in the college campus are wind, pollen grains, natural dust, vehicular

emissions, and laboratory fumes etc. The air pollutants monitored are Ozone, Carbon monoxide, Sulphur dioxide (SO2). Ammonia. Oxides of Nitrogen as NO2, Particulate Matter (PM)

Monitoring for:

Air Monitoring Report (Near Main Gate)

AIR QUALITY	$\mu g/m^3$		
Pollutant	**minimum**	**Maximum**	**Average**
NO2	15	31	23
Ozone	13	339	238
SO2	4	30	16
CO	2	88	82
PM10	73	66	49
PM25	33		

NOISE POLLUTION: -

Noise pollution in an institute refers to the excessive, unwanted, or disruptive sound levels within an educational or academic institution, such as a school, college, university, or research facility. It is a form of environmental pollution that can have various negative effects on students, teachers, and staff, as well as the overall learning and working environment. Here are some key aspects of noise pollution in an institute:

Sources of Noise: Noise pollution in institutes can originate from various sources, including:

Classroom activities: Noise generated by students, teachers, and equipment during lectures, discussions, and practical sessions.
Construction and maintenance work: Noise from ongoing construction or renovation projects within or near the institution.

Vinay Kumar Dham
Lead Assessor

Outdoor sources: Traffic, industrial activities, and neighbouring establishments can contribute to noise pollution if they are in close proximity.

Recreational areas: Noise from sports facilities, playgrounds, or social gatherings can affect the learning environment.
Effects on Learning and Productivity: Excessive noise can disrupt the learning process and reduce concentration levels among students. It can also affect the productivity of teachers, researchers, and administrative staff, making it challenging to carry out their duties effectively.

Health Impacts: Prolonged exposure to high levels of noise pollution can lead to various health issues, such as stress, anxiety, hearing impairment, sleep disturbances, and even cardiovascular problems. These health issues can affect both students and staff.

Regulatory Measures: Many countries have regulations and guidelines in place to limit noise levels in educational institutions. These regulations often specify acceptable noise levels for different areas within the institution, such as classrooms, libraries, and outdoor spaces.

Mitigation Strategies: To address noise pollution in institutes, several mitigation strategies can be employed, including:

Soundproofing: Installing acoustic materials, such as sound-absorbing panels, carpets, and curtains, to reduce noise levels in classrooms and other spaces.
Scheduling: Planning construction and maintenance work during non-instructional hours to minimize disruption.
Education: Raising awareness among students and staff about the importance of reducing noise and practicing good noise etiquette.
Noise barriers: Erecting physical barriers or green spaces to shield the institution from external noise sources.
Technology: The use of technology, such as noise-cancelling headphones and acoustically designed classrooms, can also help mitigate the impact of noise pollution.

In summary, noise pollution in an institute refers to the adverse effects of excessive noise levels on the educational and working environment. It can have a significant impact on the well-being and performance of students, teachers,

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Lead Assessor

and staff, making it important to implement measures to reduce and manage noise pollution within educational institutions.

College is located in the beyond the main link road and there is no nearby railway station / bus stand / factory / theatre / playground / market / malls / banquet / marriage palace etc. So there is no much noise pollution.

Photographs of Environmental Consciousness:

The photographs are also a part of Report. This covers green area, utilities installed in the campus, Solar panels, Greenery, Safety Slogans, Environment Awareness Slogans, Green Policy, infrastructure, Outsourced process, Sports Facilities & etc.

Acknowledgement

Acceptance By the College

Confirmation	
Provide confirmation on accomplishment of Audit Criteria and Audit Objective	**The Audit is completed as per objective and audit criteria.**
Assessment of Other Shifts (if applicable) or Review of Other Shift Records	NA
Capture Temporary Site Details with proper Objective Evidence (Can be a part of Production sheet as well)	NA

Vinay Kumar Jha

Lead Assessor

ASSESSMENT COMMENTARY

Positive points:

1) Personnel involved in green audit are well-versed with the subject.
2) The infrastructure of the institute is excellent.
3) Adequate greenery is seen in the college campus.
4) Top management is committed to implementing all recommendations
5) The college has done a lot of work on event management to maintain environmental awareness.
6) It is a good idea to involve villages in increasing environmental awareness.
7) Botanical and herbal garden is a good concept.
8) The organization is working on green initiatives.

Vinay Kumar Dham
Lead Assessor

Mr. Vinay Kumar Jham

10.09.2023

Mr. Ankur Singla

10.09.2023

Vinay Kumar Jham
Lead Assessor

REVOLUTIONARY CONSULTANTS PUNJAB

THANK YOU...!

REVOLUTIONARY CONSULTANTS
SCO 97, Bhattan Street. Nabha,
Dist. Patiala, Punjab-147201
Website: www.revolutionary.co.in;
Contact: 7888752963 / 9988064638

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Lead Assessor

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GREEN AUDIT ASSESSMENT REPORT

Name of the Organization	Nehru Memorial Govt. College	
Address	Barnala Road, Distt. Mansa, Punjab - 151505, India	
Site Address (If any)	--	
No. of Employees	Total 36; including 21-teaching staff & 15 non-teaching staff	
No. of Shift	01-General	
E mail id	nmgcmansa786@gmail.com , enquirynmgc@gmail.com	
Contact Person	Dr. Lovleen (Principal)	
Website	http://www.nmgcmansa.ac.in	
Telephone/Fax	01652-232074	
Scope	"PROVIDING QUALITY EDUCATION PROMOTE RESEARCH, INNOVATION AND ENTREPRENEURSHIP. TRAINING THROUGH VARIOUS PROGRAMS IN THE FIELD OF MANAGEMENT, INFORMATION TECHNOLOGY, E-GOVERNESS AND AGRICULTURAL"	
Exclusion	--	
Audit Team	Lead Assessor: Vinay Kumar Jham Auditor: Ankur Singla Technical Expert: NA	No of Man-days : 02
Starting Date of Audit	25.08.2023	
End Date of Audit	25.08.2023	
Brief about the organization	It was to realize India's first Prime Minister Pandit Jawaharlal Nehru's dream of an educationally rich and vibrant India that Advocate, Late Sh. Des Raj, former Health Minister, Punjab and Member, Punjab Public Service Commission, and some of his friends established this institution of	

Vinay Kumar Jham
Lead Assessor

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	higher learning in 1965 in Pandit Nehru's memory. Lovingly known as Babu Des Raj to one and all, he was a visionary fired with missionary zeal to dispel the darkness of ignorance by spreading the light of knowledge. His untiring efforts and those of his friends, who shared his ideas and his concern for the people of this predominantly rural area, bore fruit in the form of this College. The foundation stone of the College building was laid by Late Comrade Ram Kishen, the then Chief Minister of Punjab, on 18th August 1965. The old building had a small administrative block, three laboratories, and five classrooms; out of these five, one doubled as a library also. Mansa, then a Tehsil of Bathinda, was educationally one of the most impoverished areas of the Malwa region of Punjab. Under the able guidance of founder President of the College Managing Committee Babu Des Raj, and very competent leadership provided by Sh. B. P. Mohan, the founder Principal of the College, Nehru Memorial College happened to be the first coeducational College which catered to the educational needs of the area for about three decades before being taken over by the Govt. of Punjab on March 18, 1994; it was then rechristened as Nehru Memorial Government College. The taking over of the College by the Punjab Govt. was a defining moment for the College in many ways. Late Sardar Beant Singh, the then Chief Minister of Punjab, who was largely instrumental in the Punjab Govt. taking over the College, graced the College with his presence at a function marking the inauguration of the College as Govt. College on 21st March, 1994.Sensing the growing needs of the College, liberal grants were sanctioned by the Punjab Govt. from time to time. Sardar Parkash Singh Badal, the then Chief Minister of Punjab, laid the foundation stone of the new (present) building on 7th August, 1997
Purpose of Audit	1) To verify the implementation of the Green Audit Management System as per the Standards Requirement, 2) Verification of Documented information of each process for the effective implementation. 3) Meeting all Regulatory Compliances.

Vinay Kumar Jham
Lead Assessor

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Green Audit Report

March-2023

GREEN AUDIT

Submitted to:
Nehru Memorial Govt. College,
Barnala Road, Mansa, Punjab
Pin-151505, India

Submitted by:
Revolutionary Consultants
SCO 97, Bhattan Street, Nabha
Pin-147201, Punjab, India

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Lead Assessor

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ACKNOWLEDGEMENT

REVOLUTIONARY CONSULTANTS, Patiala, Punjab takes this opportunity to appreciate & thank the management of Nehru Memorial Govt. College for giving us an opportunity to conduct green audit for the Following buildings of the college.

- Arts & Commerce-Graduation & Post Graduation
- Science
- Canteen, Library, Toilets & Water Works
- Park, Parking, Admin Block, Class Rooms, Smart Class Rooms,
- Multipurpose Sports Stadium &
- Gymnasium Hall

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

Green Audit Team:

Name:	Vinay Kumar Jham (Lead Assessor)
Qualification:	-BSc Hons Chemistry – Delhi University -Msc in Chemistry in 1972 – Delhi University -PG Diploma Sales & Marketing 1973 FMS, Delhi University
Experience:	-Worked in PSU – Andrew Yule & Company from 1972 till 2007 -After retirement; completed Lead Auditor Course in ISO standards 9001, 14001, 45001, 21001. -Completed 2000 man- days as second- & third-party auditor Also a Lead tutor for auditing process and auditing awareness.
Name:	Ankur Singla (Auditor)
Qualification:	-B.tech (M.E.) – PTU, Jalandhar
Experience:	-Working in ISO systems from 01 decade -LA in ISO 9001, 14001, 45001, 21001, ISO 50001 -Completed 1000 man- days as second- & third-party auditor

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Lead Assessor

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	Lead Assessor Declaration (Tick or cross Each Column as per applicability)
✓	Auditing is based on a sampling basis of the available documented information
✓	Audit is combined, joint or integrated. – Integrated
✓	The effectiveness of corrective actions are verified as raised in las Internal audit & management review meetings.
✓	Nonconformities are verified, now closed.
✓	Outcomes are effective and complying.
✓	The internal audit and management review process are effective and complying with the requirements.
✓	The scope of certification is appropriate.
✓	The capability of the management system to meet applicable requirements and expected
✓	The audit objectives has been fulfilled and achieved.

NEHRU MEMORIAL GOVT. COLLEGE, MANSA

Green Audit report

August 2023

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We help you grow...!

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ATTENDENCE SHEET:

NAME OF PERSON	DESIGNATION
Mr. Vinay Kumar Jham	Lead Assessor
Mr. Ankur Singla	Auditor
Mr. Ravinder Singh	Professor
Mr. Baljit Singh	Professor
Ms. Jyoti	Professor
Ms. Sonam	Professor
Mr. Ambesh Bhardwaj	Professor
Mr. Jaskaran Singh	Professor

Vinay Kumar Jham
Lead Assessor

Executive Summary:

The rapid urbanization and Economic Activities at local, regional and Global Level has given rise to Environmental Issues. The concept of Environment & Green Audit was formulated looking into seriousness of these issues to implement at the university campuses and colleges. This will also lead to sustainable Development.

Nehru Memorial Govt. College also took this initiative to have green policy with protection of Environment in their philosophy. The purpose of audit was to ensure good practices are initiated and maintained in the areas of Energy saving, Water management and clean air to mention few. This will ultimately impact the health of students.

The recommendations/ conclusions are arrived on the basis of Data submitted by the process owner on the basis of present scenario, looking into management controls implemented so far and identified risks for all the activities of campus.

1. Introduction

Green Audit is a systematic process of identification, quantification, recording, reporting and analysis of components of environmental diversity of various establishments. Green audit was initiated with the beginning of 1970s with the motive of inspecting the work conducted within the organizations whose exercises can cause risk to the health of inhabitants and the environment.

Globalization with rapid urbanization has led to socio economic and environmental crises. To tackle these issues and impart awareness among generations, it is highly important to adopt the system of the Green Campus for the institutes. This may lead for sustainable development and at the same time reduce a sizable amount of atmospheric greenhouse gases from the environment.

The aim of the Green Audit is to review the overall environment management systems. The objective and benefits of this green audit is:

a) Environmental Parameters awareness
b) Improve Environment standards of the institute
c) To reduce Depletion of resources
d) Disposal of Hazardous and Non-Hazardous wastages.

d) CSR for improving the Environments of entire campus and to involve neighborhood

Organizations now recognize the importance of environmental matters and accept that their environmental performance should be scrutinized to understand its impact and to take remedial measures to lessen it.

Environmental auditing is used to

- Investigate
- Understand and
- Identify

These are then used to help in improving existing human activities, with the aim of reducing the adverse effects of these activities on the environment.

An environmental auditor studies an organization's environmental effects in a systematic and documented manner and produces an environmental audit report.

Green audit for the university has examined the following systems

- Water Management
- Waste Management
- Health and safety management
- Sanitation management
- Adopted Green practices
- Biodiversity

1.1 About the College:

PRINCIPAL'S MESSAGE
ਸੰਦੇਸ਼

ਪਿਆਰੇ ਵਿਦਿਆਰਥੀਓ !

ਯੁਵਾ ਸ਼ਕਤੀ ਕਿਸੇ ਵੀ ਕੌਮ ਦੀ ਸਭ ਤੋਂ ਵੱਡੀ ਤਾਕਤ ਹੁੰਦੀ ਹੈ। ਨੌਜਵਾਨ ਵਰਗ ਦੇਸ਼ ਦੇ ਵਿਕਾਸ ਦੀ ਨੀਂਹ ਹੁੰਦਾ ਹੈ। ਜਿਹੜੇ ਨੌਜਵਾਨਾਂ ਦੇ ਦਿਲਾਂ 'ਚ ਅੱਗੇ ਵੱਧਣ ਦੀ ਤਾਂਘ, ਅੱਖਾਂ 'ਚ ਸੁਨਹਿਰੀ ਭਵਿੱਖ ਦੇ ਸੁਪਨੇ, ਮਨ 'ਚ ਇਕਾਗਰਤਾ, ਸੋਚ 'ਚ ਪ੍ਰਗਤੀਸ਼ੀਲਤਾ, ਵਿਚਾਰਾਂ 'ਚ ਨਿਵੇਕਲਾਪਣ, ਸਰੀਰ 'ਚ ਤਾਕਤ, ਹਿੰਮਤ, ਫੁਰਤੀਲਾਪਣ ਆਦਿ ਹੋਣ, ਉਹ ਨੌਜਵਾਨ ਸੁਨਿਸ਼ਚਿਤ ਹੀ ਇੱਕ ਸੁਚੱਜਾ, ਨਰੋਆ ਨਿੱਖਰਿਆ ਅਤੇ ਸਿਹਤਮੰਦ ਸਮਾਜ ਸਿਰਜ ਸਕਦੇ ਹਨ। ਪਰ ਇਹ ਸਭ ਤਾਂ ਹੀ ਸੰਭਵ ਹੈ ਜੇਕਰ ਨੌਜਵਾਨਾਂ ਦੀਆਂ ਸਰੀਰਕ, ਮਾਨਸਿਕ ਭਾਵਨਾਤਮਕ ਅਤੇ ਸਮਾਜਿਕ ਬਿਰਤੀਆਂ ਨੂੰ ਸਹੀ ਦਿਸ਼ਾ ਪ੍ਰਦਾਨ ਕੀਤੀ ਜਾਵੇ। ਇਹ ਸਹੀ ਦਿਸ਼ਾ ਵਿੱਦਿਆ ਰਾਹੀਂ ਹੀ ਸੰਭਵ ਹੈ, ਜਿਸ ਵਿੱਚ ਚੰਗੇ ਵਿੱਦਅਕ ਅਦਾਰਿਆਂ ਦੀ ਅਹਿਮ ਭੂਮਿਕਾ ਹੈ।

ਨਹਿਰੂ ਮੈਮੋਰੀਅਲ ਸਰਕਾਰੀ ਕਾਲਜ ਮਾਨਸਾ ਜ਼ਿਲ੍ਹੇ ਦਾ ਅਜਿਹਾ ਹੀ ਇੱਕ ਸਿਰਮੌਰ ਵਿੱਦਿਅਕ ਅਦਾਰਾ ਹੈ, ਜੋ ਲੰਮੇ ਸਮੇਂ ਤੋਂ ਵਿਦਿਆਰਥੀਆਂ ਦੇ ਸਰਵਪੱਖੀ ਵਿਕਾਸ ਲਈ ਪ੍ਰਗਤੀਸ਼ੀਲ ਰਿਹਾ ਹੈ। ਇਸ ਸੰਸਥਾ ਨੇ ਉੱਚ ਕੋਟੀ ਦੇ ਪ੍ਰੋਫੈਸਰ, ਪੱਤਰਕਾਰ, ਅਧਿਆਪਕ, ਡਾਕਟਰ, ਵੀਕਲ, ਖਿਡਾਰੀ, ਕਲਾਕਾਰ, ਨੇਤਾ ਅਤੇ ਸਮਾਜ ਸੇਵੀ ਸਮਾਜ ਦੀ ਝੋਲੀ ਪਾਏ ਹਨ। ਇਹਨਾਂ ਵੱਖ-ਵੱਖ ਪੱਦਵੀਆਂ 'ਤੇ ਸੁਸੋਭਿਤ ਵਿਦਿਆਰਥੀਆਂ ਨੇ ਜਿੱਥੇ ਸੰਸਥਾ ਦਾ ਨਾਂ ਰੋਸ਼ਨ ਕੀਤਾ ਹੈ, ਉਥੇ ਇਹ ਵਿਦਿਆਰਥੀ ਆਪਣੀਆਂ ਅਗਲੀਆਂ ਪੀੜ੍ਹੀਆਂ ਤੇ ਨਵੇਂ ਵਿਦਿਆਰਥੀਆਂ ਲਈ ਚੰਗੇ ਮਾਰਗ ਦਰਸ਼ਕ ਅਤੇ ਆਦਰਸ਼ ਬਣੇ ਹੋਏ ਹਨ।

ਅੱਜ ਦੀ ਤੀਬਰ ਰਫ਼ਤਾਰ ਅਤੇ ਕਠਿਨ ਮੁਕਾਬਲੇ ਦੇ ਦੌਰ 'ਚ ਵਿਦਿਆਰਥੀਆਂ ਨੂੰ ਆਤਮ-ਨਿਰਭਰ ਕਾਬਿਲ ਅਤੇ ਯੋਗ ਬਣਾਉਣ ਲਈ ਅਤੇ ਉਹਨਾਂ ਦੇ ਸਰਵਪੱਖੀ ਵਿਕਾਸ ਲਈ ਇਹ ਕਾਲਜ ਅਧੁਨਿਕ ਵਿਸ਼ਿਆਂ ਦੀ ਸਿੱਖਿਆ, ਖੇਡਾਂ, ਸੱਭਿਆਚਾਰਕ ਅਤੇ ਸਾਹਿਤਕ ਗਤੀਵਿਧੀਆਂ, ਐਨ.ਐਸ.ਐਸ, ਯੁਵਕ ਭਲਾਈ ਗਤੀਵਿਧੀਆਂ, ਲੀਗਲ ਲਿਟਰੇਸੀ, ਰੈਡ ਕਰਾਸ, ਕੈਰੀਅਰ ਗਾਈਡੈਂਸ, ਕੰਪਿਊਟਰ ਸਿੱਖਿਆ ਅਤੇ ਅਨੇਕਾਂ ਹੋਰ ਉਸਾਰੂ ਸਰਗਰਮੀਆਂ ਦਾ ਪਲੇਟਫਾਰਮ ਪ੍ਰਦਾਨ ਕਰਦਾ ਹੈ। ਆਪਣੇ ਭਵਿੱਖ ਪ੍ਰਤੀ ਸੁਚੇਤ, ਈਮਾਨਦਾਰ, ਮਿਹਨਤੀ ਤੇ ਲਗਨ ਵਾਲੇ ਵਿਦਿਆਰਥੀ ਸਮਾਜ 'ਚ ਅਹਿਮ ਸਥਾਨ ਅਤੇ ਪਹਿਚਾਣ ਬਣਾ ਲੈਂਦੇ ਹਨ ਅਤੇ ਸਫ਼ਲਤਾ ਦੇ ਸਿਖ਼ਰਾਂ ਤੀਕ ਉਡਾਰੀਆਂ ਲਾਉਂਦੇ ਹਨ।

ਮੈਨੂੰ ਪੂਰੀ ਉਮੀਦ ਹੈ ਕਿ ਇਸ ਕਾਲਜ ਦੇ ਵਿਦਿਆਰਥੀ ਕਾਲਜ ਦੇ ਨਿਯਮਾਂ ਦਾ ਪਾਲਣ ਕਰਦੇ ਹੋਏ ਅਨੁਸ਼ਾਸਨ ਵਿੱਚ ਰਹਿਕੇ ਆਪਣੇ ਸਰਵਪੱਖੀ ਵਿਕਾਸ ਲਈ ਹਮੇਸ਼ਾ ਯਤਨਸ਼ੀਲ ਰਹਿਣਗੇ ਅਤੇ ਕਾਲਜ ਦਾ ਨਾਂ ਰੋਸ਼ਨ ਕਰਨਗੇ। ਮੈਂ ਵਿਦਿਆਰਥੀਆਂ ਦੀ ਸਫ਼ਲਤਾ ਅਤੇ ਸੁਨਹਿਰੀ ਭਵਿੱਖ ਲਈ ਦੁਆ ਕਰਦਾ ਹਾਂ।

Nehru Memorial Govt. College, embarked on its mission in the field of Technical Education. It is going for NAAC assessment and is affiliated to Punjabi University; Patiala. And spread over 50,395 square meters of area and has a green area of 7459 sq. meters. It is located on the prominent location at Sirsa Barnala Road, Mansa, Punjab & Surrounded by Clean and Green area. College offering post graduate & undergraduate programs in Arts, Commerce, Science etc.

The college has number of faculty like Computer Science & Information Technology, Commerce Management, Arts. The college has excellent Infrastructure Like a Big Library, Sport facilities and Labs. The location is in the vicinity of various schools and colleges. There is no of industries across the road away from institute, ideal place for Higher Studies. They have a Placement Departments

Total strength of students is over 1400, 21 Teaching and 15 non-Teaching Staff. Most of the Professors are Doctorate in their disciplines It has total 10 labs in IT including 3 labs in computer & IT, 3 labs in science, 3 smart lecture theatres, 1 canteen & etc.

College Buildings and other allied Facilities: -

Sr. No.	Particulars	Space
1	Administration Department	Spacious
2	Accounts Department	Spacious & Creative
3	English Department	Spacious and Creative
4	Punjabi & Hindi Department	Spacious
5	Commerce Department	Spacious and Creative
6	Math, Economics & History Department	Spacious and Creative
7	Computer Department	Spacious
8	Political Science Department	Spacious

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Lead Assessor

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9	Physical Education Department	Spacious
10	Library & Canteen facility	Very Spacious
11	Toilet Blocks	Spacious
12	Parking Area	Spacious
13	Open Air Theatre	Spacious
14	Auditorium	Spacious
15	Lecture Theatre	Well maintained
16	Computer & Science Labs	Spacious and Creative

The Mission:
To impart Holistic Education aiming to make students Market relevant Globally, Competent Morally Upright and Socially Responsible Citizens.

Vision: Strive for Perfection and Settle for Excellence.

Objectives: Soft Skills, Train, To Foster an Environment Conducive to Pursuit of Knowledge.

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Lead Assessor

Areas Assessed:

- Waste Management,
- Greening of Campus,
- Energy Management,
- Water management,
- Clean Air,
- Animal Welfare &
- Environmental Legislatives.

Assessment of building infrastructure

Sr. No.	Particulars	Space	Ventilation	Natural Light	Cleanliness	Remark
1	Administration & Management Department	Spacious	Good	Good	Good	Comparatively Good cross ventilation
2	Arts Department	Spacious	Good	Good	Good	
3	Admission & Placement Dept.; Accounts & Registrar Department	Spacious	Good	Good	Good	
4	Commerce Department	Spacious	Good	Good	Good	

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Lead Assessor

5	Library facility	Library Less Spacious	Good	Good	Good	
6	Canteen	Spacious	Good	Good	Good	
7	Toilet Blocks	Spacious	Good	Poor	Good	
8	Parking Area	Spacious	Good	Good	Good	
9	Staircases	Spacious	Good	Good	Good	
10	Science Department	Spacious	Good	Good	Good	

Reference attached images in Annexure-I

2. Objectives of the Green Audit Study:

The objective and benefits of this ECO/Green Audit is to:
a) Improve Environmental awareness amongst all interested parties in the campus.
b) Improve Environment standards by awareness.
c) Reduce loss of resources and wastages that is a national wastage.
d) Implement CSR for improving the Environments of entire campus and to involve neighborhood.
e) Ensure all these objectives shall ultimately improve the image and goodwill of the Educational institute and Campus.
f) To determine usage/wastage of energy or water or other resources;
g) Implement changes to ascertain optimum usage of resources and make savings.
h) To promote health consciousness and environmental awareness, values and ethics among stake holders of organization.

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Lead Assessor

3. Methodology:

As per the audit plan the audit criteria is to study the Waste, water, energy management and find the ways to achieve this objective including Clean Air and Green environments.

ASSESSMENT COMMENTARY & ASSESSMENT OBJECTIVE EVIDENCE

Executive Summary: Satisfactory

This is the green audit of the College which is applying for NAAC. The college is doing their bid towards environmental protection and environmental awareness at local and global front.

Audit criteria is environmental cognizance, waste minimization and management, biodiversity conservation, water conservation, energy conservation and environmental legislative compliance by the campus. A questionnaire is used during audit. This audit report contains observations and recommendations for improvement of environmental consciousness.

4. Observations and Recommendations

4.1 Waste Minimization and Re-cycling

A. Waste generation & Management

1. Waste water Generation and Treatment

Sr. No.	Waste category	Method of disposal
1	From toilets	Closed drainage system
2	From Canteens & other buildings	Closed drainage systems

B. Solid Waste

Sr. No.	Waste category	Method of disposal
1	Dry Waste	Disposed off in bins and takenaway by MC.
2	Wet waste and Garden waste	Composting pits in the campus
3	Biomedical waste	Not Applicable.
4	E waste	Following the higher education departments guidelines.

Observations:

1) They Generate Dry Waste leaves from the trees. Thew wet waste as generated by Canteen is converted to Compose while the dry waste is daily lifted by Municipality.

2) E Waste from Computer Department is also disposed to the vendor authorized by Pollution Board.

3) Additionally, Bio degradable items like leaf, food residues are kept in separate pits at many locations.

4) Interaction is done with the community in the nearby villages to create awareness and a message to recycle the waste.

5) The solid waste is kept in different color bins.

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6) Used Oil as developed during service of DG set = Reused in Shuttering and other metal surfaces to prevent rusting.

Recommendations:

1) To formulate the SOP for collection and disposal with Roles & Responsibility and target date.
2) To determine the specific objective of minimization of waste wherever possible.
3) No Composter = Presently Collected in Ditch and used for horticulture. = Needs better and upgraded method.
4) Two categories of Dust Bins = Dry & Wet = needs identification and proper color code.

Reference attached images in Annexure-II.

Vinay Kumar Inam
Lead Assessor

4.2 Greening

As discussed, there is a number of trees and other plants in the premises. There is various types of plants including fruit plants, medicinal plants, shady plants & ornamental plants as described below

List of plants at college; Mansa

S. No.	Fruit plants	Medicinal plants	Shady plants	Ornamental plants
1	*Mangifera indica* Mango - 1	*Ocimum tenuiflorum* (Tulsi) -10	*Azadirachta indica* Neem -200	*Saraca asoca* Ashoka – 30
2	*Psidium guajava* Guava – 1	*Trminalia chebula* (harad)-1	*Terminalia arjuna* Arjun -500	*Hyphorbe lagenicaulis* Bottale palm -10
3	*Syzygium cumini* Jamun – 20	*Phyllanthus emblica* (Amla) -100	*Melia azedarach* Dek-500	Hibiscus – 50
4	*Musa balbisiana* Banana – 3	*Carissa carandas* (Kronda/Karanda)-2	*Tectona grandis* Teak (Sagwan) -8	*Dypsis lutescens* Erica palm-10
5	*Prunus avium* Cherry-5	*Moronia oleifera* (Drumstick tree) 400	*Neolamarckia cadamba* Kadam tree – 11	*Casurina equisetifolia* Casurina-1
6	Manilkara zapota Sapota-5	*Bauhinia varigeta* (Kachnar) -400	*Cassia fistula* Golden shower -7	*Clerodendrum splendens* Pgoda/-6
7	*Citrus limon* Lemon-500	*Punica granatum* Pomegranate -1	*Delonix regia* Flame of forest -100	*Bamboosa bamboosa* Bamboo plant – 10
8	*Ziziphus zuzuba* Ber-2	*Murraya koenigii* (Curry tree) -10	*Swietenia mahgoni* American mahogany-19	*Callistemon spp.* Bottle Brush-3
9	Bil-1	*Nyctanthes arbour-tristis* Tree of sadness-1	*Polyalthia longifolia* Mast tree – 6	*Alstonia scholaris* Satpatia-15
10		*Terminalia bellirica* (Bahera plant)-400	*Ficus religiosa* Pipal-20	*Chukrasia tabularis* Chukrasia-12
11		*Sapindus mukorossi* (Reetha plant) -1	Dalbergia sissoo Shisham-(Tahli) -10	*Mimusops elengi* Monsari- 12

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Lead Assessor

12		*Mimoso pudica* Touch me not- *2*	*Ficus bengalensis* Bohar-10	*Delonix regia* Gulmohar-20
13			*Eucalyptus terreticornis* Safeda-(200)	*Cassia fistula* Amaltas-20
14			*Carissa opacca* Garna-10	*Jacaranda mimosifolia* Jacaranda -10
15			Dhak-100	
Total	538	1328	1701	209

TOTAL – 3776

List of plants in front of College Building; Mansa

S. No.	Fruit plants	Medicinal plants	Shady plants	Ornamental plants
1	*Mangifera indica* Mango -2	*Azatirachita indica* Neam 15	*Melia azedarach* Dek 16+10	*Alstonia scholaris* Satpatia-6
2	*Psidium guajava* Guava – 3+3	*Murraya koenigii* (Curry tree) -1	*Morus alba* Toot 3+3	*Cassia fistula* Amaltas-1
3	*Syzygium cumini* Jamun – 4	*Ficus carica* Anjeer-1	*Carissa opacca* Garna-6	*Adhatoda indica* Bans-45
4	*Coleus ambonicusp* Bil-1	*Grewia asiatica* Phalsa-1		*Ficus benjamina* Ficus-8
5	*Prunus avium* Cherry-1	*Carissa carandas* Karonda-2		*Hibiscus indica* China Rose-1
6	Manilkara zapota Sapota-1	*Phyllanthus emblica* (Amla) -2		*Jasmine spp.* Jaismin-1

7	*Citrus limon* Lemon-2	*Moringa oleifera* Sohanjna-1		*Saraca asoca* Ashoka -76
8	*Ziziphus zuzuba* Ber-2			*Cestrum nocturnum* Night blooming-1
9	Pomegranate-3			*Hyphorbe lagenicaulis* Bottale palm -3
10	Peach-1			*Araucaria heterophyylla chrismis tree 5*
11	*Citrus spp.* Kinno 2			*Rosa indica* Rose 17
12	*Eribotrya japonica* Loquat 2			
Total	27	12	38	164

TOTAL – 241

Organization has various types of trees including: -

ਆਮਲਾ 100
ਅਰਜਨ 500
ਬਹੇੜਾ 400
ਬੇਰੀ 150
ਕਾਲੀ ਸਰੀਂਹ 25
ਦੇਸੀ ਕਿੱਕਰ 200
ਢੱਕ 100
ਲਸੂੜਾ 100
ਮਹਿੰਦੀ 75
ਜਾਮਣ 600
ਜੰਡ 200
ਜੰਗਲ਼ ਜਲੇਬੀ 200
ਕਚਨਾਰ 400
ਸੁਖਚੈਨ 600

ਖੈਰ 25
ਮੌਲਸਰੀ 50
ਵਟ 100
ਨਿੰਮ 200
ਪਿੱਪਲ20
ਪਿਲਖਨ 50
ਰਜੈਣ 600
ਰੇਰੂ 25
ਰਹੂੜਾ 100
ਸੋਹੰਜਨਾ 400
ਤੂਤ 25
ਕਨੇਰ ਪੀਲੀ 25
ਹਮੇਲੀਆਂ 25
ਡੇਕ 500

Observations:

1) Natural Vegetation covering the whole campus.

2) Students can use the lawn for relaxation and studying in peaceful environments. They are also involved in Plantation Drive.

3) There is more than 10, 000 plants and trees as per the geography of Campus. Every year they add new trees to maintain the survival rate which is more than 90%. There is various medicinal plants like Harar Amaltas, Bahera and also No. Of fruits trees like Jamun Total 43 medicinal, 203 shaddy neem, arjun, ornamental 460 and 260 fruits to mention few.

4) A Separate committee with 07 senior personnel to ensure the greenery in the campus.

5) The trees and plants are also planted by Students, Villagers as per ownership programme once a year. The College has adopted 5 villages including Khera, Sikhera, Kandola, Kandauli & Lakhan Who have briefing for protection of Environment, Rallies for env. Protection like the practice of Stubble Burning is held twice a year.

6) Beauty and Eco park is developed in the entire campus like Temple & parks in the college.

Recommendations:

1) More villages can be involved in plantation drive, a future plan to be decided as per annual calendar.

2) The specified number of plants and the type of plants eg; of medicinal values and needs to be targeted in the start of academic year.

Reference attached images in Annexure-III.

4.3 Energy Conservation

Observations:

1) Energy is used in the campus by Lights, Fans, AC, Computers, water distribution, Equipments installed for running the various activities.

2) Power saving mode is worked out in running streetlights by alternate switching. Also, similar mode is used for AC, Computer while not in use. Solar Panel and lights are installed in the common

3) Stand by arrangements to run AC, TV, computer in the different Facility is through DG Set.

4) Energy saving drills is done to involve security staff.

5) Replaced 980 LED tubes, 57 LED panel light, 72 LED flood lights and 23 solar lights. This is an ongoing process.

6) Canteen, pharmacy all labs are running over PNG provided by IGL. All residential facilities are going to use PNG in future.

Recommendations:

1) Periodic monitoring needs to be done for Lux values at various locations to identify the possible areas for saving of energy.

2) The energy audit needs to be done once a year to get the exact picture of saving. The data of Electric Consumption need to be documented.

3) The targets and objectives need to be specific & measurable to monitor the performance.

Reference attached images in Annexure-IV.

PARAMOUNT QUALITY CERTIFICATION PQC PUNJAB

4.4 Water Conservation

Observations:

1) Water is used for drinking, washing, laboratory use, watering in plants in the entire campus.

2) The water is stored in Underground Tanks

3) Water leakage is stopped by periodic maintained pipes.

4) College has a water works operated by the seaways board to provide the water

5) Water Harvesting is done through Rain Water Harvesting Means Refer Photos.

Recommendations:

1) The readings in water meter needs effective comparison for the population using with specific parameters.

2) The NOC needs to be taken from Ground water Authority.

3) SOP needs to be defined with measurable Objectives.

4) Test certificates needed for STP with the usage of treated water.

5) Periodic testing needs to be done for drinking water.

6) To reduce water consumption in toilets taps and flushing Aero Control device may be installed.

7) Needs to put up slogan for Water Saving.

Reference attached images in Annexure-V.

4.5 Clean Area

Observations:

1) Room Windows Floor Ratio is 40%. All the rooms are fully Ventilated and have Natural Lights.

2) Types of vehicles in the college are Students, Personal and Official. Separate Parking are identified for Staff and Others. These are either petrol or Diesel and electric driven

3) DG set is installed with regular checks and maintenance is done by company engineers. DG set details are as follows: -
- 125 KVA- 01 Nos

4) No student has any respiratory problem as per medical checkup.

5) Entire walking area is green and well laid.

Recommendations:

1) This needs to be followed with effective air quality monitoring at the identified locations.
Eg: Parking area, DG set area, Chemical Labs. In future possibility of Electric or CNG operated vehicles need to be explored.

2) Health Checkup camps may be organized for Villagers.

Reference attached images in Annexure-VI.

Vinay Kumar Jhamb
Lead Assessor

4.6 Animal Welfare

In the campus there is various types of flies and other insects as described as follows:

List of insects at College Premises

Sr. No.	Common Name	Scientific Name
	Butterflies	
1	Mottled Emigrant	Catopsilia pyranthe
2	Common Crow	Euploea core
3	Common tiger	Danaus genutia
4	Common Pierrot	Castalius rosimon
5	Common grass yellow	Eurema hecabe
6	Lemmon Pancy	Junonia lemonias
	Flies	
1	Ditch Jewell	Brachythemis contaminata (Fam – Libillulidae)
2	Ruddy marsh skimmer	Crocothemis servilia (Fam –Labillulidae)
3	Wandering glider / Common Globe skimmer	Pantala flavescens (Fam – Libillulidae)
4	Crimson marsh glider	Trithemis aurora (Fam – Libillulidae)

5	Slender blue skimmer	Orthetrum luzonicum (Fam – Libillulidae)
Millipede		
1	Yellow spotted millipede	Harpaphe haydeniana (Fam – Xystodesmidae)

List of reptiles at College Premises:

Sr. No.	Common Name	Scientific Name
1	Common Indian Skink	Lampropholis guichenoti
2	Common garden lizard	Calotes versicolor

List of mammals at College Premises

Sr. No.	Common Name	Scientific Name
1	Three striped Palm Squirrel	Funambulus palmarum
2	Indian flying fox (Vatavaghul)	Pteropus giganteus

Observations:

1) Domestic animals are only Birds and Few Pet Dogs.

2) College has put up birds Nest on the big and Short trees.

Recommendations:

1) More Birds houses can be placed on trees to attract them.

2) As a long-term vision opening of a mini zoo or a fish pond can be thought of.

3) Butterfly Park may be developed.

Reference attached images in Annexure-VII.

4.7 Environmental Legislative

Observations:

1) Housekeeping is in house and scheduled.
2) No certified First aiders at present. Needs to improve Emergency Preparedness systems.
3) Air/Noise/Lux/Waste data to be monitored periodically.

Recommendations:

1) Consent of Air, Water, and noise from PB-PCB needs to be taken.

2) Air emission monitoring data needs to be generated for DG sets.

3) Fire NOC is also needed.

Reference attached images in Annexure-VIII.

General Practices:

Observations:

1) The roles to maintain green environments is given to various departments like a) Horticulture for plantation b) Maintenance department for Energy, water, management.

Additionally, any special drive of plantation is done involving students.

Vinay Kumar Jham

Lead Assessor

2) The overall management of these departments and maintenance of Utilities is done by the Administration department headed by the Dean and Principal

Recommendations:

1) The institute needs to develop SOP's for the green audit with effective Roles Responsibility.

2) The institute needs effective monitoring of all parameters on waste, water management and conservation of energy considering past trends and the objectives to be achieved in Environment management.

3) The green policy to be displayed at prominent locations along with slogans related to saving of resources.

4) Air Quality Monitoring needs effective implementation.

5) Noise, Lux monitoring needs to be introduced as no evidence is available presently.

6) Housekeeping schedule needs to be introduced with checklist due to Covid.

7) Energy Audit needs to be done at least once a year.

8) Aspect/impact study and Mock drills for emergency preparedness needs to be introduced. These need proper calendar and findings.

Vinay Kumar Jham
Lead Assessor

5. Conclusions:

The Institute has already done work on Green Technology and committed to save the environment and resources. The OFI/Recommendations as mentioned under each activity in the report needs to be closed.

It is recommended to issue the certificate of Green/Environment Audit subject to the action plan for gaps.

6. Photographs of Environmental Consciousness:

The photographs are also a part of Report. This covers green area, utilities installed in the campus, Solar panels, Greenery, Safety Slogans, Environment Awareness Slogans, Green Policy, infrastructure, Outsourced process, Sports Facilities & etc.

7. Acknowledgement

Acceptance By the College

8. Confirmation	
Provide confirmation on accomplishment of Audit Criteria and Audit Objective	**The Audit is completed as per objective and audit criteria.**
Assessment of Other Shifts (if applicable) or Review of Other Shift Records	NA
Capture Temporary Site Details with proper Objective Evidence (Can be a part of Production sheet as well)	NA

ASSESSMENT COMMENTARY

Positive points:

1) **The personnel involved in green audit are well conversant with the subject.**
2) **The infrastructure of the Institute is Excellent.**
3) **Enough greenery is observed in the College campus.**
4) **Top Management is committed to implement all the recommendations**
5) **The college has done lot of work on events management to sustain Environmental awareness.**
6) **Good idea to involve Villages to increase awareness.**
7) **Vertical Garden is a good concept.**

Mr. Vinay Kumar Jham **Principal**
25.08.2023

Mr. Ankur Singla
25.08.2023

Vinay Kumar Jham
Lead Assessor

THANK YOU...!

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Vinay Kumar Dhami
Lead Assessor

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