ENERGY AUDIT REPORT

Pt.Mohan Lal SD College for Women Gurdaspur

CONDUCTED BY:

R.K. ELECTRICALS & ENERGY AUDIT SERVICES

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2022-23

ENERGY AUDIT CERTIFICATE

(2022-23)

This is to certify that the **"R.K.Electricals and Energy Audit Services**" conducted Energy Audit of **"Pt.Mohan Lal SD College for Women, Gurdaspur"** situated at Gurdaspur, Punjab from 12/05/2022 to 14/05/2022 for the year 2022-2023. This audit involved extensive consultation with all the related campus team, office record, data collection, measurements and cost benefit analysis

The study exhibited the Annual Energy saving potential of 19287 KWH with annual monetary saving: Rs. 2.31 Lakh by investing Rs.8.63 Lacs

RAKESH KUMAR

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For R.K.Electricals & Energy Audit Services

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Acknowledgement

R.K.ELECTRICALS & ENEGY AUDIT SERVICES expresses sincere thanks to the authorities of Pt.Mohan Lal SD College for Women, Gurdaspur (Punjab) for their kind assistance and co-operation during the DPR & Preparation for energy efficiency improvements of their Campus.

We would like to place on record our sincere thanks to the

President Mr**. Upkar Krishan Sharma**

& Principal Dr. (Mrs) Neeru Sharma

and the Institution management for giving us an opportunity to carry out the study in the campus.

We would also like to extend gratitude to all the officers, technicians, staff and operators of Pt.Mohan Lal SD College for Women, Gurdaspur who have rendered their valuable assistance during the course of study.

ER. R.K, Sharma MIE, FIV

BEE's Energy Auditor (EA-10080) MoP, GoI

ABBREVIATIONS

A	Ampere
AC	Alternating Current
APFC	Automatic Power factor Controller
Avg.	Average
BEE	Bureau of Energy Efficiency
CEA	Certified Energy Auditor
CFL	Compact florescent lamp
EER	Energy Efficiency Ratio
FTL	Florescent Tube Light
Kcal	Kilo Calories
Kg.	Kilogram
KL	Kilo Liter
KV	Kilo Volt
kVA	Kilo Volt Ampere
KVAr	Kilo Volt Ampere Reactive
kW	Kilo Watts
kWh	Kilo Watt Hour
M or m	Meter
Mm	Millimetre
Max.	Maximum
Min.	Minimum
MT	Metric Ton
No.	Number
PF	Power Factor
TR	Tons of Refrigeration
V	Voltage
W	Wattage (watt)

Executive Summary

RKE & EAS (R.K.ELECTRICALS & ENEGY AUDIT SERVICES) was entrusted the DPR for energy efficiency improvement in the **Pt.Mohan Lal SD College for Women, Gurdaspur**, Punjab. The Institution's management is conscious with regard to its Energy Efficiency Levels and they have initiated several measures to reduce the energy consumption. During field studies, it was observed that the management was found to be progressive as it has done very well on energy conservation front by implementing several energy conservation initiatives such as awareness on energy efficiency, and is in process of making Green Building Campus, Good usage of day light in campus, installation of LED light fixtures at few locations etc. We acknowledge and appreciate the commitment of the **Pt.Mohan Lal SD College for Women, Gurdaspur** management towards conservation of Energy.

However, energy conservation is a continuous process and there is always scope for further improvements. The objective was to reduce further the energy consumption. This involved a detailed Energy:

i) Establish a baseline of the present energy consumption pattern,

ii) Identify Energy Efficiency Measures (EEM's) which can lead to sustained energy savings in the campus and

iii) Prepare an action plan to implement the same.

This report is an attempt to provide overview of energy consumption, its variation and energy reduction potential of **PT.MLSD College for Women, Gurdaspur** campus. The report also highlights the major energy saving opportunities available in the air conditioners, fans, lighting at the campus A set of recommendations which will assist in improving energy efficiency has also been highlighted in this report. This report has emerged after a detailed energy audit of campus during 12/05/2022 to 14/05/2022 to find out the performance level of air conditioners, fans, and lighting and other equipment installed in the premises and find out potential for energy conservation and reduction in power consumption.

Total saving potential: **Amount of expected annual saving – Rs 2.31 Lacs Investment- 8.63 Lacs .Energy (KWh) Saveable- 19287 (Without installing Solar power plant))**

The Brief description about the premises is shown below:

Project Title:	**Project Report Number:**
Detailed Energy Audit at Pt. Mohan Lal SD College for Women, Gurdaspur(Pb)	RKS/EA-15/2022
Client:	
Pt.Mohan Lal SD College for Women, Gurdaspur	
Contact Person:	
Dr. Neeru Sharma (Principal)	
Date of Audit	**Source of Electricity**
12/05/2022 to 14/05/2022	Utility &DG Set
Date of this Report:	**Date of Approval:**
26/03/2022	
***Work Carried out by**:(Team Composition)*	**Er. R.K.Sharma (BEE Certified Energy Auditor) EA-10080,** **Er.Varun Sharma – B Tech Elect MBA, PGD (Indl Safety Mgmt)** **Er. M C Goyal, AMIE(Elect)** **Er. Paramjeet Singh Saini (BEE C/Energy Auditor EA-19322)**

SUMMARY OF ENERGY EFFICIENCY MEASURES

EEM	Proposed Energy Efficiency Measures	Nos.	Annual energy consumption -kwh	Annual energy consumption after replacement-kwh	Annual energy saving - kwh	Annual monetary saving- Rs.	Total investment including installations-Rs.	SPB period -yrs
EEM-1	Providing and fixing Active power filter for suppressing the current Harmonics in the LT panel I/C side of 25/50A capacity	1			1346	16147	30000	1.9
EEM-2	Providing and fixing 10 KVAr Automatic power factor correction panel with capacitor and relay	1			3627	43527	75000	1.7
EEM-3	Replacement of existing ceiling/wall mounted type fitting 36 watt Fluorescent tube lamp with ceiling/wall mounted LED batten tube light 4 feet 20 watt fitting	30	1553	675	878	10536	11,100	1.1
EEM-4	Replacement of Existing 9 watt direct fit CFL lamp with direct fit 6 watt LED lamp	64	648	432	216	2592	6,656	2.6
EEM-5	Replacement of existing 2x2'x36 w CFL fixture with 36 watt LED panel light - Kwh	30	5427	3015	2412	28944	49,580	1.7
EEM-6	Replacement of Existing 1000 watt Halogen flood lighting with 100 watt LED Flood lighting	2	7000	500	6500	78000	26,600	0.3
EEM-7	Replacement of existing direct fit LED lamp 36 watt with 20 watt LED tube light	134	1571	321	1250	15000	26,600	1.8

EEM	Proposed Energy Efficiency Measures	Nos.	Annual energy consumption -kwh	Annual energy consumption after replacement-kwh	Annual energy saving -kwh	Annual monetary saving-Rs.	Total investment including installations-Rs.	SPB period -yrs
EEM-8	Replacement of existing 65watt old inefficient ceiling fan withBLDC BEE 5 star rated 28 watt 1200 mm sweep ceiling fan	128	6725	2419	4306	51672	3,84,000	7.4
EEM-9	Replacement of existing 1.5 T old inefficient window type-air conditioner with BEE 5 star rated 1.5 T window type AC	6	2025	1316	709	8508	1,80,000	21.2
EEM-10	Annual Maintenance and repair of water coolers installed in the building	5	2325	2116	209	2508	2,500	1.0
EEM-11	Replacement of existing 2 hp conventional motor pump set with BEE star rated energy efficient 2 hp submersible pump set	2	3415	2561	854	10248	26,000	2.5
EEM-12	Replacement of 7 nos. 2000 watt old conventional inefficient geysers with Solar water heaters in hostel@75000/- for 1000 lts capacity	2	10500	8547	1953	23436	1,50,000	6.4

EEM	Proposed Energy Efficiency Measures	Nos.	Annual energy consumption -kwh	Annual energy consumption after replacement-kwh	Annual energy saving - kwh	Annual monetary saving- Rs.	Total investment including installations-Rs.	SPB period -yrs
EEM-13	Installation of 20 KWp Solar plant in the campus as Renewal energy source for catering some load of the building@50000/kw	1	-	-	20000	240000	1000000	**4.2**
TOTAL			**41189**	**21902**	**39287**	**471444**	**18,63,036**	**3.952**
TOTAL without installing solar power plant			**41,189**	**21,902**	**19,287**	**2,31,444**	**8,63,036**	**3.7**

NET SAVINGS

1. Units Saveable: 19287 KWH (Without Solar power system)
Amount Saveable: Rs. 2.31 Lacs
Investment: Rs. 8.63 Lacs
2. Units Saveable: 39287 KWH (with solar power system)
Amount Saveable: Rs. 4.71 Lacs
Investment: Rs. 18.63 Lacs

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For R.K.Electricals and Energy Audit Services

CHAPTER-I

Introduction

1.1 The Project

The Project was to prepare a DPR for energy efficiency improvements of the entire campus of **Pt.Mohan Lal SD College for Women, Gurdaspur**.

With the advent of energy crisis and exponential hikes in the costs of different forms of energy, Energy Audit is manifesting its due importance in Commercial as well as Industrial Establishments. Energy Audit helps to understand more about the ways energy and fuels are used in any Establishments and helps in identifying areas where waste may occur and scope for improvement exists.

Energy Audit is the key to a systematic approach for decision-making in the area of energy management as it attempts to balance the total energy inputs with its use and serves to identify all the energy streams in a facility/ Establishment.

It was with this objective that **RKE & EAS (R.K.ELECTRICALS & ENEGY AUDIT SERVICES)** was entrusted by the authorities of Pt.Mohan Lal SD College for Women, Gurdaspur for the study of their Institute. The basic objective of the Audit was to study the load distribution/ consumption pattern in the campus and also to study the operations of major energy intensive equipment/ systems to identify potential areas wherein energy savings are practically feasible.

1.2 Back ground of Pt.Mohan Lal SD College for Women, Gurdaspur

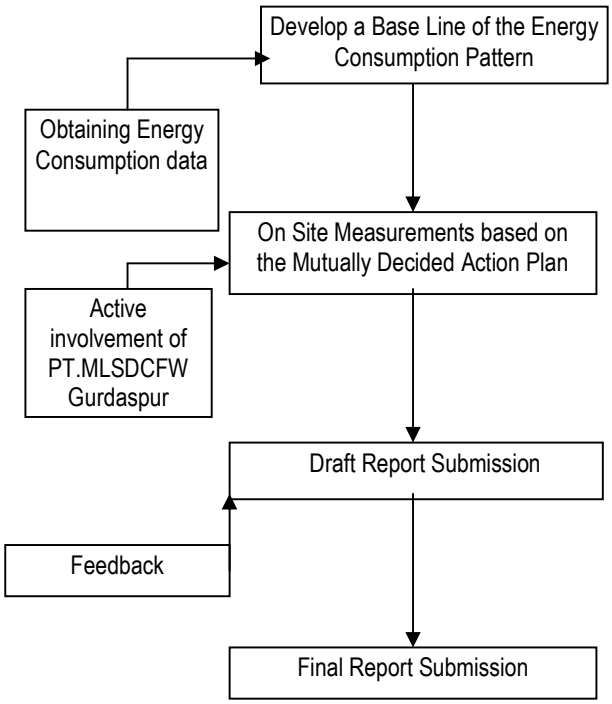
Pt. Mohan Lal SD College for Women, Gurdaspur had its humble beginning in 1995, established under the management of Goswami Ganesh Dutta Sanatam Dharma College Society. The college is founded and crafted on the lofty ideals of Pt. Mohan Lal Ji an immortal luminary, a paradigm of perfection and true Karamyogi who served as former Home, Finance, Education and Industries Minister, Punjab.
The most important aim of this college is educating women specifically due to the fact that women can play a significant role in boosting the growth procedure of the entire nation.
The college provides quality of academic input, student care, state of-the-art infrastructure and job prospects. Over the years, the management of the college has appointed vibrant Faculty Members with expertise in diverse areas. They are well

qualified academicians who always inspire and encourage the students. The college provides placements to students which make it one of the most sought-after college in Gurdaspur.

The college campus is quite attractive, modern and it is well-equipped for academic pursuits, convenience and comfort. There are even special opportunities available for the growth of the students. The vision of the college is to emerge as a premier institution to empower women through holistic education and the main mission of the college is to excel in the field of empowering women by making use of global perspectives through competitive and vocational education. Broadening the mental limitations of women in the society is also one of the most important aims of the college.

1.3 Methodology

Methodology adopted for achieving the desired objectives viz: Assessment of the Current operational status and Energy savings include the following:



- Discussions with the concerned officials for identification of major **areas of focus** and other related systems;
- A team of engineers visited the campus and had discussions with the concerned officials/ supervisors to collect data/ information on the operations and Load Distribution in the campus. The data was analyzed to arrive at a **base line energy consumption pattern**.
- **Measurements and monitoring** with the help of appropriate instruments including continuous and/ or time lapse recording, as appropriate and visual observations were made to identify the energy usage pattern and losses in the system.

- Computation and **in-depth analysis** of the collected data, including utilization of computerized analysis and other techniques as appropriate were done to draw inferences and to evolve suitable energy conservation measure/s for improvements/ reduction in specific energy consumption.

The entire recommendations have been backed up with techno-economic calculations including the estimated investments required for implementation of the suggested measures and payback period.

1.4 Instrumentation Support

Some of the instruments used for undertaking the audit include the following:

- Digital Pressure Meter
- Anemometer with Vane Type Probe &Hygrometer
- Three Phase Power Analyzer ALM-31 with appropriate CT's & PT's
- Single Phase Power Analyzer with appropriate CT's
- Digital Temperature Meter
- Ultrasonic Flow meter
- Infrared Temperature Meter
- Lux Meter and digital distance meter

CHAPTER-2

Baseline Scenario

2.1 OVER VIEW OF THE BUILDING

PRELIMINARY DETAILS OF THE BUILDING

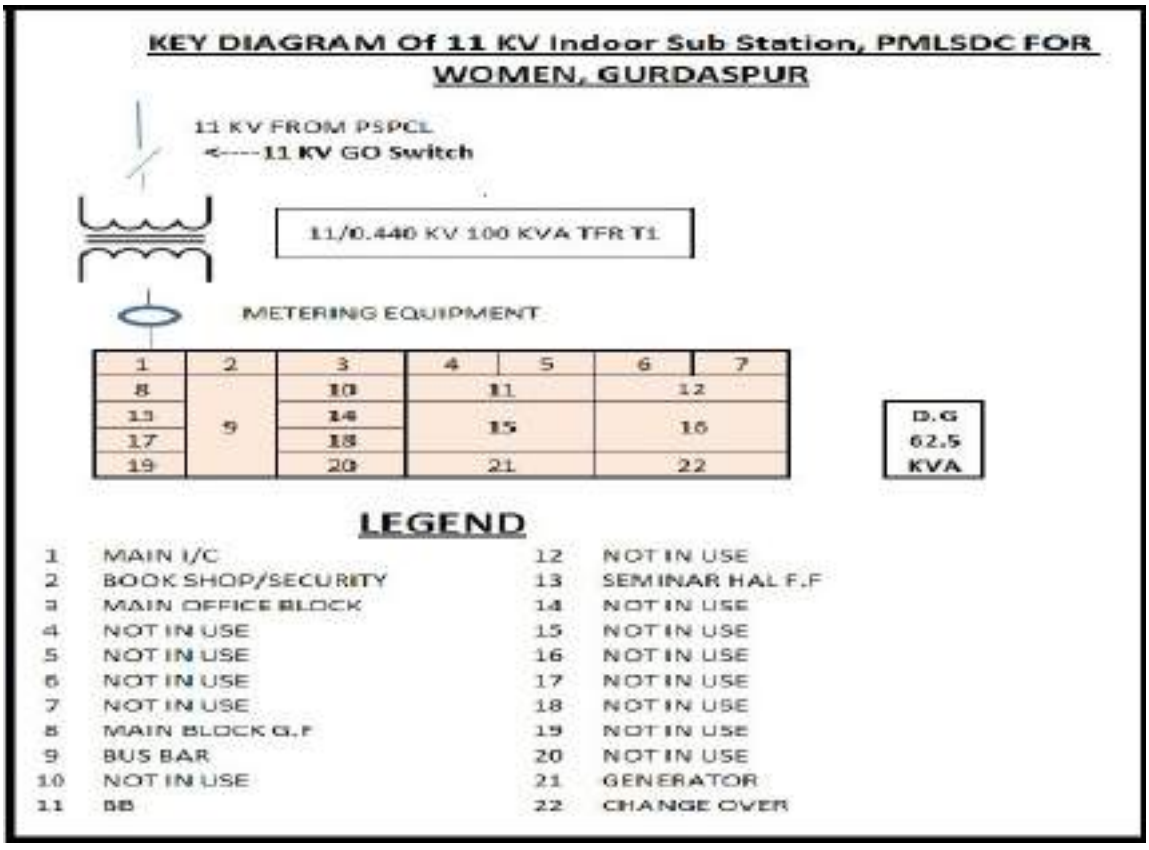
Name of the building	Pt.Mohan Lal SD College for Women, Gurdaspur
Location/Address	Pt.Mohan Lal SD College for Women, Gurdaspur.
Name and address of the owner	Pt.Mohan Lal SD College for Women, Gurdaspur, Gurdaspur
Ground covered area of the building	30311 Sq ft
Connected load of the building	78+15 =93KW
Average Annual energy consumption of the building	41268 kVAh
Average Annual billing of the building	4.98 Lakh
Average Rate per Kwh	Rs.12/-
No. Of Gen sets with capacity	62.5+35 KVA
Average annual consumption of the Diesel	117272Litres/yr App.
Nature of the building	Educational Institution
Storey	Ground,1st ,2,nd , Floor
Hours of normal operation of the building	6-8 hrs
Percentage of air conditioned floor area	Less than40%
Name & contact Number of the Nodal officer I/C	Dr. Neeru Sharma M:9463284185

CHAPTER-3

Electrical System Network

3.1. PURCHASED POWER

Pt.Mohan Lal SD College for Women, Gurdaspur, Punjab draws power from PSPCL through dedicated feeder at 11 KV. The Building has 1 no. Pole mounted transformer of 100KVA to step down the voltage from 11 KV to 433V.The connected/sanctioned load of the building is 77.900 kW. SLD/key diagram of the Building is shown below:



SLD/Key diagram of the Building

A

B

A - 100 KVA POLE MOUNTED TRANSFORMER INSTALLED FOR THE CAMPUS

B - BOUNDARY WALL OF THE PANEL ROOM TOWARDS ROAD SIDE

3.2. OBSERVATIONS & RECOMMENDATIONS

- For better housekeeping of Panel control room, blower/vacuum cleaner is required.
- Panel room may be repaired after removing the abundant DG Set lying there in and exhaust fan be installed for dissipation heat.
- Equipment installed in the panel control room needs periodic maintenance/Service or AMC for routine or breakdown service be made.

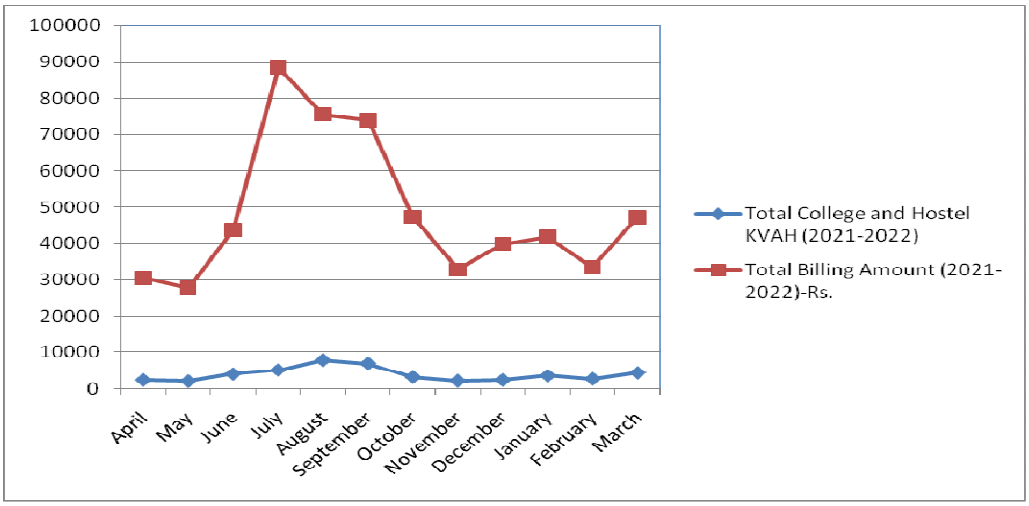
3.3. SELF GENERATED POWER

The building has 1 Nos. of DG Set of 62.5 KVA for college and other 35 KVA for Hostel installed in acoustic cover for in-house power generation. The operation of the DG set is limited to power cuts only.

3.4. REVIEW OF PRESENT ENERGY CONSUMPTION & BILLING: The details of electrical consumption copied from electricity bills for 2021-22 xl sheet 'purchase power' Annx-1/1and is shown below:

Financial Year	21-22
Annual- Lacs kVAh	0.48
Amount – Rs lacs	5.82
Rs / kWh	12

Thus, electrical energy of about **44846 kWh** costing Rs.**5.82 Lakh** is consumed annually



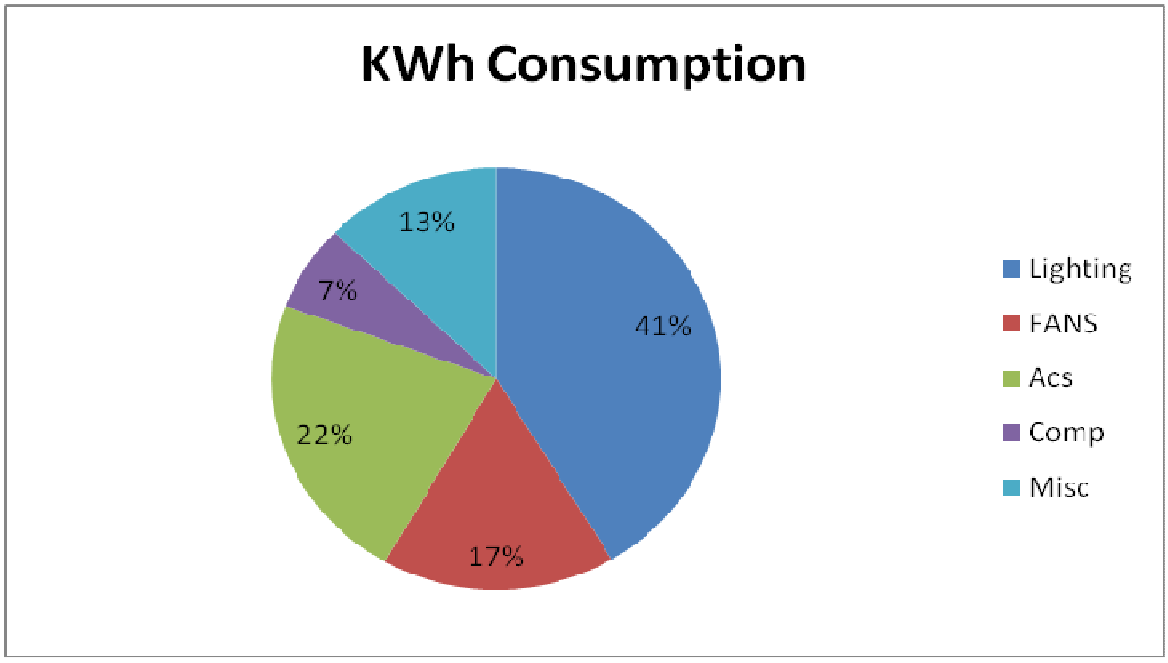
Energy Consumption Profile for FY 2021-22 KWh Vs Month

3.5. SHARE OF ENERGY CONSUMPTION IN DIFFERENT AREAS

The auditors tried to calculate energy consumption of various equipment installed. The summary of the same is as follows

SHARE OF ENERGY		
Share of Energy (Percentage)	**Units**	**%age**
Lighting	18556	41
Fans	7558	17
Air conditioning	10019	22
Computers	2963	7
Misc	5740	13
Total KWh	**44846**	**100%**
Total KVAh	**48066**	

% share of Energy Consumption



Sharing of the Energy consumption within the boundary is shown graphically. Thus lighting, ACs and fan consumptions are predominant in the buildings.

3.6. BUILDING LOAD PROFILE

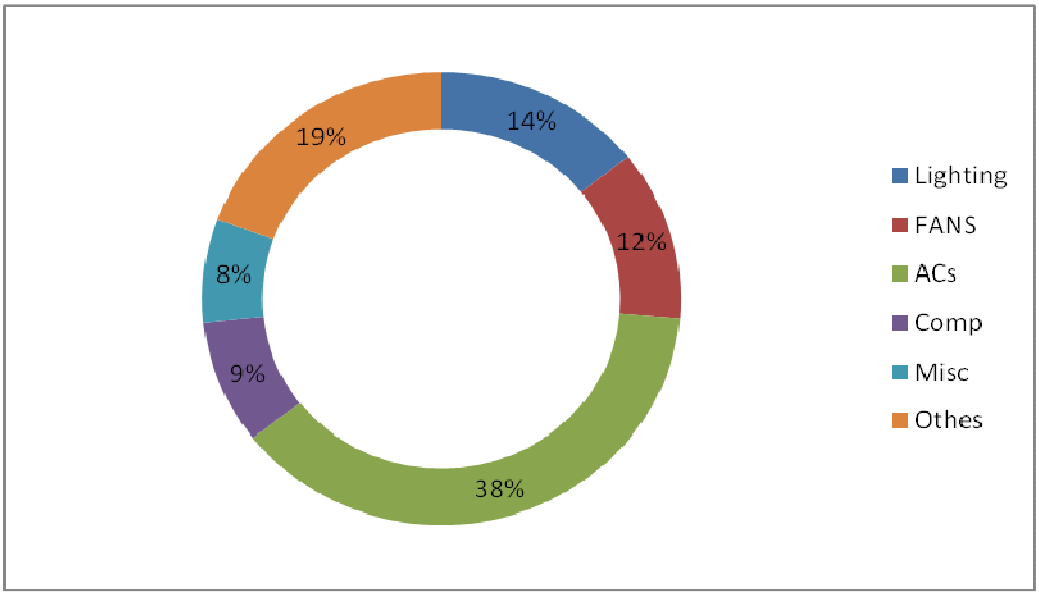
Connected / Sanctioned load: **78+15=93kW**

It was noticed during onsite assessment that one Transformer having capacity of 100 KVA is installed for the entire premises. Inventory list of the Building is shown below:

The auditors checked and calculated the electric load of the building and the load detail is as under:

Item	Load in KW
Lighting	12.722
Fans	10.876
Air conditioning	34
Computers	7.8
Misc	6.63
Others	17.241
TOTAL	**89**

Load details of the Building



Graph showing sharing of load (in KW)

Findings and Recommendations

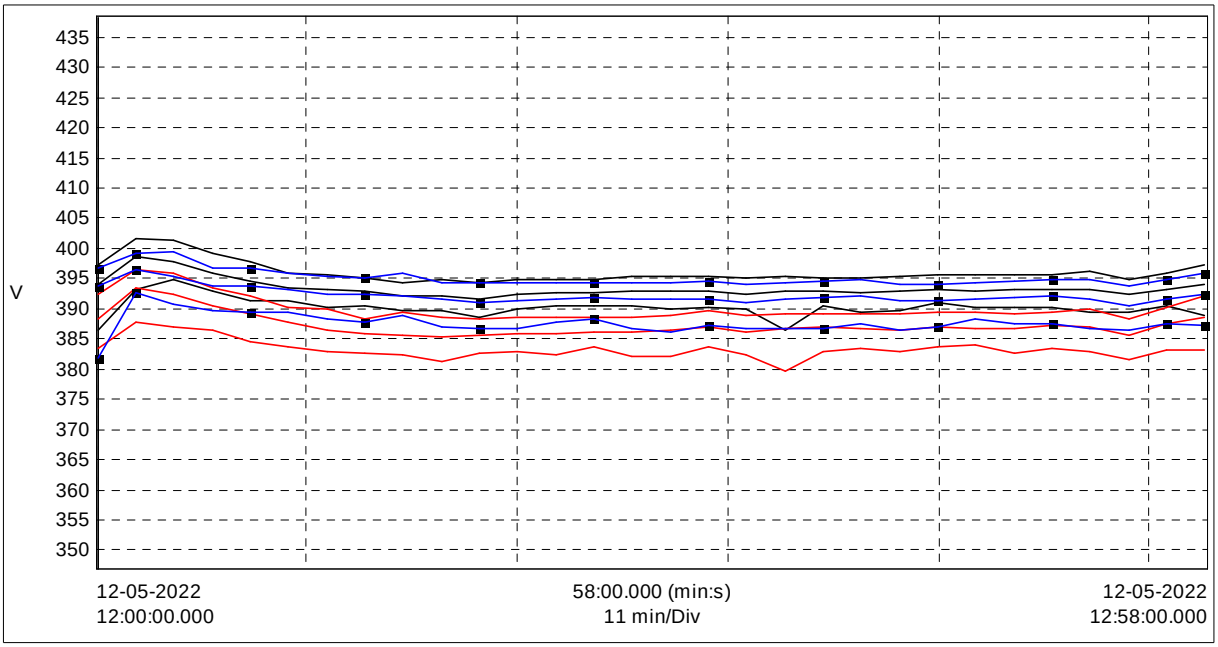
Sanctioned connected load of college building is 78 KW where as load found to be 89 KW and could be brought within sanctioned limit by implementing the recommendations of major power consuming equipment/area

MEASURING ELECTRICAL PARAMETERS OF INCOMMER IN PANEL ROOM

3.7. VOLTAGE PROFILE – LT IN COMMER

During the audit, quality of in-coming power is measured through 3 Phase Power Analyser. The observations on power quality of various loads/connections are provided in below paragraph.

The Load Analyses was done in order to measure the power quality parameters using power analyser at incomer panels of T/F Thus, various parameters were recorded which included Voltage, Current, Power Factor, Total Harmonic Distortion (THD), and Unbalancing of Load etc.



Voltage profile

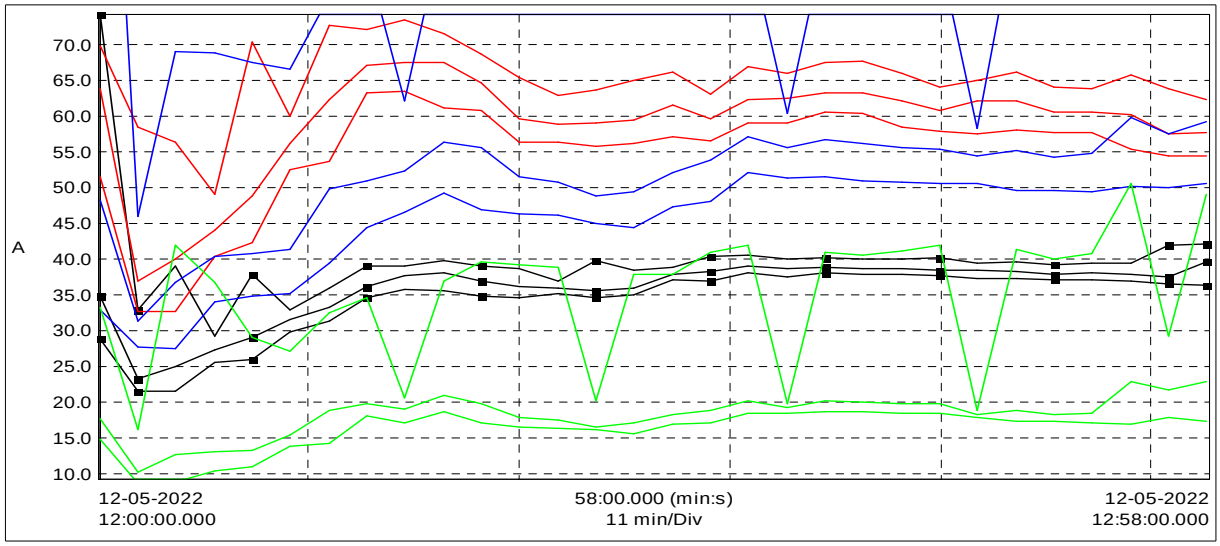
Urms Line 1	Urms Line 2	Urms Line 3	Average	%age im-balance
393.396	387.258	392.212	391.0	**0.30**

Imbalance voltage

IMBALANCE VOLTAGE

The unbalanced voltage is 0.30% which is under the prescribed limit as per IEEE standards. An unbalance of 1% is acceptable as it doesn't affect the cable.

3.8. CURRENT PROFILE– LT IN COMMER



Current profile

Arms	Arms	Arms	Average	%age
Line 1	Line 2	Line 3		im-balance
21.52	32.68	27.61	27.3	**19.84**

Imbalance current

IMBALANCE CURRENT

The unbalance current was observed to be **19.84%.** The long term running with three phase unbalance of the distribution system shall lead to series of problems, such as increase of transformer loss, reduction of output of the transformer ,reduction of the output of the transformer, reduction of the active output of the motor, increase of loss of the distribution line and damage of the electric equipment Any large single phase load, or a number of small loads connected to only one phase cause more current to flow from that particular phase causing voltage drop on line.

Recommendations: Balance the load in the distribution system.

3.9. HARMONIC GENERATIONS

Equipment based on frequency conversion techniques generates harmonics. With the increased use of such equipment, harmonics related problems have enhanced which are leading to heating of cables, bus bars and transformers, overloading of electrical distribution system, frequent tripping of switchgears, frequent failure of costly mother boards and capacitors of equipment etc.

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

System Problem	Common Causes	Possible Effects	Solutions
Harmonics (non sinusoidal voltages and /or current wave forms)	Office – Electronics, UPSs, variable frequency drives, high intensity discharge lighting and electronic and core coil ballasts.	Over- heating of neutral conductors, motors .transformers, switch gear. Voltage drop, low power factors, reduced capacity.	Take care with equipment selection and isolate sensitive electronics from noisy circuits.

Common causes and solution of harmonics

The Harmonic Voltage and Current Limitations set forth by IEEE 519 1992 are:

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

harmonic current limitations

Maximum Harmonic Current Distortion in Percent of IL
120 Volt through 69 KV
Individual Harmonic Order (Odd Harmonics)

ISC/IL	h<11	11<h<17	17<h<23	23<h<35	35<h	TDD
<20*	4.0	2.0	1.5	0.6	0.3	5.0
20<50	7.0	3.5	2.5	1.0	0.5	8.0
50<100	10.0	4.5	4.0	1.5	0.7	12.0
100<1000	12.0	5.5	5.0	2.0	1.0	15.0
>1000	15.0	7.0	6.0	2.5	1.4	20.0

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

Harmonics (%) in 100kVA Transformer

During the assessment, Audit team also measured the harmonics level. Details are mentioned below:

A1 THDf	12-05-2022	17.7	% f
A2 THDf	12-05-2022	10.9	% f
A3 THDf	12-05-2022	16.2	% f
U12 THDf	12-05-2022	1	% f
U23 THDf	12-05-2022	1.2	% f
U31 THDf	12-05-2022	1.1	% f
V1 THDf	12-05-2022	1.4	% f
V2 THDf	12-05-2022	1.4	% f
V3 THDf	12-05-2022	1.4	% f

Av. Voltage THD & Current THD (%) in the Transformer

It is evident from the above table that the average voltage THD (%) in the Transformer was observed to be in range of 1 % to 1.4 % which is in the prescribed limit as per IEE standard of Voltage harmonics of 5%. It is also evident from the above table that the average current THD (%) was observed to be in range of 10.9% to 17.7% which is not in the prescribed limit.

FINDINGS & RECOMMENDATIONS:

The load on the I/C panel was observed **32 Amps.**
It is suggested to install 3 Phase 4 Wire **Active Power Filter (APF)** of **25/50 Amps capacity** to reduce the harmonic distortions.

EEM-1 providing Active power filter for suppressing the current Harmonics in the LT panel I/C side

Energy Saving Calculations

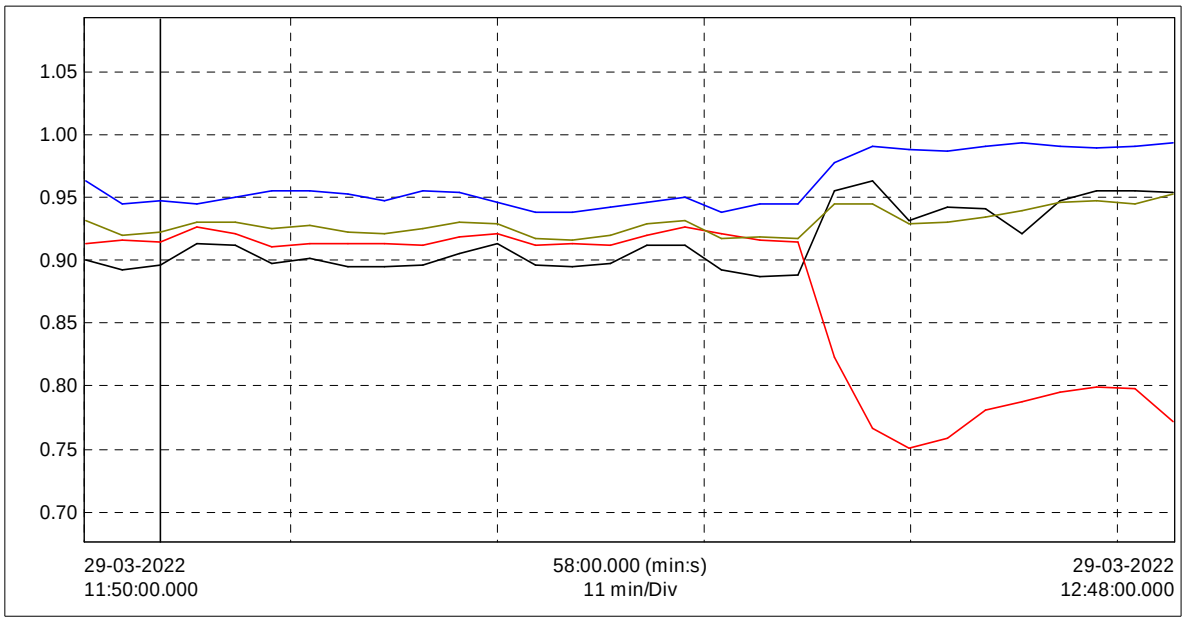
Load on I/C panel -Amps	32
Current Harmonics--%f	17.7
Annual power consumption- - KWh	44852
Annual saving in energy due to Loss reduction @3% of annual energy consumption--KWh	1346
Annual monetary saving @ Rs 12/KWh ---Rs.	16147
Investment for Active power filter @Rs.30000	30000
payback period-Years	1.9

The payback period is calculated to be 1.9 years. Since the product life is much more than that, the move is economically beneficial and energy saving.

3.9.1. REACTIVE LOAD MANAGEMENT

3.9.2. Power factor measurement

Auditors measured the power factor by installing the load master and recorded the parameters as below:



PF1	12-05-2022	0.896	0.885	0.904
PF2	12-05-2022	0.977	0.969	0.98
PF3	12-05-2022	0.977	0.947	0.983
		Av PF	0.933	

Findings & Recommendations:

The average power factor found to be 0.933 where as desired PF 0.999

At present no reactive power factor compensation has been provided on LT bus by suitable capacitors to improve the power factor It is essential that the power factor of

the system be maintained as high as possible (close to unity).It reduces the load on the electrical distribution system, increase energy efficiency and decreases electricity costs. Removing the reactive power from the system can make this possible. Power factor correction capacitors are used in this purpose.

As such **10 KVAr capacitors** are required to be installed in LT distribution system with APFC relay for improvement in power factor.

EEM-2 Providing 10 KVAr Automatic power factor correction panel with capacitor and relay

Energy Saving Calculations:

Transformer-KVA	100
Measured Power-KW	35
Measured PF	0.933
Measured KVA	37.51
Desired PF	0.999
KVAr required-KVAr	8.855
Estimated KVA	35.35
Saving in KVA	2.16
Running Hrs/day	6
Rate/KVAh-Rs.	12
Annual saving in consumption -KVAh	3627
Annual monetary saving @ Rs. 12/--Rs	43527
Investment- Lacs Rs.	75000
SPB-year	1.7

The payback period is calculated to be 1.7years. Since the product life is much more than that, the move is economically beneficial and energy saving

CHAPTER-4
LIGHTING

Adequate and proper lighting contributes both directly and indirectly towards productivity, safety and towards providing an improved atmosphere. Primary considerations to ensure energy efficiency in lighting system are: selection of most efficient light source as far as possible in order to minimize power cost and energy consumption.

a. Matching proper lamp type to the intended work task or aesthetic application, consistent with colour, brightness control and other requirements.
b. Establish adequate light levels to maintain productivity improve security and improve safety.

4.1. LIGHTING INVENTORY

During the onsite assessment, Audit team has carried out the lighting survey for various locations in Pt.Mohan Lal SD College for Women, Gurdaspur The Total lighting details installed in the premises are given below.

4.2.1. LIGHTING LOAD DETAILS OF THE BUILDING **Total load: 12.72 KW**

Type of Luminary		No.	Watt	Total- Watts
FTL	1X4'X36 W	30	36	1080
CFL	9W	64	9	576
	2x36 W Fixture	30	72	2160
HALLOGEN	1000W	2	1000	2000
LED	Direct fit lamp 3W	13	3	39
	Direct fit lamp12 W	43	12	516
	20W T/L	37	15	555
	Direct fit lamp 36 W	134	36	4824
LED PANEL	36W	27	36	972

4.3. LUX MEASUREMENT

A high quality DIGITAL LUX METER was used to measure the illumination levels at various locations of Pt.Mohan Lal SD College for Women, Gurdaspur and the recommended level of lightning in these areas is given in the table

The recommended light level as per standard is shown below:

Location	Recommended LUX
Normal work station space, open or closed office	500
Conference Rooms	300
Training Rooms	500
Internal Corridors	200
Auditorium	150-200
Entrance Lobbies, Atria`	200
Stairwells	200
Toilets	200
Dining Areas	150-200

Recommended Standard Light level Details

4.3.1. STUDY FINDING OF LIGHTING

The building authorities provided the details of luminaries installed within their Building premises. The auditors surveyed area and compared type of fittings, their height, and type of reflectors. Based upon this survey and data obtained from the authorities, hours and days of running, the energy consumption is calculated as follows & also to find out the ILER.

Sr. No	LOCATION	Measured Lux	ILER	Remarks
1	Principal's office	145	0.47	Urgent action required
2	Computer lab room	102	2.44	good
3	Seminar hall	195	1.02	satisfactory
4	Room No.8	200	23.47	Good /good daylight
5	Room No.17	213	21.69	Good/good daylight
6	Hostel reception	245	4.48	Good/good daylight
7	Hostel mess	237	7.57	Good /good daylight
8	Hostel room no.3	255	2.74	Good /good daylight

Assessment of the Lighting

OBSERVATIONS

- During Audit, It was observed that the fluorescent tubes are fitted with magnetic blasts on conventional 40/36W luminaries.
- It was also observed during the audit that reflector/diffuser were not provided for most of the Fluorescent tubes to distribute the uniform lighting in the room.

As per study findings, it is recommended for converting the existing installation to use more efficient lighting equipment.

RECOMMENDATION

4.4 Installation of Energy Efficient Lights

EEM-3 Replacement of 36W T-12 WITH 20 W LEDTUBE LIGHT

In the existing system 30 nos. 36 W, T-12 FTLs are being used to provide general illumination to part of this building. The proposed scenario includes replacement of T-12 type with 20 W LED 4' long Tube Light. The energy saving calculations is shown below.

Existing FTL 36 watt installed in the campus

Energy Saving Calculation

Energy Saving Calculation		Units	Value
Total Number of fittings	=	Nos.	30
Energy Consumption of 36 W T-12 FTL (including ballast) as per xl sheet "consumption pattern", Annexure/A1	=	kWh	1553
Energy Consumption of 20 W LED Tube Light as per xl sheet EEM as Annexure/ EEM-3	=	kWh	675
Cost Benefit Analysis			
Annual Energy Savings potential	=	kWh	847
Per Unit cost	=	Rs.	12/-
Annual Monetary Savings	=	Rs.	10536
Investment/ fixture (including replacement cost)	=	Rs.	370
Total Investment	=	Rs.	11100
Simple Payback Period	=	Years	1

Energy saving by replacement of Florescent Light with Energy Efficient Tube Light

The payback period is calculated to be 1 years. Since the product life is much more than that, the move is economically beneficial and energy saving.

EEM-4 Replacement of existing CFL 9 watt with direct fit 6 W LED bulb

Energy Saving Calculation

Energy Saving Calculation		Units	Value
Total Number of fittings	=	Nos.	64
Energy Consumption of 9 watt CFL as per xl sheet "consumption pattern", Annexure/A1	=	kWh	648
Energy Consumption of proposed direct fit 6W LED bulb as per xl sheet EEM as Annexure/ EEM-4	=	kWh	432
Cost Benefit Analysis			
Annual Energy Savings potential	=	kWh	216
Per Unit cost	=	Rs.	12/-
Annual Monetary Savings	=	Rs.	2592
Investment/ fixture (including replacement cost)	=	Rs.	104
Total Investment	=	Rs.	6656
Simple Payback Period	=	Years	2.4

Replacement of existing 9 W CFL with direct fit LED 9 Watt direct fit lamp

The payback period is calculated to be 2.4 years. Since the product life is much more than that, the move is economically beneficial and energy saving

EEM-5 Replacement of existing 2x2'x36 W CFL Fixture with 36 W LED panel light

Energy Saving Calculation

Energy Saving Calculation		Units	Value
Total Number of fittings	=	Nos.	30
Energy Consumption of existing 2x2'x36 watt CFL fixture as per xl sheet "consumption pattern", Annexure/A1	=	kWh	2430
Energy Consumption of proposed 36 W LED panel light as per xl sheet EEM as Annexure/ EEM-5	=	kWh	1215
Cost Benefit Analysis			
Annual Energy Savings potential	=	kWh	1215
Per Unit cost	=	Rs.	12/-
Annual Monetary Savings	=	Rs.	14580
Investment/ fixture (including replacement cost)	=	Rs.	2500
Total Investment	=	Rs.	75000
Simple Payback Period	=	Years	5

The payback period is calculated to be 5 years. Since the product life is much more than that, the move is economically beneficial and energy saving

EEM-6 Replacement of existing Halogen flood light 1000 watt with 100 watt LED flood light

Energy Saving Calculation		Units	Value
Total Number of fittings	=	Nos.	2
Energy Consumption of existing halogen flood light 1000 watt as per xl sheet "consumption pattern", Annexure/A1	=	kWh	7000
Energy Consumption of proposed 1000 W LED flood light as per xl sheet EEM as Annexure/ EEM-6	=	kWh	500
Cost Benefit Analysis			
Annual Energy Savings potential	=	kWh	6500
Per Unit cost	=	Rs.	12/-
Annual Monetary Savings	=	Rs.	78000
Investment/ fixture (including replacement cost)	=	Rs.	13300
Total Investment	=	Rs.	26600
Simple Payback Period	=	Years	0.3

The payback period is calculated to be 0.3 years. Since the product life is much more than that, the move is economically beneficial and energy saving

EEM-7 Replacement of existing direct fit LED bulb 36 watt with 20 watt LED tube light

Energy Saving Calculation		Units	Value
Total Number of fittings	=	Nos.	134
Energy Consumption of existing direct fit LED bulb 36 watt as per xl sheet "consumption pattern", Annexure/A1	=	kWh	5427
Energy Consumption of proposed 20 W LED tube light as per xl sheet EEM as Annexure/ EEM-7	=	kWh	3015
Cost Benefit Analysis			
Annual Energy Savings potential	=	kWh	2412
Per Unit cost	=	Rs.	12/-
Annual Monetary Savings	=	Rs.	28944
Investment/ fixture (including replacement cost)	=	Rs.	370
Total Investment	=	Rs.	49580
Simple Payback Period	=	Years	1.7

The payback period is calculated to be 1.7 years. Since the product life is much more than that, the move is economically beneficial and energy saving

CHAPTER-5

Fans

5. STUDY FINDING OF FANS

The Fan details installed in the premises are given below

Sr No	Specification Item	Rating Watt	Total nos.	Total load (KW)
1	Ceiling Fans 1200mm sweep	65	188	14.025
2	Wall fans	40	4	0.16
3	Exhaust fans	60	7	0.88

Inventory list of existing fans

5.1 CEILING FANS

Existing 65W Ceiling fan installed in the campus

The standard fans are installed in the premises. 65W Ceiling fan should be replaced with BEE 5 star rated energy efficient BLDC fan comparatively with same air Flow but reduced in their wattage.

Service Value= Minimum Air Delivery (m3/min) / Power Consumption (kWh)
Star: Service Value ≥ 3.2 to <3.4
2 star: Service Value ≥ 3.4 to <3.6
Star: Service Value ≥ 3.6 to <3.8
Star: Service Value ≥ 3.8 to <4.5star: Service Value ≥ 4.0

OBSERVATIONS

During Audit, Air delivery was not observed on their name plate

RECOMMENDATION

EEM-8 Replacement of 128 nos. old inefficient ceiling fans with 28W Energy efficient/5 star rated BLDC ceiling fans

It was observed and discussed with college authorities during the audit that 188 Nos. ceiling fans are installed in the different Floors, class rooms and hostels building. Out of 188 fans, 60 no. fans are new which has been replaced/new installed 10-12 months back. Thus 128 no. ceiling fans are recommended to replace the existing old inefficient ceiling fans with 28W BLDC energy efficient fans. The energy saving calculation is shown below:

Energy Saving Calculation		Units	Value
Total Number of ceiling fans	=	Nos.	128
Energy Consumption of existing old inefficient 65 watt Ceiling fan as per xl sheet " consumption pattern", Annexure-A/2	=	Watt	6725
Energy Consumption after replacement with 28 W energy efficient fans as per Annexure/ EEM-8	=	Watt	2419
Cost Benefit Analysis			
Annual Savings potential	=	kWh/year	4306
Per Unit cost	=	Rs.	12/-
Annual Monetary Savings	=	Rs.	51670
Investment-1200 mm sweep ceiling fan	=	Rs.	3000
Total Investment	=	Rs.	384000
Simple Payback Period	=	year	7.4

The payback period is calculated to be 7.4 year, which is high. Since the product life is much more than that, the move is economically beneficial and energy saving and may be replaced in phase manner.

5.2 Wall fans

Only 20 nos. wall fans of 40 watt each are being used rarely in the campus, thus not recommended to replace as replacement is not viable.

5.3 EXHAUST FANS

Only 7 nos. wall fans of 40 watt each are being used rarely in the campus, thus not recommended to replace as replacement is not viable.

CHAPTER-6

Study of HVAC System

6. AIR CONDITIONING SYSTEM & WATER COOLERS

The main purpose of an Air Conditioning (AC) system is to help maintain good indoor air quality through adequate ventilation with filtration and provide thermal comfort. AC systems are among the largest energy consumers in buildings. The choice and design of the AC system can also affect many other high performance goals, including water consumption (water-cooled air conditioning equipment) and acoustics.

6.1. DESCRIPTION OF AC SYSTEM

Pt.Mohan Lal SD College for Women, Gurdaspur has installed 6 Nos. each Window Air Conditioners and Split air conditioners and one unit of VRV air conditioner for office building. The specifications are given below:

	Capacity	Type	Total
Air conditioner ,Make VOLTAS	1.5T	window	6
Air conditioner, Make Voltas	1.5T	split	6
VRF unit	22 HP	VRF	1
Total			**13**

Air-Conditioning system details of the building

6.2. POWER CONSUMPTION MEASUREMENT OF EXISTING AIR CONDITIONERS

The auditors measured the power consumption of some of air conditioners shown in xl sheet “ac “shown below: Annx/7,8

Measured data:

Sr. No	Air Conditioners	Rated			Measured Parameters			
	Location	Make	Type	Tons	Volts	I	PF	KW
1	Computer lab	SAMSUNG	Window	1.5	260.7	7.9	0.78	1.61
2	Office building	SAMSUNG	VRF	1.5	414.93	14.87	0.799	9.712

Power consumption of the Air Conditioners

6.3. PERFORMANCE OF AIR CONDITIONERS

The audit team has carried out the performance of some of the Air Conditioners by measuring the actual Tonnage (Cooling Capacity) using hygrometer and anemometer. The performance of the Air conditioner is shown below:

Existing Old 1.5 T AC’s

Existing VRF Unit 22 HP AC’s

Rated Parameters of VRF Unit and performance of AC&VRF installed at office building PMLCollege for Women

Cooling Capacity	61.6 kW
Heating Capacity	69.3 kW
Model Name	AM220FXVAGR/EU
Performance (nominal)	22 HP
Power Input	17.35 kW(Cooling), 16.70 kW(Heating)
Current Input	27.8 A(Cooling), 26.8 A(Heating)

Pt.ML SDC Gsp Measured data of AC at office building		
Performance of ACs	**Window AC 1.5 T**	**VRF at office bdg.**
Parameters	1	**1**
Average Speed	1.8	1.20
Inlet Area	0.0419	1.18
Suction Air Flow m3/hr	272	5098
Dry bulb temperature	26.5	28.4
Wet Bulb Temperature	15	26
Enthalpy KJ/Kg	41.39	80.37
Density of air at 0°C	1.293	1.293
Density of air at inlet tem	1.171	1.171
Flow in Kg/Hour	318	5970
Dry bulb temperature	26	27
Wet Bulb Temperature	13	24.4
Enthalpy KJ/Kg	35.98	73.85
Heat shed by Air in Evaporator -Kcal	1720	38925
Heat shed by Air in Evaporator - Tons	0.57	12.87
Power - kW	1.61	9.712
kW/Ton	2.83	0.75
EER	1.24	4.66

Findings and Recommendations

Window ACs are inefficient as EER is low, replace with BEE star 5 rated AC & performance of VRF AC unit is satisfactory

6.4. Maintenance of ACs and Water Coolers

6.4.1Air conditioners

During Energy Audit, Building personal informed that each air conditioner and water coolers are cleaned and washed at the beginning of summer season. At random 2 nos. ACs were checked as below:

Location – **Computer lab at FF**		
Tons	1.5	1.5
Make	Samsung	
Year		
Condition of filter	Satisfactory	Satisfactory
Condition of evaporator / condenser	Satisfactory	Satisfactory
Noise level	ok	ok

Air Conditioner maintenance condition

OBSERVATIONS & RECOMMENDATIONS

The Performance assessment of units was done only for the purpose of comparison. .

- Most of the split AC's has been replaced with BEE 5star rated AC's which is a mandatory phase as per star rated plan of BEE and installed in the seminar hall are occasionally used as such replacement not viable
- Regular Maintenance of the A/C is required for proper refrigeration effect by attending the gas leakages present and cleaning of the filters.

EEM-9 About 6 Nos. old inefficient AC'S are proposed to be replaced with new BEE 5 star rated ACs installed in the building. The energy saving calculations shown below:

Energy Saving Calculations		Units	Window 1.5 T
Total Number of Air conditioners	=	Nos.	6
Energy Consumption of existing old inefficient Air conditioners as per xl sheet " consumption pattern", Annexure/A2	=	kwh	2025
Annual saving potential after replacement with energy efficient 1.5T window BEE star rated AC @ 35% as per Annexure/ EEM- 9	=	Kwh/year	709
Per Unit cost	=	Rs.	12
Annual Monetary Savings	=	Rs.	8505
Investment/ fixture replacement	=	Rs./fixture	30000
Total Investment	=	Rs.	180000
Simple Payback Period	=	year	21

Replacement of old inefficient AC with energy efficient BEE 5 star rated AC

The payback period would be 21 years, though the payback period high which is viable. Since the product life is much more than that .Move is economically beneficial and energy saving

6.4.2. Water Cooler

Existing water cooler in the campus

5 Nos. of water coolers are installed in the building premises to enable the students and staff to get cool water. The water temperature is controlled with a thermostat. Normally it is kept at tap no. 4. Refrigerant R-22 is used in these coolers. No pressure gauges are installed on refrigerant circuit.

Measured parameters of water cooler

Measured the parameters of the cooler installed in the 2nd floor and the Energy saving calculation is as below**:**

EEM-10 Maintenance & Energy Saving Calculation of Water coolers

Energy Saving Calculation		Units	Value
Normal water temperature	=	ºC	24
Reasonable chilled water temperature	=	ºC	14
Water Temperature measured	=	ºC	11
Difference in temperature	=	ºC	3
Cost Benefit Analysis			
Excess energy consumption @ 3%/ ºC rise in temperature	=	%	9
Energy consumption in water cooler xl sheet "EEMs- 11 Annx-A/3	=	KWh	2325
Energy saving potential @ 15%	=	KWh	209
Amount savable @ Rs12/ kWh	=	Rs.	2511
Expenditure for maintenance of all evaporator coils-Rs	=	Rs.	2500
Payback period			1

The payback period would be 1years, which is viable. Since the product life is much more than that .Move is economically beneficial and energy saving

OBSERVATIONS & RECOMMENDATIONS

-Install temp. and pressure gauges
Temperature of cooled water be maintained near about 14 degree centigrade

CHAPTER-7

Study of Computers

This institute has about 79 nos. of computers with LED monitors.. The computers are generally for IT/computer classes and for office use

An equivalently sized LED monitor is upwards of 80% smaller in size and weight compared to a CRT/LCD.The larger the screen, the bigger the size difference. The other major drawback of LCD deals with the power consumption. The energy needed for the electron beam means that the monitors consume and generate a lot more heat than the LED monitors. On an average, CRT Monitors consume 500W while LCD monitors consume 300 Watt while LED computer consume only 100 watt. The annual energy consumption is about 2962 KWh units. The auditors find no saving in it.

CHAPTER-8

Study of Pumping System

The building has made the provision for storage the water for the facility of the staff and students in the college and hostels and has installed 4 no. PVC tanks of 2000 lts capacity each on roof top. There are 2 nos. submersible pump set of 2 hp each installed for college and hostel to feed and store the water direct in the PVC tanks located at roof top. The pump installed for filling the tanks runs for app. 2-4 hrs.daily

8.1. POWER CONSUMPTION

The power of pump feeding to college was measured during the audit and found to be 1.42 KW the other pump was not working.

Existing submersible pump set in the campus

8.2. Pump and efficiency: Based upon head, load and measured flow of the pump installed for college the other pump feeding to hostel not working, the auditors calculated efficiency of motor pumps xl sheet Annx- A 21,A 22 as follows:

Description	Pump
Head, assumed-M	12
Measured flow-M3/hr	12.5
Rated(measured power) power-KW	1.42
Hydraulic power-KW	0.409
Overall efficiency-%	28.79
Pump efficiency-%	36

RECOMMENDATIONS: Overall efficiency of pump set is low it is recommended to replace the pump with BEE star rated energy efficient pump set

EEM-11 Energy Saving Calculation

Energy Saving Calculation		Units	Submersible Water pump set 2 hp
Total Number of motor pump set -2 nos	=	Nos.	2
Energy Consumption of existing old inefficient pump set as per xl sheet " consumption pattern Annx A/ 4& A/5	=	kwh	3415
Annual saving potential after replacement with energy efficient BEE star rated pump set as per xl sheet " EEMs 11	=	Kwh/year	854
Per Unit cost	=	Rs.	12
Annual Monetary Savings	=	Rs.	10245
Total Investment@ Rs.13000/- set	=	Rs.	26000
Simple Payback Period	=	year	2.5

The payback period is calculated to be 2.5 year which is high. Since the product life is much more than that, the move is economically beneficial and energy saving.

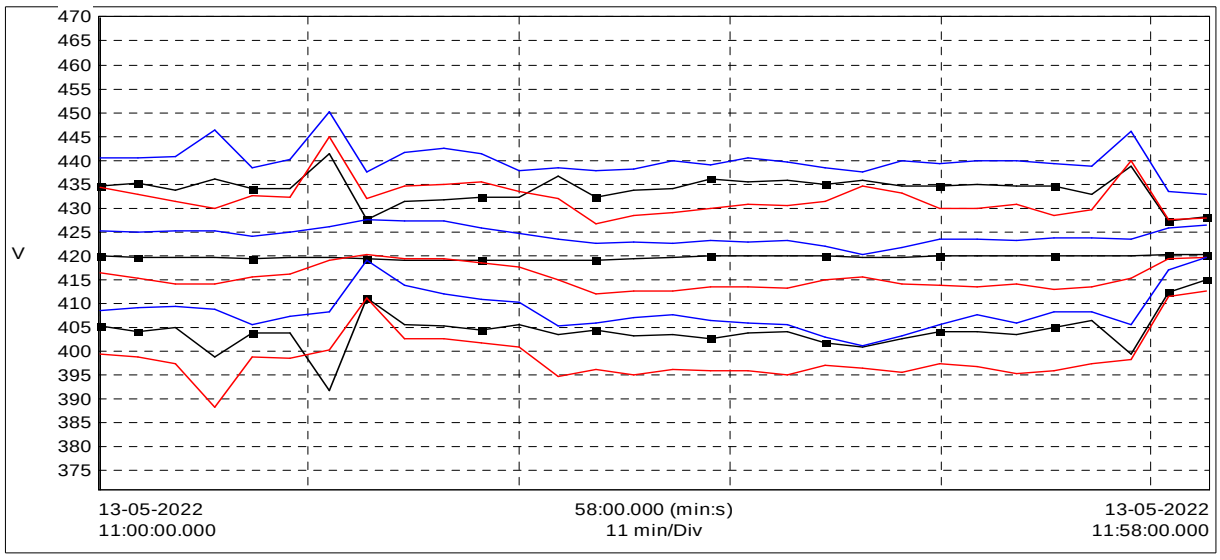
CHAPTER-9

Study of DG Sets

9.1. Pt.Mohan Lal SD College for Women, Gurdaspur has installed 1 No. of DG Set with l capacity of 62.5 kVA for college building and the 35 KVA for hostel with acoustic cover for providing backup to power cut-off from utility supply. For analysing DG of 62.5 KVA, the DG set was ran for an hour

Existing DG Set 62.5 KVA installed in the college

U12 rms	13-05-2022	25:00.0	419.61	391.7	441.4	V
U23 rms	13-05-2022	25:00.0	415.437	388	445	V
U31 rms	13-05-2022	25:00.0	424.147	401	450.2	V



Graph showing Volts of 62.5 kva DG set measured on 13/05/2022

9.2. Measured Parameters – xl sheet "lighting" Annx – A/10

Urms Line 1	Urms Line 2	Urms Line 3	Average	%age im-balance
391.7	388	401	393.6	**1.8**

Imbalance-voltage –current

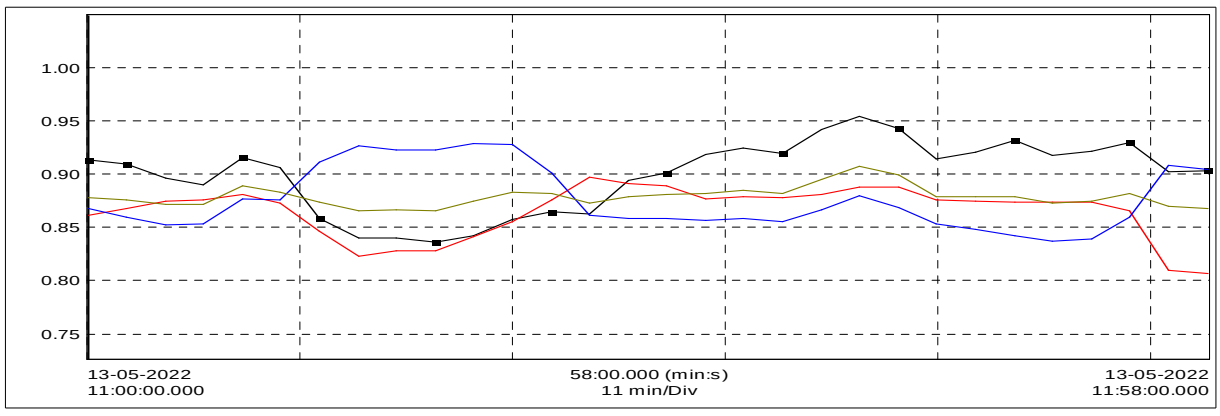
IMBALANCE VOLTAGE

The unbalanced voltage is 1.8% which is under the prescribed limit as per IEEE standards. An unbalance of 1-2% is acceptable as it doesn't affect the cable.

POWER FACTOR

Average power factor comes to 0.879

PF1	13-05-2022	11:00.0	0.899	0.836	0.954
PF2	13-05-2022	11:00.0	0.865	0.807	0.897
PF3	13-05-2022	11:00.0	0.876	0.837	0.928
PFT	13-05-2022	11:00.0	0.879	0.866	0.907



Graph showing Power factor of 62.5 kva DG set measured on 13/05/2022

9.3. Data analysis of DG

All the measurement data is being analyzed

a) Supply voltage: Average voltage is 393.6 Volts which is low

The unbalanced voltage is 1.8% which is under the prescribed limit as per IEEE standards. An unbalance of 2% is acceptable as it doesn't affect the equipment/cable.

b) Supply Current: Average supply current is 33.5A

c) The unbalance current was observed to be 26%.Being the load on the GEN SET is very less. The large current unbalance at no load/low load is quite common and does not indicate any fault. Any large single phase load, or a number of small loads connected to only one phase cause more current to flow from that particular phase causing voltage drop on line. All the single phase loads should be distributed on the three phase system such that they put equal load on three phases. The maximum unbalanced load between phases should not exceed 10% of the capacity of the gen set since this can cause over heating of the alternator.

d) Power factor: Power factor is 0.879 which is more than 0.8

The load power factor is entirely dependent on the load The AC generator is designed for the power factor of 0.8 lag as specified by standards

9.4. OBSERVATIONS & RECOMMENDATIONS

Following is supplemented in management's efforts to further bring down energy costs.

1. Specific energy consumption:-The most important thing is to know specific energy consumption. Energy meters are installed on set, it is being monitored. Log book is maintained for DG sets.
2. Effect of temperature & suction pressure - For every 3.5 ℃ increase in inlet air temperature, fuel consumption increases by 1%. The DG Sets is normally designed for ambient temperature of 25 to 30 degree centigrade. Higher

temperature & lower suction pressure decreases efficiency. The position of set is as below:-

i. Expansion joint, exhaust pipes & bends - These are insulated, exhaust pipe may be insulated.
Iii.Oil pressure: It varied from 4.9 to 5.1 kilogram/ sq cm. It was found satisfactory.
Iii.Water temperature: It remained in range from 40 to 48 ℃. I t is found on lower side.
Iii.With balanced load, it can be loaded up to normal75%. With some control on power factor, it can be loaded up to 85%.

The auditors do not find any saving in it.Therefore, Energy saving potential – Nil.

CHAPTER-10

Study of Solar Water heating System

10.1. Solar energy is one of the most widely used renewable source of energy one can use renewable energy technologies to convert solar energy in to electricity. It is very reliable source of energy and can significantly reduce the electricity bills. There are about 60 occupants in the hostel. Every person uses about 20 liters of water per day. At present 7 nos. installed geysers are old and inefficient consume more power to use renewable energy it is recommended to install solar water heaters in place of geysers

EEM-12 Replacement of existing 7 Nos.Old Conventional inefficient Geysers with Solar water heaters

Energy Saving Calculation		Units	Value
Total Number of students in the hostel	=	Nos.	70
Water required per student-lts/day	=	Lts/day	20
Amount of water to be used in the hostel-lts/day	=	Lts/day	1400
Specific heat of water=1	=	unit	1
Change in temp for heating water from 25 degree to 60 degree (60-25)= delta T=35 degree	=	Degree centigrade	35
Energy required to heat 1400 lts of water C-	=	kcal/day	49000
Equivalent electrical energy reqd-	=	Kwh/day	57
Equivalent annual potential of electrical energy	=	Kwh	8547
Saving in energy by replacing with SWH	=	Kwh	1953

Per Unit cost		Rs.	12
Annual monetary saving	=	Rs.	23422
Investment of SWH@Rs.75000/-per 1000lts cap	=	150000	150000
Simple payback period	=	Year	6.4

CHAPTER-11

Study of Solar Power System (Renewable Energy Application

Detailed report on Solar Roof Top Grid Interactive Power Plant.

Solar energy is one of the most widely used renewable source of energy one can use renewable energy technologies to convert solar energy in to electricity, it is very reliable source of energy and can significantly reduce the electricity bills

Options based on Renewables

11.1. Installation of 20 KWp roof top Solar Power Plant:

At present, power is sourced from the PSPCL at 11 kV, which is subsequently stepped down to 433 V using 1 no. transformer of 100 kVA. Metering is done at the LV level. Power is also generated using 1 DG set of 62.5 kVA. The auditors measured the load on in comer LT panel with three phase power analyzer and found max 32KW and minimum 31 Kw thus It is recommended to Install a 20 KWp Roof Top Solar Power Plant (without battery backup) The college building has ample space i.e. Roof top area on college building. The average power generation from a 1 KWp SPV System is around 4-5 kWh per day. Since the proposed SPV system does not have a battery backup grid connection would be required to meet the power requirements during night. Also the SPV power generation varies with time of day, the balance power requirements are automatically met by the grid supply during this period.

SPACE AVAILBLE ON COLLEGE BUILDING ROOFS FOR INSTALLATION OF SOLAR POWER PANEL MEASURING 25 MTR x 14 MTR AND 100 MTR X 14 MTR APPROX.

11.2. Project Overview

The following are the salient features of the photovoltaic project

Item	Description	Details
1	Project Type	CAPTIVE USE
3	Plant Capacity	20 kW
4	Project Location	Gurdaspur ,Punjab
5	Project Applicant Name	PML SD College for women Gurdaspur
6	Technology – Modules	Polycrystalline Silicon Technology
7	Inverter type	String inverters
8	Mounting Structure	Fixed Tilt- Rooftop
9	Evacuation Voltage	440 V
10	Area Required	Approx. 200 Sq. m
11	Annual Energy generation estimated end of 1st year	20,000 kWh in the first year with Crystalline Silicon Module with fixed mounting structure.

The cost of installing a solar PV system has reduced considerable over the years as a result Grid Interactive Solar PV plant are gaining popularity.
The plant could consider installing a grid interactive Solar PV system of 20 KWp. Technical details & payback analysis is given under the subsequent headings.
The SPV power generation varies with time of day, the balance power requirement are automatically met by the grid supply. For instance, if the total load requirement is 100 KWp and the SPV at a particular point of time generates 10 KWp, the balance 90 KWp will be fed from the grid.
The SPV system would be integrated with the existing LT supply. The SPV system would work under auto synchronism with the grid supply. In such systems, the SPV draws a reference of frequency / voltage from the grid and accordingly auto regulates / synchronizes with the grid
Batteries would not be required as it is suggested that the utilization may be focused during daytime only. Installation of batteries would involve higher investment and regular maintenance/replacement after few years.

Some of the salient features are listed below:

- Provides uninterrupted & Stable DC / AC Power Supply to dedicated load
- No noise and Easy to install
- Simple to operate and Pollution free working
- Low maintenance cost with the generating panels having a long life
- Soft loan available / installation under ESCO mode is also available

11.3. Major Components

- PV Module
- MS Galvanized Mounting Structure
- Array / Sub-Main / Main Junction Box
- Power Conditioning Unit
- Cable and Hardware
- Earthing Kit

11.4. Scope of Work

Sl. No.	Description
1	**PERMITS AND APPROVALS**
1.1	Approval for PV Plant
1.2	HT/LT/CT. Meter Testing from PSPCL
1.3	Power supply for operations
1.4	Post Commissioning Asset Insurance

Sl. No.	Description
2	**ENGINEERING**
2.1	Design Basis Document, Creation of Engineering, Drawings, specification, construction drawings
3	**PROCUREMENT**
3.1	Solar PV modules
3.2	Module mounting structures –Fixed Tilt
3.3	DC & AC Cables
3.4	Inverters & String Combiner Box
3.5	Earthing Material, Fire Extinguishers & Weather Monitoring System
3.6	Remote Monitoring
4	**LOGISTICS**
4.1	Transit, storage, erection all risk insurance cover
5	**CONSTRUCTION ACTIVITIES**
5.1	Civil Engineering Works
5.2	Electrical Engineering Works
5.3	Other Miscellaneous Systems
6	**PROJECT AND CONSTRUCTION MANAGEMENT**
6.1	Project Management, scheduling & tracking
6.2	Site Supervision
6.3	HSE Monitoring
6.4	Quality Assurance / Quality Control
7	**POST CONSTRUCTION ACTIVITIES**
7.1	As built drawings.
7.2	Handing over copies of manuals and test report for all project components.
8	**TESTING AND COMMISSIONING**
8.1	Mechanical completion test
8.2	PR acceptance test

11.5. Mounting Structure

The mounting structure is designed to fix PV modules of different sizes. This shall be fixed type structure with optimal tilt conforming to geographic location of the PV plant. The module arrays of the mounting structure are designed in a way that the

surrounding ground has access to sufficient light, moisture and accessibility for future maintenance activities.

Mounting systems	Specifications
Material	Galvanized steel for frame SS304 for accessories (for module fixing) GI hardware for structure fixing
Modules tilt angle	Approx. 23℃(Indicative – can change during detailed engineering)
Number of modules per Structural element	10 x2 [H x V] (Indicative – can change during detailed Engineering)

As the distance from the lower edge of the module to the ground is generally around 0.5-1 m, the ground might be easily maintained. The structure will be designed according to IS 800, IS 801 & load calculations corresponding to IS 875 Part 1 to 5 taking in to consideration of all the applicable load conditions for the given location.

11.6. String Inverter

The selection of the inverter supplier shall be based on best performance in class and proven reliability. The chosen inverter will offer the highest efficiency among string transformer-less inverters.

11.7. Cables and Conduits

PV module wiring and cables are typically exposed to harsh conditions in outdoor climate. It is essential that the cables are designed to withstand such conditions and also reduce the energy losses that occur due to high temperature, ageing, etc.

Type	Material	Insulation & Outer Sheath	Salient Features
Solar Cables	Tinned fine copper strands	PVC	-40℃ up to +90℃ > 25 years
Other Cables	Single or multi- wire conductors of plain copper/Al	PVC	-40℃ up to +70℃

Solar cables manufactured by reputed cable manufacturers, which are especially designed for PV applications. These solar cables must be extremely robust and resist high mechanical load and abrasion. High temperature resistance and excellent weather proofing characteristics provide a long service life.

The characteristics of these solar cables are:

1,000 V DC Voltage rating
Application temperature range from -40ºC to +90ºC
High resistance against UV, ozone and hydrolysis
High mechanical robustness & resistance against water, oil and chemicals

These cables shall be typically fixed to the mounting structures using UV proof cable ties and / or fixing clamps up to the Generator Junction boxes. Maximal admissible temperature is 90 degrees Celsius.

After coupling, cables of bigger sections may be used down to the Inverters Station. They may either mounted on galvanized cable trays in the shade of the modules or buried underground.

11.8. Lightning Arrester

The Solar Plant shall include lightning arresters for protection of the plant against lightning strikes. Streamer type lightning arresters may be used, which will have more coverage area.

11.9. Monitoring System

The Monitoring System provides complete plant monitoring, remote diagnosis, data storage and display. It also allows end user to access plant information via a PC, regardless of operating system or browser type. The system shall be the

link between the inverter and its owner. The Monitoring System supports RS232 or RS485 interfaces for data transfer to and from all inverters.

11.9.1. Operation and Maintenance

Regular operation & maintenance of the SPV Power Plant after commissioning along with supply of consumable items as and when necessary and submission of Daily analysis and evaluation of operational plant data through remote monitoring, O&M includes:

- Visual inspections
- Data recording: A robust data-logger and related sensors to measure the Irradiation, the ambient and modules temperature and the energy output of the power plant. The information is available through a web interface accessible from any location.
- Monthly/yearly energy and performance reporting
- Plant health monitoring and troubleshooting measures
- Module cleaning, plant preventive and scheduled maintenance and replacement work as required
- Emergency response
- Refurbishments & Warranty claim management and redressal system

In addition to this also includes Preventive inspection and maintenance of system components according to manufacturer's specifications, documentation of events and measures, provision of small parts and operating material. Fault detection and analysis includes function check after fault message is received, immediate start of fault removal measures and long-term trend analysis. Analysis of interruptions and incidents, supply chain management for spare parts i.e. modules, inverters, cabling and mechanical components.

Measured load on the i/coming panel and average load found to be 32 KW.Taking 70% load for on grid solar power system i.e. 23 kw thus 20 KWp of on grid system is recommended

11.9.2. Energy Savings & Payback period`

EEM-13: Installation of a 20 KWp Solar Roof Top Grid Interactive Power Plant

Rated capacity of the Solar PV System-KWp	20 KWp, Solar panel 400 watt
Estimated number of Modules-nos.	60 nos
Average power generation per day-Kwh	80kWh/ day
Expected power generation per annum-Kwh(250 sunny days)	20,000 kWh per annum

EEM -13

Providing and fixing 20 KWp Solar Roof Top Grid Interactive Power Plant

Energy Savings Calculations:

Parameters	Units	Values
Source of Power	-	Solar PV
Installed Capacity	kW	20
Annul Power Generation	kWh /Year	20,000
Overall Purchased Power Rate	Rs. /kWh	12
Monetary Benefits	**Rs. /Year**	**2,40,000**
Investment Required @ Rs. 0.50 Lakh /KWp	Rs. Lakh	10
Simple Payback Period	Years	4.1

The payback period is calculated to be 4.1 year, which is high. Since the product life is much more than that, the move is economically beneficial and energy saving.

Note: Installation of 20 KWp Solar Power Plant would bring the institution to generate excess electrical energy which can be pumped to the grid effectively making the institute as a net positive building.

RAKESH KUMAR Digitally signed by RAKESH KUMAR Date: 2022.10.04 12:38:23 +05'30'

For R.K.Electricals and Energy Audit Services

(END OF THE REPORT)

GREEN AUDIT REPORT

OF

PT.MLSD COLLEGE, GURDASPUR

AUDIT CONDUCTED ON: 12.05.2022

CONDUCTED BY:

R.K. ELECTRICALS & ENERGY AUDIT SERVICES

Er. R. K. Sharma MIE, FIV
BEE's Energy Auditor (EA-10080) MoP, GoI
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2022-23

CERTIFICATE

This is to certify that “R.K.Electricals & Energy Audit Services” had conducted a detailed Green Audit of "PT.MLSD College for Women, Gurdaspur campus during the year 2022-23 and they had submitted all required data and credentials for evaluation. Three types of data that are GPS points, field survey data and googal earth data for Geo referencing have been used in this study. Based on the data submitted, the College's actions and measures have been verified and found to be satisfactory. The efforts made by staff and students in the areas of environment and sustainability are much appreciated and encouraged.

Below are some of the media links showing Green awareness drives held by students and staff of PT.MLSDC for Women, Gurdaspur.

1. https://youtu.be/xWm13hRAd2U
2. https://youtu.be/D-uMKhBh9Ls
3. https://www.facebook.com/groups/788465557953990/permalink/2385580124909184/https/

For R.K. Electricals & Energy Audit Services

INDEX

1. ACKNOWLEDGEMENTS

"R.K.ELECTRICALS & ENERGY AUDIT SERVICES" expresses sincere thanks to the

President Mr. Upkar Krishan Sharma

Principal – Dr. Neeru Sharma

Asst. Prof. Gurdeep Kaur

for giving us an opportunity to conduct the Green Audit of PT.MLSDC for Women, Gurdaspur

The Study team members of **R.K.ELECTRICALS & ENERGY AUDIT SERVICES sincerely** thank the support staff members of PT.MLSDC for Women, Gurdaspur who have rendered their all possible co-operation and assistance during the entire period of assignment.

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For R.K.Electricals & Energy Audit Services

2. EXECUTIVE SUMMARY

R.K.ELECTRICALS & ENERGY AUDIT SERVICES was entrusted the Green audit of PT.MLSDC for women, Gurdaspur. The management of the college is conscious with regard to improve sustainability and complementary to its Green Policy. The purpose of this audit was to ensure that the practices followed in the campuses are in accordance with the green policy adopted by the institution, it works on several facets of Green Campus including water conservation, electricity conservation, tree plantation, waste management, paperless work, mapping of biodiversity Keeping in view these issues in mind, the specific objectives of the audit are to evaluate the adequacy of the management control framework of environment sustainability as well as the degree to which the departments are in compliance with the applicable regulations, policies and standards.

PT.MLSDC for Women, Gurdaspur aims to minimize the environmental impact of its operations and move towards restoring environmental integrity, promote social justice, equity and diversity contribute to human health and maintain its financial viability.

As part of its commitment to sustainability, PT.MLSDC for Women, Gurdaspur developed a Sustainability Policy and Sustainability Strategy and is now developing a series of Sustainability Action Plans on energy and greenhouse, water, transport and waste to support implementation of the Policy and Strategy.

This document deals with Green Audit of PT.MLSDC for Women, Gurdaspur for the year 2022-2023

2.1. The brief description of Premises

Project Title: Green Audit of PT.MLSDC for Women, Gurdaspur		
Client: Principal, PT.MLSDC Gurdaspur		
Contact Person: Dr. Neeru Sharma (Principal)		
Date of Audit: 12.05.2022		
Source: Data collection from the staff & Physical verification/Inspection		
Report Number: RKS/GA-15/2022	**Date of report: 25.05.2022**	
***Work Carried out by**:(Team Composition)*	**Er. R.K.Sharma** (BEE's Energy Auditor) EA-10080, IGBC Accreditated Professional **Mrs Savita Sharma** Msc (Ecology Environment**)** **Er. Varun Sharma** B.Tech (EE), MBA, PGD (Indl Safety Mgmt) **Er. Paramjeet Singh** (BEE's Energy Auditor)	**Signature**

3. INTRODUCTION

1.2 Back ground of Pt.Mohan Lal SD College for Women, Gurdaspur

Pt. Mohan Lal SD College for Women, Gurdaspur had its humble beginning in 1995, established under the management of Goswami Ganesh Dutta Sanatam Dharma College Society. The college is founded and crafted on the lofty ideals of Pt. Mohan Lal Ji an immortal luminary, a paradigm of perfection and true Karamyogi who served as former Home, Finance, Education and Industries Minister, Punjab.

The most important aim of this college is educating women specifically due to the fact that women can play a significant role in boosting the growth procedure of the entire nation.

The college provides quality of academic input, student care, state of-the-art infrastructure and job prospects. Over the years, the management of the college has appointed vibrant Faculty Members with expertise in diverse areas. They are well qualified academicians who always inspire and encourage the students. The college provides placements to students which make it one of the most sought-after college in Gurdaspur.

The college campus is quite attractive, modern and it is well-equipped for academic pursuits, convenience and comfort. There are even special opportunities available for the growth of the students. The vision of the college is to emerge as a premier institution to empower women through holistic education and the main mission of the college is to excel in the field of empowering women by making use of global perspectives through competitive and vocational education. Broadening the mental limitations of women in the society is also one of the most important aims of the college

3.3 Utility of Green Audit

These are used to help improve existing human activities, with the aim of reducing the adverse effects of these activities on the environment. It becomes essential to adopt the system of the Green Campus for the institutes which will lead for sustainable development and at the same time reduce a sizable amount of atmospheric CO2 from the environment. The National Assessment and Accreditation Council, New Delhi (NAAC) has made it mandatory that all Higher Educational Institutions should submit an annual Green Audit Report. Moreover, it is part of Corporate Social Responsibility of the Higher Educational Institutions to ensure that they contribute towards the reduction of global warming through carbon footprint reduction measures.The audit team will study an organization's environmental effects in a systematic and documented manner and will produce a green audit report.

4. OBJECTIVE OF THE STUDY

The main objective of the green analysis is to promote the Environment Management and Conservation in the college Campus. The purpose of the analysis is to identify, quantify, describe and prioritize framework of Environment Sustainability in compliance with the applicable regulations, policies and standards. The main objectives of carrying out Green Analysis are:

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

5. METHODOLOGY

Methodology adopted for achieving the desired objectives viz: physical inspection of the campus, observation and review of the documentation, interviewing key persons and data analysis, measurements and recommendations. Three types of data that are GPS points, field survey data and googal earth data for Geo referencing have been used in this study. The study covered the following area to summarize the present status of environment management in the campus:

I. Geographical Metrological parameters

II. Water consumption and management

III. Electricity consumption and management

IV. Air quality assessment and management

V. Sound pollution monitoring

VI. Waste management

VII. Biodiversity status of the campus

6. GEOGRAPHICAL AND METROLOGICAL PARAMETERS

Gurdaspur is a District of Punjab State, India. It is located between rivers Beas and Ravi, about 241 Kms from Chandigarh, the state capital of Punjab. PIN code is 143521

6.1. Weather Bins

This area has a humid subtropical climate characterized by a seasonal rhythm: hot summers, cold winters, unreliable rainfall and great variation in temperature. Gurdaspur weather by month weather averages:
Gurdaspur has the moderate climate prevailing. There is a lot of rainfall in the summer, and in the winter it is quite dry again. The average annual temperature for Gurdaspur is 30° degrees and there is about 572 mm of rain in a year. It is dry for 222 days a year with an average humidity of 45% and an UV-index of 6. During three months of monsoon season from July to September, the moist air of oceanic origin penetrates into the district and causes 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 the hot weather season or Pre-monsoon season which ends up to the last week of June.

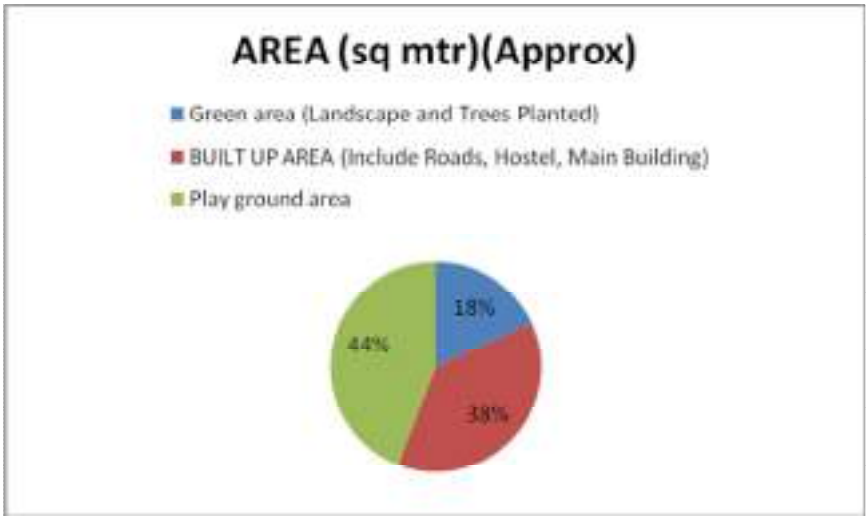
6.1.2. Rain fall

The normal annual rainfall of Gurdaspur1113 mm in which is unevenly distributed over the district. The southwest monsoon sets in last week of June and withdrawn towards end of September and contributes about 82% of annual rainfall. July and August are the rainiest months. Rest 18% of the annual rainfall occurs during none of the year in the form of thunder storm and western disturbances. Rainfall in the district increases from southwest to northeast. Therefore, climatically, the district has a very hot in summer and frequently scorching heat is in full swing. The climate of Gurdaspur district can be classified as tropical steppee, semi arid and hot which is mainly dry except in rainy months and characterised by intensely hot summer and cold winter. During three months of monsoon season from July to September, the moist air of oceanic origin penetrates into the district and causes high humidity, cloudiness and good monsoon

Satellite Image of PT.MLSDC for Women, Gurdaspur

6.1.3. LAND USE DATA OF PT.MLSDC for Women, Gurdaspur

CATEGORIES OF LAND USE-%	***AREA (sq mtr)(Approx)***
Green area (Landscape and Trees Planted)	1363
BUILT UP AREA (Include Roads, Hostel, Main Building)	2810
Play ground area	3305
TOTAL AREA	**7483**



7. WATER CONSUMPTION AND MANAGEMENT

7.1. Water extraction and Storage

The building has made the provision for storage the water for the facility of the staff and students in the college and hostels. Water is pumped into storage PVC tanks of various sizes placed in the roof top of the building for storage of 5000 lts of water for hostel and 8000 lts in the campus building per day. The pumps installed for filling the tanks runs for app. 2-4 hours daily

Water Pumping set for College building supply

Water Pumping set for Hostel supply

7.2. Details of Pumps

PT.MLSDC for Women, Gurdaspur has installed 2 nos of Submersible pumps for the extraction of water at various locations

Details of Pumps installed in College Campus				
Sr.No.	**Name**	**Quantity (Nos)**	**Capacity HP/KW**	**Location**
1	Submersible Pump	1	2 HP	Near Main college building
2	Submersible Pump	1	2 HP	For and near Hostel

7.3. Drinking water and quality

Reverse Osmosis Plant - Reverse osmosis (RO) is a membrane separation process, driven by a pressure gradient, in which the membrane separates the solvent (generally water) from other components of a solution. The membrane configuration is usually cross-flow. The campus has provided purified R.O. drinking water to all the students and staff residing in the campus by setting up the R.O plant. In additional to drinking purpose, R.O water is provided to the hostel mess for cooking foods.

Measured pH value and TDS Value of RO filtered drinking water

Auditors checked the quality of the drinking water after it is treated from RO Plant by taking a sample and found the quality water which is as under:

SR NO.	Particulars of checked item	Value	Remarks
1	Sample of drinking water for testing PH Value	7.3	Good
2	Sample of drinking water for testing TDS(total dissolved solids) Value	245 ppm	Fair

Findings and comments

1. The PH value of safe drinking water lies between 6.5 & 8.5
Tested the sample of drinking water and found to be 7.3 which is Neutral PH value for safe drinking water

2. The TDS value of safe drinking water is less than 300 ppm
The TDS value of tested sample found to be 245 which is good and safe for drinking water

7.4. Water Conservation

PT.MLSDC for Women, Gurdaspur has developed for the various water-use categories in the office buildings and for monitoring and operational procedures. They are grouped according to indoor water use, outdoor water use, and monitoring and operational procedures.

Manually operated Taps being used in washrooms

Fig: Sensor based wash basin Taps being used in building of PT.MLSDC Gurdaspur

7.4.1. Use of Efficient Water Urinals/Fixtures

- **Low water use urinals:** PT.MLSDC for Women, Gurdaspur is using standard systems urinals. Water is applied by turning the taps ON and same are turned OFF after appropriate usage. The management has started

replacing standard manually operated taps with sensor based automatically operated taps.

- **Smart flush systems:** Now a days smart flush system using 0.8 litres per flush have also been launched. It is advised to PT.MLSDC for Women, Gurdaspur management to install more smart sensor based taps to further avoid water wastage in urinals.

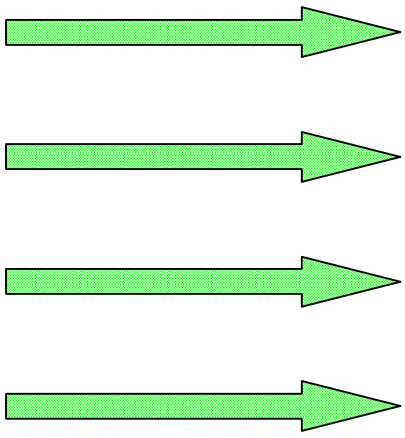
- **Waterless urinals:** There are various technologies available for waterless urinals. In oil barrier technology, the urinals operate using an oil wall between the urine and the atmosphere, preventing odour from escaping.

- **In another technology**, the barrier has been replaced by a seal with a collapsible silicone tube that closes after the fluid has passed through it, to prevent gases from flowing into room.

- **Other system** uses biological blocks which include microbial spores and

  Surfactants which can be placed into any urinal, thus eliminating water use

Other Areas which need attention for water conservation include



Identifying and Fixing Leaks

Review Leakages periodically& take corrective measures

Re-use Water

Re Cycle Water

7.4.2. Identifying and Fixing Leaks

The hidden water leaks can cause loss of considerable water and energy without anyone being aware of it. A small leak can amount to large volumes of water loss. Leaks become larger with time, and they can lead to other equipment failure. Fix that leaky pipe, toilet, faucet, or roof top tank to save considerable amount of money and water

7.4.3. Review Leakages periodically& take corrective measures

Regular maintenance of the toilets should be carried out. Test for leaks and make necessary repairs promptly. Keep the toilet in working order by periodically inspecting and replacing flappers and other defective parts.

7.4.4. Reuse & Recycle

The management is advised to install a micro sewage treatment plant so that waste water from wash rooms be recycled and utilized for garden irrigation

7.4.5. Rain Water Harvesting and conservation

One of medium of harvesting rainwater is providing the incoming rainwater directly to the ground. This will increase the ground water level of the location and also helps in achieving the ground waterat same or at less level than the existing level,

7.4.6. Rain water Harvesting: In PT.MLSDC for Women, Gurdaspur : A small Rain water harvesting system exists near building block including low land area water from other blocks, roofs, , and hostel and through roads collected in to earth pit for charging.

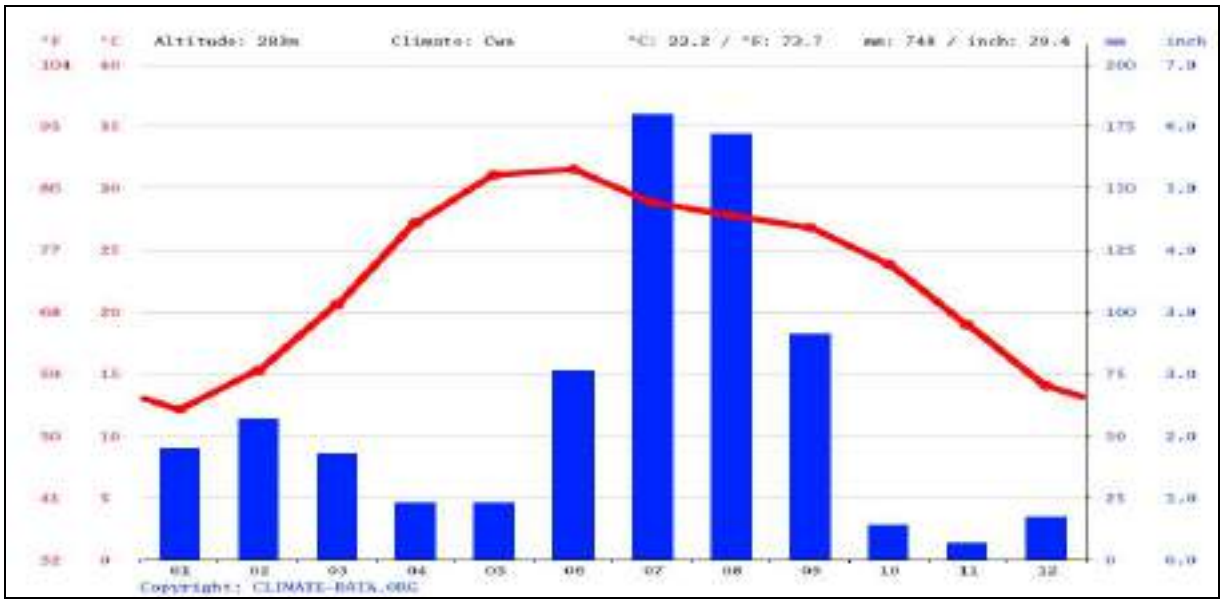
Rain water harvesting Tank (Marked area)

Inlets for Rainwater charging wells

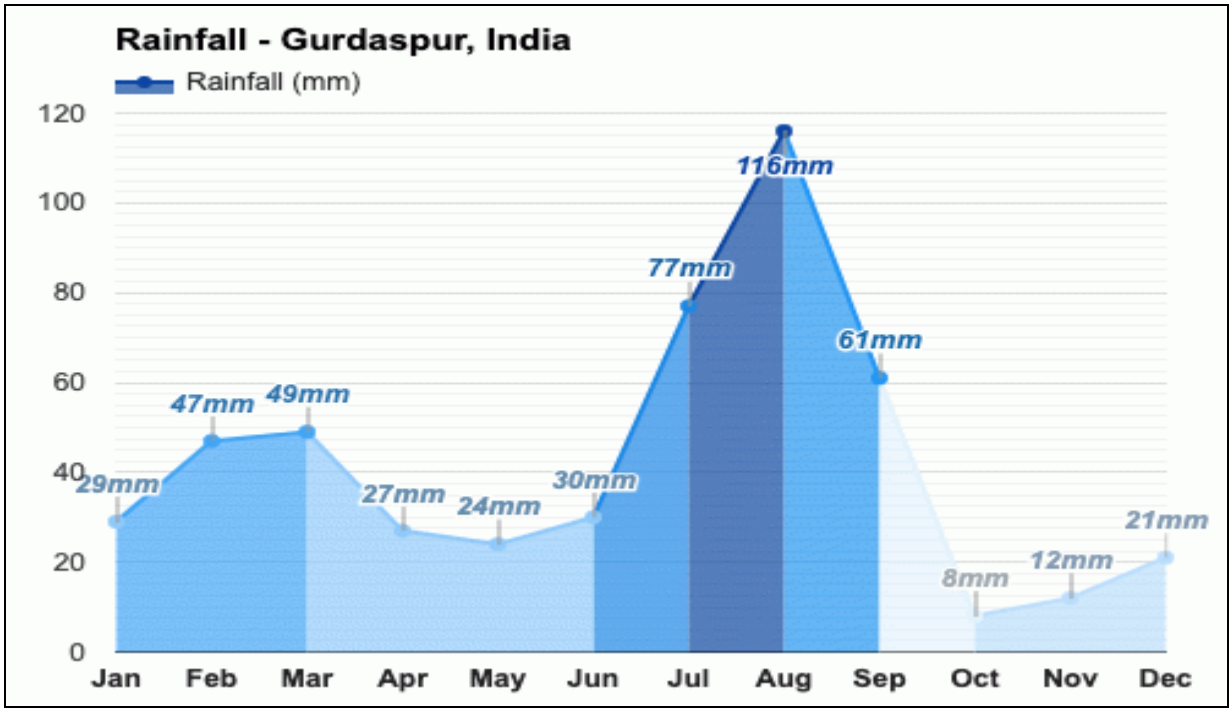
7.4.6. Rain fall

Gurdaspur has the moderate climate prevailing. There is a lot of rainfall in the summer, and in the winter it is quite dry again. The average annual temperature for Gurdaspur is 30° degrees and there is about 572 mm of rain in a year. It is dry for 222 days a year with an average humidity of 45% and an UV-index of 6.. Therefore, climatically, the district has a very hot in summer and frequently scorching heat is in full swing. The climate of Gurdaspur district can be classified as tropical steppe, semi arid and hot which is mainly dry except in rainy months and characterised by intensely hot summer and cold winter.

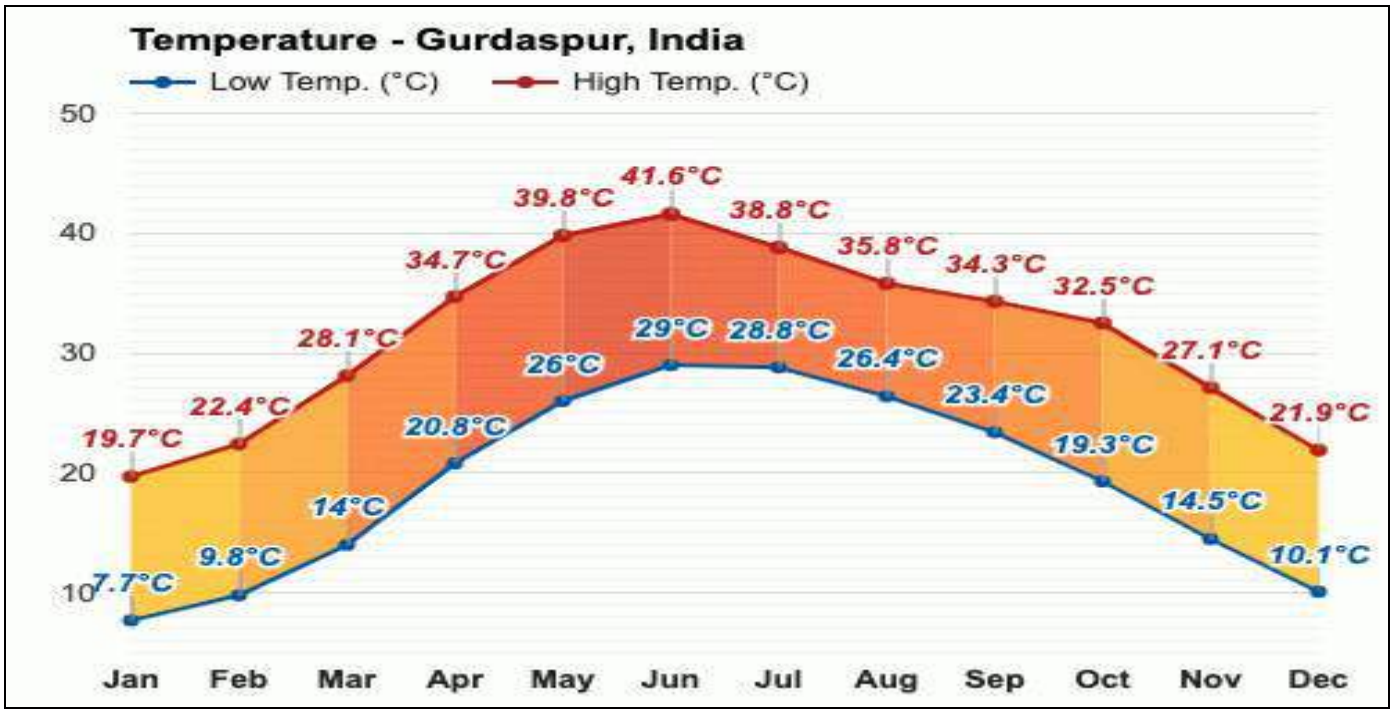
During three months of monsoon season from July to September, the moist air of oceanic origin penetrates into the district and causes high humidity, cloudiness and good monsoon rainfall. The period from October to November constitutes post monsoon season. The cold weather season prevails from December to February followed by the hot weather season or Pre-monsoon season which ends up to the last week of June.



CLIMATE GRAPH // WEATHER BY MONTH IN GURDASPUR



Rainfall Data of Gurdaspur (Punjab)



AVERAGE TEMPERATURE GURDASPUR

7.4.8. Feasibility: there is more feasibility of Water harvesting Potential in PT.MLSDC GURDASPUR Campus (June, July Aug & Sept) near parking area (underground wells)

Month	Average Rainfall	Average water harvested considering 60% recovery potential(run off co-eff) and 10000 m^2 estimated roof area from where rain water can be harvested
June-21	30 mm	450 m^3
July-21	77 mm	1068m^3
Aug-21	116 mm	1032m^3
Sept-21	61 mm/m^2	528m^3
Total		3078 m^3

Thus it is recommended to provide enhanced rain water harvesting and recharging system i.e. Installation of more recharge wells / rain water harvesting pits for recharging groundwater tables.

There would be no direct monetary benefits, but there would be some improvement in the water table. The precipitation varies 173 mm | 7 inch between the driest month and the wettest month. The average temperatures vary during the year by 19.4 °C | 34.9 °F. The month with the highest relative humidity is August (79.64 %). The month with the lowest relative humidity is April (29.91 %) The month with the highest number of rainy days is July (19.47 days). The month with the lowest number of rainy days is November (1.03 days) Gurdaspur is in the northern hemisphere. Rains starts here at the end of June and ends in September. There are the months of Rainy days: July, August, and September.

Findings and comments

Monitoring is the most important prerequisite for efficient water management. Thus, in the water supply network, it is necessary to have a robust system of monitoring.

1. Monthly water withdrawal and consumption record be maintained for monitoring system.

2. Water withdrawal permission is required from Central ground water authorities or local PWD authorities.

3. Optimize water requirement for domestic use through water saving measures in urinals, canteens etc. Use low water /smart flush system or water less urinals

4. Metering arrangements at all water withdrawal points shall be made and calibration

Certificates of the same shall be available.

5. Provide more scope of rain water harvesting system in the campus, hence more rain water harvesting wells are proposed to be constructed underground, especially in low lying areas.

8. ELECTRICITY CONSUMPTION AND MANAGEMENT

PT.MLSD College for women, Gurdaspur draws power from PSPCL through dedicated feeders at 11 KV. The campus has a transformer of 100 KVA to step down the voltage from 11 KV to 0.440 KV

8.1. Detail electricity billing

Billing Month (Previous Consumption pattern)	Actual KVAH Consumption
April	**2487**
May	**2171**
June	**4147**
July	**5240**
August	**7976**
September	**7074**
October	**3274**
November	**2277**
December	**2485**
January	**3659**
February	**2799**
March	**4484**
Total	**48073**

8.2 Energy conservation measures

PT.MLSDC for Women, Gurdaspur has installed solar street lights for illumination of internal roads and lawns in night and to harness renewable solar energy as well.

8.2.1. Solar Street Lights: Solar street lights are being used to tap Renewable energy Resources for the lighting in campus.

SOLAR STREET LIGHTS

8.2.2. LED lights: About 380 no. conventional lighting has been replaced with LED lighting thus lowering the electricity consumption in the campus

LED LIGHTS

Conventional Fluorescent lights and CFLs are being replaced in phased manner inside the campus

8.2.3. LUX MEASUREMENT

A high quality **DIGITAL LUX METER** was used to measure the illumination levels at various locations of PT.MLSDC for Women, Gurdaspur and the recommended level of lightning in these areas is given in the table:

8.2.4. The recommended light level as per standard is shown below:

Location	Recommended LUX
Normal work station space, open or closed office	500
Conference Rooms	300
Training Rooms	500
Internal Corridors	200
Auditorium	150-200
Entrance Lobbies, Atria`	200
Stairwells	200
Toilets	200
Dining Areas	150-200

Recommended Standard Light level Details

8.2.5. Study finding of Lux level

The building authorities provided the details of luminaries installed within their Building premises. The auditors surveyed area and measured Lux level which is as under:

Sr. No	LOCATION	Measured Lux	Remarks
1	Principal's office	145	poor
2	Computer lab room	102	poor
3	Seminar hall	200	Satisfactory
4	Room No.8	200	Satisfactory
5	Room No.17	213	Satisfactory
6	Hostel reception	245	Satisfactory
7	Hostel mess	237	Satisfactory
8	Hostel room no.3	255	Satisfactory

Assessment of the Lighting with the Lux meter

Findings & Comments

The authorities of PT.MLSDC for Women, Gurdaspur are quite conscious about energy conservation and has already started replacing conventional lighting with LED lighting and some street lights and has been advised to install a mini solar power plant to facilitate and promote energy efficiency in the campus in addition to installation of solar geysers. As per measurement of lighting in the rooms of campus by the auditors with the high quality Lux meter, the light level found good and comfortable for health of the occupants.

9. AIR QUALITY ASSESMENT

9.1. The Air Quality Index

The **Air Quality Index** (AQI) is an index for reporting daily air quality. It tells us how clean or polluted the air is, and what associated health effects might be a concern. The AQI focuses on health effects which may experience within a few hours or days after breathing polluted air.

9.2. IN DOOR ENVIORONMENTAL QUALITY

Health and comfortable life is the top most priority of every building user. Corresponding to health and wellbeing, the quality of a built environment for its occupant inside a building is referred to as in door environmental quality. Indoor environmental quality involves noise disturbance, occupant density, in door lighting, day lighting, ventilation, room temperature, cleanliness and indoor humidity. All these factors add up and form indoor environmental quality.

The AQI is divided into three categories. **CO2, TVOC & HCHO** Each category has health concern. This is shown below in the table.

AQI Basics for Pollution			
CO2	**TVOC**	**HCHO**	**Description of Air Quality**
< 600 ppm	**< .6mg/m3**	**< .0.08mg/m3**	Air quality is excellent, and air pollution poses no risk.
>600 < 1000 ppm	**>0.6 < 1.6mg/m3**	**>0.08 < 0.12mg/m3**	**Air quality is good.** and air pollution poses no risk..
>1000 ppm	>1.6 **mg/m3**	>0.12 **mg/m3**	**Air quality is good. Some members of the general public may experience health effects; members of sensitive groups may experience more serious health effects.**

9.3. Auditors measured some air quality parameters at different locations in the buildings.

Sr No.	Location	CO2	TVOC	HCHO	temperature in degree centigrade	Relative Humidity in %
1	Main office building (indoor)	405	0.021	0.001	25.55	30
2	Park near Main building	410	0.025	0.05	33	36
3	Hostel	398	0..022	0.001	32	32

MEASUREMENT OF AIR QUALITY PARAMETERS INSIDE PT.MLSDC GURDASPUR COLLEGE CAMPUS

Recordedd AQI outside the building was 99

PM 2.5 → 35.04 µgm/m3 and PM 10 → 83.42 µgm/m3

Findings & Comments

By analyzing the above data, outdoor Air quality index is 99, and PM 2.5 and PM 10 parameters are unhealthy and hence stringent pollution control measures are advised

10. SOUND POLLUTION MONITORING

The human ear is constantly being assailed by man-made sounds from all sides, and there remain few places in populous areas where relative quiet prevails. There are two basic properties of sound, (1) loudness and (2) frequency. Loudness is the strength of sensation of sound perceived by the individual. It is measured in terms of Decibels. Just audible sound is about 10 dB, a whisper about 20 dB, library place 30 dB, normal conversation about 35-60 dB, heavy street traffic 60-75 dB, boiler factories 120 dB, jet planes during take-off is about 150 dB, rocket engine about 180 db. The loudest sound a person can standwithout much discomfort is about 80 db. Sounds beyond 80 dB can be regarded as pollutant as it harms hearing system. The WHO has fixed 45 dB as the safe noise level for a city to avoid sleep disturbances. For international standards a noise level up to 65 dB is considered tolerable. Frequency is defined as the number of vibrations per second. It is denoted in Hertz (Hz). Sound pollution is another important parameter that is taken into account for green auditing of the Campus. Different sites were chosen for the monitoring purpose
The Auditors measured sound level at different location as under:

S.No.	Description	db (Av)
1	Near office area in main building	52.6
2	Library	48
3	Near Canteen area	61
4	Inside Hostel Building	63
5	Principal's office	49

Findings and comments: Sound level found satisfactory

11. WASTE MANAGEMENT

Waste management includes the activities and actions required to manage waste from its inception to its final disposal. This includes the collection, transport, treatment and disposal of waste, together with monitoring and regulation of the waste management process.

Waste can be solid, liquid, or gas, each type has different methods of disposal and management. Waste management deals with all types of waste, including industrial, biological and household. In some cases, waste can pose a threat to human health. Waste is produced by human activity, for example, the extraction and processing of raw materials. Waste management is intended to reduce adverse effects of waste on human health, the environment or aesthetics.

Waste management practices are not uniform among countries (developed and developing nations) regions (urban and rural areas), and residential and industrial sectors can all take different approaches.

11.1. Dust Bins & Lifting of Waste

PT.MLSDC for Women, Gurdaspur has placed waste bins for proper segregation of solid wastes in the different locations of the campus

Detail of dustbins in Campus is as under:

Article	Nos.
Dust Bin 60 ltr Plastic (Sintex)	15
Dust Bin 80 ltr (Aristo)	02
Dust Bin 50 ltr green (Sintex)	05
Dust Bin 15 ltr (Sintex)	10
Dust Bin 15 ltr Utility (Aristo)	10
Dust Bin 15 ltr Green Aristo	05

Dust Bin Green 55 ltr.	05
Dust Bin Blue 50 ltr.	05

11.2. Kitchen Waste

The Canteen in PT.MLSDC for Women, Gurdaspur runs for all the students, Staff and supporting Staff and has policy of zero food waste policy. It has created awareness for the same through posters in the canteen. The food waste log is maintained daily and makes sure people produce less food waste and as a community campus excels in reduction of food waste.

For taking care of Solid waste (Dry and Wet) from various buildings, kitchens, canteens, hostels etc, college management has tie up for lifting garbage and waste from campus with a local Municipal contractor. The waste collection vehicle of this contractor visits the campus twice a day for collection of waste which is already separated in Green and Blue dustbins (separate for dry and wet waste). Approximate waste collection tunes to 10 Quintal per month

PICTURE OF WASTE BEING COLLECTED FROM COLLEGE CAMPUS BY DESIGNATED WASTE VENDOR

11.3. Sewage Treatment

The Campus has availed a sewage connection from local municipal authorities, hence all the waste water is disposed off efficiently, however, it is recommended that a micro Sewage treatment plant is installed in campus to treat the water from washroom taps discharge for further treatment and for use as irrigation water to irrigate lawns of campus thus has potential to save water.

12. BIODIVERSITY IN CAMPUS

Introduction

PT.MLSDC for Women, Gurdaspur situated in the vicinity of farms and agricultural areas are rich in biodiversity. To conserve this biodiversity, it is important to have an understanding of the bio-diversity of an area so that the local people can be aware of the richness of bio-diversity of the place they are living in and their responsibilityto maintain that richness.

In today's world, among the popular conservation measures which are taken to spread wildlife and environmental awareness, butterfly gardens can be placed in a significant position. To create butterfly garden, we need to know which associate plants and other fauna are present in the surrounding. This study allows us to understand the faunal and floral diversity of the surrounding areas of the college premises and their inter-relationship.

12.1. Objectives:

The main objective of this study is to get a baseline data of bio-diversity of the area which will include:

Documentation of the Landscape area use

Documentation of the floral diversity of the area, its trees, herbs, shrubsand climbers.

Documentation of the major faunal groups like mammals, reptiles,amphibians, birds and butterflies.

12.2. Method of Study

Brief methodology for the floral and faunal survey is given below:

.The total area was surveyed by walking at daytime.

Sampling was done mostly in random manner

Surveys were conducted for the maximum possible hours in daytime.

Tree species were documented through physical verification.

For faunal species we emphasized mainly on the direct sighting. Also call of various birds and amphibians and nesting of some faunal species were considered as direct evidences.

Reptiles were found mostly by looking in potential shelter sites like the under surface of rocks, logs, tree hollow sand leaf litter and also among and underneath the hedges. Sometimes some species, particularly the garden lizards were also observed in open spaces (on twigs and branches and even on brick constructions) while they were basking under direct and bright sunlight. Active invertebrates like the insects require more active search. For larger winged insects like butterflies, random samplings were carried and point sampling was also done.

12.3. Landscape Use

The baseline landscape consumption may be calculated in Litres/m2/day. Whereas, the actual landscape requirement is done as per the plantation species/trees/turf grass. Also, during the actual calculation the annual impending rainwater is also considered.

However, as the part of landscape demand is catered with the treated water from STP. Hence, the treated water is reduced from the total landscape demand for more feasible solution.

The total landscape in the campus premises utilize sprinklers and natural ditches to irrigate the green area

Land scape watering schedule

In winter season –Alternate days; Others-Twice a week

Irrigation Guidelines:

The best irrigation system is sprinkler which is one of effective way to save water, better yield and possibility of using soluble fertilizers and chemicals less problem of clogging of sprinkler nozzles due to sediment laden water

LANDSCAPE WATERING GUIDELINES

How Much & How Often Water to the outer edge of the plant canopy and to the depth indicated. Watering frequency will vary depending on season, plant type, weather and soil.		Seasonal Frequency - Days Between Waterings				Water This Deeply (Typical Root Depth)
		Spring Mar - May	Summer May - Oct	Fall Oct - Dec	Winter Dec - Mar	
Trees	Desert adapted	14-30 days	7-21 days	14-30 days	30-60 days	24-36 inches
	High water use	7-12 days	7-10 days	7-12 days	14-30 days	24-36 inches
Shrubs	Desert adapted	14-30 days	7-21 days	14-30 days	30-45 days	18-24 inches
	High water use	7-10 days	5-7 days	7-10 days	10-14 days	18-24 inches
Groundcovers & Vines	Desert adapted	14-30 days	7-21 days	14-30 days	21-45 days	8-12 inches
	High water use	7-10 days	2-5 days	7-10 days	10-14 days	8-12 inches
Cacti and Succulents		21-45 days	14-30 days	21-45 days	if needed	8-12 inches
Annuals		3-7 days	2-5 days	3-7 days	5-10 days	8-12 inches
Warm Season Grass		4-14 days	3-6 days	6-21 days	15-30 days	6-10 inches
Cool Season Grass		3-7 days	none	3-10 days	7-14 days	6-10 inches

These guidelines are for established plants (1 year for shrubs, 3 years for trees). Additional water is needed for new plantings or unusually hot or dry weather. Less water is needed during cool or rainy weather. Drip run times are typically 2 hours or more for each watering.

12.4. Findings

Matching with the green and sustainable practices, the college campus has facility for sewage treatment plant, RO drinking water points, solid waste management system and separate parking facilities for 2 and 4 wheelers. Around 1363 sq mt of the campus area is covered with lush green lawns & plantation covering plants & tree species, thus giving pure oxygen to the students and making campus a treat to eyes.

12.5. Faunal Species

The list of Fauna indicates that the college campus is significantly rich in faunal diversity. Significant number of bird nests can be seen at many places.

Faunal groups with species number

1.	Birds	21
2.	Reptiles	1
3.	Amphibians	3
4.	Butterflies	12

12.6. List of Butterflies

No.	Common Name	Scientific Name
1	Common Rose	Pachliopta aristolochiae
2	Lime Butterfly	Papitto demolis
3	Tailed Jay	Grapheme agamemnon
4	Small Grass Yellow	Furema Brigitte
5	Common Grass Yellow	Eurema hecabe
6	Common Quaker	Neopithecops Zamora
7	Dark Grass Blue	Zizeeria karsandra
8	Indian Wanderer	Pareronia hippie
9	Lemon Emmigrant	Catopsila Pomona
10	Mottled Emmigrant	Catopsila pyranthe

12.7. List of Birds

No.	Common Name	Scientific Name
1	House Crow	Corvus splendens
2	House Sparrow	Passer domesticus
3	Common Iora	Aegithrna tipsia
4	Common Kingfisher	Alcedo atthis
5	Common Myna	Acridotheres tristis
6	Common Pigeon	CoInmba livia
7	Common Sandpiper	Actitis hypoleucos
8	Common Tailorbird	Orthotomus sutortus
9	Coppersmith Barbet	Megalaima haemacephala
10	Common Hawk Cuckoo	Hierococcyx varlus
11	Common Hoopoe	Upupa epops

12.7. List of Amphibians

No.	Common Name	Scientific Name
1	Frog	Enphldctis cyanophlyctis
2	Indian Toad	Duttaphrynus melanostictus

12.8. Floral species:

The list of Flora indicates a significant diversity of plants which indicates the overall richness of the place. The most diverse group is tree total 374 trees list as below:

SR. NO	COMMON NAME	SCINTIFIC NAME	FAMILY	QTY IN CAMPUS
1	Squirrel	Funambulus palmarium	Sciuridae	20
2	Crow	Corvous splendens	Corvidae	50
3	Sparrow	Passer domesticus	Passeridae	25
4	Koel	Eudynamis scolopsacaus	Cuculidae	01
5	Crane	Gruidae gruiformes	Gruidae	05
6	Bulbul	Molpastes cafer	Pycnonotidae	01
7	Myna	Acridotheres tristis	Sturnidae	10
8	Woodpecker	Dendrocopos himalayensis	Picidae	02
9	Pigeon	Columba livia	Columbidae	50
10	Kingfisher	Alcedo atthis	Alcedinidae	01
11	Parrot	Phaethontidae psittaciformes	Psittacidae	10
12	Housesnake	Boaedon capensis	Elapidae	10
13	Toad	Bufo bufo	Bufonidae	100
14	Frog	Rana temporaria	Ranidae	100
15	Green lizards	Lacerta bilineata	Agamidae	05
16	Newt	Tylototriton verrucosus	Salamandridae	01
17	Chameleon	Calotes versiicolor	Chamaeleonidae	01
18	Earthworm	Lumbricus terrestres	Lumbricidae	100
19	Grasshopper	Poekilocerus pictus	Pyrgomorphidae	50
20	Dragonfly	Pantala flavescens	Libellulidae	50
21	Ladybug	Coccinella spternpunctata	Coccinellidae	50
22	Ant	Camponotus	Formicidae	100
23	Moth	Plodia interpunctella	Pyralidae	50
24	Mosquito	Aedes aegypti	Culicidae	100
25	Housefly	Musca domestica	Muscidae	100
26	Honey bee	Apis indica	Apidae	100
27	Wasp	Ropalidia marginata	Vespidae	100
27	cuicket	Acheta domesticus	Grylloidae	100
28	Termite	Cryptotermes dudleys	Termitoidae	100

Seasonal – Winter Annuals		
Sr. No	Species	Qty planted in campus
1	Citrus sinensis	05
2	Litchi chinesis	02
3	Mangifera indica	10
4	Prunus domestica	02
5	Aegle marmelos	01
6	Citrus aurantiifolin	04
7	Citrus maxima	01
8	Psidium Guajava	03
9	Camelia japonica	20
10	Papaver Somnifirum	02
Pot Plants		
1	Aloe barbadensis	05
2	Epipremnus aureum	10
3	Dracena prifarciata	08
4	Calendula officinalis	20
5	Tagetes	10

No.	Common Name	Scientific Name
1	Scutch grass /Dhruva	Cynodon dactylon
2	Centipede grass	Eremochloa ophiuroides

Findings:

Biodiversity status of PT.MLSDC for Women, Gurdaspur campus found satisfactory.

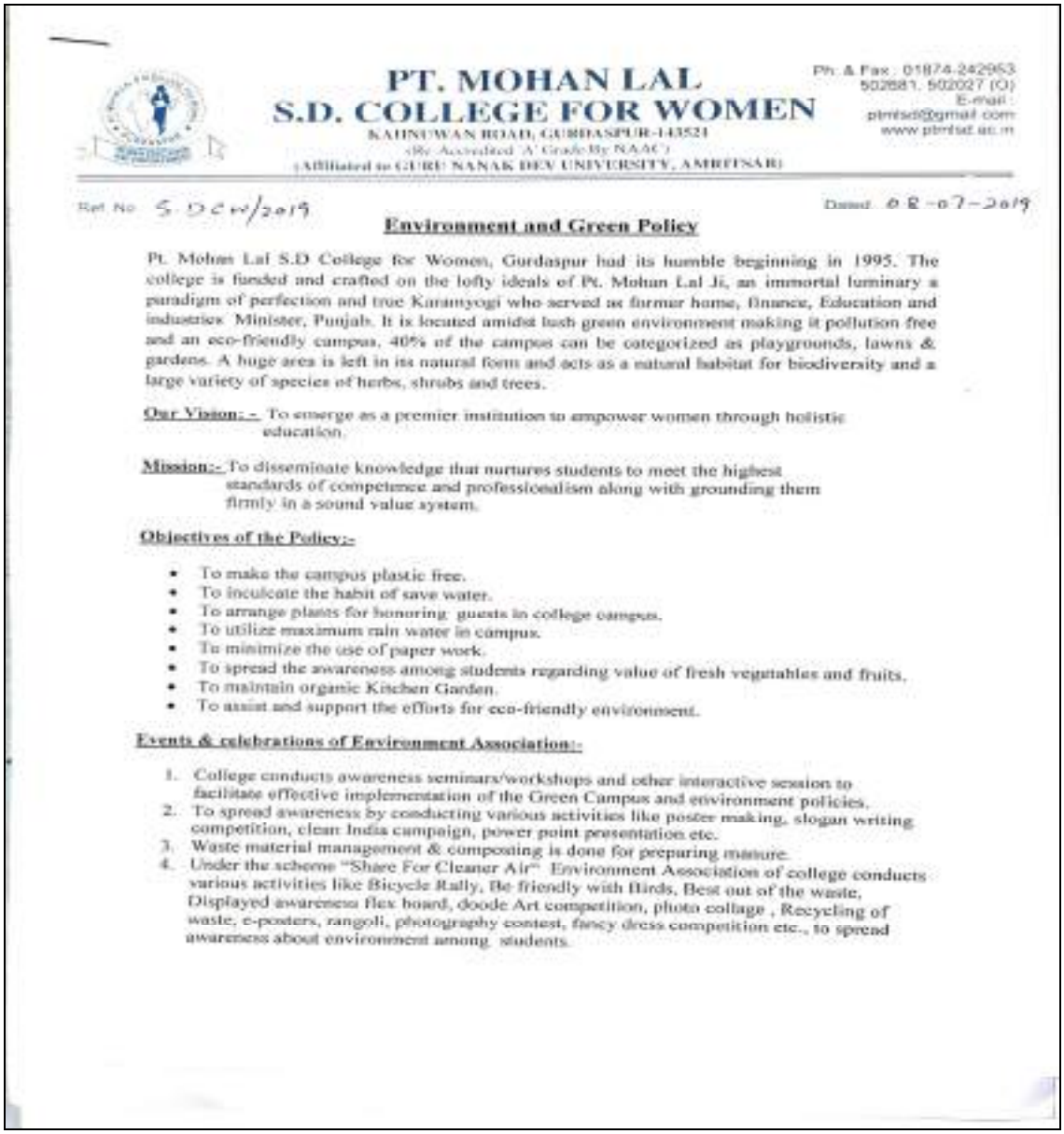
13. RECOMMENDATIONS

1. The college campus is no doubt bio diversified but more plantations especially medicinal plantations are required in the campus. Plantation of fruit plants will attract more birds.
2. Sustainable use of resource and ecology balance of the college campus must be maintained through the year.
3. Sound and air quality monitoring be done on regular basis.
4. More scope of Rain water harvesting be proposed for the campus.
5. Balance conventional lighting be replaced with LED lighting.
6. For robust system of water monitoring monthly water withdrawal and Consumption record be maintained and metering arrangements at all water Withdrawal points shall be made
7. More awareness camps be organized by college students and staff in nearby Villages for subtle (crop residue) management.
8. Management may consider installing solar power plant to harness renewable solar energy.
9. A micro STP is proposed to be set up in campus to utilize waste water from washrooms and kitchen for further utilization for irrigating lawns and pot plants.

14. PROGRAMME AND INITIATIVES

Programme and Initiatives taken by PT.MLSDC for Women, Gurdaspur

Environment and Green Policy of campus management



PT. MOHAN LAL
S.D. COLLEGE FOR WOMEN
KAHNUWAN ROAD, GURDASPUR-143521
(Re-Accredited 'A' Grade By NAAC)
(Affiliated to GURU NANAK DEV UNIVERSITY, AMRITSAR)

Ph. & Fax : 01874-242953
502681, 502027 (O)
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www.ptmlsd.ac.in

Ref No: S.D.C.W/2019 Dated: 02-07-2019

Environment and Green Policy

Pt. Mohan Lal S.D College for Women, Gurdaspur had its humble beginning in 1995. The college is funded and crafted on the lofty ideals of Pt. Mohan Lal Ji, an immortal luminary a paradigm of perfection and true Karamyogi who served as former home, finance, Education and industries Minister, Punjab. It is located amidst lush green environment making it pollution free and an eco-friendly campus. 40% of the campus can be categorized as playgrounds, lawns & gardens. A huge area is left in its natural form and acts as a natural habitat for biodiversity and a large variety of species of herbs, shrubs and trees.

Our Vision:- To emerge as a premier institution to empower women through holistic education.

Mission:- To disseminate knowledge that nurtures students to meet the highest standards of competence and professionalism along with grounding them firmly in a sound value system.

Objectives of the Policy:-

- To make the campus plastic free.
- To inculcate the habit of save water.
- To arrange plants for honoring guests in college campus.
- To utilize maximum rain water in campus.
- To minimize the use of paper work.
- To spread the awareness among students regarding value of fresh vegetables and fruits.
- To maintain organic Kitchen Garden.
- To assist and support the efforts for eco-friendly environment.

Events & celebrations of Environment Association:-

1. College conducts awareness seminars/workshops and other interactive session to facilitate effective implementation of the Green Campus and environment policies.
2. To spread awareness by conducting various activities like poster making, slogan writing competition, clean India campaign, power point presentation etc.
3. Waste material management & composting is done for preparing manure.
4. Under the scheme "Share For Cleaner Air" Environment Association of college conducts various activities like Bicycle Rally, Be friendly with Birds, Best out of the waste, Displayed awareness flex board, doode Art competition, photo collage , Recycling of waste, e-posters, rangoli, photography contest, fancy dress competition etc., to spread awareness about environment among students.

- The project "ARPIT" is organized by Environment Association on the birth Anniversary of Pandit Ji every year.
- Incharges of the Environment Association make plan regarding the scheme 'Plant of the Month' every month, a seasonal plant is highlighted under this activity.
- "Stall of Vegetables arranged for staff members.
- Plants saplings are planted under the project "Van Mohatsav" every year inside the college as well as outside the college.

Scope of the Policy :-

Clean Campus Initials:

- Plastic bottles, polythene bags are strictly prohibited in the campus. Anti plastic campaign is regular feature of the college. Paper bags, jute bags and handmade bags are promoted in the college.
- Green and blue dustbins are placed in the campus at different regions for Biodegradable and Non Bio-degradable wastes.

Landscaping Initiatives

More than 85 trees and 107 shrubs are in college along with grass cover which provide clean and cool air. The diverse green cover of college is also home to various animals and birds creating a campus rich in biodiversity. Cleanliness and plantation drive has been conducted by Environment Association of college in which students and staff members have actively participated.

Clean Air Initiatives

Pollution free certificates are compulsory for students and staff members who use their own vehicles. Students and staff members who come on bicycle are honored by college. Smoking in the campus is strictly prohibited. Entry of vehicles inside the campus without pollution certificate is strictly prohibited.

Infrastructural Initiative

- **Renewable sources of energy** To minimize and manage the use of electricity produced by non-renewable resources, college has switched to solar energy ,energy saving and energy efficient equipments such as LED's for purposes of lighting .
- **Solid waste management:** The solid waste (separated as biodegradable and non-biodegradable) is appropriately disposed off through Municipal council. At regular periods, paper trash (practical files, waste papers, newspapers, etc.) is sold to vendors for recycling. The agenda of NSS unit of the college includes clean-up initiative to raise awareness about solid waste among students. In campus, composting bins have been constructed for composting leaves to prepare manure. There are three vermicomposting units in the area beside the hostel. All the biodegradable waste like stale food from the hostel kitchen, dry leaves,

paper, etc. are decomposed in these units. Organic waste is turned into manure which is used for a kitchen garden and also sold to the faculty members.

- **Liquid waste management:** The internal sewage system, which is connected to the sewer line, safely disposes of liquid waste from hostels and washrooms. Waste water of the hostel is drained out in the kitchen garden.
- **Hazardous chemicals waste management:**
  - ✓ Waste chemicals in the lab are disposed of by dissolving them in water.
  - ✓ Chemicals and glassware are put in different bins. Blue and yellow bins are placed in labs. Blue bins are used for dumping non- reacting chemicals and yellow bins are for tubes, bulbs, gloves and pipettes.

Principal **Convener**

Environment Association and Green Club of PT.MLSD College, Gurdaspur

Pt. Mohan Lal S.D College For Women
Gurdaspur

Ref No. SDC/2021 Dated 13-07-2021

For environment protection and awareness an **Environment Association and Green Club** has been constituted in the college campus. The following are the members of the committee.

Members:-

1. Mrs. Sunita Khajuria (Convenor)
2. Mrs. Gurdeep Kaur
3. Mrs. Manisha
4. Mrs. Sweety
5. Miss. Kajal

Principal

Awareness rally for pollution reduction from Automobiles

Bicycle rally being taken out by students and staff of college to promote theme of pollution reduction from Automobiles.

Existing trees in campus are well taken care of

Awareness Drives regarding Importance of Green Environment are regularly organized in campus


10 STEPS 2 SUCCESS
Success Mantras
Pt MLSD College, Gurdaspur,Punjab.
Longitude Latitude
75.3795° E 31.9873° N
23° C

Plantation Drives are being regularly organized by Students of Campus under staff supervision

As a measure to promote Greenery in campus, 'Plant of the Month' Event is regularly observed in Campus

A unique initiative – Every important visitor to college is honored with a plant to promote healthy environment by College Authorities

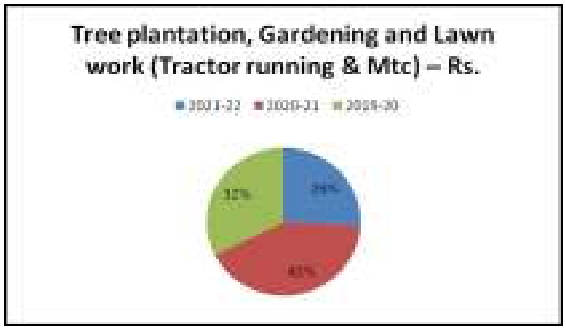
Cleanliness Drives on lines of Swatch Bharat Abhiyan are regularly organized by students and staff of Campus

15. Media Links:

Below are links of some of events organized by staff and students of PT.MLSDC for Women, Gurdaspur regarding initiative to improve green and healthy environment:

1. https://youtu.be/xWm13hRAd2U
2. https://youtu.be/D-uMKhBh9Ls
3. https://www.facebook.com/groups/788465557953990/permalink/2385580124909184/
4. https://www.facebook.com/groups/788465557953990/permalink/2472502429550286/
5. https://www.facebook.com/groups/788465557953990/permalink/2219409924859539/
6. https://www.facebook.com/groups/788465557953990/permalink/2241727605961104/
7. https://www.facebook.com/groups/788465557953990/permalink/2207224819411383/
8. https://www.facebook.com/groups/788465557953990/permalink/2304673232999874/
9. https://www.facebook.com/groups/788465557953990/permalink/1959607757506425/
10. https://www.facebook.com/groups/788465557953990/permalink/1961854023948465/

16. EXPENDITURE ON GREEN INITIATIVES DURING THE LAST THREE YEARS



Financial Year	Tree plantation, Gardening and Lawn work (Tractor running & Maintenance) – Rs.
2021-22	12560
2020-21	20301
2019-20	15694

17. CONCLUSION

Considering the diversity of PT.MLSDC for Women, Gurdaspur, there is significant environmental research both by faculty and students. The environmental awareness initiatives are substantial. The installation of solar water heater system and replacement of conventional lighting with LED lighting are noteworthy. Besides, environmental awareness program initiated by the administration shows how the campus is going green. Few recommendations are added to curb the menace of strategic management using eco-friendly and scientific techniques. This may lead to the prosperous future in context of Green Campus & thus sustainable environment and community development

For R.K.Electricals & Energy Audit Services

(END OF THE REPORT)

ENVIRONMENT AUDIT REPORT

OF

PT. MOHAN LAL SD COLLEGE FOR WOMEN

GURDASPUR PUNJAB

CONDUCTED BY:

R.K. ELECTRICALS & ENERGY AUDIT SERVICES an ISO Co

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HP Govt. Emp Energy Auditor, DoE, Shimla
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M: 09501332233
E-Mail: er.rakesh50@ymail.com

2022-23

CERTIFICATE

This is to certify that the **"R.K. Electricals & Energy Audit Services**" had conducted Environment Audit of **"PMLSD College for Women Gurdaspur"** from 16/06/2023 to 17/06/2023 for the year 2022-2023. This audit involved extensive consultation with all the campus team, interactions with key personnel on wide range of issues related to Environmental aspects. The College has Environmental Committee for sustainable use of resources.

The audit team opines that the overall site is maintained well from environmental perspective. The efforts made by staff and students in the areas of environment and sustainability are much appreciated and encouraged.

Below are some of the links where students and staff made best efforts:

https://www.facebook.com/share/p/qe2NvYVTjYKgdHTh/?mibextid=xfxF2i

https://www.facebook.com/share/p/pCL5Q14w96Shbwir/?mibextid=xfxF2i

https://www.facebook.com/share/p/pgpahJho9HKyUfmj/?mibextid=xfxF2i

https://www.facebook.com/share/p/qXi54ZUx9DyzGnPi/?mibextid=xfxF2i

https://www.facebook.com/share/p/pgpahJho9HKyUfmj/?mibextid=xfxF2i

https://www.facebook.com/share/p/QfL7rnpGzXx1c4Hj/?mibextid=xfxF2i

https://www.facebook.com/share/p/XZr92xrerpcEs42u/?mibextid=xfxF2i

https://www.facebook.com/share/p/aHMn7ybXDcnFG6CP/?mibextid=xfxF2i

https://www.facebook.com/share/p/CSw3AYvaWK4p4d7Y/?mibextid=xfxF2

RAKESH KUMAR Digitally signed by RAKESH KUMAR
Date: 2023.07.06 15:39:13 +05'30'

For R.K. Electricals & Energy Audit Services

INDEX

1. ACKNOWLEDGEMENTS

R.K. ELECTRICALS & ENEGY AUDIT SERVICES expresses sincere thanks to the

President - Ms. Vaishali Sharma

Principal – Dr. Neeru Sharma

Asst. Prof - Ms. Gurdeep Kaur

Asst. Prof -Ms. Samita Khajuria

for giving us an opportunity to conduct the Environment Audit of **PMLSD College for Women Gurdaspur**

The Study team members of "**R.K. ELECTRICALS & ENERGY AUDIT SERVICES" sincerely** thank the support staff members of **PMLSD College for Women Gurdaspur** who have rendered their all-possible co-operation and assistance during the entire period of assignment.

.

For R.K. Electricals & Energy Audit Services

2. EXECUTIVE SUMMARY

An environmental audit is a snap shot in time, in which one assesses campus performance in complying with applicable environmental laws and regulations. Though a helpful benchmark, the audit almost immediately becomes outdated unless there is some mechanism in place to continue the effort of monitoring environmental compliance. The management of the college is conscious with regard to improve sustainability and complementary to its Environmental Policy and aims to Minimize the environmental impact of its operations and move towards restoring environmental integrity

Audit criterion 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.

The Brief description about Audit is shown below:

Project Title:	**Project Report Number:**
Environment Audit of PMLSD College for Women Gurdaspur	**RKS/ENA**-27/2023
Client:	
Principal, PMLSD College for Women Gurdaspur	
Contact Person:	
Asst. Prof. Ms. Gurdeep Kaur	
Date of Audit	
16/06/2023 to 17/6/2023	
Date of this Report:	
06.07.2023	
***Work Carried out by**:(Team Composition)*	**Er. R.K. Sharma (BEEs Energy Auditor) & IGBC Accredited Professional** **Mrs. Savita Sharma (Msc. Ecology and Environment)** **Er. Varun Sharma B. Tech (EE), MBA, PGD (Indl Safety)**

RAKESH KUMAR
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3. INTRODUCTION

3.1 Environment Audit is a process of systematic identification, quantification, recording, reporting and analysis of components of environmental diversity of various establishments. It aims to analyze environmental practices within and outside of the concerned sites, which will have an impact on the eco-friendly ambience. Environment audit can be a useful tool for a college to determine how and where they are using the most energy or water or resources; It can also be used to determine the type and volume of waste, which can be used for a recycling project or to improve waste minimization plan. It can create health consciousness and promote environmental awareness, values and ethics. Thus it is imperative that the college evaluate its own contributions toward a sustainable future. As environmental sustainability is becoming an increasingly important issue for the nation, the role of higher educational institutions in relation to environmental sustainability is more prevalent.

3.2 Back ground of Pt. Mohan Lal SD College for Women, Gurdaspur

Pt. Mohan Lal SD College for Women, Gurdaspur had its humble beginning in 1995, established under the management of Goswami Ganesh Dutta Sanatam Dharma College Society. The college is founded and crafted on the lofty ideals of Pt. Mohan Lal Ji an immortal luminary, a paradigm of perfection and true Karamyogi who served as former Home, Finance, Education and Industries Minister, Punjab.
The most important aim of this college is educating women specifically due to the fact that women can play a significant role in boosting the growth procedure of the entire nation.
The college provides quality of academic input, student care, state of-the-art infrastructure and job prospects. Over the years, the management of the college has appointed vibrant Faculty Members with expertise in diverse areas. They are well qualified academicians who always inspire and encourage the students. The college provides placements to students which make it one of the most sought-after colleges in Gurdaspur.

The college campus is quite attractive, modern and it is well-equipped for academic pursuits, convenience and comfort. There are even special opportunities available for the growth of the students. The vision of the college is to emerge as a premier institution to empower women through holistic education and the main mission of the college is to excel in the field of empowering women by making use of global perspectives through competitive and vocational education. Broadening the mental limitations of women in the society is also one of the most important aims of the college.

4. ENVIRONMENT AUDIT - QUESTIONNAIRE

4.1. BRIEF DESCRIPTION OF COLLEGE CAMPUS

Had any Environmental Audit conducted earlier***?***
No, this is first time a systematic way of monitoring their environmental eminence initiative taken by, PML SD College for Women Gurdaspur for environment protection.

What is the total permanent population of the Institute?

Particulars	**Total**
Students-Nos.	1075
Teaching & non teaching staff-Nos.	51 teachers, 24 non-teaching
Approximate Number of Visitors (Per day)-Nos.	15

Where is the campus located?
Pt. Mohan Lal SD College for Women located in Gurdaspur

Which of the following are available in your college?

1	Garden area	Yes
2	Play ground	Yes
3	Kitchen	Yes
4	Toilets	Yes
5	Garbage Or Waste Store Yard	No
6	Laboratory	Yes
7	Canteen	Yes
8	Hostel Facility -(numbers)	Yes
9	Guest House and staff residences	Yes

Which of the following are found near your institute?

1	Municipal dump yard	No
2	Garbage heap	No
3	Public convenience	Yes
4	Sewer line Stagnant water	Nearby Nalah but water not stagnant
5	Open drainage	No
6	Industry – (Mention the type)	
7	Bus / Railway station	Yes
8	Market / Shopping complex / Public halls	Yes

5. WASTE MANAGEMENT

5.1. QUESTIONNAIRE

1	Does your institute generate any waste?	Yes		
	If so, what are they?	Dry waste (e-waste, Papers.), Wet (Chemical, Sewerage), Organic Waste		
2	What is the approximate amount of waste generated per day? (in Qt/month) (approx.)	3-5 Quintals / Month	Dry Waste	Wet Waste
			3.5 Qt appx	1.5 Qt appx
3	How is the waste generated in the institute managed? By	Organic waste - Composting), Solid waste- Municipal council		
4	Do you use recycled paper in institute?	No		
5	Do you use reused paper in institute?	Yes		
6	How would you spread the message of recycling to others in the community? Have you taken any initiatives? If yes, please specify.	By organising lecture on concerned topics, Rallies, Awareness campaigns through NSS and Environment Association in adopted villages and other places.		
7	Can you achieve zero garbage in your institute? If yes, how?	Not Yet, but efforts are being made to minimize the Garbage generation in campus. Even the presently generated Garbage is disposed off through local Municipal contractors		

5.2. WASTE DISPOSAL

Waste management or Waste disposal is all the activities and actions required to manage waste from its inception to its final disposal. This includes amongst other things, the collection, transportation and disposal of garbage, sewage and other waste products together **with monitoring and regulation.**

Green waste dry and fallen leaves are collected and buried in compost pits where after some time, same is converted into manure naturally which is used in agriculture

PMLSD College for Women Gurdaspur has placed waste bins for proper segregation of solid wastes in the different locations of the campus

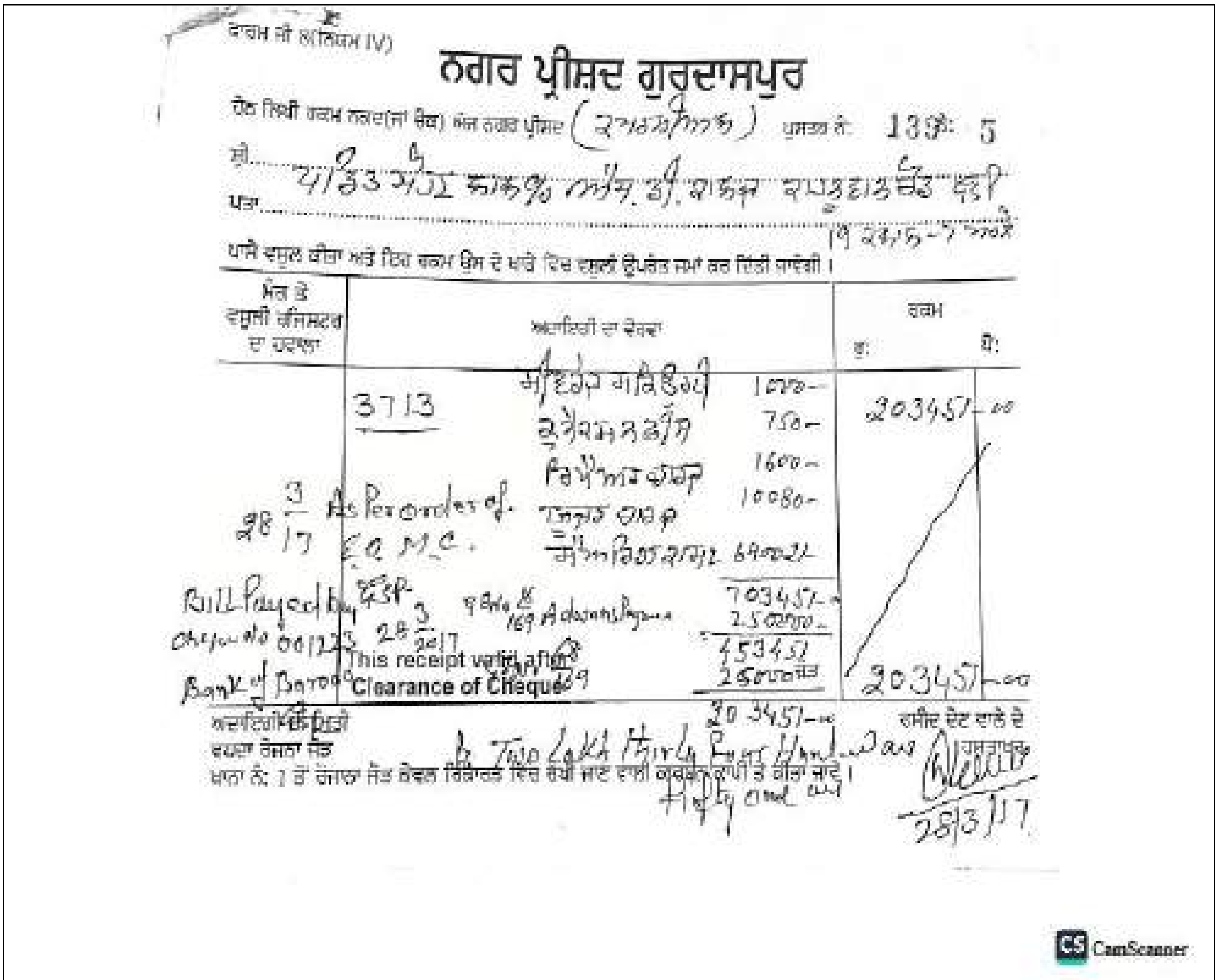
5.3. Details of dustbin at PML SD College for Women Gurdaspur

Item	Nos.
Dust Bin 60 lts Plastic (Sintex)	15
Dust Bin 80 lts (Aristo)	02
Dust Bin 50 lts green (Sintex)	05
Dust Bin 15 lts (Sintex)	20
Dust Bin 15 lts Utility (Aristo)	10
Dust Bin 15 lts Green Aristo	05
Dust Bin Green 55 lts.	05
Dust Bin Blue 50 lts.	05

Separate dustbins for dry and wet waste inside Campus ⇦

Garbage from campus being lifted away by local vendor

For taking care of Solid waste (Dry and Wet) from various buildings, kitchens, canteens, hostels etc, PMLSD College for Women Gurdaspur has tie up for lifting garbage and waste from campus with a local Municipal contractor. The waste collection vehicle of this contractor visits the campus daily for collection of waste which is already separated in green and blue dustbins (separate for wet and dry waste). Approximate waste collection to the tunes of 100Kg per month.


ਨਗਰ ਪ੍ਰੀਸ਼ਦ ਗੁਰਦਾਸਪੁਰ

3713

203457-00

28/3/17 As Per order of EO MC.

Bill Payed by Cheque No 001223 28/3/2017 Bank of Baroda

This receipt valid after Clearance of Cheque

203457-00

CamScanner

5.4. Sewage Treatment

The Campus has availed a sewage connection from local municipal authorities; hence all the waste water is disposed off efficiently, ***however, it is recommended that a micro-Sewage treatment plant is installed in campus to treat the water from washroom taps discharge for further treatment and for use as irrigation water to irrigate lawns of campus thus has potential to save water.***

5.5. NOTICE OF SCRAP DSPOSING COMMITTEE CONSTITUTED IN COLLEGE CAMPUS

Pt. Mohan Lal S.D. College for Women
Gurdaspur

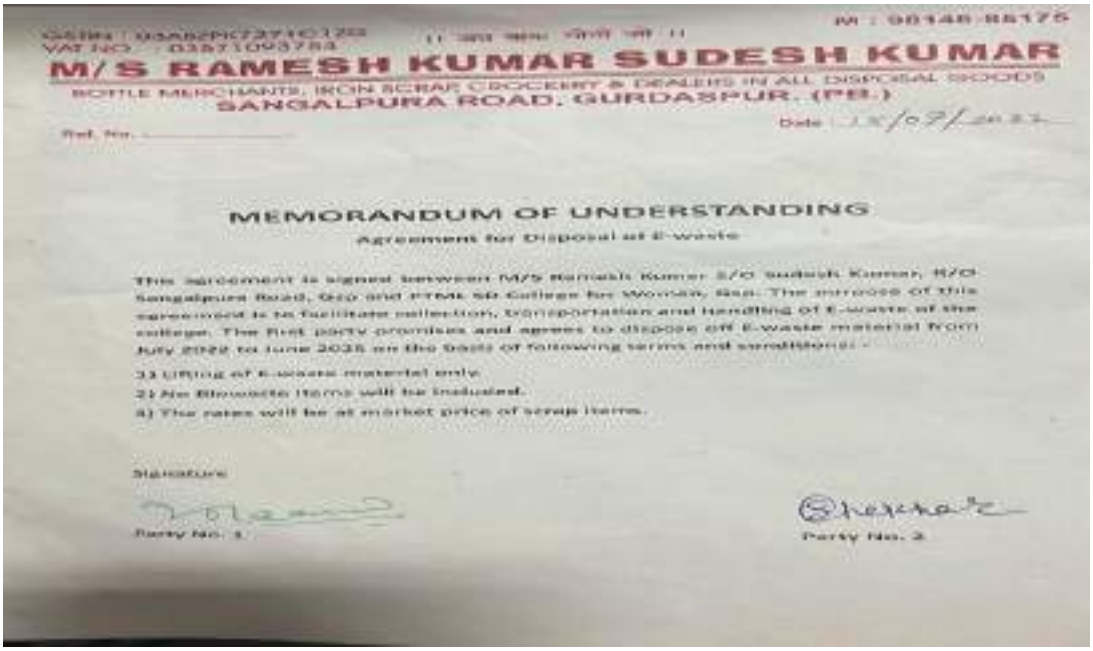
Ref. No. - [illegible]/2022 Dated: 18/01/2022

Scrap Disposal Committee

It is to inform you that Committee regarding the disposing off scrap material has been reconstituted to inspect the articles to be disposed off at higher rate contract.

Sr. No.	Name of the Member	Signature
1.	Ms. Jaspreet	
2.	Mr. Gagandeep Mahajan	
3.	Mr. Harpreet Singh	
4.	Mrs. Navjot Kaur	
5.	Mr. Shiv Kumar	

Dr. (Mrs.) Neeru Sharma
Principal



M/S RAMESH KUMAR SUDESH KUMAR

BOTTLE MERCHANTS, IRON SCRAP, CROCKERY & DEALERS IN ALL DISPOSAL GOODS

SANGALPURA ROAD, GURDASPUR. (PB.)

Ref. No. _____ Date 13/09/2022

MEMORANDUM OF UNDERSTANDING

Agreement for Disposal of E-waste

This agreement is signed between M/S Ramesh Kumar S/O Sudesh Kumar, R/O Sangalpura Road, Gsp and PTML SD College for Women, Gsp. The purpose of this agreement is to facilitate collection, transportation and handling of E-waste of the college. The first party promises and agrees to dispose off E-waste material from July 2022 to June 2025 on the basis of following terms and conditions: -

1) Lifting of E-waste material only.
2) No Biowaste items will be included.
3) The rates will be at market price of scrap items.

Signature

Party No. 1 Party No. 2

6. GREENING THE CAMPUS

6.1. QUESTIONNAIRE

1	Is there a garden in your institute?	Yes	
2	Do students spend time in the garden?	Yes	
3	Total number of Plants in Campus	Plant type	Approx. number
		Seasonal	50
		others	75
		Trees	85
4	Suggest plants for your campus. (Trees, vegetables, herbs, etc.)	Aromatic Plants, Medicinal Plants, Spices Air purifying plants	
5	Does the campus have any Horticulture Department	No	
	Number of Staff working in Horticulture department	00	
6	Number of Plantation Drives organized by college per annum. (If Any)	About 40	
7	Number of plantations Planted in Last FY.	100	
	Survival Rate	80%	
8	Plant Distribution Program for Students and Community	150	
9	Plant Ownership Program	Yes	

6.2. Existing Environment Policy

Eco-friendly practices and educational resources combine in a Green Campus to promote sustainable practices. It allows institutions to re-define their environmental culture and develop new paradigms for solving the social, economic, and environmental problems of mankind by utilizing a Green Campus concept. PML SD College for Girls, Gurdaspur has a well-defined Environment Consciousness policy and also a fully empowered Environment Committee as under

7.1.6

Pt. Mohan Lal S.D College For Women
Gurdaspur

Ref No.

Dated 15/12/18

For environment protection and awareness an **Environmental Association** has been constituted in the college campus. The following are the members of the committee.

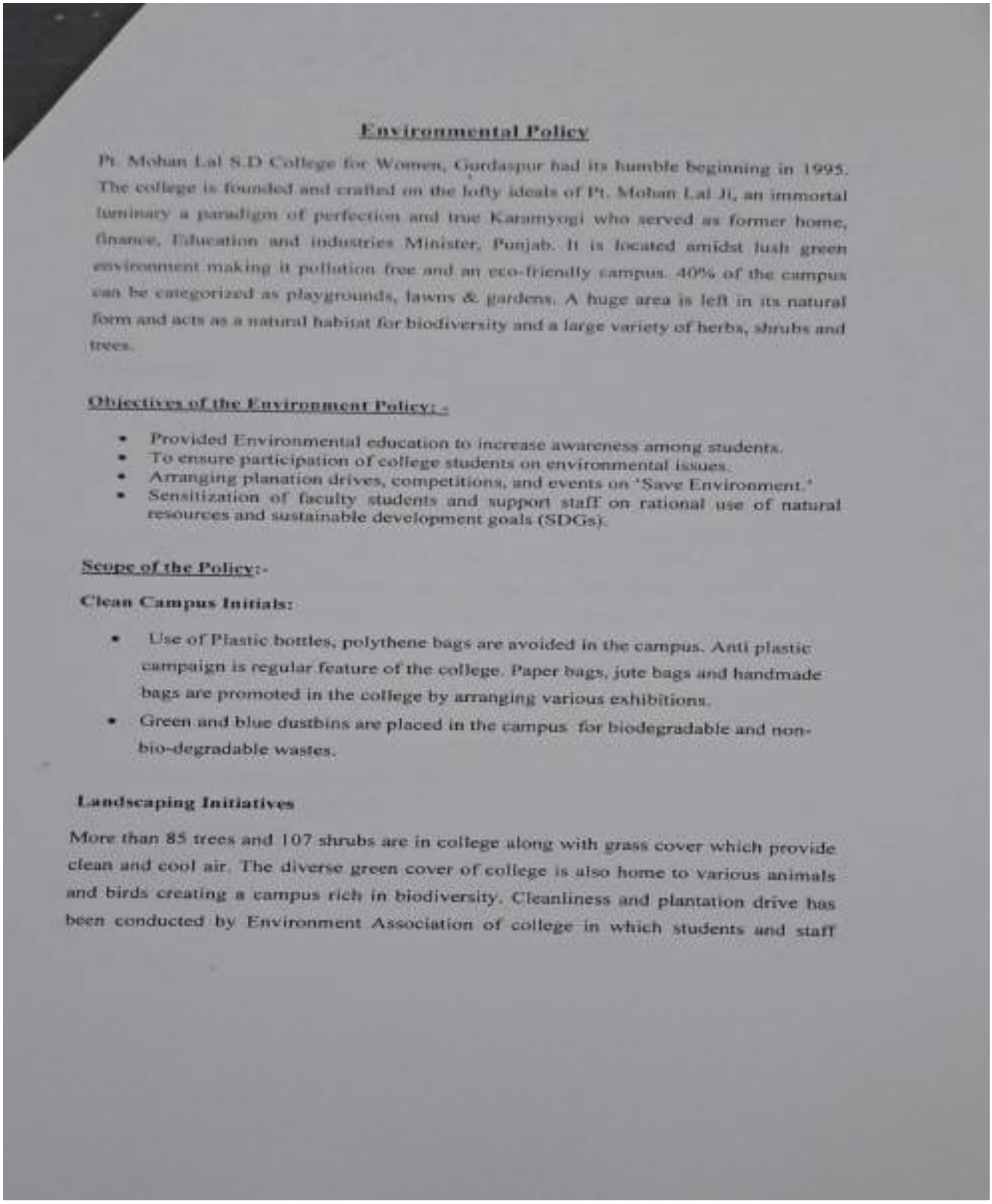
Members:-

1. Mrs. Samita Khajuria (Convener)
2. Mrs. Gurdeep Kaur
3. Mrs. Manisha
4. Mrs. Sweety
5. Miss. Kajal

Principal

Principal
Pt. Mohan Lal S.D. College
for Women, Gurdaspur

Below are the Office orders made by the PT MLSD Campus authorities, Gurdaspur in respect of Environment Policies



Environmental Policy

Pt. Mohan Lal S.D College for Women, Gurdaspur had its humble beginning in 1995. The college is founded and crafted on the lofty ideals of Pt. Mohan Lal Ji, an immortal luminary a paradigm of perfection and true Karamyogi who served as former home, finance, Education and industries Minister, Punjab. It is located amidst lush green environment making it pollution free and an eco-friendly campus. 40% of the campus can be categorized as playgrounds, lawns & gardens. A huge area is left in its natural form and acts as a natural habitat for biodiversity and a large variety of herbs, shrubs and trees.

Objectives of the Environment Policy: -

- Provided Environmental education to increase awareness among students.
- To ensure participation of college students on environmental issues.
- Arranging planation drives, competitions, and events on 'Save Environment.'
- Sensitization of faculty students and support staff on rational use of natural resources and sustainable development goals (SDGs).

Scope of the Policy:-

Clean Campus Initials:

- Use of Plastic bottles, polythene bags are avoided in the campus. Anti plastic campaign is regular feature of the college. Paper bags, jute bags and handmade bags are promoted in the college by arranging various exhibitions.
- Green and blue dustbins are placed in the campus for biodegradable and non-bio-degradable wastes.

Landscaping Initiatives

More than 85 trees and 107 shrubs are in college along with grass cover which provide clean and cool air. The diverse green cover of college is also home to various animals and birds creating a campus rich in biodiversity. Cleanliness and plantation drive has been conducted by Environment Association of college in which students and staff

members have actively participated. All trees, shrubs and indoor plants are labeled with their name. It gives identification of the product and helps in grading.

Clean Air Initiatives

Pollution free certificates are compulsory for students and staff members who use their own vehicles. Students and staff members who come on bicycle are honored by college. Smoking in the campus is strictly prohibited. Entry of vehicles inside the campus without pollution certificate is strictly prohibited.

Infrastructural Initiatives

- **Renewable sources of energy** To minimize and manage the use of electricity produced by non-renewable resources, college has switched to solar energy, solar panel, energy saving and energy efficient equipments such as LED's for purposes of lighting.
- **Solid waste management:** The solid waste (separated as biodegradable and non-biodegradable) is appropriately disposed off through Municipal council. At regular periods, paper trash (practical files, waste papers, newspapers, etc.) is sold to vendors for recycling. The agenda of NSS unit of the college includes clean-up initiative to raise awareness about solid waste among students. In campus, composting bins have been constructed for composting leaves to prepare manure. There are three vermicomposting units in the area beside the hostel. All the biodegradable waste like stale food from the hostel kitchen, dry leaves, paper, etc. are decomposed in these units. Organic waste is turned into manure which is used for a kitchen garden and sold to the faculty members.
- **Liquid waste management:** The internal sewage system, which is connected to the sewer line, safely disposes of liquid waste from hostels and washrooms. Waste water of the hostel is drained out in the kitchen garden.
- **Hazardous chemicals waste management:**

1. Waste chemicals in the lab are disposed of by dissolving them in water.

2. Chemicals and glassware are put in different bins. Blue and yellow bins are placed in labs. Blue bins are used for dumping non- reacting chemicals and yellow bins are for tubes, bulbs, gloves and pipettes.

Activities of Environment Association and other committees: -

- On 14th July, 2022 a plantation drive was organized in college premises by NSS and Red Ribbon Club. Ms. Shahila Qadri, President, Red Ribbon Society, Gurdaspur along with Dr. Pannu and Dr. Rajeev were the resource person.
- On 15th July, 2022 Environment Association and Green Club in collaboration with Ministry of Jal Shakti and Red Ribbon Society, Gurdaspur organized a Public Interactive Programme in which Aditya Sharma (Hydro- meteorologist) and Sunil Kumar (Geophysics) from Ministry of Jal Shakti were the resource person.
- Environment Association of the college distributed plants among of the staff and students under project 'Arprit' on 30th Aug,2022
- On 2nd Dec, 2022 Environment Association and Green Club of the college organized 'Anti-Pollution Drive' on National Pollution Day to spread awareness about the problem caused by increasing pollution.
- World Soil Day celebrated by Environment Association on 5th Dec, 2022
- On 13th Dec, 2022 NSS unit, Environment Association and Green club of the college organised an 'awareness rally on Swachh Bharat and Drug Abuse' in collaboration with Sanjh Kendra Gurdaspur. In this rally 80 students of the college along with 10 staff members, Sanjh Kendra staff, PPM staff, committee members and Red Cross society members participated. SP Navjot Singh, Nodal officer and Committee member Sh. Amarpal Singh were also present in the rally.
- On 27th May, 2023 Environment Association and NSS unit of college in collaboration Ministry of Education celebrated World Environment Day.

50 students participated in various events like Rangoli, Best out of waste, wall painting, fancy dress competition and doodle art poster.

- On 2nd June, 2023 Environment Association and NSS organized a plantation drive in the college campus in which Mr. Romesh Mahajan, Chairperson, Red Cross Centres Gurdaspur was the Chief Guest. 12 students participated in this event. An Oath taking pledge for 'Save Environment' ceremony for CA students was arranged in the college campus.
- On 5th June, 2023 Environment Association of the college observed World Environment Day. SD Nursery was inaugurated by Sh. Hiramani Aggarwal, LMC, Gurdaspur.
- College have achieved the target of planting 100 plants through help of staff members and students.
- On 5th June ,2023 IIC, celebration Activity Cell, NSS and Environment association celebrate 'World Environment Day' in which Rangoli competition, wall painting competition, pot making competition and doodle art competition were organised.
- On 6th June,2023, NSS and Environment Association of the college organised an awareness workshop on Sustainable practices and Mission Life in collaboration with Ministry of Environment Forest and climate change
- On 6th June, 2023 Youth Club of the college in collaboration with Jai Hind Sewa Club, Gurdaspur held a plantation drive outside the college campus. Also, on the same day NSS and Environment Association released a poster on Environment Awareness.
- Salad Day was celebrated by environment Association and NSS
- Celebration Activity Cell of the institution innovation council of college celebrated the 'world technology day.'
- Wall Magazine by Environment Association was displayed.

Principal
Pt. Mohan Lal S.D. College
for Women, Gurdaspur

Objectives of the Policy

- To safeguard the environment within and around the campus.
- To keep the campus clean and environment friendly.
- To motivate all stake holders to ensure judicious use of scarce natural resources.
- To increase awareness among staff and students regarding different issue and possible solutions related to environment and motivate them to adopt good practices for protection of environment.
- To frame the green policies that will enhance the ecological efficiency in the campus.
- To continually improve the efficient use of all natural resources including water and energy.
- To make sustainable efforts to make the campus plastic free and tobacco free.
- To improve resource use through reduction in material use by reducing waste and to identify recycling opportunities for west generated such as metal scrap, paper, e-waste etc.
- To conduct in house environmental and energy audits from time to time.
- To make the campus self-reliant in energy using solar energy and to make the campus net zero.
- To recycle waste water and utilize it for landscape irrigation.

6.3. Scope of the Policy

Green Campus develops new extracurricular and co-curricular practices that allow students to take leadership roles in creating positive change. As a result of these initiatives, all infrastructural and administrative activities will be reviewed from the viewpoints of energy, efficiency, sustainability, and environment.

The focus areas of the policy are

- Green Campus Initiatives
- Clean Campus Initiatives
- Tobacco free Campus
- Net Zero Emission Campus
- Water Conservation Initiatives
- Waste Management Initiatives

6.4. Existing Plastic Ban Policy

The pollution of the environment by plastics has now been identified as a global problem. A quick-term advantage and ease of use have made plastic and plastic goods wildly popular. Plastic has grown more and more popular over the past century, outpacing trash management as a result. Our environment, as well as our health and well-being, suffer from plastic pollution. We have all contributed, consciously or unwittingly, to this issue, and we must work together to minimize and eradicate plastic pollution.

The government has chosen to implement a plastic ban on a nationwide scale in order to address the environmental dangers created by the widespread usage of plastic. Educational institutions must take the lead in this national effort. Educational institutions must take a leadership role in the fight to phase out single-use plastics.

6.5. Guidelines

The guideline aims to assist Indian higher education institutions in achieving a plastic-free campus. It is not intended to be comprehensive, but rather to offer basic guidelines and suggestions relevant to all institutions. The recommendations urge institutions to implement policies and practices that promote a more environmentally friendly and plastic-free campus environment.

The institute will educate stakeholders about the need of reducing, reusing, and recycling plastic.

All stakeholders are encouraged to reduce their reliance on plastic bags on campus.

Stakeholders must adhere to rigorous waste segregation guidelines.

As far as feasible, students should recycle the resources available for creative work at college festivals.

Conducting events and poster contests, among other things, to promote the creation of ecological and environmentally friendly products in order to reduce the use of single- use plastic.

7. ENERGY CONSERVATION

7.1. QUESTIONNAIRE

1	List ways that you use energy in your institute. (Electricity, LPG, firewood, others). Using this list, try to think of ways that you could use less energy every day.	Electrical energy, LPG, Solar Pannel, Heat energy, Thermal energy
2	Are there any energy saving methods employed in your institute? If yes, please specify. If no, suggest some	Using Solar Power in campus, CFL and LED bulbs
3	How many CFL/LED bulbs has your institute installed?	380
4	Are any alternative energy sources employed / installed in your institute? (photovoltaic cells for solar energy, windmill, energy efficient stoves, etc.,) Specify.	Solar Power Plant of Capacity 20 KWP, Induction stove for cooking, Energy saving BEE five-star energy efficient AC
5	Do you run "switch off" drills at institute?	Yes
6	Are your computers and other equipment's put-on power-saving mode?	Yes
7	Does your machinery (TV, AC, Computer, weighing balance, printers, etc.) run on standby modes most of the time? If yes, how many hours?	No

7.2. Energy conservation measures:

7.2.1. LED lights: About 380 no. conventional lighting has been replaced with LED lighting thus lowering the electricity consumption in the campus

A Rooftop Solar Power Plant of Capacity 20 KWP installed in Campus

7.2.2. Solar Street Lights

PT. MLSDC for Women, Gurdaspur has installed solar street lights for illumination of internal roads and lawns in night and to harness renewable solar energy as well.

7.2.3. Solar street lights are being used to tap Renewable energy Resources for the lighting in campus

8. WATER MANAGEMENT

8.1. QUESTIONNAIRE

1	List four uses of water in your institute	Drinking, Cooking, Cleaning and Gardening Purpose
2	How does your institute store water? Are there any water saving techniques followed in your institute?	Yes, Rain water harvesting
3	If there is water wastage, specify why and how can the wastage be prevented / stopped?	No
4	Locate the point of entry of water and point of exit of waste water in your institute.	Entry- In front of Main Gate Exit- Backside of Hostel
	Entry-	
	Exit-	
5	Write down four ways that could reduce the amount of water used in your institute	Turn off taps after use Check Leakage Watering of Gardens only when it needs Waste water from RO and hostel kitchen is used in kitchen garden
6	Record water use from the institute water meter for six months (record at the same time of each day). At the end of the period, compile a table to show how many Litres of water have been used.	300000/- litres.
7	Does your institute harvest rain water?	Yes

8	Is there any water recycling System.	No

8.2. Water quality and conservation

Pt. Mohan Lal SD College for Women, Gurdaspur utilizes 13 K Litres of Water per day approximately. Ground water is extracted using submersible Water pumps and pumped to overhead tanks after storing in a tank near canteen area.

8.3. Drinking water

Reverse Osmosis Plant - Reverse osmosis (RO) is a membrane separation process, driven by a pressure gradient, in which the membrane separates the solvent (generally water) from other components of a solution. The membrane configuration is usually cross-flow. The campus has provided purified R.O. drinking water to all the students and staff residing in the campus by setting up the R.O filters. In additional to drinking purpose, R.O water is provided to the hostel mess for cooking foods.

↑ **Existing RO FILTERS in the campus**

← **Measured pH and TDS values of filtered drinking water**

Auditors checked the quality of the drinking water after it is treated from RO Plant and the results are as under:

SR NO.	Particulars of checked item	Value	Remarks
1	Sample of drinking water for testing PH Value	7.5	Good
2	Sample of drinking water for testing TDS (total dissolved solids) Value	80 ppm	Very Good

Thus, as per above table the water is safe for drinking.

8.4. Utilization of Waste water*:*

A small Rain water harvesting system exists near hostel building rain water from hostel and through roads is collected in to earth pit for charging This rainwater isused for various purposes like irrigating in Landscaping or watering the lawns*.*

9. AIR QUALITY ASSESMENT

9.1. When air quality is good, the air is clear and contains only small amounts of solid particle and chemical pollutants. Poor air quality, which contains high levels of pollutants, is often hazy and dangerous to health and the environment. Air quality is described according to the (link is external) Air Quality Index (AQI), which is based on the concentration of pollutants present in the air at a particular location.

9.2. INDOOR ENVIORONMENTAL QUALITY

Health and comfortable life is the top most priority of every building user. Corresponding to health and wellbeing, the quality of a built environment for its occupant inside a building is referred to as in door environmental quality. Indoor environmental quality involves noise disturbance, occupant density, in door lighting, day lighting, ventilation, room temperature,

cleanliness and indoor humidity. All these factors add up and form indoor environmental quality.

Auditors measured some parameters at different locations in the buildings

Sr No.	Location	CO2	TVOC	HCHO	temperature in degree centigrade	Relative Humidity in %
1	Main office building (indoor)	405	0.021	0.001	25.55	30
2	Park near Main building	410	0.025	0.05	33	36
3	Hostel	398	0..022	0.001	32	32

From the Above table, it is found that the room temperature and relative humidity are in comfortable limits. Also, the ventilation and day lighting are in good conditions. But various environmental aspects like AQI, CO2 etc are in not healthy limits. It is advised that more pollution control measures need to be adopted in and around campus.

Recordedd AQI outside the building was 99; PM 2.5 → 35.04 µgm/m3 and PM 10 → 83.42 µgm/m3

By analyzing the above data, outdoor Air quality index is 99, and PM 2.5 and PM 10 parameters are unhealthy and hence pollution control measures are advised

With growth of campus population by increase in the student's intake and further augmentation of infrastructure, share of college campus carbon foot prints likely to increase in future.

10. TRANSPORT

10.1. QUESTIONNAIRE

1	Does Campus has own or contracted vehicles?		A combination of campus-owned and operator-owned vehicles			
2	Provide details of campus owned / hired motorized Vehicles?	Cars	Bus	Vans	Bike +Other	Total
	No. of vehicles	2	-	3	250	255
	No. of vehicles more than five years old	1	-	3	100	104
	No. of non-air-conditioned vehicles	-	-	3	250	253
	PUC done	1	-	3	250	254
3	Specify the type of fuel used by your College's vehicles:					
	Diesel	2	-	3		5
	Petrol + CNG	-	-	-		-
	CNG	-	-	-		-
	LPG	-	-	-		-
	Petrol	-	-	248		248
4	Electrical	-	-	2		2

Transport accounts for alongside local government and planning authorities is also crucial to optimize local public transport solutions.

10.2. Internal Campus Transport

PT. MLSD College for Women Gurdaspur campus cover large areas, so transport to and from college campus are unavoidable. However, the method of transport is a choice and, rather than only thinking of the quickestway, campus needs to consider the greenest way. While cars can sometimes prove necessary, cycling and walking is strongly encouraged. To offer people an alternative to using their cars: (Electric buggy van can be

Provided) Facilitate bicycle use by installing bike racks/safe storage next to entrances, as wellas safe paths.

Offer access to free/cheap bikes, provide bike hire, etc.

Offer interest-free loans to purchase public transport season tickets.

To create healthier options, an overall campus plan needs to include more environment friendly initiatives like eco friendly transportation, enhanced use of renewable energy resources etc.

11. ANIMAL WELFARE

11.1. QUESTIONNAIRE

1	List the animals (wild and domestic) found on the campus (dogs, cats, squirrels, birds, insects, etc.)	Cats, squirrels, Birds, Insects, Lizards, Snakes, Frogs
2	How many dogs in your area have undergone Animal birth control / Anti rabies vaccination	No dogs under these areas
3	Does your institute have a Biodiversity programme?	Yes

The concept of animal welfare includes three elements: the animal's normal biological functioning (which, among other things, means ensuring that the animal is healthy and well-nourished), its emotional state (including the absence of negative emotions, such as pain and chronic fear)

Animal welfare **covers the responsibilities that humans have when it comes to the treatment of animals in captivity.** There are many different situations where animals are held in captivity by people. From farms raising animals for food and zoos to laboratories that run animal testing and circuses, the range of different situations where animals are captive is vast and shocking. Animal welfare refers to the responsibility that humans have when it comes to the treatment of these animals.

At present In the PT.ML SD College for Women campus Gurdaspur as surveyed no animal found except variety of birds and squirrels but these are not harmful to humans.

12. ENVIRONMENTAL LEGISLATIVE COMPLIANCE – WASTE MANAGEMENT

12.1. QUESTIONNAIRE

1	Are you aware of any environmental Laws Pertaining to different aspects of environmental management?	Yes
2	Does your institute have any rules to protect the environment	Yes, Ban of plastic bags
3	Is Environmental Ambient Air Quality monitoring conducted by the institute?	No
4	Dose Environmental Water and Wastewater Quality monitoring conducted by the Institute?	Yes
5	Dose stack monitoring of DG sets conducted by the Institute?	No
6	Is any warning notice, letter issued by state Government bodies?	No
7	Dose any Hazardous waste generated by the Institute? If yes explain its category and disposal method	No
8	Is any Bio medical waste generated by the Institute? If yes explain its category and disposal method	No

Principles of Environmental Enforcement (Implementation and Enforcement of Environmental Law (IMPEL), 1992) have defined legal compliance as: "Full implementation of applicable environmental legislation. Compliance occurs when requirements are met and desired changes are achieved."

To help build a culture of improved voluntary compliance within industry and improve compliance practices the department and has published guidance material and supporting information to help industry understand how to meet its environmental obligations and achieve good environmental practices.

- Environmental policy. Environmental Policy should reflect the commitment of top management to comply with applicable legal requirements and other requirements, supported by adequate resources.
- Legal and other requirements (4.3.2) Clause 4.3.2 of ISO 14001 states that the organization should know applicable legal requirements related to their activities and services.
- The objectives and targets (4.3.3) ISO 14001, in its clause 4.3.3, states that when an organization establishes environmental objectives it should take into account its legal and other requirements.
- Evaluation of **compliance** (4.5.2) Periodic evaluation of **compliance** is important, because even if your organization is in **compliance** today you cannot be sure that it will be in **compliance** in six months or a year.

13. GENERAL

13.1. QUESTIONNAIRE

1	Are you aware of any environmental Laws pertaining to different aspects of environmental management?	Yes
2	Does your institute have any rules to protect the environment? List possible rules you could include.	Horns are avoided at the campus, Fire of wastage avoided
3	Does housekeeping schedule in your campus?	Yes
4	Are students and faculties aware of environmental cleanliness ways? If Yes Explain	Yes, by organizing various event by displaying flex on environment awareness on slogan writing competitions, poster making competitions. By organizing rallies by celebrating swatch Abhiyan.
5	Dose Important Days Like World Environment Day, Earth Day, and Ozone Day etc. eminent in Campus?	Yes
6	Dose Institute participated in National and local Environmental Protection Movement?	Yes
7	Dose Institute has any Recognition /certification for environment friendliness?	Yes
8	Dose Institute using renewable energy?	Yes
9	Dose Institution conducts a green /environmental audit of its campus?	Yes, periodically.
10	Has the institution been audited / accredited/certified by any other agency such as NABL, NABET, TQPM, NAAC etc.?	Yes

14. BEST PRACTICES AND INITIATIVES

14.1. QUESTIONNAIRE

A	Renewable Energy A clean source of energy is utilized at campus. Efforts towards Carbon Neutrality	Yes
B	Biodiversity Conservation Flora and fauna conservation	Yes
C	Tree Plantation Drives	Yes
D	Ground Water Recharge units of Rain Water Harvesting System	No
E	Pollution Reduction Personal Vehicles (Students) not allowed at campus	Yes (PUC permit)
F	E Waste Management	Yes
G	Solid Waste Management Lifting of garbage from cooled campus by local dump yard.	Yes
H	Adoption of Village School	Yes
I	Water Conservation	Yes
J	Corporate Resource Centre (CRC)	No
K	Mitigation measures for Air pollution at construction stage and operation stage by developing adequate green belt.	Yes
L	Mitigation measures for noise pollution by isolation of noise generation activities	Yes
M	Disaster management plan	Yes, Training to students through seminars
N	Fire protection system	Yes

15. RECOMMENDATIONS

- Environmental Monitoring i.e. (Ambient Air Quality monitoring) & Stack Monitoring of DG sets need to be conducted by Punjab State Pollution Control Board, approved laboratory with frequency of six month.
- PT. MLSD College for Women Gurdaspur is planning to tie up with a concern for E-waste management; still it is advised that monthly / yearly record of E-Waste disposal be maintained at campus as per E waste rules 2016.
- Campus has already constituted a Green Club and framed Green /Environment policy it also has an Environment Association for regulating eco-friendly initiatives at campus premises.
- As per Waste Management plan more effective way out for disposing solid waste out of campus on daily basis is need of the hour.
- PT. MLSD College for Women Gurdaspur campus is extracting ground water for using for drinking and other purposes. It is highly recommended that they install a metering system/permission from CGWA for regulating and monitoring the same as it is a precious resource.
- Scope of installing more rain water harvesting should be explored in campus area.
- Scope for more solar power plant be also explored in the campus.

16. ENVIRONMENT CONSCIOUSNESS PROGRAMS

ਰਾਸ਼ਟਰੀ ਪ੍ਰਦੂਸ਼ਣ ਕੰਟਰੋਲ ਦਿਵਸ ਮਨਾਇਆ

ਰਾਸ਼ਟਰੀ ਪ੍ਰਦੂਸ਼ਣ ਕੰਟਰੋਲ ਦਿਵਸ ਮੌਕੇ ਜੁਟੇ ਸਾਇੰਟਿਸਟ ਵਿਦਿਆਰਥਣਾਂ।

कॉलेज में पर्यावरण एसोसिएशन और ग्रीन क्लब ने विशेष मिट्टी दिवस मनाया

On 2nd Dec, 2022 Environment Association and Green Club of the college organized 'Anti-Pollution Drive' on National Pollution Day to spread awareness about the problem caused by increasing pollution

स्वच्छ भारत व नशाखोरी पर एसडी कॉलेज फॉर वुमेन गुरदासपुर में रैली आयोजित

On 13th Dec, 2022 NSS unit, Environment Association and Green cluborganised an **'Awareness Rally on Swachh Bharat and Drug Abuse'** in collaboration with Sanjh Kendra Gurdaspur. In this rally 80 students of the college along with 10 staff members, Sanjh Kendra staff, PPM staff, committee members and Red Cross society members participated. SP Navjot Singh, Nodal officer and Committee member Sh. Amarpal Singh were also present in the rally

Plantation drive by drug de-addiction centre marks World Environment Day celebrations

छात्राओं व स्टाफ ने पौधारोपण कर दिया पर्यावरण संरक्षण का संदेश

On 5th June, 2023 Environment Association and NSS unit in collaboration Ministry of Education celebrated World Environment Day. 50 students participated in various events like Rangoli, Best out of waste, wall painting, fancy dress competition and doodle art poster.

इन्वायरमेंट क्लब ने विश्व पर्यावरण दिवस मनाया

News Clippings


छात्राओं को कागज तैयार करने की विधियों से करवाया अवगत

मिल का दौरा करने वाली छात्राएं।


ਰਾਸ਼ਟਰੀ ਪ੍ਰਦੂਸ਼ਣ ਕੰਟਰੋਲ ਦਿਵਸ ਮਨਾਇਆ

ਰਾਸ਼ਟਰੀ ਪ੍ਰਦੂਸ਼ਣ ਕੰਟਰੋਲ ਦਿਵਸ ਮੌਕੇ ਬੂਟੇ ਲਾਉਂਦੀਆਂ ਵਿਦਿਆਰਥਣਾਂ।

On 15th July 2022, a Public Interactive Programme was organized by Environment Association and Green Club in collaboration with Ministry of Jal Shakti and Red Ribbon Society, Gurdaspur in which Aditya Sharma (Hydro-meteorologist) and Sunil Kumar (Geophysics) from Ministry of Jal Shakti were

the resource persons.

- On 5th December, 2022 **'World Soil Day'** was celebrated, to highlight the value of healthy soil and to promote the sustainable management of soil resources. The students of Self-Help Group under Mahatma Gandhi National Council of Rural Education celebrated this day to spread awareness and knowledge about the healthy soil.

On 13th Dec, 2022 an '**Awareness Rally on Swachh Bharat and Drug Abuse**' was organized by NSS unit, Environment Association and Green club organized in collaboration with Sanjh Kendra Gurdaspur. In this rally 80 students along with 10 staff members, Sanjh Kendra staff, PPM staff, committee members and Red Cross society members participated. SP Navjot Singh, Nodal officer and Committee member Sh. Amarpal Singh were also present in the rally.

RAKESH KUMAR

Digitally signed by RAKESH KUMAR
Date: 2023.07.06 15:42:39 +05'30'

Credentials in r/o R.K. Electricals and Energy Audit Services:

a) Certificate ISO 50001:2018(Energy Management Services)

CERTIFICATE

This is to Certify that the Management System of

R.K. ELECTRICALS & ENERGY AUDIT SERVICES

PROGRESSIVE SOCIETY, 1131, SECTOR 50 B, CHANDIGARH - 160047, INDIA.

has been audited and found to comply with the requirements of:

ISO 50001:2018
(Energy Management System)

For the Scope of activities described bellow:

DEALS IN ENERGY MANAGEMENT, ENERGY, ENVIRONMENT & GREEN AUDITS,

THERMOGRAPHY OF ELECTRIC EQUIPMENT AND ELECTRIC INSTALLATIONS OF BUILDINGS & INSTITUTIONS AND INDUSTRIES.

Certificate No.: 279101

Date of initial registration	*Date of this Certificate*	*Surv. audit on or before/ Certificate expiry*	*Recertification Due*
16-07-2022	*16-07-2022*	*15-06-2023*	*15-06-2025*

Validity of this certificate is subject to successful completion of surveillance audit on or before due date, in case surveillance audit not conducted this certificate shall suspended/cancelled

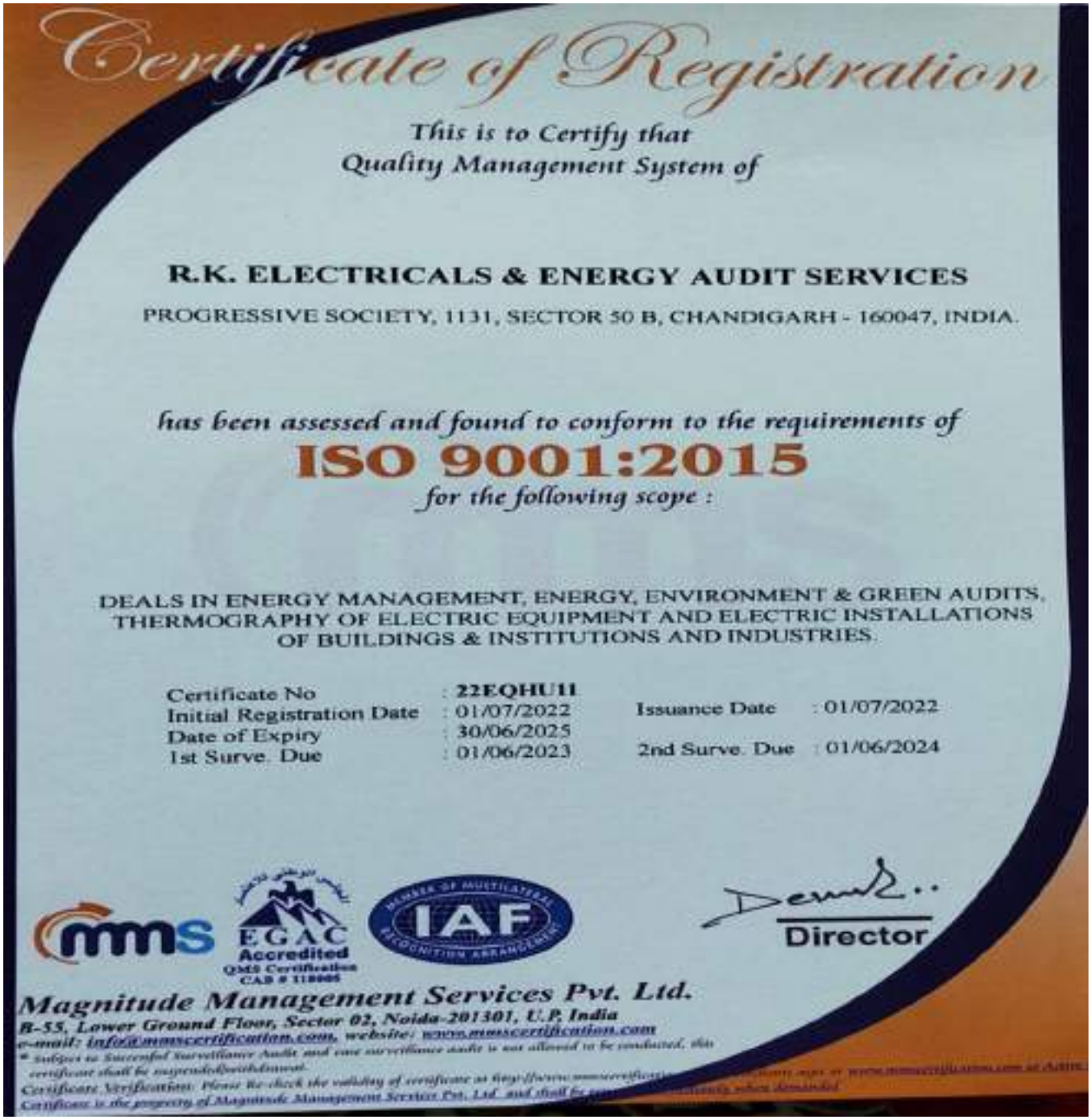
Director

This Certificate is the property of LMS Certification Limited and shall be returned immediately when demanded.

KAB-EN-06

LMS Certification Limited
Labrynth Business Centre, 43 Middle Hill Gate, Stockport,
Great Manchester, England-SK1 3DG
Phone :+44 208 935 5094
Company No.: 11029176

b) Certificate ISO 9001:2015 (Quality Management System)



Certificate of Registration

This is to Certify that
Quality Management System of

R.K. ELECTRICALS & ENERGY AUDIT SERVICES

PROGRESSIVE SOCIETY, 1131, SECTOR 50 B, CHANDIGARH - 160047, INDIA.

has been assessed and found to conform to the requirements of

ISO 9001:2015

for the following scope :

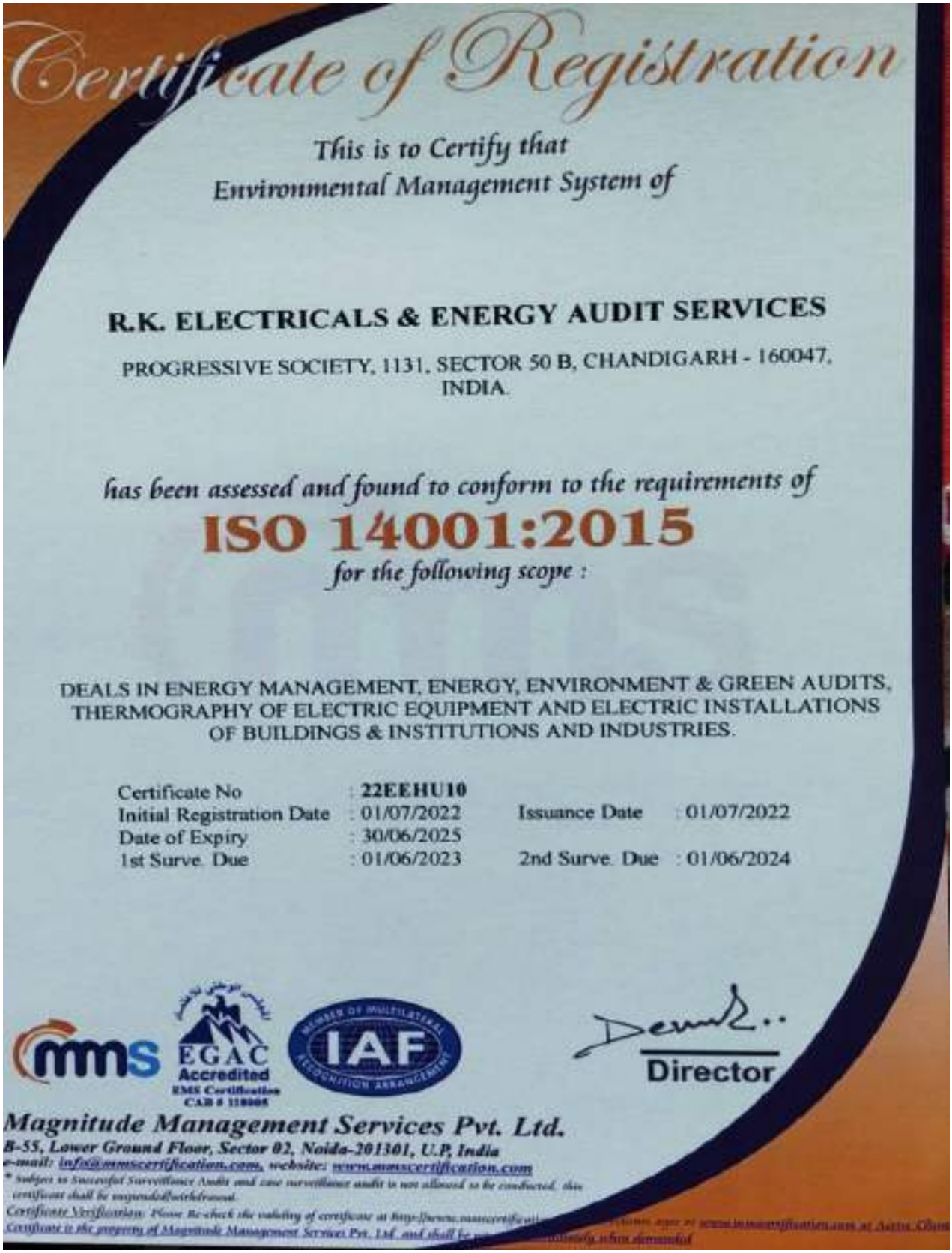
DEALS IN ENERGY MANAGEMENT, ENERGY, ENVIRONMENT & GREEN AUDITS, THERMOGRAPHY OF ELECTRIC EQUIPMENT AND ELECTRIC INSTALLATIONS OF BUILDINGS & INSTITUTIONS AND INDUSTRIES.

Certificate No	: 22EQHU11		
Initial Registration Date	: 01/07/2022	Issuance Date	: 01/07/2022
Date of Expiry	: 30/06/2025		
1st Surve. Due	: 01/06/2023	2nd Surve. Due	: 01/06/2024

Director

Magnitude Management Services Pvt. Ltd.
B-55, Lower Ground Floor, Sector 02, Noida-201301, U.P, India
e-mail: info@mmscertification.com, website: www.mmscertification.com

c) Certificate ISO 14001:2015 (Environmental Management System)



Certificate of Registration

This is to Certify that
Environmental Management System of

R.K. ELECTRICALS & ENERGY AUDIT SERVICES

PROGRESSIVE SOCIETY, 1131, SECTOR 50 B, CHANDIGARH - 160047, INDIA.

has been assessed and found to conform to the requirements of

ISO 14001:2015

for the following scope :

DEALS IN ENERGY MANAGEMENT, ENERGY, ENVIRONMENT & GREEN AUDITS, THERMOGRAPHY OF ELECTRIC EQUIPMENT AND ELECTRIC INSTALLATIONS OF BUILDINGS & INSTITUTIONS AND INDUSTRIES.

Certificate No	: 22EEHU10		
Initial Registration Date	: 01/07/2022	Issuance Date	: 01/07/2022
Date of Expiry	: 30/06/2025		
1st Surve. Due	: 01/06/2023	2nd Surve. Due	: 01/06/2024

mms EGAC Accredited EMS Certification CAB # 118005 IAF

Director

Magnitude Management Services Pvt. Ltd.
B-55, Lower Ground Floor, Sector 02, Noida-201301, U.P, India
e-mail: info@mmscertification.com, website: www.mmscertification.com

d) Certificate of Energy Auditor MoP GoI

Regn. No. EA-10080 Certificate No. 5591

National Productivity Council

(National Certifying Agency)

PROVISIONAL CERTIFICATE

This is to certify that Mr. / Ms. Rakesh Kumar Sharma

son / daughter of Mr. Krishan Datt

has passed the National Certification Examination for Energy Auditors held in July - 2010, conducted on behalf of the Bureau of Energy Efficiency, Ministry of Power, Government of India.

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

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

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

Place : Chennai, India

Date : 7th October, 2010

Controller of Examination

e) Certificate of IGBC Accredited Professional (IGBC India)

IGBC

CII Confederation of Indian Industry

The Indian Green Building Council

hereby certifies that

Rakesh Kumar Sharma

has successfully demonstrated knowledge on the Green Building Design & Construction, Building Standards & Codes, IGBC Resources & Processes and Green Design Strategies & their Impacts, required to be awarded the title of

IGBC Accredited Professional

K S Venkatagiri
Executive Director
CII-Godrej GBC

Gurmit Singh Arora
Chairman
Indian Green Building Council

B Thiagarajan
Vice-Chairman
Indian Green Building Council

f) Certificate of Electrical Engg.

ਪੰਜਾਬ ਟੈਕਨੀਕਲ ਯੂਨੀਵਰਸਿਟੀ

Punjab Technical University

Jalandhar

Regn. cum Roll No. L-40405009

BACHELOR OF TECHNOLOGY

Mr./Ms. Varun Sharma son/daughter of Sh. Rakesh Sharma

student of Chandigarh Engineering College, Landran, having completed the course of studies approved by the University and having passed the prescribed examination held in Dec.-2007, has been conferred the degree of Bachelor of Technology of this University in the discipline of Electrical Engineering in First Division

Given under the seal of the University

Registrar, Jalandhar. 25/10/10

Vice-Chancellor

Chancellor

g) Award certificate

Award for Outstanding Contribution

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