ADARSH MAHILA MAHAVIDYALAYA, BHIWANI

Affiliated to CBLU, Bhiwani

Session 2022-23

External Audit Report and Certificate:

1. ISO 9001:2015
2. ISO 14001:2015
3. Energy Audit Report and Certificate
4. Green Audit Report and Certificate
5. FSSAI Report
6. ISO 21001:2018

Certificate of Registration

This is to Certify that
Quality Management System of

ADARSH MAHILA MAHAVIDYALAYA

HANSI GATE, BHIWANI HARYANA-127021, INDIA

has been assessed and found to conform to the requirements of

ISO 9001:2015

for the following scope :

PROVIDING THE EXCELLENCE THROUGH CREATION, DISSEMINATIONS AND APPLICATION OF KNOWLEDGE IN CONSONANCE WITH SOCIAL NEEDS FOR A BRIGHTER TOMORROW TO THE LEARNERS OF POSTGRADUATE AND UNDERGRADUATE LEVEL ALONG WITH BASIC EDUCATION

Certificate No	: **22EQGB27**		
Initial Registration Date	: 25/04/2022	Issuance Date	: 25/04/2022
Date of Expiry	: 24/04/2025		
1st Surve. Due	: 25/03/2023	2nd Surve. Due	: 25/03/2024

EGAC Accredited
QMS Certification
CAB # 118005

MEMBER OF MULTILATERAL RECOGNITION ARRANGEMENT 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

* Subject to Successful Surveillance Audit and case surveillance audit is not allowed to be conducted, this certificate shall be suspended/withdrawal.

Certificate Verification: Please Re-check the validity of certificate at http://www.mmscertification.com/verifyclients.aspx or www.mmscertification.com at Active Clients.

Certificate of Registration

This is to Certify that
Environmental Management System of

ADARSH MAHILA MAHAVIDYALAYA

HANSI GATE, BHIWANI HARYANA-127021, INDIA

has been assessed and found to conform to the requirements of

ISO 14001:2015

for the following scope :

CREATION AND AWARENESS OF AN ECO FRIENDLY CAMPUS WITH THE PRIORITIES IN MANAGEMENT OF PRESERVATION OF FAUNA AND FLORA, MANAGEMENT OF WASTE, CONSERVATION OF GREEN ENVIRONMENT, ENERGY AND WATER.

Certificate No	: **22EEHT80**		
Initial Registration Date	: 24/08/2022	Issuance Date	: 24/08/2022
Date of Expiry	: 23/08/2025		
1st Surve. Due	: 24/07/2023	2nd Surve. Due	: 24/07/2024

EGAC Accredited
EMS Certification
CAB # 118005

MEMBER OF MULTILATERAL RECOGNITION ARRANGEMENT IAF

Director

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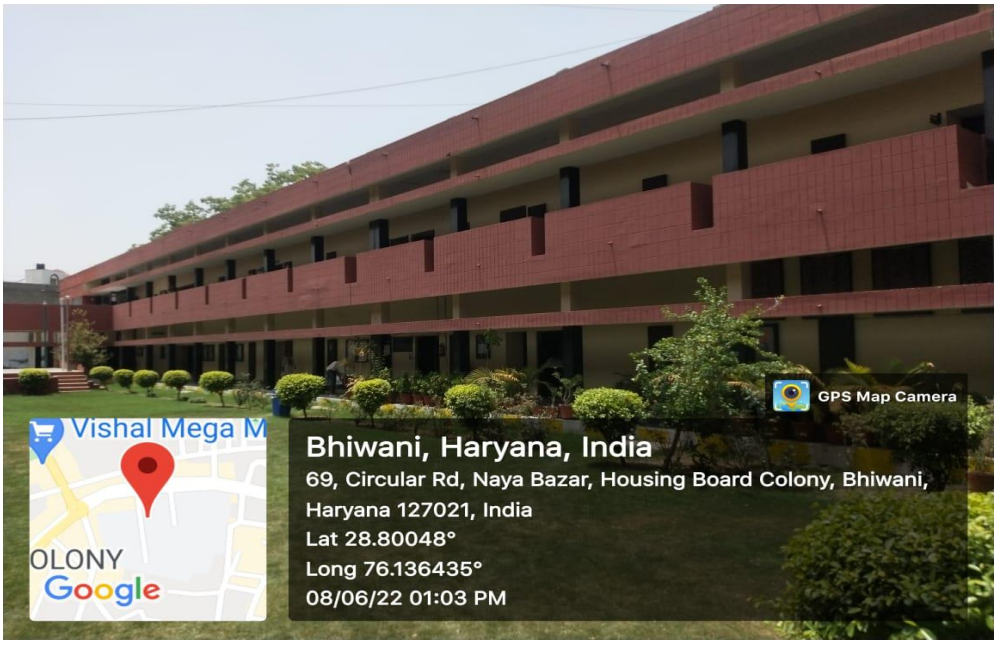
ENERGY AUDIT REPORT

ADARSH MAHILA MAHAVIDYALAYA, BHIWANI

JUNE - 2022



CONDUCTED BY:

A-Z ENERGY ENGINEERS PVT. LTD.

PLOT NO. 12, 4860-62, HARBANS SINGH STREET, KOTHI NO. 24,
WARD NO. II, DARYA GANJ, NEW DELHI-11002
011-23240541, 9811402040 pp_mittal@yahoo.com

Contents

ABBREVIATIONS

A	Ampere
AC	Alternating Current
Avg.	Average
CFL	Compact Fluorescent Lamp
CFM	Cubic feet minute
DTL	Double Tube Light
DG	Diesel Generator
FTL	Florescent Tube Light
GT	Generator Transformer
DTL	Double Tube Light
KL	Kilo Liter
KV	Kilo Volt
kVA	Kilo Volt Ampere
kW	Kilo Watts
kWh	Kilo Watt Hour
LED	Light Emitting Diode
Lit	Liters
M or m	Meter
Max.	Maximum
Min.	Minimum
MT	Metric Ton
MW	Mega Watt
No.	Number
PF	Power Factor
STL	Single Tube Light
TR	Ton of Refrigerant
V	Voltage
AMMB	Adarsh Mahila Mahavidyalaya, Bhiwani

Acknowledgement

M/s. A-Z Energy Engineers Pvt. Ltd. expresses sincere thanks to the Management of **"Adarsh Mahila Mahavidyalaya, Bhiwani** for their kind assistance and co-operation for carrying out the Energy Audit of their **facility**. The site visit for the Energy Audit was conducted in June. 2022.

The Management is highly conscious about its Energy Efficiency levels and they have initiated several measures to reduce the energy consumption, which includes use of LED lights, Star Rated ACs etc. **A-Z Energy Engineers Pvt. Ltd. acknowledges and appreciates the commitment of the management towards conservation of Energy.**

The Audit team of A-Z Energy Engineers Pvt. Ltd. conveys their gratitude and thanks to the management of Adarsh Mahila Mahavidyalaya for their positive attitude in safety, reliability and energy conservation program through energy efficiency improvement and better utilization of available energy system infrastructures followed by their proactive role in conducting the energy audit study.

The Audit team would like to register their sincere thanks to management of the college for their guidance, coordination, active support, participation during the audit and motivating the audit team.

Officials from Adarsh Mahila Mahavidyalaya, Bhiwani

- Mr. Ashok Buwaniwala - Gen. Secretary
- Mrs. Rachna Arora - Principal
- Mrs. Neelam Gupta - IQAC Coordinator

Official from Energy Committee Member

- Dr. Nisha Sharma - Asst. Professor
- Dr. Deepu Saini - Asst. Professor
- Ms. Sunita - Asst. Professor

Audit Team Members

- Dr. P.P. Mittal - Accredited Energy Auditor (AEA-011)
- Mr. Neeraj Dhingra – Accredited Energy Auditor (AEA-203)
- Mr. Hemant Gupta – Certified Energy Manager (EA-13120)
- Mr. Ajit Yadav – Energy Engineer
- Mr. Prashant Kumar – Energy Engineer

(Dr. P.P Mittal)
Accredited Energy Auditor- AEA-0011

Highlights of the Energy Audit

The Broad Scope of work and Key Systems/ Equipment's covered during the Energy Audit was as follows:

- **Review of Electricity Bills**, Contract Demand and Power Factor for the last one year in which possibility was explored for further increase of contract demand an improvement of P.F.
- **Electrical System Network:** which would include detailed study of the transformer of various rating / capacities their operational pattern, loading, no load losses, power factor measurement on the main power distribution boards and scope for improvement if any. the study would also cover possible improvement in energy metering systems for better control and monitoring
- **Study of Motors Pumps Loading** Study of motors above 10 KW in terms of measurement of Voltage (V), Current (I), Power (kW) and P.F. and thereby suggesting measure for energy saving like reduction in size of motors or installation of energy saving device in the existing motors. Study of Pumps and their flow, thereby suggesting measures for energy saving like reduction in size of Motors and Pumps of installation of energy saving device in the existing motors, optimization of pumps.
- **Chiller& Cooling tower:** Performance shall be evaluated as regards; their input power vis-à-vis TR capacity and performance will be compared to improve to the best in the category.
- **Lighting System: -** Study of type and fitting of lighting and suggest measures for improvements and energy conservation opportunity wherever feasible.

- **RO System: -** Study of type and fitting of R.O and suggest measures for improvements and energy conservation opportunity wherever feasible.
- **UPS System: -** Performance shall be evaluated of UPS System, improvements and energy conservation opportunity wherever feasible.

Key Points

- *The Detailed Energy Audit of Adarsh Mahila Mahavidyalaya, Bhiwani (AMMB) was carried out in June 2022 to find out the energy saving potential. The report provides the major highlights on potential energy saving opportunities available in the college.*
- *AMMB draws power from the Dakshin Haryana Vidyut Vitran Nigam Ltd., at 11 kV; subsequently the voltage is stepped down by transformers 11 KV to 0.433 KV by 160 KVA transformer. The Contract demand of college is 72 KVA.*
- *The Campus is being billed on kVAh basis; therefore, the effect of power factor is inbuilt in the billing structure. During the Year, the operating power factor varied from 0.89 to 0.97. However, if we look at the overall average power factor is around 0.94, which is lower side. In the billing last month feb & mar 2022 power factor is 0.95, which is slightly lower side. The effect of power factor is inbuilt in the billing structure so to be improves power factor is 0.999*

  APFC Panel or the capacitor banks wherein the delivery is poor or out of order may be replaced, so that the overall system power factor is maintained at around 0.99 (lag). Improvement in the power factor would subsequently reduce the KVAh consumption, the resultant benefits interms of energy savings. At the time of audit, the capacitor banks were not in operation.
- *The harmonics levels measured in main incomer. The details is given in below table.*

Particulars	TR (160 KVA) (Average)
THD Phase1 (V)	1.07
THD Phase2 (V)	1.10
THD Phase3 (V)	1.08
THD Phase1 (A)	4.26

THD Phase2 (A)	7.26
THD Phase3 (A)	4.19

The average voltage harmonics levels were around below 1%, which is under limit. The current harmonics levels were around below 9% for Transformer, which is under limit.

- *The college Management is highly conscious about its Energy Efficiency and cost and has initiated several measures to reduce the energy consumption which includes replacement of conventional lamps with LEDs, use of star rated ACs and other appliances*
- *Although there is no simpler way to reduce the amount of energy consumed by lighting system than to manually turn OFF whenever not needed, this is not done as often as it could be. In response, automatic lighting control strategies like installation of occupancy sensors can be considered to Control light in response to the presence or absence of people in the space. Quantification of energy savings on this account is not possible.*

Cumulative Energy Saving Opportunities in kWh & Corresponding Monitory Benefits with Payback

ECO's	Quantity	Energy Savings per Annum		Estimated Investments	Simple Payback Period
	Nos.	KWh	Rs	(Rs)	(Months)
Installed Maximum Demand Controller Unit to Optimize the Maximum Demand	1	-	62082	30000	6
Replacing existing T12 (40W) with LED (18W)	99	5445.00	50148	44550	11
Replacing existing T8 36Wwith LED LED (18W)	52	2340.00	21551	23400	13
Replacing existing fans with 5 Star rated BEE label Fans	23	2097.60	19319	59800	37
Installation of solar PV of 50 kWp	1	69000	635490	2500000	47
Total		**78882.60**	**788590.00**	**2657750.00**	**41**

CHAPTER-1INTRODUCTION

1.1. THE PROJECT

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 every establishment. Energy Audit helps to understand more about the way's energy is used in any establishment and helps in identifying areas where waste may occur and scope for improvement exists.

It was with this objective that "**M/s. A-Z Energy Engineers Pvt. Ltd.,** Plot No.12, 4860-62, Harbans Singh Street, Kothi No. 24, Ward No. II, Darya Ganj, New Delhi-11002, was entrusted with the job of conducting Energy Audit of "Adarsh Mahila Mahavidyalaya, Bhiwani".

1.2. SCOPE OF WORK

The Broad Scope of work was to:

1. **Analysis of the Electricity bills**
   - (i) Analysis of the different section of the electricity bills.
   - (ii) Study of the fixed charges and variable charges and comments on the same.
   - (iii) Calculation of the load actor.
   - (iv) Comments on the contract demand and suggestions to reduced them
2. **Power factor and Harmonics Analysis**
   - (i) Measured of power factor/ harmonics analysis at the major loads.
   - (ii) Suggesting methods to improve the present power factor.
   - (iii) Suggesting method for improving power quality and reduction of Harmonics if any.
3. **Metering and Monitoring Status**
   - (i) Review of exiting metering system of the plant
   - (ii) Suggesting need and methods to improve the metering system, if required.
4. **Transformers**
   - (i) Study of major transformer in the plant.
   - (ii) Measuring of loading pattern and current efficiency of the transformer.
   - (iii) Data shall be collected using portable power analyzer and energy meter installed in plants.
   - (iv) Snapshot study for similar equipment.
5. **Water Pumps**

   Study of water pumps (15 KW and above) would be carried out:-

(i) Measured of flow and head using plant instruments if available.
(ii) Measured of power consumption.
(iii) Checking running hours of the pumps and optimization of the same.
(iv) Recommend measure to reduce the power consumption.
(v) Application of flow control methods.
(vi) Application of retrofit for energy savings.

6. **Lighting System**

Detailed audit in lighting system normally results in considerable saving. illumine readings with lux meter should act as a basis for comparative purpose. The study should cover measurement of lux level at works place and at various points of light usage. Application of retrofits such as: -

(i) Timer Control
(ii) Photocell control for street lighting
(iii) Use of energy efficient lighting

7. **DG Sets**

(i) Specific electricity generation ratio evaluation (based on the data).
(ii) Performance evaluation i.e., Energy balance efficiency calculations (based on the data).

1.3. OBJECT OF STUDY

The purpose of this study is to demonstrate the technical and financial feasibility of implementation of energy efficiency measures in Adarsh Mahila Mahavidyalaya, Bhiwani. The purpose of this report is: –

(i) to analyze the present energy consumption pattern
(ii) to investigate for energy conservation measures without compromising the production level
(iii) to assess the techno-economic feasibility of the energy conservation measure

1.4. 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 Site and had discussions with the concerned officials/ supervisors to collect data/ information on the operations and Load Distribution within the Building. 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 plan/s for improvements/ reduction in specific energy consumption.

1.5. INSTRUMENTATION SUPPORT

Instruments used for undertaking the audit include the following:

- Electric Load Manager with appropriate CT's & PT's for Power Measurements with recording facilities.
- Dual Type Digital Temperature (°C/°F) Measuring Device with appropriate probes;
- Ultra-Sonic Flow Meter
- Flue Gas Analyzer
- Pressure Gauges
- Anemometers
- Lux Meter
- Hygrometer

CHAPTER-2 BASE LINE DATA

2.1. GENERAL DETAILS

Contact Details		
Brief description of Assignment	:	Detailed Energy Audit of Electrical Systems & Utility Equipment's.
Name & Address of the Building	:	Adarsh Mahila Mahavidyalaya, Bhiwani
Operational Days	:	240 Days per annum
Contact Officer	:	Mrs Neelam Gupta–IQAC,Coordinator
Power		
Source	;	Dakshin HaryanaBijli Vitran Nigam,
AC No.	:	6575180000
Sanctioned Load	:	65 KW
Contracted Demand	:	72KVA
Annual Purchased Power Consumption	:	
Apr. 2021 to Mar. 2022	:	122042.00 kWH
Apr. 2021 to Mar. 2022	:	129528.00 kVAh
Annual Purchased Power Bill	:	
Apr. 2021 to Mar. 2022	:	Rs.1125843
Average Purchased Power Cost	:	
Apr. 2021 to Mar. 2022	;	Rs. 8.63 per kVAh
Apr. 2021 to Mar. 2022	:	Rs. 9.21 per kWh
Energy Charge	:	Rs. 6.65 per kVAh

CHAPTER-3PRESENT ENERGY SCENARIO

3.1. PURCHASED POWER

AMMB draws power from the Dakshin Haryana Bijli Vitran Nigam, at 11 kV; subsequently the voltage is stepped down from 11 KV to 0.433 KV by 160 KVA X 1 Nos. transformer. The Contract demand of college is 72 KVA.

3.2. REACTIVE POWER COMPENSATION

Based on the electricity bills, it was observed that the power factor from Apr. 2021 to Mar. 2022 varies from 0.89-0.97 i.e., average power factor was 0.94 which appears to be on lower side. The building is being billed on kVAh basis; therefore, the effect of power factor is in built in the billing structure. The minimum, maximum and average PF (Apr. 2021 to Mar. 2022) are as follows.

Description	Min. PF	Max. PF	Average PF
Power Factor	0.89	0.97	0.94

3.3. SELF-GENERATED POWER

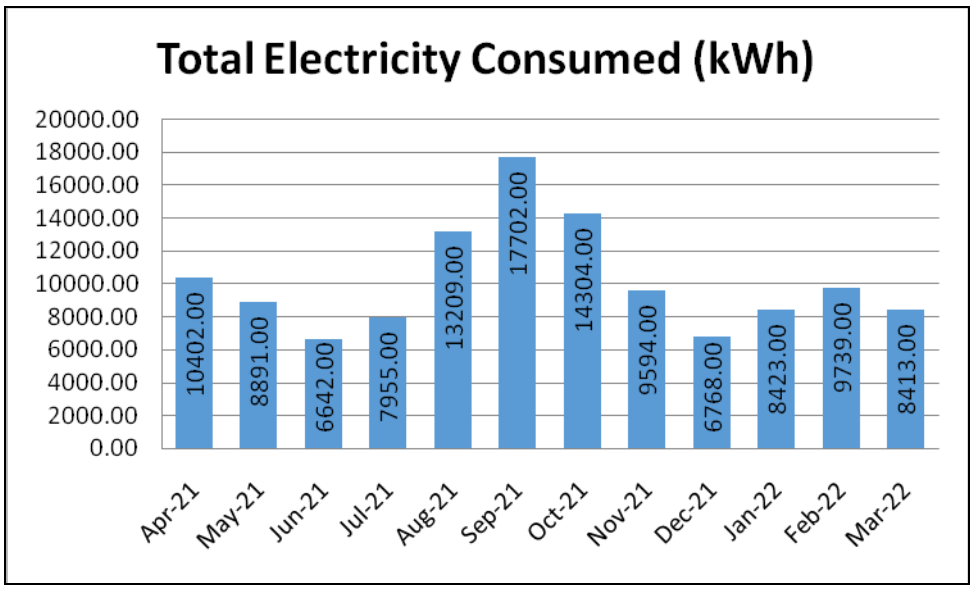
The college has 1 No of DG Sets of 125 kVA installed for in-house power generation during power failure. The DG is operating during power cut & for testing purpose.

3.4. PURCHASED POWER CONSUMPTION PATTERN

3.4.1. Apr 2021-Mar 2022

Sr. No.	Billing Month	Days	MDI	Power factor	Electricity consumed (kWh)	Electricity consumption (kVAh)	Energy Charge (Rs.)	Fixed Charges (Rs.)	Fuel Surcharge (Rs.)
1	Apr. 2021	30	39.32	0.946	10992.00	10402.00	12474.74	73096.80	3848.74
2	May. 2021	31	47.02	0.923	9635.00	8891.00	12072.32	64072.75	3289.67
3	Jun. 2021	30	22.39	0.886	7493.00	6642.00	12474.74	49828.45	2457.54
4	Jul. 2021	31	63.12	0.927	8582.00	7955.00	12072.32	57070.30	2943.35
5	Aug. 2021	31	86.07	0.949	13920.00	13209.00	12474.74	92568.00	4887.33
6	Sep. 2021	30	87.66	0.966	18317.00	17702.00	12107.83	121808.05	1895.90
7	Oct. 2021	31	72.26	0.960	14903.00	14304.00	11717.28	99104.95	0.00
8	Nov. 2021	30	65.55	0.930	10321.00	9594.00	12107.83	68634.65	0.00
9	Dec. 2021	31	25.35	0.915	7399.00	6768.00	11717.26	49203.35	0.00
10	Jan. 2022	31	39.66	0.945	8911.00	8423.00	12107.83	59258.15	0.00
11	Feb. 2022	28	40.72	0.952	10225.00	9739.00	12107.83	67996.25	0.00
12	Mar. 2022	31	36.87	0.953	8830.00	8413.00	10936.11	58719.50	0.00
	Total				**129528.00**	**122042.00**	**144370.83**	**861361.20**	**19322.53**
	Avg.		**52.17**	**0.942**	**10794.00**	**10170.17**	**12030.90**	**71780.10**	**1610.21**
	Max		**87.66**	**0.966**	**18317.00**	**17702.00**	**12474.74**	**121808.05**	**4887.33**
	Min		**22.39**	**0.886**	**7399.00**	**6642.00**	**10936.11**	**49203.35**	**0.00**

Sr. No.	Billing Month	Electricity Duty (Rs.)	Municipal Tax (Rs.)	penalty for exceeding the cd	Total Payable Amount (Rs.)	Inr/Unit kvah	Inr/Unit kwh
1	Apr. 2021	1040.20	1788.41	0	83888.89	7.63	8.06
2	May. 2021	889.10	1588.69	0	83339.53	8.65	9.37
3	Jun. 2021	664.20	1295.21	0	68103.14	9.09	10.25
4	Jul. 2021	795.50	1441.72	0	75319.19	8.78	9.47
5	Aug. 2021	1320.90	2198.6	27760.52	142322.00	10.22	10.77
6	Sep. 2021	1776.20	2712.24	34322.22	176099.62	9.61	9.95
7	Oct. 2021	1430.40	2216.44	0	116093.06	7.79	8.12
8	Nov. 2021	959.40	1614.85	0	84546.73	8.19	8.81
9	Dec. 2021	676.80	1218.41	0	63990.82	8.65	9.45
10	Jan. 2022	842.30	1427.32	0	74940.60	8.41	8.90
11	Feb. 2022	973.90	1602.08	0	84021.06	8.22	8.63
12	Mar. 2022	841.30	1385.11	0	73179.11	8.29	8.70
	Total	**12210.20**	**20489.08**	**62082.74**	**1125843.75**		
	Avg.	**1017.52**	**1707.42**	**5173.56**	**93820.31**	**8.63**	**9.21**
	Max	**1776.20**	**2712.24**	**34322.22**	**176099.62**	**10.22**	**10.77**
	Min	**664.20**	**1218.41**	**0.00**	**63990.82**	**7.63**	**8.06**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18000.00
16000.00
14000.00
12000.00
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2000.00
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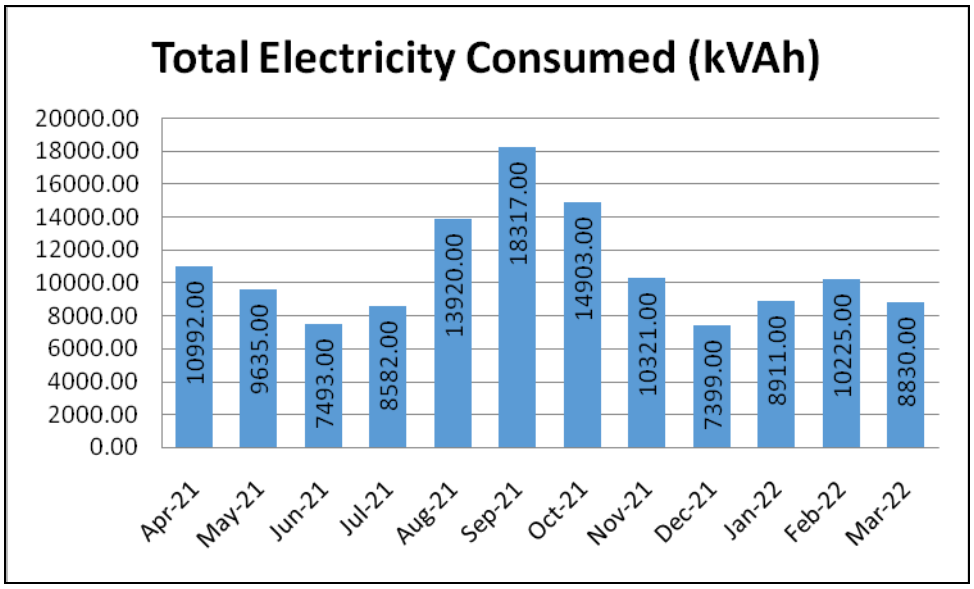
Total Electricity Consumed (kVAh)
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18000.00
16000.00
14000.00
12000.00
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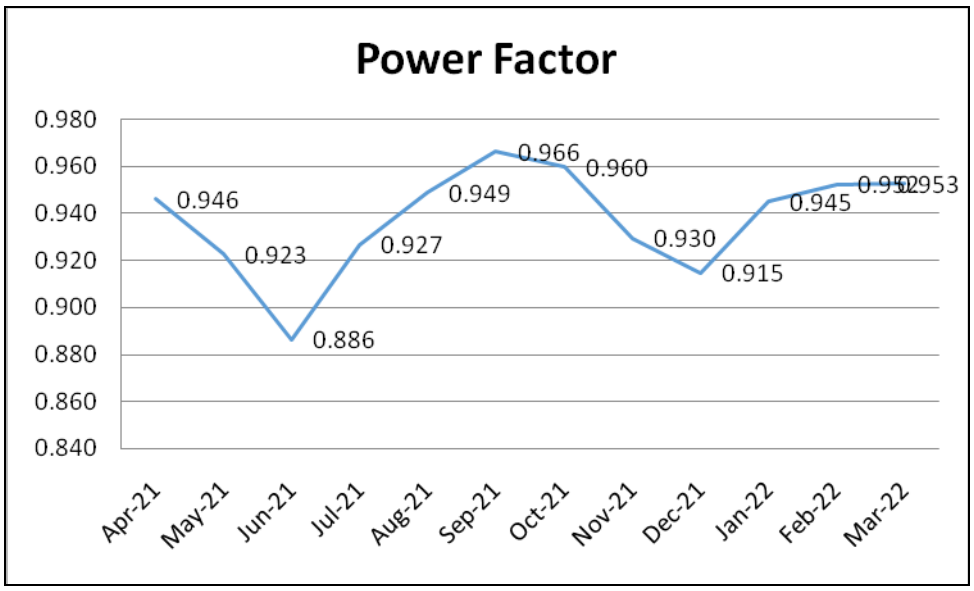
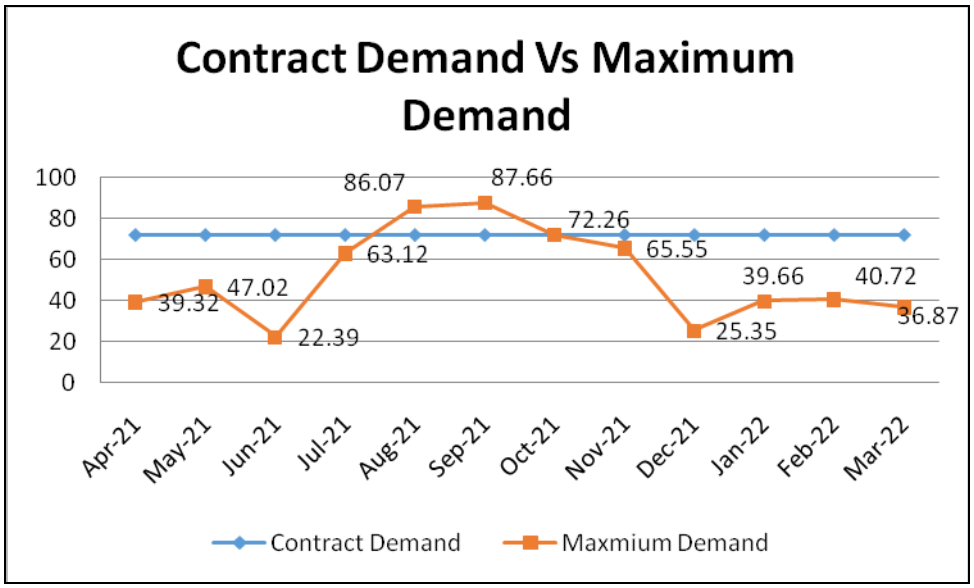




- Average monthly consumption of the college is 0.10 Lakhs kVAh /month, while total annual consumption of the college is 1.29 Lakhs kVAh units. For fulfilling energy needs college has been paying Rs 0.93 lakhs/Month while annually college, is paying Rs 11.25 Lakhs.
- Incoming supply voltage is 11 kV which is further stepped down to 433 V with the help of transformer.
- Average demand of the college is 52.17 KVA, while variation of M.D. is within 22.39 to 87.66 KVA respectively.

3.5. SUMMARY

Average Purchased Power Cost	:	
Apr. 2021 to Mar. 2022	:	Rs. 9.21 per KVAh
Apr. 2021 to Mar. 2022	:	Rs. 8.63 per KWh
Energy Charge	:	
Apr. 2021 to Mar. 2022	:	Rs. 6.65 per KVAh

3.6 Recommendation – Install Maximum Demand Control Unit to Optimize the Maximum Demand

- Demand control meter installation will assist Adarsh Mahila Mahavidyalaya management in rationalizing demand registered and limit the same to near contract demand levels, thereby avoiding to pay penalty for exceeding demand. In the last 12 months, Adarsh Mahila Mahavidyalaya management has two month exceeded its contract demand of 86.07 kVA and 87.66. Maximum Demand of last 12 months (April 2021 to March 2022) at 87.66 kVA. The penalty for exceeding the CD Rs. 62082 for two Months. Cost of installing Maximum demand controller is about Rs. 30,000 giving a simple payback period of 6 months.

Maximum Demand Controller

Measure
Control of maximum power demand by installation of Maximum Demand controller
Equipment
Electrical maximum demand controller
Principle
MD controller monitors the demand of the college and compares it to a set maximum value. Non-essential loads can be switched off automatically when the actual demand exceeds the set point. Electrical motive loads consume more energy during start to overcome starting torque. At this time, the loads draw more current & the demand is increased. If such loads are simultaneously started (or started within few minutes of each other) in a unit, the maximum demand shoots up. If this

occurs within the same metering period, the maximum demand is registered high for the unit. This can be avoided by either slowly starting up or staggering the loads over a half an hour or more (highly impractical) or by monitoring the load rise and switching off loads, in case a set value is reached. The later function is automatically performed by the MD controller, if required.
Background
A careful evaluation of the pattern revealed that the complex has exceeded contract demand. A maximum demand controller should be installed at the incoming bus. This controller will monitor the demand. For example, the maximum set point can be set as 65 kVA. If the demand exceeds this level, the controller switches off non-critical loads like office AC's etc or the facility personnel can manually switch off few loads. These can be staggered and switched ON later when the demand has stabilized in the facility.
This measure is of relevance to all establishments under the TOD tariff demand. Demand charges are paid based on any half-an-hour period maximum demand during the metering period. • Maximum demand controller installed on the incomer ensures that costly mistakes never occur. • Very useful with fluctuating power loads.

CHAPTER-4TRANSFORMER LOAD PROFILE

4.1. RATED SPECIFICATION OF TRANSFORMER

Adarsh Mahila Mahavidyalaya, Bhiwani draws power from the Dakshin Haryana Bijli Vitran Nigam, at 11 kV; subsequently the voltage is stepped down by one transformer 11 KV to 0.433 KV by 160 KVA X 1 Nos. transformer. The Contract demand of college is 72 KVA.

Details of transformers, whose load profile has been taken during the audit,

Name Plate Data		TR-1
Rated	kVA	160
Voltage	H. V	11
	L.V	433

4.2. LOADING ON MAIN INCOMER

The total loading was recorded on 160 KVA transformer and load profile of transformer was measured during the audit and the averaged-out readings are given here in:

4.2.1. Load Profile of Transformer (160 KVA)

Identification	TR-1 (500 kVA)		
Voltage (Volts) P-P	Max.	Min.	Avg.
"R" Phase	418.78	394.96	405.26
"Y" Phase	417.75	390.00	402.02
"B" Phase	416.46	390.22	400.51
Current (Amps)			
"R" Phase	183.60	79.83	136.98
"Y" Phase	122.51	32.15	71.88
"B" Phase	175.06	75.56	130.18
Power Factor			
"R" Phase	0.996	0.959	0.987
"Y" Phase	0.995	0.950	0.979
"B" Phase	0.985	0.952	0.972
Power Drawn (KW)			
"R" Phase	40.95	18.31	31.17
"Y" Phase	28.01	7.45	16.52
"B" Phase	38.55	17.13	28.89
Total	**107.51**	**42.89**	**76.58**
Power Drawn (KVA)			

Identification	TR-1 (500 kVA)		
"R" Phase	41.55	19.08	31.55
"Y" Phase	28.39	7.82	16.83
"B" Phase	39.41	17.85	29.65
Total	**109.35**	**44.75**	**78.03**
Voltage Harmonics (THD %)			
"R" Phase	1.25	0.92	1.07
"Y" Phase	1.24	0.98	1.10
"B" Phase	1.26	0.93	1.08
Current Harmonics (THD %)			
"R" Phase	6.88	3.16	4.26
"Y" Phase	11.15	4.61	7.26
"B" Phase	6.66	2.74	4.19
Frequency	50.1	49.9	50.0

4.3. GRAPHICAL LOAD PROFILE OF TRANSFORMER

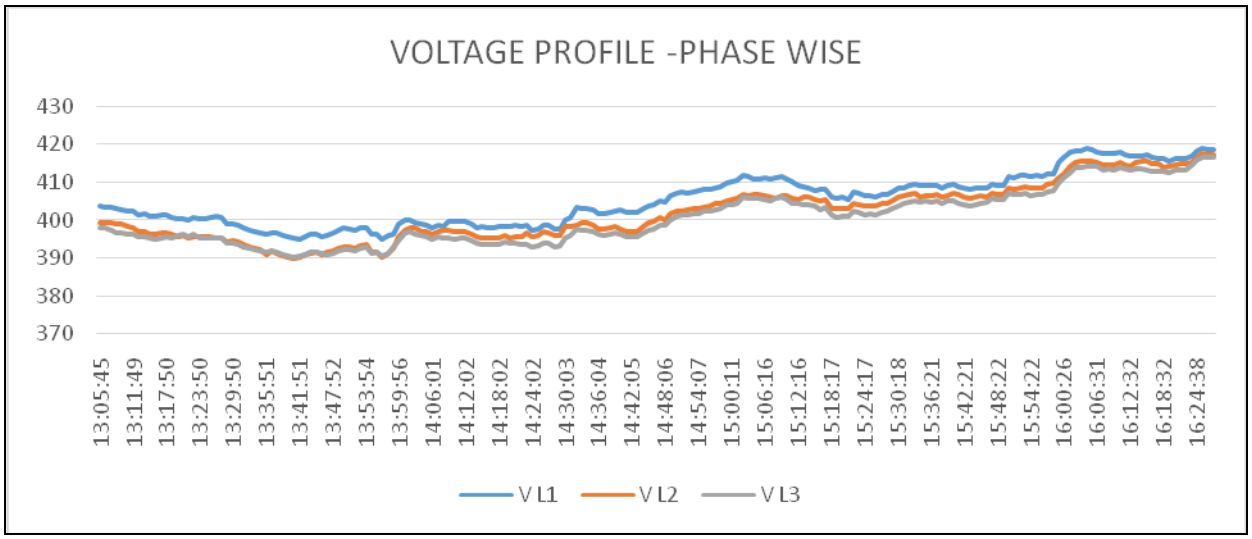
The load profile of the electrical parameters was recorded by using a portable 3-phase power analyzer. During the recording, the power analyzer recorded all the electrical parameters for further detailed analysis. The analysis of the different parameters recorded load hours reading at the LT incoming main supply is given below

4.3.1. Graphical Load profile of LT Panel Transformer

A) Graphical Voltage Profile (Volt)

All electrical equipment has a designed range of operating voltage. Therefore, it is important to operate all electrical equipment, within the specified voltage range. The voltage variations in all the three phases (R, Y and B) were recorded at the main Supply. The graphs below depict the variations in the voltage

Voltage Profile- Phase wise (V)



The observations taken from the above graphs:

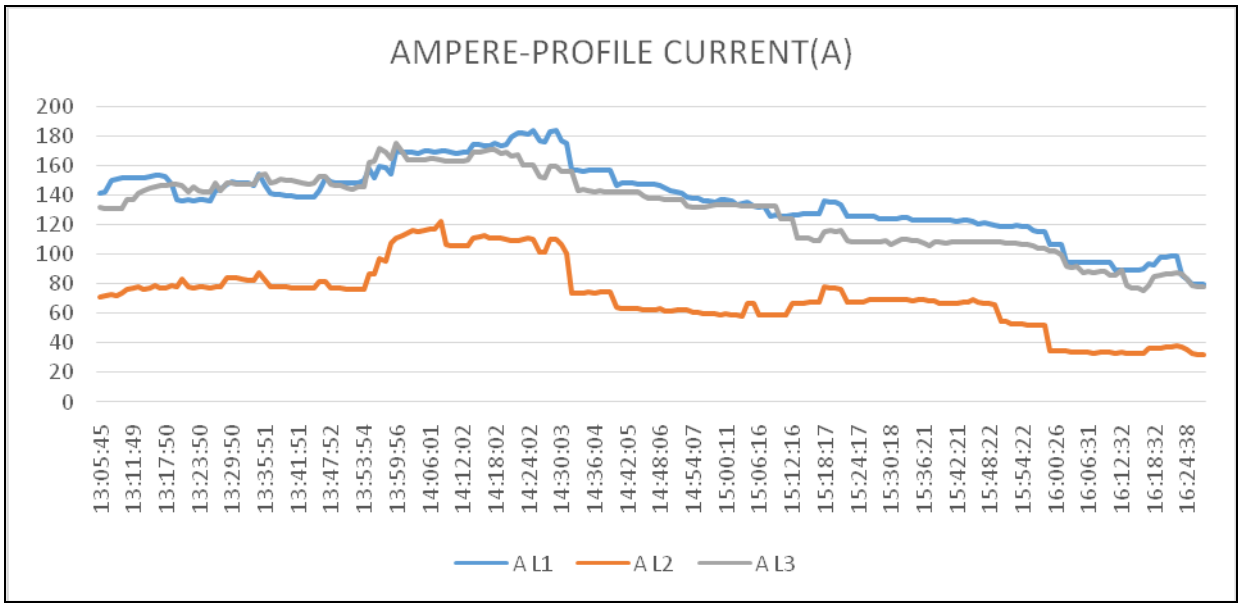
- There was a slight variation in phase-to-phase voltage.
- The average voltage recorded

	Voltage (R) Phase	Voltage(Y) Phase	Voltage(B) Phase
Max.	418.78	417.75	416.47
Min.	394.961	390.00	390.23
Ave.	405.26	402.02	400.51

B) Graphical Current Profile (Amp)

Current profile is the variation in the electrical current versus time. The current variations in all the three phases (R, Y and B) were recorded at the main panel of the transformer. The graphs below present the variations in the current:

Current Profile- Phase wise of the main Supply



The observations taken from the above graphs:

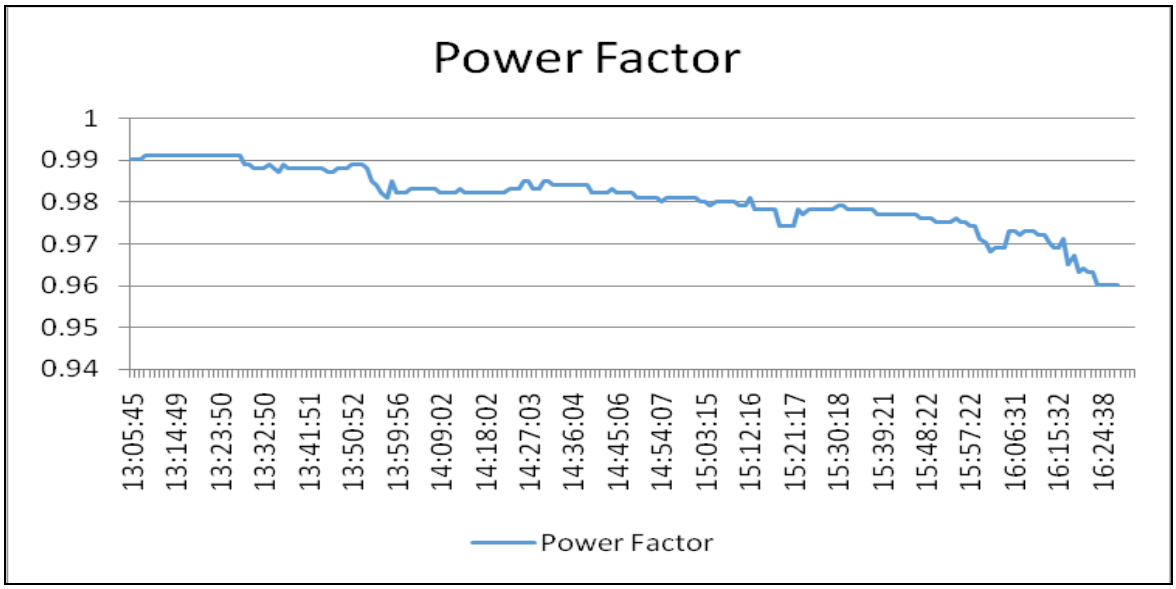
There is a considerable current variation in the different phases and hence the phase-to-phase load is not balanced. The Current variation during the load hours of measurement period

	Amp. Phase (R)	Amp. Phase (Y)	Amp. Phase (B)
Max.	183.61	122.51	175.06
Min.	79.83	32.15	75.57
Ave.	136.99	71.89	130.18

C) Graphical Power Factor Profile

Under the current tariff system, the billed units are in kVAh and the demand charges for apparent power (kVA) depend on the power factor. If the facility has a low power factor, then the demand drawn from the grid will increase and consequently the facility will incur more demand charges. The variation in the power factor was recorded to explore opportunities for improvement. The graph below presents the variations in the power factor of the power supply to the building:

Power factor profile for the main Incomer



The observations taken from the above graphs:

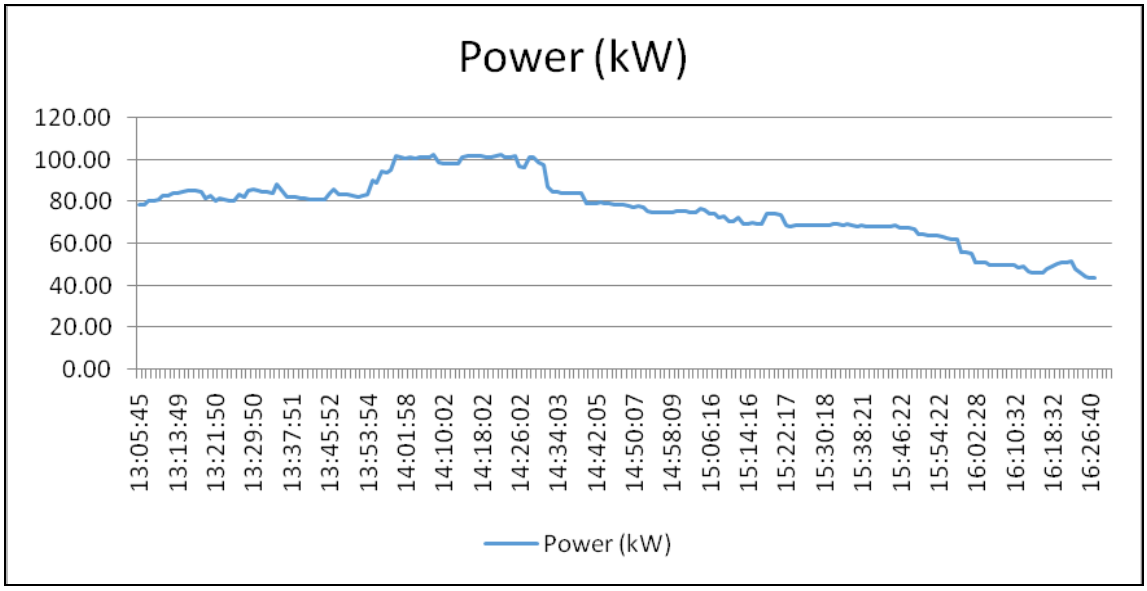
- The Powerfactor varied from 0.96 to 0.99 during the load hours of measurement period and average 0.98.

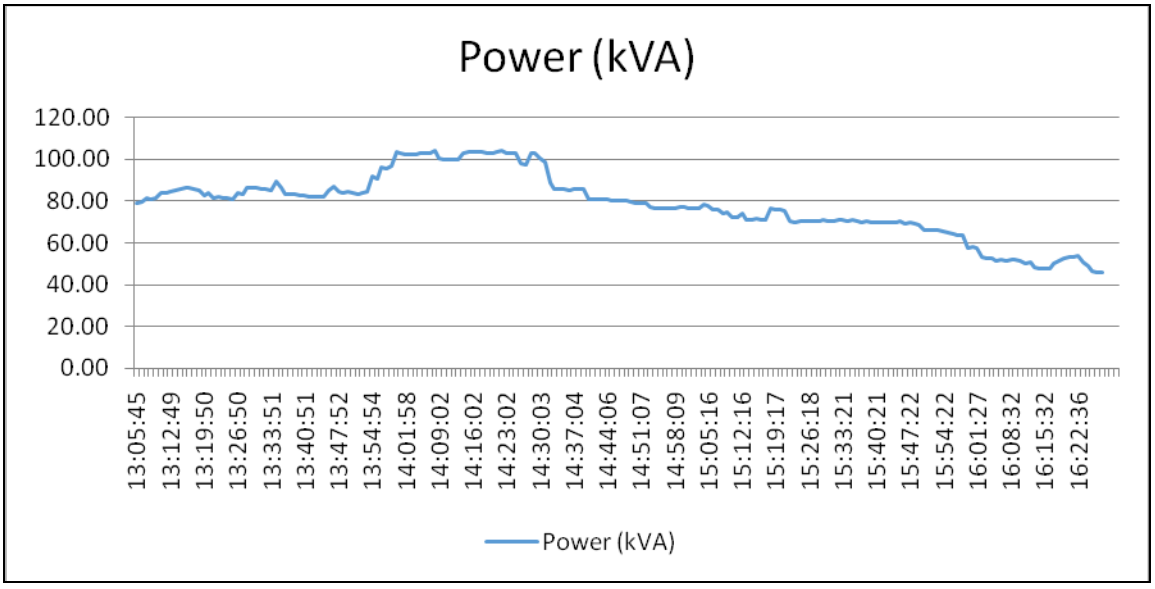
D) Graphical Load Profile (KW & KVA)

Load (real power) profile and apparent power profile is the variation in the electrical load versus time. In any electrical system, the vector sum of the active power (kW) and reactive power (kVAR) make up the total (or apparent) power (kVA) used. This is the power generated by a generation station for the user to perform a given amount of work. The total power is measured in kVA (Kilo Volts-Amperes) and the load or active power is measured in kW (kilowatts) and they become equal as and when the power factor approaches unity. Total electricity charges (units and demand) are based on the load or active power (kW) and apparent power (kVA).

During the energy audit studies, the total operating load at the transformer was recorded to find out the variation in the load at different times of the day. The following graph depicts the variation in the load and apparent power of the premises:

Load Profile Real power (kW & kVA) profile of main incomer





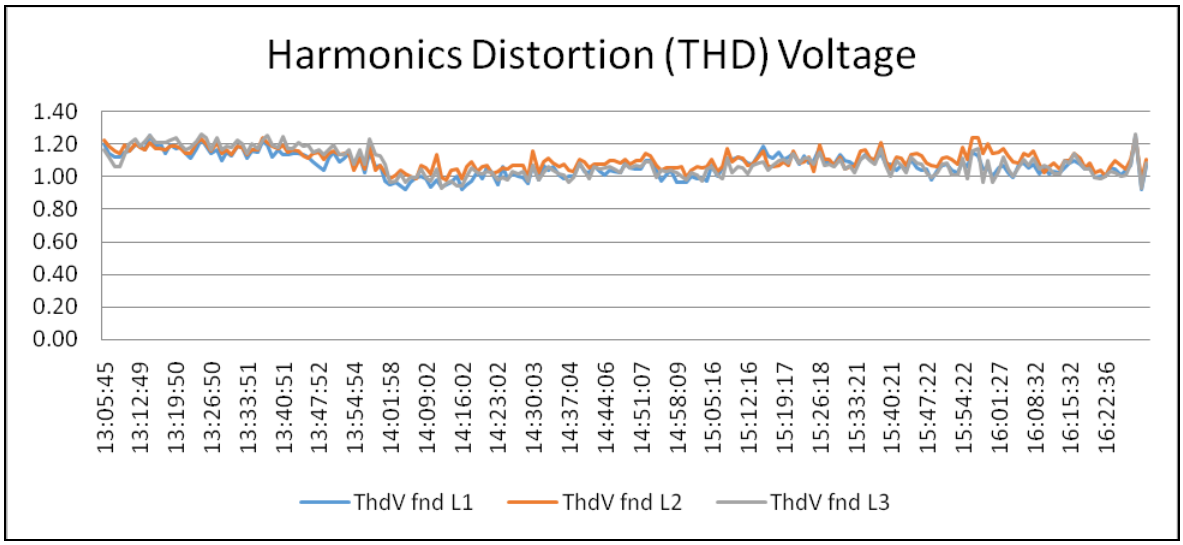
The observations taken from the graph:

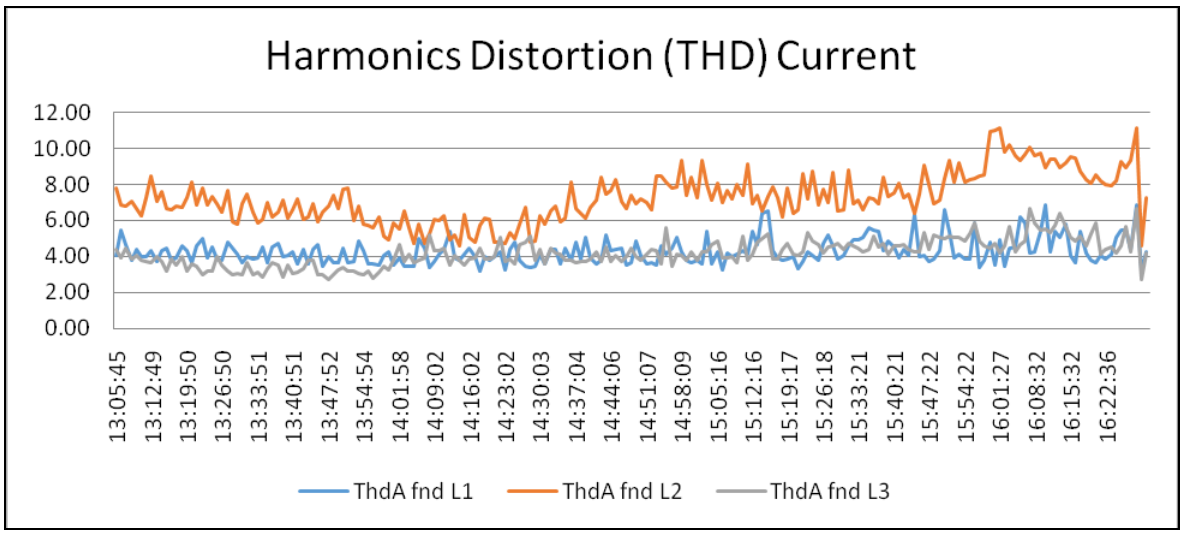
- The load (kW) variation ranges from 43.68 kW to 102.31 kW during the load hours of measurement period and Average 76.60 kW.
- The apparent power (kVA) varies from 45.53 kVA to 104.20 kVA during the Load hours of measurement period and Average 78.03 kVA.

- The maximum loading on the transformer during the load hours of measurement period was 65% and the average loading on the transformer was 48.76%.

E) Graphical Voltage & Current Harmonics Profile

Percentage of Total Harmonic Distortion (THD) - Phase wise Voltage& Current





The observations taken from the above graphs:

- The percentage of average voltage THD is in the range of 1.07 % to 1.10 % and average 1.08%. This is well within the recommended limits as per IEEE Standards i.e., 4% variation for voltage & 12% variation for current.
- The percentage of average current THD is in the range of 4.19 % to 7.26 %.Voltage harmonics with in limit & current THD levels within the limits.

CHAPTER-5 REACTIVE POWER COMPENSATION

5.1. CAPACITOR BANK INSTALLED

The College is being billed on kVAh basis; therefore, the effect of power factor is inbuilt in the billing structure. In campus different rating LT capacitor banks are installed. The actual KVAr delivery of individual Capacitor banks were measured during the Energy Audit. Results are given in the table.

5.2. RECOMMENDATIONS

5.2.1. Improvement in the Operating Power Factor

The College is being billed on KVAh basis; therefore, the effect of power factor is inbuilt in the billing structure. LT capacitor banks are installed. The minimum, maximum and average PF (Apr 2021 to Mar 2022) as per electricity bill are as follows

Description	Avg. Power Factor
Min. PF	0.886
Max. PF	0.966
Average PF	0.942

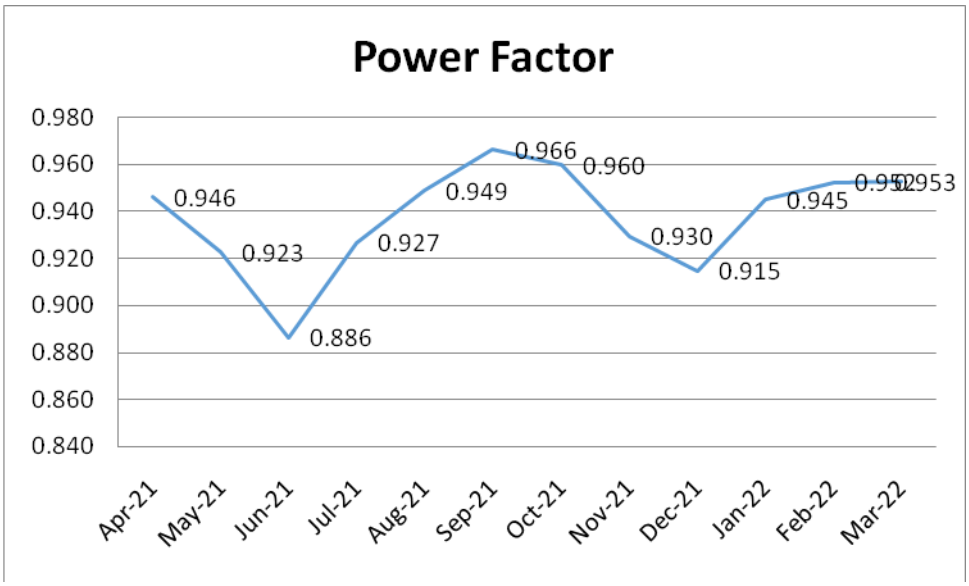
There are two capacitor banks panel are installed in the substation at LT Side. The building is being billed on KVAh basis; therefore, the effect of power factor is inbuilt in the billing structure. Based on the electrical bills (11 KV) for Apr 2021 to Mar 2022, the operating power factor on the main incomer varied from 0.886 to 0.966. However, if we look at the overall average power factor is around 0.942, which is slightly lower side.

It is therefore recommended to replace or repair the existing capacitor bank so that the overall system power factor is maintained at around 0.99 (lag). Improvement in the power factor would subsequently reduce the KVAh consumption.

5.2.2. Actual P.F from Electricity bill

Month	Power Factor
Apr. 2021	0.946
May. 2021	0.923
Jun. 2021	0.886

Month	Power Factor
Jul. 2021	0.927
Aug. 2021	0.949
Sep. 2021	0.966
Oct. 2021	0.960
Nov. 2021	0.930
Dec. 2021	0.915
Jan. 2022	0.945
Feb. 2022	0.952
Mar. 2022	0.953
Avg.	**0.942**



5.2.3. Advantages of Power Factor Improvement

- Reactive components of the network are reduced and so also the total current in the system from the source end.
- I^2R power losses are reduced in the system because of reduction in current.
- Voltage level at the load end is increased.
- kVA loading on the source generators as also on the transformers and line upto the capacitors reduce giving capacity relief. A high-power factor can help in utilities the full capacity of the electrical system.

5.2.4. Cost benefits of Power Factor Improvement

- Reduced kVA (Maximum Demand) charges in electricity bill
- Reduced distribution losses (kWh) within the plant network
- Better voltage at motor terminals and improved performance of motors
- A high-power factor eliminates penalty charges imposed when operating with low power factor

CHAPTER-6 POWER QUALITY

6.1. POWER QUALITY & HARMONICS

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

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

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

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%

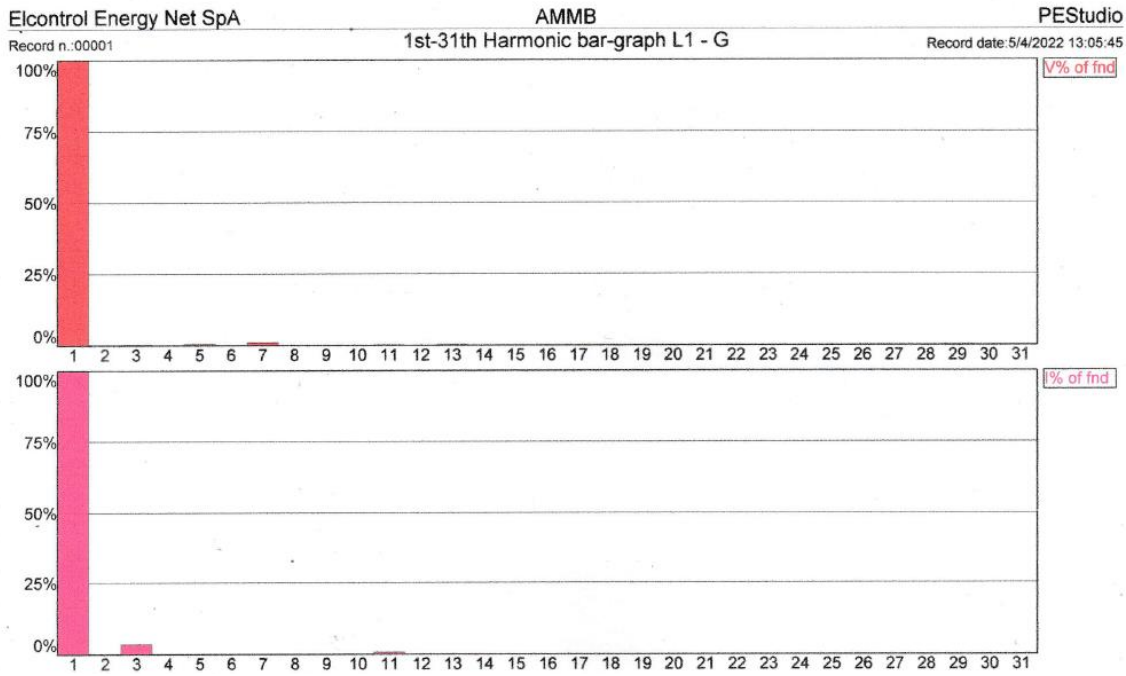
harmonic current limitations

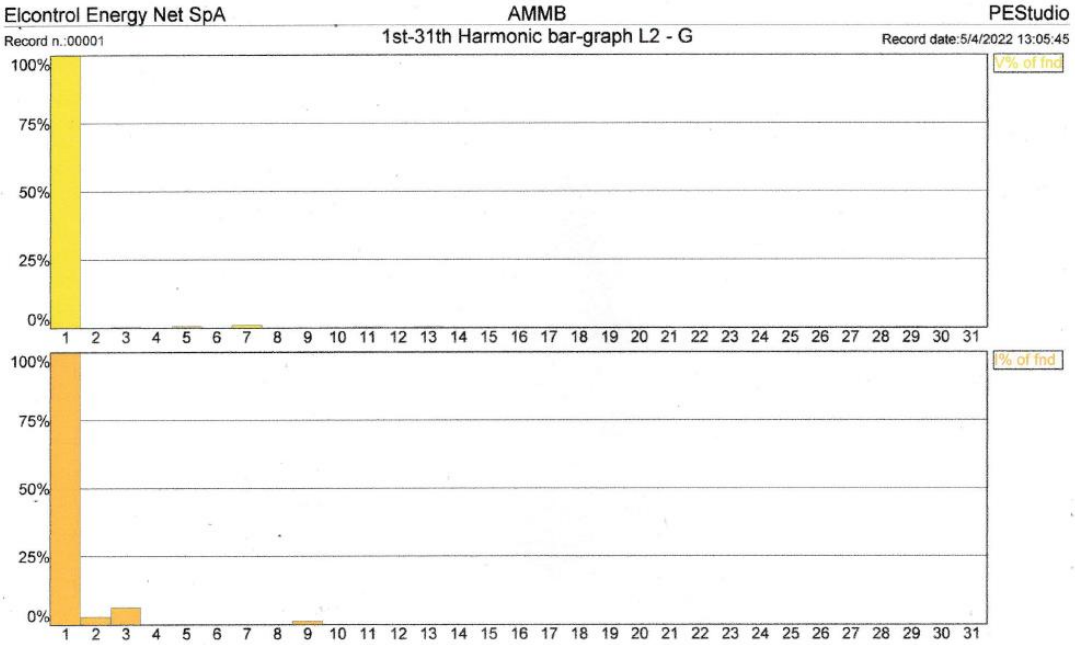
Maximum Harmonic Current Distortion in Percent of IL
120 Volt through 69 KV
Individual Harmonic Order (Odd Harmonics)

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.

Particulars	Transformer (160 KVA)
	Overall (Average)
Voltage Harmonics (V THD)	
"R" Phase	1.07
"Y" Phase	1.10
"B" Phase	1.08
Current Harmonics (A THD)	
"R" Phase	4.26
"Y" Phase	7.26
"B" Phase	4.19


Elcontrol Energy Net SpA
AMMB
PEStudio
Record n.:00001
1st-31th Harmonic bar-graph L1 - G
Record date:5/4/2022 13:05:45
V% of fnd
I% of fnd
100%
75%
50%
25%
0%
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31


Elcontrol Energy Net SpA
AMMB
PEStudio
Record n.:00001
1st-31th Harmonic bar-graph L2 - G
Record date:5/4/2022 13:05:45
V% of fnd
I% of fnd
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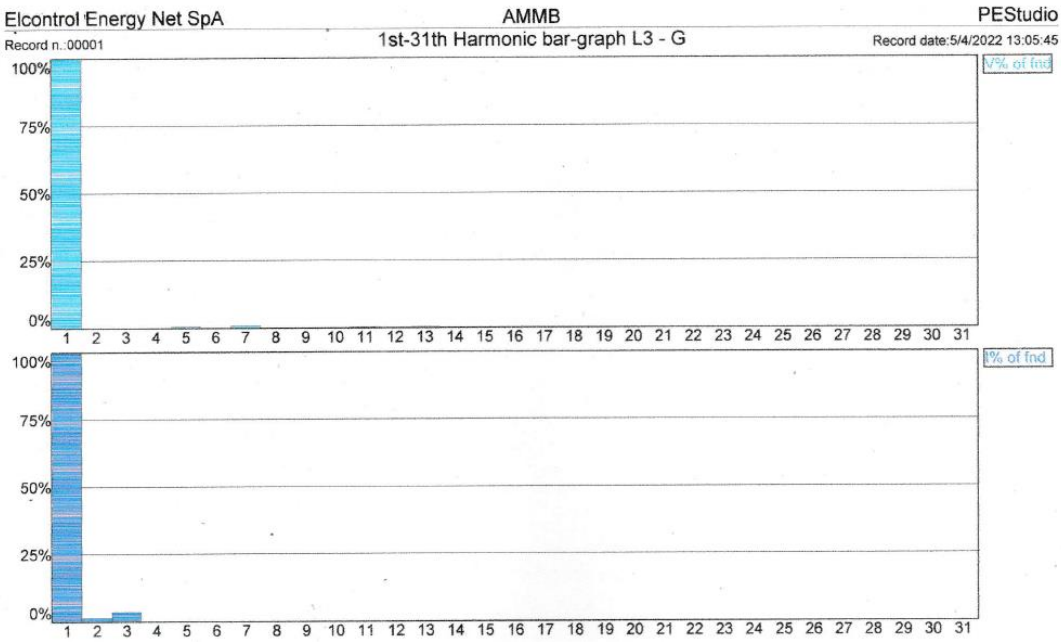
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31



As detailed above, the average voltage harmonics levels were around below 2%, which is under limit. The current harmonics levels were around below 8% in Transformer, which is under limit. **The Overall Voltage harmonics for Transformer are within limit and current harmonics for Transformer is within limit.**

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

Different technologies are available mitigating the harmonics from the system. These include:

Detuned or broadband harmonic filters: these filter banks are tuned to a frequency just below the predominant harmonic frequency. If the predominant harmonic frequency is said, 5th, it is normal practice to tune the filters to 189 Hz, or 3.78th harmonic, in 50 Hz systems.

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

6.2. OBSERVATIONS & SUGGESTIONS:

It is clear from the above data that the voltage & Current harmonics are within limit.

6.3. MAJOR CAUSES OF HARMONICS

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

Electronic Switching Power Converters

- Computers, Uninterruptible power supplies (UPS), Solid-state rectifiers
- Electronic process control equipment, PLC's, etc
- Electronic lighting ballasts, including light dimmer
- Reduced voltage motor controllers

Arcing Devices

- Discharge lighting, e.g. Fluorescent, Sodium and Mercury vapor
- Arc furnaces, Welding equipment, Electrical traction system, Ferromagnetic Devices
- Transformers operating near saturation level
- Magnetic ballasts (Saturated Iron core)
- Induction heating equipment, Chokes, Motors

Appliances

- TV sets, air conditioners, washing machines, microwave ovens
- Fax machines, photocopiers, printers

These devices use power electronics like SCRs, diodes, and thyristors, which are a growing

Percentage of the load in industrial power systems.

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

Blinking of Incandescent Lights	Transformer Saturation
Capacitor Failure	Harmonic Resonance
Circuit Breakers Tripping	Inductive Heating and Overload
Conductor Failure	Inductive Heating
Electronic Equipment Shutting down	Voltage Distortion
Flickering of Fluorescent Lights	Transformer Saturation
Fuses Blowing for No Apparent Reason	Inductive Heating and Overload
Motor Failures (overheating)	Voltage Drop

Neutral Conductor and Terminal Failures	Additive Triplen Currents
Electromagnetic Load Failures	Inductive Heating
Overheating of Metal Enclosures	Inductive Heating
Power Interference on Voice Communication	Harmonic Noise
Transformer Failures	Inductive Heating

CHAPTER-7 AIR-CONDITION SYSTEM

7.1. WINDOW/SPLIT A.C UNITS

Split / Window AC's are installed at several locations in the station building. The details of AC are as follows:

S.No.	Area Name	Make	2 Ton Split AC	2 Ton Window AC	1.5 Ton Split AC	1.5 Ton Window AC	BEE Rating
1	Auditorium	Mitsubishi	6	0	0	0	
2	Auditorium	Carettee	0	0	0	2	
3	Management office	Mitsubishi	2	0	0	0	
4	Management office	LG	2	0	0	0	5
5	Management office	LG	0	0	0	1	
6	College Main Office	Mitsubishi	0	0	2	0	
7	Head clerk office	Voltas	0	0	1	0	
8	Principal office	Hitachi	0	2	0	0	
9	Library	Hitachi	1	0	0	0	1
10	Library	Hitachi	1	0	0	0	2
11	Library	Samsung	0	0	0	1	
12	Fine Arts	Hitachi	0	0	0	1	2
13	Room no7	LG	0	0	0	1	3
14	BCA Cabin and Lab	Hitachi	0	2	0	0	0
15	BCA Cabin and Lab	LG	0	1	0	0	0
16	BCA Cabin and Lab	Samsung	0	1	0	0	0
17	Commerce Lab-1	LG	0	0	0	2	
18	Commerce Lab-1	Mitsubishi	0	0	0	2	
19	Commerce Lab-2	Mitsubishi	0	1	0	0	
20	Commerce staff room	Hitachi	0	0	0	1	
21	ASM lab	Samsung	0	0	0	1	
22	Cabin adjoining room37	LG	0	0	0	1	
23	Room no15	LG	0	0	0	1	1
24	Staff room	Carrier	0	0	0	1	
25	room no 25	LG	0	0	0	2	
26	Hostel warden office	Voltas	0	0	1	0	
27	Canteen	Voltas	0	0	2	0	
28	Room no17	LG	0	0	0	1	

Small Office Cabins	:	0.1 TR m^2
Medium Size Office with 10-30 people occupancy with Central A/c	:	0.06 TR/m^2

Large Multistoried office complex with Central A/c	: 0.04 TR/m^2

There are around 28 nos. window, splits& tower A/Cs are installed in the building complex. Air conditioning system are in operating during the energy audit. Most of the ACs were very old and some A/Cs were new which were BEE star rated., Old inefficient ACs are need toe replaced with Energy efficient 5 Star rated AC. In absence of any specific norms, which can say that a Window AC can be condemned/ scrapped after it has run for a particular number of hours, the best available criterion for scrapping an AC is its energy efficiency ratio. EER will normally take into account all possible aspect, which could lead to inefficiency like ageing, condition of the cooling coils and above all the technological drawbacks (when compared with modern day similar products). It is recommended to replace left-over non-star rates ACs with Star Rated ACs, resulting further saving in energy,

Recommendation/ Observation of AC System

1. Monthly cleaning schedule Air Filters
2. Replace Damage filters.
3. Yearly service
4. Check and clean condenser coils
5. Check and clean air filters
6. Check pipe Insulation

CHAPTER-8 CEILING FAN

8.1. CEILING FAN

There are many fans installed in the campus, but it is observed that there are 23 numbers of ceiling fans which are very old and consuming around 65 to 70 W. Ceiling fan used for Classroom, office, Labs, hostels and other areas.

8.1.1. Study of installed Ceiling Fans and recommendation for improvement

- Ceiling fans installed are very old and are equipped with conventional resistance based regulators
- These fans can be replaced with BEE 5-star rated ceiling fans or latest super-efficient 35 W Fans equipped with BLDC motor

Recommendation

The replacement of existing ceiling fans with energy efficient ceiling fans (35 W) will result approx.55 percent energy savings without compromising on air delivery.

Energy and financial savings

The following parameters and assumptions are considered to estimate the energy savings and financial viability of this option:

Assumptions and Input parameters		
Cost parameters	Unit	Value
Ceiling fans need to be replaced	Number	23
Cost of energy efficient ceiling fan	INR/ piece	2600
Installation Cost	% of capital cost	5
Operating parameters		
Number of running hours	Per day	10
Number of operating days	Per year	240
Average electricity tariff	INR/kWh	9.21
Energy and financial savings		
Power consumption of existing ceiling fan	W/piece	70

Assumptions and Input parameters		
Cost parameters	Unit	Value
Power consumption of EE ceiling fan	W/piece	32
Energy savings	W/piece	38
Annual energy saving	kWh/year	2097.6
Annual monetary saving	INR/year	19318.896
Total investment requirement	INR	59800
Simple payback period	Months	37

An energy saving of 55 percent can be achieved by replacing the existing ceiling fan with Energy Efficient ceiling fan. Implementation of this measure needs an investment of INR 5, 9,800.0 and will have a simple payback period of 37 months.

CHAPTER-9LIGHTING SYSTEMS

9.1. LIGHTING

9.1.1. Systems Installed

Various types of lighting fixtures are installed in different Area as and locations. Premises has already installed energ Efficient LED Lights at most of the places.

Energy Efficient LED Lights offer reduction in the power co color rendering properties and high luminous efficacy. The detail of lighting fixtures is given below:

T5, CFL, LED Light, Street Light, Sodium, MH, etc. Energy Efficient LED Lights offer reduction in the power consumption besides excellent color rendering properties and high luminous efficacy. The detail of lighting fixtures is given below:

9.1.2. Types of Lighting fitting Fixtures

S.I	Fixture	Power Rating (Watt)	Qty (nos.)	Total Watt	Total (kW)
1	FTL	40	99	3960	3.96
2	FTL	36	52	1872	1.87
3	LED Tube Light	20	170	3400	3.40
4	LED Bulb	9	36	324	0.32
5	LED Bulb	14	14	196	0.20
6	LED Flood Light	100	65	6500	6.50
7	LED Round Light on Road	60	15	900	0.90
8	LED Surface Light	14	40	560	0.56

9.1.3. Department Wise Installed Lighting fixtures

AREA NAME	FTL 40W	FTL 36W	LED (FTL) 20W	LED (BULB 14W)	60W BULB
Room No 18	3	0	0	0	0
Room No 19	3	0	0	0	0
Dark Room	0	0	3	0	0
Washroom	0	0	2	0	0
C. Department	1	0	0	1	0
Room 39	3	1	1	0	0

Room40	1	0	0	0	0
Room41	3	2	0	0	0
Room42	4	1	0	0	0
Room43	2	2	1	0	0
Room44	4	1	0	0	0
Room45	2	2	0	0	0
Room46	1	3	0	0	0
Room27	4	0	0	0	0
Room26	3	0	0	0	0
Room25	4	0	0	0	0
Room24	1	0	0	0	0
Room23	2	1	1	0	0
Room22	0	0	2	0	0
Room21	1	1	1	0	0
Room20	1	3	0	0	0
Room5	4	1	4	0	0
BCA Dept.	2	0	0	0	0
Music Dept.	1	1	0	0	0
Fine Art Cabin	0	1	0	0	0
Fine Art Dept.	1	1	2	0	0
Room6	1	1	0	0	0
Dept. Of H.Sci.	1	3	1	0	0
H.Scie. Staff Room	0	2	0	0	0
H.Sci. Lab Room	2	2	0	0	0
Room9	4	0	0	0	0
Room 10a	2	0	0	0	0
Room10	0	4	0	0	0
Room11	1	0	3	0	0
Clerk Deptt.	0	0	2	12	0
Clerk Office Store	1	0	0	0	0
Head Clerk Office	1	2	0	0	0
Principal Office	0	0	4	0	0
Staff Room	0	2	0	0	0
Library Office	0	2	0	0	0
Library	7	5	0	0	0
Room13	1	0	0	0	0
Room14	1	1	1	0	0
Room15	1	1	1	0	0
Room16	1	0	1	0	0
Room17	1	0	0	0	0
Room29	1	0	1	0	0
Room28	4	0	1	1	0

Room12	4	1	0	0	0
Room34	0	0	3	0	0
Room33	0	0	6	0	0
Room 32	0	0	3	0	0
Room31	1	0	6	0	0
Room30	2	2	1	0	0
Physics Cabin	0	2	0	0	0
Room 37	0	1	5	0	0
Room35	0	0	10	0	0
Store	0	0	1	0	0
Hostel Area Room	0	0	61	0	0
H.Common Hall	0	0	6	0	0
Mess Worker	0	0	4	0	0
Store Room	0	0	2	0	0
Dispensary	0	0	1	0	0
Hostel Office	0	0	1	0	0
Canteen	0	0	7	0	0
C1	0	0	3	0	0
C2	0	0	3	0	0
C3	0	0	3	0	0
C4	0	0	3	0	1
C5	1	0	1	0	0
Main Office	2	0	1	0	0
Computer Lab	2	0	6	0	0
Room 1	0	0	1	0	0
Room2	2	0	0	0	0
Library	2	0	0	0	0
Conference Room	2	0	0	0	0
Auditorium	0	0	0	0	16

Different types of Light various watts are installed in campus. As units has already installed LEDs lights, still further saving in light could be achieved by taking following steps.

9.1.4. Time based control or Daylight linked control

Timed-turnoff switches are the least expensive type of automatic lighting control. In some cases, their low cost and ease of installation makes it desirable to use them where more efficient controls would be too expensive. Newer types of timed-turnoff switches are completely electronic and silent. The best choice is an electronic unit that allows the

engineering staff to set a fixed time interval behind the cover plate. This system is recommended for street Lighting application in the building. Photoelectric cells can be used either simply to switch lighting on and off, or for dimming. They may be mounted either externally or internally. It is however important to incorporate time delays into the control system to avoid repeated rapid switching caused, for example, by fast moving clouds. By using an internally mounted photoelectric dimming control system, it is possible to ensure that the sum of daylight and electric lighting always reaches the design level by sensing the total light in the controlled area and adjusting the output of the electric lighting accordingly. If daylight alone is able to meet the design requirements, then the electric lighting can be turned off. The energy saving potential of dimming control is greater than a simple photoelectric switching system

9.1.5. Localized Switching

Localized switching should be used in applications, which contain large spaces. Local switches give individual occupants control over their visual environment and also facilitate energy savings. By using localized switching, it is possible to turn off artificial lighting in specific areas, while still operating it in other areas where it is required, a situation which is impossible if the lighting for an entire space is controlled from a single switch.

9.1.6. illumination & Lux level

To study, analyze and identify energy conservation options in lighting, a study of the unit lighting load was conducted. The purpose of the study was to determine the lighting load and its distribution in various sections of the buildings, determine the quality of illumination provided, and recommend measures to improve illumination and reduce electricity consumption.

A high quality and accurate digital LUX meter was used to measure the illumination level at various sections of the building during working hours. Other performance indicators such as type of lamps used, luminaries, mounting height, physical condition of lamps, use of day lighting, etc. were also noted down

Major reasons for poor illumination levels at selected locations of the building are as follows:

- Poor reflectors/no reflector installed for the tube lights.
- Large height of installed fittings from the working plane.

- Reduction in illumination due to ageing.
- Very old fittings and dust deposition on luminaries

9.1.7. Common and Recommended Light Levels Indoor

The outdoor light level is approximately 10,000 lux on a clear day. In the building, in the area closes to windows, the light level may be reduced to approximately 1,000 lux. In the middle area it may be as low as 25- 50 lux. Additional lighting equipment is often necessary to compensate the low levels.

Earlier it was common with light levels in the range 100 -300 lux for normal activities. Today the light level is more common in the range 500 – 1000 lux – depending on activity. For precision and detailed works, the light level may even approach 1500 – 2000 lux.

The table below is a guidance for recommended light level in different work spaces:

Activity	Illumination (lux, lumen/m^2)
Public areas with dark surroundings	20 -50
Simple orientation for short visits	50 -100
Working areas where visual tasks are only occasionally performed	100 -150
Warehouse, Homes, Theaters, Archives	150
Easy Office work, classes	250
Normal Office work, PC work, Study library, Groceries, show room, laboratories	500
Supermarkets, Mechanical workshops, Office landscapes	750
Normal Drawing work, very detailed mechanical works	1000
Detailed drawing work, very detailed mechanical works	1500 -2000
Performance of visual tasks of low contract and very small size for prolonged periods of time	2000 -5000
Performance of visual tasks of low contract and very small size for prolonged period of time	2000 -5000
Performance of very prolonged and exacting visuals tasks	5000 – 10000
Performance of very special visual tasks of extremely low contract and small size	10000 – 20000

9.2. RECOMMENDATIONS

9.2.1. Optimization of the Main Incomer Voltage on Main Panel

The average voltage on LT side of Transformers was around 220 V. The phase to neutral voltage is around 220V which is good for the lighting load.

As the conventional light was replaced with LED lamps in phase manner the effect of voltage reduction in terms of power saving will be almost negligible. However, reduction and stabilization of voltage will improve the life of lamps.

9.2.2. Replacement of Conventional T12 Tube lights (40 W) with LED (20W) Energy Efficient Lights

Around 99 No's of T12 (40W) Tube light is installed in college campus at different locations. That the conventional lights replaced with Energy Efficient LED Lights. The saving potential calculate 50% light is in operation at a time. The resultant benefit has been worked out as follows:

T12 tube lights (40W) can be replaced with LED based tube lights (18 W) as they provide similar lux levels with further enhanced energy savings.

Recommendation

The replacement of T12(40 W) with LED based tube lights (18 W) will result in close to 50 percent energy savings without compromising on light levels

Energy and Financial Savings

The following parameters and assumptions have been considered while estimating the energy savings and financial viability of this option

Savings in replacements of T12 (40W) with LED tube lights (18W)

Assumptions and Input parameters		
Cost parameters		
Particulars	**Unit**	**Value**
Existing T12 (40W) need to be replaced	Number	99
Cost of LED based tube lights (18 W)	INR/ piece	450
Installation Cost	% of capital cost	5
Operating parameters		
Particulars	Unit	Value
Number of running hours	Per day	10

Number of operating days	Per year	250
Average life of LED based tube lights (18 W)	Hours	50,000
Average electricity tariff	INR/kWh	9.21
Energy and financial savings		
Parameters	**Unit**	**Value**
Power consumption of T12 tube lights	W/piece	40
Power consumption of LED tube lights	W/piece	18
Energy savings	W/piece	22
Annual energy saving	kWh/year	5445.00
Annual monetary saving	INR/year	50148.45
Total investment requirement	INR	44550
Simple payback period	Months	11

An energy saving of 50 percent can be achieved by replacing the existing Tube lights T12 (40W) with LED based tube lights (18W). Implementation of this measure needs an investment of INR 44550 and will have a simple payback period of 11 months.

9.2.3. Replacement of Conventional T8 Tube lights (36W) with LED Tube (20W) Energy Efficient Lights

Around 52 No's of T8 (36W) Tube light is installed in college campus at different locations. That the conventional lights replaced with Energy Efficient LED Lights. The saving potential calculate 50% light is in operation at a time. The resultant benefit has been worked out as follows:

T8 tube lights (36W) can be replaced with LED based tube lights (18 W) as they provide similar lux levels with further enhanced energy savings.

Recommendation

The replacement of T8 (36 W) with LED based tube lights (18 W) will result in close to 50 percent energy savings without compromising on light levels

Energy and Financial Savings

The following parameters and assumptions have been considered while estimating the energy savings and financial viability of this option

Savings in replacements of T8(36W) with LED tube lights (18W)

Assumptions and Input parameters		
Cost parameters		
Particulars	**Unit**	**Value**
Existing T12 (40W) need to be replaced	Number	52
Cost of LED based tube lights (18 W)	INR/ piece	450
Installation Cost	% of capital cost	5
Operating parameters		
Particulars	Unit	Value
Number of running hours	Per day	10
Number of operating days	Per year	250
Average life of LED based tube lights (18 W)	Hours	50,000
Average electricity tariff	INR/kWh	9.21
Energy and financial savings		
Parameters	**Unit**	**Value**
Power consumption of T12 tube lights	W/piece	36
Power consumption of LED tube lights	W/piece	18
Energy savings	W/piece	18
Annual energy saving	kWh/year	2340.00
Annual monetary saving	INR/year	21551.40
Total investment requirement	INR	23400
Simple payback period	Months	13

An energy saving of 50 percent can be achieved by replacing the existing Tube lights T8 (36W) with LED based tube lights (18W). Implementation of this measure needs an investment of INR 23400 and will have a simple payback period of 13 months.

CHAPTER-10 D.G SETS

10.1.D.G. RATED SPECIFICATIONS

The college has installed 01 no. DG Set of 125 KVA for in-house power generation. The DG operates during power failure and testing purpose only. The rated specification of DG is as follows

Name Plate Data	UoM	DG-1
Rated	kVA	125
	kW	50
Voltage	V	415
Amp.	I	260
Phase		3
PF		0.8
RPM		1500
Hz		50

10.2.GENERAL RECOMMENDATIONS FOR ENERGY MEASURED IN DG SETS

1. Ensure steady load condition on the DG set and avoid idle running.
2. Improve air filtration.
3. Ensure fuel oil storage, handling and preparation as per manufacturers' guidelines/oil company data.
4. Calibrate and overhaul fuel injectors and injection pumps regularly as recommended by manufacturer.
5. Ensure compliance with maintenance checklist
6. Ensure steady load conditions, avoiding fluctuations, imbalance in phases, harmonic loads.
7. Carryout regular field trials to monitor DG set performance, and maintenance planning as per requirements.
8. Efficiency of DG Set can be increase by loading 70-80% load
9. The starting current of squirrel cage induction motor is as much as six times the rated current for a few seconds with direct-on-line starters. In practice, it has been found that the starting current value should not exceed 200% of the full load capacity of the alternator. The voltage and frequency

throughout the motor starting interval recovers and reaches rated values usually much before the motor has picked up full speed

10. It is always recommended to have the load as much balanced as possible, since the unbalanced loads can cause heating of the alternator, which may result in unbalanced output voltage. The maximum unbalanced load between phases should not exceed 10% of the capacity of the generating sets.

11. The electricity rules clearly specify that two independent earths to the body and neutral should be provided to give adequate protection to the equipment in case of an earth fault and to drain away any leakage of potential from the equipment to the earth.

CHAPTER-11 SOLAR PHOTOVOLTAIC CELL

11.1. INSTALLATION OF SOLAR PHOTOVOLTAIC CELL (SPV)

The college has lot of spare space at roof top where solar PV panels could be installed. **Solar photovoltaic technologies** convert solar energy into useful energy forms by directly absorbing solar photons—particles of light that act as individual units of energy—and converting part of the energy to electricity.

The units or kWh output of a solar panel will depend on the panel efficiency and availability of sunlight in a location. The factor that defines this output is called CUF (or Capacity Utility Factor). For India, it is typically taken as 19% and the calculation of units goes as:

The units or kWh output of a solar panel will depend on the panel efficiency and availability of sunlight in a location. The factor that defines this output is called CUF (or Capacity Utility Factor). For India, it is typically taken as 19% and the calculation of units goes as

Units Generated Annually (in kWh) = System Size in Kw * CUF * 365 * 24.

So typically, a 1 kW capacity solar system will generate 1600-1700 kWh of electricity per year. This can provide electricity for 25 years.

Around 50 kWp of solar PV based power can be installed in the areas as recommended above. There are various options for capital Investment.

Inputs	Unit	Value
Capacity of Plant	kWp	50
CUF/PLF	%	19%
1kWp solar Generation (Per day)	kWh	4.6
Capacity of Plant	kWp	50
Cost (Per Kw)	₹	50000

Inputs	Unit	Value
Electricity Tariff	₹ /Unit or kWh	9.21
Average Yearly generation	kWh (Units)	69000
Total Generation in 25 Years	kWh (Units)	1725000
Average Monthly Savings	₹	52957.5
Average Annually Savings	₹	635490
Total Savings over 25 years	₹	15887250
Total Capital Investment	₹	2500000
Simple Payback	**Months**	**47**

It is recommended to install a Solar Photovoltaic Cell (50 KW) in the premises. The resultant benefits in terms of energy savings workout to Rs. 6.35 Lacs per annum with an estimated investment of Rs. 25 Lacs and simple payback period of 47 months.

CHAPTER-12 OTHER POSSIBLE AREAS FOR ENERGY SAVINGS

12.1. DAY LIGHT HARVESTING

Although there is no simpler way to reduce the amount of energy consumed by lighting system than to manually turn OFF whenever not needed, this is not done as often as it could be. In response, automatic lighting control strategies can be adopted:

- Scheduling Control: Use a time scheduling device to control lighting systems according to predetermined schedules

A central processor with relays is usually capable of controlling several output channels, each of which may be assigned to one or more lighting circuits. Overrides can be provided to accommodate individuals who use the space during scheduled off hours.

- Day lighting: Control lights in response to the presence of daylight illumination in the space
- Lumen Maintenance: gradually adjust the electric light levels over time to correspond with the depreciation of light output from ageing lamps.
- Occupancy Sensing: Control light in response to the presence or absence of people in the space

These are automatic scheduling devices that detect motion and turn ON / OFF the lights accordingly. Most of these devices can be calibrated for sensitivity and for the length of time delay between the last detected occupancy and extinguishing of light. Occupancy sensors typically consist of a motion detector, a control unit and a relay.

Occupancy-linked control can be achieved using infrared, acoustic, ultrasonic or microwave sensors, which detect either movement or noise in room spaces. These sensors switch lighting on when occupancy is detected, and off again after a set time period, when no occupancy movement detected. They are designed to override manual switches and to prevent a situation where lighting is left on in unoccupied spaces. With this type of system it is important to incorporate a built-in time delay, since occupants often remain still or quiet for short periods and do not appreciate being plunged into darkness if not constantly moving around.

Daylight Harvesting is the term used in sustainable architecture and the building controls for a control system that reduces the use of artificial lighting with electric lamps in building interiors when natural daylight is available, in order to reduce energy consumption. The concept of daylight harvesting is simple. Digital photo sensors detect daylight levels and automatically adjust the output level of electric lighting to create a balance. The goal is energy savings.

Until now there have been barriers to widespread acceptance of daylight harvesting. This is due in part to complications associated with commissioning. With the availability of integrated micro panel lighting controls, with 2 or 4 switching outputs daylight harvesting is feasible. The features normally include unique set points, delays and adjustment curves for every relay.

12.2. Timed Based Control or Daylight Linked Control

Timed-turnoff switches are the least expensive type of automatic lighting control. In some cases, their low cost and ease of installation makes it desirable to use them where more efficient controls would be too expensive. Newer types of timed-turnoff switches are completely electronic and silent. The best choice is an electronic unit that allows the engineering staff to set a fixed time interval behind the cover plate. This system is recommended for street Lighting application in the building. Photoelectric cells can be used either simply to switch lighting on and off, or for dimming. They may be mounted either externally or internally. It is however important to incorporate time delays into the control system to avoid repeated rapid switching caused, for example, by fast moving clouds. By using an internally mounted photoelectric dimming control system, it is possible to ensure that the sum of daylight and electric lighting always reaches the design level by sensing the total light in the controlled area and adjusting the output of the electric lighting accordingly. If daylight alone is able to meet the design requirements, then the electric lighting can be turned off. The energy saving potential of dimming control is greater than a simple photoelectric switching system.

12.3. Localized Switching

Localized switching should be used in applications, which contain large spaces. Local switches give individual occupants control over their visual environment and also facilitate energy savings. By using localized switching it is possible to turn off artificial lighting in specific areas, while still operating it in other areas where it is required, a situation which is impossible if the lighting for an entire space is controlled from a single switch.

CHAPTER-13GENERAL TIPS FOR ENERGY CONSERVATION IN DIFFERENT UTILITIES SYSTEMS

13.1.ELECTRICITY

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

13.2.MOTORS

- Properly size to the load for optimum efficiency.
- (High efficiency motors offer of 4 - 5% higher efficiency than standard motors)
- Check alignment.
- Provide proper ventilation
- (For every 10°C increase in motor operating temperature over recommended peak, the motor life is estimated to be halved)
- Check for under-voltage and over-voltage conditions.
- Balance the three-phase power supply.
- Demand efficiency restoration after motor rewinding.

13.3.DRIVES

- Use variable-speed drives for large variable loads.
- Use high-efficiency gear sets.
- Use precision alignment.
- Check belt tension regularly.
- Eliminate variable-pitch pulleys.
- Use flat belts as alternatives to v-belts.
- Use synthetic lubricants for large gearboxes.
- Eliminate eddy current couplings.
- Shut them off when not needed.

13.4.FANS

- Use smooth, well-rounded air inlet cones for fan air intakes.
- Avoid poor flow distribution at the fan inlet.
- Minimize fan inlet and outlet obstructions.
- Clean screens, filters, and fan blades regularly.
- Use aerofoil-shaped fan blades.
- Minimize fan speed.
- Use low-slip or flat belts.
- Check belt tension regularly.
- Eliminate variable pitch pulleys.
- Use variable speed drives for large variable fan loads.

- Use energy-efficient motors for continuous or near-continuous operation
- Eliminate leaks in ductwork.
- Minimize bends in ductwork
- Turn fans off when not needed.

13.5. BLOWERS

- Use smooth, well-rounded air inlet ducts or cones for air intakes.
- Minimize blower inlet and outlet obstructions.
- Clean screens and filters regularly.
- Minimize blower speed.
- Use low-slip or no-slip belts.
- Check belt tension regularly.
- Eliminate variable pitch pulleys.
- Use variable speed drives for large variable blower loads.
- Use energy-efficient motors for continuous or near-continuous operation.
- Eliminate ductwork leaks.
- Turn blowers off when they are not needed.

13.6. PUMPS

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

13.7. LIGHTING

- Reduce excessive illumination levels to standard levels using switching, delamping, etc. (Know the electrical effects before doing delamping.)
- Aggressively control lighting with clock timers, delay timers, photocells, and/or occupancy sensors.
- Install efficient alternatives to incandescent lighting, mercury vapor lighting, etc. Efficiency (lumens/watt) of various technologies range from best to worst approximately as follows: low pressure sodium, high pressure sodium, metal halide, fluorescent, mercury vapor, incandescent.
- Select ballasts and lamps carefully with high power factor and long-term efficiency in mind.
- Upgrade obsolete fluorescent systems to Compact fluorescents and electronic ballasts
- Consider lowering the fixtures to enable using less of them.
- Consider daylighting, skylights, etc.

- Consider painting the walls a lighter color and using less lighting fixtures or lower wattages.
- Use task lighting and reduce background illumination.
- Re-evaluate exterior lighting strategy, type, and control. Control it aggressively.
- Change exit signs from incandescent to LED.

13.8.DG SETS

- Optimize loading
- Use waste heat to generate steam/hot water /power an absorption chiller or preheat process or utility feeds.
- Use jacket and head cooling water for process needs
- Clean air filters regularly
- Insulate exhaust pipes to reduce DG set room temperatures
- Use cheaper heavy fuel oil for capacities more than 1MW

13.9.BUILDINGS

- Seal exterior cracks/openings/gaps with caulk, gasketing, weatherstripping, etc.
- Consider new thermal doors, thermal windows, roofing insulation, etc.
- Install windbreaks near exterior doors.
- Replace single-pane glass with insulating glass.
- Consider covering some window and skylight areas with insulated wall panels inside the building.
- If visibility is not required but light is required, consider replacing exterior windows with insulated glass block.
- Consider tinted glass, reflective glass, coatings, awnings, overhangs, draperies, blinds, and shades for sunlit exterior windows.
- Use landscaping to advantage.
- Add vestibules or revolving doors to primary exterior personnel doors.
- Consider automatic doors, air curtains, strip doors, etc. at high-traffic passages between conditioned and non-conditioned spaces. Use self-closing doors if possible.
- Use intermediate doors in stairways and vertical passages to minimize building stack effect.
- Use dock seals at shipping and receiving doors.
- Bring cleaning personnel in during the working day or as soon after as possible to minimize lighting and HVAC costs.

13.10. WATER & WASTEWATER

- Recycle water, particularly for uses with less-critical quality requirements.
- Recycle water, especially if sewer costs are based on water consumption.
- Balance closed systems to minimize flows and reduce pump power requirements.
- Eliminate once-through cooling with water.
- Use the least expensive type of water that will satisfy the requirement.
- Fix water leaks.
- Test for underground water leaks. (It's easy to do over a holiday shutdown.)
- Check water overflow pipes for proper operating level.

- Automate blowdown to minimize it.
- Provide proper tools for wash down -- especially self-closing nozzles.
- Install efficient irrigation.
- Reduce flows at water sampling stations.
- Eliminate continuous overflow at water tanks.
- Promptly repair leaking toilets and faucets.
- Use water restrictors on faucets, showers, etc.
- Use self-closing type faucets in restrooms.
- Use the lowest possible hot water temperature.
- Do not use a heating system hot water boiler to provide service hot water during the cooling season -- install a smaller, more-efficient system for the cooling season service hot water.
- If water must be heated electrically, consider accumulation in a large insulated storage tank to minimize heating at on-peak electric rates.
- Use multiple, distributed, small water heaters to minimize thermal losses in large piping systems.
- Use freeze protection valves rather than manual bleeding of lines.
- Consider leased and mobile water treatment systems, especially for deionized water.
- Seal sumps to prevent seepage inward from necessitating extra sump pump operation.
- Install pretreatment to reduce TOC and BOD surcharges.
- Verify the water meter readings. (You'd be amazed how long a meter reading can be estimated after the meter breaks or the meter pit fills with water!)
- Verify the sewer flows if the sewer bills are based on them

13.11. MISCELLANEOUS

- Meter any unmetered utilities. Know what normal efficient use is. Track down causes of deviations.
- Shut down spare, idling, or unneeded equipment.
- Make sure that all of the utilities to redundant areas are turned off -- including utilities like compressed air and cooling water.
- Install automatic control to efficiently coordinate multiple air compressors, chillers, cooling tower cells, boilers, etc.
- Renegotiate utilities contracts to reflect current loads and variations.
- Consider buying utilities from neighbors, particularly to handle peaks.
- Leased space often has low-bid inefficient equipment. Consider upgrades if your lease will continue for several more years.
- Adjust fluid temperatures within acceptable limits to minimize undesirable heat transfer in long pipelines.
- Minimize use of flow bypasses and minimize bypass flow rates.
- Provide restriction orifices in purges (nitrogen, steam, etc.).
- Eliminate unnecessary flow measurement orifices.
- Consider alternatives to high-pressure drops across valves.
- Turn off winter heat tracing that is on in summer.

Annexure-1

Certification

This part shall indicate certification by Accredited Energy Auditor stating that:

(i) The data collection has been carried out diligently and truthfully;

(ii) All data monitoring devices are in good working condition and have been calibrated or certified by approved agencies authorized and no tempering of such devices has occurred

(iii) All reasonable professional skill, case and diligence had been taken in preparing the energy audit report and the contents thereof are a true representation of the facts;

(iv) Adequate training provided to personnel involved in daily operations after implementation of recommendations; and

(v) The energy audit has been carried out in accordance with the Bureau of Energy Efficiency (Manner and Intervals of Time for the Conduct of Energy Audit) Regulations, 2010.

(Dr. P.P. Mittal)

Accredited Energy Auditor AEA-011

Annexure-2

Certificate of Accreditation

ENERGY IS LIFE
BEE
CONSERVE IT

BUREAU OF ENERGY EFFICIENCY

Examination Registration No. : EA-6851

Accreditation Registration No.: AEA-0011

Certificate of Accreditation

This is to certify that Mr./Ms. Prem Prakash Mittal having its trade/registered office at Delhi has been given accreditation as accredited energy auditor. The certificate shall be effective from 26th day of February 2013

The certificate is subject to the provisions of the Bureau of Energy Efficiency (Qualifications for Accredited Energy Auditors and Maintenance of their List) Regulations, 2010.

This certificate shall be valid until it is cancelled under regulation 9 of the Bureau of Energy Efficiency (Qualifications for Accredited Energy Auditors and Maintenance of their List) Regulations, 2010

On cancellation, the certificate of accreditation shall be surrendered to the Bureau within fifteen days from the date of receipt of order of cancellation.

Your name has been entered at AEA No. 0011 in the register of list of accredited energy auditors. Your name shall be liable to be struck out on the grounds specified in regulation 8 of the Bureau of Energy Efficiency (Qualifications for Accredited Energy Auditors and Maintenance of their List) Regulations, 2010.

Given under the seal of the Bureau of Energy Efficiency, Ministry of Power, this 26th day of May 2014

Secretary,
Bureau of Energy Efficiency
New Delhi

Annexure-3

Recommended Lux Levels for different locations

➢ **Entrance**	
Entrance halls, lobbies, waiting rooms	= 200
Enquiry Desks	= 500
Gate Houses	= 200
➢ **Circulation Areas**	
Lifts	= 100
Corridors, passageways, stairs	= 100
Escalators, revelators	= 150
➢ **Medicine & First Aid Centers**	
Consulting Rooms, Treatment Rooms	= 500
Rest Rooms	= 150
Medical Stores	= 150
➢ **Staff Rooms**	
Offices	= 300
Changing, locker and cleaners room, Cloak rooms, lavatories	= 100
Rest Rooms	= 150
➢ **Staff Restaurants**	
Canteens, Cafeterias, dining rooms, mess rooms	= 200
Survey, vegetable preparation, washing up area	= 300
Food preparation & cooking	= 500
Food stores, cellars	= 150
➢ **Communication**	
Switch board rooms	= 300
Telephone, apparatus rooms	= 150
Telex room, post rooms	= 500
Reprographic room	= 300

Annexure-4

Transformers Standard Losses in watts

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

19th December, 2016

Important Instructions to all Distribution Transformer manufacturers and permittee:

This is with reference to the amendment notification, S.O. No. 4062 (E) for Distribution Transformer dated 16th December, 2016. Amendments in the star rating programs as follows:

Table 2 (Effective from 1st January, 2017 onwards)

Standard Losses in watts up to 11 KV Class (For ratings below 200 kVA & for 200 kVA)										
Rating (kVA)	Star 1		Star 2		Star 3		Star 4		Star 5	
	50 Per cent. Load	100 Per cent. Load	50 Per cent. Load	100 Per cent. Load	50 Per cent. Load	100 Per cent. Load	50 Per cent. Load	100 Per cent. Load	50 Per cent. Load	100 Per cent. Load
16	135	440	120	400	108	364	97	331	87	301
25	190	635	175	595	158	541	142	493	128	448
63	340	1140	300	1050	270	956	243	870	219	791
100	475	1650	435	1500	392	1365	352	1242	317	1130
160	670	1950	570	1700	513	1547	462	1408	416	1281
200	780	2300	670	2100	603	1911	543	1739	488	1582

Table 3 (Effective from 1st January, 2017 onwards)

Standard losses in watts up to 11 KV Class (For ratings above 200 kVA)											
Rating (kVA)	Per Cent. Impedance	Star 1		Star 2		Star 3		Star 4		Star 5	
		50 Per Cent. Load	100 Per Cent. Load	50 Per Cent. Load	100 Per Cent. Load	50 Per Cent. Load	100 Per Cent. Load	50 Per Cent. Load	100 Per Cent. Load	50 Per Cent. Load	100 Per Cent. Load
250	4.5	980	2930	920	2700	864	2488	811	2293	761	2113
315	4.5	1025	3100	955	2750	890	2440	829	2164	772	1920
400	4.5	1225	3450	1150	3330	1080	3214	1013	3102	951	2994
500	4.5	1510	4300	1430	4100	1354	3909	1282	3727	1215	3554

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

चौथा तल, सेवा भवन, आर० के० पुरम, नई दिल्ली-110 066 वेबसाईट/Website : www.beeindia.in
4th Floor, Sewa Bhawan, R.K. Puram, New Delhi-110 066 टेली/Tel.: 26179699 (5 Lines) फैक्स/Fax : 91 (11) 26178352

630	4.5	1860	5300	1745	4850	1637	4438	1536	4061	1441	3717
1000	5	2790	7700	2620	7000	2460	6364	2310	5785	2170	5259
1250	5	3300	9200	3220	8400	3142	7670	3066	7003	2991	6394
1600	6.25	4200	11800	3970	11300	3753	10821	3547	10363	3353	9924
2000	6.25	5050	15000	4790	14100	4543	13254	4309	12459	4088	11711
2500	6.25	6150	18500	5900	17500	5660	16554	5430	15659	5209	14813"

Manufacturers/permittee should consider the following for getting star rating approvals:

1. Manufacturers/Permittee are allowed to renew their existing models as per table 2 w.e.f 22nd December, 2016.
2. All the existing models will be valid till 31st December 2016 and after this, these models will be made expired automatically by BEE.
3. Manufacturers/Permittee are allowed to register their fresh models as per table 2 & table 3 w.e.f 22nd December, 2016.

Read the following instructions carefully for those manufacturers who wish to continue the existing model.

A. Renewal of Existing Model:

If the existing model is continued to comply with revised star level, then the following shall apply:

1. A renewal option (i.e., from table 1 to table 2) will be available on manufacturers/permittee's web portal from 22nd December, 2016. If any of the permittee willing to continue their existing model, a declaration on company letter head (with stamp & sign of authorised signatory) needs to be submitted to the Bureau Along with Renewal fee of **five hundred rupees**. (Renewal fee may be paid through Online Banking or Demand Draft).
2. **After verification, approval letter will be send to permittee for the renewed model with revised star level and it will directly appear in Search & Compare page of BEE star label website (http://www.beestarlabel.com/Home/Searchcompare).**

Cases in which continuation is applicable:

Case 1: A 100 KVA distribution transformer with Brand name.....DEF.....and model no. ...ABC/x/y/z..... is registered with BEE as per existing table 1 (valid up to 31st December,2016) and its Total Losses (at 50% loading- 435 W & at 100% loading- 1500 W) i.e. **5 star as per existing table.**

So after revision, for the same brand & model with the Total Losses (at 50% loading- 435 W & at 100% loading- 1500 W) i.e. **2 star as per revised table** (Table 2).

Case 2: A 100 KVA distribution transformer with Brand name.....DEF.....and model no. ...ABC/x/y/z..... is registered with BEE as per existing table 1 (valid up to 31st December,2016) and its Total Losses (at 50% loading- 317 W & at 100% loading- 1130 W) i.e. **5 star as per existing table.**

So after revision, for the same brand & model with the Total Losses (at 50% loading- 317 W & at 100% loading- 1130 W) i.e. **5 star as per revised table** (Table 2).

In both the cases, old test reports would be applicable and BEE would consider the old test report for granting renewal approvals. Declaration is applicable even for *Case 2,* if there is no technical modification in order to comply with revised energy performance standards (i.e. table 2).

B. How to apply:

Renewal: All these expired models will appear in manufacturer's portal and in order to renew the model, the following link (marked in red colour) needs to be clicked. Where renewal form will be generated. The link (marked in red colour) would directly appear in manufacturer's portal w.e.f 22nd December, 2016.

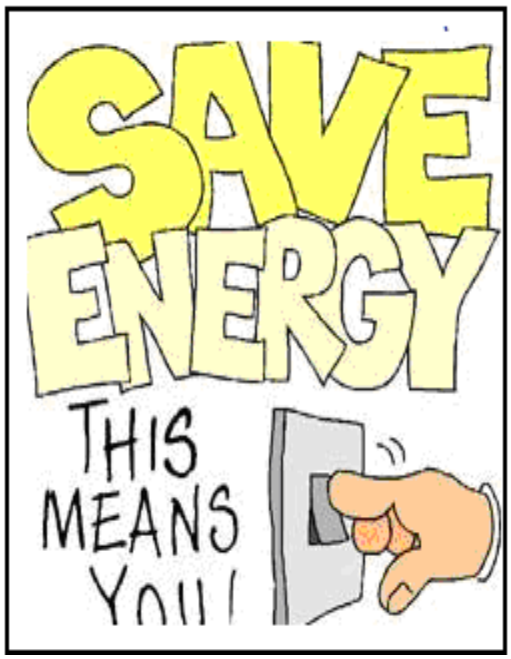
Renewal

Saurabh Diddi
(Energy Economist)
19th December, 2016

For further queries write to: helpdesk@beenet.in , mkhiriya@beenet.in

Annexure-5


Switch me off
when you leave!
computers
fans
lights
air-conditioning
Close doors and windows when the air-conditioning is on.
Do not overcool an air-conditioned room. Set the temp between 24°C and 25°C.
television
other appliances that consume electricity


SAVE
ENERGY
THIS
MEANS
You!


बिजली की बचत
आपकी बचत
आसान है तरीका, अधिक है फायदा
बिजली बचाइये बिजली पाइये
ऊर्जा कार्यकुशलता ब्यूरो
ENERGY IS LIFE
CONSERVE IT

ISO 21001:2018

Scan this code with your smart phone to verify the certificate

Certificate of Registration

This is to certify that the Management System of

ADARSH MAHILA MAHAVIDYALAYA

HANSI GATE, BHIWANI, HARYANA - 127021, INDIA

has been independently assessed by PQC and found to comply with the requirements of

ISO 21001:2018

(Educational Organizations Management System)

Certification Scope:

PROVIDING ECO - FRIENDLY QUALITATIVE INFRASTRUCTURE, ACADEMIC & CO- CURRICULAR FACILITIES AND DELIVERY OF EDUCATION TO THE YOUNG MINDS AT GRADUATE AND POST GRADUATE LEVEL.

Certification Calendar:

Client Id: 8979

Certificate No: INEO/HR-10147/0422

Registered on: 25.04.2022

Issued on: 25.04.2022

Expires on: 24.04.2025

1st Surveillance on/before: 24.04.2023

2nd Surveillance on/before: 24.04.2024

SCOTLAND Accredited Services Limited
ACCREDITED
Management System Certification

CERTIFIED ISO 21001:2018 CERTIFIED

PQC CERTIFIED SASL

Authorized Signatory

PARAMOUNT QUALITY CERTIFICATIONS

27, Old Gloucester Street, London, WC1N 3AX, United Kingdom. Email:- info@pqcert.in

Validity of this certificate is subject to successful completion of surveillance audit on or before of due date.
(In case surveillance audit is not allowed to be conducted, this certificate shall be suspended/withdrawal.)
Certification Verification: Please check this validity of the certificate at:- https://pqcert.in/certified-clients/ or www.pqcert.in at Certified Client

www.pqcert.in

PQC SCT

Name of the Organization	Adarsh Mahila Mahavidyalaya	
Address	Hansi Gate, Bhiwani, Haryana-127021, India	
Site Address (If any)	--	
No. of Employees	Teaching Staff :13; Adoc /Contractual 64; Non-Teaching Staff: 43	
No. of Shift	01-General	
E mail id	principalammb@gmail.com	
Contact Person	Dr. Ms. Rachna Arora (Principal)	
Telephone/Fax	+91-94164 39355	
Scope	"PROVIDING THE EXCELLENCE THROUGH CREATION, DISSEMINATIONS AND APPLICATION OF KNOWLEDGE IN CONSONANCE WITH SOCIAL NEEDS FOR A BRIGHTER TOMORROW TO THE LEARNERS OF POSTGRADUATE AND UNDERGRADUATE LEVEL ALONG WITH BASIC EDUCATION".	
Exclusion	--	
Audit Team	Lead Assessor: Ram Kumar Singh Auditor: NA Technical Expert: NA	No of Man-days: 01
Starting Date of Audit	01.07.2022	
End Date of Audit	01.07.2022	
Brief about the organization	Established in 1970 and declared 'Best College 'by the government of Haryana, Adarsh Mahila Mahavidyalaya, Bhiwani has carved a prime niche for itself on the educational map of Haryana. The college has a distinctive proud history of being established by social reformers who were also dedicated to the cause of women education. It has rendered yeoman 's service to the cause of women upliftment and education in the area by imparting quality education to the girls for half a century now. The institution was established and nomenclature with the noble and elevating vision to create 'adarsh' i.e ideal young women who combine the best of Old and New the traditional 'sanskaras' and a modern outlook ;and the institute has lived up to its name. The multifarious achievements of the college and its excellent performance in the fields of Academic , Co-curricular activities and Sports compel admiration. Affiliated to C.B.L.U Bhiwani, providing education to around 3000 students, the college offers multi faculty U.G courses in Arts, Commerce and Science; PG courses and also professional courses like BCA, ASM, B.COM, BSC with Computers. The college campus combines the Greenery of Nature and Elegance of Infrastructure. It provides very congenial and conducive atmosphere -ideal for all-round growth of the students. Sports grounds, open gym, large lawns, auditorium, hostel facilities, equipped library, pleasant canteen everything blends to create a beautiful ambience a platform for full growth of one's potentials and	

	capabilities. The dedicated and highly qualified faculty and the enterprising college management consistently continue to put in their best efforts to take the college to still greater heights of all-round excellence and glory **From the Principal Desk: -** **"As you all know Adarsh Mahila Mahavidyalaya is a prestigious educational institution for girls in Bhiwani. The goal of this institute is to impart quality education to the students. In addition to this, we also emphasize on co-curricular activities like music, art, dance, yoga etc. for holistic development of the students. Moral values are also being inculcated in the students by highly qualified and dedicated teaching staff of the College. I believe that our youth is the building block of the nation. So, I appeal to the students to respect their elders, study sincerely and work hard in all the fields so as to achieve their professional goals and to become responsible citizens of the country.**
Purpose of Audit	1) To verify the implementation of the Green Audit Management System as per the Standards Requirement, 2) Verification of Documented information of each process for the effective implementation. 3) Meeting all Regulatory Compliances.

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

Opening meeting and audit proceedings:

The audit started as per mutually agreed Audit plan. Principal of the college participated in the opening meeting and then left due to some prior engagements. The IQAC coordinators remained involved with the audit team throughout the audit activities. After the opening meeting, the audit was started by taking a round of the different process areas of the organization.

Comments on Internal audit:

Internal audit was conducted by consultant Mr. Ankur Singla & internally by Ms. Meghna. The organization has till now conducted only one Internal audit where in 1 NC was identified. Closure of NC verified. The effectiveness of the internal audit found satisfactory. This is a small organization with simple functions.

Comments on MRM:

The Green Audit requires that Internal audit and MRM should be organized once in every 6 months and the MRM should be organized within one month of Internal audit. The organization has so far organized only one MRM. All prescribed agenda points were reviewed, Improvement targets regarding organizational Environmental objectives was finalized during the MRM. MRM found effective.

Closing meeting:

The one man day stage-2 audit was conducted amicably, the staff was found transparent and open to learn. Following is the Summary.

ATTENDENCE SHEET:

NAME OF PERSON	DESIGNATION
Ms. Rachana Arora	Principal
Ms. Neelam Gupta	Associate Prof. – Physics
Dr. Amita Gaba	Associate Prof. – Commerce
Ms. Rinku Aggarwal	Assistant Prof. – English
Dr. Suman	Assistant Prof. – Sanskrit
Dr. Nisha Rani	Assistant Prof. – Physics
Dr. Manjeet Maan	Associate Prof. – English
Dr. Indu Sharma	Associate Prof. - Hindi
Dr. Aparna Batra	Associate Prof. - English

ADARSH MAHILA MAHAVIDYALAYA, BHIWANI

Green Audit report

July 2022

REVOLUTIONARY CONSULTANTS

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We help you grow…!

1. Introduction

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

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

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

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

Environmental auditing is used to

- Investigate
- Understand and
- Identify

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

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

Green audit for the university has examined the following systems

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

1.1 About the College:

It is NAAC accredited B+ Grade College affiliated from C.B.L.U, Bhiwani is established in 1970. And spread over 42567.87 Sq. m. (84 Canals 3 Maria); Building Area 11000 Sq. ft. & Green Area 7063 Sq. ft. It is located in Hansi Gate, Bhiwani in Haryana Surrounded by Clean and Green area.

There are number of Faculty covering the department of Computer Science, Mathematics & Commerce, Science, Home Science, Psychology, Fine Arts, Physical Education and sports & Non-Medical Subjects.

In addition, they have post graduate courses in English, Mathematics & Economics. Total strength of students is 3000 students, 13 teaching & Adoc/Contractual 64 & 43 non-teaching. Most of the Professors are Doctorate in their disciplines. College has total well equipped labs including Botany Lab-01, Zoology Lab-01, Chemistry Lab-01, Home science Lab-01, Physics Lab-02, Music & Instrument -02, BCA-01, B. Sc Computer Science-01 & B.com-02.

College Buildings and other allied Facilities: -

Sr. No.	Particulars	Space
1	Administration & Management Department	Spacious
2	Arts Department	Spacious
3	Commerce Department	Spacious and Creative
4	Chemistry & Physics Department	Spacious
5	Zoology & Botany Department	Spacious and Creative
6	PG Courses Department	Spacious and Creative
7	Music Department	Spacious and Creative
8	Library & closed sports facility	Spacious
9	Toilet Blocks	Spacious
10	Parking Area	Spacious

11	Canteen	Spacious
12	Internal connecting Roads	Well maintained
13	Gardens	Spacious and Creative

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

Vision: Strive for Perfection and Settle for Excellence.

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

Areas Assessed:

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

Assessment of building infrastructure

Sr. No.	Particulars	Space	Ventilation	Natural Light	Cleanliness	Remark
1	Administration and Arts, Commerce dept. building	Spacious	Good	Poor	Good	Comparatively poor cross ventilation at individual teacher's room

2	Physics Dept.	Spacious	Good	Good	Good	
3	Math Dept.	Spacious	Good	Good	Good	
4	Fine Arts & Music (Vocal & Instrumental)	Spacious	Good	Good	Good	
5	Library & sports facility	Library Less Spacious	Good	Good	Good	
6	Canteen	Spacious	Good	Good	Good	
7	Toilet Blocks	Spacious	Good	Poor	Good	
8	Parking Area	Spacious	Good	Good	Good	
9	Staircases	Spacious	Good	Good	Good	
10	Hostel Rooms	Spacious	Good	Poor	Good	

Reference attached images in Annexure-I

2. Objectives of the Green Audit Study:

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

3. Methodology:

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

ASSESSMENT COMMENTARY & ASSESSMENT OBJECTIVE EVIDENCE

Executive Summary: Satisfactory

This is the green & environmental audit of the College under NAAC affiliation. The College is doing their bid towards green projects, energy saving, environmental protection and environmental awareness at local and global front.

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

4. Observations and Recommendations

4.1 Waste Minimization and Re-cycling

A. Waste generation & Management

1. Waste water Generation and Treatment

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

B. Solid Waste

Sr. No.	Waste category	Method of disposal
1	Dry Waste	Disposed off in bins and takenaway by MC.
2	Wet waste and Garden waste	Behind hostel; fertilizer has been made for the plants from the wet and garden waste in 2-3 months.
3	Biomedical waste	NA
4	E waste	Has been sent to vendor to recycling.

Observations:

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

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

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

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

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

Recommendations:

1) To formulate the SOP for collection and disposal with Roles & Responsibility and target date.
2) To determine the specific objective of minimization of waste wherever possible.

Reference attached images in Annexure-II.

4.2 Greening

As discussed, In the campus, there is various types of plants including fruit plants, medicinal plants, shady plants & ornamental plants as described below:-

MEDICINAL / HERBAL PLANT

Sr. No	Scientific name	Number	Common name	Family	Habit
1	Adenium obesum	6	Desert rose	Apocynaceae	Shrub
2	Albizia lebbeck	2	Siris	Fabaceae	Tree
3	Aloe barbadensis	2	Aloevera	Asphodelaceae	Herb
4	Azadirachta indica	14	Neem	Meliaceae	Tree
5	Bryophyllum pinnatum	4	Patharchat	Crassulaceae	Herb
6	Cassia fistula	1	Kasia/ sena	Fabaceae	Tree

7	Crinum latifolium	2	Sudarshan	Amaryllidaceae	Herb
8	Dypsis lutescens	5	Areca palm	Arecaceae	Tree
9	Elaeocarpus	6	Rudraksha	Elaeocarpaceae	Tree
10	Jatropha curcas	2	Poison nut	Euphorbiaceae	Tree
11	Juniperus	23	Junipers	Cupressaceae	Herb
12	Juniperus indica	5	Desi junipers	Cupressaceae	Shrub/ tree
13	Kalanchoe blossfeldiana	5	Kalanchoe	Crussulaceae	Herb
14	Murraya koenigii	6	Curry patta/ meetha neem	Rutaceae	Ttree
15	Ocimum sanctum	30	Tulsi	Lamiacerae	Herb
16	Origanum majorana	2	Marwa	Lamiaceae	Herb
17	Prosopis cineraria	2	Janti	Fabaceae	Tree
18	Ruscus aculeatus	7	Butcher's broom	Aspargaceae	Shrub
19	Saraca asoca	51	Ashoka	Fabaceae	Tree
20	Stevoia rebaudiana	1	Sugar free plant	Asteraceae	Shrub
21	Tectona grandis	4	Teak/ sagwan	Lumiaceae	Tree
22	Tinospora cordifolia	1	Giloy	Menispermaceae	Climber

TOTAL: - 181

ORNAMENTAL PLANT

Sr. No	Scientific name	Number	Common name	Family	Habit
1	Araucaria angustifolia	32	Christmas tree	Araucariaceae	Tree
2	Beaucarnea recurvata	9	Nolina palm	Aspargaceae	Tree
3	Bombax ceiba	1	Semal	Malvaceae	Tree
4	Bougainvillea glabra	7	Bougainvillea/ paperflower	Nyctaginaceae	Climber
5	Cactus	2	Cactus	Cactaceae	Shrub
6	Calendula officinalis	80	Calendula/ pot merigold	Asteracea	Herb
7	Callistemon	4	Bottle brush	Myrtaceae	Tree
8	Cascabela thevetia	12	Kaner	Apocynaceae	Shrub
9	Catharanthus roseus	10	Sadabahar	Apocynaceae	Shrub
10	Chrysanthemum	2	Guldavari	Asteraceae	Herb
11	Cycas revolute	4	Sago palm	Cycadaceae	Tree

12	Delonix regia	1	Gulmohar	Fabaceae	Tree
13	Delphinium	80	Lark spur	Ranunculaceae	Herb
14	Dracena	8	Dracena	Aspargaceae	Shrub
15	Dracena frafrans	1	Green Dracena	Aspargaceae	Shrub
16	Dracena marginata	1	Red edge Dracena	Aspargaceae	Shrub
17	Epipremnum aureum	4	Money plant	Araceae	Climber
18	Epithelanta micromeris	2	Button cactus	Cactaceae	Shrub
19	Eucalyptus globulus	1	Eucalyptus/ safeda	Myrtaceae	Tree
20	Euphorbia milli	9	Crown of thorns	Apocynaceae	Herb
21	Hibiscus	7	English gurhal	Malvaceae	Shrub
22	Hibiscus rosa- sinensis	7	Desi gurhal	Malvaceae	Shrub
23	Holoptelea integrifolia	6	Jungle cork tree/ papdi	Ulmaceae	Tree
24	Hyophorbe legenicaulis	27	Bottle palm	Arecaceae	Tree
25	Ixora coccinea	1	Flame of the wood	Rubiaceae	Shrub
26	Jasminum	2	Chameli	Oleaceae	Tree
27	Jasminum sambac	2	Motiya	Oleaceae	Shrub
28	Lagestonia	1	Lagestonia	Lythraceae	Tree
29	Monster	1	Swiss cheese plant	Araceae	Herb/ clmber
30	Papaver somniferum	250	Poppy	Papaveraceae	Herb
31	Petunia	9	Petunia	Solanaceae	Herb
32	Platycladus orientalis	7	Morpankhi	Cupressaceae	Shrub/ tree
33	Plectranthus scutelloroides	1	Coleus	Lamiaceae	Herb
34	Plumeria alba	4	Champa	Apocynaceae	Tree
35	Plumeria pudica	1	Nag champa	Apocynaceae	Tree
36	Rhapis excels	7	Rabish palm	Arecaceae	Tree
37	*Rosa cultv. 'the shepherdess'*	14	English rose	Rosaceae	Shrub
38	Rosa moschata	343	Desi rose	Rosaceae	Shrub
39	Tabernamontana divaricata	5	Chandni	Apocynaceae	Tree
40	Tagetes erecta	180	Marigold	Asteraceae	Herb
41	Yucca brevifolia	2	Yucca palm	Aspergaceae	Tree

TOTAL: - 1,147

SHADY PLANT

Sr. No	Scientific name	Number	Common name	Family	Habit
1	Dalbergia sissoo	3	Sheesham	Fabaceae	Tree
2	Ficus benghalensis	1	Banyan tree	Moraceae	Tree
3	Ficus benjamina	4	Weeping fig/ ficus	Moraceae	Tree
4	Ficus religiosa	7	Peepal	Moraceae	Tree
5	Ficus retusa	525	Ficus panda	Moraceae	Tree
6	Terminalia arjuna	2	Arjun	Combretaceae	Tree
7					

TOTAL: - 542

FRUIT PLANT

Sr. No	Scientific name	Number	Common name	Family	Habit
1	Aegle marmelos	8	Wood apple	Rutaceae	Tree
2	Citrus limon	5	Lemon	Rutaceae	Tree
3	Elettaria cardamomum	1	Elaichi	Zingebraceae	Herb
4	Emblica officinalis	2	Amla	Euphorbiaceae	Tree
5	Livistona chinensis	12	Chinese fan palm	Aarecaceae	Tree
6	Mangifera indica	1	Mango	Anacardiaceae	Tree
7	Mimusoups elengi	9	Molshree	Sapotaceae	Tree
8	Morus alba	2	Mulberry	Moraceae	Tree
9	Psidium guajava	4	Amrud	Myrtacea	Tree
10	Syzygium cumini	5	Java plum/ jamun	Myrtaceae	Tree

TOTAL: - 49

Observations:

1) Natural Vegetation covering the whole campus.

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

3) There is more than 1919 plants and trees as per the geography of Campus. Every year they add new trees to maintain the survival rate which is more than 70%. There are various medicinal/herbal plants like Adenium obesum, Albizia lebbeck, Aloe barbadensis, Azadirachta indica and also No. of shady plants-542, ornamental plants-1147.

4) A Separate committee of four members has been assigned to ensure the greenery in the campus.

5) college has done various plantation activities as having collaboration with "Stand with Nature" a NGO from bhiwani. College has also adopted one village named "Umravat" which is 6.7 km from college premised and they provide the adult education over there on every weekend.

6) Beauty and Eco park is developed in the entire campus like Biological garden, Herbals garden & sarswati loan.

Recommendations:

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

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

Reference attached images in Annexure-III.

4.3 Energy Conservation

Observations:

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

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

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

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

5) Replaced various LED tubes, LED panel light & working on solar project.

Recommendations:

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

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

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

Reference attached images in Annexure-IV.

4.4 Water Conservation

Observations:

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

2) The water is stored in Underground Tanks having the capacity of 126280 Litres.

3) Water leakage is stopped by periodic maintained pipes.

4) The previously, there were 06 water connections and to reduce the water wastage; only 02 connection is working now; water is to be provided from the Public Health Engineering Department, entry point is through submersible, a state Government body in the campus which is further distributed by the Estate department.

5) Water Harvesting is done through Rain Water Harvesting.

Recommendations:

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

2) SOP needs to be defined with measurable Objectives.

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

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

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

6) Needs to put up slogan for Water Saving.

Reference attached images in Annexure-V.

4.5 Clean Area

Observations:

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

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

3) DG sets are installed with regular checks under within the maintenance team.

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

5) Entire walking area is green and well laid.

Recommendations:

1) The data of vehicles like PUC, Insurance, Fire Extinguisher in Vehicles, First aid Box needs to be implemented with monitoring at entry or exit point.

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

3) Health Checkup camps may be organized for Villagers.

Reference attached images in Annexure-VI.

4.6 Animal Welfare

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

List of insects at College Premises

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

Millipede		
1	Yellow spotted millipede	Harpaphe haydeniana (Fam – Xystodesmidae)

List of reptiles at College Premises:

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

List of mammals at College Premises

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

Observations:

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

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

Recommendations:

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

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

Reference attached images in Annexure-VII.

4.7 Environmental Legislative

Observations:

1) B+ grade NACC Recognition Certificate.

2) Housekeeping is in house and scheduled.

Recommendations:

1) Consent of Air, Water, and noise from pollution dept.

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

3) Fire NOC is also needed.

Reference attached images in Annexure-VIII.

General Practices:

Observations:

1) The roles to maintain green environments is given to various departments like a) Green Club for plantation b) Maintenance department for Energy, water management. c) Department of Ecology for animal welfare. Additionally, any special drive of plantation is done involving students.

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

Recommendations:

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

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

3) The green policy to be displayed at prominent locations along with slogans related to saving of resources.
4) Air Quality Monitoring needs effective implementation.

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

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

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

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

5. Conclusions:

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

6. Photographs of Environmental Consciousness:

The photographs are also a part of Report. This covers green area, utilities installed in the campus. Solar panels.

7. Acknowledgement

Acceptance By the College

ASSESSMENT COMMENTARY

Positive points:

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

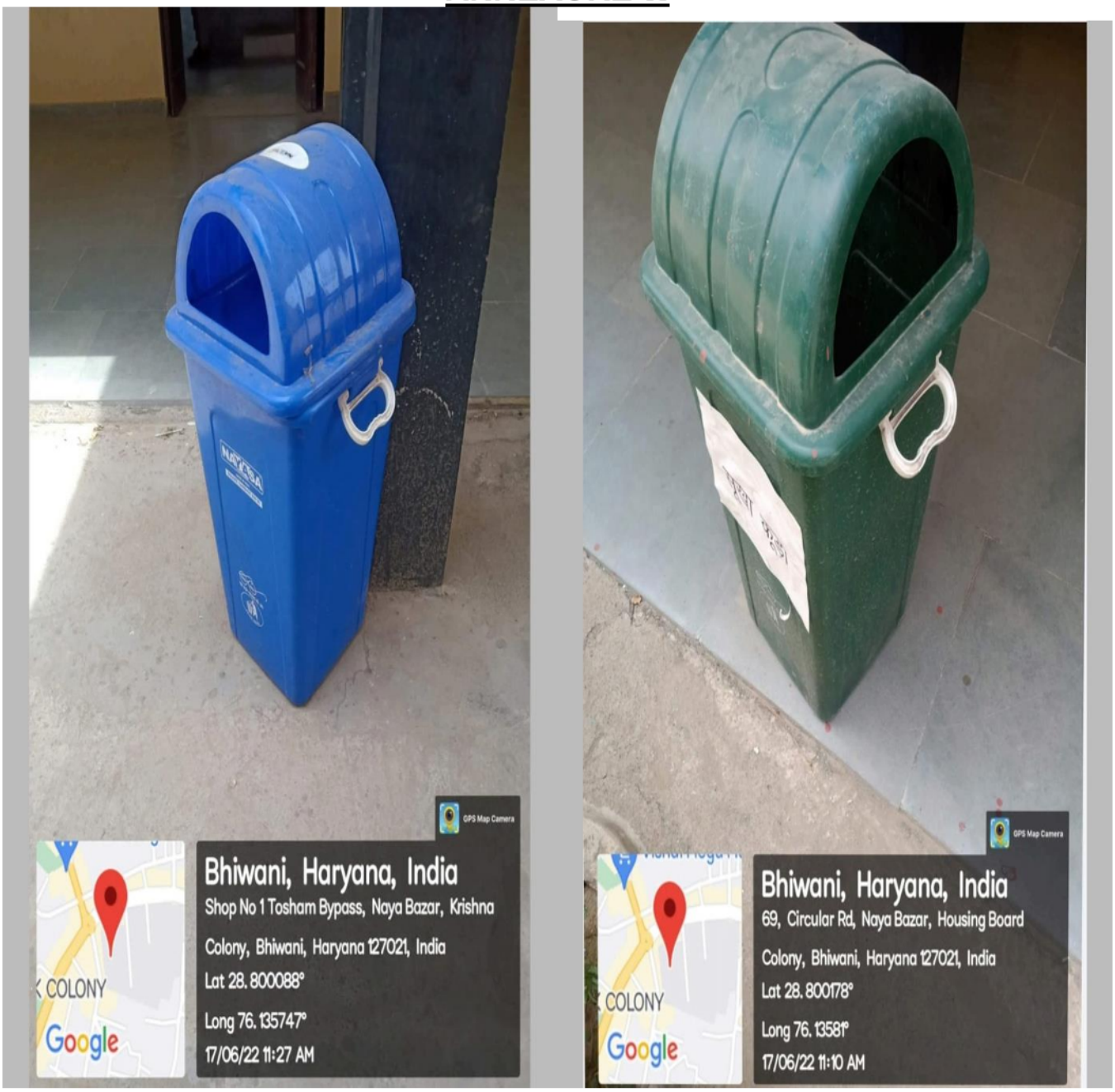
01.07.2022

Ms. Neelam Gupta
01.07.2022

ANNEXURE-I
OFFICE PREMISES

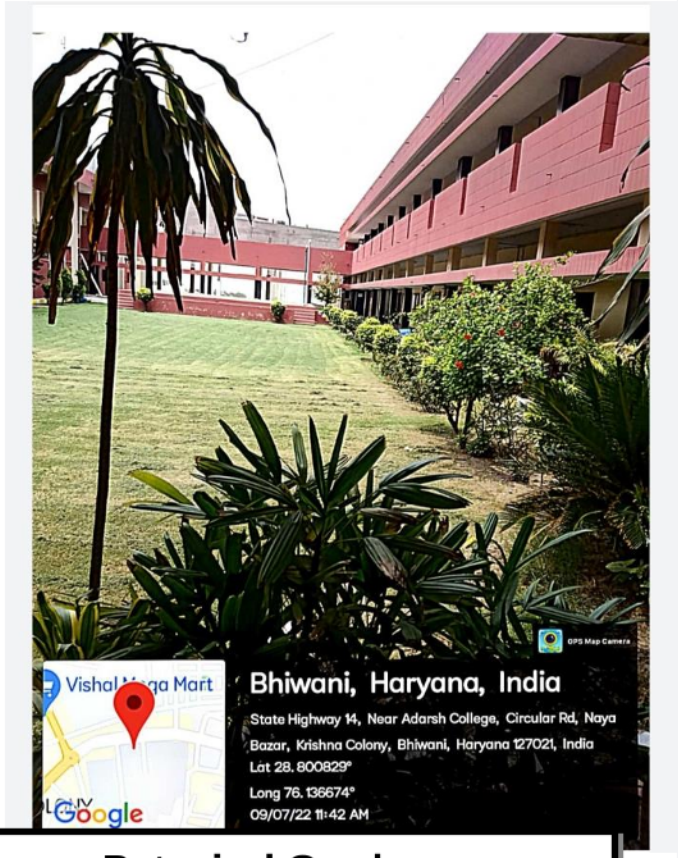
ANNEXURE-I
OFFICE PREMISES

ANNEXURE-II



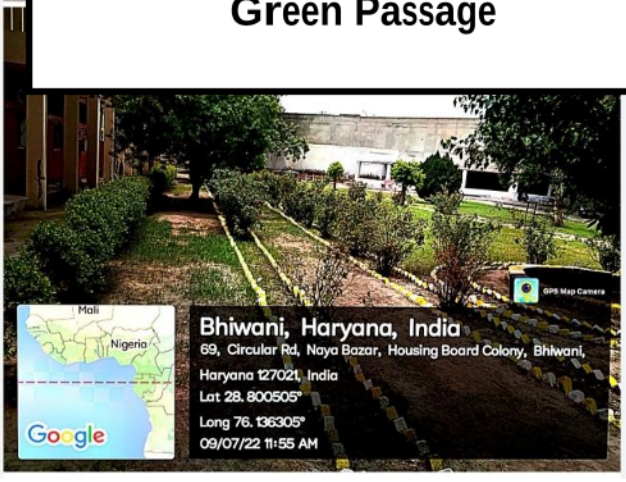
WASTE DISPOSAL SYSTEM & WASTE MANAGEMENT

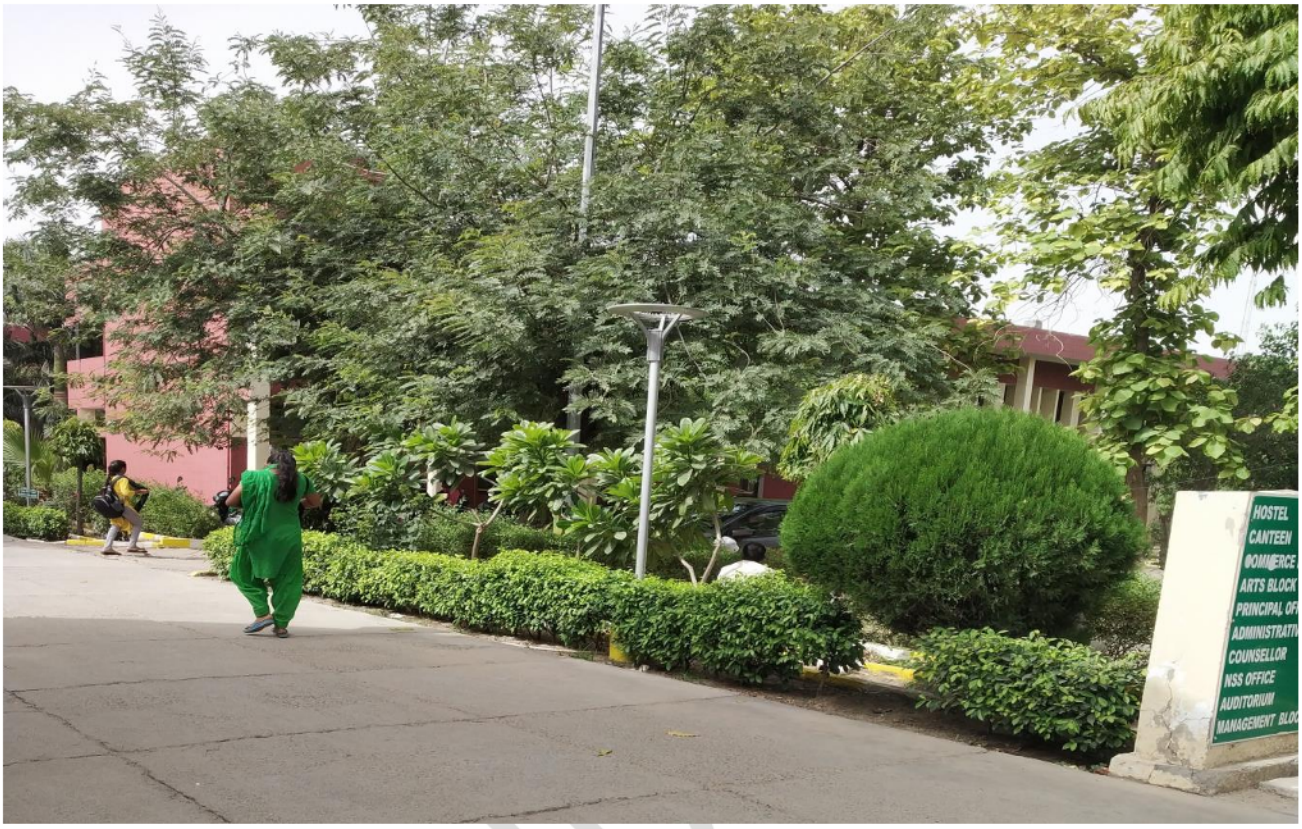
Annexure-III



Botanical Garden

Green Passage

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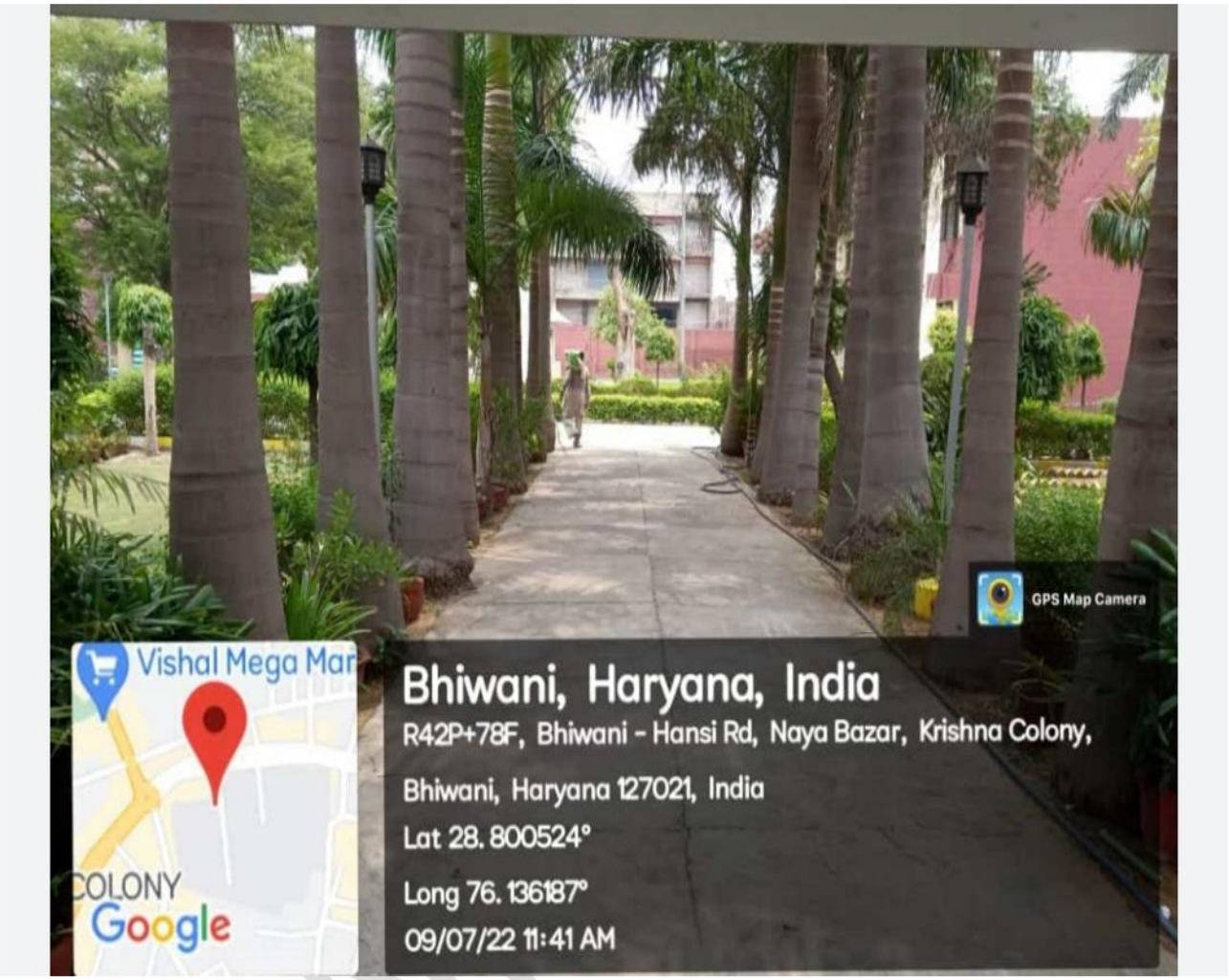
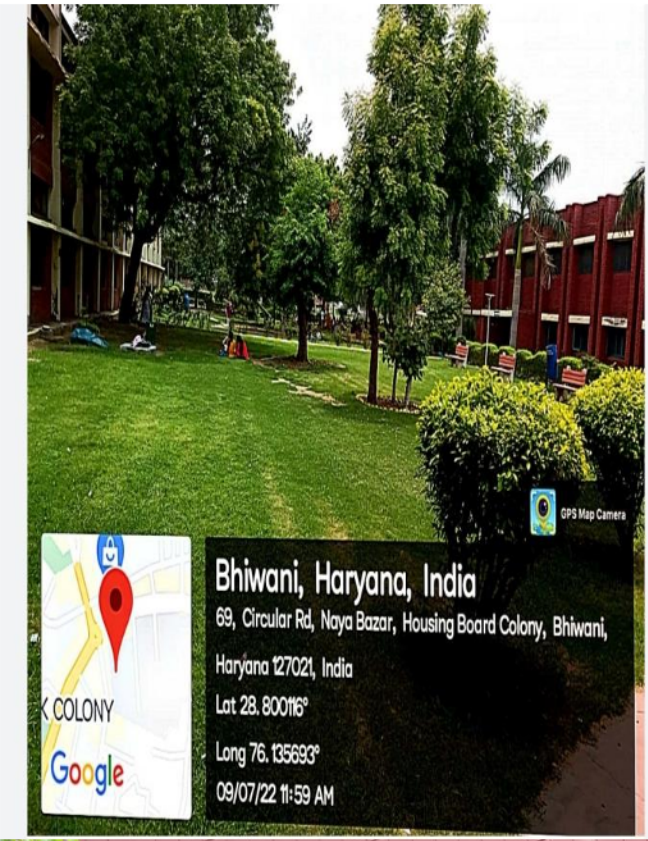
CANTEEN
ARTS BLOCK
COUNSELLOR
NSS OFFICE
AUDITORIUM

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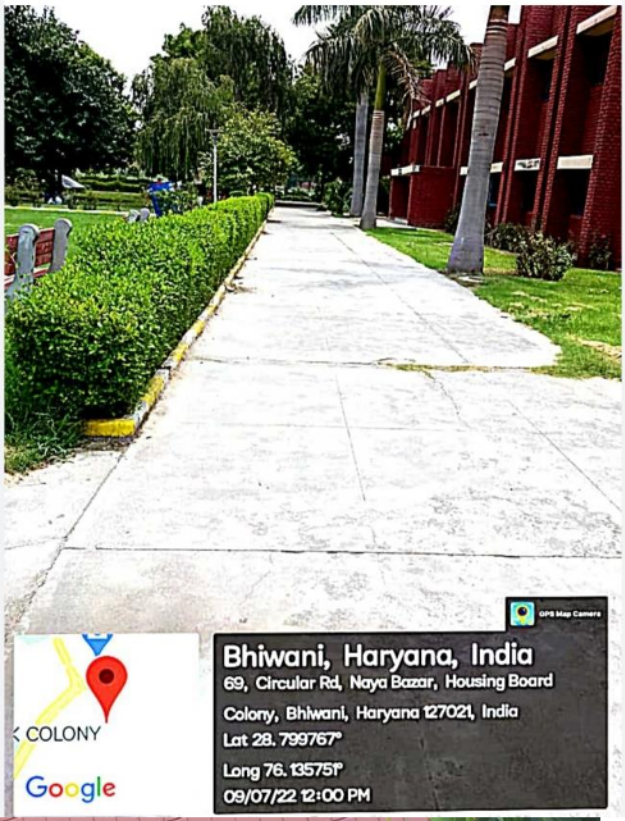
COLONY
Google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Colony, Bhiwani, Haryana 127021, India
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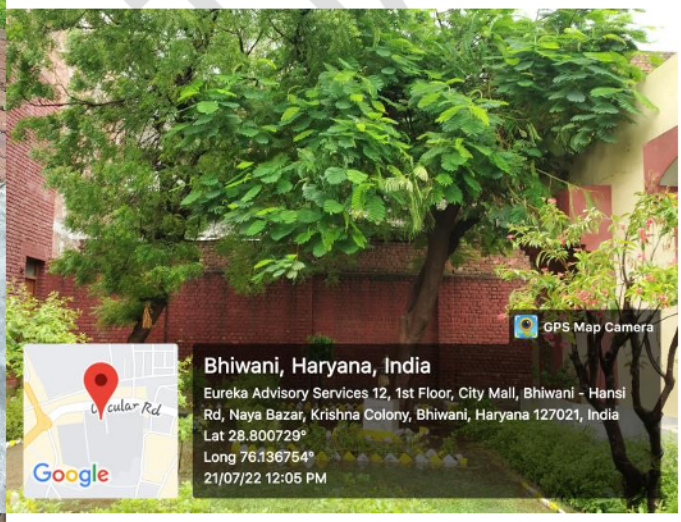
Annexure-III




आज़ादी का अमृत महोत्सव शृंखला में
आदर्श महिला महाविद्यालय, भिवानी
स्टैंड विद नेचर
के सहयोग से प्रस्तुत करता है
हरीतिमा उत्सव
16 जुलाई 2022


GPS Map Camera
Bhiwani, Haryana, India
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Circular Rd
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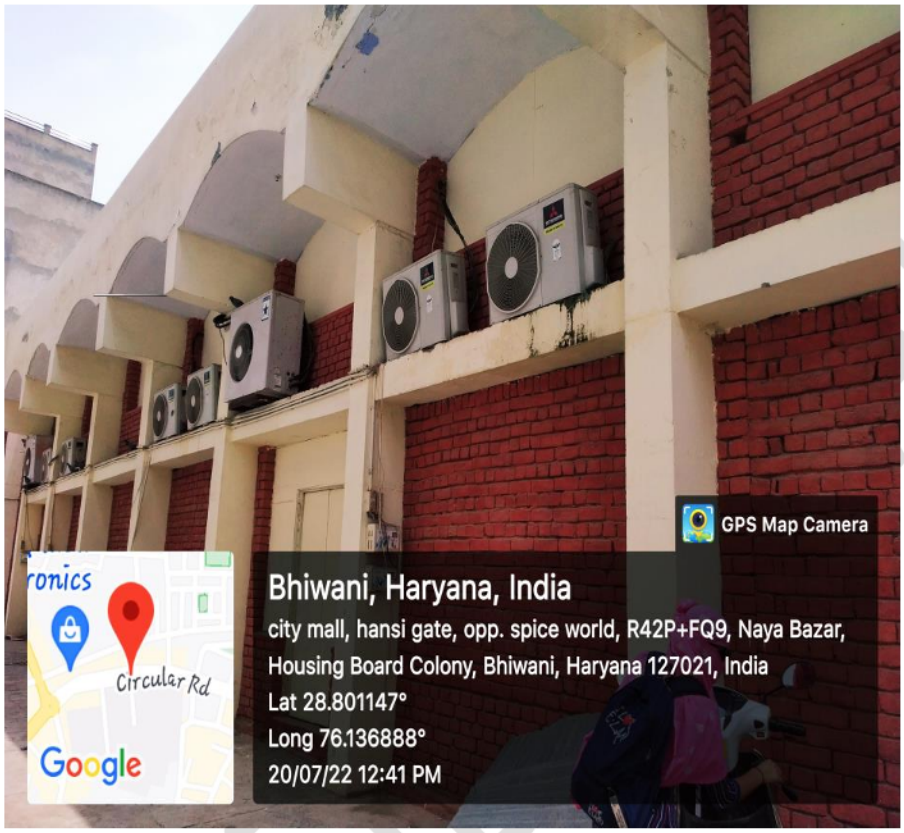
ANNEXURE-V



SOLAR LIGHTS

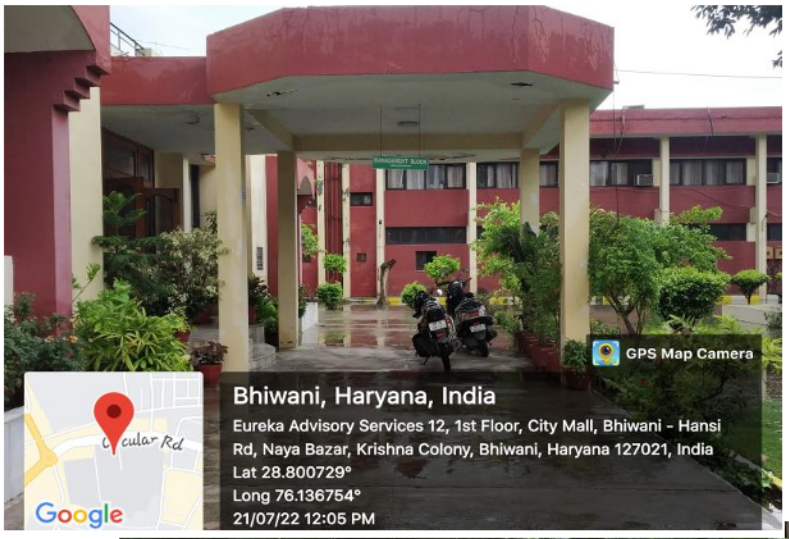
ANNEXURE-V

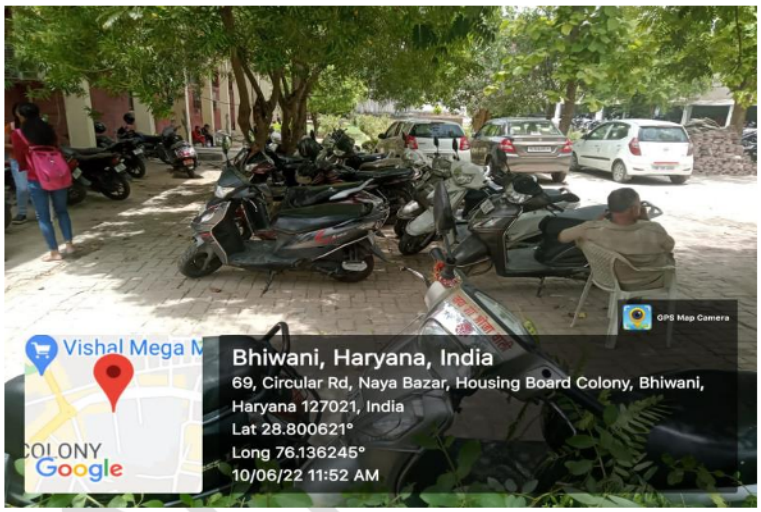
WATER TUBE WELL

RO WATER

RO WATER

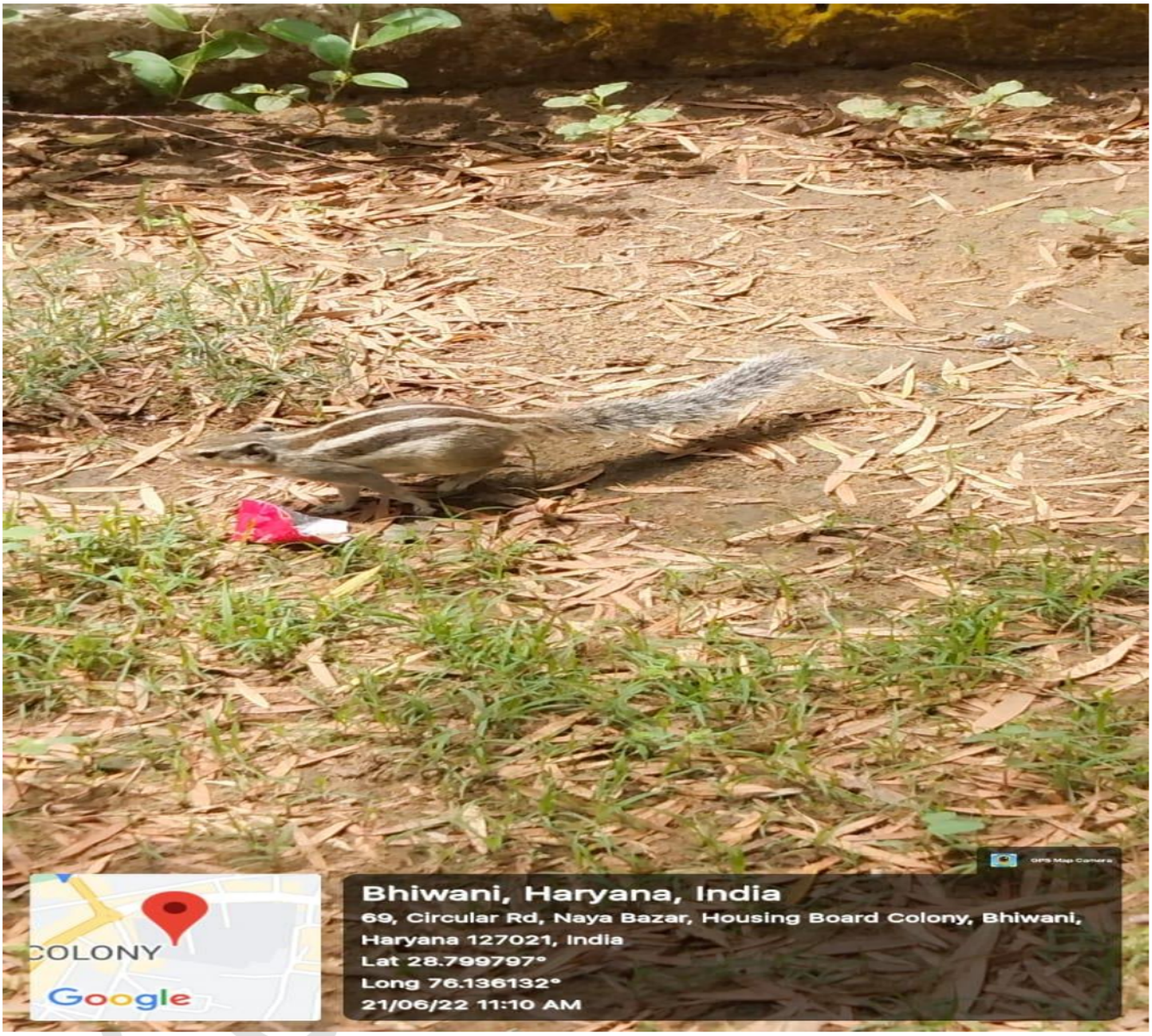
ANNEXURE-VI





Car Parking

Annexure-VII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Google


GPS Map Camera
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Bhiwani, Haryana 127021, India
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ANNEXURE-VII



BUTTERFLIES




BIRDS & BIRDS NEST

Registration Certificate
Government of Haryana
Department Of Food and Drug Administration
Food Safety and Standards Authority of India
Registration Certificate under FSS Act, 2006

पंजीकरण संख्या / Registration Number: **20822002000478**

1.	Name and permanent address of Food Business Operator (FBO) / खाद्य व्यापार ऑपरेटर का नाम और स्थायी पता:	ADARSH MAHILA MAHAVIDYALAYA BHIWANI ADRASH MAHILA MAHAVIDYALAYA, COLLEGE HANSI GATE, BHIWANI , Rajpura Kharkari (23) , Bhiwani, Bhiwani, Haryana-127021
2.	Address of location where food business is to be conducted / premises / स्थान का पता जहां खाद्य व्यापार / परिसर है:	ADRASH MAHILA MAHAVIDYALAYA, COLLEGE HANSI GATE, BHIWANI, Rajpura Kharkari (23), Bhiwani, Bhiwani, Haryana - 127021
3.	Kind of Business / कारोबार का प्रकार:	Club/Canteen
4.	Photo Identity Card / फोटो पहचान पत्र(विवरण) :	N/A

This Registration certificate is issued under and is subject to the provisions of FSS Act, 2006 all of which must be complied with by the petty food business. / यह पंजीकरण खाद्य संरक्षा और मानक अधिनियम, 2006 के अधीन अनुदत्त की गई और वह अधिनियम के उपबंधो के अध्यादीन है जिनका अनुज्ञप्तिधारी द्वारा अवश्य पालन किया जाना चाहिए.

Place / स्थान: Bhiwani

Registering Authority

Issued On / दिनांक: 12-09-2022 (New Registration)

Valid Upto: / वैधता: 11-09-2027 (For details, refer Annexure)

Annexures:

1. Product Annexure
2. Validity Annexure
3. Registration Id Card

Note:

1. **Application for renewal of Registration Certificate can be filed as early as 180 days prior to expiry date of Registration Certificate. You can file application for renewal or modification of Registration Certificate by login into FSSAI's Food Safety Compliance System(**https://foscos.fssai.gov.in**) with your user id and password or call us at 1800112100 for any clarification.**
2. **This Registration Certificate is only to commence or carry on food businesses and not for any other purpose.**
3. **This is computer generated Registration Certificate and doesn't require any signature or stamp by authority.**
4. **This Registration Certificate is allowed to conduct food businesses activities having annual turnover upto Rs. 12 Lacs only.**

Registration Certificate
Government of Haryana
Department Of Food and Drug Administration
Food Safety and Standards Authority of India
Registration Certificate under FSS Act, 2006

पंजीकरण संख्या / Registration Number: **20822002000478**

Detail(s) of Food Item

[**Note:**Only standardised food products are allowed to be manufactured as per the list available on FoSCoS.]

Other then Manufacturer Unit	
Sl. No	**Name of the food category**
1	16 - Prepared Foods

Validation And Renewal Annexure

Registration Certificate
Government of Haryana
Department Of Food and Drug Administration
Food Safety and Standards Authority of India
Registration Certificate under FSS Act, 2006

पंजीकरण संख्या / Registration Number: **20822002000478**

Validity From	Validity Upto	Issued On	Fee Paid	Type
12-09-2022	11-09-2027	12-09-2022	500 INR	New

Suspension History

S.No	History	Date
N/A		

Current Status of Registration: Registration Certificate issued

Note:

1. **Application for renewal of Registration Certificate can be filed as early as 180 days prior to expiry date of Registration Certificate. You can file application for renewal or modification of Registration Certificate by login into FSSAI's Food Safety Compliance System(**https://foscos.fssai.gov.in**) with your user id and password or call us at 1800112100 for any clarification.**

Registration ID Card

Registration ID: **20822002000478**

Valid Upto: 11-09-2027

Name: ADARSH MAHILA MAHAVIDYALAYA BHIWANI

Address: ADRASH MAHILA MAHAVIDYALAYA, COLLEGE HANSI GATE, BHIWANI, Rajpura Kharkari (23), Bhiwani, Bhiwani, Haryana - 127021

KOB: Club/Canteen

Govt ID Card: N/A

Issuing Authority: Bhiwani **Issued On:** 12-09-2022

[Disclaimer:This Registration ID card is issued only for the provisions laid down under Food Safety and Standards Act, 2006 and hence, shall not be used for any other purpose.]

NAAC Accredited B+

Adarsh Mahila Mahavidyalaya

Affiliated to Chaudhary Bansi Lal University, Bhiwani
Hansi Gate, Bhiwani - 127021 (Hr.)
Phone No. 01664-242414 & 240422
Email : info@adarshcollegebhiwani.com
Website : www.adarshcollegebhiwani.com
Email: principalammb@gmail.com
Website: www.ammb.ac.in

Ref. No. AMMB/ –

Dated 19/5/20

Green Campus code of conduct for the session 2020-21

A Green Campus is where natural cordial practices and instruction consolidate to advance maintainable and eco-accommodating practices in the grounds. The green grounds idea offers an organization the chance to lead the pack in reclassifying its natural culture and growing new ideal models by making practical answers for ecological, social and monetary needs of humanity.

Objectives

- Understanding various environmental issues and the need to address them.
- Sensitizing people about the need for protection of the environment for a sustainable and healthy future.
- Instill a sense of responsibility for the environment and a personal commitment to protect and preserve the environment
- Ensure environment friendly practices in the college.

Clean Campus Initiatives

- Generating mass awareness on cleanliness and hygiene amongst students and staff members by holding regular cleanliness drives. The idea is to motivate them to contribute in a proactive manner.
- Activities under 'Swachh Bharat Abhiyan' will be a key component of all the community work being done by NSS, NCC and Green Society volunteers of the college.
- Staff Members will be encouraged to participate in the cleanliness drive in the college campus.
- Events such as Poster Making and Slogan Competitions, Essay Writing, Spoken Word Poetry, Speeches, Skits on 'Swachh Bharat' will be organised.
- Rallies on themes connected with 'Swachh Bharat Abhiyan' in and around the college campus will be conducted to create mass awareness.
- Remove all kinds of waste material like broken furniture, unusable equipment etc.
- Administer of the pledge by students and staff members to maintain cleanliness of the college campus and its surrounding areas on an annual basis.
- Conduct workshops on the 3Rs: Reduce, reusing and recycling of waste.

- Commit to managing waste and maintaining a clean campus especially during college events.

Waste Management Processes – Solid Waste Management

With its aim to provide holistic education that also has a positive impact on the environment, the college will adopt practices that will mitigate the generation, and manage solid waste through the following methods :

- Collect paper waste produced on campus and collaborate with scrap dealers for recycling.
- Ensure that all cleaning products used by college staff have a minimal detrimental impact on the environment
- Use two types of bins separately for biodegradable and non-biodegradable wastes in the college campus as well as in hostels
- Minimize the use of fertilizers and pesticides in college grounds, opting for the use of compost produced on site wherever possible.
- Encourage the students and teachers to use emails for assignment submissions.
- Take initiatives to spread awareness amongst students about:
- Food wastage and ways of minimizing it
- Minimizing the use of packaged food
- The habit of reusing and recycling non-biodegradable products
- Organizing workshops for students on solid waste management.

Plastic-Free Campus

In view of the Government of India's resolution to ban all single use plastics due to the hazardous impact of plastic use and pollution, the college administration strictly bans the use of single use plastics in its premise to make it a 'Plastic Free Campus'.

Minimize consumption of water

Repair sources of water leakage, such as dripping taps and showers as quickly as possible.

Install appliances which reduce water consumption.

Ref. No. AMMB/ Dated .....

Using an efficient and hygienic water storage mechanism is to minimize the loss of water during storage.

Environment Protection and Green & Clean Campus

The College makes all the necessary efforts to involve the students, faculty and staff in "Clean, Green and Eco-Friendly Initiatives" by designating a policy document to run this drive for the purpose of protecting Environment. The College is a quality conscious college. It protects its own environment with its green campus initiative and keeps pollution free campus. Environment development is its basic work with the educational policies implemented on the campus. Environmental conscious administration, the management and the students of the college look after the environment carefully. Every year, during the rainy season, we do tree plantation and carefully look after it. It's our own responsibility to preserve the work done on the campus related to the environment.

Our Environmental Policy:

- To create awareness regarding environmental policy amongst the students and the teachers.
- To sensitize the students and staff regarding the use of drinking water properly for which, we have provided purified (RO aqua-guard) drinking water facilities on the campus.
- To maximize the use of ICT and minimize the use of paper. It will help to go towards "Paperless Office".
- To use the solid waste through vermin-compost on the campus and use it as a fertilizer.
- To use "Use me" Dry and Wet dust bins in the college campus so as to keep the college campus clean.

Principal
Adarsh Mahila Mahavidyalaya
Bhiwani