Miranda House
UNIVERSITY OF DELHI

ENERGY AUDIT REPORT

2022-2023

PREPARED BY
EHS ALLIANCE SERVICES

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CERTIFICATE

EHS alliance

AUDIT CERTIFICATE

PRESENTED TO

MIRANDA HOUSE

GC Narang Road, University Enclave, New Delhi, 110007

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

ENERGY AUDIT

ACADEMIC YEAR 2022-23

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

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

EHS ALLIANCE SERVICES GURGAON

AUDITOR SIGNATURE

03.10.2023
DATE OF AUDIT

EHS ALLIANCE SERVICES, PLOT A-72, SURYA VIHAR, GURUGRAM, 122001
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ACKNOWLEDGEMENT

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

First of all, we would like to thank **Prof. Bijayalaxmi Nanda - Principal** for giving us an opportunity to evaluate the environmental performance of the campus.

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

We are also thankful to

DR. Saloni Bahri - ***Convener, IQAC***

Dr. Monika Tomar - ***Ex-Officio Member, IQAC***

Dr. Deepali - ***Convener, Garden Committee***

Dr. Rekha Kumari - ***Convener, MH Vatavaran***

DISCLAIMER

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

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

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

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Vijay Singh
Lead Auditor EMS & Energy

Dr. Uday Pratap
Co-Auditor EMS & Energy

ABBREVIATION

A	**Amps**
AC	**Air Conditioner**
AC	**Alternating Current**
AMET	**Academy of Maritime Education and Training**
CFL	**Compact fluorescent lamp**
CIP	**Comprehensive Inspection Programme**
DC	**Direct Current**
HSD	**High Speed Diesel**
Hz	**Hertz**
kg	**Kilogram**
kVA	**kilo-volt-ampere**
kW	**kilo Watts**
kWh	**kilowatt hour**
kWp	**Kilowatt peak**
LED	**Light Emitting Diode**
LPG	**Liquefied Petroleum Gas**
MMS	**Module mounting structure**
MPPT	**Maximum Power Point Tracker**
NAAC	**The National Assessment and Accreditation Council**
SEC	**Specific Energy Consumption**
SPV	**Solar Photovoltaic**
STC	**Standard Test Condition**
TV	**Television**
V	**Volts**
W	**Watts**
W/m2	**watt per square metre**

OVERVIEW OF THE COLLEGE

Miranda House, college for women, located in the University of Delhi campus, is a premier women's institution. It was established in 1948 by the then Vice Chancellor, Sir Maurice Gwyer. Lady Edwina Mountbatten laid its foundation stone on March 7 in the same year. Originally designed by renowned architect Walter George, Miranda House is built in warm red brick with cool and spacious corridors. The College shares an architectural affinity with other colonial educational institutions of the country. In the past six decades, as the College has grown, several other buildings have been added in consonance with its original design. Special efforts are on to preserve the heritage of its pristine architectural glory.

Miranda House offers liberal education in social sciences, humanities and basic sciences to more than 3500 students. The faculty, renowned for its meritorious basis profile and versatile talent, is dedicated to the cause of liberal education. Through their three years at Miranda, our students develop a sense of social responsibility, intellectual rigour, and practical knowledge. They learn communication, analytical and problem-solving skills, and a demonstrated ability to apply their education to our complex and diverse world. The College has always maintained high academic standards. More significantly, it has

provided students an enabling and creative environment to freely develop and express views that help them respond to changes in society.

The College has always maintained high academic standards. More significantly, it has provided students an enabling and creative environment to freely develop and express views that help them respond to changes in society. Being on the University campus, its proximity to other colleges facilitates the participation of Miranda students in several inter-college events, both academic and cultural. Those who will make the College hostel their home for the next three years have the privilege of residing in one of the most beautiful residential buildings on the University campus The institution's philosophy is guided by a pedagogy that encourages the students to explore new domains, to critically examine the world around them and to question stereotypes.

The Legacy... traditions and institutional values

MH has a rich legacy. Established at dawn of independence it provided a unique opportunity to young women for quality higher education. They set for themselves high goals and ideals. They worked for a new society in which women would enjoy equal opportunity with men in professional and public fields. In this, they were abetted by the founding faculty who were independent minded, and belonged to the select group of highly educated women in independent India with a deep concern for quality of education they imparted. They were also charged with a spirit of adventure, steeped in idealism, and committed to women empowerment and the task of building a nation. Proud of their mission as early pioneers, they worked with single-minded devotion in setting the Miranda traditions. These attributes of total dedication have contributed in a large measure to the position of distinction occupied by the college. Over near seven decades of its existence, the college has grown from strength to strength, continuing to provide an atmosphere of high academic excellence and rich cultural activities to its students. The college has established a niche for itself amongst the globally recognized premiere institutions of higher learning.

Being a college established and maintained by the University, Miranda House has a special place among the women's colleges of the University of Delhi. Its location in the heart of the University Campus, and its close interaction with the various Departments of the University and other campus colleges gives it a unique advantage. Although a

women's college, it is not a cloister. It welcomes interaction with other colleges and educational organizations across the country, actively engaging both men and women in all its extramural activities, competing with the best on equal terms.

The extremely distinguished list of alumnae imparts a sense of confidence and immense pride in students. They view themselves as torchbearers of great traditions. All this propels them to often explore uncharted territory, think unfettered, and bend traditions in a bid to create a better world, especially for women.

MISSION

The stated mission of the college is to provide

- a stimulating active learning environment attracting young women with exceptional desire to make a difference to the world
- highest quality liberal arts and basic science education through distinctive academic programmes that instill rigour in the pursuit of knowledge
- culturally sensitive inclusive environment upholding core values of respect for diversity
- enriching co-curricular activities linking education to the world of work and communities
- dedicated and responsive faculty of scholars to assist each student fulfill aspirations and reach milestones
- competencies for new domains of knowledge and the future of work in a globally connected world
- early mentoring for leadership instilling capacity to explore new ideas, take intellectual risk, and usher paradigm change

VISION

The Upanishadic maxim in the college logo “Swadhyayann pramaditavyam” enshrines Miranda House’s understanding of what education must accomplish and steers students towards introspection and self-learning.

Miranda House envisions a world where women have their rightful place and are given due recognition as leaders to reach top positions in all sectors of human endeavour. To give shape to this vision, Miranda House continually reaffirms and embraces its responsibility to build on its historic legacy of leadership in the education of women. It remains strongly committed to addressing issues of gender in all their complexity and preparing young women to:

lead professionally successful lives enriched by the love of learning build personally fulfilling lives radiating integrity and strength of character sustain purposeful engagement with the world with an open mind and balanced perspective develop an understanding of their duty to nation and nation-building meet with confidence the challenges they will encounter in their lives flourish in a different cultural milieu in an increasingly interconnected world uphold the core institutional values of respect for diversity, inclusiveness, and humanism to emerge as leaders charged with new ideas and the capacity to make a difference.

Facilities in the campus

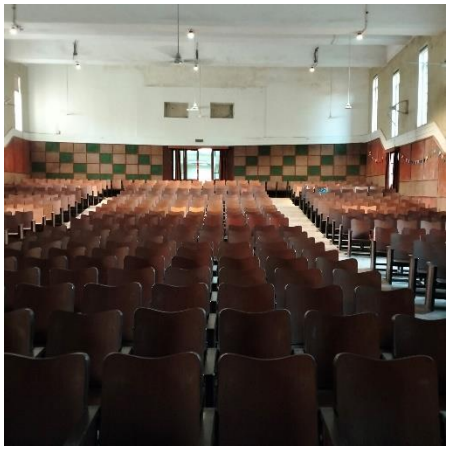
Amenities at Miranda provide far more than academic and administrative facilities on campus. It is dedicated to provide students with an exceptional infrastructure for learning as well as facilities for simplifying the procurement of fundamental skills. To accomplish the goal, Miranda House offers the following :

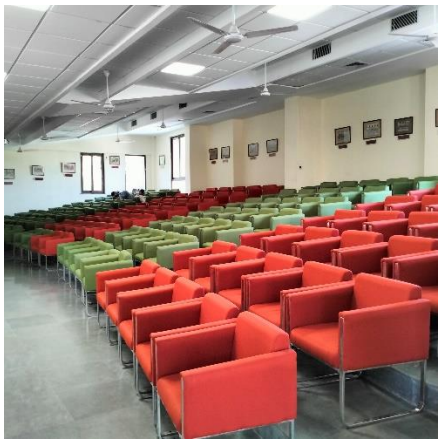
LIBRARY: The Miranda House Library was established on 7th March 1948 and the first book was accessioned on 22nd July 1948. The foundation stone of the present building was laid by Smt. Indira Gandhi, then Prime Minister of India on 7th March 1973. The Miranda House Library preserves and provides access to a rich and enduring source of knowledge to inform, inspire and engage its users in their intellectual and creative endeavors by the well-known motto "Right Document to the Right Reader at the Right Time". It takes pride in fulfilling this inherent mission to the hilt.

SMART CLASSROOMS: The total of 43 formal lecture spaces provide comfortable seating for 2200 students in regular classes with potential for easily accommodating another 10% at any time. Nearly all lecture venues have

- Neatly arranged custom designed, comfortable desks and benches with shelves for bags; teacher table and chair.
- Green Ceramic Board for use with dust-free chalk or White Board for use with marker pens.
- Roof mounted Projector, and a pull down white display screen for multimedia projection.
- Custom-designed Lecterns facility to link laptop to multimedia projector.
- Extra power outlets on front wall for flexible usage of the room.
- Air-conditioning where considered essential.

AUDITORIUM: Miranda House has an Auditorium with seating capacity of 450 in the Main Hall. As one of the oldest constructions in the college, it is part of the college building that was designed by Walter George. The architecture is unique. The Miranda House Auditorium and its stage bring alive nostalgic memories and are of historic importance.





SEMINAR HALL: The Seminar Hall has a seating capacity of 125. It has a high quality sound system, wall mounted speakers, conference table mikes, roving mikes, lapel microphone, provision for recording; Roof mounted high luminosity projection system.

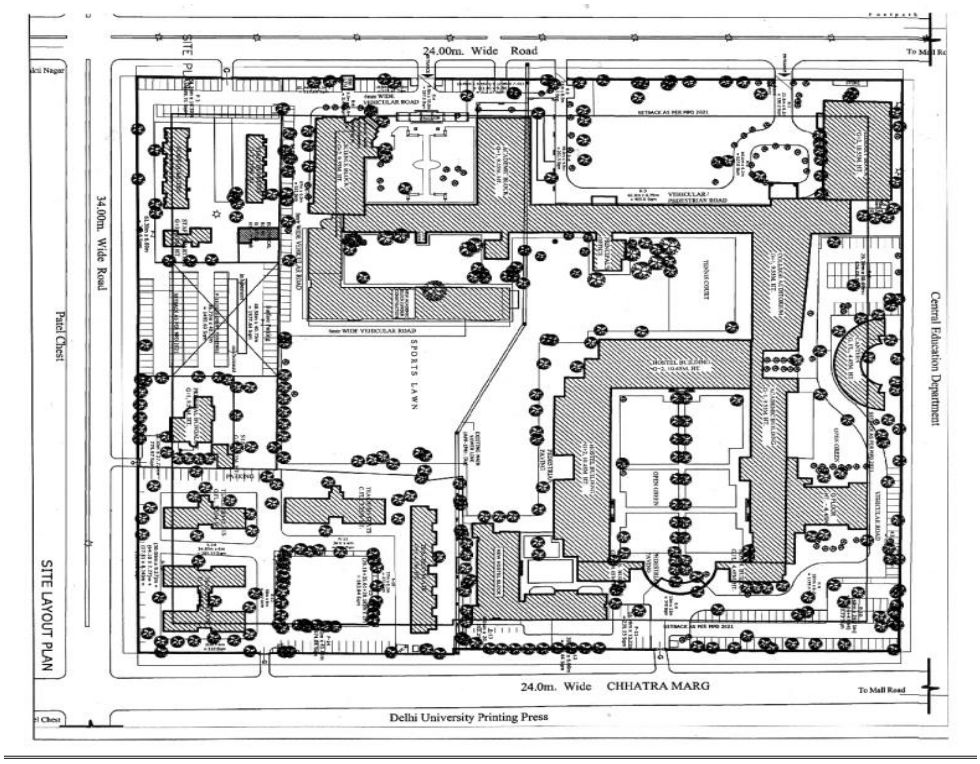
SPORTS FACILITY: Miranda House has a Sports Ground. Facilities exist for a wide range of indoor as well as outdoor sports. The college has 14 Sport Teams and competitively participates in Archery, Athletics, Ball Badminton, Basketball, Chess, Cross-country, Netball, Power Lifting, Table Tennis, Taekwondo, Tennis, Weight Lifting, Volleyball and Yoga

FITNESS CENTRE: Fitness Centre is equipped with weight and cardio training equipment to cater to the needs of both, students and staff. The hall is air-conditioned.

CAFETERIA: The Cafeteria has been aesthetically renovated and is furnished with custom-designed furniture. It includes a well-ventilated open kitchen for preparation of certain food items, with chimney hoods above burner stoves. Utmost hygiene is maintained at the food counters, dedicated storage spaces for grocery, cookware crockery and cutlery and dish washing area. Additional large room adjoining the main hostel kitchen and opening into the cafeteria complex is used for preparation work and most of the heavy duty cooking. Water supply for cooking and drinking purpose is from the Hostel Reverse Osmosis Water Purification Plant.

HOSTEL: The hostel designed by the renowned architect Walter George, with the foundation stone laid by Lady Edwina Mountbatten, lends to the college a historical charm and a sense of legacy. It is laid out in an aesthetically designed quadrangle enclosing well kept gardens paced out by a majestic bottle palm lined pathway. The long corridors, the dining hall with a high arched ceiling, and stonework balconies add to its charm.

Geo Location
Geo Coordinates from Google maps:
28.6925615, 77.2102979



AUDIT PARTICIPANTS

On behalf of the college

Name	Designation
Prof. Bijayalaxmi Nanda	*Principal*
DR. Saloni Bahri	*Convener, IQAC*
Dr. Simranjit	*Member, IQAC*
Dr. Monika Tomar	*Ex-Officio Member, IQAC*
Dr. Sujata Sengupta	*Member, IQAC*
Dr. Hena Oak	*Member, IQAC*
Dr. Neeru Yadav	*Member, IQAC*
Dr. Deepali	*Convener, Garden Committee*
Dr. Rekha Kumari	*Convener, MH Vatavaran*

On behalf of EHS Alliance Services

Name	Position	Qualifications
Mr. Vijay Singh	Lead Auditor	*M.Sc. M. Tech (Environment Science & Engineering), Energy Auditor, Post Diploma in Industrial Safety Management*
Dr. Uday Pratap	Co-Auditor	*Ph.D., EMS: Lead Auditor ISO14001:2015, QCI–WASH*

EXECUTIVE SUMMARY

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

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

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

ENERGY AUDIT - ANALYSIS

1. ENERGY CONSUMPTION

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

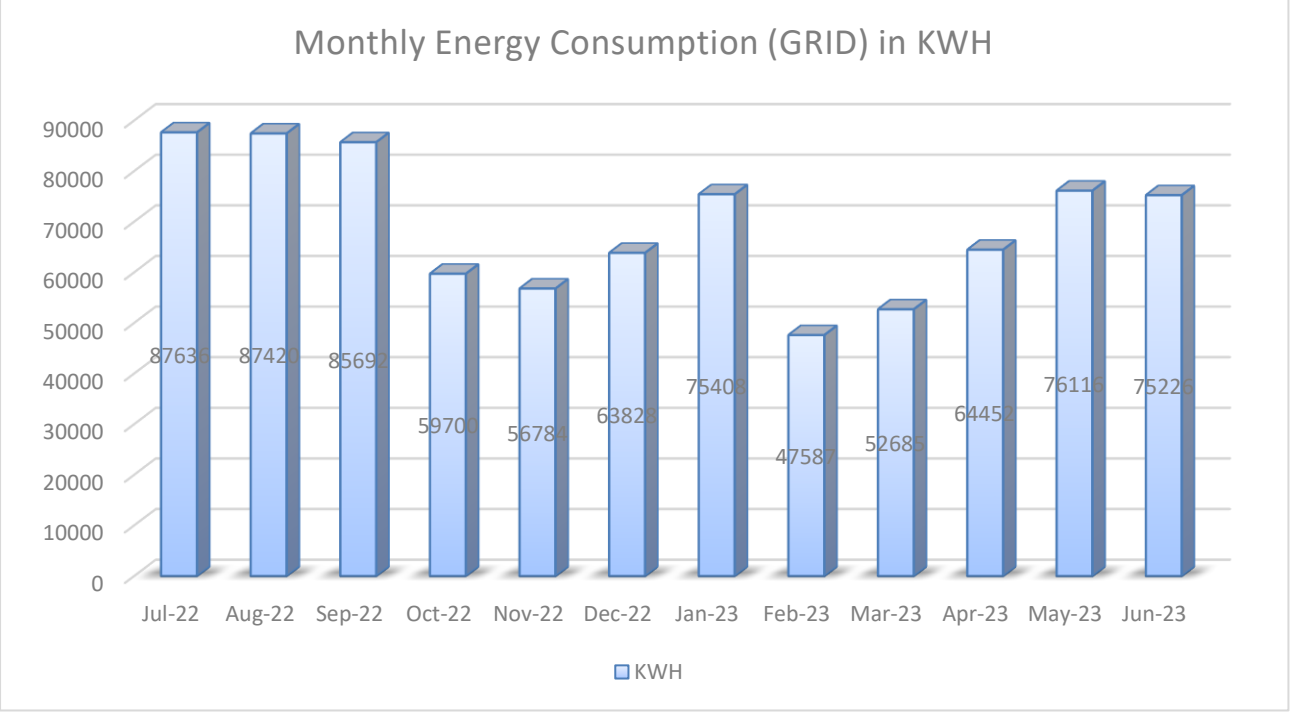
The details of **"Meter Connection"** at **"Miranda House"** are as follows-

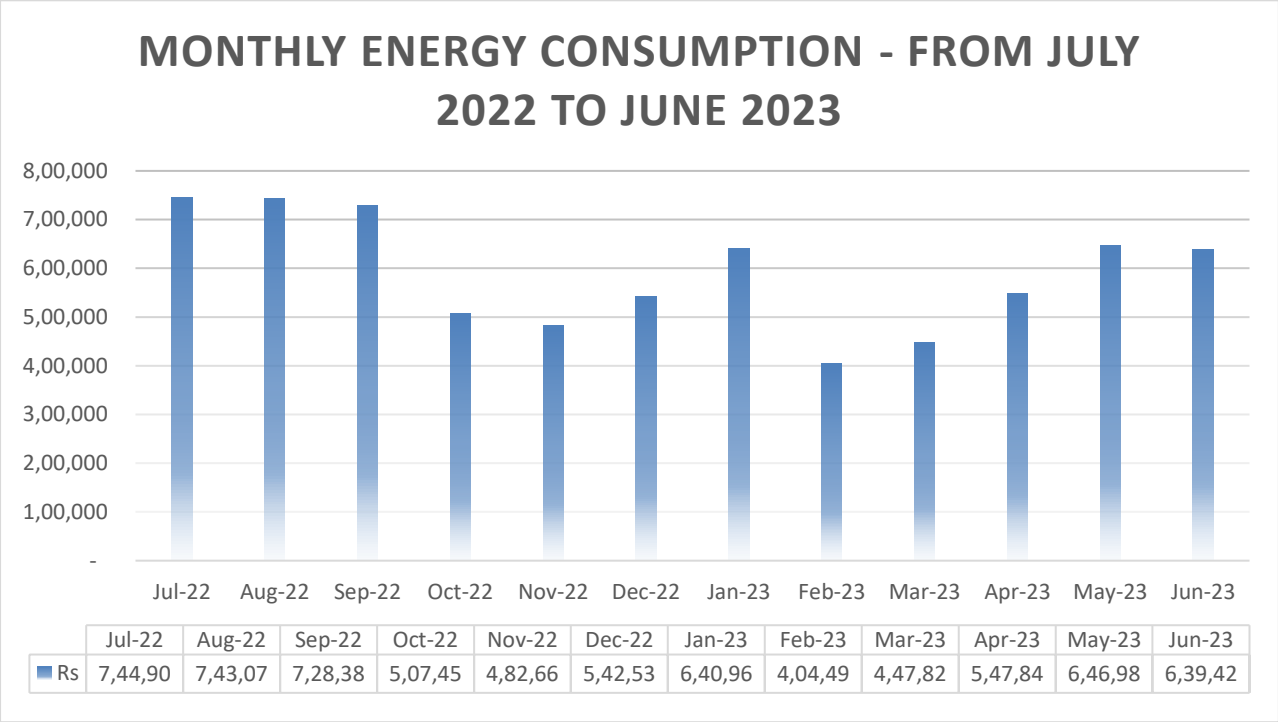
Name	-	The Principal
CA No.	-	60000002711

1.1 SUMMARY OF MONTHLY ELECTRICITY CONSUMPTION AND TOTAL BILL AMOUNT

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

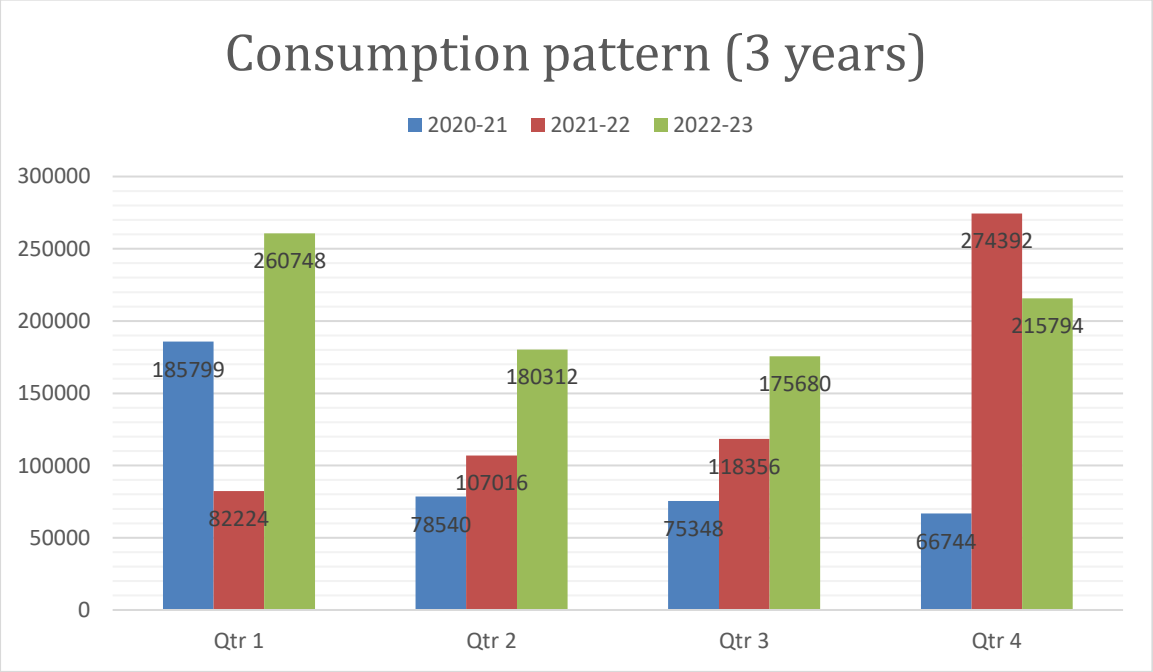
Month	Grid Units	Amount	Solar Units	Total Units	Amount
Jul-22	87636	8.50	840	88,476	7,44,906
Aug-22	87420	8.50	840	88,260	7,43,070
Sep-22	85692	8.50	840	86,532	7,28,382
Oct-22	59700	8.50	840	60,540	5,07,450
Nov-22	56784	8.50	840	57,624	4,82,664
Dec-22	63828	8.50	840	64,668	5,42,538
Jan-23	75408	8.50	8188	83,596	6,40,968
Feb-23	47587	8.50	2600	50,187	4,04,490
Mar-23	52685	8.50	13650	66,335	4,47,823
Apr-23	64452	8.50	13000	77,452	5,47,842
May-23	76116	8.50	10805	86,921	6,46,986
Jun-23	75226	8.50	9566	84,792	6,39,421
SUM	**832534**		**62,849**	**8,95,383**	**70,76,539**





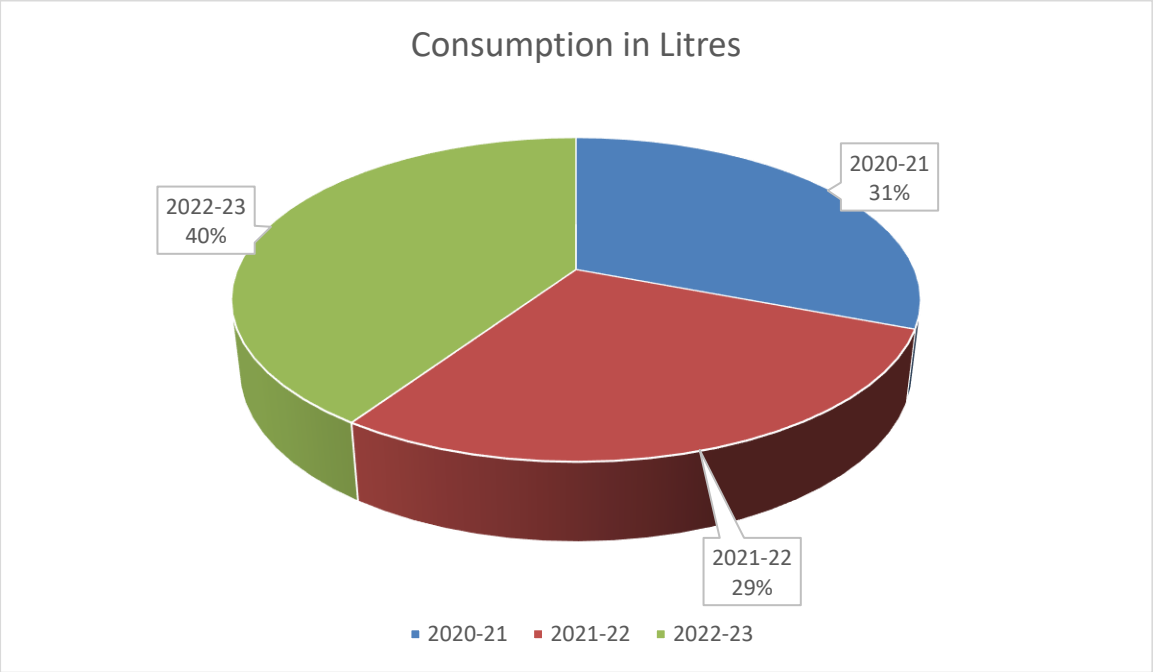
	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23
Rs	7,44,90	7,43,07	7,28,38	5,07,45	4,82,66	5,42,53	6,40,96	4,04,49	4,47,82	5,47,84	6,46,98	6,39,42

Analysis of electricity consumption for the last 3 years is shown below



2. DIESEL CONSUMPTION

From July 2022 to June 2023, Miranda House has consumed 300 litres of fuel. Three year usage pattern is shown below



3. ANALYSIS OF DG SETS

In the campus, there is only one Diesel Generator (DG) set for its electrical power needs in case of Grid power failure. DG sets capacity is 250 kVA.

DG Set Design Details		
Description	***Unit***	***DG at Station 1***
Rated capacity	kVA	320 KVA
Hz		50
Sl No.		3306081004174
Make		Sudhir
Volts	Volts	400 Volts
PF		0.8
Phase		3 Phase
RPM		1200
Amps	Amps	445.2
Mfg.		2011

DG Set Operation details		
Operating hours during testing	Hours	0.50
% Loading	%	62.78
Energy Generation	kWh	34.98
Load	kVA	91.74
Fuel consumption during testing	Litre	9
Specific energy generation	kWh/litre	3.14

Observation and Suggestions:-

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

As per the trial taken during the energy audit the percentage loading of DG set is 62.78% which is ok and specific energy consumption of DG Sets 3.14 kWh/Litre which is satisfactory because as per manufacturer recommendation, best practices for SEC in DG sets range from 3.0 to 3.5 kWh/Litre and above.

We recommend college to initiate stack monitoring of DG set through authorized lab.

4. AC SYSTEM

Energy Efficiency Ratio (EER): Performance of smaller chillers and rooftop units is frequently measured in EER rather than kW/ton. EER is calculated by dividing a chiller's cooling capacity (in Btu/h) by its power input (in watts) at full-load conditions. The higher the EER, the More efficient the unit. The cooling effect produced is quantified as tons of refrigeration (TR). The above TR is also called as air-conditioning tonnage.

There are Split ACs installed in Miranda House in various areas of various capacity which detail is given below: -

Sl No.	Location/Identification	Type(Window/Split)	Qty	RR. Tonnage	Room Temp. (°C)	AC-Tout (°C)	AC-Tin (°C)	Room-RH (%)	Area (m2)	Air velocity (m/s)	Enthalpy Hout	Enthalpy Hin	Heat Load in TR	KW supplied	(Eff.) Power per Ton (KW /TON)	EER
1	Ground Floor	S	10	2	24	12	20	52	0.03	2.2	25	38	0.3	0.6	1.7	2
2	Ground Floor	S	1	2	24	11	19	52	0.03	2.6	24	37	0.4	0.6	1.5	2.3
3	Ground Floor	W	13	1.5	24	10	18	52	0.03	2.4	24	37	0.4	0.5	1.5	2.3
4	First Floor	S	7	1.5	23	12	20	52	0.03	2.3	25	38	0.3	0.6	1.7	2.1
5	First Floor	W	8	1.5	24	12	20	52	0.03	2.2	25	38	0.3	0.6	1.7	2
6	Second Floor	S	2	1.5	24	11	19	52	0.03	2.6	24	37	0.4	0.6	1.5	2.3
7	Second Floor	W	10	1.5	24	10	18	52	0.03	2.4	24	37	0.4	0.5	1.5	2.3
8	Third Floor	S	4	2	23	12	20	52	0.03	2.3	25	38	0.3	0.6	1.7	2.1
9	Third Floor	S	2	2	24	12	20	52	0.03	2.2	25	38	0.3	0.6	1.7	2
10	Third Floor	W	12	1.5	24	11	19	52	0.03	2.6	24	37	0.4	0.6	1.5	2.3
11	Robo lab	W	2	1.5	24	10	18	52	0.03	2.4	24	37	0.4	0.5	1.5	2.3
12	Library	W	1	1.5	23	12	20	52	0.03	2.3	25	38	0.3	0.6	1.7	2.1

Remarks: - We have checked Energy Efficiency Ratio of AC's and EER of AC's is fairly OK. But in future you should purchase 5-Star rated invertor based split AC's because power consumption of Inverter based BEE 5-Star rated AC's is less than non-star rated AC's.

Also, we recommend Miranda House to organize periodic maintenance schedule and take corrective actions for insulating of AC's refrigerant lines in order to protect energy losses.

5. FANS ANALYSIS

In the Miranda House, there are 934 Ceiling Fans are installed, out of which 905 fans are of 70W and 29 fans are 120W. The observation and suggestion are given below.

Fan Wattage	Fan Count
70 Watt	905
120 Watt	29

Total no of Ceiling Fans (120W)	=	58	Nos.
Total no of Ceiling Fans (70W)	=	887	Nos.
Total wattage of 120W Ceiling Fans	=	6,960	Watt
Total wattage of 70W Ceiling Fans	=	62,090	Watt
Total wattage of BEE 5 Star rated Fans (30W)	=	26,668	Watt
Total saving in Wattage after replacement	=	42,382	Watt
Operating hours per day	=	8	Hours
Operating days per annum	=	180	Days
Energy charges per unit in Rs.	=	8.5	INR
Saving in Rs./annum	=	5,18,756	INR
Investment INR		28,35,000	INR
Payback period: - Months		5.47	Years

Observation and Suggestions: -

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

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

6. ANALYSIS OF LIGHTING SYSTEM

6.1 BRIEF DESCRIPTION OF EXISTING SYSTEM

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

6.2 INVENTORY OF LIGHTING

Sl. No.	Location/ Identification	36W Normal Light	72W LED	32W LED	39W LED	150W LED	20W LED	20W LED-FOB Aly Side	10W LED Glow Shine
1	Room no. 120	14	-	-	-	-	-	-	-
2	Room No. 119	14	-	-	-	-	-	-	-
3	Room No. 118	14	-	-	-	-	-	-	-
4	Room No. 117	8	-	-	-	-	-	-	-
5	Room No. 116	8	-	-	-	-	-	-	-
6	Room No. 115	6	-	-	-	-	-	-	-
7	Room No. 114	8	-	-	-	-	-	-	-
8	Rom No. 113	1	-	-	-	-	-	-	-
9	Room No. 112	1	-	-	-	-	-	-	-
10	Room No. 101	3	-	-	-	-	-	14	-
11	Room No. 102	-	-	-	-	-	28	-	-
12	Bank Area	-	-	-	-	-	23	-	-
13	Room No. 104	-	-	-	-	-	-	-	12
14	Auditorium	-	-	-	-	-	-	26	-
15	Wash Room Auditorium	8	-	-	-	-	-	-	-

16	Room No. 105	8	-	-	-	-	-	-	-
17	Room No. 111	2	-	-	-	-	-	-	-
18	Room No. 106	8	-	-	-	-	-	-	-
19	Room No. 107	32	-	-	-	-	-	-	-
20	Room No. 108	44	-	-	-	-	-	-	-
21	Room No. 109	8	-	-	-	-	-	-	-
22	Room No. 110	6	-	-	-	-	-	-	-
23	Server Room	4	-	-	-	-	-	-	-
24	Principal Office Area	-	-	-	-	-	-	-	32
25	Admin. Office	-	-	-	-	-	-	26	-
26	Room No. 128	-	-	-	-	-	-	12	-
27	Accounts Branch Area	-	-	-	-	-	-	24	-
28	Room No. 129	12	-	-	-	-	-	-	-
29	Room No. 130	4	-	-	-	-	-	-	-
30	Room No. 131	4	-	-	-	-	-	-	-
31	Room No. 132	4	-	-	-	-	-	-	-
32	Room No. 133	4	-	-	-	-	-	-	-
33	Room No. 134	4	-	-	-	-	-	-	-
34	Room No. 135	4	-	-	-	-	-	-	-
35	Room No. 136	36	-	-	-	-	-	-	-
36	Room No. 137	12	-	-	-	-	-	-	-
37	Room No. 138	8	-	-	-	-	-	-	-
38	Room No. 139	8	-	-	-	-	-	-	-
39	Room No. 140		-	-	-		-		

		12				-		-	-
40	Room No. 141	10	-	-	-	-	-	-	-
41	Room No. 142	6	-	-	-	-	-	-	-
42	Room No. 143	18	-	-	-	-	-	-	-
43	Room No. 144	-	-	-	-	-	10	-	-
44	Room No. 145	24	-	-	-	-	-	-	-
45	Room NO. 146	10	-	-	-	-	-	-	-
46	Room No. 148	4	-	-	-	-	-	-	-
47	Room No. 149	16	-	-	-	-	-	-	-
48	Room No. 150	22	-	-	-	-	-	-	-
49	Room No. 151	12	-	-	-	-	-	-	-
50	Room No. 152	108	-	-	-	-	-	-	-
51	Room No. 153	9	-	-	-	-	-	-	-
52	Room No. 154	8	-	-	-	-	-	-	-
53	Room No. 155	-	-	6	-	-	-	-	-
54	Room No. 156	-	-	37	-	-	-	-	-
55	Room No. 157	-	-	34	-	-	-	-	-
56	Room No. 158	-	-	8	-	-	-	-	-
57	Room No. 201	-	-	-	-	-	4	-	-
58	Room No. 202	-	-	-	-	-	4	-	-
59	Room No. 203	-	-	-	-	-	4	-	-
60	Room No. 204	-	-	-	-	-	4	-	-
61	Room No. 205	-	-	-	-	-	4	-	-
62	Room No. 206	-	-	-	-	-	4	-	-

63	Room No. 207	12	-	-	-	-	-	-	-
64	Room NO. 208	12	-	-	-	-	-	-	-
65	Room No. 209	12	-	-	-	-	-	-	-
66	Room No. 210	12	-	-	-	-	-	-	-
67	Room NO. 211	-	-	-	-	-	12	-	-
68	Room No. 212	-	-	-	-	-	12	-	-
69	Room No. 213	2	-	-	-	-	-	-	-
70	Room No. 214	-	-	-	-	-	8	-	-
71	Room No. 215	-	-	-	-	-	9	-	-
72	Room No. 216	-	-	-	-	-	8	-	-
73	Room No. 217	-	-	9	-	-	-	-	-
74	Room No.218	6	-	-	-	-	-	-	-
75	Room No.219	12	-	-	-	-	-	-	-
76	Room No. 220	8	-	-	-	-	-	-	-
77	Room No. 221	8	-	-	-	-	-	-	-
78	Room No. 222	8	-	-	-	-	-	-	-
79	Room No.223	8	-	-	-	-	-	-	-
80	Room No. 224	8	-	-	-	-	-	-	-
81	Room No. 225	12	-	-	-	-	-	-	-
82	Room No. 226	8	-	-	-	-	-	-	-
83	Room No. 227	8	-	-	-	-	-	-	-
84	Room No.228	14	-	-	-	-	-	-	-
85	Room No. 229	14	-	-	-	-	-	-	-
86	Room No. 230		-	-	-		-		

		14				-		-	-
87	Room No. 231	8	-	-	-	-	-	-	-
88	Room No. 232	-	-	-	-	-	4	-	-
89	Room No. 233	-	-	-	-	-	8	-	-
90	Room No. 234	-	-	-	-	-	4	-	-
91	Room No. 235	-	-	-	-	-	14	-	-
92	Roomn No. 236	4	-	-	-	-	20	-	-
93	Roomn no.237	4	-	-	-	-	-	-	-
94	Room No. 238	12	-	-	-	-	-	-	-
95	Room No.239	18	-	-	-	-	-	-	-
96	Room No. 240	6	-	-	-	-	-	-	-
97	Room No.241	18	-	-	-	-	-	-	-
98	Room No.242	4	-	-	-	-	-	-	-
99	Room No. 243	4	-	-	-	-	-	-	-
100	Room No. 244	4	-	-	-	-	-	-	-
101	Room No. 245	4	-	-	-	-	-	-	-
102	Room No. 246	12	-	-	-	-	-	-	-
103	Room No. 247	45	-	-	-	-	-	-	-
104	Room No. 248	36	-	-	-	-	-	-	-
105	Room No. 249	18	-	-	-	-	-	-	-
106	Room No. 250	12	-	-	-	-	-	-	-
107	Room no.251	22	-	-	-	-	-	-	-
108	Room No. 252	6	-	-	-	-	-	-	-
109	Room No. 253	42	-	-	-	-	-	-	-

110	Room No. 254	10	-	-	-	-	-	-	-
111	Room No. 255	40	-	-	-	-	4	-	-
112	Room No. 256	-	-	2	-	-	-	-	-
113	Room No. 257	-	-	-	-	-	2	-	-
114	Room No. 258	-	-	-	-	-	2	-	-
115	Room No. 259	-	-	-	-	-	2	-	-
116	Room No. 260	22	-	-	-	-	-	-	-
117	Room No. 261	129	-	-	-	-	-	-	-
118	Room No. 262	16	-	-	-	-	-	-	-
119	Room No. 263	-	-	6	-	-	-	-	-
120	Room No. 264	-	-	20	-	-	-	-	-
121	Room No. 265	-	-	45	-	-	4	-	-
122	Room No. 266	-	-	6	-	-	6	-	-
123	Room No. 267	-	-	11	-	-	8	-	-
124	Room No. 268	-	-	11	-	-	8	-	-
125	Room No. 301	36	-	-	-	-	-	-	-
126	Room No. 302	24	-	-	-	-	-	-	-
127	Room No. 303	10	-	-	-	-	-	-	-
128	Room No. 304	45	-	-	-	-	-	-	-
129	Room No. 305	42	-	-	-	-	-	-	-
130	Room No. 306	12	-	-	-	-	-	-	-
131	Room No. 307	18	-	-	-	-	-	-	-
132	Room No. 308	78	-	-	-	-	-	-	-
133	Room No. 309	-	-	-	-				

						-	4	-	-
134	Room No. 310	4	-	-	-	-	-	-	-
135	Room No. 311	-	-	-	-	-	2	-	-
136	Room No. 312	36	-	-	-	-	-	-	-
137	Room No. 313	-	-	-	-	-	-	-	-
138	Room No. 314	31	-	-	-	-	5	-	-
139	Room No. 315	-	-	6	-	-	-	-	-
140	Room No. 316	-	-	9	-	-	-	-	-
141	Room No. 317	-	-	6	-	-	-	-	-
142	Room No. 318	-	-	11	-	-	-	-	-
143	Room No. 319	-	-	11	-	-	-	-	-
144	Room No. 320	-	-	12	-	-	-	-	-
145	Room No. 321	-	-	6	-	-	6	-	-
146	Room No. 322	-	-	11	-	-	8	-	-
147	Room No. 323	-	-	11	-	-	8	-	-
148	College Library Building	-	-	-	-	-	495	-	-
149	College Canteen	18	-	-	-	-	20	-	-
150	Student Activity Room	-	-	-	-	-	14	-	-
151	Nescafe Kiosk	4	-	-	-	-	-	-	-
152	Pizza AND More	4	-	-	-	-	-	-	-
153	DRC Server Room	4	-	-	-	-	-	-	-
154	New Building Terrace	-	-	-	-	8	-	-	-
	TOTAL	1,596	-	278	-	8	782	102	44

6.3 LUX MEASUREMENT

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

Observation

College has initiated LED based lighting solution, but still there are 15 96(36W) tube lights. LEDs save energy, the life span is much greater and emit virtually no heat. We recommend to replace the tube lights with LEDs.

Additionally, we recommend to install motion sensor-based lights in common areas such as library, washrooms, corridors, etc.

We also recommend to increase solar lights for open areas like parking, ground, street lights, etc. and motion sensor lights for common areas such as library, corridors, washrooms, etc. Table below shows the performance characteristics comparison of all luminaries.

Table - Luminous Performance Characteristics of Commonly Used Luminaries					
Type of Lamp	Lumens/Watt		Colour Rendering Index	Typical Application	Typical Life
	Range	Avg.			
Incandescent	8-18	14	Excellent (100)	Homes, restaurants, general lighting emergency lighting	1000
Fluorescent lamps	46-60	50	Good w.r.t coating (67-77)	Offices, shops, hospitals, homes	5000
Compact fluorescent Lamps (CFL)	40-70	60	Very Good (85)	Hotels, shops, homes, offices	8000-10000

High pressure mercury (HPMV)	44-57	50	Fair (45)	General lighting in factories, garages, car parking. flood lighting	5000
Halogen lamps	18-24	22	Excellent (100)	Display, flood lightening, stadium exhibition grounds, construction areas	2000 - 4000
High pressure sodium (HPSV) SON	67-121	90	Fair (22)	General lighting in ware houses, factories, street lighting	6000 - 12000
Low pressure sodium (LPSV) SOX	101-175	150	Poor (10)	Roadways, tunnels, canals, street lighting	6000 - 12000
Metal halide lamps	75-125	100	Good (70)	Industrial bays, spot lighting, flood lighting, retail stores	8000
LED Lamps	30-50	40	Good (70)	Reading lights, desk lamps, night lights, spotlights, security lights, signage lights, etc.	40000 - 100000

7. OTHER POWER CONSUMPTION

7.1 INVENTORY OF IT INFRASTRUCTURE

Sl No.	Location/ Identification	Laptops	Desktops	Notebook	Tablets	Printers/ Scanners	UPS
1	Botany Lab. 129						
2	Botany Lab. 130						
3	Room No. 141						
4	Room No. 142						
5	Room No. 143						
6	Room No. 152						

7	Room No. 153						
8	Room No. 240						
9	Room No. 251						
10	Ground Floor Main Gate						
11	Ground Floor New Building						
12	College Library						
13	Auditorium						
14	Canteen						
15	First Floor New Building Physics Lab.	1040	386	116	3	47	15
16	First Floor Old Building Physics Lab.						
17	First Floor Accounts Branch						
18	Common water cooler						
19	First Floor Geography Deptt.						
	TOTAL	1040	386	116	3	47	15

7.2 WATER PUMP DETAILS

Pump Details		
Pump No.-1	Main Gate 7.5 hp 1 hp	Hostel Main Gate 7.5 hp (1), 5 hp (1)
Pump No.-2	New Building Mono Booster Pump 5 hp No.3	Submersible Pump Hostel Old Block/
Pump No.3	Teachers Flat 7.5 hp, 5hp, 1 hp	Submersible Pump Hostel New Block/
Pump No.-4	Non-Teaching Flat 7.5 (2) 1 hp (1)	Submersible Pump Paper Plant
Pump No.-5	College R.O.Plant 5 hp (2), 1 hp (2)	Librar , Canteen, New Building, Old Building
Pump No.-6	Hostel R.O.Plant 5 hp (2), 3 hp (1), 1 hp (2)	Submersible at Sports Ground and Botany Herbal Garden

7.3 OTHER LOADS

Sl No.	Location/Identification	160W Exhaust Fan	Water Cooler-200W
1	Botany Lab. 129	2	
2	Botany Lab. 130	2	
3	Room No. 141	1	
4	Room No. 142	1	

5	Room No. 143	1	
6	Room No. 152	4	
7	Room No. 153	1	
8	Room No. 240	1	
9	Room No. 251	4	
10	Ground Floor Main Gate		1
11	Ground Floor New Building		1
12	College Library		1
13	Auditorium		1
14	Canteen		1
15	First Floor New Building Physics Lab.		1
16	First Floor Old Building Physics Lab.		1
17	First Floor Accounts Branch		1
18	Common water cooler		2
19	First Floor Geography Deptt.		1
	TOTAL	**17**	**11**

ANALYSIS

There should be regular maintenance schedule of equipment like pumps, exhaust fans and IT equipment. Electronics such as computers, printers, scanners, etc. more than 3 year or 5 years (as per their life) should be replaced with new computers/laptops. Ideal Temperature should be maintained for all electronic appliances.

8. CAPACITOR BANK

Sl. No.	Identification	Capacity in KVAR
1	Substation I	500 KVAR
2	Substation II	500 KVAR

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