IIHMR UNIVERSITY

Registrar
The IIHMR University
1, Prabhu Dayal Marg
Near Sanganer Airport, Jaipur-302029

IIHMR UNIVERSITY

ENERGY AUDIT REPORT

2023-2024

PREPARED BY
EHS ALLIANCE SERVICES

TABLE OF CONTENT

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CERTIFICATE

EHS alliance

CERTIFICATE

PRESENTED TO

IIHMR UNIVERSITY

1, Prabhu Dayal Marg,Near Sanganer Airport, Jaipur - 302029

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 2023-24

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

SIGNATURE

10.04.2024
DATE OF AUDIT

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ACKNOWLEDGEMENT

EHS Alliance Services would like to thank the management of IIHMR University for assigning this important work of Energy Audit. We appreciate the cooperation to the teams for the completion of the assessment.

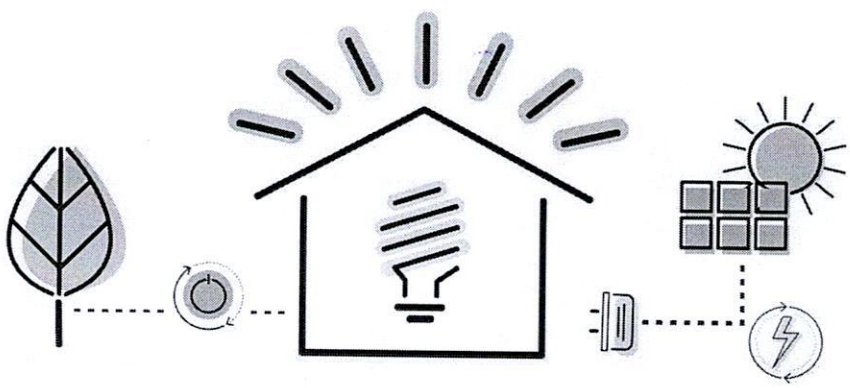
First of all, we would like to thank ***Dr. P. R. Sodani - President of IIHMR University*** for allowing us to evaluate the environmental performance of the campus.

We would also like to thank **Dr. Susheela Sharma, *Chief Admin Officer & Audit Coordinator***, 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

Mr. Hem K. Bhargava	*Registrar*
Dr. Goutam Sadhu	*Professor*
Dr. Tripti Bisawa	*Coordinator, IQAC*
Dr. Hemant Kumar Mishra	*Faculty Member*



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DISCLAIMER

EHS Alliance Services Energy Audit Team has prepared this Energy Audit Report for IIHMR University based on input data submitted by the representatives of university 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

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ABBREVIATION

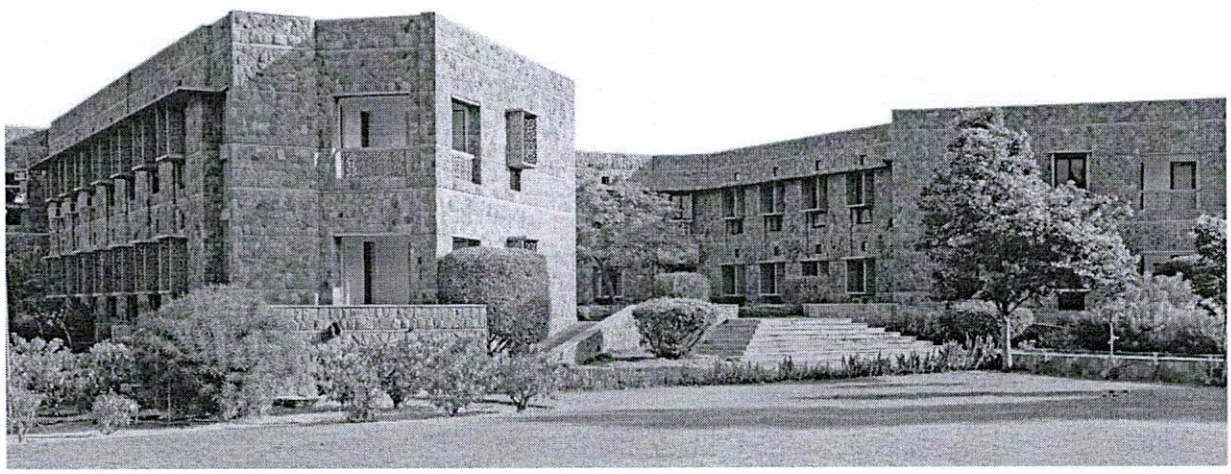
A	Amps
AC	Air Conditioner
AC	Alternating Current
AMET	Academy of Maritime Education and Training
CFL	Compact fluorescent lamp
CIP	Comprehensive Inspection Program
DC	Direct Current
HSD	High-Speed Diesel
Hz	Hertz
kg	Kilogram
kVA	kilo-volt-ampere
kW	kilo Watts
kWh	kilowatt hour
kWp	Kilowatt peak
LED	Light 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 meter

OVERVIEW OF THE UNIVERSITY

The genesis of IIHMR University dates to October 5, 1984, when its sponsoring body, the Indian Institute of Health Management Research, was established. In 2014, IIHMR University was established and incorporated as a postgraduate research university by the Government of Rajasthan vide the IIHMR University, Jaipur Act, 2014 (Act No. 3, of 2014).

The University has four Schools:

- Institute of Health Management Research (IHMR)
- School of Pharmaceutical Management (SPM)
- School of Development Studies (SDS)
- S. D. Gupta School of Public Health (SDG-SPH)



IIHMR University has a multi-disciplinary faculty team that is extensively engaged in academics, research, training, consultancy, partnerships, and collaborations. IIHMR University offers the following postgraduate programs: MBA (Hospital and Health Management), MBA (Pharmaceutical Management), MBA (Development Management).

IIHMR University offers Ph.D. programs in public health, health management, hospital management, digital health, and development studies.

IIHMR University has significantly contributed to the Executive Development and Management Development Programs by consistently engaging in EDPs/MDPs for national and international

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participants, working with government, national and international NGOs, and private sector organizations. Participants from more than 40 countries benefitted from the EDPs/MDPs. IIHMR University offers the following executive programs: Executive MPH, Executive MHA, Executive MBA (CSR & ESG Management), Executive PGDM (Micro and Small Business Management/ Banking, Finance, and Insurance Management), Certificate Course on Digital Health and Executive Master of Public Health Management (EMPMH) for Government of Odisha.

MISSION & VISION

MISSION

IIHMR University is dedicated to the improvement in standards health through better management of health care and relat programmes. It seeks to accomplish this through manageme education, research, training, consultation and institutior networking in a national and global perspective.

VISION

To become a world-class higher education institution by promoti education and research for betterment of society.

Facilities in the campus

IIHMR University's beautiful campus is among the best designed and landscaped campuses in the country. Spread over 14.37 acres, the campus is lush green and punctuated by wonderful buildings, tall trees, and pathways. The pictures on this page give you a glimpse into this wonderful world.

GREEN CAMPUS: IIHMR University boasts a pristine, eco-friendly campus adorned with lush greenery, exquisite landscaping, and vibrant flower beds.

COMPUTER LAB: IIHMR University's Computer Center is equipped with cutting-edge technology to support both academic and administrative tasks year-round. In addition to facilitating university activities such as research, teaching, training, and consultancy, the center actively engages in software development, particularly in the healthcare sector.

SPORTS ACTIVITIES: IIHMR University encourages students to engage in sports for leisure and fitness. We offer facilities for various sports including lawn tennis, table tennis, carom, billiards, cricket, football, badminton, basketball, and volleyball. Students often enjoy participating in and spectating these activities in the evenings.

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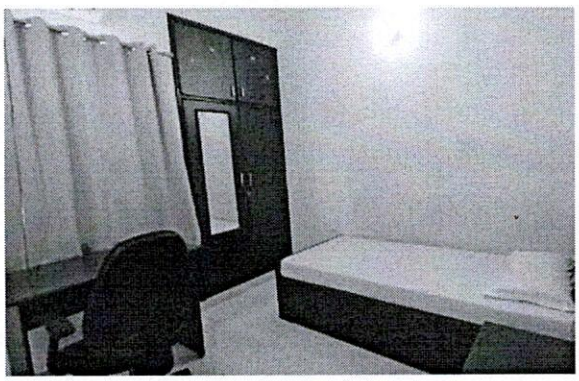
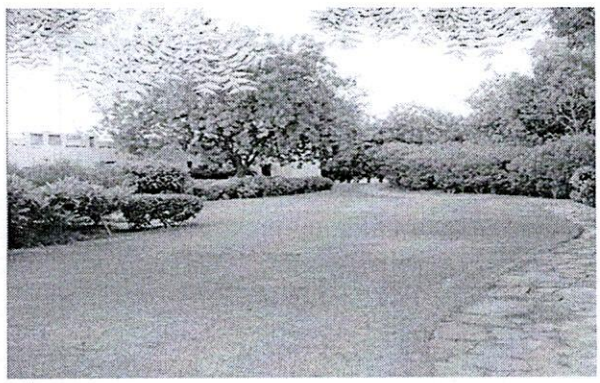
MESS: IIHMR University operates a large mess serving wholesome and nutritious meals to students.

CANTEEN: Students can also dine at on-campus canteen, which offers healthy and affordable food options ranging from spicy samosas to full meals. The menu includes a variety of chocolates and soft drinks to cater to different preferences.

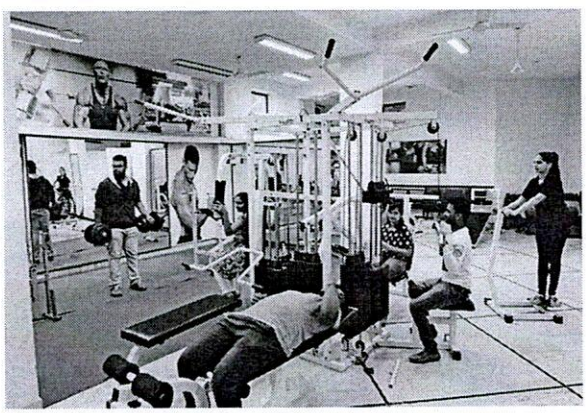
HOSTEL: IIHMR University provides comfortable hostel accommodations on campus, featuring spacious, well-furnished rooms with both air-conditioned and air-cooled options, along with modern amenities for student convenience.



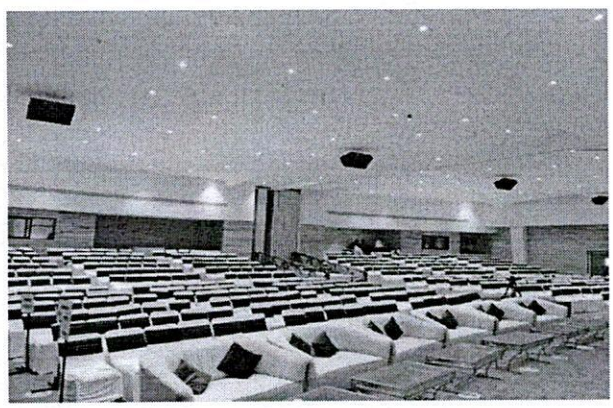
Hostel



Lush Green Campus



Well Equiped Gyms



Spacious Auditorium

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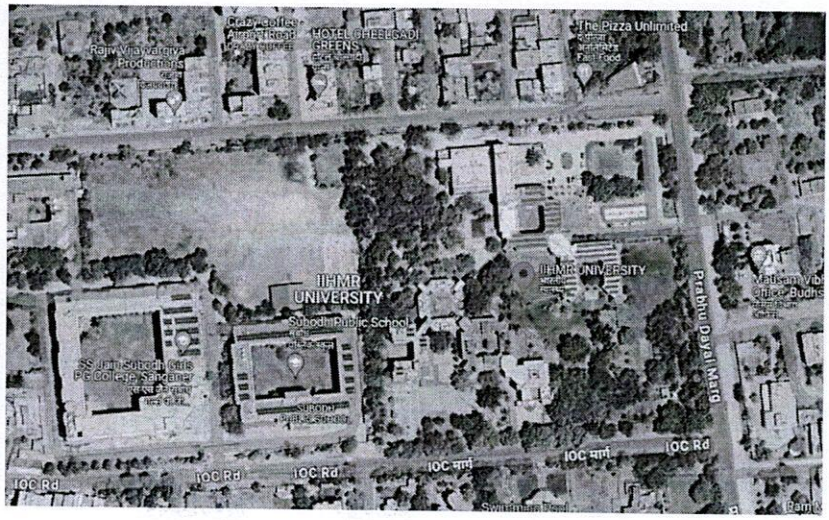
Geo Location
Geo Coordinates from Google maps:
26.820572, 75.816055



AUDIT PARTICIPANTS

On behalf of the university

Name	Designation
Dr. P. R. Sodani	*President of IIHMR University*
Shri Hem K. Bhargava	*Registrar*
Dr. Goutam Sadhu	*Professor*
Dr. Susheela Sharma	*Chief Administrative Officer*
Dr. Tripti Bisawa	*Coordinator, IQAC*
Dr. Hemant Kumar Mishra	*Faculty Member*
Mr. Subhash Kumar Jha	*A.M. Administration*
Ms. Baishakhi Roy	*Admin Department*
Mr. Shiv Prasad Sharma	*Asst. Civil Engineer*

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*

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EXECUTIVE SUMMARY

The purpose of this Energy Audit was to seek opportunities to improve the energy efficiency of the IIHMR University. 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 IIHMR University. 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 IIHMR University.

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 July 2023 to June 2024

The details of **"Meter Connection"** at **"IIHMR University"** are as follows-

Name	-	Indian Institute of Health Management
CA No.	-	211464033162

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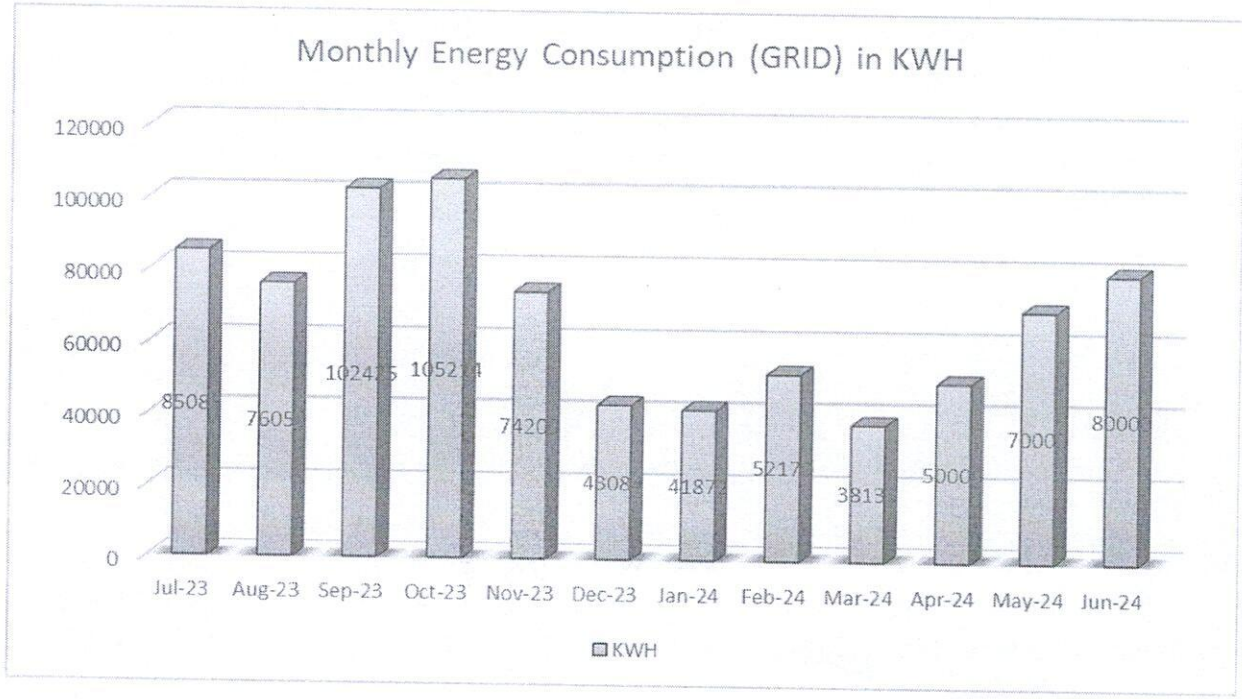
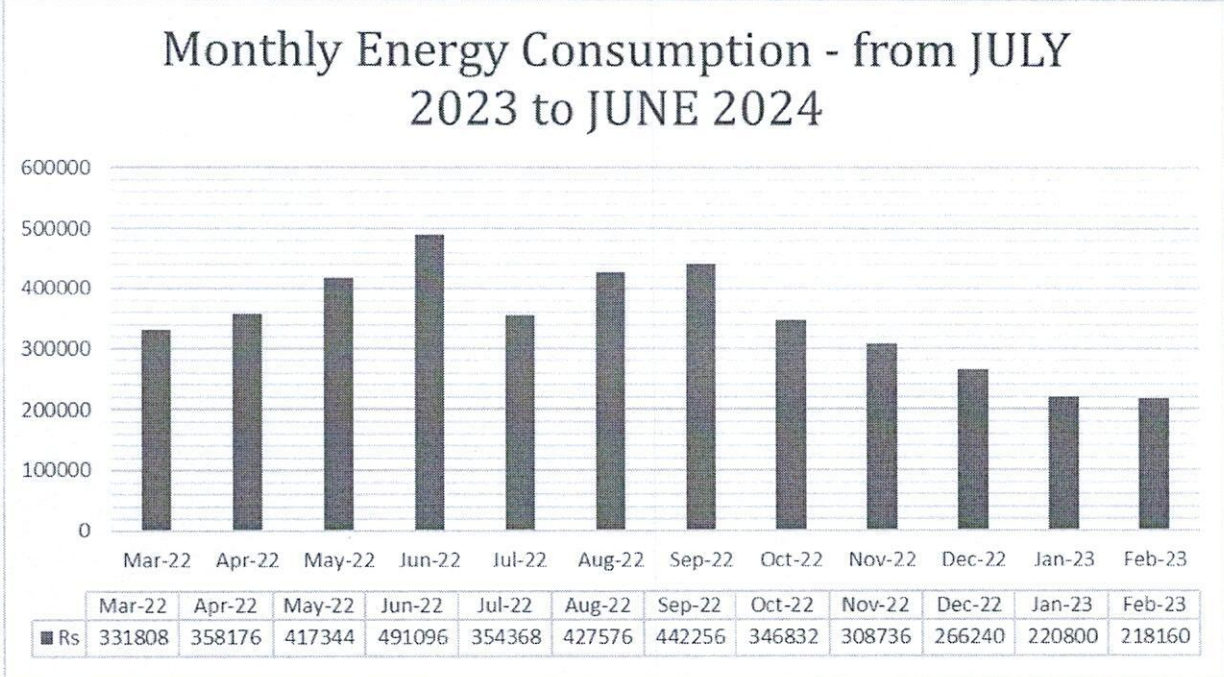
1.1 Summary of Monthly Electricity Consumption and Total Bill Amount

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 2023 to June 2024

Month	Grid Units	Amount	Solar Units	Total Units	Amount
Jul-23	*85085*	*8.50*	*10876*	*95961*	*815668*
Aug-23	*76050*	*8.50*	*11900*	*87950*	*747575*
Sep-23	*102425*	*8.50*	*11872*	*114297*	*971525*
Oct-23	*105214*	*8.50*	*13524*	*118738*	*1009273*
Nov-23	*74200*	*8.50*	*9740*	*83940*	*713490*
Dec-23	*43084*	*8.50*	*10880*	*53964*	*458694*
Jan-24	*41872*	*8.50*	*10252*	*52124*	*443054*
Feb-24	*52170*	*8.50*	*12364*	*64534*	*548539*
Mar-24	*38135*	*8.50*	*13600*	*51735*	*439748*
Apr-24	*50000*	*8.50*	*12000*	*62000*	*527000*
May-24	*70000*	*8.50*	*12000*	*82000*	*697000*
Jun-24	*80000*	*8.50*	*12000*	*92000*	*782000*
SUM	***818235***		***141008***	***959243***	***8153566***



Note: April, May and June data is on pro rata basis.



	Mar-22	Apr-22	May-22	Jun-22	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Jan-23	Feb-23
Rs	331808	358176	417344	491096	354368	427576	442256	346832	308736	266240	220800	218160

2. DIESEL CONSUMPTION

Below is the diesel consumption details in litres from July 2023 to June 2024.

Period	Diesel consumption (in litres)
Jul-23	*600.00*
Aug-23	*500.00*
Sep-23	*500.00*
Oct-23	*185.00*
Nov-23	*395.00*
Dec-23	*400.00*
Jan-24	*400.00*
Feb-24	*200.00*
Mar-24	*0.00*
Apr-24	*150.00*
May-24	*400.00*
Jun-24	*400.00*
Total	***4130.00***

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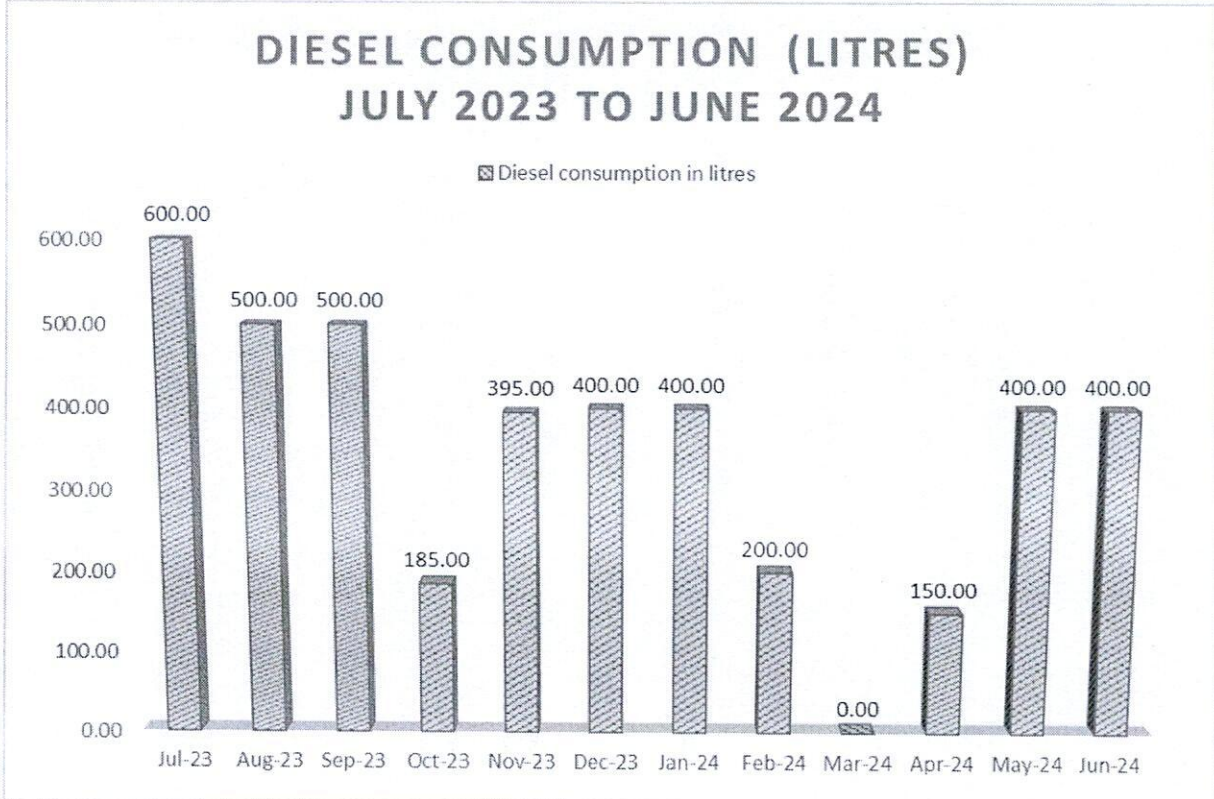

3. ANALYSIS OF DG SETS

In the campus, there are two Diesel Generator (DG) sets for its electrical power needs in case of Grid power failure. DG sets capacity is 570 kVA.

DG Set Design Details			
Description	***Unit***	***DG at Station 1***	***DG at Station 1***
Rated capacity	*kVA*	*250*	*320*
Hz		*50.6*	*50*
Sl No.		*NIIL528578*	*N21D178391*
Make		*Sudhir (Cummins)*	*Sudhir (Cummins)*
Volts	*Volts*	*415*	*415*
PF			
Phase		*3 Phase*	*3 Phase*
RPM		*1500*	*1500*
Amps	*Amps*	*250*	*250*
Mfg.		*2015*	*2021*

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DG Set Operation details		
Operating hours during testing	*Hours*	*0.50*
% Loading	*%*	*66.56*
Energy Generation	*kWh*	*32.15*
Load	*kVA*	*93.25*
Fuel consumption during testing	*Litre*	*8*
Specific energy generation	*kWh/litre*	*3.18*

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 66.56% which is ok and specific energy consumption of DG Sets 3.18 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 university 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 IIHMR University in various areas of various capacity which detail is given below:-

Sl No.	Location/Identification	Type(Window/ S)	(Qty.)	TR	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	Class Room-1	S	2	0.75	24	11.5	19	53	0.03	2.3	23	38	0.36	0.75	1.81	1.94
2	Class Room-1	S	4	2	24	12	20	52	0.03	2.2	25	38	0.32	2	1.72	2.04
3	Class Room-1	S	1	1.5	24	11	19	52	0.03	2.6	24	37	0.38	1.5	1.52	2.31
4	Vacant room near to Class room 1	S	1	1.5	24	10	18	52	0.03	2.4	24	37	0.35	1.5	1.53	2.3
5	Class Room-2 & 3	S	4	2	23	11	19	52	0.03	2	22	37	0.33	2	1.74	2.02
6	Class Room-4	S	4	2	23	12	20	52	0.03	2.2	25	38	0.32	2	1.74	2.03
7	Class Room-5	S	2	1.5	23	12	19	52	0.03	2.3	24	37	0.33	1.5	1.74	2.02
8	Class Room-6 (OLD Auditorium)	S	1	2	23	13	20	52	0.03	2.5	26	38	0.31	2	1.87	1.88
9	Class Room-6 (OLD Auditorium)	P	1	10	24	12	21	52	0.03	2.2	24	39	0.34	10	1.92	1.83
10	Class Room-6 (OLD Auditorium)	P	1	3	23	12	20	52	0.03	2.5	25	38	0.34	3	1.87	1.88
11	Class Room-7 (Conference Hall)	P	1	0.75	22	10	19	52	0.03	2.2	20	37	0.39	2	1.99	1.77
12	Class Room-8	C	2	1.5	24	11	20	52	0.03	2.3	22	38	0.38	1.5	1.69	2.08
13	Class Room-9	S	1	2	23	12	20	52	0.03	2.5	25	38	0.34	2	1.87	1.88
14	Class Room-9	S	2	1.5	24	12	20	53	0.03	2.5	25	38	0.34	1.5	1.79	1.97
15	Class Room-10	S	2	2	22	11.5	22	52	0.03	2.1	23	43	0.44	2	1.77	1.99
16	Class Room-10	S	2	1.5	24	12	20	53	0.03	2.4	25	38	0.33	1.5	1.78	1.98
17	Class Room-11	S	1	2	23	11	21	52	0.03	2.4	24	40	0.4	2	1.8	1.95
18	Class Room-11	C	3	1.5	23	12	20	52	0.03	2.5	25	38	0.34	1.5	1.86	1.89
19	Class Room-12	S	1	2	22	10	19	52	0.03	2.2	20	37	0.39	2	1.99	1.77
20	Class Room-12	S	4	2	24	11	19	52	0.03	2.6	24	37	0.38	2	1.52	2.31
21	Class Room-13	S	4	2	24	10	18	52	0.03	2.4	24	37	0.35	2	1.53	2.3
22	Class room 16 (New Auditorium)	C	4	2	23	12	20	52	0.03	2.3	25	38	0.33	2	1.67	2.11
23	Medical room	W	1	0.75	24	11	18	52	0.03	2.4	22	37	0.38	0.75	1.69	2.08
24	UPS Room- Academic Building	S	1	2	23	11	19	52	0.03	2	22	37	0.33	2	1.74	2.02

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25	Marketing Office	S	2	2	23	13	20	52	0.03	2.3	26	38	0.31	2	1.74	2.02
26	Tutorial 2 (Currently Placement Office)	S	2	2	23	12	20	52	0.03	2.2	25	38	0.32	2	1.74	2.03
27	Examination Block	S	4	2	23	12	19	52	0.03	2.3	24	37	0.33	2	1.74	2.02
28	Room No.- ..... Arindam Das	W	1	0.75	22	11.5	22	52	0.03	2.1	23	43	0.44	0.75	1.77	1.99
29	Room No.- 305, Vinod Tejwani	S	1	2	24	11	20	52	0.03	2.3	22	38	0.38	2	1.69	2.08
30	Room No.- 302	S	1	2	24	12	20	53	0.03	2.5	25	38	0.34	2	1.79	1.97
31	Room No.- 304 (Tutorial 1 - 2nd Floor)	S	1	2	24	12	20	53	0.03	2.4	25	38	0.33	2	1.78	1.98
32	Room No. 306	S	1	2	23	12	20	52	0.03	2.5	25	38	0.34	2	1.87	1.88
33	Room No. 307	S	1	2	22	11.5	22	52	0.03	2.1	23	43	0.44	2	1.77	1.99
34	EPBAX Room	S	1	1.5	23	11	19	53	0.03	2.4	22	38	0.4	1.5	2.02	1.74
35	Chairman Office (Dismented and Ac shifted to Ground floor of New Auditorium)	S	2	1.5	23	11	21	53	0.03	2.5	24	40	0.42	1.5	1.77	1.99
36	old Open area/ Placement Office (Dismented and Ac shifted to Ground floor of New Auditorium)	S	1	1.5	22	12	20	52	0.03	2.6	25	38	0.35	1.5	2.02	1.74
37	Office Rajeev JI (Dismented and Ac shifted to Ground floor of New Auditorium)	W	1	0.75	24	11	18	53	0.03	2.4	22	37	0.38	0.75	1.7	2.07
38	Admin Block (dismented and shifted to New Auditorium Basement)	S	2	2	23	11	21	52	0.03	2.4	24	40	0.4	2	1.8	1.95
39	Room No. 217	W	1	0.75	23	12	18	52	0.03	2.4	24	37	0.33	0.75	1.88	1.87
40	Room No. 219	W	1	0.75	24	12	21	52	0.03	2.4	24	39	0.38	0.75	1.76	2
41	Room No. ..... Tripti Biswas	S	1	1.5	24	11	20	52	0.03	2.2	22	38	0.39	1.5	1.61	2.18
42	President Office- PA	W	1	0.75	24	11.5	19	52	0.03	2.1	23	38	0.33	0.75	1.92	1.83
43	Room No. 222- President Office	S	1	2	22	10	19	52	0.03	2.2	20	37	0.39	2	1.99	1.77
44	Room No.-227- President Waiting Lounge	S	1	2	24	12	20	52	0.03	2.2	25	38	0.32	2	1.72	2.04
45	Room No.- President Room	S	1	2	23	11	19	52	0.03	2	22	37	0.33	2	1.74	2.02
46	First Floor- Admin Work Station	S	2	2	23	12	20	52	0.03	2.2	25	38	0.32	2	1.74	2.03
47	Board Room	S	2	2	23	13	20	52	0.03	2.5	26	38	0.31	2	1.87	1.88

48	Studio 1	S	1	1.5	24	11	19	52	0.03	2.6	24	37	0.38	1.5	1.52	2.31
49	Studio 2	S	1	1.5	24	10	18	52	0.03	2.4	24	37	0.35	1.5	1.53	2.3
50	Work Station of Studio Rooms	S	1	1.5	23	12	19	52	0.03	2.3	24	37	0.33	1.5	1.74	2.02
51	Room No. ..... Mr. Ashok Agarwal	W	1	0.75	24	12	21	53	0.03	2.3	24	39	0.36	0.75	1.76	2
52	Room No. ..... Mr. Niraj Shrivastava	S	1	2	23	12	20	52	0.03	2.5	25	38	0.34	2	1.87	1.88
53	Room No. ..... Mr. Hem Bhargava (Registrar)	W	1	0.75	24	11	18	53	0.03	2.3	22	37	0.36	0.75	1.81	1.94
54	Room No. ..... Chair person's Office	W	1	0.75	22	12	20	52	0.03	2.6	25	38	0.35	0.75	2.02	1.74
55	Room No. ..... Mr. SD Gupta	S	1	2	22	11.5	22	52	0.03	2.1	23	43	0.44	2	1.77	1.99
56	Room No. ..... HR Office (Old)	S	1	2	23	11	21	52	0.03	2.4	24	40	0.4	2	1.8	1.95
57	Room No. ..... Raj Kr. Pathak	W	1	0.75	23	12	19	52	0.03	2.3	24	37	0.33	0.75	1.74	2.02
58	Room No. 115D	W	1	0.75	24	11	18	52	0.03	2.4	22	37	0.38	0.75	1.69	2.08
59	Room No. ..... Society's Account Office	W	1	0.75	24	11.5	19	53	0.03	2.3	23	38	0.36	0.75	1.81	1.94
60	Room No. 201	W	1	0.75	24	11	18	52	0.03	2.4	22	37	0.38	0.75	1.69	2.08
61	Room No. 202	W	1	0.75	22	11.5	22	52	0.03	2.1	23	43	0.44	0.75	1.77	1.99
62	Room No. 203	W	1	0.75	24	11	18	53	0.03	2.4	22	37	0.38	0.75	1.7	2.07
63	Room No. 204	W	1	0.75	23	12	18	52	0.03	2.4	24	37	0.33	0.75	1.88	1.87
64	Room No. 205	W	1	0.75	24	12	21	52	0.03	2.4	24	39	0.38	0.75	1.76	2
65	Room No. 206	W	1	0.75	24	11.5	19	52	0.03	2.1	23	38	0.33	0.75	1.92	1.83
66	Research Wing A 1	S	1	1.5	24	11	20	52	0.03	2.3	22	38	0.38	1.5	1.69	2.08
67	Research Wing A 2	S	1	1.5	24	12	20	53	0.03	2.5	25	38	0.34	1.5	1.79	1.97
68	Research Wing B	S	1	2	22	10	19	52	0.03	2.2	20	37	0.39	2	1.99	1.77
69	Room No. 207	W	1	0.75	24	12	21	53	0.03	2.3	24	39	0.36	0.75	1.76	2
70	Room No. 208	W	1	0.75	24	11	18	53	0.03	2.3	22	37	0.36	0.75	1.81	1.94
71	Room No. 209	W	1	0.75	22	12	20	52	0.03	2.6	25	38	0.35	0.75	2.02	1.74
72	Room No. 210	W	1	1.5	24	12	20	53	0.03	2.4	25	38	0.33	1.5	1.78	1.98
73	Room No. 211	W	1	0.75	23	12	19	52	0.03	2.3	24	37	0.33	0.75	1.74	2.02
74	Room No. 212	W	1	0.75	24	11	18	52	0.03	2.4	22	37	0.38	0.75	1.69	2.08
75	Room No. 214	S	1	2	24	11	19	52	0.03	2.6	24	37	0.38	2	1.52	2.31
76	Room No. 215	W	1	0.75	24	11	18	53	0.03	2.4	22	37	0.38	0.75	1.7	2.07
77	Guest Faculty 1st Floor	S	1	2	24	10	18	52	0.03	2.4	24	37	0.35	2	1.53	2.3
78	Faculty- Monika Choudhary	W	1	0.75	23	12	18	52	0.03	2.4	24	37	0.33	0.75	1.88	1.87
79	Faculty- Sumit Jain	S	1	2	23	12	20	52	0.03	2.3	25	38	0.33	2	1.67	2.11
80	Guest Faculty	S	1	2	23	11	19	52	0.03	2	22	37	0.33	2	1.74	2.02
81	Room No.- 315	S	1	2	23	13	20	52	0.03	2.3	26	38	0.31	2	1.74	2.02

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82	Room No. 506	S	1	1.5	23	12	20	52	0.03	2.5	25	38	0.34	1.5	1.86	1.89
83	Room No. 507	S	1	2	23	12	20	52	0.03	2.2	25	38	0.32	2	1.74	2.03
84	UPS Room- IT Building	S	1	2	23	12	19	52	0.03	2.3	24	37	0.33	2	1.74	2.02
85	Computer Lab- 1	S	6	2	24	11	20	52	0.03	2.3	22	38	0.38	2	1.69	2.08
86	Computer Lab- 2	S	2	2	24	12	20	53	0.03	2.5	25	38	0.34	2	1.79	1.97
87	Computer Lab- 3	W	1	1.5	23	11	19	53	0.03	2.4	22	38	0.4	1.5	2.02	1.74
88	Computer Lab- 3	T	1	3	23	12	20	52	0.03	2.3	25	38	0.33	3	1.67	2.11
89	Computer Lab- 3	S	1	2	24	12	20	53	0.03	2.4	25	38	0.33	2	1.78	1.98
90	Room No. 318	S	2	2	23	12	20	52	0.03	2.5	25	38	0.34	2	1.87	1.88
91	BCT Office	S	5	2	22	11.5	22	52	0.03	2.1	23	43	0.44	2	1.77	1.99
92	Gym Area	S	3	2	23	11	21	52	0.03	2.4	24	40	0.4	2	1.8	1.95
93	Hostel C Block	S	7	1.5	23	11	21	53	0.03	2.5	24	40	0.42	1.5	1.77	1.99
94	Hostel C Block	S	2	2	22	10	19	52	0.03	2.2	20	37	0.39	2	1.99	1.77
95	Hostel C Block	W	3	1.5	22	12	20	52	0.03	2.6	25	38	0.35	1.5	2.02	1.74
96	Club House- Dinning Area	S	4	2	23	11	21	53	0.03	2.5	24	40	0.42	2	1.77	1.99
97	Club House- Seminar Hall	W	2	1.5	24	11	20	52	0.03	2.2	22	38	0.39	1.5	1.61	2.18
98	Club House- Seminar Hall	T	3	3	24	11	20	52	0.03	2.3	22	38	0.38	3	1.65	2.14
99	Club House- Guest House Area	S	2	1.5	24	12	20	52	0.03	2.2	25	38	0.32	1.5	1.72	2.04
100	Club House- PMA Office	S	2	1.5	23	12	20	52	0.03	2.5	25	38	0.34	1.5	1.86	1.89
101	Club House- PMA Office	S	1	2	22	12	20	52	0.03	2.6	25	38	0.35	2	2.02	1.74
102	Club House- PMA Office	W	1	1	24	11	20	52	0.03	2.3	22	38	0.38	1	1.77	1.98
103	Club House- Director Bunglow	S	6	2	24	11	20	52	0.03	2.2	22	38	0.39	2	1.61	2.18
104	Hostel K Block	S	28	1	24	11	20	52	0.03	2.3	22	38	0.38	1	1.77	1.98
105	B Block Guest House	S	1	1	23	12	22	53	0.03	2.2	24	42	0.41	1	1.75	2
106	B Block Guest House	S	15	1.5	23	13	20	52	0.03	2.5	26	38	0.31	1.5	1.87	1.88
107	B Block Guest House	W	5	1	23	12	20	53	0.03	2.6	25	38	0.35	1	1.9	1.85
108	B Block Guest House	W	5	1.5	23	11	19	53	0.03	2.4	22	38	0.4	1.5	2.02	1.74
109	hostel 2nd D,E,F	S	24	1	24	11	20	52	0.03	2.3	22	38	0.38	1	1.65	2.14
110	hostel 1st A,B,C	S	54	0.75	24	12	21	52	0.03	2.4	24	39	0.38	0.75	1.76	2
111	Hostel J Block	S	80	0.75	24	11.5	19	52	0.03	2.1	23	38	0.33	0.75	1.92	1.83
112	Hostel J Block	VRV	1	10	24	12	20	52	0.03	2.2	25	38	0.32	2	1.72	2.04
113	Hostel J Block	VRV	1	4.5	24	12	20	53	0.03	2.3	24	39	0.36	3	1.79	1.96
114	Hostel J Block	S	9	2	24	12	20	52	0.03	2.2	25	38	0.32	2	1.72	2.04
115	Hostel J Block	S	2	1.5	23	12	20	52	0.03	2.3	25	38	0.33	1.5	1.67	2.11

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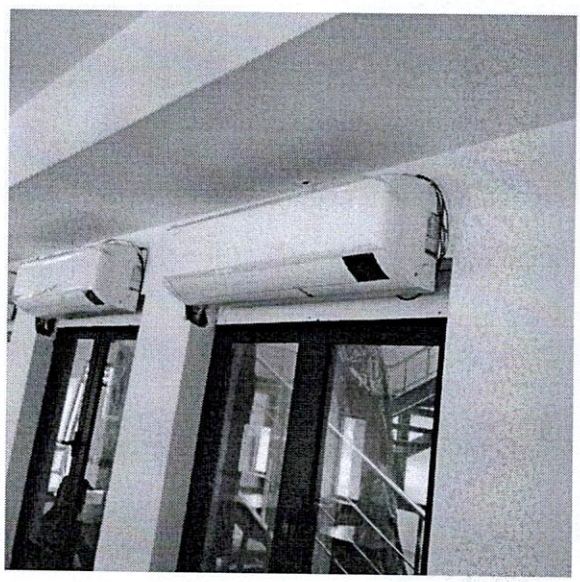
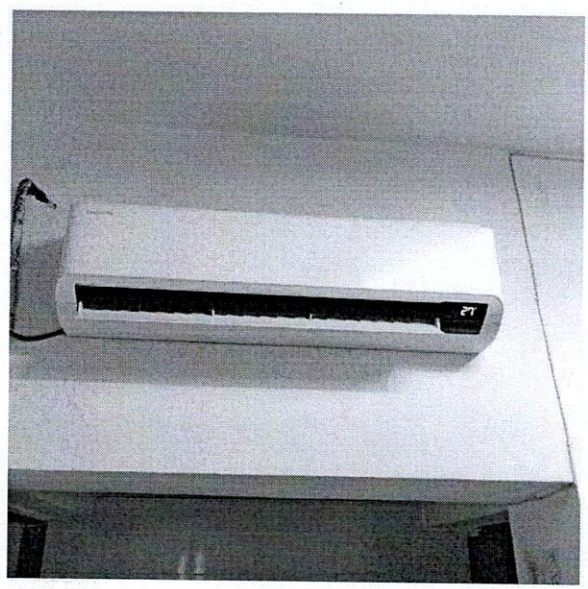
116	Hostel J Block	S	16	1	24	12	20	53	0.03	2.3	24	39	0.36	1	1.79	1.96
117	Hostel J Block	VRV	1	1	24	10	18	53	0.03	2.4	21	37	0.4	1	1.73	2.04
118	Accounts Department	S	1	1.5	24	11	19	52	0.03	2.6	24	37	0.38	1.5	1.52	2.31
119	Accounts Department	W	4	1.5	23	11	19	52	0.03	2	22	37	0.33	1.5	1.74	2.02

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 IIHMR University 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 IIHMR University, there are 874 fans installed. Wattage wise details are mentioned below along with the inventory details.

60Watt Fans – 361

32 Watt Fans – 110

80 Watt Fans – 403

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Sl No.	Location/ Identification	Ceiling Fan-60W	Ceiling Fan-32W	Wall Hanging Fan 80W	Total
1	V Tejwani	1			1
2	Room No. - Placement	2			2
3	Room No. - NK Sharma	1			1
4	Conference Hall	32		4	36
5	Room No. 225	1			1
6	Room No. 306	1			1
7	Faculty Wing 1,2 & Rooms	27			27
8	Class Room 1	11		2	13
9	Corridor class(1-4)	2			2
10	Class Room 2 & 3	11			11
11	Class Room 4	8			8
12	Class Room 5	5			5
13	Corridor- Studio	2			2
14	Class Room 8		4		4
17	Class Room 9	8			8
19	Class Room 10	8			8
21	Class Room 11		8		8
23	Class Room 12	9			9
24	Class Room 13	9			9
30	Hostel 1			72	72
31	Hostel 2			24	24
32	Hostel 3			96	96
33	Hostel 4 (J Block)			159	159
34	Hostel 5 (K Block)			36	36
35	Guest House (B Block)	40			40
37	Canteen Area	62		1	63
38	Director Bungalow	8		1	9
39	MDp Center	23			23
40	Staffs Quarters (C Block)	18			18
41	Guest Office	5		1	6
42	BCT BASEMENT	10		1	11
43	GYM AREA	11			11
44	COMPUTER LAB	14			14
45	SADANI'S SIR WING	12			12
46	NEERAJ SIR WING	12			12
47	PGDM BASEMENT	6		2	8
49	RECEPTION AREA	2		1	3
50	Admin/Accounts/HR Block- New		21		21
51	Library		25	3	28
52	New Auditorium		31		31
53	New Admin Block & SDGSPM		21		21
	Total	**361**	**110**	**403**	**874**

The observations and suggestions are given below.

Total no of Ceiling Fans (60W)	*Nos.*	*361*
Total no of Ceiling Fans (80W)	*Nos.*	*403*
Total wattage of 60W Ceiling Fans	*Watt*	*21660*
Total wattage of 80W Ceiling Fans	*Watt*	*32240*
Total wattage of BEE 5 Star rated Fans (30W)	*Watt*	*10830*
Total saving in Wattage after replacement	*Watt*	*43070*
Operating hours per day	*Hours*	*6*
Operating days per annum	*Days*	*180*
Energy charges per unit in Rs.	*INR*	*8.5*
Saving in Rs./annum	*INR*	*395383*
Investment INR	*INR*	*1997500*
Payback period:- Months	*YEARS*	*5.05*

Observation and Suggestions: -

The university has 110 BEE 5-star rated fans. But still, there are 361 60W fans and 403 80W fans. The payback period of BEE 5-star fans is more than 5 years, so we don't recommend replacing existing fans to BEE 5-star rated 30W fans but we suggest purchasing BEE 5-star fans for future purchases.

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

6. ANALYSIS OF LIGHTING SYSTEM

6.1 Brief description of the existing system

For assessing the energy efficiency of the lighting system, an 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 the working level have been done.

6.2 Inventory of Lighting

Lights (As per wattage)	TOTAL
03 W LAMP	*198*
05W LED	*113*
5 W BULB	*84*
07W LED	*393*
8 W SURFACE LIGHT	*108*

60W LED	*9*
10 W	*7*
12W	*36*
14 W	*26*
15 W	*220*
18W	*20*
18W LED Light	*239*
12 W LED Round	*59*
25 W	*3*
30W LED	*137*
36W Tube light	*958*
40 W TUBE LIGHT	*103*
18W LED Flood	*20*
20 W LED	*531*
CFL	*276*
22W	*409*
28 W	*1*
100W	*1*
Total	***3951***

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

University has initiated LED based lighting solution, but still there are 1061 (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.

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We also recommend to use 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 Renderi 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, floodlighting, retail stores*	*8000*
LED Lamps	*30-50*	*40*	*Good (70)*	*Reading lights, desk lamps, night lights, spotlights, security lights, signage lights, etc.*	*40000 - 100000*

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7. OTHER POWER CONSUMPTION

7.1 Inventory of IT Infrastructure

Sl No.	Location/ Identification	Desktop	Laptop	Printers	Scanners	Servers	Projectors	Wi-Fi Access points	Network Switches	Digital Display	Online UPS
1	*Faculty*	*10*	*33*	*28*							
2	*Accounts*	*13*	*5*	*5*	*1*						
3	*Administration*	*12*	*7*	*8*							
4	*Academic*	*7*	*2*	*3*							
5	*Examination*	*5*	*2*	*3*							
6	*Library*	*14*	*1*	*5*	*1*						
7	*IT*	*13*	*6*	*3*		*4*					
8	*Placement*	*5*	*3*	*3*							
9	*Marketing*	*5*	*1*	*3*							
10	*Research officers*	*11*	*2*	*2*							
11	*Computer Labs*	*140*		*18*							
12	*HR*	*3*	*5*	*2*	*1*						
13	*Classrooms*	*20*					*20*				
14	*IT Store*	*33*	*57*								
15	*President sir Home*	*1*		*1*							
16	*Trustee sir Home*	*1*		*1*							
17	*Dr. Agarwal office*	*1*	*2*								
18	*President offie*	*6*	*2*	*4*							
19	*Registrar office*	*2*	*3*	*3*							
20	*IQAC*	*2*	*1*	*1*							
21	*Account Society*	*4*	*1*	*2*							
22	*NFHS East West*	*2*		*1*							
23	*NFHS Uttarakhand*	*1*		*1*							
24	*SDS Meeting Room*	*1*									
25	*Campus*							*102*	*97*	*15*	*6*
	Total	***312***	***133***	***97***	***3***	***4***	***20***	***102***	***97***	***15***	***6***

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7.2 Water pump details

Description	Rated Power of Motor	Motor Eff.	Discharge Head	Suction Head	Pump Type
Unit	*KW*	*%*	*m*	*m*	*Submersible/ Monoblock/ Centrifugal Etc.*
Pump No.-1	*7.5*	*58*	*50-60*	*48-53*	*Submersible*
Pump No.-2	*7.5*	*61*	*70-75*	*50-60*	*Open Well Motor/Pump*
Pump No.-3	*3.5*	*55*	*55*	*48-53*	*Submersible*
Pump No.-4	*5*	*51*	*55*	*48-53*	*Submersible*
Pump No.-5	*3.5*	*46*	*55*	*48-53*	*Open Well Motor/Pump*

7.3 Other Loads

Sl No.	Location/ Identification	60W Exhaust Fan	160W Exhaust Fan	Water Cooler-200W	180W-Desert Cooler	Water Cooler-575W
1	*2nd Floor Placement Dept.*	*1*				
2	*Room No. 225*	*1*				
3	*Class Room Toilet*	*2*				
4	*Toilet near 1*	*2*				
5	*Class Room Toilet*	*1*				
6	*Virtual Studio-Toilet (M & F)*	*3*				
7	*Toilet near Class room 8*	*1*				
8	*Toilet near Class room 9*	*1*				
9	*Toilet near Class room 13*	*1*				
10	*Hostel 4 (J Block)*		*48*			
11	*Hostel 5 (K Block)*	*32*				
12	*Guest House (B Block)*		*3*		*1*	
13	*Canteen Area*					*3*
14	*Director Bungalow*	*3*			*1*	
15	*MDp Center*		*2*			
16	*Toilet in C Block (C-2)*	*1*		*1*		
17	*GYM AREA*		*4*			
18	*1st Floor Toilet*	*4*				

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	Admin Block					
19	*Ground Floor Toilet Admin Block*	*4*				
20	*2nd Floor Toilet*	*4*				
21	*New Auditorium 2nd Floor*	*1*				
22	*Examination Department- Toilet BASEMENT*	*5*				
23	*Toilet- Board Room*	*1*				
24	*Toilet- Reception Area*	*1*			*1*	
25	*Corridor CLASS (1-4)*	*1*				*5*
26	*New Auditorium (Basement, Ground & First Floor)*	*1*				
27	*New Admin Block & SDGSPM*	*2*				
	Total	***73***	***57***	***1***	***3***	***8***

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.	Location/ Identification	Capacity in KVAR
1	*J Block*	*50*
2	*New Auditorium*	*150*
3	*Old Electric Service station*	*75*
4	*Old Electric Service station (Dead)*	*25*
	TOTAL	***300***

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

Registrar
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