

BUREAU VERITAS INDIA PVT LTD

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Energy Audit Report 2022-23

For

Presidency University, Bengaluru

Itgalpur, Rajanakunte, Yelahanka, Bengaluru 560064



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Bureau Veritas (India) Pvt. Limited is thankful to the Presidency University, Bangalore, for their positive support in undertaking this intricate task of energy Audit. The field studies would not have been completed on time without their interaction and timely support. We are grateful for their co-operation during field studies and provision of data for the study. The field study of this audit was carried out on 3rd May 2023.

The officials of Presidency University, Bangalore coordinated and helped to the audit team during the field study and measurement, and expresses special thanks to the following persons of Presidency University, Bangalore.

1	Sumesh Sharma	Director Administration
2	Dr. Badri H S	Deputy Director- IQAC
3	Arun	MEP Manager
4	Srinivas	Electrician
5	Praveen	Logistics Manager

And all other officers, technicians and staffs for the keen interest shown in this study and the courtesy extended.

We are thankful to the management for giving us the opportunity to be involved in this very interesting and challenging project.

We would be happy to provide any further clarifications, if required, to facilitate implementation of the recommendations.

MR. SANJAY SINGH
EA-1462
Certified Energy Auditor
M. Tech (Energy Management)



Sr.No. EA/22-23/2811

Dated 28/11/2023

Certificate

This is to certify that **Presidency University, Bangalore** has conducted Detailed Energy Audit in the academic year 2022 - 2023 to assess the energy initiative planning, efforts, activities, implemented in the college campus like energy efficient Light, Fan, AC etc. Energy Management conservation Awareness activities.

Bureau Veritas (India) Pvt. Limited has verified campus data of **Presidency University, Bangalore**, This Energy Audit, is also aimed to assess impact of energy initiatives for maintenance of the campus eco-friendly.

Mr. Sanjay Singh

EA-1462

Certified Energy Auditor, BEE

Bureau Veritas (India) Pvt. Limited





List of Contents

CHAPTER-01	9
EXECUTIVE SUMMARY	9
1.1 Details of University:	9
CHAPTER-02	16
INTRODUCTION	16
2.1 Introduction of Energy Audit	16
2.2 Methodology & Approach	16
2.3 Scope of Work	16
2.4 Instrument used in Energy Audit	17
CHAPTER-03	18
ELECTRICITY BILL ANALYSIS	18
3.1 Month Wise Energy Consumption	18
3.1.1 Observations & Suggestion:	21
CHAPTER-04	22
SITE VISIT AND DATA ANALYSIS	22
4.1 Transformer Loading Analysis:	22
4.2 Transformer Power Quality Analysis:	23
4.2.1 Observation and Suggestions :	26
4.3 Diesel Generator (DG)	27
4.4 Observation and Suggestions :	32
4.5 Lighting Load Analysis	33
4.6.1 Observations & Comments	74
4.7 Air Circulation Fan load Analysis	74
4.7.1 Observations & Suggestion	75
4.8 Air Conditioning Load Analysis	75
4.8.1 Observations & Comments:	76
4.10 Details of Pumps Load analysis	76
4.10.1 Observation and Comments	77
4.11 UPS Power supply Analysis:	78
4.11.1 UPS Actual Power measurement and analysis	80
4.11.2 Observation and Suggestions :	81
4.12 Sewage Treatment Plant	81



4.12.1 Observation and Suggestions :	82
4.13 Solar Power Plant Analysis :	83
4.13.1 Observation and Suggestions:	86
4.14 Basic Details of Thermography	87
STANDARD LUX LEVEL	93
ANNEXURE -2	94
ENERGY SAVER FOR AIR CONDITIONING SYSTEM	94
ANNEXURE -3	95
SUPER ENERGY EFFICIENT BLDC CEILING FAN	95
COMPARISON BETWEEN ORDINARY,5 STAR RATED AND SUPER EFFICIENT FANS	96
ANNEXURE -4	97
STAR LEVELING PROGRAM BY BUREAU OF ENERGY EFFIECIENCY	97

List of Table

Table 1: Executive Summary for Presidency University	10
Table 2:Electricity bill analysis 2022-23.....	19
Table 3: Energy Consumption of 2022-23.....	21
Table 4: Details of installed Transformer & DG in Campus.....	22
Table 5: Details of Transformer analysis in Campus	22
Table 6: Transformer Power Quality Analysis (800kVA).....	23
Table 7: Transformer Power Quality Analysis (500kVA).....	24
Table 8: DG1 Power Quality Analysis (500kVA) MBA01	27
Table 9: DG2 Power Quality Analysis (250kVA).....	28
Table 9: DG2 Power Quality Analysis (500kVA) at in Engineering Block.....	29
Table 11: DG2 Power Quality Analysis for 500kVA 02	30
Table 11: Details of Indore Lighting lux measurement in Central Admin	33
Table 12: Details of Indore Lighting lux measurement in D Block Ground floor DGL04	34
Table 13: Details of Indore Lighting lux measurement in Admin	45
Table 17: Details of Indore Lighting lux measurement in Central MBA block	48
Table 15: Details of Indore Lighting lux measurement in Central E Block Labs	53
Table 16: Details of Indore Lighting lux measurement in F Block.....	56
Table 17: Details of Indore Lighting lux measurement in Central HJK Class Room	57
Table 18: Details of Indore Lighting lux measurement in Central L Block Labs	58
Table 19: Details of Indore Lighting lux measurement in S Block.....	70
Table 20: Details of Indore Lighting lux measurement in Night duration	73



Table 21: Details of Air circulation Fan.....	74
Table 22: Details Energy Saving Potential in air circulation fan	75
Table 23: Details of HVAC load	75
Table 24: Details Borewell submersible pumps load	76
Table 25: Details of Other Pumping load analysis	77
Table 26: Details of UPS connected load analysis	78
Table 27: UPS Actual Power measurement and analysis	80
Table 28: STP Panel Power measurement and analysis.....	81
Table 29: 230 kW Solar Power Plant generation analysis.....	83
Table 30: 230 kW Solar Power generation at LT panel on 05-05-2023 at 15:00:00	84
Table 31: 488 kW Solar Power Plant Available area on building roof for solar plant installation	85

List of Figure

Figure 1: Details of Electricity Connected Load campus.....	11
Figure 2: Electricity charges & Billing analysis.....	18
Figure 3: Actual Vs Contract Demand in kVA(2022-23).....	20
Figure 4: Electricity charges analysis Rs per kWh.....	20
Figure 5: Site visit and measurement in transformer loading analysis	25
Figure 6: Site visit and measurement in DG loading analysis.....	31
Figure 7: 230 kW Solar plant site visit	83

Abbreviation

BESCOM	Bangalore Electrical Supply Company Limited
SPP	Solar Power Plant
DG	Diesel Generator
Hrs	Hours
IS	Indian Standards
kVA	Kilo Volt- Ampere
kVA	Kilo Volt
KVAR	Kilovolt-Ampere Reactive
kWh	Kilo Watt hour
kW	kilo Watt
LED	Light Emitting Diode
LT	Low Tension
P.F	Power Factor
PG	Post Graduate
PO	Post Box
PU	Presidency University
SMF	Sealed Maintenance Free
STP	Sewage Treatment Plant
UPS	Uninterruptible Power Supply
V	Volt
WP	Watt Peaks

CHAPTER-01

EXECUTIVE SUMMARY

1.1 Details of University:

Presidency University, Bangalore is a private university located in Itgalpur, Rajanakunte, Yelahanka, Bengaluru 560064 (10 kms from Yelahanka Town) 13.1682°N 77.5354°E. The University established in 2013 and commenced classes in 2015. The University is recognized by the University Grants Commission (UGC).

The institute offers a total of 51 courses in various disciplines such as Engineering, Law Management, Information Science, Commerce and Designing at the 38 undergraduate programs and 13 postgraduate programs. In all there are 11336 students studying these programs during the academic year 2020-21, of whom 10004 are UG students, 1332 are PG students.

The campus of Presidency University has a built-up area of 137496. Sq.m, and 123171 sqm. It provides all necessary best in class facilities including a library, labs, and a fully Wi-Fi enabled campus. It has spacious classrooms, conference halls, auditoria, panel rooms, and sports facilities.

Table 1: Executive Summary for Presidency University

1	Name of Consumer:	Presidency University- Bangalore
2	Name of the contact person	Dr. Badri H S - Deputy Director
3	Address of the consumer	AH Memorial Education Trust No 21/1, Dibbur Village, Hessaraghatta Hobli Bangalore North Taluk, Karnataka -560084
4	Transformer capacity	1300 kVA
5	Capacity of back generators	1500 kVA
6	Contract Demand	400 kVA
7	Demand Charges	₹265/KVA for 85% Of contract demand or 400 kVA and more than 400 kVA ₹ 530/KVA
8	Roof top solar power plant	230 KW
9	solar power plant generation	125610 Units
10	Annual Energy consumption	1,076,965 kWh (Including BESCO & Solar generation)
11	Annual Amount paid to BESCO	₹ 10573509/-
12	Type of connection	1HT2C2
13	Period of Audit	April -22 to March -23
14	Average Energy Charge in per unit Rs. /kWh	₹ 10

a) Existing Major Energy Consuming Technology and Electricity billing analysis:

The college consumes energy in primarily 5 areas namely Lighting, Fans, AC , Projector and Pumps among others. The total connected load is **1376 KW**. The college also has captive of four DG sets with two of 250 KVA and two of 500 Kva to provide backup power with an operation of 6–75 hours per month. UPS with a capacity KVA provides the required standby during the transition.

The loads were segregated based on the end use as listed below, Total connected load is and load distribution is given below:

Table 2: Connected Load (kW)

S.N.	Types of Loads	Load in kW	Percentage %
1	Lighting Load	214	16%
2	Fan Load	263	19%
3	Borewell & surface Pumps Load	120	9%
4	Air Conditioning Load	750	55%
5	Projector load	25	2%
6	Lifts load	4	0.3%
Total Power in kW		1376	100%

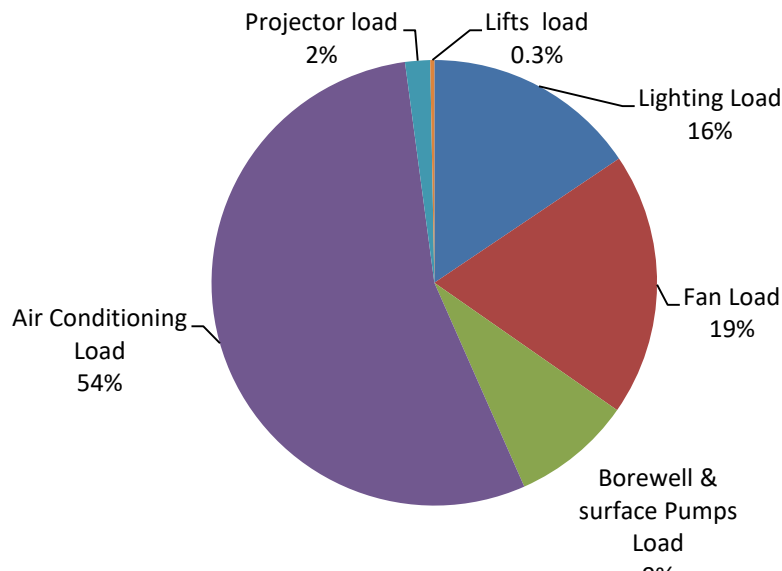


Figure 1: details of Electricity Connected Load campus

❖ Electricity Bill Analysis

Presidency University, Bangalore receives power at 11 kV and steps down to 433 V transformers (11 kV / 433V) with a contract demand (CD) of **400 kVA**.

- It observed and analyzed, maximum actual demand **320 to 560 kVA** and total contract demand load is **400 kVA** as per electricity bills analysis of 2022-23, which is higher than permissible limit upto 20% extra of Contract demand in month of **April 2022, May 2022, and June 2022**.
- It observed and analyzed, The annual energy consumption during FY 2022-23 is **1,076,965 kWh per year** and **Rs 10573509 /Year** including 230 kW Solar power generation around **125610 kWh** from October 2022 to March 2023.
- It observed and analyzed, Overall average unit rate is **Rs. 10/kWh**, which varies from **Rs 11/ kWh to Rs 7 per kWh** during FY 2022-23 and It is projected around **Rs 7 /kWh** in future FY 2023-24 by installing 230 kW Solar power plant.
- It observed and analyzed, Total amount of Excess Load/MD Penalty at (Rs 530.00 per kVA and actual MD below charges Rs 265 per kVA MD) is **Rs 121900 /-** during FY 2022-2023 in month of **April 2022, May 2022, and June 2022**.
- It observed, Power factor is varies from **0.99** in FY 2022-23, which is very good as per electricity bill.

❖ Transformer

- It observed, The rated capacity of Transformer no. 1 is **800 KVA** and Transformer No.2 is 500 kVA, The percentage of actual loading on Transformer 1 is **64 %** and **Transformer 2 is 43 % respectively**, which is good and The best performance of transformer is **50-60%** loading.
- It observed, current harmonic at Transformer no. 1 is varying from **4.4 to 6.7 %** & Transformer no. 2 is **15 to 25 %**, which is satisfactory under **10 %** permissible limit.
- It observed, current harmonic at Transformer no. 1 is varying from **2.2 to 6.5 %** & Transformer no. 2 is **15 to 25 %**, which is more than **10 %** permissible limit.
- It is suggested to install harmonic filter to use quality power supply as per requirement.
- It observed, voltage harmonic at Transformer no. 1& 2 is varying from **3.1 to 3.9 %** & **2.7 to 3.6 %** in transformer no.1 & 2 voltage harmonic is **less than 5 % under permissible limit**.
- We observed and analyzed, maximum power factor in Transformer no. 1&2 was **0.99**, which is satisfactory.

❖ Diesel Generator (DG)

- It Observed, The rated capacity of 2 no of **500kVA** DG is **and** 2 no of **250kVA** respectively and The percentage of loading on DG 500 kVA Engineering Block **was 72 %** , DG 500 kVA 02 **was 75 %** , **and 250 MBA was 37 %**, **and DG 02 250 kVA was 40 % respectively** which is low.
- We observed, current harmonic at 500 kVA DG Engineering block and 500 DG 02 is varying from 3.8 to 5.3 % and **& 250 kVA DG 02 was varies upto 8% respectively**, which is under limit , and **250 kVA DG MBA varies upto 18 %** ,which is more than 10% permissible limit ..
- It observed, voltage harmonic at DG 250 MBA is varying upto **8 %**, **which is very higher and DG 250 kVA and 500 kVA Eng block is under permissible limit.**
- It observed and analyzed, Maximum power factor in DG no. 1&2 was **0.92 to .98 respectively**, which is slightly low at DG 1 and satisfactory in DG 2.
- It is suggested to installed Harmonic filter to reduce harmonics within limit.

❖ Lighting Load Analysis

- It observed, Total no 1,19,947 LED lighting fixture are installed various type of indoor and outdoor location .
- It is **appreciated to use LED Lighting luminaries** in different location of campus as per site visit.
- It observed, during site visit, Total Connected indoor and Outdoor lighting load is **214 kW**
- It observed, Building orientation is perfectly and minimum building envelop losses and sufficient use of natural light in day time.
- It observed, some location Lux level below standard, It is suggested to as more luminaries and use day lighting as per requirement.
- It is suggested to install occupancy /Motion sensor in Principal cabin, professor cabin and Offices to save energy.
- It observed and analyzed , Average monthly power utilization is between 25680 units or kWh , Lighting load with fixtures account to 50% of total power consumption , 99-100 % of the lighting are energy efficient LED fixtures

❖ Air Circulation Fan load Analysis

- It observed, Total no. of air circulation fan more than **2604** and of Air circulation fixture fan fixtures were installed, out of approximate **19%**.
- It observed, during site visit, Total Connected of air circulation fans load is **263 kW**.
- It is suggesting to install energy saving BLDC Fan and It will get energy saving

approximately **212700 kWh per year** and also will get amount saving approximately **Rs 21 Lacs per year**

❖ Air Conditioning Load

- It observed, There were installed various energy efficient HVAC system like Split ac, VRF, Ductable, duct and cassette air conditioning were in campus.
- It observed, during site visit, Total Connected of air conditioning load is **750 kW**, which is contributed around 55 % of total load.
- It observed and appreciated to install VRF system for saving energy and environment.
- It is **suggesting to purchase New AC as 5 star rated Air Conditioning** system as per Star leveling program by Bureau of Energy Efficiency 2022, and will get huge amount of electricity saving.
- It is suggested to maintain air conditioning set temperature above **24 Degree Celsius**, **it is suggested to** increase temperature 1 °C to save energy consumption 3 to 4 % as per Bureau of Energy Efficiency.
- **It is suggested conducting regular air condition maintenance** in every 3 months to increase performance of air conditioning.
- It is **suggested to installed and placed outdoor unit towards north side Wall** of the building, if possibility to available space north side Wall
- It is suggested to install energy **saver device and will get up to 20-25 % electricity saving**, details has shown in recommendation also.
- It observed, **most of outdoor unit (condenser) of air conditioning** system placed open area, so performance of outdoor system degrade continuously due to environmental impact.
- It is suggested to **provide a canopy to save from environment impact** and performance enhancement for outdoor unit condenser.

❖ Pumping Load Analysis

- It observed during Energy Audit and site visit, **7 no submersible and 18 no mono block surface Pumps, of Capacity from 0.5 to 20 HP within** College campus for drinking water, Flushing and gardening purpose.
- It observed and measured Power consumption pump was **120 KW as** per site visit and measurement.
- It is suggested to install digital telemetry enable water flow meter in borewell and other water supply pumps to monitor water abstraction and consumption in different application.
- It is suggesting to **purchase 5 star rated pumps and will get huge** amount of saving as per Star leveling program by Bureau of Energy Efficiency 2022

❖ UPS Loading Analysis

- It observed and analysis ,Total UPS connected load is 845 kVA for 31 no of UPS from in college premises.
- We observed, current harmonic is varying from **29 to 41 % respectively** which is more than 10 % permissible limit .
- It observed, voltage harmonic is varying from **2.4 to 2.5 % respectively** , **which is under 5 % permissible limit.**
- It observed and analyzed, Maximum power factor was **0.95 respectively**, which is satisfactory
- It is suggested to installed Harmonic filter to reduce harmonics within limit.

❖ STP Plant Power Loading Analysis

- It observed and analysis ,Total STP actual measured load is **32 kW** in college premises.
- We observed, current harmonic is varying from **6 % respectively** which is under 10 % permissible limit .
- It observed, voltage harmonic is varying from **2.8 to 3.4 % respectively** , **which is under 5 % permissible limit.**
- It observed and analyzed, Maximum power factor was **0.75 to 0.829 respectively**, which is slightly low .

❖ Solar Power Plant Load

- It observed and analyzed , There are installed 230 kW Solar Power plant at Building roof area in premises of the college campus and working from Oct 17th 2022
- It observed and analyzed ,The Presidency University has around 138053 Sqm of roof area and only using 1.5 % of roof area for solar generation by installing 230 kW Solar power plant
- It observed and analyzed , there is a potential to install nearly 718 kWp of roof top grid connected Solar Power plant , which will generate about 2439 units every day or nearly 60997 kWh monthly and 731965 kWh per Year .
- It Observed and analyzed , Average daily unit generation varies from 2.2 to 4.7 kWh per day per kW solar plant, which is average and nearly 5 kWh per day per kW solar plant .
- It Observed and analyzed , Solar generation Contribution in 21 to 32 % of total electricity consumption as per data provided by university.
- It observed and measured, 230 kW solar instantaneous generation around 76 kW and Current harmonics under limit 10 % and voltage harmonic under 5 %.
- It is observed, Solar plant Power Factor is upto 0.99 , which is satisfactory.
- it is suggested to install 488 kW solar plant and Payback Analysis for Net Zero Emission on institutes building roof area.

CHAPTER-02

INTRODUCTION

2.1 Introduction of Energy Audit

Energy Audit is an effective means of establishment present efficiency levels and identifying Potential areas of improvement in energy consumption, Energy audit of utility systems largely helps, which are given below:

- Reducing the energy consumption with resultant reduction in electricity bills.
- Audit involves data collection, data verification and detailed analysis of the data.
- The analysis leads to recommendations, which are short term (with minimum investment), medium term (with moderate investment) and long term (with capital expenditure).
- The cost benefit analysis of various energy conservation proposals enables managements to take decisions regarding implementation schedules.

2.2 Methodology & Approach

Energy audit of Presidency University has been conducted by analysis of power consumption patterns over the year, total connected load, and utilization of power. All the functional areas of PU have been studied to understand connected loads, load utilization, details of records maintained, and analysis of documents.

- Visual inspection and data collection.
- Observations on the general condition of the facility and equipment and quantification
- Identification / verification of energy consumption and other parameters by measurements
- Correlation with documentary evidence, meter readings etc
- Validation
- Identifying potential energy saving opportunities.
- Conclusion and Recommendations.

2.3 Scope of Work

The scope of work of the energy audit is as given below

- a) Review of Electricity Bills, Contract Demand and Power Factor: For the last one year, in which possibility will be explored for further reduction of contract demand and improvement of P.F.
- b) Electrical System Network: This would include a detailed study of all the Transformer operations of various Ratings / Capacities, No Load Losses, Power Factor Measurement

and scope for improvement if any. The study would also cover possible improvements in energy metering systems for better control and monitoring.

- c) Electrical Motors, the study of various capacity motors and utilization, loading, efficiency, and thereby suggesting measures for energy saving like reduction in the size of motors or installation of an energy-saving device in the existing motors.
- d) Study of other electrical loads like air-conditioners, lifts, etc for their efficiency and scope for further improvements if any.
- e) Illumination System: Study of the illumination system, LUX level in various areas, area lighting, etc. and suggest measures for improvements and energy conservation opportunity wherever feasible.
- f) DG Sets: Study the operations of DG Sets to evaluate their average cost of Power Generation, Specific Energy Generation, and subsequently identify areas wherein energy savings could be achieved after analyzing the operational practices, etc. of the DG Sets

During study several interactions was made to the office personnel and technicians to share the actual operation al features of equipment's maintenance of equipment breaks down, down time of machineries, safety measures etc. At the same time required data was collected from the various departments and review the same with the operational actual data.

The study focused on improving energy use efficiency and identifying energy saving opportunities at various equipment's. The analyses included simple payback period and life cycle cost calculations where investments are required to be made to implement recommendations, to establish their economic viability.

2.4 Instrument used in Energy Audit

We have a wide array of latest, sophisticated, portable, diagnostic and measuring instruments to support our energy audit investigations and analyses. The audit study made use of various portable instruments along with plant online instrumentations, for carrying out various measurements and analyses. The specialized instruments that were used during the energy audit include:

- Power Analyzer.
- Ultra-Sonic Flow Meter.
- Digital power clamp meter & multi-meter (2745 KUSAMMECO)
- Digital Hygrometer HD-304HTC
- Digital Lux Meter (LX-101A HTCTM)
- Digital Anemometer (AVM -07HTC)
- IR Thermometers for temperature measurement HTC TM (IR -50 to 15500C)

CHAPTER-03

ELECTRICITY BILL ANALYSIS

3.1 Month Wise Energy Consumption

The maximum demand, energy consumption, fixed charges, energy charges and total bill in Rs. for the financial year 2022-23 are showing below tables as per electricity bill. All the one year's data has been represented by the various graphs. This indicator addresses energy consumption, energy sources, energy monitoring, and electricity consumption.

Figure 2: Electricity charges & Billing analysis

Name & Address:	Type	Educational Institutions - HT2C
AH Memorial Education Trust No 21/1, Dibbur Village Hessaraghatta Hobli Bangalore North Taluk BANGALORE, KAR -560084	Tariff	1HT2C2
	Contract Demand(KVA)	400
	85% of CD (KVA)	340
	Recorded Demand (KVA)	560
	Billing Demand (KVA)	560

Demand Charges: 400.00 KVA at Rs265.00 per kVA
Energy Charges: First 1,00,000.00 kWh at Rs8.25 per kWh
Energy Charges: For the next 2,960.00 kWh at Rs8.65 per kWh
Excess Load/MD Penalty: 140.00 kVA at Rs530.00 per kVA

Table 2:Electricity bill analysis 2022-23

Month FY 2022-23	Contract Demand (KVA)	Maximu m Demand in (KVA)	Billing 85% of contract or Actual demand (KVA)	Bescom		230 kW Solar Power Plant		Excess Load/MD Penalty at Rs 530.00 per kVA and actual below MD charges Rs 265 per kVA	Bescom & Solar Plant Total units KWH	Avera ge per unit charge s Rs/K Wh
				Total consumed units KWH	Billing amount Rs	Generation units (kWH)	Exporting (kWH)			
Apr-22	400	540	540	102960	1056154	0	0	37100	102960	10
May-22	400	560	560	98720	1084850	0	0	42400	98720	11
Jun-22	400	500	500	78880	892781	0	0	26500	78880	11
Jul-22	400	460	460	85180	930187	0	0	15900	85180	11
Aug-22	400	400	400	79240	838479	0	0		79240	11
Sep-22	400	380	380	86040	938084	0	0		86040	11
Oct-22	400	NA	340	68960	1174182	449.9	0		69410	NA
Nov-22	400	340	340	76680	841726	20512	0		97192	9
Dec-22	400	400	400	50400	564991	15600	181.5		66182	9
Jan-23	400	320	340	58540	620033	26264	1840		86644	7
Feb-23	400	320	340	63220	662582	30120	1454		94794	7
Mar-23	400	320	340	97140	969460	32664	1920		131724	7
Total				945960	10573509	125609.91	5395.5	121,900.00	1,076,965	

Figure 3: Actual Vs Contract Demand in kVA(2022-23)

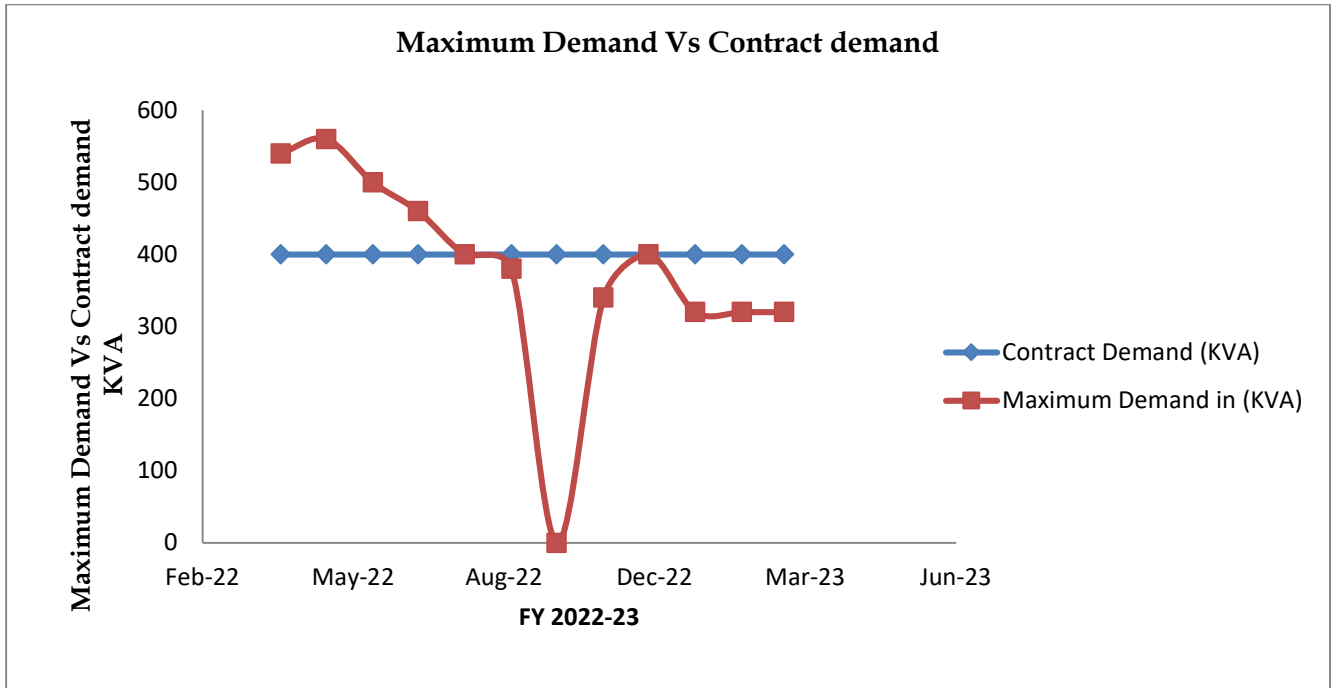


Figure 4: Electricity charges analysis Rs per kWh

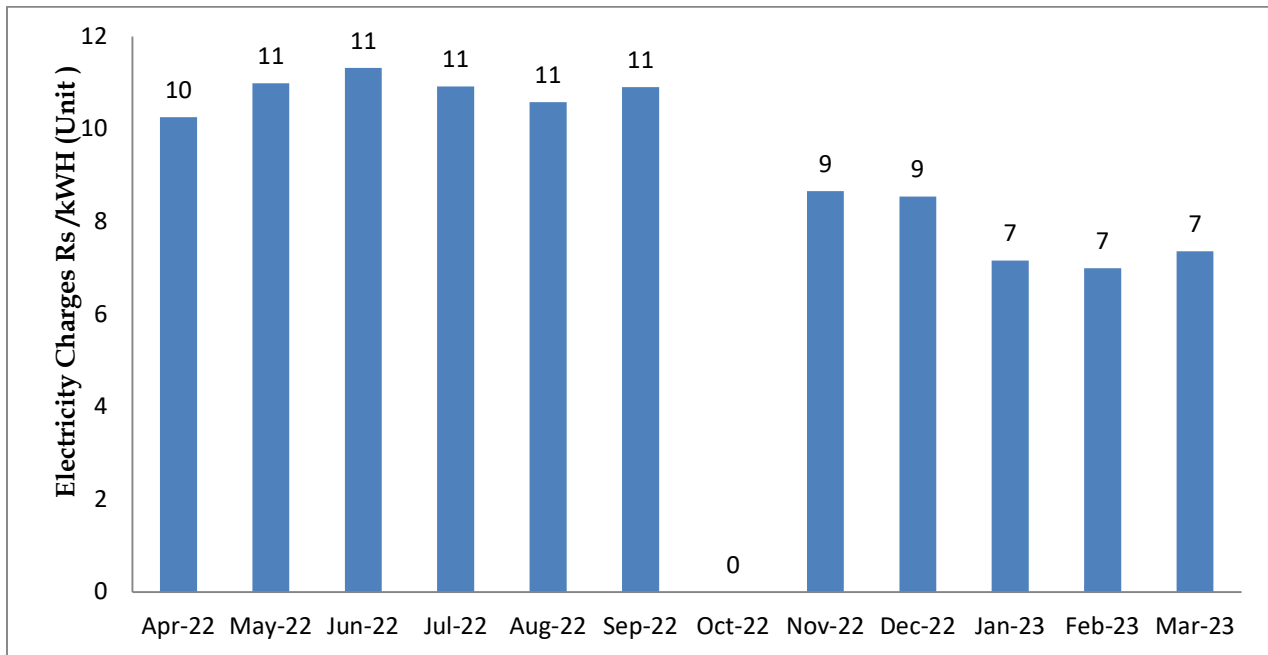


Table 3: Energy Consumption of 2022-23

Electrical Energy Consumption & Cost Figure For 2022-23			
Sr. No.	Particulars	Unit	Values
1	Annual Electricity Consumption	KWh	1,076,965
2	Million Ton of Oil Equivalent	MTOE	928
3	Cost of Electricity purchased	Rs.	10573509
4	Overall Unit Rate	Rs./kWh	10

3.1.1 Observations & Suggestion:

Presidency University, Bangalore receives power at 11 kV and steps down to 433 V transformers (11 kV / 433V) with a contract demand (CD) of **400 kVA**.

- It observed and analyzed, maximum actual demand **320 to 560 kVA** and total contract demand load is **400 kVA** as per electricity bills analysis of 2022-23, which is higher than permissible limit upto 20% extra of Contract demand in month of **April 2022, May 2022, and June 2022**.
- It observed and analyzed, The annual energy consumption during FY 2022-23 is **1,076,965 kWh per year** and **Rs 10573509 /Year** including 230 kW Solar power generation around **125610 kWh** from October 2022 to March 2023.
- It observed and analyzed, Overall average unit rate is **Rs. 10/kWh**, which varies from **Rs 11/ kWh to Rs 7 per kWh** during FY 2022-23 and It is projected around **Rs 7 /kWh** in future FY 2023-24 by installing 230 kW Solar power plant.
- It observed and analyzed, Total amount of Excess Load/MD Penalty at (Rs 530.00 per kVA and actual MD below charges Rs 265 per kVA MD) is **Rs 121900 /-** during FY 2022-2023 in month of **April 2022, May 2022, and June 2022**.
- It observed, Power factor is varies from **0.99** in FY 2022-23, which is very good as per electricity bill.



4.2 Transformer Power Quality Analysis:

4.2.1 Transformer 1 (800 kVA) power quality analysis:

Table 6: Transformer Power Quality Analysis (800kVA)

V1 rms	V2 rms	V3 rms	A1 rms	A2 rms	A3 rms	AN rms	P1 (W)	P2 (W)	P3 (W)	PF1	PF2	PF3	U12 THD f	U23 THDf	U31 THD f	A1 THD f	A2 THDf	A3 THD f
V	V	V	A	A	A	A	kW	kW	kW				% f	% f	% f	% f	% f	% f
246	247	247	643	585	617	68	467	428	452	0.99	0.99	0.99	3.4	3.4	3.5	6.3	7	6.5
246	247	248	646	589	628	70	470	431	461	0.99	0.99	0.99	3.4	3.3	3.4	6.3	6.7	6.4
246	247	248	651	595	624	66	473	435	458	0.98	0.99	0.99	3.3	3.3	3.3	6.4	6.7	6.6
246	248	247	648	596	624	64	470	436	458	0.98	0.98	0.99	3.4	3.3	3.3	6.6	7	6.7
244	246	246	659	601	623	68	476	436	454	0.99	0.99	0.99	3.1	3.1	3.1	6.2	6.6	6.5
246	247	247	673	620	613	71	492	456	451	0.99	0.99	0.99	3.5	3.4	3.5	4.3	4.5	4.1
246	247	247	671	618	603	74	491	455	443	0.99	0.99	0.99	3.5	3.4	3.5	4.3	4.5	4.1
246	248	247	670	617	601	73	491	454	442	0.99	0.99	0.99	3.6	3.4	3.5	4.3	4.7	4.1
246	248	247	673	615	600	78	493	453	441	0.99	0.99	0.99	3.6	3.5	3.6	4.3	4.9	4.2
247	248	247	684	620	608	81	501	457	447	0.99	0.99	0.99	3.5	3.4	3.5	4.1	4.7	4.1
247	248	247	685	619	607	83	503	457	447	0.99	0.99	0.99	3.7	3.5	3.6	4.3	4.9	4.2
247	248	248	679	617	607	79	499	456	448	0.99	0.99	0.99	3.8	3.6	3.7	4.4	4.7	4.1
248	249	250	697	621	609	96	514	460	452	0.99	0.99	0.99	3.9	3.8	3.9	4.5	4.7	4.4
248	250	250	692	625	611	90	510	463	454	0.99	0.99	0.99	3.9	3.8	3.8	4.6	4.7	4.4
247	250	249	672	626	619	71	493	464	459	0.99	0.99	0.99	3.8	3.7	3.7	4.6	4.6	4.4

4.2.2 Transformer 2 (500 kVA) power quality analysis:

Table 7: Transformer Power Quality Analysis (500kVA)

V1 rms	V2 rms	V3 rms	A1 rms	A2 rms	A3 rms	AN rms	P1 (W)	P2 (W)	P3 (W)	PF1	PF2	PF3	U12 THDf	U23 THDf	U31 THDf	A1 THDf	A1 THDf	A1 THDf
V	V	V	A	A	A	A	kW	kW	kW				% f	% f	% f	% f	% f	% f
242	242	242	230	223	186	33	163	155	127	0.98	0.96	0.94	2.9	2.9	2.8	23	24	25
242	242	242	231	220	187	35	163	153	128	0.98	0.96	0.94	2.9	2.9	2.8	23	24	25
242	242	242	239	220	184	43	169	153	126	0.98	0.96	0.94	2.8	2.9	2.7	22	23	24
242	242	242	236	216	183	43	167	150	125	0.98	0.96	0.94	2.9	2.9	2.7	22	23	24
241	241	241	259	241	208	45	182	165	140	0.97	0.95	0.93	2.8	2.9	2.7	20	21	22
241	241	241	265	255	223	40	186	174	149	0.97	0.94	0.92	2.9	3	2.8	20	21	22
240	241	240	282	276	237	41	197	186	155	0.97	0.93	0.91	2.9	2.9	2.8	18	19	20
239	240	239	310	303	262	47	214	202	169	0.96	0.93	0.90	2.8	2.9	2.7	17	18	19
239	240	239	310	310	269	41	214	207	173	0.96	0.93	0.90	2.8	2.9	2.7	16	17	18
240	240	240	298	298	251	42	206	199	162	0.96	0.93	0.90	2.8	2.9	2.8	16	17	18
243	243	243	305	287	252	57	214	193	163	0.96	0.92	0.89	2.8	2.9	2.8	15	16	17
242	243	243	305	286	247	59	214	193	159	0.96	0.92	0.88	2.8	2.9	2.8	15	16	17
247	248	247	263	271	235	34	184	179	147	0.94	0.89	0.85	3.5	3.6	3.4	21	22	23
245	246	244	258	269	224	28	179	176	139	0.94	0.89	0.85	3.1	3.2	3	21	22	23
246	246	246	254	262	221	32	176	171	137	0.94	0.89	0.84	3.1	3.3	3.1	21	22	23
246	246	246	241	254	200	31	165	163	119	0.93	0.87	0.81	2.9	3.1	2.9	22	23	24
246	246	246	244	258	209	27	168	165	126	0.93	0.87	0.82	3	3	2.9	22	23	24
246	246	246	244	257	213	27	168	164	129	0.93	0.87	0.82	3	3	2.9	22	23	24
246	246	246	247	262	212	29	169	168	127	0.93	0.87	0.81	3	3	2.8	22	23	24
246	246	246	251	266	214	30	173	172	129	0.93	0.87	0.82	3	3	2.8	22	23	24
246	246	246	252	267	220	30	174	173	133	0.93	0.88	0.82	3	3	2.9	22	23	24
246	246	246	252	268	219	29	174	173	133	0.93	0.88	0.82	2.9	3	2.9	23	24	25
246	246	246	257	268	215	34	177	173	130	0.93	0.88	0.82	2.9	3	2.9	22	23	24
246	245	246	258	267	212	39	178	172	126	0.93	0.87	0.81	3	3.1	2.9	23	24	25



Figure 5: Site visit and measurement in transformer loading analysis

4.2.3 Observation and Suggestions :

- It observed, The rated capacity of Transformer no. 1 is **800 KVA** and Transformer No.2 is 500 kVA , The percentage of actual loading on Transformer 1 is **64 % and Transformer 2 is 43 % respectively** ,which is good and The best performance of transformer is **50-60%** loading.
- It observed, current harmonic at Transformer no. 1 is varying from **4.4 to 6.7 %** & Transformer no. 2 is **15 to 25 %** ,which is satisfactory under **10 %** permissible limit .
- It observed, current harmonic at Transformer no. 1 is varying from **2.2 to 6.5 %** & Transformer no. 2 is **15 to 25 %** ,which is more than **10 %** permissible limit .
- It is suggested to install harmonic filter to use quality power supply as per requirement.
- It observed, voltage harmonic at Transformer no. 1& 2 is varying from **3.1 to 3.9 %** & **2.7 to 3.6 %** in transformer no.1 & 2 voltage harmonic is **less than 5 % under permissible limit.**
- We observed and analyzed, maximum power factor in Transformer no. 1&2 was **0.99**, which is satisfactory.



4.3 Diesel Generator (DG)

4.3.1 Diesel Generator 01 (DG 1) power quality analysis: (250 kVA) MBA 01

Table 8: DG1 Power Quality Analysis (500kVA) MBA01

V1 rms	V2 rms	V3 rms	A1 rms	A2 rms	A3 rms	AN rms	P1 (W)	P2 (W)	P3 (W)	PF1	PF2	PF3	U12 THDf	U23 THDf	U31 THDf	A1 THDf	A2 THDf	A3 THDf
V	V	V	A	A	A	A	kW	kW	kW				% f	% f	% f	% f	% f	% f
242	238	240	141	144	122	20	100	99	81	0.98	0.96	0.93	6.5	5.7	5.8	15.8	13	17.6
242	238	240	148	149	128	21	104	102	86	0.98	0.96	0.93	6.9	6	6.1	16	13.2	17.1
242	238	240	153	153	131	22	108	105	88	0.98	0.96	0.93	7.1	6.1	6.3	16	13.6	17
242	238	241	156	159	131	22	110	109	88	0.98	0.96	0.93	7.1	6.1	6.2	16	12.8	17.3
242	238	241	158	161	132	24	112	110	89	0.98	0.96	0.93	7.3	6.2	6.3	16	12.9	18.1
242	238	241	175	177	144	27	124	120	96	0.98	0.95	0.92	8	6.8	7	16.5	12.9	18.6
241	238	241	191	196	157	27	134	133	105	0.97	0.95	0.92	8.3	7.3	7.4	16.6	12.1	18.1
176	238	241	196	202	162	26	98	137	108	0.72	0.95	0.92	8.4	7.5	7.3	16.6	11.9	18
243	238	241	199	205	165	25	141	139	111	0.98	0.95	0.93	8.5	7.5	7.5	16.6	11.8	17.8
243	237	241	211	223	174	25	150	151	116	0.98	0.95	0.93	8.7	7.8	7.8	16.5	10.6	17.8
243	237	241	225	240	185	25	161	162	124	0.98	0.95	0.93	9	8.1	8	16.3	10.1	17.5
243	236	241	240	254	193	34	171	172	128	0.98	0.95	0.92	9	8.1	8.2	15.8	9	18.1
243	236	241	240	254	193	34	171	172	128	0.98	0.95	0.92	9	8.1	8.2	15.8	9	18.1
243	237	241	238	253	192	34	170	171	128	0.98	0.95	0.92	9.1	8.1	8.2	15.9	9.1	18.2
242	238	241	180	184	147	27	128	126	99	0.98	0.96	0.93	7	6.3	6.4	14.7	10.3	17.2



4.3.2 Diesel Generator (DG 2) power quality analysis: (250KVA)

Table 9: DG2 Power Quality Analysis (250kVA)

V1 rms	V2 rms	V3 rms	A1 rms	A2 rms	A3 rms	AN rms	P1 (W)	P2 (W)	P3 (W)	PF1	PF2	PF3	U12 TH Df	U23 THDf	U31 TH Df	A1 TH Df	A2 THD f	A3 TH Df
V	V	V	A	A	A	A	kW	kW	kW				% f	% f	% f	% f	% f	% f
241	241	242	133	100	119	29	96	72	86	0.997	0.997	0.997	1.4	1.5	1.5	6.1	7.2	7.4
241	241	242	136	99	119	34	98	71	86	0.997	0.998	0.998	1.4	1.5	1.5	6.1	7.4	7.5
241	241	241	132	99	134	39	95	71	97	0.997	0.998	0.998	1.4	1.5	1.5	6.3	7.5	6.7
241	241	242	134	99	134	38	96	71	97	0.997	0.997	0.998	1.4	1.5	1.5	6	7.7	6.5
241	242	241	131	100	130	34	94	72	94	0.997	0.997	0.998	1.4	1.6	1.4	6.1	8.1	6.6
241	242	242	131	99	130	34	94	71	94	0.997	0.997	0.998	1.4	1.6	1.5	6	8.2	6.7
241	242	242	131	97	127	33	94	70	92	0.997	0.997	0.998	1.4	1.6	1.5	6	8.2	6.8
241	241	242	130	98	122	29	94	71	88	0.997	0.997	0.997	1.4	1.6	1.5	6.1	7.9	7
241	242	242	126	93	123	33	90	68	89	0.997	0.997	0.997	1.5	1.5	1.4	6.3	8	6.9
240	242	241	125	92	128	38	90	67	92	0.997	0.998	0.997	1.5	1.6	1.4	6.3	8	6.7



4.3.3 Diesel Generator (DG 3) power quality analysis: (500KVA) at Engineering Bloack

Table 10: DG2 Power Quality Analysis (500kVA) at in Engineering Block

V1 rms	V2 rms	V3 rms	A1 rms	A2 rms	A3 rms	AN rms	P1 (W)	P2 (W)	P3 (W)	PF1	PF2	PF3	U12 THDf	U23 THDf	U31 THDf	A1 THDf	A2 THDf	A3 THDf
V	V	V	A	A	A	A	kW	kW	kW				% f	% f	% f	% f	% f	% f
239	239	239	499	508	511	1000	357	364	366	0.997	0.999	0.999	2.1	2	2	4.8	5.1	4.4
239	239	239	496	506	512	997	355	362	366	0.997	0.998	0.998	2.1	2.1	2	4.8	5.1	4.3
239	239	239	494	500	520	1003	353	358	372	0.997	0.998	0.998	2.1	2.1	1.9	4.8	5.2	4.2
239	239	239	497	503	519	1006	355	360	371	0.997	0.998	0.998	2.1	2.1	1.9	4.8	5.2	4.3
239	239	239	495	489	521	1002	353	351	373	0.997	0.998	0.998	2.2	2.2	1.9	4.6	5.2	4.1
239	239	239	490	484	509	985	351	347	364	0.997	0.998	0.998	2.1	2.1	1.9	4.7	5.2	4.3
239	239	239	491	483	512	988	351	346	366	0.997	0.998	0.998	2.1	2.1	1.9	4.7	5.3	4.2
239	239	239	499	483	515	997	356	346	368	0.997	0.998	0.998	2.1	2.1	1.9	4.7	5.3	4.2
239	239	239	505	483	509	997	360	346	365	0.998	0.998	0.998	2	2.1	1.9	4.6	5.3	4.3
239	239	239	503	483	514	1001	359	346	368	0.998	0.998	0.998	2.1	2.1	1.9	4.6	5.3	4.3
239	239	239	506	494	525	1016	362	354	375	0.998	0.998	0.998	2.1	2.1	1.9	4.6	5.1	4.1
239	240	238	490	496	524	1007	351	356	374	0.998	0.999	0.999	2.2	2.1	2	4.6	5.1	4
239	239	238	490	502	524	1009	351	360	374	0.998	0.999	0.999	2.2	2.1	2	4.6	5	3.9
239	240	238	486	501	526	1010	348	360	376	0.998	0.999	0.999	2.2	2.1	1.9	4.7	5	3.8
239	240	238	482	498	535	1015	345	358	382	0.998	0.999	0.999	2.2	2.1	1.9	4.8	5	3.8
239	240	238	485	490	533	1009	347	352	381	0.998	0.999	0.999	2.2	2.2	1.9	4.7	5.1	3.8
239	240	238	485	489	534	1010	347	351	382	0.998	0.999	0.999	2.2	2.1	1.9	4.7	5.1	3.8
239	240	238	491	490	535	1015	351	352	383	0.998	0.999	0.999	2.2	2.2	1.9	4.6	5.1	3.8



4.3.4 Diesel Generator (DG 4) power quality analysis: 500KVA 02

Table 11: DG2 Power Quality Analysis for 500kVA 02

V1 rms	V2 rms	V3 rms	A1 rms	A2 rms	A3 rms	AN rms	P1 (W)	P2 (W)	P3 (W)	PF1	PF2	PF3	U12 THD f	U23 THDf	U31 THDf	A1 THD f	A2 TH Df	A3 THDf
V	V	V	A	A	A	A	W	W	W				% f	% f	% f	% f	% f	% f
240	240	238	464	481	489	39	332	345	350	0.996	0.998	0.999	2.3	2.1	2.1	5.6	5.5	4.5
240	240	238	462	482	493	44	330	346	352	0.995	0.998	0.998	2.3	2.1	2	5.6	5.5	4.5
239	239	17	475	499	510	47	340	358	352	0.996	0.998	0.997	2.3	2	2.3	5.4	5.2	4.3
239	239	6	502	522	530	42	360	374	364	0.998	0.999	0.997	2.3	2	2.3	4.9	4.8	4
239	239	6	506	518	527	39	363	371	364	0.997	0.998	0.997	2.2	2	2.3	4.9	4.9	4.1
239	239	41	505	516	527	40	361	370	364	0.996	0.998	0.997	2.2	2.4	2.6	4.9	5	4.2
239	239	239	501	506	509	31	358	362	364	0.995	0.998	0.997	2.2	2.2	2	4.9	5.1	4.3
239	239	239	497	504	504	29	355	361	360	0.995	0.998	0.997	2.2	2.1	2	5	5.1	4.4
239	239	239	500	503	511	32	357	360	365	0.995	0.998	0.997	2.2	2.1	1.9	5	5.1	4.3
239	239	239	509	510	513	29	364	365	367	0.995	0.998	0.997	2.1	2.1	1.9	4.9	5.1	4.3
239	239	239	506	514	515	31	362	367	368	0.995	0.998	0.997	2.1	2.1	1.9	4.9	5.1	4.4
240	239	239	494	525	517	42	354	375	369	0.995	0.998	0.997	2	2	1.9	5.1	4.9	4.3
239	239	238	496	517	531	50	354	371	379	0.995	0.997	0.997	2.1	2	1.9	5.1	5	4.2
239	239	238	495	519	529	48	353	372	377	0.995	0.997	0.997	2.1	2	1.9	5.1	5	4.2
239	239	238	493	512	524	46	352	367	374	0.995	0.997	0.997	2.1	2	1.9	5.1	5.1	4.2



Figure 6: Site visit and measurement in DG loading analysis



4.4 Observation and Suggestions:

- It Observed, The rated capacity of 2 no of **500kVA** DG is **and** 2 no of **250kVA** respectively and The percentage of loading on DG 500 kVA Engineering Block **was 72 %** , DG 500 kVA 02 **was 75 %** , **and 250 MBA was 37 %** , **and DG 02 250 kVA was 40 % respectively** which is low.
- We observed, current harmonic at 500 kVA DG Engineering block and 500 DG 02 is varying from 3.8 to 5.3 % and **& 250 kVA DG 02 was varies upto 8% respectively** , which is under limit , and **250 kVA DG MBA varies upto 18 %** , which is more than 10% permissible limit ..
- It observed, voltage harmonic at DG 250 MBA is varying upto **8 %** , **which is very higher and DG 250 kVA and 500 kVA Eng block is under permissible limit.**
- It observed and analyzed, Maximum power factor in DG no. 1&2 was **0.92 to .98 respectively** , which is slightly low at DG 1 and satisfactory in DG 2.
- It is suggested to installed Harmonic filter to reduce harmonics within limit.

4.5 Lighting Load Analysis

The Presidency University, Bangalore has various type indoor and outdoor LED 1,19,947 lighting fixture are installed and lighting load is 214 kW in college campus, Average monthly power utilization is between 25680 units or kWh, Lighting load with fixtures account to 50% of total power consumption, 99-100 % of the lighting are energy efficient LED fixtures and As per IS 3616, average lighting level of 200 to 300 Lux should be maintained at teaching spaces, offices, and meeting rooms. Lighting Levels have been measured at various locations as indicated in the table below.

Table 12: Details of Indore Lighting lux measurement in Central Admin

CENTRAL ADMIN GROUND			CENTRAL ADMIN 1ST FLOOR			CENTRAL ADMIN 2nd FLOOR		
SL NO	CABIN NAME	LUX VALUE	SL NO	CABIN NAME	LUX VALUE	SL NO	CABIN NAME	LUX VALUE
1	AG-CB 01	951	1	Cabin no-1	704	1	Chairman office reception	1150
2	AG-CB 02	782	2	Cabin no-1	1050	Meeting hall		
3	AG-CB 03	668	3	Cabin no -02	895	1	NO-1	1050
4	AG-CB 04	669	4	Cabin no -03	922	2	NO-2	1185
VC Boardroom			5	Cabin no -04	881	3	NO-3	645
1	no -1	837	6	Cabin no -05	1240	4	NO-4	1045
2	no -2	879	7	Cabin no -06	1350	5	Wating room	852
3	no -3	769	8	Kitchen room	1205	6	NO-6	804
4	AG-CB 05	859	9	Gents restroom	831	7	Kitchen area	683
5	AG-CB 06	869	10	Ladies restroom	1018	Kitchen		
6	AG-CB 07	957	11	Reception corridor	1584	1	NO-01	1025
7	Entrance corrodor	651	12	Salman sir office reception	969	2	NO-02	884
8	AG-CB 02 Opposite corridor	540	13	Cabin no 1	963	3	Reception NO-1	1704
9	AG- CB 01 Opposite corridor	950	Board room			4	NO-02	1051
10	Gents rest room	712	1	No-1	886	5	Office entrance corridor	1800
11	Ladies rest room	728	2	No-2	655	6	Rest room opposite corridor	1911
12	Kitchen room	1056	3	Salman sir cabin	1145	7	Gents restroom	1355
HR Boardroom			4	NO-02	1120	8	Ladies rest room	976
1	No-1	742	Discussion room					
2	No-2	851	1	NO-1	1565			
3	No-3	754	2	NO-2	1755			
4	AG-CB 08	694	3	Restroom corridor	1950			
5	AG-CB 09	635	4	Cabin -03 corridor	953			
HR Cabins								
1	No-1	1005						
2	No-2	951						
3	No-3	920						
4	No-4	1102						
5	HR Cabin corridor	752						
6	Rest room corridor	1902						



Table 13: Details of Indore Lighting lux measurement in **D Block Ground floor DGL04**

HOD CABIN				
SL NO	Workstation	lux value	Phase to Neutral	Earth to Neutral
1	CABIN01	375	221	0.6
2	CABIN02	650	220	0.6
3	CABIN03	340	225	0.7
4	Reception	289	210	0.8

D Block Ground floor DGL04					D Block Ground floor DGL05				
SL NO	Workstation	lux value	Phase to Neutral	Earth to Neutral	SL NO	Workstation	lux value	Phase to Neutral	Earth to Neutral
1	workstation01	227	210	0.6	1	workstation01	195	233	0.6
2	workstation02	334	215	0.7	2	workstation02	214	238	0.7
3	workstation03	282	216	0.8	3	workstation03	296	246	0.8
4	workstation04	150	219	0.5	4	workstation04	379	248	0.5
5	workstation05	256	216	0.5	5	workstation05	264	243	0.5
6	workstation06	233	219	0.6	6	workstation06	270	243	0.6
7	workstation07	239	201	0.6	7	workstation07	264	243	0.6
8	workstation08	229	220	0.6	8	workstation08	295	238	0.6
9	workstation09	224	221	0.7	9	workstation09	276	246	0.7
10	workstation10	233	220	0.8	10	workstation10	271	248	0.8
11	workstation11	264	225	0.7	11	workstation11	269	243	0.7
12	workstation12	240	226	0.6	12	workstation12	300	243	0.6
13	workstation13	235	230	0.6	13	workstation13	290	250	0.6
14	workstation14	226	216	0.7	14	workstation14	249	241	0.7
15	workstation15	223	218	0.8	15	workstation15	205	235	0.8
16	workstation16	230	215	0.6	16	workstation16	231	246	0.6
17	workstation17	235	210	0.7	17	workstation17	235	235	0.7
18	workstation18	242	215	0.6	18	workstation18	266	236	0.6
19	workstation19	231	216	0.8	19	workstation19	279	239	0.8
20	workstation20	235	219	0.7	20	workstation20	290	237	0.7
21	workstation21	240	216	0.6	21	workstation21	314	231	0.6
22	workstation22	238	219	0.6	22	workstation22	290	233	0.6
23	workstation23	263	201	0.7	23	workstation23	277	238	0.7
24	workstation24	267	220	0.8	24	workstation24	258	246	0.8
25	workstation25	263	221	0.6	25	workstation25	248	248	0.6
26	workstation26	298	220	0.6	26	workstation26	249	243	0.6
27	workstation27	264	225	0.7	27	workstation27	267	243	0.7
28	workstation28	257	226	0.7	28	workstation28	268	243	0.7
29	workstation29	247	230	0.8	29	workstation29	290	238	0.8





D Block Ground floor DGL04					D Block Ground floor DGL05				
SL NO	Workstation	lux value	Phase to Neutral	Earth to Neutral	SL NO	Workstation	lux value	Phase to Neutral	Earth to Neutral
30	workstation30	245	216	0.7	30	workstation30	245	246	0.7
31	workstation31	244	218	0.7	31	workstation31	256	248	0.7
32	workstation32	297	219	0.8	32	workstation32	240	243	0.8
33	workstation33	290	220	0.7	33	workstation33	249	243	0.7
34	workstation34	233	212	0.6	34	workstation34	293	250	0.6
35	workstation35	308	211	0.7	35	workstation35	296	241	0.7
36	workstation36	290	214	0.8	36	workstation36	295	235	0.8
37	workstation37	302	219	0.9	37	workstation37	290	246	0.9
38	workstation38	278	210	0.8	38	workstation38	292	235	0.8
39	workstation39	212	215	0.7	39	workstation39	297	236	0.7
40	workstation40	261	216	0.1	40	workstation40	298	239	0.1
41	workstation41	245	217	0.8	41	workstation41	235	237	0.8
42	workstation42	262	220	0.9	42	workstation42	236	231	0.9
43	workstation43	252	219	0.7	43	workstation43	242	233	0.7
44	workstation44	256	216	0.8	44	workstation44	245	238	0.8
45	workstation45	255	219	0.7	45	workstation45	248	246	0.7
46	workstation46	304	218	0.7	46	workstation46	245	248	0.7
47	workstation47	306	219	0.6	47	workstation47	245	243	0.6
48	workstation48	276	216	0.9	48	workstation48	242	243	0.9
49	workstation49	287	219	0.7	49	workstation49	248	243	0.7
50	workstation50	306	215	0.8	50	workstation50	221	238	0.8
51	workstation51	396	216	0.7	51	workstation51	298	246	0.7
52	workstation52	290	218	0.9	52	workstation52	261	248	0.9
53	workstation53	238	210	0.8	53	workstation53	217	243	0.8
54	workstation54	295	215	0.7	54	workstation54	235	243	0.7
55	workstation55	309	220	0.5	55	workstation55	290	250	0.5
56	workstation56	345	220	0.5	56	workstation56	298	241	0.5
57	workstation57	355	221	0.6	57	workstation57	283	235	0.6
58	workstation58	276	220	0.6	58	workstation58	295	246	0.6
59	workstation59	322	225	0.7	59	workstation59	290	235	0.7
60	workstation60	320	226	0.7	60	workstation60	295	236	0.7
61	workstation61	390	228	0.5	61	workstation61	298	239	0.6



D Block Ground floor DGL03				
SL NO	Workstation	lux value	Phase to Neutral	Earth to Neutral
1	workstation01	310	215	0.6
2	workstation02	261	210	0.7
3	workstation03	300	216	0.8
4	workstation04	288	219	0.5
5	workstation05	320	217	0.5
6	workstation06	276	210	0.6
7	workstation07	208	215	0.6
8	workstation08	189	216	0.6
9	workstation09	307	218	0.7
10	workstation10	289	220	0.8
11	workstation11	219	220	0.7
12	workstation12	234	215	0.6
13	workstation13	281	220	0.6
14	workstation14	234	226	0.7
15	workstation15	167	218	0.8
16	workstation16	317	215	0.6
17	workstation17	342	210	0.7
18	workstation18	390	215	0.6
19	workstation19	245	216	0.8
20	workstation20	293	219	0.7
21	workstation21	479	216	0.6
22	workstation22	346	219	0.6
23	workstation23	390	201	0.7
24	workstation24	268	220	0.8
25	workstation25	221	221	0.6
26	workstation26	201	220	0.6
27	workstation27	304	225	0.7
28	workstation28	409	226	0.7
29	workstation29	294	230	0.8
30	workstation30	372	216	0.7
31	workstation31	250	218	0.7
32	workstation32	329	219	0.8
33	workstation33	354	220	0.7
34	workstation34	278	212	0.6
35	workstation35	256	211	0.7
36	workstation36	304	214	0.8
37	workstation37	267	219	0.9
38	workstation38	204	210	0.8
39	workstation39	364	215	0.7





D Block Ground floor DGL03				
SL NO	Workstation	lux value	Phase to Neutral	Earth to Neutral
40	workstation40	319	216	0.1
41	workstation41	308	217	0.8
42	workstation42	286	220	0.9
43	workstation43	292	219	0.7
44	workstation44	280	216	0.8
45	workstation45	187	219	0.7
46	workstation46	186	218	0.7
47	workstation47	336	219	0.6
48	workstation48	296	216	0.9
49	workstation49	290	219	0.7
50	workstation50	249	215	0.8
51	workstation51	238	216	0.7
52	workstation52	176	218	0.9
53	workstation53	189	210	0.8
54	workstation54	363	215	0.7
55	workstation55	351	220	0.5
56	workstation56	355	220	0.5
57	workstation57	332	221	0.6
58	workstation58	368	220	0.6
59	workstation59	287	225	0.7
60	workstation60	363	226	0.7
D Block Ground floor DGL01& 02				
SL NO	Workstation	lux value	Phase to Neutral	Earth to Neutral
1	workstation01	383	243	0.6
2	workstation02	409	238	0.9
3	workstation03	404	246	0.6
4	workstation04	469	248	0.7
5	workstation05	503	243	0.6
6	workstation06	558	243	0.6
7	workstation07	408	243	0.7
8	workstation08	365	238	0.8
9	workstation09	345	246	0.5
10	workstation10	217	248	0.5
11	workstation11	209	243	0.6
12	workstation12	412	243	0.6
13	workstation13	437	250	0.6
14	workstation14	597	241	0.7
15	workstation15	279	235	0.8
16	workstation16	222	246	0.7





D Block Ground floor DGL03				
SL NO	Workstation	lux value	Phase to Neutral	Earth to Neutral
17	workstation17	351	235	0.6
18	workstation18	245	236	0.6
19	workstation19	194	239	0.7
20	workstation20	249	237	0.8
21	workstation21	440	231	0.6
22	workstation22	405	216	0.7
23	workstation23	502	215	0.6
24	workstation24	504	216	0.8
25	workstation25	351	243	0.7
26	workstation26	203	238	0.6
27	workstation27	275	246	0.6
28	workstation28	314	248	0.7
29	workstation29	178	243	0.8
30	workstation30	230	243	0.6
31	workstation31	326	243	0.6
32	workstation32	307	238	0.7
33	workstation33	401	246	0.7
34	workstation34	396	248	0.8
35	workstation35	307	243	0.7
36	workstation36	304	243	0.7
37	workstation37	147	250	0.8
38	workstation38	121	241	0.7
39	workstation39	281	235	0.6
40	workstation40	274	246	0.7
41	workstation41	269	235	0.8
42	workstation42	115	236	0.9
43	workstation43	134	239	0.8
44	workstation44	122	237	0.7
45	workstation45	169	231	0.1
46	workstation46	321	216	0.8
47	workstation47	502	215	0.9
48	workstation48	596	216	0.7
49	workstation49	566	243	0.8
50	workstation50	416	238	0.7
51	workstation51	216	246	0.7
52	workstation52	362	248	0.6
53	workstation53	502	243	0.9
54	workstation54	507	243	0.7
55	workstation55	589	243	0.8





D Block Ground floor DGL03				
SL NO	Workstation	lux value	Phase to Neutral	Earth to Neutral
56	workstation56	312	238	0.7
57	workstation57	505	246	0.9
58	workstation58	532	248	0.8
59	workstation59	570	243	0.7
60	workstation60	456	243	0.5
61	workstation61	344	250	0.5
62	workstation62	451	241	0.6
63	workstation63	510	235	0.6
64	workstation64	454	246	0.7
65	workstation65	280	235	0.7
66	workstation66	480	236	0.8
67	workstation67	508	239	0.7
68	workstation68	385	237	0.7
69	workstation69	243	231	0.8
70	workstation70	235	216	0.7
71	workstation71	460	215	0.6
72	workstation72	544	216	0.7
73	workstation73	479	243	0.8
74	workstation74	291	238	0.9
75	workstation75	264	246	0.8
76	workstation76	281	248	0.7
77	workstation77	288	243	0.1
78	workstation78	276	243	0.8
79	workstation79	292	243	0.9
80	workstation80	283	238	0.7
81	workstation81	299	246	0.8
82	workstation82	227	248	0.7
83	workstation83	202	243	0.7
84	workstation84	265	243	0.6
85	workstation85	258	250	0.9
86	workstation86	304	241	0.7
87	workstation87	301	235	0.8
88	workstation88	186	246	0.7
89	workstation89	339	235	0.9
90	workstation90	405	236	0.8
91	workstation91	152	239	0.7
92	workstation92	328	237	0.5
93	workstation93	300	231	0.5
94	workstation94	267	216	0.8





D Block Ground floor DGL03				
SL NO	Workstation	lux value	Phase to Neutral	Earth to Neutral
95	workstation95	253	215	0.7
96	workstation96	381	216	0.1
97	workstation97	387	243	0.8
98	workstation98	276	238	0.9
99	workstation99	273	246	0.7
100	workstation100	356	248	0.8
101	workstation101	302	243	0.7
102	workstation102	311	243	0.7
103	workstation103	260	243	0.6
104	workstation104	188	238	0.9
105	workstation105	208	246	0.7
106	workstation106	205	248	0.8
107	workstation107	185	243	0.7
108	workstation108	151	243	0.9
109	workstation109	211	250	0.8
110	workstation110	258	241	0.7
111	workstation111	268	235	0.5
112	workstation112	246	246	0.5
113	workstation113	130	235	0.7
114	workstation114	209	236	0.8
115	workstation115	227	239	0.7
116	workstation116	234	237	0.7
117	workstation117	170	231	0.8
118	workstation118	201	216	0.7
119	workstation119	250	215	0.6
120	workstation120	223	216	0.7

D Block DFL04					D Block DFL05				
SL NO	Workstation	lux value	Phase to Neutral	Earth to Neutral	SL NO	Workstation	lux value	Phase to Neutral	Earth to Neutral
1	workstation01	389	243	0.6	1	workstation01	302	220	0.6
2	workstation02	289	243	0.9	2	workstation02	306	220	0.9
3	workstation03	310	238	0.6	3	workstation03	200	215	0.6
4	workstation04	302	246	0.7	4	workstation04	165	220	0.7
5	workstation05	378	248	0.6	5	workstation05	319	226	0.6
6	workstation06	382	243	0.6	6	workstation06	315	218	0.6
7	workstation07	473	243	0.7	7	workstation07	282	215	0.7
8	workstation08	870	250	0.8	8	workstation08	215	210	0.8
9	workstation09	290	241	0.5	9	workstation09	278	215	0.5





D Block Ground floor DGL03									
SL NO	Workstation		lux value		Phase to Neutral			Earth to Neutral	
10	workstation10	291	235	0.5	10	workstation10	248	216	0.5
11	workstation11	320	246	0.6	11	workstation11	260	219	0.6
12	workstation12	440	235	0.6	12	workstation12	256	216	0.6
13	workstation13	394	236	0.6	13	workstation13	276	218	0.6
14	workstation14	432	239	0.7	14	workstation14	323	219	0.7
15	workstation15	756	237	0.8	15	workstation15	220	216	0.8
16	workstation16	360	231	0.7	16	workstation16	330	219	0.7
17	workstation17	207	233	0.6	17	workstation17	239	215	0.6
18	workstation18	345	238	0.6	18	workstation18	300	216	0.6
19	workstation19	369	246	0.7	19	workstation19	257	218	0.7
20	workstation20	502	248	0.8	20	workstation20	311	210	0.8
21	workstation21	441	243	0.6	21	workstation21	317	215	0.6
22	workstation22	576	243	0.7	22	workstation22	270	220	0.7
23	workstation23	532	243	0.6	23	workstation23	222	220	0.6
24	workstation24	312	238	0.8	24	workstation24	301	211	0.8
25	workstation25	260	246	0.7	25	workstation25	263	219	0.7
26	workstation26	291	248	0.6	26	workstation26	206	216	0.6
27	workstation27	209	243	0.6	27	workstation27	257	219	0.6
28	workstation28	348	243	0.7	28	workstation28	284	201	0.7
29	workstation29	314	250	0.8	29	workstation29	277	220	0.8
30	workstation30	323	241	0.6	30	workstation30	280	221	0.6
31	workstation31	283	235	0.6	31	workstation31	268	220	0.6
32	workstation32	246	246	0.7	32	workstation32	250	225	0.7
33	workstation33	320	235	0.7	33	workstation33	303	226	0.7
34	workstation34	315	236	0.8	34	workstation34	301	230	0.8
35	workstation35	227	239	0.7	35	workstation35	294	216	0.7
36	workstation36	278	237	0.7	36	workstation36	330	218	0.7
37	workstation37	315	231	0.8	37	workstation37	250	219	0.8
38	workstation38	240	233	0.7	38	workstation38	168	220	0.7
39	workstation39	289	238	0.6	39	workstation39	260	212	0.6
40	workstation40	293	246	0.7	40	workstation40	245	211	0.7
41	workstation41	303	248	0.8	41	workstation41	275	214	0.8
42	workstation42	344	243	0.9	42	workstation42	280	219	0.9
43	workstation43	412	243	0.8	43	workstation43	260	210	0.8
44	workstation44	414	243	0.7	44	workstation44	219	215	0.7
45	workstation45	450	238	0.1	45	workstation45	237	218	0.1
46	workstation46	440	246	0.8	46	workstation46	234	219	0.8
47	workstation47	400	248	0.9	47	workstation47	240	216	0.9
48	workstation48	338	243	0.7	48	workstation48	274	219	0.7





D Block Ground floor DGL03									
SL NO	Workstation		lux value		Phase to Neutral		Earth to Neutral		
49	workstation49	410	243	0.8	49	workstation49	318	215	0.8
50	workstation50	363	250	0.7	50	workstation50	335	216	0.7
51	workstation51	303	241	0.7	51	workstation51	301	218	0.7
52	workstation52	393	235	0.6	52	workstation52	337	210	0.6
53	workstation53	229	246	0.9	53	workstation53	312	215	0.9
54	workstation54	324	235	0.7	54	workstation54	241	220	0.7
55	workstation55	345	243	0.8	55	workstation55	335	220	0.8
56	workstation56	329	243	0.7	56	workstation56	365	211	0.7
57	workstation57	355	250	0.9	57	workstation57	364	218	0.9
58	workstation58	345	241	0.8	58	workstation58	360	210	0.8
59	workstation59	396	235	0.7	59	workstation59	356	215	0.7
60	workstation60	400	246	0.5	60	workstation60	392	220	0.5
61	workstation61	330	235	0.5	61	workstation61	275	220	0.5
62	workstation62	287	236	0.7	62	workstation62	260	211	0.7
IT room (Electrical room)									
Workstation		lux value		Phase to Neutral		Earth to Neutral			
1		475		220		0.6			
2		376		220		0.9			
3		390		215		0.6			
4		393		220		0.7			
5		395		226		0.6			
6		357		218		0.6			

D Block DSL04					D Block DSL05				
SL NO	Workstation	lux value	Phase to Neutral	Earth to Neutral	SL NO	Workstation	lux value	Phase to Neutral	Earth to Neutral
1	workstation01	393	220	0.6	1	workstation01	525	220	0.6
2	workstation02	374	220	0.9	2	workstation02	520	220	0.9
3	workstation03	404	215	0.6	3	workstation03	446	215	0.6
4	workstation04	354	220	0.7	4	workstation04	432	220	0.7
5	workstation05	355	226	0.6	5	workstation05	306	226	0.6
6	workstation06	398	218	0.6	6	workstation06	326	218	0.6
7	workstation07	369	215	0.7	7	workstation07	400	215	0.7
8	workstation08	325	210	0.8	8	workstation08	340	210	0.8
9	workstation09	378	215	0.5	9	workstation09	250	215	0.5
10	workstation10	266	216	0.5	10	workstation10	260	216	0.5
11	workstation11	413	219	0.6	11	workstation11	208	219	0.6
12	workstation12	358	216	0.6	12	workstation12	278	216	0.6





D Block DSL04					D Block DSL05				
SL NO	Workstation	lux value	Phase to Neutral	Earth to Neutral	SL NO	Workstation	lux value	Phase to Neutral	Earth to Neutral
13	workstation13	460	218	0.6	13	workstation13	297	218	0.6
14	workstation14	180	219	0.7	14	workstation14	357	219	0.7
15	workstation15	320	216	0.8	15	workstation15	314	216	0.8
16	workstation16	391	219	0.7	16	workstation16	331	219	0.7
17	workstation17	320	215	0.6	17	workstation17	340	215	0.6
18	workstation18	306	216	0.6	18	workstation18	404	216	0.6
19	workstation19	475	218	0.7	19	workstation19	288	218	0.7
20	workstation20	376	210	0.8	20	workstation20	334	210	0.8
21	workstation21	390	215	0.6	21	workstation21	410	215	0.6
22	workstation22	393	220	0.7	22	workstation22	218	220	0.7
23	workstation23	395	220	0.6	23	workstation23	380	220	0.6
24	workstation24	357	211	0.8	24	workstation24	293	211	0.8
25	workstation25	328	219	0.7	25	workstation25	189	219	0.7
26	workstation26	407	216	0.6	26	workstation26	195	216	0.6
27	workstation27	359	219	0.6	27	workstation27	133	219	0.6
28	workstation28	399	201	0.7	28	workstation28	179	201	0.7
29	workstation29	352	220	0.8	29	workstation29	224	220	0.8
30	workstation30	320	221	0.6	30	workstation30	287	221	0.6
31	workstation31	384	220	0.6	31	workstation31	303	220	0.6
32	workstation32	377	225	0.7	32	workstation32	310	225	0.7
33	workstation33	293	226	0.7	33	workstation33	281	226	0.7
34	workstation34	315	230	0.8	34	workstation34	342	230	0.8
35	workstation35	352	216	0.7	35	workstation35	316	216	0.7
36	workstation36	387	218	0.7	36	workstation36	392	218	0.7
37	workstation37	400	219	0.8	37	workstation37	370	219	0.8
38	workstation38	290	220	0.7	38	workstation38	201	220	0.7
39	workstation39	420	212	0.6	39	workstation39	339	212	0.6
40	workstation40	491	211	0.7	40	workstation40	277	211	0.7
41	workstation41	337	214	0.8	41	workstation41	197	214	0.8
42	workstation42	328	219	0.9	42	workstation42	227	219	0.9
43	workstation43	385	210	0.8	43	workstation43	115	210	0.8
44	workstation44	327	215	0.7	44	workstation44	169	215	0.7
45	workstation45	395	218	0.1	45	workstation45	215	218	0.1
46	workstation46	423	219	0.8	46	workstation46	281	219	0.8
47	workstation47	435	216	0.9	47	workstation47	322	216	0.9
48	workstation48	306	219	0.7	48	workstation48	242	219	0.7
49	workstation49	238	215	0.8	49	workstation49	260	215	0.8
50	workstation50	338	216	0.7	50	workstation50	315	216	0.7





D Block DSL04					D Block DSL05				
SL NO	Workstation	lux value	Phase to Neutral	Earth to Neutral	SL NO	Workstation	lux value	Phase to Neutral	Earth to Neutral
51	workstation51	321	218	0.7	51	workstation51	267	218	0.7
52	workstation52	416	210	0.6	52	workstation52	344	210	0.6
53	workstation53	296	215	0.9	53	workstation53	307	215	0.9
54	workstation54	232	220	0.7	54	workstation54	286	220	0.7
55	workstation55	550	220	0.8	55	workstation55	244	220	0.8
56	workstation56	327	211	0.7	56	workstation56	190	211	0.7
57	workstation57	404	218	0.9	57	workstation57	365	218	0.9
58	workstation58	380	210	0.8	58	workstation58	168	210	0.8
59	workstation59	369	215	0.7	59	workstation59	191	215	0.7
60	workstation60	398	220	0.5	60	workstation60	140	220	0.5
61	workstation61	510	220	0.5	61	workstation61	190	220	0.5
					62	workstation62	275	218	0.7
					63	workstation63	289	210	0.6

Hod cabin D block 2nd floor			
Workstation	lux value	Phase to Neutral	Earth to Neutral
1	308	220	0.6
2	581	220	0.9
3	594	215	0.6
4	509	220	0.7
5	585	226	0.6
6	522	218	0.6
7	452	215	0.7
8	694	210	0.8
9	675	215	0.5
10	644	216	0.5
11	625	219	0.6
12	509	216	0.6
13	427	218	0.6
14	458	219	0.7
15	424	216	0.8
16	529	219	0.7
17	539	215	0.6
18	449	216	0.6



Table 14: Details of Indore Lighting lux measurement in Admin

Admin								
SL NO	Block	lux value	SL NO	Block	lux value	SL NO	Block	lux value
Ground floor			1st Floor			2nd Floor		
1	Cabin#1	410	1	workstation01	283	1	workstation01	143
2	Cabin#2	324	2	workstation02	304	2	workstation02	145
3	Cabin#3	321	3	workstation03	291	3	workstation03	180
4	Cabin#4	315	4	workstation04	236	4	workstation04	77
5	Cabin#5	318	5	workstation05	330	5	workstation05	81
6	Cabin#6	316	6	workstation06	305	6	workstation06	93
7	Cabin#7	358	7	workstation07	289	7	workstation07	84
8	Cabin#8	399	8	workstation08	290	8	workstation08	91
9	Cabin#9	407	9	workstation09	299	9	workstation09	99
10	Cabin#10	304	10	workstation10	287	10	workstation10	101
11	Cabin#11	355	11	workstation11	309	11	workstation11	108
12	Cabin#12	361	12	workstation12	391	12	workstation12	97
13	Cabin#13	366	13	Reception	390	13	workstation13	99
14	Cabin#14	233	14	Cabin#1	340	14	workstation14	89
15	Borad room#1	408	15	Cabin#2	305	15	Lab	101
16		342	16	Cabin#3	296	16		108
17		338				17		152
18		360				18		108
19		380				19		161
20	Borad room#2	411				20	Studends Lab	101
21		348				21		102
22		332				22		108
23		361				23		108
24		381				24		151
					25	Cabin#1	78	
					26		91	
					27		101	
					28	Cabin#2	67	
					29		80	
					30		61	
					31		90	



COE			DSA		
SL NO	Block	lux value	SL NO	Block	lux value
Basement			1	Reception	208
1	workstation01	90	2	Cabin #1	375
2	workstation02	103	3	Cabin #2	272
3	workstation03	108	4	Cabin #3	304
4	workstation04	120	5	Board room	240
5	workstation05	122	6		248
6	workstation06	107	7		242
7	workstation07	108	8		241
8	workstation08	91	9		256
9	workstation09	70			
10	workstation10	78			
11	Cabin #1	236			
12	Cabin #2	231			
13	Cabin #3	236			
Ground floor					
14	Cabin #1	632			
15	Cabin #2	653			
16	Cabin #3	555			
17	Cabin #4	714			
18	Cabin #5	304			
19	Board room	831			
20		563			
21		709			
22		731			
23		760			
1st Floor					
24	Cabin #1	109			
25	Cabin #2	108			
26	Cabin #3	123			
27	Cabin #4	131			
28	Cabin #5	124			
29	Cabin #6	100			
30		144			
31		123			
32	Board room	136			
33		141			
34		148			
35		143			
36		160			



Old admin			Old admin			
SL NO	Block	lux value	SL NO	Block	lux value	
Ground floor			1st Floor			
1	Cabin#1	490	1	workstation01	115	
2	Cabin#2	369	2	workstation02	118	
3	Cabin#3	206	3	workstation03	113	
4	Cabin#4	286	4	workstation04	116	
5	Cabin#5	231	5	workstation05	120	
6	Cabin#6	260	6	workstation06	120	
7	Cabin#7	231	7	workstation07	122	
8	Cabin#8	344	8	workstation08	128	
9	Cabin#9	117	9	workstation09	130	
10	Cabin#10	231	10	workstation10	118	
11	Cabin#11	230	11	workstation11	118	
12	workstation	291	12	workstation12	117	
13		299	13	workstation13	116	
14		301	14	workstation14	115	
15		308	15	workstation15	118	
16		301	16	workstation16	119	
17		308	17	workstation17	113	
18		299	18	workstation18	118	
19		291	19	workstation19	121	
20		Borad room	234	20	workstation20	130
21			231	21	workstation21	239
22	236		22	workstation22	211	
23	238		23	workstation23	212	
24	290		24	workstation24	236	
			25	workstation25	240	
			26	workstation26	241	
			27	Cabin#1	145	
			28	Cabin#2	282	
			29	Cabin#3	215	
			30	Cabin#4	238	
			31	Cabin#5	140	



Table 15: Details of Indore Lighting lux measurement in Central MBA block

1st floor computer lab MBA block			Basement computer lab		
SL NO	Workstation	lux value	SL NO	Workstation	lux value
1	workstation01	108	1	workstation01	93
2	workstation02	115	2	workstation02	91
3	workstation03	123	3	workstation03	98
4	workstation04	142	4	workstation04	95
5	workstation05	149	5	workstation05	96
6	workstation06	157	6	workstation06	99
7	workstation07	157	7	workstation07	98
8	workstation08	138	8	workstation08	93
9	workstation09	127	9	workstation09	92
10	workstation10	136	10	workstation10	91
11	workstation11	137	11	workstation11	95
12	workstation12	146	12	workstation12	101
13	workstation13	158	13	workstation13	97
14	workstation14	162	14	workstation14	96
15	workstation15	160	15	workstation15	93
16	workstation16	150	16	workstation16	94
17	workstation17	144	17	workstation17	98
18	workstation18	125	18	workstation18	91
19	workstation19	112	19	workstation19	108
20	workstation20	96	20	workstation20	101
21	workstation21	110	21	workstation21	107
22	workstation22	110	22	workstation22	98
23	workstation23	128	23	workstation23	89
24	workstation24	128	24	workstation24	99
25	workstation25	140	25	workstation25	96
26	workstation26	145	26	workstation26	89
27	workstation27	168	27	workstation27	95
28	workstation28	154	28	workstation28	98
29	workstation29	162	29	workstation29	93
30	workstation30	144	30	workstation30	92
31	workstation31	123	31	workstation31	96
32	workstation32	96	32	workstation32	108
33	workstation33	87	33	workstation33	101
34	workstation34	119	34	workstation34	101
35	workstation35	123	35	workstation35	99
36	workstation36	150	36	workstation36	96
37	workstation37	137	37	workstation37	95
38	workstation38	136	38	workstation38	94





1st floor computer lab MBA block			Basement computer lab		
SL NO	Workstation	lux value	SL NO	Workstation	lux value
39	workstation39	145	39	workstation39	93
40	workstation40	110	40	workstation40	91
41	workstation41	122	41	workstation41	98
42	workstation42	133	42	workstation42	99
43	workstation43	161	43	workstation43	96
44	workstation44	1564	44	workstation44	91
45	workstation45	161	45	workstation45	97
46	workstation46	156	46	workstation46	96
47	workstation47	141	47	workstation47	95
48	workstation48	140	48	workstation48	94
49	workstation49	143	49	workstation49	95
50	workstation50	121	50	workstation50	93
51	workstation51	86	51	workstation51	78
52	workstation52	101	52	workstation52	81
53	workstation53	108	53	workstation53	84
54	workstation54	121	54	workstation54	86
55	workstation55	130	55	workstation55	77
56	workstation56	128	56	workstation56	91
57	workstation57	143	57	workstation57	97
58	workstation58	142	58	workstation58	79
59	workstation59	129	59	workstation59	86
60	workstation60	120	60	workstation60	81
61	workstation61	110	61	workstation61	84
62	workstation62	114	62	workstation62	94
63	workstation63	147	63	workstation63	96
64	workstation64	150	64	workstation64	78
65	workstation65	153	65	workstation65	91
66	workstation66	143	66	workstation66	89
67	workstation67	144	67	workstation67	90
68	workstation68	114	68	workstation68	98
69	workstation69	109	69	workstation69	99
70	workstation70	98	70	workstation70	88
71	workstation71	126	71	workstation71	84
72	workstation72	129	72	workstation72	85
73	workstation73	158	73	workstation73	101
74	workstation74	162	74	workstation74	99
75	workstation75	156	75	workstation75	96
76	workstation76	167	76	workstation76	94
77	workstation77	160	77	workstation77	93





1st floor computer lab MBA block			Basement computer lab		
SL NO	Workstation	lux value	SL NO	Workstation	lux value
78	workstation78	153	78	workstation78	94
79	workstation79	135	79	workstation79	95
80	workstation80	126	80	workstation80	99
81	workstation81	141	81	workstation81	96
82	workstation82	148	82	workstation82	96
83	workstation83	150	83	workstation83	98
84	workstation84	171	84	workstation84	82
85	workstation85	172	85	workstation85	99
86	workstation86	136	86	workstation86	95
87	workstation87	130	87	workstation87	96
88	workstation88	134	88	workstation88	91
89	workstation89	111	89	workstation89	99
90	workstation90	101	90	workstation90	98
91	workstation91	126	91	workstation91	96
92	workstation92	139	92	workstation92	94
93	workstation93	140	93	workstation93	101
94	workstation94	134	94	workstation94	101
95	workstation95	173	95	workstation95	106
96	workstation96	157	96	workstation96	74
97	workstation97	150	97	workstation97	79
98	workstation98	134	98	workstation98	94
99	workstation99	148	99	workstation99	99
100	workstation100	134	100	workstation100	96
101	workstation101	141	101	workstation101	92
102	workstation102	154	102	workstation102	93
103	workstation103	173	103	workstation103	96
104	workstation104	170	104	workstation104	98
105	workstation105	178			
106	workstation106	174			
107	workstation107	169			
108	workstation108	152			
109	workstation109	134			
110	workstation110	109			
111	workstation111	121			
112	workstation112	131			
113	workstation113	136			
114	workstation114	137			
115	workstation115	161			
116	workstation116	156			



1st floor computer lab MBA block			Basement computer lab		
SL NO	Workstation	lux value	SL NO	Workstation	lux value
117	workstation117	131			
118	workstation118	130			
119	workstation119	130			
120	workstation120	123			
121	Table #1	128			
122	Table #2	130			



MBA Block Class Room						
SL NO	Block	lux value	lux value	lux value	lux value	lux value
1	MG01	166	139	132	121	112
2	MG02	111	183	146	130	198
3	MG03	131	165	233	134	122
4	MG04	126	157	228	130	115
5	MG05	110	115	89	124	121
6	MG06	127	166	104	131	152
7	Moot court room	207	224	159	222	148
8	MG08	177	149	203	94	127
9	MG09	145	147	184	136	130
10	MG10	196	181	258	152	141
11	MG11	134	196	177	122	246
12	MG12	120	145	199	108	114
13	MG13	148	179	218	236	246
14	MF01	131	151	208	138	134
15	MF02	126	137	181	122	118
16	MF03	112	121	153	113	103
17	MF04	105	119	163	118	103
18	MF08	110	145	192	133	111
19	MF09	124	132	177	122	110
20	MF10	111	155	192	115	139
21	MF11	142	153	187	121	128
22	MF12	121	138	190	117	132
23	MF13	112	129	170	109	125



Table 16: Details of Indore Lighting lux measurement in Central E Block Labs

Computer lab E Block Labs			Multi purpose Hall E Block Labs		
SL NO	Workstation	lux value	SL NO	Workstation	lux value
1	workstation01	120	1	workstation01	148
2	workstation02	176	2	workstation02	150
3	workstation03	132	3	workstation03	144
4	workstation04	148	4	workstation04	155
5	workstation05	160	5	workstation05	155
6	workstation06	161	6	workstation06	157
7	workstation07	171	7	workstation07	161
8	workstation08	148	8	workstation08	164
9	workstation09	142	9	workstation09	177
10	workstation10	169	10	workstation10	171
11	workstation11	158	11	workstation11	108
12	workstation12	190	12	workstation12	109
13	workstation13	151	13	workstation13	162
14	workstation14	138	14	workstation14	170
15	workstation15	162	15	workstation15	174
16	workstation16	118	16	workstation16	177
17	workstation17	158	17	workstation17	163
18	workstation18	176	18	workstation18	177
19	workstation19	137	19	workstation19	185
20	workstation20	150	20	workstation20	203
21	workstation21	118	21	workstation21	133
22	workstation22	190	22	workstation22	101
23	workstation23	152			
24	workstation24	155			
25	workstation25	105			
26	workstation26	113			
27	workstation27	138			
28	workstation28	169			
29	workstation29	161			



E Block Labs							
SL NO	Block	lux value	lux value	lux value	lux value	lux value	lux value
1	Machines shop	104	105	111	140	108	122
2		183	180	181	151	180	146
3	Fluid mechanics lab	109	122	189	140	187	128
4	Strength of materials lab	120	128	188	187	118	160
5	Fluid mechanics & machines lab	149	140	152	106	142	139
6	Mechatronics lab	128	183	128	150	108	78
7		128	175	101	188	150	174
8	Soil mechanics lab	152	135	108	170	123	129
9		156	176	128	142	136	160
10	SOD faculty room	120	161	158	118	118	113
11	Studio 1	91	85	152	151	153	109
12	Hard materials lab	99	105	98	94	131	165
13	ES04	106	108	185	183	181	98
14	ES05	160	157	165	174	177	101
15	Studio 2	160	143	111	144	51	92



E Block 1st floor Faculty #1			E Block 1st floor Faculty #2			E Block 2nd floor Faculty #1			E Block All HOD cabin		
SL NO	Workstation	lux value	SL NO	Workstation	lux value	SL NO	Workstation	lux value	SL NO	Workstation	lux value
1	workstation01	127	1	workstation01	115	1	workstation01	93	1st floor		
2	workstation02	101	2	workstation02	113	2	workstation02	104	1	Cabin#1	265
3	workstation03	32	3	workstation03	111	3	workstation03	98	2	Cabin#2	262
4	workstation04	116	4	workstation04	130	4	workstation04	95	3	Cabin#3	689
5	workstation05	130	5	workstation05	112	5	workstation05	78	4	workstation01	237
6	workstation06	111	6	workstation06	123	6	workstation06	79	5	workstation02	193
7	workstation07	127	7	workstation07	119	7	workstation07	90	6	workstation03	256
8	workstation08	106	8	workstation08	105	8	workstation08	101	2nd floor		
9	workstation09	132	9	workstation09	112	9	workstation09	80	1	Cabin#1	266
10	workstation10	131	10	workstation10	118	10	workstation10	92	2	Cabin#2	275
11	workstation11	81	11	workstation11	123	11	workstation11	93	3	Cabin#3	291
12	workstation12	103	12	workstation12	105	12	workstation12	91	4	workstation01	263
13	workstation13	82	13	workstation13	106	13	workstation13	94	5	workstation02	239
14	workstation14	26	14	workstation14	89	14	workstation14	92			
15	workstation15	26	15	workstation15	29	15	workstation15	75			
16	workstation16	113	16	workstation16	30	16	workstation16	92			
17	workstation17	125				17	workstation17	92			
						18	workstation18	88			
						19	workstation19	83			
						20	workstation20	80			
						21	workstation21	32			
						22	workstation22	24			



Table 17: Details of Indore Lighting lux measurement in F Block

F Block 1st floor Faculty #2			F Block 2nd floor Faculty #1			F Block 2nd floor Faculty #2			E Block All HOD cabin		
SL NO	Workstation	lux value	SL NO	Workstation	lux value	SL NO	Workstation	lux value	SL NO	Workstation	lux value
1	workstation01	115	1	workstation01	128	1	workstation01	72	1st floor		
2	workstation02	104	2	workstation02	122	2	workstation02	50	1	COE	404
3	workstation03	113	3	workstation03	122	3	workstation03	42	2		433
4	workstation04	121	4	workstation04	82	4	workstation04	74	3	workstation01	250
5	workstation05	124	5	workstation05	86	5	workstation05	59	4	workstation02	263
6	workstation06	115	6	workstation06	119	6	workstation06	56			
7	workstation07	92	7	workstation07	73	7	workstation07	59			
8	workstation08	116	8	workstation08	101	8	workstation08	25	2nd floor		
9	workstation09	124	9	workstation09	27	9	workstation09	54	1	Cabin#1	276
10	workstation10	103	10	workstation10	35	10	workstation10	16	2	Cabin#2	245
11	workstation11	98	11	workstation11	68	11	workstation11	9	3	Cabin#3	272
12	workstation12	123	12	workstation12	97	12	workstation12	20	4	workstation01	260
13	workstation13	127	13	workstation13	69	13	workstation13	70	5	workstation02	276
14	workstation14	119	14	workstation14	61	14	workstation14	80	6	workstation03	283
15	workstation15	105	15	workstation15	76	15	workstation15	76			
16	workstation16	38	16	workstation16	104	16	workstation16	72			
17	workstation17	35	17	workstation17	78	17	workstation17	70			
			18	workstation18	76						
			19	workstation19	38						
			20	workstation20	31						
			21	workstation21	83						
			22	workstation22	71						



Table 18: Details of Indore Lighting lux measurement in Central HJK Class Room

H,J,K Class Room																							
H block								J block								K block							
SL NO	Block	lux value	lux value	lux value	lux value	lux value	lux value	SL NO	Block	lux value	lux value	lux value	lux value	lux value	lux value	SL NO	Block	lux value	lux value	lux value	lux value	lux value	lux value
1	HG01	118	92	302	136	132	95	1	JG01	103	102	182	191	152	168	1	KG01	129	125	180	182	114	103
2	HG02	96	93	191	192	98	213	2	JG02	63	53	117	125			2	KG02	123	126	199	198	134	135
3	HG03	85	82	194	194	118	201	3	JG03	67	113	139	64			3	KG03	133	131	217	192	119	135
4	HG04	92	108	138	136	97	198	4	JG04	96	93	190	192	146	172	4	KG04	131	128	197	198	120	247
5	HF01	127	124	167	174	118	114	5	JF01	125	123	180	182	127	111	5	KF01	128	122	183	188	105	159
6	HF02	122	128	179	181	129	125	6	JF02	97	94	116	115			6	KF02	126	126	185	188	132	136
7	HF03	130	135	189	181	106	195	7	JF03	94	91	117	112			7	KF03	132	127	183	186	115	160
8	HF04	120	128	188	187	118	160	8	JF04	120	122	182	183	128	150	8	KF04	132	130	189	185	135	127
9	HS01	110	112	171	169	116	153	9	JS01	130	129	169	168	131	153	9	KS01	120	123	172	197	131	184
10	HS02	115	117	165	167	105	185	10	JS02	48	43	87	101			10	KS02	115	117	187	173	116	142
11	HS03	100	123	173	176	102	217	11	JS03	74	36	82	120			11	KS03	115	113	164	171	114	152
12	HS04	120	122	159	154	104	140	12	JS04	112	118	162	167	121	150	12	KS04	127	126	183	186	117	207



Table 19: Details of Indore Lighting lux measurement in Central L Block Labs

L Block 1st Floor Labs														
L Block 1st floor LF01			L Block 1st floor LF02			L Block 1st floor LF03			L Block 1st floor LF04			L Block 1st floor LF05		
SL NO	Workstation	lux value	SL NO	Workstation	lux value	SL NO	Workstation	lux value	SL NO	Workstation	lux value	SL NO	Workstation	lux value
1	workstation01	153	1	workstation01	191	1	workstation01	138	1	workstation01	138	1	workstation01	159
2	workstation02	154	2	workstation02	191	2	workstation02	138	2	workstation02	130	2	workstation02	153
3	workstation03	158	3	workstation03	185	3	workstation03	143	3	workstation03	138	3	workstation03	155
4	workstation04	158	4	workstation04	181	4	workstation04	147	4	workstation04	136	4	workstation04	149
5	workstation05	173	5	workstation05	182	5	workstation05	159	5	workstation05	141	5	workstation05	153
6	workstation06	170	6	workstation06	171	6	workstation06	160	6	workstation06	142	6	workstation06	152
7	workstation07	174	7	workstation07	171	7	workstation07	162	7	workstation07	140	7	workstation07	157
8	workstation08	170	8	workstation08	167	8	workstation08	159	8	workstation08	139	8	workstation08	145
9	workstation09	128	9	workstation09	165	9	workstation09	155	9	workstation09	138	9	workstation09	143
10	workstation10	122	10	workstation10	176	10	workstation10	138	10	workstation10	144	10	workstation10	143
11	workstation11	127	11	workstation11	171	11	workstation11	145	11	workstation11	140	11	workstation11	153
12	workstation12	123	12	workstation12	174	12	workstation12	136	12	workstation12	142	12	workstation12	139
13	workstation13	126	13	workstation13	179	13	workstation13	142	13	workstation13	145	13	workstation13	126
14	workstation14	130	14	workstation14	172	14	workstation14	150	14	workstation14	139	14	workstation14	122
15	workstation15	135	15	workstation15	167	15	workstation15	164	15	workstation15	136	15	workstation15	146
16	workstation16	139	16	workstation16	159	16	workstation16	160	16	workstation16	138	16	workstation16	153
17	workstation17	147	17	workstation17	161	17	workstation17	159	17	workstation17	153	17	workstation17	148
18	workstation18	146	18	workstation18	163	18	workstation18	163	18	workstation18	154	18	workstation18	139
19	workstation19	148	19	workstation19	160	19	workstation19	156	19	workstation19	152	19	workstation19	163
20	workstation20	146	20	workstation20	164	20	workstation20	145	20	workstation20	141	20	workstation20	160
21	workstation21	150	21	workstation21	170	21	workstation21	137	21	workstation21	153	21	workstation21	149
22	workstation22	148	22	workstation22	162	22	workstation22	134	22	workstation22	154	22	workstation22	162
23	workstation23	152	23	workstation23	164	23	workstation23	147	23	workstation23	155	23	workstation23	157



L Block 1st Floor Labs														
L Block 1st floor LF01			L Block 1st floor LF02			L Block 1st floor LF03			L Block 1st floor LF04			L Block 1st floor LF05		
SL NO	Workstation	lux value	SL NO	Workstation	lux value	SL NO	Workstation	lux value	SL NO	Workstation	lux value	SL NO	Workstation	lux value
24	workstation24	151	24	workstation24	152	24	workstation24	146	24	workstation24	152	24	workstation24	148
25	workstation25	143	25	workstation25	174	25	workstation25	158	25	workstation25	139	25	workstation25	152
26	workstation26	149	26	workstation26	172	26	workstation26	164	26	workstation26	143	26	workstation26	155
27	workstation27	151	27	workstation27	169	27	workstation27	151	27	workstation27	142	27	workstation27	151
28	workstation28	133	28	workstation28	170	28	workstation28	151	28	workstation28	150	28	workstation28	132
29	workstation29	151	29	workstation29	163	29	workstation29	149	29	workstation29	151	29	workstation29	139
30	workstation30	142	30	workstation30	159	30	workstation30	155	30	workstation30	158	30	workstation30	105
31	workstation31	146	31	workstation31	149	31	workstation31	161	31	workstation31	152	31	workstation31	122
32	workstation32	148	32	workstation32	164	32	workstation32	162	32	workstation32	152	32	workstation32	121
33	workstation33	159	33	workstation33	156	33	workstation33	160	33	workstation33	151	33	workstation33	134
34	workstation34	137	34	workstation34	145	34	workstation34	149	34	workstation34	160	34	workstation34	154
35	workstation35	140	35	workstation35	163	35	workstation35	166	35	workstation35	159	35	workstation35	143
36	workstation36	139	36	workstation36	156	36	workstation36	165	36	workstation36	162	36	workstation36	147
37	workstation37	151	37	workstation37	165	37	workstation37	168	37	workstation37	166	37	workstation37	145
38	workstation38	137	38	workstation38	167	38	workstation38	169	38	workstation38	154	38	workstation38	147
39	workstation39	147	39	workstation39	170	39	workstation39	164	39	workstation39	158	39	workstation39	144
40	workstation40	143	40	workstation40	171	40	workstation40	162	40	workstation40	161	40	workstation40	143
41	workstation41	176	41	workstation41	160	41	workstation41	160	41	workstation41	166	41	workstation41	148
42	workstation42	162	42	workstation42	163	42	workstation42	157	42	workstation42	162	42	workstation42	147
43	workstation43	168	43	workstation43	154	43	workstation43	164	43	workstation43	159	43	workstation43	145
44	workstation44	165	44	workstation44	157	44	workstation44	151	44	workstation44	152	44	workstation44	142
45	workstation45	153	45	workstation45	155	45	workstation45	156	45	workstation45	140	45	workstation45	131
46	workstation46	141	46	workstation46	154	46	workstation46	150	46	workstation46	159	46	workstation46	101
47	workstation47	151	47	workstation47	157	47	workstation47	154	47	workstation47	152	47	workstation47	102



L Block 1st Floor Labs														
L Block 1st floor LF01			L Block 1st floor LF02			L Block 1st floor LF03			L Block 1st floor LF04			L Block 1st floor LF05		
SL NO	Workstation	lux value	SL NO	Workstation	lux value	SL NO	Workstation	lux value	SL NO	Workstation	lux value	SL NO	Workstation	lux value
48	workstation48	143	48	workstation48	154	48	workstation48	174	48	workstation48	153	48	workstation48	101
49	workstation49	154	49	workstation49	141	49	workstation49	171	49	workstation49	156	49	workstation49	122
50	workstation50	148	50	workstation50	151	50	workstation50	174	50	workstation50	153	50	workstation50	130
51	workstation51	141	51	workstation51	155	51	workstation51	176	51	workstation51	152	51	workstation51	134
52	workstation52	160	52	workstation52	152	52	workstation52	170	52	workstation52	156	52	workstation52	151
53	workstation53	171	53	workstation53	165	53	workstation53	169	53	workstation53	152	53	workstation53	144
54	workstation54	173	54	workstation54	140	54	workstation54	165	54	workstation54	160	54	workstation54	143
55	workstation55	166	55	workstation55	154	55	workstation55	168	55	workstation55	161	55	workstation55	145
56	workstation56	163	56	workstation56	164	56	workstation56	172	56	workstation56	152	56	workstation56	142
57	workstation57	168	57	workstation57	172	57	workstation57	175	57	workstation57	154	57	workstation57	146
58	workstation58	153	58	workstation58	169	58	workstation58	171	58	workstation58	156	58	workstation58	142
59	workstation59	153	59	workstation59	151	59	workstation59	173	59	workstation59	142	59	workstation59	146
60	workstation60	146	60	workstation60	152	60	workstation60	172	60	workstation60	149	60	workstation60	138
61	workstation61	152	61	workstation61	160	61	workstation61	175	61	workstation61	157	61	workstation61	132
62	workstation62	165	62	workstation62	161	62	workstation62	171	62	workstation62	160	62	workstation62	103
63	workstation63	149	63	workstation63	152	63	Professor	169	63	workstation63	148	63	workstation63	101
64	workstation64	157	64	workstation64	152				64	workstation64	154	64	Profesor	150
65	workstation65	162	65	workstation65	141				65	workstation65	148			
66	workstation66	153	66	workstation66	142				66	Professor	160			
67	Professor	158	67	Professor	164									



L Block 2nd Floor Labs														
L Block 2nd floor LS01			L Block 2nd floor LS02			L Block 2nd floor LS03			L Block 2nd floor LS04			L Block 2nd floor LS05		
SL NO	Workstation	lux value	SL NO	Workstation	lux value	SL NO	Workstation	lux value	SL NO	Workstation	lux value	SL NO	Workstation	lux value
1	workstation01	154	1	workstation01	170	1	workstation01	151	1	workstation01	174	1	workstation01	174
2	workstation02	166	2	workstation02	172	2	workstation02	153	2	workstation02	166	2	workstation02	176
3	workstation03	170	3	workstation03	171	3	workstation03	165	3	workstation03	161	3	workstation03	178
4	workstation04	179	4	workstation04	172	4	workstation04	178	4	workstation04	172	4	workstation04	173
5	workstation05	165	5	workstation05	173	5	workstation05	177	5	workstation05	160	5	workstation05	174
6	workstation06	168	6	workstation06	175	6	workstation06	176	6	workstation06	153	6	workstation06	173
7	workstation07	167	7	workstation07	169	7	workstation07	168	7	workstation07	155	7	workstation07	175
8	workstation08	170	8	workstation08	170	8	workstation08	164	8	workstation08	163	8	workstation08	170
9	workstation09	154	9	workstation09	168	9	workstation09	160	9	workstation09	166	9	workstation09	174
10	workstation10	170	10	workstation10	172	10	workstation10	153	10	workstation10	164	10	workstation10	173
11	workstation11	176	11	workstation11	173	11	workstation11	173	11	workstation11	163	11	workstation11	171
12	workstation12	180	12	workstation12	177	12	workstation12	156	12	workstation12	149	12	workstation12	176
13	workstation13	179	13	workstation13	173	13	workstation13	164	13	workstation13	182	13	workstation13	171
14	workstation14	172	14	workstation14	159	14	workstation14	153	14	workstation14	167	14	workstation14	170
15	workstation15	182	15	workstation15	154	15	workstation15	161	15	workstation15	164	15	workstation15	172
16	workstation16	182	16	workstation16	149	16	workstation16	169	16	workstation16	157	16	workstation16	175
17	workstation17	188	17	workstation17	146	17	workstation17	171	17	workstation17	169	17	workstation17	176
18	workstation18	189	18	workstation18	159	18	workstation18	176	18	workstation18	169	18	workstation18	179
19	workstation19	170	19	workstation19	158	19	workstation19	162	19	workstation19	169	19	workstation19	178
20	workstation20	176	20	workstation20	164	20	workstation20	163	20	workstation20	171	20	workstation20	170
21	workstation21	179	21	workstation21	173	21	workstation21	165	21	workstation21	161	21	workstation21	157
22	workstation22	174	22	workstation22	174	22	workstation22	170	22	workstation22	169	22	workstation22	155
23	workstation23	176	23	workstation23	171	23	workstation23	172	23	workstation23	173	23	workstation23	150



L Block 2nd Floor Labs														
L Block 2nd floor LS01			L Block 2nd floor LS02			L Block 2nd floor LS03			L Block 2nd floor LS04			L Block 2nd floor LS05		
SL NO	Workstation	lux value	SL NO	Workstation	lux value	SL NO	Workstation	lux value	SL NO	Workstation	lux value	SL NO	Workstation	lux value
24	workstation24	172	24	workstation24	174	24	workstation24	177	24	workstation24	176	24	workstation24	168
25	workstation25	179	25	workstation25	180	25	workstation25	173	25	workstation25	174	25	workstation25	156
26	workstation26	175	26	workstation26	175	26	workstation26	158	26	workstation26	167	26	workstation26	155
27	workstation27	182	27	workstation27	172	27	workstation27	170	27	workstation27	164	27	workstation27	164
28	workstation28	175	28	workstation28	175	28	workstation28	168	28	workstation28	174	28	workstation28	158
29	workstation29	175	29	workstation29	160	29	workstation29	168	29	workstation29	171	29	workstation29	169
30	workstation30	172	30	workstation30	145	30	workstation30	145	30	workstation30	175	30	workstation30	164
31	workstation31	177	31	workstation31	149	31	workstation31	149	31	workstation31	175	31	workstation31	159
32	workstation32	174	32	workstation32	157	32	workstation32	162	32	workstation32	176	32	workstation32	161
33	workstation33	175	33	workstation33	142	33	workstation33	165	33	workstation33	172	33	workstation33	159
34	workstation34	178	34	workstation34	143	34	workstation34	175	34	workstation34	176	34	workstation34	170
35	workstation35	182	35	workstation35	149	35	workstation35	173	35	workstation35	179	35	workstation35	171
36	workstation36	176	36	workstation36	153	36	workstation36	172	36	workstation36	174	36	workstation36	148
37	workstation37	171	37	workstation37	172	37	workstation37	176	37	workstation37	173	37	workstation37	155
38	workstation38	172	38	workstation38	174	38	workstation38	179	38	workstation38	174	38	workstation38	172
39	workstation39	178	39	workstation39	179	39	workstation39	178	39	workstation39	180	39	workstation39	155
40	workstation40	172	40	workstation40	183	40	workstation40	174	40	workstation40	171	40	workstation40	166
41	workstation41	177	41	workstation41	185	41	workstation41	177	41	workstation41	172	41	workstation41	161
42	workstation42	172	42	workstation42	170	42	workstation42	174	42	workstation42	170	42	workstation42	161
43	workstation43	174	43	workstation43	176	43	workstation43	175	43	workstation43	168	43	workstation43	172
44	workstation44	180	44	workstation44	169	44	workstation44	169	44	workstation44	171	44	workstation44	154
45	workstation45	180	45	workstation45	171	45	workstation45	160	45	workstation45	172	45	workstation45	162
46	workstation46	174	46	workstation46	166	46	workstation46	158	46	workstation46	143	46	workstation46	155



L Block 2nd Floor Labs														
L Block 2nd floor LS01			L Block 2nd floor LS02			L Block 2nd floor LS03			L Block 2nd floor LS04			L Block 2nd floor LS05		
SL NO	Workstation	lux value	SL NO	Workstation	lux value	SL NO	Workstation	lux value	SL NO	Workstation	lux value	SL NO	Workstation	lux value
47	workstation47	178	47	workstation47	155	47	workstation47	151	47	workstation47	149	47	workstation47	164
48	workstation48	179	48	workstation48	159	48	workstation48	143	48	workstation48	159	48	workstation48	175
49	workstation49	172	49	workstation49	145	49	workstation49	142	49	workstation49	172	49	workstation49	164
50	workstation50	175	50	workstation50	144	50	workstation50	159	50	workstation50	176	50	workstation50	176
51	workstation51	174	51	workstation51	167	51	workstation51	168	51	workstation51	175	51	workstation51	166
52	workstation52	175	52	workstation52	170	52	workstation52	172	52	workstation52	173	52	workstation52	158
53	workstation53	177	53	workstation53	172	53	workstation53	174	53	workstation53	175	53	workstation53	160
54	workstation54	170	54	workstation54	171	54	workstation54	173	54	workstation54	170	54	workstation54	159
55	workstation55	179	55	workstation55	173	55	workstation55	178	55	workstation55	173	55	workstation55	142
56	workstation56	176	56	workstation56	172	56	workstation56	176	56	workstation56	178	56	workstation56	144
57	workstation57	178	57	workstation57	179	57	workstation57	174	57	workstation57	175	57	workstation57	141
58	workstation58	181	58	workstation58	169	58	workstation58	173	58	workstation58	170	58	workstation58	159
59	workstation59	179	59	workstation59	180	59	workstation59	168	59	workstation59	175	59	workstation59	165
60	workstation60	179	60	workstation60	177	60	workstation60	165	60	workstation60	168	60	workstation60	174
61	workstation61	179	61	workstation61	176	61	workstation61	161	61	workstation61	170	61	workstation61	171
62	workstation62	173	62	workstation62	170	62	workstation62	158	62	workstation62	176	62	workstation62	171
63	workstation63	175	63	workstation63	161	63	workstation63	147	63	workstation63	162	63	workstation63	164
64	workstation64	169	64	workstation64	154	64	workstation64	147	64	workstation64	155	64	workstation64	160
65	Professor	173	65	Professor	163	65	Professor	174	65	workstation65	160	65	Professor	175
									66	Professor	169			

L Block Class Room						
SL NO	Block	lux value	lux value	lux value	lux value	lux value
1	LB01	135	127	154	125	173
2	LB02	134	128	151	129	168
3	LB03	139	130	145	136	180
4	LB04	135	140	141	129	175
5	LB05	132	133	135	136	153
6	LB06	138	141	143	151	179
7	LB07	135	140	141	148	177
8	LB08	136	125	151	126	163
9	LB09	131	136	151	126	174
10	LB10	135	128	154	125	174
11	LG01	137	140	143	141	169
12	LG02	140	141	141	143	177
13	LG03	141	148	145	141	180
14	LG04	140	140	141	139	179
15	LG05	140	141	142	143	177
16	LG06	141	142	142	143	179
17	LG07	139	140	143	139	177
18	LG08	140	141	141	143	179
19	LG09	141	147	145	141	180
20	LG10	139	140	142	142	171
21	LT01	170	185	176	142	161
22	LT02	149	178	149	126	135
23	LT03	149	177	152	106	142
24	LT04	145	166	176	161	170
25	LT05	179	180	167	170	174
26	LT06	176	156	137	152	166
27	LT07	165	147	147	146	159
28	LT08	173	133	166	147	154
29	LT09	167	153	155	131	150
30	LT10	171	145	170	149	155



F Block Labs							
SLN	Block	lux value	lux value	lux value	lux value	lux value	lux value
1	Energy conversion eng lab	168	190	100	150	91	123
2	Heat and mess transfer lab	157	93	192	97	130	154
3	Linear integrated ckt lab	141	70	130	100	160	131
4	Electrical machines lab 1	80	125	100	140	137	141
5	Power electronics lab	90	133	140	160	94	158
6	control systems lab	101	147	115	130	166	96
7	Digital design lab	160	118	130	167	185	160
		134	174	164	128	140	142
8	Petroleum geology lab	168	170	180	160	90	164
9	Engineering geology lab	130	155	182	145	160	132
10	Reservoir Engineering lab	173	184	170	174	151	135
11	Drilling fluids &cements labs	167	168	182	173	108	168

N Block							
SL NO	Block	lux value	lux value	lux value	lux value	lux value	lux value
1	NB01	111	109	150	155	134	156
2	NB02	114	113	171	164	147	98
3	NB03	116	114	169	170	145	123
4	NB04	120	119	158	159	146	92
5	NB05	121	122	189	179	146	224
6	NB06	119	118	165	160	143	189
7	NB07	76	71	93	101		
8	NB08	70	62	93	99		
9	NG01	119	116	137	139	138	99
10	NG02	120	119	160	152	136	115
11	NG03	117	118	145	132	137	265
12	NG04	99	99	159	150	149	186
13	Chemistry lab	121	124	154	158	149	150
14		121	162	163	143	121	135
15	NF01	120	122	161	160	147	129
16	NF02	118	119	160	161	146	139
17	NF03	121	120	157	159	143	200
18	NF04	122	123	159	159	142	185
19	Lab	116	119	160	162	138	156
20		118	118	159	156	142	161
21	NS01	109	114	160	170	145	160
22	NS02	114	111	169	165	135	123
23	NS03	120	119	159	160	142	130
24	NS04	116	114	150	163	143	170
25	NS05	118	113	159	158	139	189
26	NS06	116	119	160	162	143	200
27	NS07	69	76	80	96		



28	NS08	72	71	89	90		
P Block							
SL NO	Block	lux value	lux value	lux value	lux value	lux value	lux value
1	PB01	118	113	159	158	139	189
2	PB02	116	119	160	162	138	200
3	PB03	118	118	159	156	142	190
4	PB04	118	112	156	157	135	231
5	PG01	116	116	136	139	135	215
6	PG02	116	118	155	143	137	234
7	PG03	111	119	120	137	138	220
8	PG04	115	113	136	130	132	236
9	PF01	119	116	164	160	143	202
10	PF02	108	109	154	155	141	193
11	PF03	119	121	160	163	143	229
12	PF04	118	119	154	159	143	201
13	PS1	116	116	165	167	138	108
14	PS2	121	122	168	163	144	120
15	PS3	117	120	170	168	142	196
16	PS4	118	118	159	159	138	166

Q Block								
SL NO	workstation	lux value	SL NO	workstation	lux value	SL NO	workstation	lux value
Basement			Ground floor			1st floor		
faculty room #1			faculty room #1			faculty room #1		
1	workstation01	145	1	workstation01	118	1	workstation01	133
2	workstation02	139	2	workstation02	88	2	workstation02	130
3	workstation03	126	3	workstation03	120	3	workstation03	123
4	workstation04	118	4	workstation04	110	4	workstation04	124
5	workstation05	93	5	workstation05	71	5	workstation05	98
6	workstation06	95	6	workstation06	78	6	workstation06	89
7	workstation07	92	7	workstation07	74	7	workstation07	82
8	workstation08	86	8	workstation08	86	8	workstation08	91
9	workstation09	72	9	workstation09	63	9	workstation09	70
10	workstation10	68	10	workstation10	71	10	workstation10	72
11	workstation11	65	11	workstation11	70	11	workstation11	70





Q Block								
SL NO	workstation	lux value	SL NO	workstation	lux value	SL NO	workstation	lux value
Basement			Ground floor			1st floor		
faculty room #1			faculty room #1			faculty room #1		
12	workstation12	67	12	workstation12	70	12	workstation12	72
faculty room #2			faculty room #2			faculty room #2		
1	workstation01	86	1	workstation01	110	1	workstation01	120
2	workstation02	88	2	workstation02	110	2	workstation02	98
3	workstation03	91	3	workstation03	108	3	workstation03	93
4	workstation04	112	4	workstation04	120	4	workstation04	113
5	workstation05	83	5	workstation05	97	5	workstation05	75
6	workstation06	82	6	workstation06	91	6	workstation06	77
7	workstation07	81	7	workstation07	89	7	workstation07	74
8	workstation08	82	8	workstation08	90	8	workstation08	85
9	workstation09	76	9	workstation09	74	9	workstation09	71
10	workstation10	70	10	workstation10	77	10	workstation10	72
11	workstation11	71	11	workstation11	79	11	workstation11	71
12	workstation12	77	12	workstation12	84	12	workstation12	70

Q Block							
SL NO	Block	lux value	lux value	lux value	lux value	lux value	lux value
1	QB01	118	116	150	152	142	221
2	QB02	117	117	164	162	140	95
3	QB03	115	118	162	160	142	92
4	QB04	120	116	164	160	141	178
5	QG01	119	151	152	138	115	159
6	QG02	113	151	159	144	118	82
7	QG03	119	112	160	162	145	96
8	QG04	121	165	165	144	209	119
9	QF01	121	124	170	175	137	118
10	QF02	11	123	165	160	145	112
11	QF03	118	119	154	162	141	168
12	QF04	121	126	165	154	143	139





Q Block								
SL NO	workstation	lux value	SL NO	workstation	lux value	SL NO	workstation	lux value
Basement			Ground floor			1st floor		
faculty room #1			faculty room #1			faculty room #1		
13	QS01	117	119	173	168	140	187	
14	QS02	120	122	165	161	148	181	
15	QS03	116	117	158	155	124	109	
16	QS04	116	119	165	162	143	98	
17	QS05	72	59	85	96			
18	QS06	73	66	87	91			

R Block							
SL NO	Block	lux value	lux value	lux value	lux value	lux value	lux value
1	RB01	118	119	157	152	143	99
2	RB02	117	118	157	155	148	128
3	RB03	116	119	171	169	146	146
4	RB04	118	118	161	163	143	128
5	RG01	121	124	154	158	149	150
6	RG02	121	162	163	143	121	135
7	RG03	115	119	165	166	138	286
8	RG04	121	117	159	160	144	141
9	RF01	119	120	163	168	136	135
10	RF02	116	116	162	161	139	206
11	RF03	114	115	161	160	140	123
12	RF04	117	150	149	135	116	124
13	RS01	119	116	161	163	140	192
14	RS02	119	120	164	163	140	192
15	RS03	121	127	178	168	157	249
16	RS04	116	117	160	159	142	155

U Block								
SL NO	Block	lux value	lux value	lux value	lux value	lux value	lux value	
1	UB01	118	117	160	150	146	157	
2	UB02	119	112	160	151	141	102	
3	UB03	113	111	149	146	131	97	
4	UB04	110	115	162	163	133	97	
5	UB05	Door lock						
6	UB06							
7	UG01	116	115	154	153	138	150	
8	UG02	115	167	165	140	116	116	





Q Block								
SL NO	workstation	lux value	SL NO	workstation	lux value	SL NO	workstation	lux value
Basement			Ground floor			1st floor		
faculty room #1			faculty room #1			faculty room #1		
9	UG03	123	168	167	144	122	161	
10	UG04	127	122	167	170	144	162	
11	UG05	70	103	101	69			
12	Girl common room	71	79	93	96			
13	UF01	123	120	166	161	144	137	
14	UF02	118	120	166	169	145	138	
15	UF03	123	123	162	165	140	191	
16	UF04	123	120	163	167	123	96	
17	Boy's common room	82	91	82	56			
18		57	56	89	88			
19	US01	122	119	162	166	138	235	
20	US02	118	119	160	162	142	98	
21	US03	79	64	97	103			
22	US04	94	80	99	103			
23	US05	133	118	174	179	145	100	
24	US06	131	118	162	164	141	101	



Table 20: Details of Indore Lighting lux measurement in S Block

S Block											
SL NO	Workstation	lux value	SL NO	Workstation	lux value	SL NO	workstation	lux value	SL NO	workstation	lux value
Basement			Ground floor			1st floor			2nd floor		
Professor cabin#1			Professor cabin#1			Professor cabin#1			Professor cabin#1		
1	Cabin 01	132	1	Cabin 01	137	1	Cabin 01	133	1	Cabin 01	119
2	Cabin 02	133	2	Cabin 02	133	2	Cabin 02	140	2	Cabin 02	131
3	Cabin 03	140	3	Cabin 03	140	3	Cabin 03	139	3	Cabin 03	122
4	Cabin 04	136	4	Cabin 04	130	4	Cabin 04	129	4	Cabin 04	137
5	Cabin 05	137	5	Cabin 05	130	5	Cabin 05	135	5	Cabin 05	128
6	Cabin 06	140	6	Cabin 06	133	6	Cabin 06	138	6	Cabin 06	130
7	Cabin 07	133	7	Cabin 07	135	7	Cabin 07	138	7	Cabin 07	135
8	Cabin 08	135	8	Cabin 08	134	8	Cabin 08	139	8	Cabin 08	133
9	Cabin 09	139	9	Cabin 09	140	9	Cabin 09	137	9	Cabin 09	131
Professor cabin#2 And faculty			faculty room #1			Professor cabin#2 And faculty			faculty room #1		
10	Cabin 10	109	10	workstation01	96	10	Cabin 10	131	10	workstation01	109
11	Cabin 11	142	11	workstation02	109	11	Cabin 11	135	11	workstation02	108
12	Cabin 12	135	12	workstation03	113	12	Cabin 12	146	12	workstation03	102
13	Cabin 13	126	13	workstation04	115	13	Cabin 13	140	13	workstation04	102
14	Cabin 14	128	14	workstation05	112	14	Cabin 14	131	14	workstation05	94
15	Cabin 15	136	15	workstation06	92	15	Cabin 15	123	15	workstation06	92
16	Cabin 16	139	16	workstation07	72	16	Cabin 16	139	16	workstation07	96
17	Cabin 17	134	17	workstation08	87	17	Cabin 17	136	17	workstation08	130
18	Cabin 18	133	18	workstation09	96	18	Cabin 18	137	18	workstation09	122
19	Cabin 19	139	19	workstation10	113	19	Cabin 19	133	19	workstation10	119
20	Cabin 20	140	20	workstation11	111	20	Cabin 20	144	20	workstation11	101



S Block											
SL NO	Workstation	lux value	SL NO	Workstation	lux value	SL NO	workstation	lux value	SL NO	workstation	lux value
21	workstation01	74	21	workstation12	115	21	workstation01	80	21	workstation12	79
22	workstation02	77	22	workstation13	113	22	workstation02	76	22	workstation13	97
23	workstation03	70	23	workstation14	98	23	workstation03	83	23	workstation14	69
24	workstation04	76	24	workstation15	102	24	workstation04	73	24	workstation15	118
25	workstation05	83	25	workstation16	119	25	workstation05	79	25	workstation16	97
26	workstation06	101	26	workstation17	114	26	workstation06	81	26	workstation17	117
27	workstation07	100	27	workstation18	103	27	workstation07	80	27	workstation18	119
28	workstation08	98	28	workstation19	94	28	workstation08	76	28	workstation19	113
Professor cabin#3 And faculty			29	workstation20	99	Professor cabin#3 And faculty			29	workstation20	110
29	Cabin 21	132	30	workstation21	91	29	Cabin 21	146	30	workstation21	115
30	Cabin 22	138	31	workstation22	97	30	Cabin 22	139	31	workstation22	110
31	Cabin 23	139	32	workstation23	103	31	Cabin 23	128	32	workstation23	121
32	Cabin 24	136	33	workstation24	110	32	Cabin 24	130	33	workstation24	96
33	Cabin 25	133	34	workstation25	102	33	Cabin 25	132	34	workstation25	101
34	Cabin 26	132	35	workstation26	113	34	Cabin 26	132	35	workstation26	109
35	Cabin 27	140	Faculty room #2			35	Cabin 27	136	faculty room #2		
36	Cabin 28	142	36	workstation27	105	36	Cabin 28	136	36	workstation27	110
37	Cabin 29	141	37	workstation28	115	37	Cabin 29	133	37	workstation28	97
38	Cabin 30	125	38	workstation29	116	38	Cabin 30	108	38	workstation29	80
39	Cabin 31	141	39	workstation30	113	39	Cabin 31	149	39	workstation30	101
40	workstation01	74	40	workstation31	116	40	workstation01	77	40	workstation31	120
41	workstation02	77	41	workstation32	104	41	workstation02	90	41	workstation32	119
42	workstation03	70	42	workstation33	109	42	workstation03	93	42	workstation33	120
43	workstation04	76	43	workstation34	108	43	workstation04	79	43	workstation34	119



S Block											
SL NO	Workstation	lux value	SL NO	Workstation	lux value	SL NO	workstation	lux value	SL NO	workstation	lux value
44	workstation05	83	44	workstation35	109	44	workstation05	76	44	workstation35	101
45	workstation06	101	45	workstation36	109	45	workstation06	76	45	workstation36	96
46	workstation07	100	46	workstation37	116	46	workstation07	83	46	workstation37	103
47	workstation08	98	47	workstation38	114	47	workstation08	93	47	workstation38	109
			48	workstation39	113				48	workstation39	86
			49	workstation40	113				49	workstation40	130
			50	workstation41	116				50	workstation41	120
			51	workstation42	116				51	workstation42	130
			52	workstation43	115				52	workstation43	110
			53	workstation44	110				53	workstation44	101
			54	workstation45	103				54	workstation45	108
			55	workstation46	104				55	workstation46	107
			56	workstation47	105				56	workstation47	101
			57	workstation48	109				57	workstation48	96
			58	workstation49	112				58	workstation49	99
			59	workstation50	112				59	workstation50	100
			60	workstation51	103				60	workstation51	113
			61	workstation52	92				61	workstation52	107

Table 21: Details of Indore Lighting lux measurement in Night duration

s.no	location	lux Level during night
1	central admin basement	799
2	placement office	455
3	ground floor pantry central admin	608
4	central admin reception	99
5	ground floor passage central admin	183
6	main road	83
7	round fountain area	183
8	main gate	272
9	transport office	107
10	auditorium front side	9
11	Mg09 classroom	47
12	CCD passage area	123
13	old admine passage	47
14	h block ground passage	113
15	L Block passage	83
16	E block passage	124
17	admin g 1ST floor	89
18	D block ground floor passage	184
19	car parking area	40
20	two wheeler parking	27
21	bus parking area	89
22	COE ground floor	385
23	COE basement panel room	200
24	old admin passage	182
25	BMS OFFICE	379
26	admin G passage	102
27	restroom E block	368

4.6.1 Observations & Comments

- It observed, Total no 1,19,947 LED lighting fixture are installed various type of indoor and outdoor location .
- It is **appreciated to use LED Lighting luminaries** in different location of campus as per site visit.
- It observed, during site visit, Total Connected indoor and Outdoor lighting load is 214 kW
- It observed ,Building orientation is perfectly and minimum building envelop losses and sufficient use of natural light in day time .
- It is suggested to install occupancy /Motion sensor in Principal cabin, professor cabin and Offices to save energy.
- It observed and analyzed , Average monthly power utilization is between 25680 units or kWh , Lighting load with fixtures account to 50% of total power consumption , 99-100 % of the lighting are energy efficient LED fixtures .

4.7 Air Circulation Fan load Analysis

There is various type of air circulation ceiling fan, Wall Mounted Fan and Pedestal fan installed at various location and connected load is 263 kW in the University campus. and they also contribute very high electricity consumption. All of the fans are conventional and hence high energy consuming.

Table 22: Details of Air circulation Fan

Sl No	Description	Power in W	Quantity	Operating hours	Total KW	Total kWh per day at 50 % utilization
1	Wall mount fan 50W	50	36	8	1.8	7.2
2	Wall mount fan 55 W	55	95	8	5.225	20.9
3	Table fan 60 W	60	32	8	1.92	15
4	Celling fan 70W	70	2368	8	165.76	663
5	Exhaust Fan 35W	35	73	8	2.555	10
6	Total		2604		177	
	Other Fan load kW	Air circulation system			263	1418

Average monthly power utilization of fan load is about 42540 kWh units. Fan load contributes 19 % of total power consumption.

It is suggested to install Brush less DC fans air circulation fan like Ceiling fan , Wall mounted fan , Exhaust fan ,The typical power at normal speed varies between 3W to 28W. Operating at medium speed is about 14W to 16W.

Table 23: Details Energy Saving Potential in air circulation fan

Total no of Approximate Air circulation Fan power consumption kWh per day at 50 % utilization kWh	1418
Replacement of BLDC 5 star Fan and save upto	50%
Annual Energy Consumed by Fan (300 working Days) kWh	425400
Prospective Annual Energy Savings in kWh	212700
Average Rs Per kWh unit charge for 300 day a year	10
Annual Savings in Rupees in lacs per Year	21
Initial investment Rs in Lacs required for BLDC Fan @ 2800 per BLDC Fan	60
Payback Period in months only	34
Life of the project years	15
Depreciation Cost Rs	4
ROI {(Net annual savings - Depreciation cost)/ Investment} x 100%	29%

4.7.1 Observations & Suggestion

- It observed, Total no. of air circulation fan more than **2604** and of Air circulation fixture fan fixtures were installed, out of approximate **19%**.
- It observed, during site visit, Total Connected of air circulation fans load is **263 kW**.
- It is suggesting to install energy saving BLDC Fan and It will get energy saving approximately **212700 kWh per year** and also will get amount saving approximately **Rs 21 Lacs per year**.

4.8 Air Conditioning Load Analysis

There were installed various energy efficient HVAC system like Split ac, VRF, Ductable, duct and cassette air conditioning were in campus, Details of the air conditioners are given below.

Table 24: Details of HVAC load

Description	No Of Units	Total Cooling Load TR	Total Power Consumption kW
Split ac	60	94.5	
VRF	22	312.3	
Ductable split Ac	11	69.5	
other 2 Units	2	66	
Total	95	542	

4.8.1 Observations & Comments:

- It observed, There were installed various energy efficient HVAC system like Split ac,VRF,Ductable , duct and cassate air conditioning were in campus .
- It observed, during site visit, Total Connected of air conditioning load is **750 kW**, which is contributed around 55 % of total load .
- It observed and appreciated to install VRF system for saving energy and environment.
- It is **suggesting to purchases New AC as 5 star rated Air Conditioning** system as per Star leveling program by Bureau of Energy Efficiency 2022, and will get huge amount of electricity saving.
- It is suggested to maintain air conditioning set temperature above **24 Degree Celsius , it is suggested to** increase temperature 1 °C to save energy consumption 3 to 4 % as per Bureau of Energy Efficiency.
- **It is suggested conducting regular air condition maintenance** in every 3 months to increase performance of air conditioning.
- It is **suggested to installed and placed outdoor unit towards north side Wall** of the building ,if possibility to available space north side Wall
- It is suggested to install energy **saver device and will get up to 20-25 % electricity saving**, details has shown in recommendation also.
- It observed, **most of outdoor unit (condenser) of air conditioning** system placed open area, so performance of outdoor system degrade continuously due to environmental impact.
- It is suggested to **provide a canopy to save from environment impact** and performance enhancement for outdoor unit condenser.

4.10 Details of Pumps Load analysis

There are 7 no. of 7.5 to 20 HP capacity of submersible pump installed within college campus for drinking water, Flushing and gardening purpose.

Table 25: Details Borewell submersible pumps load

Borewell SL No	Name of the Equipment	Location	Capacity	UOM	Power consumption	Borewell pipe length in feet	Types of pipe
1	Borwell	Main Gate	20	HP	15.04	1040	GI Pipe
2	Borwell	Near Admin G Block	20	HP	15.04	1080	GI Pipe
3	Borwell	Near MBA Block canteen	7.5	HP	5.64	1000	HDPE Hose pipe
4	Borwell	Jungle borewell	17.5	HP	13.16	1000	GI Pipe
5	Borwell	Near Cicon labour Shed	15	HP	11.28	1100	GI Pipe
6	Borwell	Ramesh Galappa	NA	HP	0	NA	NA
7	Borwell	Near Cicon Gate	15	HP	11.28	500	GI Pipe
Total					71.44		

Table 26: Details of Other Pumping load analysis

S NO	Description	CAPACITY	QUANTITY	LOCATION	Total connected load	MAKE	SERIAL NO.	Runing Time per day
1	Filtration Pump	0.5HP	1	Main GateFountion	0.376	Aqua Star	QRR050S	4 Hours
2	Filtration Pump	0.5HP	1	Main GateFountion	0.376	Aqua Star	QRR050S	4 Hours
3	submersible pump	2HP	1	Main GateFountion	1.504	Kirlosker	NA	6 Hours
4	submersible pump	2HP	1	Main GateFountion	1.504	Kirlosker	NA	6 Hours
5	Filtration Pump	1.5HP	1	Round Fountion	1.128	Aqua Star	QRR050S	4 Hours
6	Filtration Pump	1.5HP	1	Round Fountion	1.128	Aqua Star	QRR050S	4 Hours
7	submersible pump	2.5HP	1	Round Fountion	1.88	Kirlosker	NA	8 Hours
8	submersible pump	2.5HP	1	Round Fountion	1.88	Kirlosker	NA	8 Hours
9	Filtration Pump	.5HP	1	Admin Fountion	0.376	Aqua Star	QRR050S	4 Hours
10	Filtration Pump	.5HP	1	Admin Fountion	0.376	Aqua Star	QRR050S	4 Hours
11	submersible pump	2HP	1	Admin Fountion	1.504	Kirlosker	NA	7 Hours
12	Filtration Pump	.5HP	1	Conop Fountion	0.376	Aqua Star	QRR050S	4 Hours
13	Filtration Pump	.5HP	1	Conop Fountion	0.376	Aqua Star	QRR050S	4 Hours
14	submersible pump	2HP	1	Conop Fountion	1.504	Kirlosker	NA	8 Hours
15	Hipressr Pump	7.5HP	1	Pump Room	5.64	NA	"0006	NA
16	Hipressr Pump	7.5HP	1	Pump Room	5.64	NA	"0004	NA
17	Mano Block	15HP	1	Pump Room	11.28	Lubi	23307783	3 Hours
18	Mano Block	15HP	1	Pump Room	11.28	Lubi	91322556	3 Hours
Total Amount					48.128			

4.10.1 Observation and Comments

- It observed during Energy Audit and site visit, **7 no submersible and 18 no mono block surface Pumps, of Capacity from 0.5 to 20 HP within** College campus for drinking water, Flushing and gardening purpose.
- It observed and measured Power consumption pump was **120 KW as** per site visit and measurement .
- It is suggested to install digital telemetry enable water flow meter in borewell and other water supply pumps to monitor water abstraction and consumption in different application.
- It is suggesting to **purchase 5 star rated pumps and will get huge** amount of saving as per Star leveling program by Bureau of Energy Efficiency2022

4.11 UPS Power supply Analysis:

Power backup in the form of 845.5 KVA UPS is implemented which is about 211 % of the contract demand. There are about 31 UPS units ranging from 1KVA to 80KVA, with SMF battery AH ranging from 26AH to 150AH. These batteries do not require topping up of distilled water and spillage of acid. Neat and clean environment can be maintained.

Table 27: Details of UPS connected load analysis

UPS DETAILS												
Sl. No.	UPS MAKE	UPS Capacity	UOM	Location	Model	Sl.No.	Battery AH	Total No. of Batteries	Batteries Make	UPS installation Date	AMC STAT US (Yes/No)	AMC Vendor Name
1	Liberty UPS	20	KVA	MBA Block - Panel Room	Adopt	210200782215506000A	26 AH	36	Exide Power safe	NA	Yes	Foresight Automation
2	Liberty UPS	20	KVA	MBA Block - Panel Room	Adopt	2101200782215605000D	26 AH	36	Exide Power safe	NA	Yes	Foresight Automation
3	Emerson ups	3	KVA	Basement Computer Lab	Emersion	8332L1711500089	26 AH	6	Quanta	NA	Yes	Foresight Automation
4	DSP Sinewave Inverter	1	KVA	MBA Block Library-02	NA	NA	65 AH	2	Exide Power safe	NA	Yes	Foresight Automation
5	Emerson ups	10	KVA	Old Admin Ground Floor	Emersion	8422L1609100070	42 AH	18	Quanta	NA	Yes	Foresight Automation
6	Emerson ups	20	KVA	Auditorium	UHA3R-0200L	2101200782217B040013	42 AH	32	Quanta	30/08/2018	Yes	Foresight Automation
7	Emerson ups	10	KVA	Admin G Ground Floor	GXT MT	8392L1 605100064	26 AH	16	Quanta	NA	Yes	Foresight Automation
8	APC ups	6	KVA	workshop	SRLEKUXI	SRLE6KUXIB21907009099	42 AH	16	Exide Power safe	NA	Yes	Foresight Automation
9	APC ups	6	KVA	Main gate	APC-SRC	B21540000935	42 AH	16	Quanta	NA	YES	Foresight Automation
10	DSP Sinewave ups	40	KVA	D Block 1st Floor	Online 360 VDC	10174007222	65 AH	30	Quanta	NA	Yes	Foresight Automation
11	DSP Sinewave ups	40	KVA	D Block 1st Floor	Online 360 VDC	10174007199	65 AH	30	Quanta	NA	Yes	Foresight Automation
12	DSP Sinewave ups	40	KVA	D Block 1st Floor	Online 360 VDC	10174007221	65 AH	30	Quanta	NA	Yes	Foresight Automation

UPS DETAILS												
Sl. No.	UPS MAKE	UPS Capacity	UOM	Location	Model	Sl.No.	Battery AH	Total No. of Batteries	Batteries Make	UPS installation Date	AMC STAT US (Yes/No)	AMC Vendor Name
13	APC ups	20	KVA	D Block 1st Floor	APC-SURT	B21539000646	65 AH	32	Quanta	NA	Yes	Foresight Automation
14	APC ups	20	KVA	D Block 1st Floor	APC-SURT	B21549000027	65 AH	32	Quanta	NA	Yes	Foresight Automation
15	DSP Sinewave Inverter	5.5	KVA	D Block 1st Floor	INVERTER	AT502064017370915	65 AH	4	Exide Power safe	NA	Yes	Foresight Automation
16	Liberty UPS	10	KVA	Auditorium	MXTMT+10 KVALB	8392L1905100066	65 AH	20	Quanta	26/09/2019	Yes	V Power Solutions
17	Liberty UPS	40	KVA	D Block Ground Floor	UHA3R-0400	21012011402194030006	100 AH	34	Quanta	11/10/2019	Yes	V Power Solutions
18	Liberty UPS	3	KVA	G Block 2nd Floor (R&D Lab)	GXTMT+CX 3KLB	8332L1905500198	65 AH	6	Quanta	16/10/2019	Yes	V Power Solutions
19	Liberty UPS	3	KVA	F Block Ground Floor (Heat and mass transfer lab)	GXTMT+CX 3KLB	8332L1906500003	65 AH	6	Quanta	6/11/2019	Yes	V Power Solutions
20	Liberty UPS	20	KVA	BMS	ITA-20K00AL3A0 2P00	2101201740219501000F	150 AH	40	Quanta	11/10/2019	Yes	V Power Solutions
21	Liberty UPS	20	KVA	BMS	ITA-20K00AL3A0 2P00	21012017402193030023	150 AH	40	Quanta	11/10/2019	Yes	V Power Solutions
22	Liberty UPS	40	KVA	L Block Basement Panel Room	UHA3R-0400	2101201140219B02001A	65 AH	40	Exide Power safe	8/3/2021	Yes	V Power Solutions
23	Liberty UPS	40	KVA	L Block Basement Panel Room	UHA3R-0400	2101201140219403000E	65 AH	40	Quanta	1/10/2019	Yes	V Power Solutions
24	Liberty UPS	40	KVA	Central Admin Panel Room	UHA3R-0400	2101201140219201000C	65 AH	40	Quanta	1/10/2019	Yes	V Power Solutions
25	DSP Sinewave Inverter	5	KVA	Central Admin	5500 Dc	AW50206HU19280074	42 AH	6	Quanta	16/9/2019	Yes	V Power Solutions
26	Liberty UPS	3	KVA	Hostel canteen	GXTMT+CX 3KLB	8332L1906500046	65 AH	6	Quanta	6/11/2019	Yes	V Power Solutions
27	Liberty UPS	40	KVA	S Block Basement Panel Room	UHA3R-0400	21012011402194010016	100 AH	34	Quanta	11/10/2019	Yes	V Power Solutions
28	APC ups	80	KVA	D Block 1st Floor	E3MUPS80K HS	0E2020K21024	150 AH	34	Quanta	20/12/2021	Warranty	NA
29	APC ups	80	KVA	D Block 1st Floor	E3MUPS80K HS	0E1924K21017	150 AH	34	Quanta	20/12/2021	Warranty	NA

UPS DETAILS												
Sl. No.	UPS MAKE	UPS Capacity	UOM	Location	Model	Sl.No.	Battery AH	Total No. of Batteries	Batteries Make	UPS installation Date	AMC STAT US (Yes/No)	AMC Vendor Name
30	APC ups	80	KVA	L Block Basement	E3MUPS80K HS		65 AH	50	Exide Power safe	3/11/2022	Warranty	NA
31	APC ups	80	KVA	L Block Basement	E3MUPS80K HS		65 AH	50	Exide Power safe	3/11/2022	Warranty	NA
		845.5						816				

11.1.1 UPS Actual Power measurement and analysis

Table 28: UPS Actual Power measurement and analysis

V1 rms	V2 rms	V3 rms	A1 rms	A2 rms	A3 rms	AN rms	P1 (W)	P2 (W)	P3 (W)	PF1	PF2	PF3	U12 THDf	U23 THDf	U31 THDf	A1 THDf	A2 THDf	A3 THDf
V	V	V	A	A	A	A	kW	kW	kW				% f	% f	% f	% f	% f	% f
237	240	237	25	25	25	10	16	17	17	0.92	0.95	0.95	2.4	2.5	2.5	41	33.2	30.9
237	240	237	25	25	25	10	16	17	17	0.92	0.95	0.95	2.4	2.4	2.5	40.8	33	30.9
237	239	238	29	25	25	12	20	17	17	0.94	0.95	0.95	2.3	2.4	2.4	33.1	33.2	30.9
237	239	238	31	25	25	12	21	17	17	0.95	0.95	0.95	2.3	2.5	2.4	30	33.5	30.8
236	240	238	30	25	25	12	20	17	17	0.95	0.95	0.95	2.4	2.5	2.4	30.7	33.4	30.6
236	240	238	30	26	25	12	20	17	17	0.95	0.95	0.95	2.4	2.5	2.4	31	33.6	30.6
236	240	238	30	26	25	12	20	17	17	0.95	0.95	0.95	2.4	2.5	2.4	30.8	33.5	30.3
237	240	238	30	25	25	12	20	17	17	0.95	0.95	0.95	2.3	2.5	2.4	30.9	33.5	30.7
236	240	238	31	25	25	12	21	17	17	0.95	0.95	0.95	2.3	2.5	2.4	29.9	33.4	30.8
236	240	238	32	25	25	13	21	17	17	0.95	0.95	0.95	2.4	2.5	2.4	29.4	33.7	30.6
236	240	237	32	25	25	13	21	17	17	0.95	0.95	0.95	2.4	2.5	2.4	29.9	33.6	30.7
237	240	237	32	25	25	13	21	17	17	0.95	0.95	0.95	2.3	2.4	2.4	29.8	33.4	30.7
237	240	237	32	26	25	13	21	17	17	0.95	0.95	0.95	2.4	2.4	2.3	29.8	33.4	30.4
237	240	237	32	25	25	12	22	17	17	0.95	0.95	0.95	2.4	2.4	2.4	29.8	33.7	30.4

237	240	237	32	26	25	12	22	17	17	0.95	0.95	0.95	2.4	2.4	2.5	29.7	33.1	30.8
237	240	237	32	25	25	13	22	17	17	0.95	0.95	0.95	2.4	2.4	2.5	29.7	33	30.9
237	239	237	32	25	25	13	22	17	17	0.95	0.95	0.95	2.3	2.3	2.4	29.5	32.7	30.8

4.11.2 Observation and Suggestions :

- It observed and analysis ,Total UPS connected load is 845 kVA for 31 no of UPS from in college premises.
- We observed, current harmonic is varying from **29 to 41 % respectively** which is more than 10 % permissible limit .
- It observed, voltage harmonic is varying from **2.4 to 2.5 % respectively** , which is under 5 % permissible limit.
- It observed and analyzed, Maximum power factor was **0.95 respectively**, which is satisfactory .
- It is suggested to installed Harmonic filter to reduce harmonics within limit.

4.12 Sewage Treatment Plant

The fresh water utilized in domestic application like drinking , toilet flushing , hand washing etc. results in sewage generation. Although a STP of 450KLD is needed for a campus of 12000 pax (as per NBC 2016), a new STP with SBR technology is under implementation. It is in advanced stage and proposed to be commissioned shortly. It is recommended to utilize the treated water for toilet flushing and landscaping so as to reduce fresh water consumption.

Table 29: STP Panel Power measurement and analysis

V1 rms	V2 rms	V3 rms	A1 rms	A2 rms	A3 rms	P1 (W)	P2 (W)	P3 (W)	PF1	PF2	PF3	U12 THDf	U23 THDf	U31 THDf	A1 THDf	A2 THDf	A3 THDf
V	V	V	A	A	A	kW	kW	kW				% f	% f	% f	% f	% f	% f
247	249	247	25	25	25	14.3	14.2	14.0	0.76	0.769	0.757	3.1	3.2	3	5.6	6.1	6.2
247	249	248	25	25	25	14.3	14.2	14.0	0.76	0.766	0.757	3.2	3.4	3.1	5.6	6.2	6.6
248	249	248	25	25	25	14.3	14.2	14.0	0.759	0.766	0.758	3.2	3.4	3.1	5.6	6.3	6.6
248	250	248	25	25	25	14.3	14.2	14.0	0.759	0.765	0.755	3.3	3.4	3.2	5.7	6.4	6.6
246	248	246	25	25	25	14.3	14.3	13.9	0.768	0.772	0.759	3.2	3.4	3.2	5.9	6.2	6.7
244	245	243	25	25	25	14.4	14.1	13.9	0.775	0.777	0.773	3.2	3.1	3	5.8	6	6.1
243	245	244	25	24	25	14.3	14.1	14.0	0.773	0.78	0.773	3.2	3.1	3	5.8	5.9	6

V1 rms	V2 rms	V3 rms	A1 rms	A2 rms	A3 rms	P1 (W)	P2 (W)	P3 (W)	PF1	PF2	PF3	U12 THDf	U23 THDf	U31 THDf	A1 THDf	A2 THDf	A3 THDf
V	V	V	A	A	A	kW	kW	kW				% f	% f	% f	% f	% f	% f
243	245	243	38	37	37	21.0	21.0	21.0	0.772	0.782	0.774	3.1	3.2	3	5	5.2	5.3
243	245	243	46	47	47	27.3	28.6	27.8	0.815	0.832	0.802	3.1	3.1	2.9	5.7	5.5	5.6
243	245	243	41	42	43	24.5	25.6	24.9	0.81	0.829	0.8	3.1	3.1	2.9	5.7	5.6	5.8
243	245	243	42	42	43	24.6	25.9	25.2	0.813	0.832	0.801	3.1	3	2.9	5.6	5.4	5.7
242	244	242	42	43	44	25.0	26.1	25.4	0.814	0.83	0.801	3	3	2.8	5.7	5.4	5.6
241	243	241	51	51	53	30.6	31.6	31.4	0.829	0.848	0.825	2.9	3	2.8	5.4	4.8	5.3
241	243	242	38	38	39	22.3	22.6	22.7	0.799	0.816	0.803	2.9	2.9	2.8	5.1	5.1	5.6

4.12.1 Observation and Suggestions :

- It observed and analysis ,Total STP actual measured load is **32 kW** in college premises.
- We observed, current harmonic is varying from **6 % respectively** which is under 10 % permissible limit .
- It observed, voltage harmonic is varying from **2.8 to 3.4 % repectively** , **which is under 5 % permissible limit.**
- It observed and analyzed, Maximum power factor was **0.75 to 0.829 respectively**, which is slightly low .

4.13 Solar Power Plant Analysis :

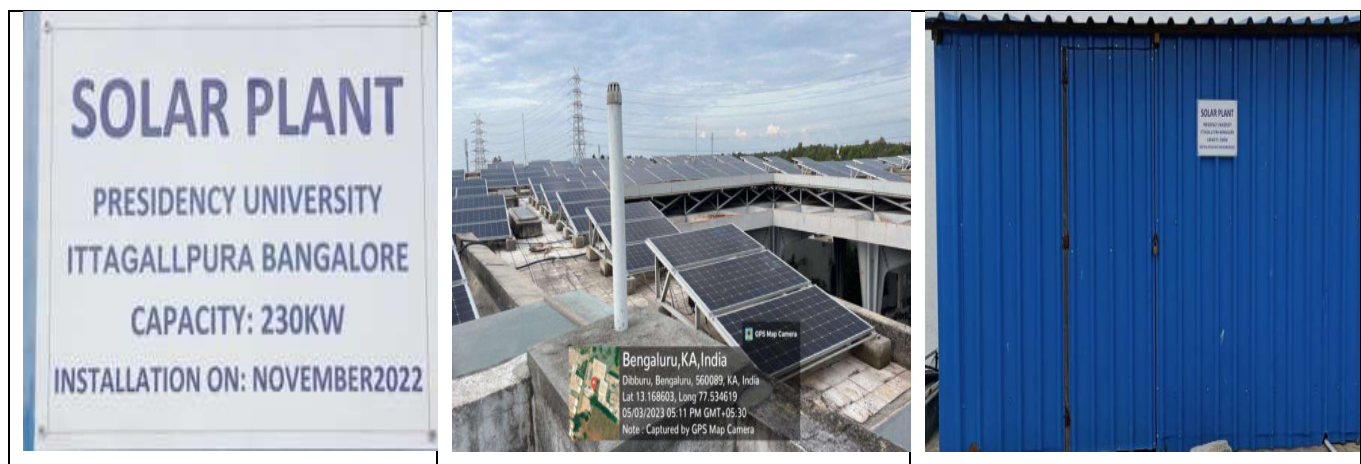
There are installed 230 kW Solar Power plant at Building roof area in premises of the college campus. The Presidency University has around **138053 Sqm of roof area** and only using 1.5 % of roof area for solar generation by installing 230 kW Solar power plant .

Assuming even 5 % of the roof is dedicated to SPV, there is a potential to install nearly 718 kWp of roof top grid connected SPV. This has a potential to generate about 2439 units every day or nearly 60997 kWh monthly and 731965 kWh per Year . This can almost bring Presidency University to a net zero consumer.

Table 30: 230 kW Solar Power Plant generation analysis

230 kW Solar Power plant commissioning has been done on Oct 17th 2022						
Month	Solar Generation units (kWH)	Solar Exporting (kWH)	Average daily unit generation (kWh per day per kW solar plant)	BESCOM Total consumed units KWH	BESCOM & Solar Total consumed units KWH	Solar generation Contribution in % as per total use
Oct-22	449.9	NA	NA	68960	69410	1%
Nov-22	20512	NA	3.0	76680	97192	21%
Dec-22	15600	181.5	2.2	50400	66182	24%
Jan-23	26264	1840	3.7	58540	86644	30%
Feb-23	30120	1454	4.7	63220	94794	32%
Mar-23	32664	1920	4.6	97140	131724	25%
Total	125609.9	5395.5		414940	545945	23%

Figure 7: 230 kW Solar plant site visit





14.2 Solar Power 230 kW generation at LT panel on 05-05-2023 at 15:00:00 :

Table 31: 230 kW Solar Power generation at LT panel on 05-05-2023 at 15:00:00

V1 rms	V2 rms	V3 rms	A1 rms	A2 rms	A3 rms	P1 (W)	P2 (W)	P3 (W)	PF1	PF2	PF3	U12 THDf	U23 THDf	U31 THDf	A1 THDf	A2 THDf	A3 THDf
V	V	V	A	A	A	kW	kW	kW				% f	% f	% f	% f	% f	% f
244	245	245	104	103	104	76	75	76	0.99	0.99	0.99	3.9	3.5	3.8	8.7	8	7.9
244	245	245	103	102	103	75	74	75	0.99	0.99	0.99	3.9	3.4	3.8	8.9	8.3	8.1
245	245	245	102	100	102	74	73	75	0.99	0.99	0.99	3.7	3.4	3.8	8.8	8.1	8.2
244	245	245	101	100	101	73	73	74	0.99	0.99	0.99	3.7	3.4	3.6	8.6	8.2	7.9
244	245	245	100	99	101	73	73	74	0.99	0.99	0.99	3.7	3.4	3.6	8.5	8.2	7.9
244	245	245	100	99	100	73	72	73	0.99	0.99	0.99	3.6	3.4	3.6	8.6	8.3	8.1
244	244	245	99	98	100	72	72	73	0.99	0.99	0.99	3.4	3.1	3.4	8.4	7.9	7.7
244	244	245	98	98	99	72	71	72	0.99	0.99	1.00	3.3	3.1	3.2	8.1	8.1	7.5
243	244	244	98	97	99	71	71	72	0.99	0.99	1.00	3.3	3	3.2	8.2	8.2	7.6
243	244	244	98	97	98	71	71	72	0.99	0.99	1.00	3.3	3	3.2	8.3	8.2	7.7
242	243	243	97	96	98	70	70	71	0.99	1.00	1.00	3	2.8	3	7.7	7.6	7.2
242	243	243	97	96	97	70	70	71	1.00	1.00	1.00	3	2.7	3	7.8	7.5	7.1
241	242	243	97	96	97	70	69	71	0.99	1.00	1.00	3	2.7	3	7.7	7.5	7.2
243	244	245	96	95	97	70	69	71	0.99	0.99	0.99	3.1	3.1	3.2	8.2	8.4	8.1
244	245	246	95	94	96	69	69	70	0.99	0.99	0.99	3.3	3.2	3.3	8.7	9	8.6
244	245	245	95	94	95	69	68	70	0.99	0.99	0.99	3.1	3.2	3.1	8.4	9.1	8.7
244	244	244	95	94	95	69	69	70	0.99	0.99	0.99	3.1	3.1	3.1	8.4	9	8.3
244	244	244	96	95	96	69	69	70	0.99	0.99	0.99	3.3	3.1	3.2	8.8	9.2	8.5
244	244	244	96	95	96	70	69	70	0.99	0.99	0.99	3.3	3.1	3.1	8.8	9.3	8.4
243	243	244	95	94	96	69	68	70	0.99	0.99	0.99	3.2	3.1	3	8.9	9.5	8.5

14.3 Solar Power Plant (488 kW) Payback Analysis for Net Zero Emission :

it is suggested to install 488 kW solar plant on institutes building roof area, Details are given below :

Table 32: 488 kW Solar Power Plant Available area on building roof for solar plant installation

S. No	Parameters	Unit	Value
1	Contract demand capacity as per BESCOM bill	kVA	400
2	Solar Power plant capacity installed in premises	kW	230
3	Renewable electricity source contribution	%	58 %
4	Emission Reduction per Year (We take CO2 emission factor =0.85/kWh) by installed 230 kW solar power plant	(tonne-CO2 per Year	345000
5	Institute Annual Electricity Consumption as per FY 2022-23	kWh per Year	1,076,965
6	Suggestion to install Capacity of Solar Power Plant net Zero emission	KW	718
7	Scope to install Capacity of Solar Power Plant	kW	488
8	Use only 3.5 % of Available Building roof Area (10 m ² /kW)	m ²	4880
9	Average solar power unit (kWh) generation per day per kW	kWh /kW / day	5.0
10	Total Average solar power unit (kWh) generation per day per kW	kWh / day	2439
11	Annul Solar Power Generation for approximately 300 day	kWh /Year	731965
12	Electricity Charges as per electricity bill	Rs./KWh	10.0
13	Solar Power plant Costing	Rs /kW	50000.0
14	Average Total amount of Annual Solar Energy Generation and saving amount	Rs. Lakhs/Year	73.2
15	Monthly Monetary Savings	Rs. Lakhs/month	6.1
16	Investment Required @ Rs. 0.50 Lakh/KW	Rs. Lakhs	244.0
17	Max Depreciation in 1st year @60%	Rs. Lakhs	146.4
18	Tax Saved through deprecation @ 30% income tax rate	Rs. Lakhs	43.9
19	Net Cost of Solar PV Plant	Rs. Lakhs	200.1
20	Simple Payback Period with depreciation	Years	2.7
21	Simple Payback Period without depreciation	Years	3.3
22	Estimated Life of proposed system	Years	25.0
23	Depreciation Cost (Investment/ Estimated life of proposed system)	Rs. Lakhs	9.8
24	ROI {(Net annual savings - Depreciation cost)/ Investment} x 100%	%	26%
25	Emission Reduction per Year (We take CO2 emission factor =0.85/kWh)	(Lacs of tonne-CO2 per Year	6
26	Total Emission Reduction during 25 Year life cycle of Solar Power Plant)	(Lacs of tonne-CO2) during 25 Year	156

4.13.1 Observation and Suggestions:

- It observed and analyzed , There are installed 230 kW Solar Power plant at Building roof area in premises of the college campus and working from Oct 17th 2022
- It observed and analyzed ,The Presidency University has around **138053 Sqm of roof area** and only using 1.5 % of roof area for solar generation by installing 230 kW Solar power plant .
- It observed and analyzed , there is a potential to install nearly 718 kWp of roof top grid connected Solar Power plant , which will generate about 2439 units every day or nearly 60997 kWh monthly and 731965 kWh per Year .
- It Observed and analyzed , Average daily unit generation varies from 2.2 to 4.7 kWh per day per kW solar plant, which is average and nearly 5 kWh per day per kW solar plant .
- It Observed and analyzed , Solar generation Contribution in 21 to 32 % of total electricity consumption as per data provided by university.
- It observed and measured, 230 kW solar instantaneous generation around 76 kW and Current harmonics under limit 10 % and voltage harmonic under 5 %.
- It is observed, Solar plant Power Factor is upto **0.99** , which is satisfactory.
- it is suggested to install 488 kW solar plant and Payback Analysis for Net Zero Emission on institutes building roof area.

4.14 Basic Details of Thermography

During the detailed energy audit, thermal imaging of electrical panels was done to estimate the health of panels. Thermal Imaging or Infrared Thermography procedure is an extremely influential method of practically monitoring, sensing and recording the heat and temperature. It further assists in effectively troubleshooting any electrical, mechanical, electronics and structural systems. Infrared Thermal Imaging offers accurate data related to the problems that remain undetected using standard visual inspection and diagnostic techniques. It offers solutions to the problems that can-not be seen with the naked eye which are clearly visible using thermal imaging.

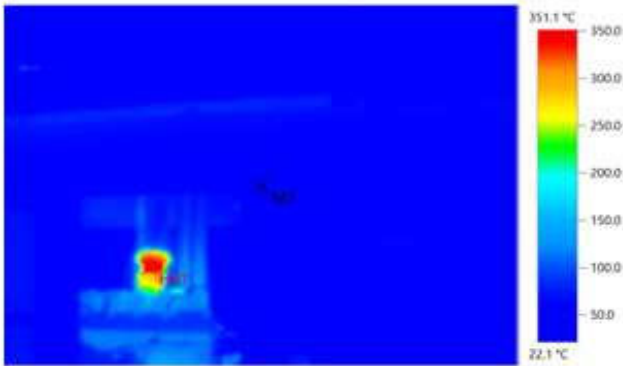
Thermography can detect problems in many electrical systems such as

- Switchgear in organization and substations
- Transformers
- Power transmission lines
- Distribution panels, circuit breakers and conductors
- Computer and low voltage systems
- Machine control Panels
- PLCs (Valves & Relays)

Benefits of Thermography Analysis

- Infrared Thermal imaging can help you detect problems like inductive heating, hot bus bar overloaded circuit & many undesirable electrical situations
- It can be used to measure or observe in areas inaccessible or hazardous for other methods
- It is a non-destructive test & contact free method
- Thermography inspect electrical objects in dark areas
- An Infrared inspection can immediately detect an overheated wire in the mesh of wires and terminals, which is impossible to see with naked eyes.
- An infrared electrical inspection can minimize injury, liability, damage, catastrophic failures and downtime of the organization
- An effective preventative maintenance strategy must include an infrared scan.





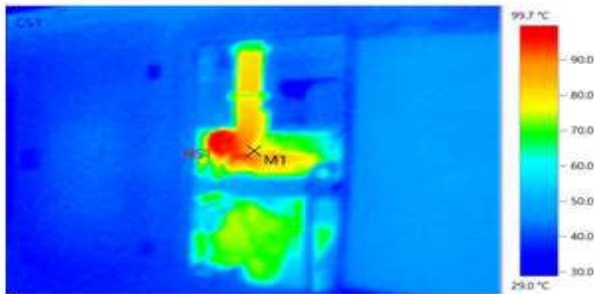
Picture data: Date: 03-05-2023 Emissivity: 0.95
 Time: 12:15:04 Refl. temp. [°C]: 20.0
 File: IR000207.BMT

Picture markings: MBA DG-02

Measurement Objects	Temp. [°C]	Emiss.	Refl. temp. [°C]	Remarks
Measure point 1	34.6	0.95	20.0	CenterSpot
Cold spot 1	22.1	0.95	20.0	
Hot spot 1	351.1	0.95	20.0	-

Picture markings: MBA DG-02

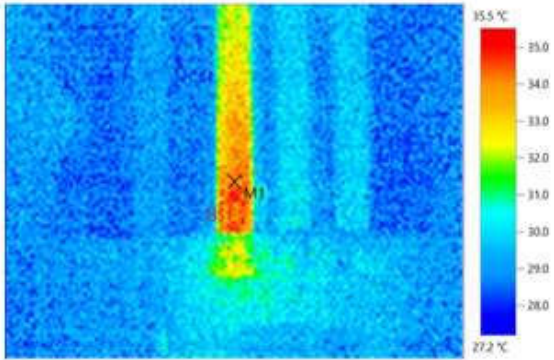
Measurement Objects	Temp. [°C]	Emiss.	Refl. temp. [°C]	Remarks
Measure point 1	34.6	0.95	20.0	CenterSpot
Cold spot 1	22.1	0.95	20.0	
Hot spot 1	351.1	0.95	20.0	-



Picture data: Date: 03-05-2023 Emissivity: 0.95
 Time: 12:16:52 Refl. temp. [°C]: 20.0
 File: IR000208.BMT

Picture markings: MBA DG-1

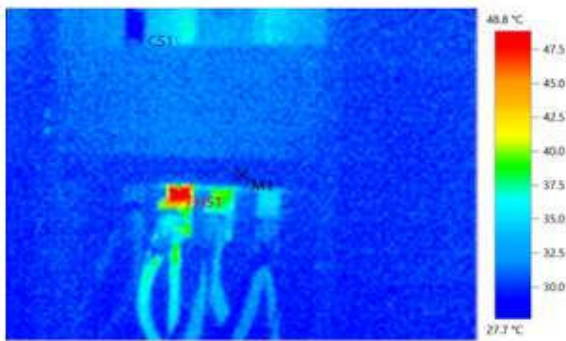
Measurement Objects	Temp. [°C]	Emiss.	Refl. temp. [°C]	Remarks
Measure point 1	78.2	0.95	20.0	CenterSpot
Cold spot 1	29.0	0.95	20.0	-
Hot spot 1	99.7	0.95	20.0	-



Picture data: Date: 03-05-2023 Emissivity: 0.95
Time: 16:52:49 Refl. temp. [°C]: 20.0
File: IR000211.BMT

Picture markings: L block basement

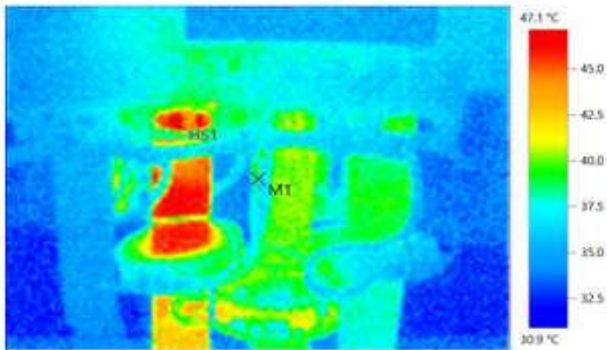
Measurement Objects	Temp. [°C]	Emiss.	Refl. temp. [°C]	Remarks
Measure point 1	34.5	0.95	20.0	CenterSpot
Cold spot 1	27.2	0.95	20.0	-
Hot spot 1	35.5	0.95	20.0	-



Picture data: Date: 05-05-2023 Emissivity: 0.95
Time: 11:15:11 Refl. temp. [°C]: 20.0
File: IR000213.BMT

Picture markings: S block basement

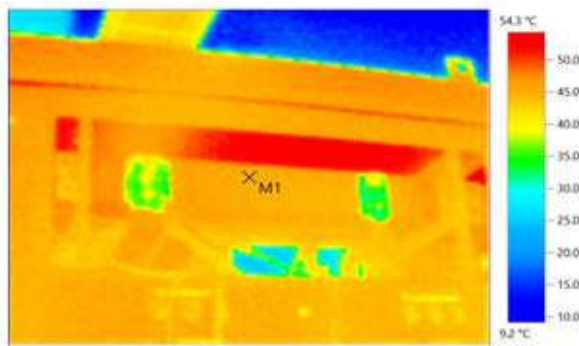
Measurement Objects	Temp. [°C]	Emiss.	Refl. temp. [°C]	Remarks
Measure point 1	29.8	0.95	20.0	CenterSpot
Cold spot 1	27.7	0.95	20.0	-
Hot spot 1	48.8	0.95	20.0	-



Picture data: Date: 05-05-2023 Emissivity: 0.95
 Time: 11:30:47 Refl. temp. [°C]: 20.0
 File: IR000214.BMT

Picture markings: D block ground floor

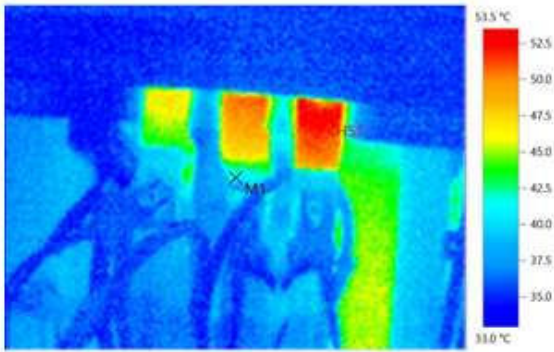
Measurement Objects	Temp. [°C]	Emiss.	Refl. temp. [°C]	Remarks
Measure point 1	38.6	0.95	20.0	CenterSpot
Cold spot 1	30.9	0.95	20.0	-
Hot spot 1	47.1	0.95	20.0	-



Picture data: Date: 05-05-2023 Emissivity: 0.95
 Time: 12:35:51 Refl. temp. [°C]: 20.0
 File: IR000215.BMT

Picture markings: Engg. Block transformer 800 kva

Measurement Objects	Temp. [°C]	Emiss.	Refl. temp. [°C]	Remarks
Measure point 1	43.6	0.95	20.0	CenterSpot
Cold spot 1	9.2	0.95	20.0	-
Hot spot 1	54.3	0.95	20.0	-

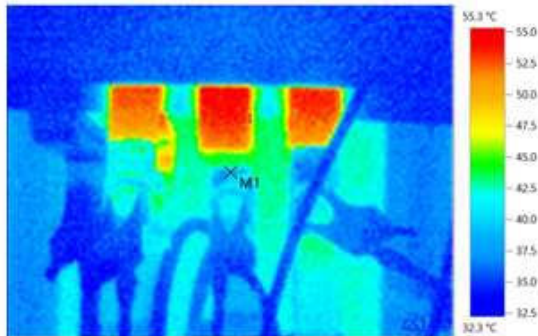


Picture data: Date: 05-05-2023
Time: 13:22:21
File: IR000216.BMT

Emissivity: 0.95
Refl. temp. [°C]: 20.0

Picture markings: Engg. DG-02 Incomer

Measurement Objects	Temp. [°C]	Emiss.	Refl. temp. [°C]	Remarks
Measure point 1	40.4	0.95	20.0	<u>CenterSpot</u>
Cold spot 1	33.0	0.95	20.0	-
Hot spot 1	53.5	0.95	20.0	-

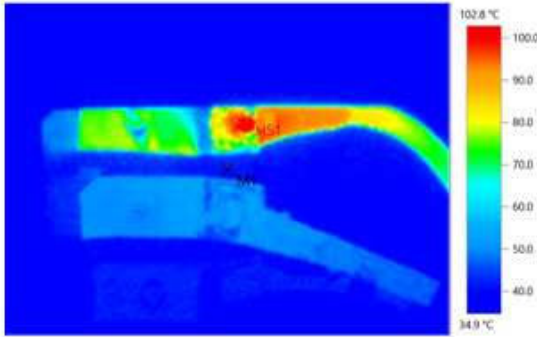


Picture data: Date: 05-05-2023
Time: 13:33:10
File: IR000217.BMT

Emissivity: 0.95
Refl. temp. [°C]: 20.0

Picture markings: Engg. DG-01 Incomer

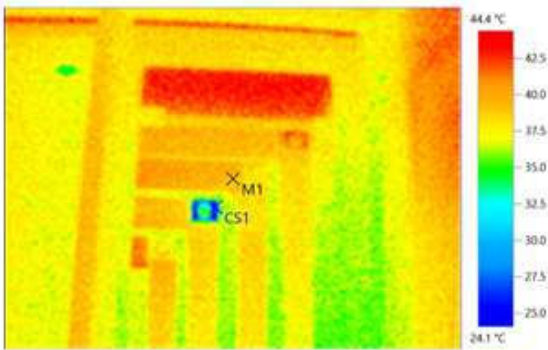
Measurement Objects	Temp. [°C]	Emiss.	Refl. temp. [°C]	Remarks
Measure point 1	38.2	0.95	20.0	<u>CenterSpot</u>
Cold spot 1	32.3	0.95	20.0	-
Hot spot 1	55.3	0.95	20.0	-



Picture data: Date: 05-05-2023 Emissivity: 0.95
 Time: 14:58:33 Refl. temp. [°C]: 20.0
 File: IR000218.BMT

Picture markings: MBA DG-01 INCOMER

Measurement Objects	Temp. [°C]	Emiss.	Refl. temp. [°C]	Remarks
Measure point 1	40.2	0.95	20.0	CenterSpot
Cold spot 1	34.9	0.95	20.0	-
Hot spot 1	102.8	0.95	20.0	-



Picture data: Date: 05-05-2023 Emissivity: 0.95
 Time: 16:04:25 Refl. temp. [°C]: 20.0
 File: IR000220.BMT

Picture markings: MBA Tranformer 500 kva

Measurement Objects	Temp. [°C]	Emiss.	Refl. temp. [°C]	Remarks
Measure point 1	39.2	0.95	20.0	CenterSpot
Cold spot 1	24.1	0.95	20.0	-
Hot spot 1	44.4	0.95	20.0	-

ANNEXURE – I

STANDARD LUX LEVEL

1. Classrooms and Lecture Halls:
 - General classrooms: 300-500 lux
 - Specialized classrooms (e.g., computer labs, science labs): 500-750 lux
 - Lecture halls and auditoriums: 300-750 lux
2. Libraries and Study Areas:
 - General reading areas: 300-500 lux
 - Study carrels and individual study areas: 500-750 lux
 - Reference areas and reading tables: 500-1000 lux
3. Offices and Administrative Areas:
 - General office areas: 300-500 lux
 - Reception areas: 300-500 lux
 - Meeting rooms: 300-750 lux
4. Laboratories and Research Areas:
 - General research areas: 500-1000 lux
 - Detailed tasks (e.g., microscopy, experiments): 1000-2000 lux
5. Sports Facilities and Gymnasiums:
 - Indoor sports courts and gymnasiums: 200-500 lux
 - Changing rooms and locker areas: 100-300 lux
6. Outdoor Areas:
 - Pathways, walkways, and parking lots: 20-50 lux (minimum lighting for safety)
 - Recreational areas: 50-200 lux
 - Sports fields and outdoor courts: Lux levels may vary depending on specific requirements and activities.

ANNEXURE -2

ENERGY SAVER FOR AIR CONDITIONING SYSTEM



PATENT
PUBLISHED



Airtron is the World's First & Only Programmable, Dual-Sensor Driven Microprocessor which saves up to 35% Electricity on all Air Conditioners with Precision Control of Set Temperature and a payback of barely 4-6 months.

IMPORTANT VALIDATIONS N.B. The Set Temp. was the Same <i>WITH / WITHOUT</i> the Airtron.				
SL. NO.	NAME OF THE COMPANY	COUNTRY	AC TYPE	SAVINGS
1	ENERGY EFFICIENCY SERVICES LTD . (EESL GOVT. OF INDIA)	INDIA	SPLIT	44.00%
2	L.G. ELECTRONICS INDIA LTD.	INDIA	SPLIT (INVERTER)	26.00%
3	VIDEOCON TELECOM	INDIA	SPLIT	20.00%
4	TATA COMMUNICATION LTD.	INDIA	SPLIT	28.30%
5	LARSEN & TOUBRO LTD.	INDIA	SPLIT	25.80%
6	TATATELE SERVICES LTD.	INDIA	SPLIT	33.00%
7	TATA POWER LTD.	INDIA	SPLIT	37.50%
8	ASHOK LEYLAND LTD.	INDIA	WINDOW	29.40
9	ZENITH ENERGY (BEE, ACCREDITED ENERGY AUDITOR)	INDIA	SPLIT	37.00%
10	ACCENTURE SERVICES PVT. LTD.	INDIA	SPLIT	37.00%
11	M/S. UNIC MAGNATE	INDIA	SPLIT	58.00%
12	SATURN PYRO (UTIM REGISTRATION OFFICE)	MALAYSIA	CEILING-SPLIT	36.00%
13	SATURN PYRO (AT MALAYSIA POLICE H.Q.)	MALAYSIA	WALL -SPLIT	34.00%
14	CPE ENERGY SDN BHD	MALAYSIA	SPLIT	57.00%

ANNEXURE -3

SUPER ENERGY EFFICIENT BLDC CEILING FAN

	900 mm	1050 mm	1200 mm	1400 mm
Warranty (Years)	3 Years	3 Years	3 Years	3 Years
Blade Span (mm/inch)	900/36	1050/42	1200/48	1400/56
RPM	450	430	350	270
Service Value	7.1	6.6	7.8	7.7
Input Voltage (V)	140-285	140-285	140-285	140-285
Power Consumption (W)	28	32	28	35
Frequency (Hz)	48-52	48-52	48-52	48-52
Air Delivery (CMM)	200	210	220	270
Power Factor	>0.98	>0.98	>0.98	>0.99
No. of Blades	3	3	3	3
Bearing (Double)	Deep Groove Double Sided Steel Shielding			
Remote Control (12 Keys)	Speed Control, Boost Mode, Timer and Sleep Mode			



Comparison Between Ordinary,5 Star Rated And Super Efficient Fans

Parameters	Ordinary Fan	5 Star Rated Fan	Super Efficient Fan
Wattage	75	50	28
RPM(speed)	380	330	360-380
CMM(air delivery)	230	210	220-230
Power factor	>0.9	>0.95	>0.99
Regulator	Yes	Yes	Not Required (Remote controlled)
Input Voltage	230	230	140-285V
Warranty	1-2 year	1-2 year	3 years
MRP	1300-1600	1800-2500	3690

ANNEXURE -4

STAR LEVELING PROGRAM BY BUREAU OF ENERGY EFFICIENCY

S.O. 3897(E).—In exercise of the powers conferred by clause (a) of section 14 of the Energy Conservation Act, 2001 (52 of 2001), the Central Government, in consultation with the Bureau of Energy Efficiency, hereby makes the following amendments in the notification of the Government of India in the Ministry of Power number S.O. 2528(E),



- More stars more savings
- Efficiency parameters
- Brand & Model details
- Technical Parameters
- Applicable dates of standard
- Manufacturing year

1) LED Lamps

Qualify for BEE Star label during voluntary period, all the tested LED lamps shall meet the minimum luminous efficacy of 79L/W. During mandatory period also, all the tested LED lamps shall meet the minimum luminous efficacy of 79L/W.

(a) Star Rating Plan – Voluntary Phase
 (Validity: 6/7/2015 to 31/12/2017)

Star Rating	Rated Luminous Efficacy (Lumen/Watt)	Remarks
1	≥68 & <79	Freezed
2	≥79 & <90	
3	≥90 & <105	
4	≥105 & <120	
5	≥120	

(b) Star Rating Plan – Mandatory Phase
 (Validity: 1/1/2018 to 31/12/2019)

Star Rating	Rated Luminous Efficacy (Lumen/Watt)	Remarks
1	≥68 & <79	Freezed
2	≥79 & <90	Not Freezed
3	≥90 & <105	
4	≥105 & <120	
5	≥120	



Mandatory Appliance

Self ballasted non directional general service LED lamps for general lighting services that work on single phase a.c supply up to and including 250 V, 50 Hz

Standard:
 IS 16102:2012- Part 1 &2, IS 16106:2012 & IS 14700 (Part 3/sec2):1999





2) Tubular Fluorescent Lamps

(Valid from 1st July, 2018 to 30th June, 2020)

Star level	★	★★	★★★	★★★★	★★★★★
	1star	2 star	3 star	4 star	5 star
lumens per Watt at 0100 hrs of operation	≥65and<75	≥75and <85	≥85and<95	≥ 95 and<110	≥110

Mandatory Appliance



Standard: IS 2418:1997


Section 14(a): S.O.179(E)
dated 16.01.2009

Section 14 (b): S.O. 178(E)
dated 16.01.2009

Regulation: No.2 /11(5)/03-BEE dated 05.01.2010


Higher is Better

Star Labeling Parameter
Lumens per Watt

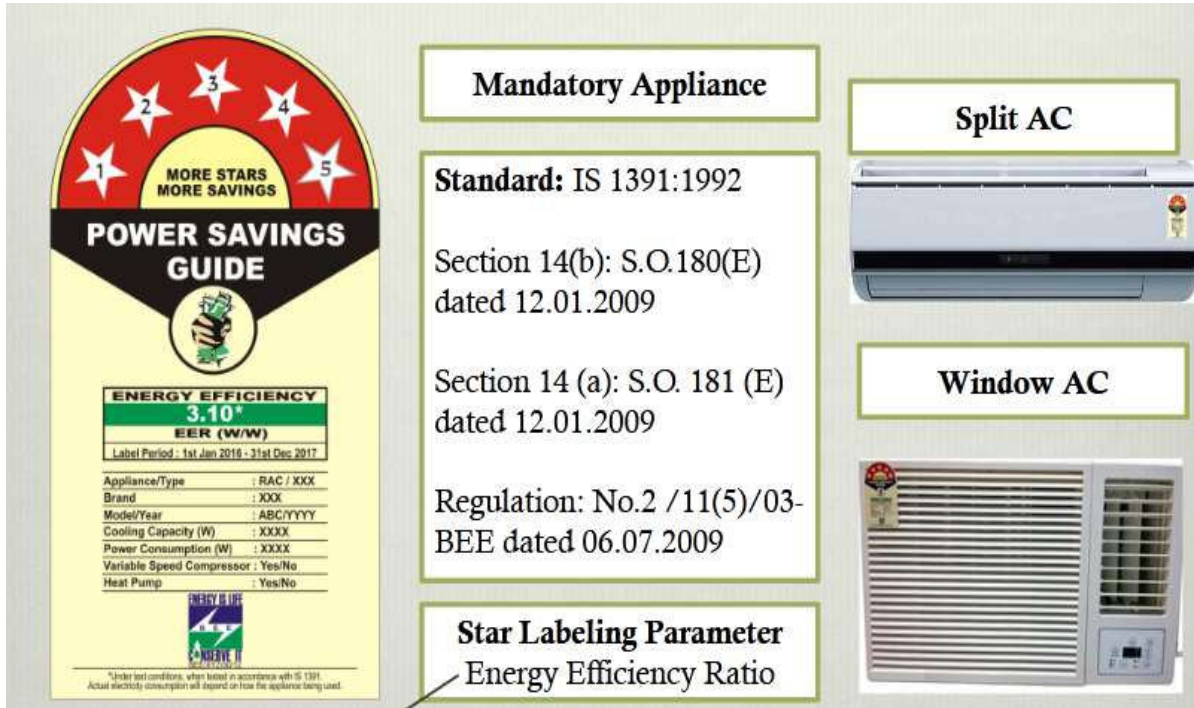


STAR RATING	★	★★	★★★	★★★★	★★★★★
Lumens per Watt at 0100 hrs of use	<61	>=61 & <67	>=67 & <86	>=86 & <92	>=92
Lumens per Watt at 2000 hrs of use	<52	>=52 & <57	>=57 & <77	>=77 & <83	>=83
Lumens per Watt at 3500 hrs of use	<49	>=49 & <54	>=54 & <73	>=73 & <78	>=78

Under test conditions when tested in accordance to IS 2418. Actual efficiency will vary as per site conditions.



3) Room Air Conditioners



Mandatory Appliance

Standard: IS 1391:1992

Section 14(b): S.O.180(E) dated 12.01.2009

Section 14 (a): S.O. 181 (E) dated 12.01.2009

Regulation: No.2 /11(5)/03-BEE dated 06.07.2009

Star Labeling Parameter
 Energy Efficiency Ratio

Split AC

Window AC

POWER SAVINGS GUIDE

ENERGY EFFICIENCY
3.10*
EER (W/W)

Label Period: 1st Jan 2018 - 31st Dec 2017

Appliance/Type : RAC / XXX
 Brand : XXX
 Model/Year : ABC/YYY
 Cooling Capacity (W) : XXXX
 Power Consumption (W) : XXXX
 Variable Speed Compressor : Yes/No
 Heat Pump : Yes/No

*Under test conditions, when tested in accordance with IS 1391. Actual electricity consumption will depend on how the appliance being used.

Table 3.1(e)

(From 1st January, 2018 to 31st December, 2020)

Indian Seasonal Energy Efficiency Ratio (kWh/kWh)		
Star level	Minimum	Maximum
1 Star	2.5	2.69
2 Star	2.7	2.89
3 Star	2.9	3.09
4 Star	3.1	3.29
5 Star	3.3	

Table 3.2(e)

(From 1st January, 2018 to 31st December, 2020)

Indian Seasonal Energy Efficiency Ratio (kWh/kWh)		
Star level	Minimum	Maximum
1 Star	3.1	3.29
2 Star	3.3	3.49
3 Star	3.5	3.99
4 Star	4.0	4.49
5 Star	4.5	

Table 3.1(f)

(From 1st January, 2021 to 31st December, 2023)

Indian Seasonal Energy Efficiency Ratio (kWh/kWh)		
Star level	Minimum	Maximum
1 Star	2.7	2.89
2 Star	2.9	3.09
3 Star	3.1	3.29
4 Star	3.3	3.49
5 Star	3.5	

Table 3.2(f)

(From 1st January, 2021 to 31st December, 2023)

Indian Seasonal Energy Efficiency Ratio (kWh/kWh)		
Star level	Minimum	Maximum
1 Star	3.3	3.49
2 Star	3.5	3.79
3 Star	3.8	4.39
4 Star	4.4	4.99
5 Star	5.0";	

1) Ceiling Fan

All ceiling fans must display the label at the point of sale. The label shall be affixed on motor of ceiling fan.

Table 4.2: Valid from 1st September, 2019 to 30th June, 2022

Star Rating	Service value
1 Star	≥ 4.0 to < 4.5

2 Star	≥ 4.5 to < 5.0
3 Star	≥ 5.0 to < 5.5
4 Star	≥ 5.5 to < 6.0
5 Star	≥ 6.0