Registered Energy Auditor : EA-13
MEDA, GOVT. OF MAHARASHTRA

Certificate of Completion

This certificate is awarded to

SONOPANT DANDEKAR SHIKSHAN MANDALI

SONOPANT DANDEKAR ARTS COLLEGE
V. S. APTE COMMERCE COLLEGE
M. H. MEHTA SCIENCE COLLEGE

for completing **ENERGY AUDIT** successfully
as on October 2020

ASHUTOSH THAKUR
MANAGING DIRECTOR
SAUR ENGINEERS & CONSULTANTS PVT. LTD.
ENERGY AUDIT DIVISION

Detailed Report

Energy Audit

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Project Beneficiary
2020-2021

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Sonopant Dandekar Shikshan Mandli (SDSM)

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SDSM
Tal. Palghar, Dist. Palghar,
Pin 401404.

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Consultants & Auditor

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SAUR
Engineers & Consultants Pvt. Ltd.
EA-13

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D-8, Plot No. 108, Akshay, Rsc-16,
Gorai-1, Borivali (west), Mumbai-400092
MAHARASHTRA
+919867499812/+919168402909

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Acknowledgement

Energy Audit is executed successfully for beneficiary details mentioned below under guidance of Registered Energy Audit Company M/s. Saur Engineers & Consultants Pvt. Ltd. having registered office at D8, Plot No. 108, Akshay Society, Gorai-1, Borivali west, Mumbai 400091 contact id: saurengineers@gmail.com.

Our sincere thanks to Site In charge, all staff of Diamond Banquet present at site, for excellent co-ordination during field measurements and providing accurate data required the said work and preparation of Test report.

Name of Beneficiary: Sonopant Dandekar Shikshan Mandli

Registration Number: NA

Address: Tal. Palghar, Dist. Palghar 401404

Contact Person: Mr. Mahesh Deshmukh

Contact Number: 02525252163

Date of Audit: 24/12/2020

Sign & Seal

Saur Engineers & Consultants Pvt. Ltd.

ENERGY AUDITOR "CLASS-A" No. EA-28
SAUR ENGINEERS & CONSULTANTS PVT. LTD.
Plot No. 108, D-8, Gorai-1, Borivali (W),
Mumbai - 400 091.

I understood the facts, suggestions and details mentioned in this energy audit report. Saur Engineers & Consultants Pvt. Ltd. explained us this report to our satisfaction. It is our responsibility to implement them all. I do not hold responsible Saur Engineers & Consultants Pvt. Ltd. for any incomplete execution and its consequences.

Sign & Seal

SDSM


S.D.S.M. COLLEGE

INDEX

1. Introduction

1.1. Background

Energy Audit is a Basic essential activity to be done for saving in electrical billing and also allied with any energy saving projects like renewable energy project and solar projects. Energy Audit is an assessment of usage, consumption and pattern of energy used in the premises based on all above parameters along with conditions and benchmarks as resource and Building Envelope Analysis, working, operational and Maintenance Procedure Analysis, Utility Data Analysis, Load Data Analysis, Analysis of Energy Consumption, Load Evaluation, consumption pattern and billing history, back-up systems and also the administrative requirements, assessment of safety concerns, assessment of operating and occupancy schedules for Equipment, Power Quality and Environmental Parameters Analysis, Efficiency and Wastage Analysis and assessment of potential risk factors.

Energy Audit is a process of systematic identification, quantification, recording, reporting and analysis of energy usage properties of institute. It aims to analyze within and surrounding the place concerned, which will see interrelation with eco-friendly atmosphere. Energy audit is a valuable means for an Institution related to educational area to determine how and where they are connected with Energy conservation drive of nation. Understanding these conditions the institution can make plans for day to day working, future expansions as well as an eco-friendly view of life while making changes and planning for savings. It provides better understanding of impact of energy consumption on working conditions to staff and visitors. As the Energy availability is becoming an increasingly important issue for the nation, the role of higher education institute is more vital and prevalent in relation with the issue.

The rapid urbanization and economic development at local, regional and global level has led to Energy availability and quality crisis. On this background it becomes essential to adopt the system of Energy efficient and safe Campus for the institution which leads for sustainable development and at the same time persisting the quality of the same while travelling on the growth path. Moreover, it is social responsibility of a High energy consuming institution to ensure that they contribute towards the saving of Energy and thus making it available who are destitute in term of energy availability.

1.2. Objective

In recent times, the Energy audit of an institution has becoming the paramount important for self-assessment of the Institution which reflects in the role of the institution in mitigation to current problem of reducing Energy availability and quality. The institution has been putting efforts to keep reducing and standardizing energy usage since its inception. Therefore the purpose of present Energy audit is to identification, quantification, recording, reporting and analysis of components of Energy utilization and electrical safety properties of institute framework of energy conservation in compliance with the applicable regulations, policies and standards.

The main objectives to carrying out the energy audit are:-

- To have overview of premises
- To record and document geographical location data
- To record and document Utility data
- To record and document Load profile data
- To record and document basic Electrical Safety observations data
- To record and document Key Observations
- To record and document Energy Conservations (if any)
- To record and document Suggestions or Recommendations (if any) to fulfill the purpose

1.3. Methodology

The purpose of Energy Audit of is to ensure that the practices followed in the campus are in accordance with the Energy Conservation Policy of the Country. The methodology includes: collection of data, physical inspection of the campus, observation and review of the documentation and data analysis.

The report is based on the documents obtained while on site, visual inspection and data collection carried out during the assessment period. All the measurements recorded on site are indicative loads and duties. All readings are collected for analysis and improvement planning. Cost estimates are indicative only as more detailed design and acceptance of suggestions will be required to improve the accuracy of these estimates.

The measurement campaign, data collection, interviews, analysis and recommendations are provided within the different material listed below:

- Electricity Bills
- Maps/Layout
- Site Report
- PQA report
- Thermal Imaging
- Metrics results and Various calculations

The units are selected from SI (international standards) with meters, Celsius degrees, Etc.

1.4. About the premises

The SDSM was founded in the Memory of Hon. Sonopant Dandekar, the scholar of higher degree, philosophe, strong protagonist of Varkari Sampradaya, the Great narrator of The "Dnyaneshwari". The SDSM founded in the year 1968 and is started arts and commerce colleges in 1970. In the year 1984 the science college was started. The college premises is about 10 hectare. It consists of five buildings with fully equipped offices, Libraries, seminar hall, Laboratories, Gymnasium, Yoga center, running track and cricket ground along with adequate toilet blocks. About 3000 students avail facilities of the institute with help of 250 Teaching and Non Teaching staff.

1.5. Energy Audit Statement

The building is adopting the "Energy Efficient Campus" system for Energy conservation and sustainability. There are main three pillars i.e. Energy saving by technology and Operation & Maintenance procedures, safe working on occupational health and performance and 100% inmates demonstrating energy efficiency literacy. The goal is to maintain safe working environment, reduce energy consumption, while creating an atmosphere where inmates can work and live healthy.

1.6. Monitoring Equipments used

1. Power Quality Analyzer
2. Clamp Meter
3. Digital Multi-meter
4. Stop watch
5. Noise Meter
6. Lux meter
7. RH Meter
8. Anemometer
9. Mega Ohm Meter
10. Earth Tester
11. IR Thermometer
12. IR Camera

1.7. Standards and References

(Resolutions, rules, regulations, guidelines, papers and programs issued by authorities time to time)

1.7.1. Bureau of Energy Efficiency
1.7.2. Maharashtra Energy Development Agency
1.7.3. Ministry of New and Renewable Energy
1.7.4. Department of Industry, Electricity and Labour
1.7.5. Inspectorate of Electricity
1.7.6. Central Electricity Regulatory Commission
1.7.7. Central Electricity Authority
1.7.8. Indian Electricity Act 2003
1.7.9. Maharashtra Electricity Regulatory Commission
1.7.10. American Council of Energy Efficiency Economy

2. Executive Summary

2.1. Objective

Energy Audit Activity at Sonopant Dandekar college, has been carried out for infrastructure located at SDSM, Tal. Palghar, dist. Palghar, 401404.The main object was to assess the existing system for Saving, Safety, Risk of single point failure, High quality professional and sustainable power quality management, Adopt best practices and Standard operating procedures.

2.2. Results

NO	Findings	Ratings	Solutions
1	Hazardous Control Panel		Refer suggestion-1 of Chapter-3
2	In-adequate Joints		Refer suggestion-2 of Chapter-3
3	Old wiring and cabling		Refer suggestion-3 of Chapter-3
4	In-adequate Earthing		Refer suggestion-4 of Chapter-3
5	Heating In Control Rooms		Refer suggestion-5 of Chapter-3
6	Inefficient Fans		Refer suggestion-6 of Chapter-3
7	Inefficient Lighting		Refer suggestion-7 of Chapter-3

Ratings of Risk/Need Level:

Low	Moderate	High

2.3. Site Status Matrix

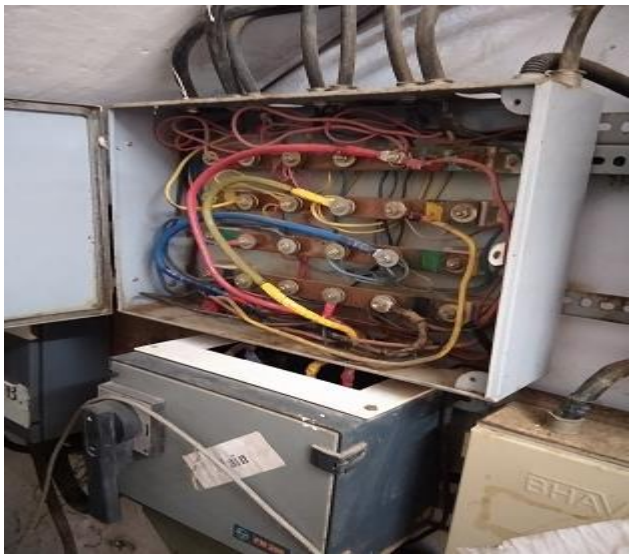
Overview	Power Quality	Safety
Envelope	Wastage	Earthing
Pumps	Motors	HVAC
Compressor	Illumination	Thermography

Ratings of Risk/Need Level:

NA	Immediate Actions to be taken	Improvements required at earliest	Planning for improvement required at earliest	Scope of improvement exists	Excellent

3. Gap Analysis

Suggestion-1	**Hazardous Control Panels.**
Description	
Control panels found OLD, un-maintained, heating and loosely connected.	
Impact	
1. Decrease efficiency. 2. Possibility of explode. 3. shorten life of equipments.	
Risk	
1. Life 2. Financial 3. Efficiency	
Solution	
New Control Panels must be installed. All old SFUs to be removed and Breaker panels to be installed.	

Suggestion-2	**In-adequate joints.**
Description	
It is found that termination of cable joint is not done properly.	
Impact	
Accident	
Risk	
1. Life 2. Financial	
Solution	
Replace Old SFUs with breaker panels, and tight all joints using cable lugs.	

Suggestion-3	**OLD wiring and cabling.**
Description	
Wiring except new building is older. Specially Main building and MB.	
Impact	
Accident	
Risk	
1. Life 2. Safety 3. Occupational	
Solution	
Replace cables and wires older than 15 years. Use copper cables instead of Aluminum.	

Suggestion-4	**In-adequate Earthing.**
Description	
Earthing found below standard values..	
Impact	
Accident	
Risk	
1. Life 2. Safety 3. Occupational	
Solution	
Install New maintenance free earthing as suggested in chapter-7.	

Suggestion-5	**Heating In control Room.**
Description	**Refer Thermography**
Control panel rooms found heated more than normal.	
Impact	
Accident	
Risk	
4. Life 5. Safety 6. Occupational	
Solution	
Install Exhaust fans to reduce heat.	

Suggestion-6	**Use Energy efficient Fans.**
Description	
The building uses old in-efficient 75W fans.	
Impact	
Increase efficiency. Saving Money.	
Risk	
Financial Efficiency	
Solution	
Use 25W BLDC fans.	

Current Scenario before introducing Suggestion			
Utilization Index	**Load (Kw)**	**Consumption (Kwh)**	**Electricity Bill (Rs)**
0.313	**40.43**	**48000**	**532154.5**

New Scenario after implementing Suggestion					
Utilization Index	**Saving Load (Kw)**	**Saving Consumption (Kwh)**	**Saving In Bills (Rs)**	**Investment (Rs)**	**Payback Period (Months)**
0.104	**28.30**	**33957**	**350000**	**1620000**	**60**

Suggestion-7	**Inefficient Lights**
Description	
The building uses old FT lights.	
Impact	
Decrease efficiency. Saving Money.	
Risk	
Financial Efficiency	
Solution	
Use 20W LED Lights.	

Current Scenario before introducing Suggestion			
Utilization Index	**Load (Kw)**	**Consumption (Kwh)**	**Electricity Bill (Rs)**
0.062	**8**	**9600**	**105312.5**

New Scenario after implementing Suggestion					
Utilization Index	**Saving Load (Kw)**	**Saving Consumption (Kwh)**	**Saving In Bills (Rs)**	**Investment (Rs)**	**Payback Period (Months)**
0.031	**4**	**4800**	**52656**	**400000**	**90**

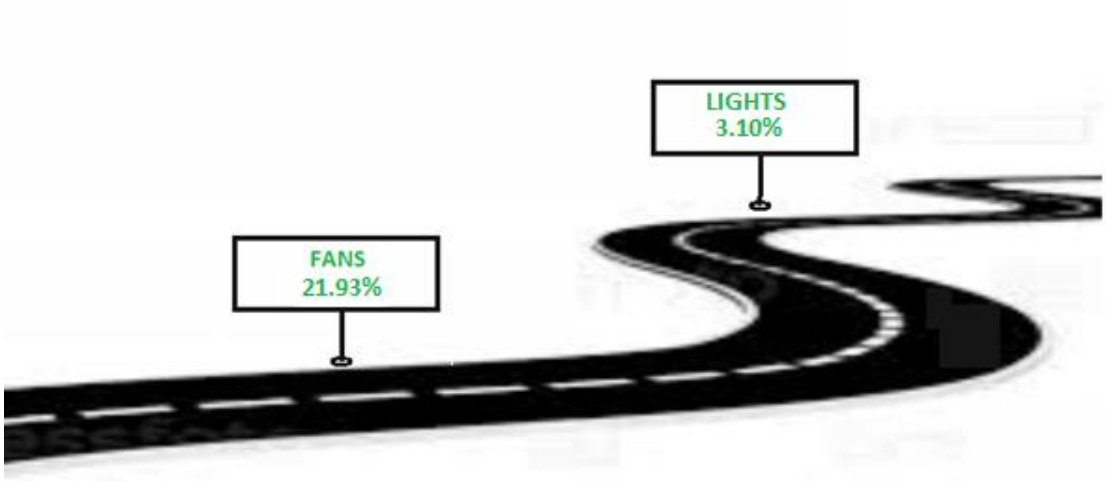
Saving Summary:

Current Annual expenses	Rs	1326112
Expected Annual Saving	Rs	402656
Saving	%	30.37
Current Load	Kw	129
Load after Implementation	Kw	96
Reduction in demand	%	24.80

Statutory Gaps and Recommendations:

1. Site Evaluation score is low (Grade: GOOD).
    - It is recommended that each point of site evaluation need to be observed and to be worked on individually.
2. Single Line Diagram of Electrical system found unavailable.
    - Single Line Diagram of Electrical system to be drawn and stored under guidance of licensed electrical contractor.
3. Design/drawing for control Panel found unavailable.
    - Drawing of control panel to be drawn and stored under guidance of licensed electrical contractor. Accurate labeling of breakers is to be done along with.
4. For Effective management of electricity install Load Manager.

Road map saving:



Road map safety:

1. **Replacing Control Panels**
2. **Install Breakers and tighten Joints**
3. **Replace old wires and cables**
4. **Installing Earthing and Grounding**
5. **Installing Exhaust Fans**

4. Technology Audit

4.1. Premises

SL No	Head	Details
1	Name of Applicant Institution	SDSM
3	Address	Tal. Dist. Palghar 401404
4	Contact Number	NA
5	Registration Certificate Number	NA
6	Sector Type	Educational Institute
7	Senior Management Contact	Asst. Prof. Mahesh Deshmukh
8	Contact Number	7972547497
9	Status of Institution (Pvt./Public)	Private
10	Company Turnover (Rs. In Lakhs)	750
11	Number of Employees	235
12	Approximate Floor Area (ft^2)	75000
13	Year of Establishment	1970
14	Plot Area (ft^2)	800000
15	Constructed Area (ft^2)	75000
16	Greenery Area (ft^2)	700000
17	Roof Area (ft^2)	24000
18	No of Buildings	5
19	Building Type	RCC Construction
20	Age of Building	30years
21	Leakages/Cracks on wall/roof	Minor wall leakages in rooms
22	No. of workers (Footfall)	250
23	No. of Customers (Footfall)	3000-4000
24	Day Vs Night activity in %	100% Day
25	Shifts per day	1
26	Hours per shift	12
27	DG Set installed	Yes
28	Inverter Installed	Yes
29	Renewable Energy System installed	No
30	(Solar/Wind/Biomass/Biofuel/Etc.)	No

4.2. Location

SL No	Head	Details	Remark
1	Name of Institute	SDSM	
2	Category	Educational Institute	
3	Address	Tal. Palghar, Dist. Palghar 401404	
4	State	Maharashtra	
5	Nearest Railway Station	Palghar	Western Railway
			Central Railway
6	Nearest Bus Station	Palghar MSRTC Depot	Interstate/Intrastate
		Palghar	Local
			Local
7	Nearest Airport	CSIA, Mumbai	
8	Longitude	19.42	
9	Latitude	72.45	

4.3. Site Overview

Questionnaire

BASIC :

1. Do you pay bills on time?
   Yes
2. Do you know what is your average electricity consumption?
   Yes 1Lakh
3. Are you using any Back-up devices you are using? What is Fuel for the same?
   Yes DG-Set

TECHNOLOGY :

4. Name Major instruments/Loads you are using?
   Computers
5. Which instruments you have upgraded recently?
   Yes LED Lights
6. Any Automization or process control device used?
   No
7. Any smart device you are using?
   No

OCCUPANCY :

8. Which is your largest consuming instrument?
   Fans
9. Do you have on / off schedule of each instrument?
   No
10. What is your per person usage?
    No

OPERATION & MENTAINANCE :

11. Which instruments you have given AMC for and what is schedule of it?
    No
12. Which instruments you are maintaining yourself and what is schedule of it?
    All
13. Does your staff has proper training for Operation and Maintenance of instruments?
    College Electricians
14. Do you have any activity for awareness/approach towards safety and efficient Energy consumption?
    Yes

OCCUPATIONAL STANDERDS :

15. Have you maintained name plate data of instruments used?
    No
16. Are your instruments sized according to use?
    Yes

PHASE SEQUENCING :

17. Is your system phase synchronized with DISCOM grid?
    No

BASIC ELECTRICAL SAFETY :

18. Have you installed proper electrical safety devices to instrument?
    Yes
19. What are short circuit protections you have implemented?
    ELCB
20. What are Over-load protections you have implemented?
    MCB
21. What are Arc Flash protections you have implemented?
    Yes-Separate electric Room
22. Any Non Insulated Joints?
    No
23. Any cables lying near hot plate/Water lines/Gas lines?
    No
24. Any damaged socket/Plug?
    No
25. Any bare wire?
    No
26. Whether grounding of metal bodies done?
    Yes
27. Are circuit breakers correctly labeled?
    Yes
28. Are circuit breakers correctly sized?
    Yes
29. Any obstruction to Control Panel/Distribution board?
    Yes
30. Are multi-plug sockets used?
    No
31. Have you ever experienced Fire/short circuit or other electric Mis-hap?
    No
32. Are you maintaining earthing regularly?
    No
33. When you have changed, repair/replaced wiring/Cables last known?
    2017

LOAD BALANCING :

34. Do you know load of your instruments and its phasewise distribution?
    No
35. Do your cables/wires get heated?
    Yes

POWER FACTOR :

36. Have you ever checked your power factor?
    No

HARMONICS :

37. Do you know harmonics of your system?
    No

SLD :

38. Have you kept your Single Line Diagram Updated and easily accessible?
    No
39. Does your existing connection match with your SLD?
    No
40. Have you marked all electrical safety devices on SLD?
    No

Score:- 135/200
Grade:- Good

(Marking System:- All question carry 5 marks each.)
Answers for following questions are descriptive. If client able to answer satisfactorily then consider "Y" (Question no :- 4,8,10,11,12,18,23,24,25,37)
(Grading System:-

- 0-40: E Worst
- 41-80: D Worse
- 81-120: C Bad
- 121-160: Good
- 161-200: Excellent)

4.4. Utility Data

4.4.1. About Unit

Year of Establishment:- 1984

LT/HT:- LT X-B-III

4.4.2. Power Supply details

4.4.2.1. Supply Details of Feeder

SL No.	Particulars	Remark
1	Utility Company	MSEDCL
2	Consumer Number	003650003739
3	Meter Number	055-MSP42485
4	MRU/BU/Unit	541
5	Phase	Three
6	Tariff	LT X(B)III

4.4.2.2. Substation and Transformer Details

SL No.	Particulars	Remark
1	Substation/ Zone	543
2	Transformer Number	162
3	Capacity	125

4.4.2.3. Billing Details

SL No.	Particulars	Any One Month	Annual
1	Electrical Units (Kwh)	8750	123005
2	Power Factor	0	0
3	KVA Contract Demand	74	74
4	KVA Registered Max Demand	53	53
5	Bill Amount	99595	1326112

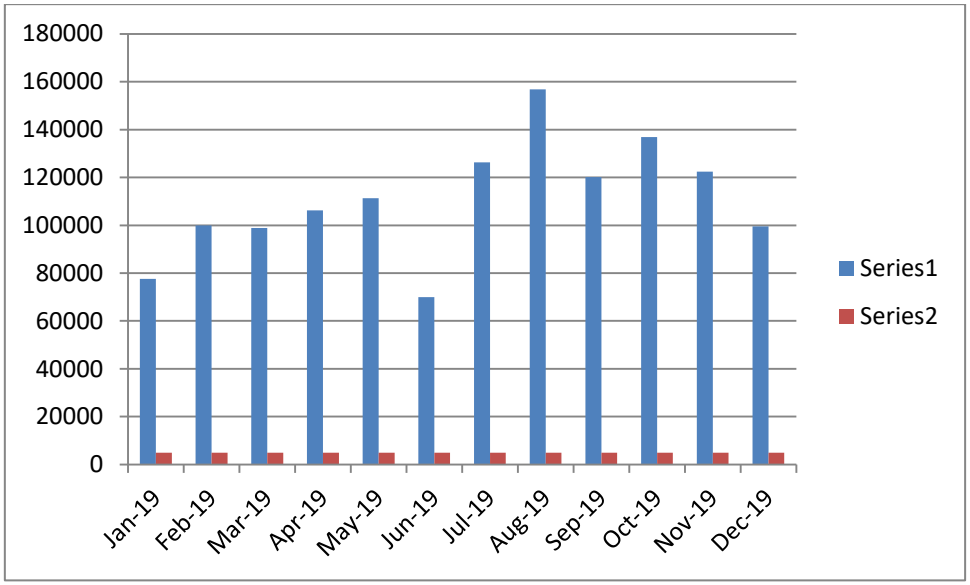
4.4.2.4. Other Energy Sources

SL No	Energy/Fuel	Please Mark In appropriate Box	Unit	Consumption per Annum	Cost Per Annum (Rs)
1	Coal		NA		
3	Lignite		NA		
4	Fuel wood & Biomass		NA		
5	High Speed Diesel		NA		
6	Light Diesel		NA		
7	LSHS		NA		
8	LPG		NA		
9	Natural Gas	• PNG • LNG • CNG	NA		
10	Electric Power		NA		
11	Captive (DG Set)		45KVA	Negligible	

4.4.2.5. Summary of Energy Bills for Last Twelve Months

Chart Energy Expenses

SL No	Month & Year	Electricity Bill (Rs.)	Fuel Bills (Rs.)	Total (Rs.)
1	**Jan-19**	77630	5000	82630
2	**Feb-19**	99987	5000	104987
3	**Mar-19**	98877	5000	103877
4	**Apr-19**	106251	5000	111251
5	**May-19**	111284	5000	116284
6	**Jun-19**	69966	5000	74966
7	**Jul-19**	126288	5000	131288
8	**Aug-19**	156846	5000	161846
9	**Sep-19**	120105	5000	125105
10	**Oct-19**	136898	5000	141898
11	**Nov-19**	122384	5000	127384
12	**Dec-19**	99596	5000	104596



4.4.2.6. Electric Energy Sources

CA No	Meter No	Sanctioned Load	Usage	Phase
		KW		
003650003739	055-MSP42485	74.60	Common	Three

4.4.2.7. Electric Bill Summary

Billing Summary			
Month	**Consumption**	**Expenses**	**Rate**
(name)	(units/kwh)	(Rs)	(Rs/Kwh)
January	5820	77630	13.34
February	7922	99987	12.62
March	9738	98877	10.15
April	9968	106251	10.66
May	10434	111284	10.67
June	6424	69966	10.89
July	12172	126288	10.38
August	15066	156846	10.41
September	12242	120105	9.81
October	13619	136898	10.05
November	10850	122384	11.28
December	8750	99596	11.38

Chart Consumption

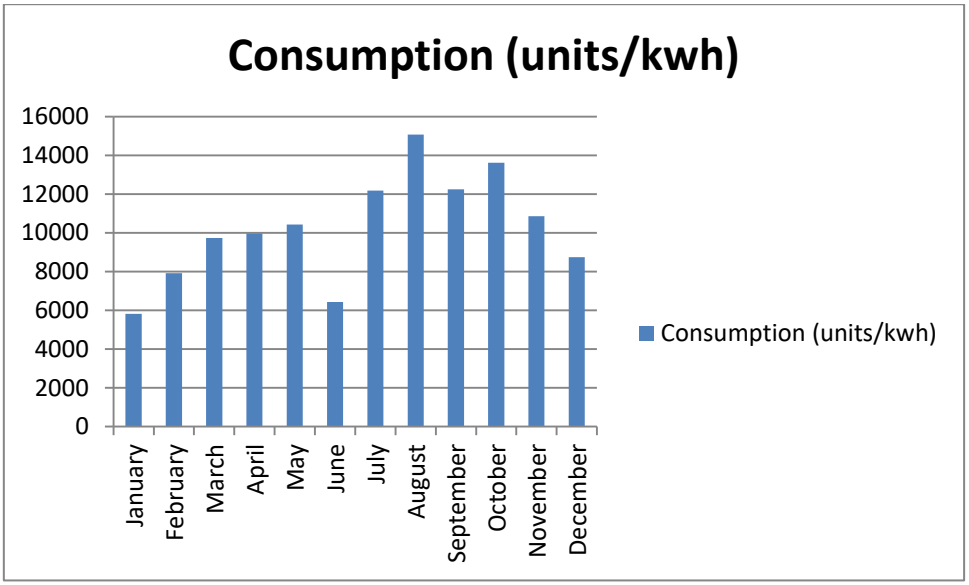
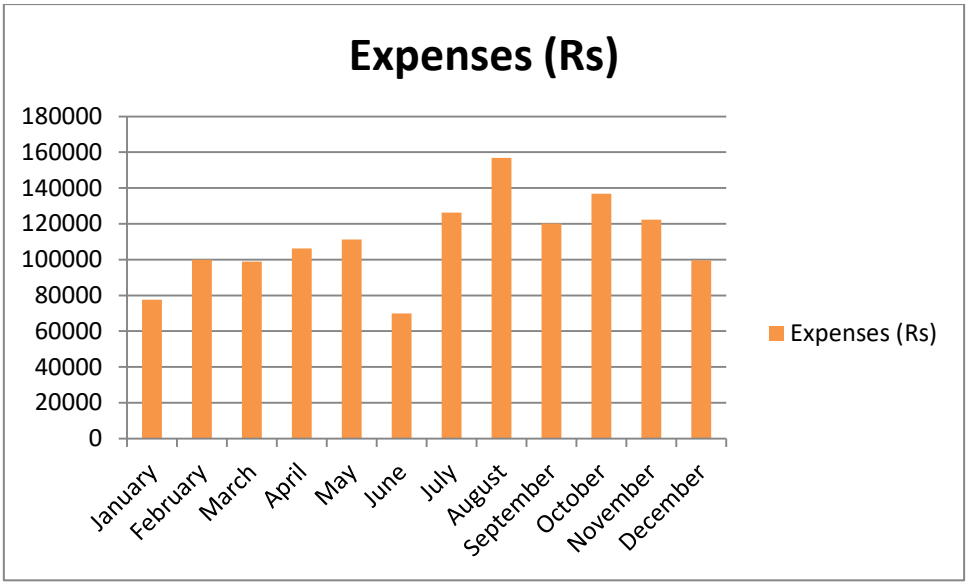


Chart Expenses



4.4.2.8. Consumption Summary

	Usage (Kwh)	Payment (Rs)	Duration
Total	123005	1326112	Annual
Min	5820	69966	January
Max	15066	156846	August
Averagre	10250.4	110509.3	Annual

4.4.2.9. Consumption Timeframe

TOD Zone	Percentage Use
0000-0600 & 2200-2400	9.95
0600-0900 & 1200-1800	54.41
0900-1200	29.61
1800-2200	6.01

4.4.2.10. Demand and Power Factor

NA

Chart Power Demand

NA

Chart Power Factor

NA

4.4.2.11. Future Expenses Projection on Electricity Bills for Next 20 Years

It is observed past 15 years that electricity rates are increasing with an average growth of 8.5% per annum. Following table will show how much amount we are going to spend on electricity next twenty years with this growth rate and same consumption.

SL No	Year	Unit Rate	Expenses
1	2019-2020	10.97	1349364.85
2	2020-2021	11.85	1457314.04
3	2021-2022	12.80	1573899.16
4	2022-2023	13.82	1699811.09
5	2023-2024	14.92	1835795.98
6	2024-2025	16.12	1982659.66
7	2025-2026	17.41	2141272.43
8	2026-2027	18.80	2312574.23
9	2027-2028	20.30	2497580.17
10	2028-2029	21.93	2697386.58
11	2029-2030	23.68	2913177.51
12	2030-2031	25.58	3146231.71
13	2031-2032	27.62	3397930.24
14	2032-2033	29.83	3669764.66
15	2033-2034	32.22	3963345.83
16	2034-2035	34.80	4280413.5
17	2035-2036	37.58	4622846.58
18	2036-2037	40.59	4992674.31
19	2037-2038	43.84	5392088.25
20	2038-2039	47.34	5823455.31

You are going to spend **Rs. 6,00,00,000/- (Rs. Six Crore)** on electricity bills in coming 20 years; if we keep current consumption as it is.

Presently DG-SET as a Back-Up supply is connected to partially to main building of this meter.

Chart Unit Rates

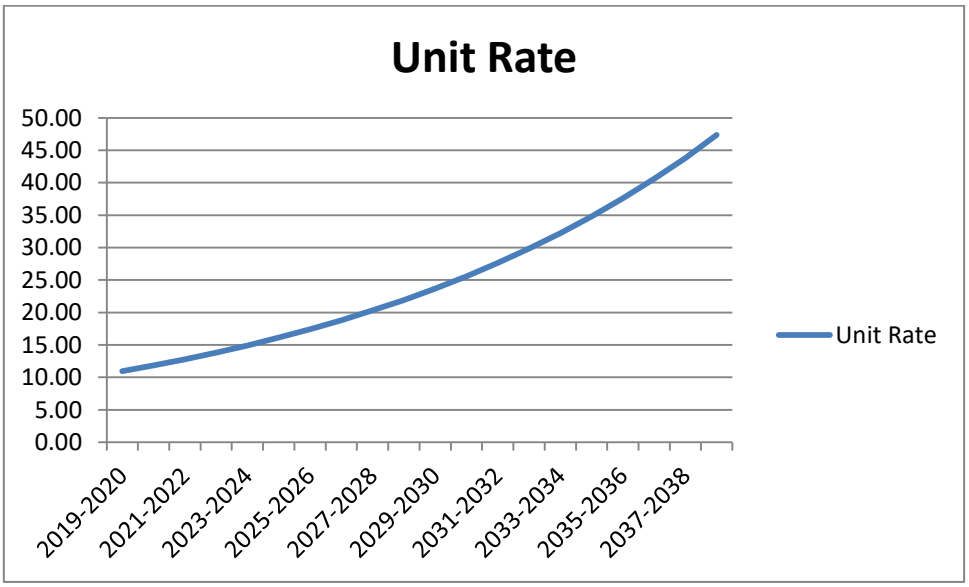
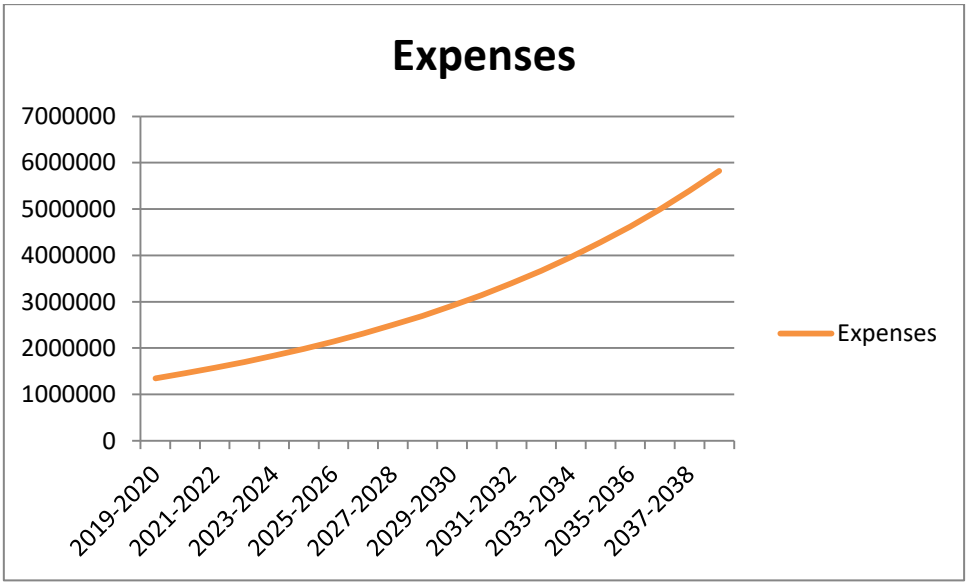


Chart Expenses



4.5. Back-Up Supply

4.5.1. Statement

Back-up	DG	Inverter	Inverter	Inverter	Inverter	DG
Name	DG-SET	IN-1	IN-2	IN-3	IN-4	DG-SET
Capacity	62.5	1.5KVA	1.5KVA	1.5KVA	1.5KVA	20
Running Hours	As required	1hr	1hr	1hr	1hr	As required
Fuel	Diesel	Electricity	Electricity	Electricity	Electricity	Diesel
Usage/Day	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
Fuel/Day	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
Purpose	Back-up for exams	Lab Back-up	Lab Back-up	Lab Back-up	Lab Back-up	Back-up for exams
Load Connected	Main Building	Lab-1	Lab-2	Lab-3	Lab-4	NA
Location	Main Building parking	Chemistry	Chemistry	Chemistry	Chemistry	NA
Rooms Connected	Main Building	Lab-1	Lab-1	Lab-1	Lab-1	NA
Fuel Bills	Negligible	NA				NA

4.5.2. Point of Connection

Main Building

4.6. Load Profile

Main Building

SL No	Room No	Load
1	1	0.27
2	2	3.20
3	3	11.02
4	4	5.93
5	5	1.51
6	6	2.63
7	7	1.56
8	Committee	2.67
9	Management	2.54
10	LCR-1	0.21
11	Staff	0.76
12	WDC	0.10
13	LCR2	0.21
14	NCC	0.31
15	Biotech L2	3.25
16	Biotech L1	1.65
17	Biotech L4	0.38
18	Biotech L3	2.65
19	Bio Staff	0.42
20	13A	0.69
21	13B	0.54
22	Exam	1.02
23	Zoo L1	0.56
24	Zoo Staff	0.61
25	Zoo L2	2.23
26	Botony-1	0.35
27	Botony-2	0.97
28	Botony L1	0.86
29	Botony L2	0.89
30	Dark Room	0.42
31	Physics L1	0.99
32	Physics L2	0.99
33	Phy Staff	0.44
34	Zoo L3	0.73
35	Zoo L4	0.37
25	Zoo L4	0.23

BMS

SL No	Room No	Load
1	Staff	0.91
2	Supervisor	0.57
3	Office	2.07
4	IT Lab	1.92
5	Seminar Hall	2.73
6	Library	2.05
7	6	0.54
8	7	0.19
9	8	0.58
10	9A	5.49
11	9B	6.24
12	10	0.46
13	11	0.17
14	12	0.46
15	13	0.57
16	14	0.61
17	15	0.61
18	16	0.59
19	17	0.59

Chemistry

SL No	Room No	Load
1	Staff Room	0.31
2	Sore	0.24
3	Phy/Chem	0.48
4	HOD	0.12
5	Lab-1	0.81
6	Lab-2	0.31
7	Corridor	0.16
8	104	0.50
9	Lupin	1.05
10	Research Lab	1.85
11	101	0.38
12	102	0.38
13	Corridor	0.20
14	Lab-1	0.24
15	Lab-2	0.24
16	Lab-3	1.39
17	Lab-4	0.39
18	Patpedhi	0.16

Mangesh Tare Bhavan

SL No	Room No	Load
1	Staff Room	0.66
2	Sore	0.70
3	Phy/Chem	0.66
4	HOD	0.66

New Building

SL No	Room No	Load
1	1	0.58
2	2	0.58
3	3	0.58
4	4	1.23
5	5	0.58
6	6	0.48
7	7	0.58
8	8	0.48
9	9	0.58
10	10	0.48
11	11	0.48
12	12	0.48
13	13	0.58
14	14	0.48
15	15	0.48
16	16	0.48
17	17	0.12
18	18	0.10
19	19	0.12
20	20	0.12
21	Vp office	0.51
22	Principal	2.49

Mahavir Bhavan

SL No	Room No	Load
1	1 to 6	10.30
2	7	0.19
3	8	0.50
4	9	0.12
5	10	0.50
6	11	0.62
7	12	0.08
8	VP	0.14
9	13	0.27
10	14	0.50
11	15	0.50
12	16	0.50
13	17	0.00
14	18	0.27
15	Exam	0.10
16	19	0.46
17	20	0.46
18	21	0.46
19	22	0.44
18	23	0.46
19	24	0.46

Miscellaneous

SL No	Room No	Load
1	Horticulture	2.54
2	Gym	0.77
3	Yoga	1.28
4	Corridor	1.60

(These tables are calculated as per discussion with user and time table provided by user.)

4.7. Load Statement

Building	Load
Main	54.09
BMS	27.325
Chemistry	9.155
Tare	2.66
NB	12.49
Mahavir Bhavan	17.255
Miscelleneous	6.19
Total	**129.165**

Load Statement Summary

Total Connected Load 129.17Kw

Chart Load

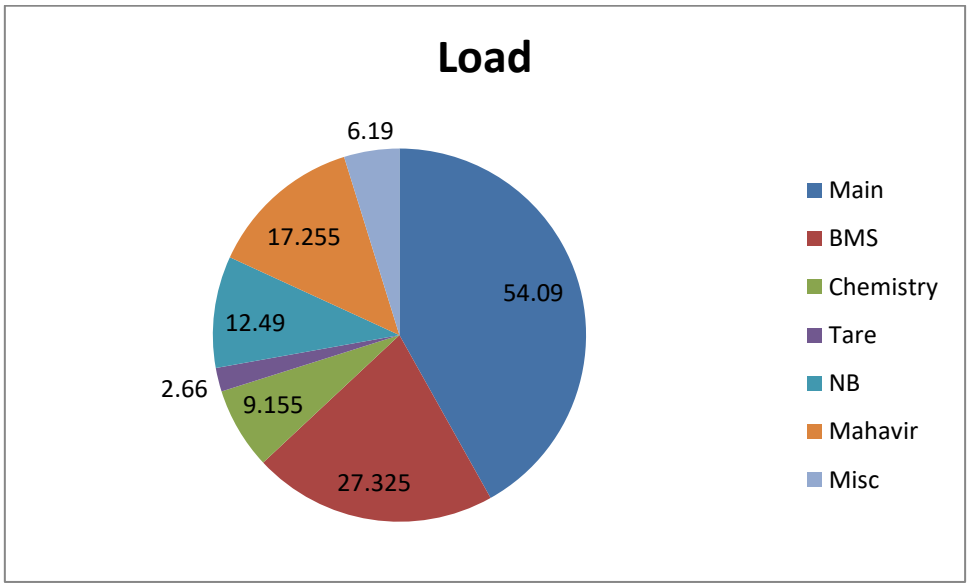
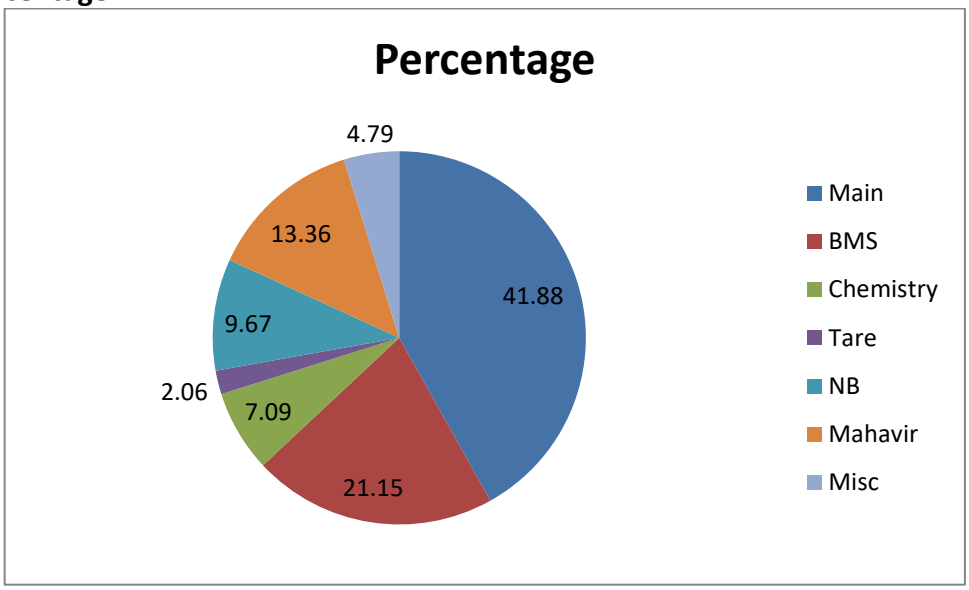


Chart Percentage



4.8. Envelope Analysis

1. Atmosphere

SL No	Room	Temperature	Humidity	Noise
		^{0}C	%	dB
1	1	27.3	65	45.4
2	2	26.5	60.7	45.2
3	3	26.8	62.5	45.8
4	4	27.7	64.3	42.2
5	5	28.4	59.4	54.5
6	6	28.4	61.3	38.7
7	7	28.6	62.9	52.4
8	Committee	28.2	63.4	51.2
9	Management	27.9	63	55.6
10	LCR-1	26.9	64.6	55.4
11	Staff	27.2	64.7	39.1
12	WDC	26.6	66	39
13	LCR2	26.6	59.3	38.9
14	NCC	27.4	59.7	65.7
15	Biotech L2	26.6	62	58.6
16	Biotech L1	26.3	64.4	49.9
17	Biotech L4	26.2	67.2	38.1
18	Biotech L3	26.1	64.7	39.2
19	Bio Staff	27.5	64.2	38.4
20	13A	27.3	63.5	38.3
21	13B	27.6	63.7	38.1
22	Exam	27.4	62	38.4
23	Zoo L1	27.2	61.2	38.3
24	Zoo Staff	27.3	66	39.3
25	Zoo L2	27.5	63.5	38.1
26	Botony-1	27.3	64.9	38.7
27	Botony-2	27.3	61.1	39.4
28	Botony L1	27.3	66.3	38.9
29	Botony L2	27.2	63	38.6
30	Dark Room	26.1	63.7	38.4
31	Physics L1	27.5	59.3	38.3
32	Physics L2	27.3	59.7	39.3
33	Phy Staff	27.6	62	38.3
34	Zoo L3	27.4	64.4	39.4
35	Zoo L4	27.4	67.2	39.4
36	25	26.6	66.8	38.9

2. Ambience

SL No	Room	General		Window			Door		Walls			Rating	
		Color	Ventilation	Protection	Fitting	Filtration	Lock	Fitting	Insulation	Cracks	Opens	Score	Percentage
1	1	3	3	2	3	2	2	2	2	2	2	22	73.33
2	2	3	3	2	2	2	2	2	2	2	2	23	76.67
3	3	3	3	2	3	2	2	2	2	2	2	23	76.67
4	4	3	3	2	3	2	2	2	2	2	2	22	73.33
5	5	3	3	2	2	2	2	2	2	2	2	29	96.67
6	6	3	3	3	3	3	3	3	3	3	2	23	76.67
7	7	3	3	2	3	2	2	2	2	2	2	30	100.00
8	Committee	3	3	3	3	3	3	3	3	3	3	24	80.00
9	Management	3	3	2	3	2	2	2	3	2	2	21	70.00
10	LCR-1	3	2	2	2	2	2	2	2	2	2	22	73.33
11	Staff	3	3	2	2	2	2	2	2	2	2	21	70.00
12	WDC	3	2	2	2	2	2	2	2	2	2	22	73.33
13	LCR2	3	3	2	2	2	2	2	2	2	2	23	76.67
14	NCC	3	3	2	3	2	2	2	2	2	2	23	76.67
15	Biotech L2	3	3	2	3	2	2	2	2	2	2	23	76.67
16	Biotech L1	3	3	2	3	2	2	2	2	2	2	22	73.33
17	Biotech L4	3	3	2	2	2	2	2	2	2	2	23	76.67
18	Biotech L3	3	3	2	3	2	2	2	2	2	2	22	73.33
19	Bio Staff	3	3	2	2	2	2	2	2	2	2	22	73.33
20	13A	3	3	2	2	2	2	2	2	2	2	23	76.67
21	13B	3	3	2	3	2	2	2	2	2	2	23	76.67
22	Exam	3	3	2	3	2	2	2	2	2	2	22	73.33
23	Zoo L1	3	3	2	2	2	2	2	2	2	2	22	73.33
24	Zoo Staff	3	3	2	2	2	2	2	2	2	2	23	76.67
25	Zoo L2	3	3	2	3	2	2	2	2	2	2	22	73.33
26	Botony-1	3	3	2	2	2	2	2	2	2	2	23	76.67
27	Botony-2	3	3	2	3	2	2	2	2	2	2	23	76.67
28	Botony L1	3	3	2	3	2	2	2	2	2	2	22	73.33
29	Botony L2	3	3	2	2	2	2	2	2	2	2	23	76.67
30	Dark Room	3	3	2	3	2	2	2	2	2	2	22	73.33
31	Physics L1	3	3	2	2	2	2	2	2	2	2	23	76.67
32	Physics L2	3	3	2	3	2	2	2	2	2	2	22	73.33
33	Phy Staff	3	3	2	2	2	2	2	2	2	2	23	76.67
34	Zoo L3	3	3	2	3	2	2	2	2	2	2	22	73.33
35	Zoo L4	3	3	2	2	2	2	2	2	2	2	23	76.67
36	25	3	3	2	3	2	2	2	2	2	2	0	0.00

3. Illumination

SL No	Lux	Decorative	Limitation	Diffuser	Reflection	Insulation	Automization	Maintenance	SOP	Meter	Energy Recovery	Score	Percentage
1	48	3	2	2	2	2	1	1	1	1	1	16	53.33
2	35	3	2	2	2	2	1	1	1	1	3	18	60.00
3	101	3	2	2	2	2	1	1	1	1	3	18	60.00
4	250	3	2	2	2	2	1	1	1	1	3	18	60.00
5	300	3	2	2	2	2	1	1	1	1	1	16	53.33
6	620	3	3	2	2	2	1	1	1	1	3	19	63.33
7	159	3	2	2	2	2	1	1	1	1	1	16	53.33
8	110	3	2	2	2	2	1	1	1	1	3	18	60.00
9	103	3	3	2	2	2	1	1	1	1	1	17	56.67
10	180	3	2	2	2	2	1	1	1	1	3	18	60.00
11	2150	3	2	2	2	2	1	1	1	1	3	18	60.00
12	102	3	2	2	2	2	1	1	1	1	3	18	60.00
13	100	3	2	2	2	2	1	1	1	1	3	18	60.00
14	120	3	2	2	2	2	1	1	1	1	3	18	60.00
15	648	3	2	2	2	2	1	1	1	1	3	18	60.00
16	1044	3	2	2	2	2	1	1	1	1	3	18	60.00
17	150	3	2	2	2	2	1	1	1	1	3	18	60.00
18	65	3	2	2	2	2	1	1	1	1	3	18	60.00
19	104	3	2	2	2	2	1	1	1	1	1	16	53.33
20	99	3	2	2	2	2	1	1	1	1	1	16	53.33
21	116	3	2	2	2	2	1	1	1	1	1	16	53.33
22	370	3	2	2	2	2	1	1	1	1	1	16	53.33
23	272	3	2	2	2	2	1	1	1	1	3	18	60.00
24	106	3	2	2	2	2	1	1	1	1	3	18	60.00
25	53	3	2	2	2	2	1	1	1	1	1	16	53.33
26	179	3	2	2	2	2	1	1	1	1	1	16	53.33
27	103	3	2	2	2	2	1	1	1	1	3	18	60.00
28	142	3	2	2	2	2	1	1	1	1	3	18	60.00
29	118	3	2	2	2	2	1	1	1	1	1	16	53.33
30	118	3	2	2	2	2	1	1	1	1	3	18	60.00
31	88	3	2	2	2	2	1	1	1	1	3	18	60.00
32	95	3	2	2	2	2	1	1	1	1	3	18	60.00
33	120	3	2	2	2	2	1	1	1	1	3	18	60.00
34	98	3	2	2	2	2	1	1	1	1	3	18	60.00
35	105	3	2	2	2	2	1	1	1	1	3	18	60.00
36	98	3	2	2	2	2	1	1	1	1	1	16	53.33

4. Safety

SL No	Factor	Critical	Appropriate	Not Applicable
1	Fire Extinguisher		✓	
2	Alarm		✓	
3	Public Address		✓	
4	Rodent Arrester	✓		
5	Access Control		✓	
6	CCTV	✓		
7	Cable/Wre Capacity		✓	
8	Type	✓		
9	Connections/Joints	✓		
10	Age	✓		
11	Insulation	✓		
12	Laying		✓	
13	Sockets		✓	
14	Multi-Plugging		✓	
15	Bare wires/contacts		✓	
16	Breaker Capacity		✓	
17	Type	✓		
18	Connections	✓		
19	Age	✓		
20	Panel Board Capacity	✓		
21	Type	✓		
22	Connections	✓		
23	Age	✓		
24	Labelling		✓	
25	Earth Protection	✓		
26	Numbers	✓		
27	Type	✓		
28	Connections	✓		
29	Age	✓		
30	Grounding	✓		
31	Cracks		✓	
32	Multiple Joints		✓	
33	Leakage		✓	
34	Damage/Tamper		✓	
35	Ease of Access		✓	
36	Danger Signs	✓		
37	SLD	✓		

38	Nameplate	✓		
39	Cable Routing		✓	
40	Fault Tagging	✓		
41	Calibration	✓		
42	Labeling	✓		
43	Main Cut OFF	✓		
44	Double Insulation Portable Things		✓	

5. Service

Energy Service	Light	Cooling
Process	Lighting Room	Room Cooling
Equipment	Natural + Tubes	Fans
Control	No	No
O&M	No	No
Management	No	No

Mahavir Bhavan

1. Atmosphere

SL No	Room	Temperature	Humidity	Noise
		Degree C	%	dB
1	1 to 6	28.1	61	38.7
2	7	28.2	60.6	52.4
3	8	28.1	61.1	51.2
4	9	28.2	60.8	39.2
5	10	27.7	62.7	38.4
6	11	27.8	62	38.3
7	12	28.9	63.1	42.2
8	Vice Principal	28.6	63.4	54.5
9	13	28.5	57.6	39.8
10	14	28.2	59.9	38.9
11	15	28.1	59.6	45.7
12	16	28.6	60.2	45.8
13	17	28.3	60.1	55.6
14	18	28.4	61.3	55.4
15	Exam	28.1	59.9	39.1
16	19	29.1	57.8	38.1
17	20	29.3	57.1	49.9
18	21	29.8	56.4	38.1
19	22	29.9	56.1	35.6
20	23	29.9	55.8	45.2
21	24	29.5	57.3	58.6

2. Ambience

SL No	Room	General		Window			Door		Walls			Rating	
		Color	Ventilation	Protection	Fitting	Filtration	Lock	Fitting	Insulation	Cracks	Opens	Score	Percentage
1	1 to 6	3	3	1	1	2	2	1	2	2	2	20	66.67
2	7	3	3	2	2	2	2	1	2	1	2	19	63.33
3	8	3	3	1	1	2	2	1	2	2	2	18	60.00
4	9	3	3	1	1	2	2	1	2	1	2	20	66.67
5	10	3	3	2	2	2	2	1	2	1	2	18	60.00
6	11	3	3	1	1	2	1	1	2	2	2	20	66.67
7	12	3	3	2	1	2	2	1	2	2	2	21	70.00
8	Vice Principal	3	3	3	2	3	1	1	2	1	2	20	66.67
9	13	3	3	2	1	2	2	1	2	2	2	18	60.00
10	14	3	2	1	1	2	2	2	2	1	2	20	66.67
11	15	3	3	2	1	2	2	1	2	2	2	19	63.33
12	16	3	2	1	2	2	2	1	2	2	2	18	60.00
13	17	3	3	1	1	2	2	1	2	1	2	19	63.33
14	18	3	3	1	1	2	1	2	2	2	2	18	60.00
15	Exam	3	3	1	1	2	2	1	2	1	2	18	60.00
16	19	3	3	2	1	2	1	1	2	2	1	18	60.00
17	20	3	3	1	2	2	1	1	2	2	1	18	60.00
18	21	3	3	2	1	2	1	2	2	1	1	18	60.00
19	22	3	3	1	2	2	2	1	2	1	1	20	66.67
20	23	3	3	2	2	2	2	1	2	2	1	20	66.67
21	24	3	3	2	1	2	2	2	2	2	1	20	66.67

3. Illumination

SL No	Illumination	Decorative	Limitation	Diffuser	Reflection	Insulation	Automization	Maintenance	SOP	Meter	Energy Recovery	Score	Percentage
1	60	3	2	2	2	2	1	1	1	1	1	16	53.33
2	75	3	2	2	2	2	1	1	1	1	1	16	53.33
3	36	3	2	2	2	2	1	1	1	1	1	16	53.33
4	51	3	2	2	2	2	1	1	1	1	1	16	53.33
5	79	3	2	2	2	2	1	1	1	1	1	16	53.33
6	198	3	3	2	2	2	1	1	1	1	1	17	56.67
7	109	3	2	2	2	2	1	1	1	1	1	16	53.33
8	302	3	2	2	2	2	1	1	1	1	1	16	53.33
9	121	3	3	2	2	2	1	1	1	1	1	17	56.67
10	89	3	2	2	2	2	1	1	1	1	1	16	53.33
11	90	3	2	2	2	2	1	1	1	1	1	16	53.33
12	86	3	2	2	2	2	1	1	1	1	1	16	53.33
13	85	3	2	2	2	2	1	1	1	1	1	16	53.33
14	100	3	2	2	2	2	1	1	1	1	1	16	53.33
15	203	3	2	2	2	2	1	1	1	1	1	16	53.33
16	530	3	3	2	2	2	1	1	1	1	1	17	56.67
17	532	3	3	2	2	2	1	1	1	1	1	17	56.67
18	609	3	3	2	2	2	1	1	1	1	1	17	56.67
19	600	3	3	2	2	2	1	1	1	1	1	17	56.67
20	1600	3	3	2	2	2	1	1	1	1	1	17	56.67
21	997	3	3	2	2	2	1	1	1	1	1	17	56.67

4. Safety

SL No	Factor	Critical	Appropriate	Not Applicable
1	Fire Extinguisher		✓	
2	Alarm		✓	
3	Public Address		✓	
4	Rodent Arrester	✓		
5	Access Control		✓	
6	CCTV	✓		
7	Cable/Wre Capacity		✓	
8	Type	✓		
9	Connections/Joints	✓		
10	Age	✓		
11	Insulation	✓		
12	Laying		✓	
13	Sockets		✓	
14	Multi-Plugging		✓	
15	Bare wires/contacts		✓	
16	Breaker Capacity		✓	
17	Type	✓		
18	Connections	✓		
19	Age	✓		
20	Panel Board Capacity	✓		
21	Type	✓		
22	Connections	✓		
23	Age	✓		
24	Labelling		✓	
25	Earth Protection	✓		
26	Numbers	✓		
27	Type	✓		
28	Connections	✓		
29	Age	✓		
30	Grounding	✓		
31	Cracks		✓	
32	Multiple Joints		✓	
33	Leakage		✓	
34	Damage/Tamper		✓	
35	Ease of Access		✓	
36	Danger Signs	✓		
37	SLD	✓		

38	Nameplate	✓		
39	Cable Routing		✓	
40	Fault Tagging	✓		
41	Calibration	✓		
42	Labelling	✓		
43	Main Cut OFF	✓		
44	Double Insulation Portable Things		✓	

5. Service

Energy Service	Light	Cooling
Process	Lighting Room	Room Cooling
Equipment	Natural + Tubes	Fans
Control	No	No
O&M	No	No
Management	No	No

BMS

1. Atmosphere

SL No	Room	Temperature	Humidity	Noise
		Degree C	%	dB
1	Staff	29.9	58.9	38.3
2	Supervisor	29.2	60.5	42.2
3	Office	28.4	63	52.4
4	IT Lab	27.7	63.1	51.2
5	Seminar Hall	27.2	65.2	39.2
6	Library	27.1	63.1	49.9
7	6	27.1	64.4	38.1
8	7	27.3	65.2	55.6
9	8	27.2	66.8	55.4
10	9A	28	64.6	54.5
11	9B	27.4	65.1	39.8
12	10	27.9	60.5	35.6
13	11	27.7	63.5	38.9
14	12	27.5	64	45.7
15	13	28.6	63.8	38.4
16	14	29.5	60.5	45.8
17	15	30.2	59.4	39.1
18	16	30.1	58.6	38.1
19	17	29.8	59.4	38.7

2. Ambience

SL No	Room	General		Window			Door		Walls			Rating	
		Color	Ventilation	Protection	Fitting	Filtration	Lock	Fitting	Insulation	Cracks	Opens	Score	Percentage
1	Staff	3	3	2	2	2	2	2	2	2	2	22	73.33
2	Supervisor	3	3	2	2	2	2	2	2	2	2	22	73.33
3	Office	3	3	2	2	2	2	2	2	2	2	22	73.33
4	IT Lab	3	3	2	2	2	2	2	2	2	2	22	73.33
5	Seminar Hall	3	3	2	2	2	2	2	2	2	2	22	73.33
6	Library	3	3	2	2	2	2	2	2	2	2	22	73.33
7	6	3	3	2	2	2	2	2	2	2	2	22	73.33
8	7	3	3	2	2	2	2	2	2	2	2	22	73.33
9	8	3	3	2	2	2	2	2	2	2	2	21	70.00
10	9A	3	2	2	2	2	2	2	2	2	2	22	73.33
11	9B	3	3	2	2	2	2	2	2	2	2	21	70.00
12	10	3	2	2	2	2	2	2	2	2	2	22	73.33
13	11	3	3	2	2	2	2	2	2	2	2	22	73.33
14	12	3	3	2	2	2	2	2	2	2	2	22	73.33
15	13	3	3	2	2	2	2	2	2	2	2	22	73.33
16	14	3	3	2	2	2	2	2	2	2	2	22	73.33
17	15	3	3	2	2	2	2	2	2	2	2	22	73.33
18	16	3	3	2	2	2	2	2	2	2	2	22	73.33
19	17	3	3	2	2	2	2	2	2	2	2	22	73.33

3. Illumination

SL No	Illumination	Decorative	Limitation	Diffuser	Reflection	Insulation	Automization	Maintenance	SOP	Meter	Energy Recovery	Score	Percentage
1	347	3	2	2	2	2	1	1	1	1	1	16	53.33
2	109	3	2	2	2	2	1	1	1	1	1	16	53.33
3	174	3	2	2	2	2	1	1	1	1	1	16	53.33
4	114	3	2	2	2	2	1	1	1	1	1	16	53.33
5	80	3	2	2	2	2	1	1	1	1	1	16	53.33
6	51	3	3	2	2	2	1	1	1	1	1	17	56.67
7	92	3	2	2	2	2	1	1	1	1	1	16	53.33
8	166	3	2	2	2	2	1	1	1	1	1	16	53.33
9	87	3	3	2	2	2	1	1	1	1	1	17	56.67
10	148	3	2	2	2	2	1	1	1	1	1	16	53.33
11	243	3	2	2	2	2	1	1	1	1	1	16	53.33
12	75	3	2	2	2	2	1	1	1	1	1	16	53.33
13	176	3	2	2	2	2	1	1	1	1	1	16	53.33
14	153	3	2	2	2	2	1	1	1	1	1	16	53.33
15	500	3	2	2	2	2	1	1	1	1	1	16	53.33
16	684	3	3	2	2	2	1	1	1	1	1	17	56.67
17	340	3	3	2	2	2	1	1	1	1	1	17	56.67
18	280	3	3	2	2	2	1	1	1	1	1	17	56.67
19	266	3	3	2	2	2	1	1	1	1	1	17	56.67

4. Safety

SL No	Factor	Critical	Appropriate	Not Applicable
1	Fire Extinguisher		✓	
2	Alarm		✓	
3	Public Address		✓	
4	Rodent Arrester	✓		
5	Access Control		✓	
6	CCTV	✓		
7	Cable/Wre Capacity		✓	
8	Type	✓		
9	Connections/Joints	✓		
10	Age	✓		
11	Insulation	✓		
12	Laying		✓	
13	Sockets		✓	
14	Multi-Plugging		✓	
15	Bare wires/contacts		✓	
16	Breaker Capacity		✓	
17	Type	✓		
18	Connections	✓		
19	Age	✓		
20	Panel Board Capacity	✓		
21	Type	✓		
22	Connections	✓		
23	Age	✓		
24	Labelling		✓	
25	Earth Protection	✓		
26	Numbers	✓		
27	Type	✓		
28	Connections	✓		
29	Age	✓		
30	Grounding	✓		
31	Cracks		✓	
32	Multiple Joints		✓	
33	Leakage		✓	
34	Damage/Tamper		✓	
35	Ease of Access		✓	
36	Danger Signs	✓		
37	SLD	✓		
38	Nameplate	✓		

39	Cable Routing		✓	
40	Fault Tagging	✓		
41	Calibration	✓		
42	Labelling	✓		
43	Main Cut OFF	✓		
44	Double Insulation Portable Things		✓	

5. Service

Energy Service	Light	Cooling
Process	Lighting Room	Room Cooling
Equipment	Natural + Tubes	Fans
Control	No	No
O&M	No	No
Management	No	No

Chemistry

1. Atmosphere

SL No	Room	Temperature	Humidity	Noise
		Degree C	%	dB
1	Staff Room	30.4	56.2	52.4
2	Store	29.8	55.2	45.8
3	Phy/Chem	29	60.2	38.9
4	HOD	27.8	61/2	39.8
5	Lab-1	28.2	62.8	55.4
6	Lab-2	28.1	63.2	38.1
7	104	26.8	64.2	39.2
8	Lupin	26.5	66.9	38.3
9	Research Lab	26.9	67.3	38.4
10	101	26.7	64.6	45.7
11	102	26.5	65.1	35.6
12	Lab-1	26.6	65.8	54.5
13	Lab-2	26.5	66.3	55.6
14	Lab-3	26.4	65.2	49.9
15	Lab-4	26.3	67.6	51.2
16	Patpedhi	26.3	67.1	42.2

2. Ambience

SL No	Room	General		Window			Door		Walls			Rating	
		Color	Ventilation	Protection	Fitting	Filtration	Lock	Fitting	Insulation	Cracks	Opens	Score	Percentage
1	Staff Room	3	3	2	3	2	2	2	2	2	2	22	73.33
2	Store	3	3	2	2	2	2	2	2	2	2	23	76.67
3	Phy/Chem	3	3	2	3	2	2	2	2	2	2	24	80.00
4	HOD	3	3	2	2	3	3	2	2	2	2	23	76.67
5	Lab-1	3	3	2	2	2	3	2	2	2	2	24	80.00
6	Lab-2	3	3	2	3	2	3	2	2	2	2	23	76.67
7	104	3	3	2	2	3	2	2	2	2	2	24	80.00
8	Lupin	3	3	2	2	3	3	2	2	2	2	25	83.33
9	Research Lab	3	3	2	3	3	3	2	2	2	2	21	70.00
10	101	3	2	2	2	2	2	2	2	2	2	23	76.67
11	102	3	3	2	3	2	2	2	2	2	2	22	73.33
12	Lab-1	3	2	2	3	2	2	2	2	2	2	23	76.67
13	Lab-2	3	3	2	3	2	2	2	2	2	2	22	73.33
14	Lab-3	3	3	2	2	2	2	2	2	2	2	23	76.67
15	Lab-4	3	3	2	3	2	2	2	2	2	2	22	73.33
16	Patpedhi	3	3	2	2	2	2	2	2	2	2	22	73.33

3. Illumination

SL No	Illumination	Decorative	Limitation	Diffuser	Reflection	Insulation	Automization	Maintenance	SOP	Meter	Energy Recovery	Score	Percentage
1	258	3	2	2	2	2	1	1	1	1	1	16	53.33
2	275	3	2	2	2	2	1	1	1	1	1	16	53.33
3	122	3	2	2	2	2	1	1	1	1	1	16	53.33
4	112	3	2	2	2	2	1	1	1	1	1	16	53.33
5	80	3	2	2	2	2	1	1	1	1	1	16	53.33
6	87	3	3	2	2	2	1	1	1	1	1	17	56.67
7	92	3	2	2	2	2	1	1	1	1	1	16	53.33
8	166	3	2	2	2	2	1	1	1	1	1	16	53.33
9	87	3	3	2	2	2	1	1	1	1	1	17	56.67
10	425	3	2	2	2	2	1	1	1	1	1	16	53.33
11	268	3	2	2	2	2	1	1	1	1	1	16	53.33
12	780	3	2	2	2	2	1	1	1	1	1	16	53.33
13	32/1074	3	2	2	2	2	1	1	1	1	1	16	53.33
14	145	3	2	2	2	2	1	1	1	1	1	16	53.33
15	170	3	2	2	2	2	1	1	1	1	1	16	53.33
16	100	3	3	2	2	2	1	1	1	1	1	17	56.67

4. Safety

SL No	Factor	Critical	Appropriate	Not Applicable
1	Fire Extinguisher		✓	
2	Alarm		✓	
3	Public Address		✓	
4	Rodent Arrester	✓		
5	Access Control		✓	
6	CCTV	✓		
7	Cable/Wre Capacity		✓	
8	Type	✓		
9	Connections/Joints	✓		
10	Age	✓		
11	Insulation	✓		
12	Laying		✓	
13	Sockets		✓	
14	Multi-Plugging		✓	
15	Bare wires/contacts		✓	
16	Breaker Capacity		✓	
17	Type	✓		
18	Connections	✓		
19	Age	✓		
20	Panel Board Capacity	✓		
21	Type	✓		
22	Connections	✓		
23	Age	✓		
24	Labelling		✓	
25	Earth Protection	✓		
26	Numbers	✓		
27	Type	✓		
28	Connections	✓		
29	Age	✓		
30	Grounding	✓		
31	Cracks		✓	
32	Multiple Joints		✓	
33	Leakage		✓	
34	Damage/Tamper		✓	
35	Ease of Access		✓	
36	Danger Signs	✓		
37	SLD	✓		
38	Nameplate	✓		
39	Cable Routing		✓	

40	Fault Tagging	✓		
41	Calibration	✓		
42	Labelling	✓		
43	Main Cut OFF	✓		
44	Double Insulation Portable Things		✓	

5. Service

Energy Service	Light	Cooling
Process	Lighting Room	Room Cooling
Equipment	Natural + Tubes	Fans
Control	No	No
O&M	No	No
Management	No	No

Mangesh Tare Bhavan

1. Atmosphere

SL No	Room	Temperature	Humidity	Noise
		Degree C	%	dB
1	J1	28.6	61	38.8
2	J2	28.6	60.7	37.9
3	J3	28.5	61.4	38.9
4	J4	29.1	58.8	39.8

2. Ambience

SL No	Room	General		Window			Door		Walls			Rating	
		Color	Ventilation	Protection	Fitting	Filtration	Lock	Fitting	Insulation	Cracks	Opens	Score	Percentage
1	J1	3	2	1	1	1	2	1	1	2	1	15	50.00
2	J2	3	2	1	1	1	1	1	1	2	1	15	50.00
3	J3	3	2	1	1	1	2	1	1	2	1	15	50.00
4	J4	3	2	1	1	1	1	1	1	2	1	14	46.67

3. Illumination

SL No	Illumination	Decorative	Limitation	Diffuser	Reflection	Insulation	Automization	Maintenance	SOP	Meter	Energy Recovery	Score	Percentage
1	400	3	3	2	2	2	1	1	1	1	1	17	56.67
2	300	3	3	2	2	2	1	1	1	1	1	17	56.67
3	3000	3	3	2	2	2	1	1	1	1	1	17	56.67
4	500	3	3	2	2	2	1	1	1	1	1	17	56.67

4. Service

Energy Service	Light	Cooling
Process	Lighting Room	Room Cooling
Equipment	Natural + Tubes	Fans
Control	No	No
O&M	No	No
Management	No	No

5. Safety

SL No	Factor	Critical	Appropriate	Not Applicable
1	Fire Extinguisher		✓	
2	Alarm		✓	
3	Public Address		✓	
4	Rodent Arrester	✓		
5	Access Control		✓	
6	CCTV	✓		
7	Cable/Wre Capacity		✓	
8	Type	✓		
9	Connections/Joints	✓		
10	Age	✓		
11	Insulation	✓		
12	Laying		✓	
13	Sockets		✓	
14	Multi-Plugging		✓	
15	Bare wires/contacts		✓	
16	Breaker Capacity		✓	
17	Type	✓		
18	Connections	✓		
19	Age	✓		
20	Panel Board Capacity	✓		
21	Type	✓		
22	Connections	✓		
23	Age	✓		
24	Labelling		✓	
25	Earth Protection	✓		
26	Numbers	✓		
27	Type	✓		
28	Connections	✓		
29	Age	✓		
30	Grounding	✓		
31	Cracks		✓	
32	Multiple Joints		✓	
33	Leakage		✓	
34	Damage/Tamper		✓	
35	Ease of Access		✓	
36	Danger Signs	✓		
37	SLD	✓		
38	Nameplate	✓		

39	Cable Routing		✓	
40	Fault Tagging	✓		
41	Calibration	✓		
42	Labelling	✓		
43	Main Cut OFF	✓		
44	Double Insulation Portable Things		✓	

New Building

1. Atmosphere

SL No	Room	Temperature	Humidity	Noise
		Degree C	%	dB
1	N1	28.5	59.7	58.7
2	N2	28.2	60.7	52.4
3	N3	28.1	61.8	51.2
4	N4	28.2	60.8	59.2
5	N5	28.3	62	58.4
6	N6	28	62.2	58.3
7	N7	27.9	61.9	52.2
8	N8	28	61.1	54.5
9	N9	27.9	61.9	59.8
10	N10	27.8	62.9	58.9
11	N11	28	62.9	55.7
12	N12	28.2	61.8	55.8
13	N13	28	62.4	55.6
14	N14	28.2	62.3	55.4
15	N15	28.2	61.6	59.1
16	N16	28.6	61.8	58.1
17	N17	28.2	62.1	59.9
18	N18	28.4	61.3	58.1
19	N19	28.4	61.6	55.6
20	N20	28.4	61.4	55.2

2. Ambience

SL No	Room	General		Window			Door		Walls			Rating	
		Color	Ventilation	Protection	Fitting	Filtration	Lock	Fitting	Insulation	Cracks	Opens	Score	Percentage
1	N1	3	3	2	3	2	3	3	2	3	3	28	93.33
2	N2	3	3	3	3	2	3	3	2	3	3	28	93.33
3	N3	3	3	3	3	2	3	3	2	3	3	27	90.00
4	N4	3	3	2	3	2	3	3	2	3	3	28	93.33
5	N5	3	3	3	3	2	3	3	2	3	3	28	93.33
6	N6	3	3	3	3	2	3	3	2	3	3	28	93.33
7	N7	3	3	3	3	2	3	3	2	3	3	28	93.33
8	N8	3	3	2	3	3	3	3	2	3	3	28	93.33
9	N9	3	3	3	3	2	3	3	2	3	3	26	86.67
10	N10	3	2	2	3	2	3	3	2	3	3	28	93.33
11	N11	3	3	3	3	2	3	3	2	3	3	27	90.00
12	N12	3	2	3	3	2	3	3	2	3	3	28	93.33
13	N13	3	3	3	3	2	3	3	2	3	3	28	93.33
14	N14	3	3	3	3	2	3	3	2	3	3	27	90.00
15	N15	3	3	2	3	2	3	3	2	3	3	28	93.33
16	N16	3	3	3	3	2	3	3	2	3	3	28	93.33
17	N17	3	3	3	3	2	3	3	2	3	3	28	93.33
18	N18	3	3	3	3	2	3	3	2	3	3	27	90.00
19	N19	3	3	2	3	2	3	3	2	3	3	28	93.33
20	N20	3	3	3	3	2	3	3	2	3	3	28	93.33

3. Illumination

SL No	Illumination	Decorative	Limitation	Diffuser	Reflection	Insulation	Automization	Maintenance	SOP	Meter	Energy Recovery	Score	Percentage
1	64	3	2	2	2	2	1	1	1	1	3	18	60.00
2	87	3	2	2	2	2	1	1	1	1	3	18	60.00
3	96	3	2	2	2	2	1	1	1	1	3	18	60.00
4	41	3	2	2	2	2	1	1	1	1	3	18	60.00
5	62	3	2	2	2	2	1	1	1	1	3	18	60.00
6	151	3	3	2	2	2	1	1	1	1	3	19	63.33
7	66	3	2	2	2	2	1	1	1	1	3	18	60.00
8	65	3	2	2	2	2	1	1	1	1	3	18	60.00
9	78	3	3	2	2	2	1	1	1	1	3	19	63.33
10	60	3	2	2	2	2	1	1	1	1	3	18	60.00
11	48	3	2	2	2	2	1	1	1	1	3	18	60.00
12	88	3	2	2	2	2	1	1	1	1	3	18	60.00
13	77	3	2	2	2	2	1	1	1	1	3	18	60.00
14	82	3	2	2	2	2	1	1	1	1	3	18	60.00
15	136	3	2	2	2	2	1	1	1	1	3	18	60.00
16	99	3	3	2	2	2	1	1	1	1	3	19	63.33
17	84	3	3	2	2	2	1	1	1	1	3	19	63.33
18	96	3	3	2	2	2	1	1	1	1	3	19	63.33
19	89	3	3	2	2	2	1	1	1	1	3	19	63.33
20	92	3	3	2	2	2	1	1	1	1	3	19	63.33

4. Safety

SL No	Factor	Critical	Appropriate	Not Applicable
1	Fire Extinguisher		✓	
2	Alarm		✓	
3	Public Address		✓	
4	Rodent Arrester	✓		
5	Access Control		✓	
6	CCTV	✓		
7	Cable/Wre Capacity		✓	
8	Type	✓		
9	Connections/Joints	✓		
10	Age	✓		
11	Insulation	✓		
12	Laying		✓	
13	Sockets		✓	
14	Multi-Plugging		✓	
15	Bare wires/contacts		✓	
16	Breaker Capacity		✓	
17	Type	✓		
18	Connections	✓		
19	Age	✓		
20	Panel Board Capacity	✓		
21	Type	✓		
22	Connections	✓		
23	Age	✓		
24	Labelling		✓	
25	Earth Protection	✓		
26	Numbers	✓		
27	Type	✓		
28	Connections	✓		
29	Age	✓		
30	Grounding	✓		
31	Cracks		✓	
32	Multiple Joints		✓	
33	Leakage		✓	
34	Damage/Tamper		✓	
35	Ease of Access		✓	
36	Danger Signs	✓		
37	SLD	✓		
38	Nameplate	✓		
39	Cable Routing		✓	

40	Fault Tagging	✓		
41	Calibration	✓		
42	Labelling	✓		
43	Main Cut OFF	✓		
44	Double Insulation Portable Things		✓	

5. Service

Energy Service	Light	Cooling
Process	Lighting Room	Room Cooling
Equipment	Natural + Tubes	Fans
Control	No	No
O&M	No	No
Management	No	No

5. Process Audit

5.1. Manpower Details

Annexure-1

5.2. Operating Methodology

5.2.1. Product & services

Annexure-2

5.2.2. Process

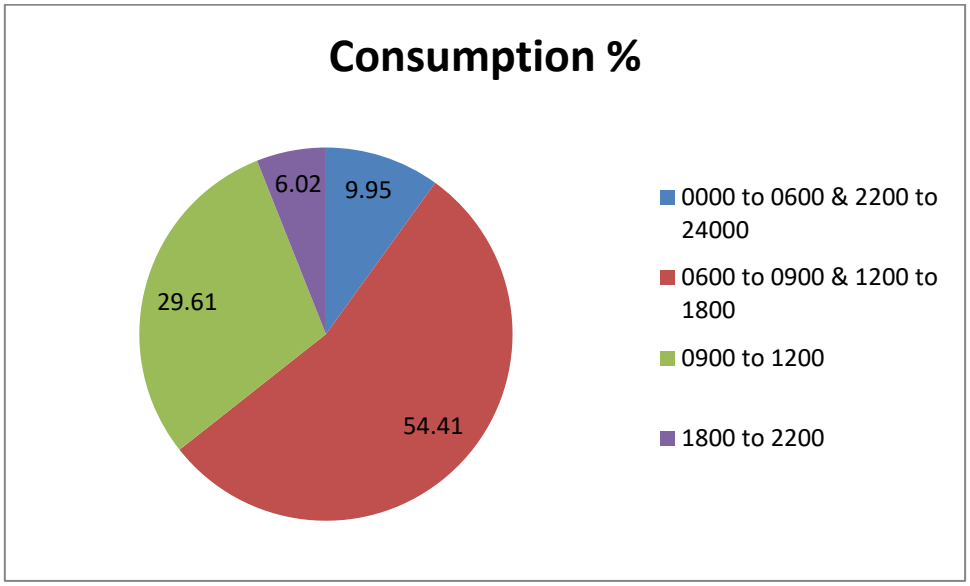
Annexure-2

5.3. Working Schedule

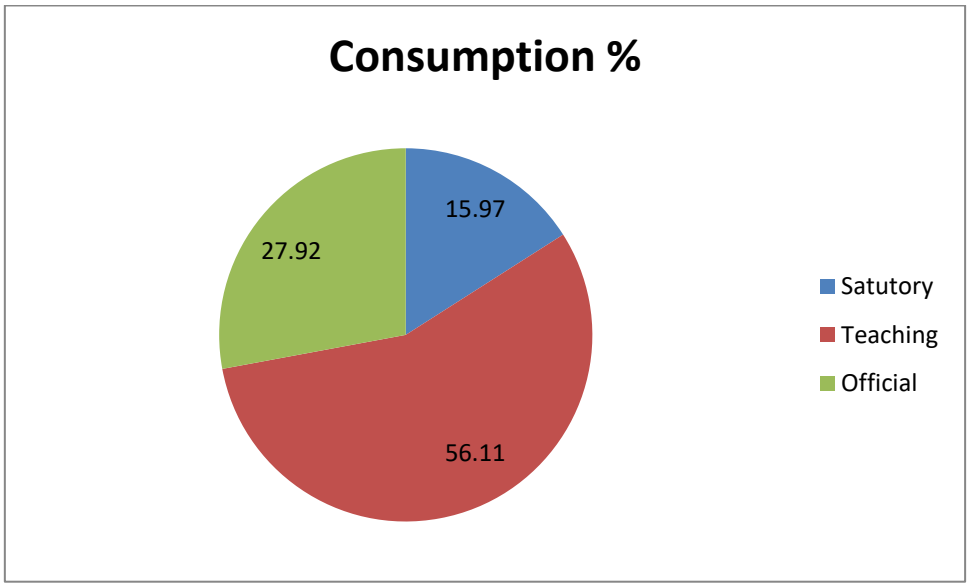
Annexure-3

5.4. Occupancy Study

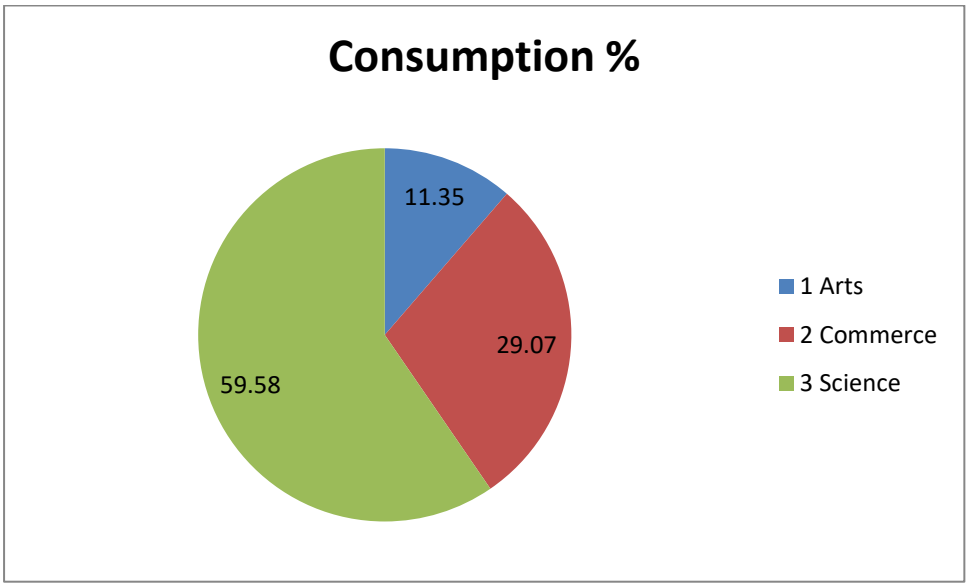
SL No	Time Frame	Consumption %
1	0000 to 0600 & 2200 to 24000	9.95
2	0600 to 0900 & 1200 to 1800	54.41
3	0900 to 1200	29.61
4	1800 to 2200	6.02



SL No	Expenses Head	Consumption
		%
1	Statutory	15.97
2	Teaching	56.11
3	Official	27.92



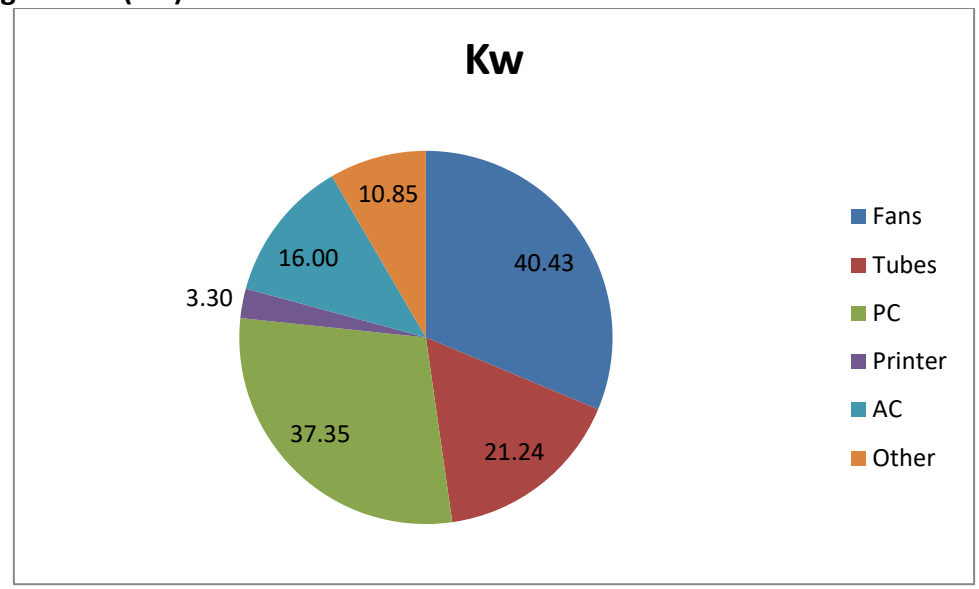
SL No	Expenses Head	Consumption
		%
1	Arts	11.35
2	Commerce	29.07
3	Science	59.58



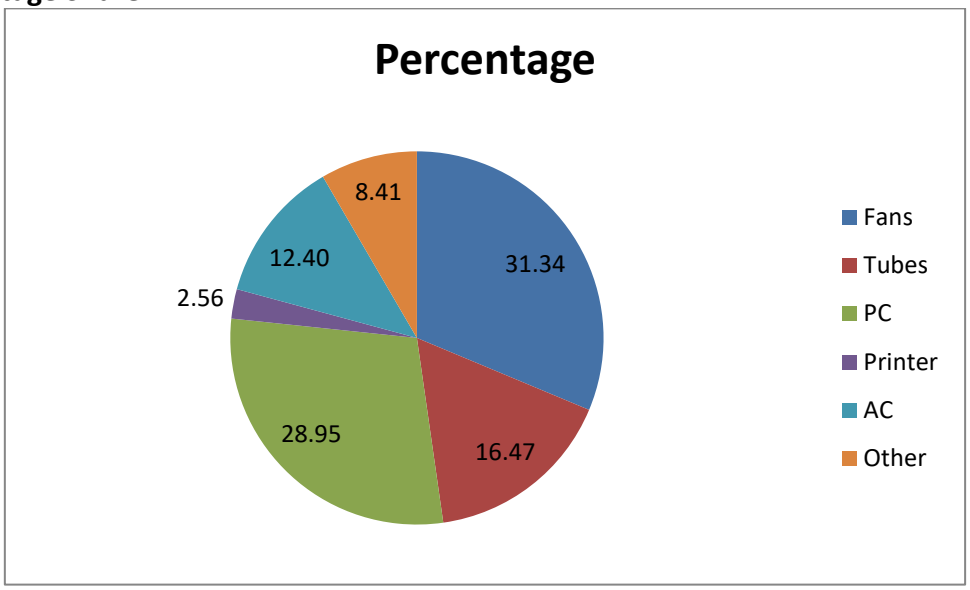
Load Balance

Name	Fans	Tubes	PC	Printer	AC	Other
Kw	40.43	21.24	37.35	3.30	16.00	10.85
Percentage	31.34	16.47	28.95	2.56	12.40	8.41

Wattage Share (Kw)



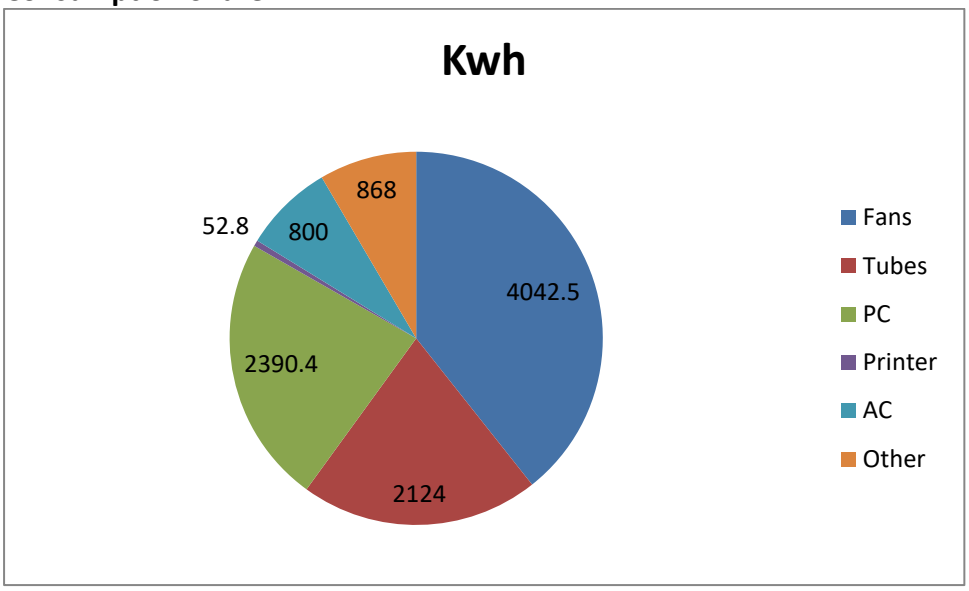
Percentage Share



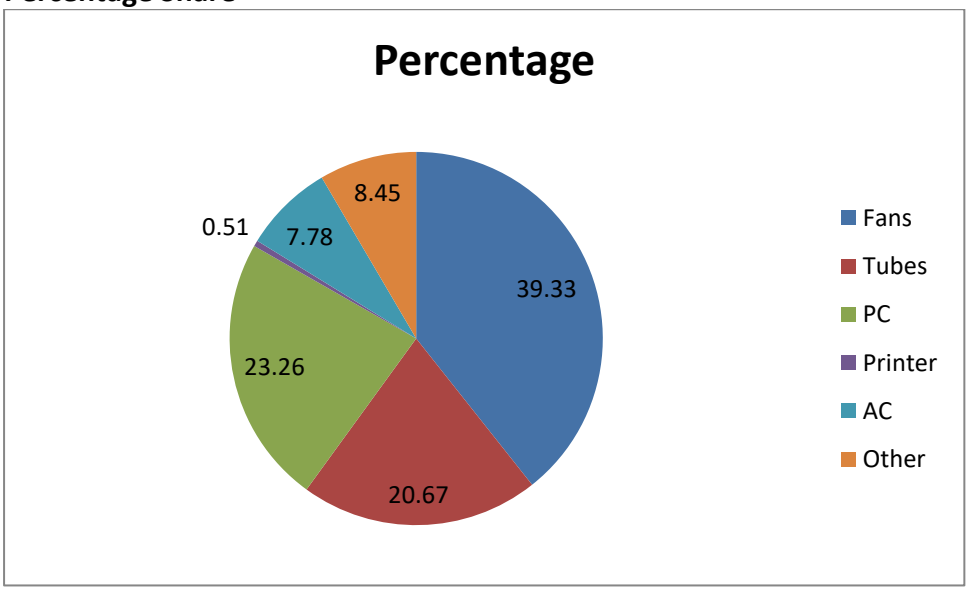
Consumption Balance

Name	Fans	Tubes	PC	Printer	AC	Other
Kwh	4042.5	2124	2390.4	52.8	800	868
Percentage	**39.33**	**20.67**	**23.26**	**0.51**	**7.78**	**8.45**

Consumption Share

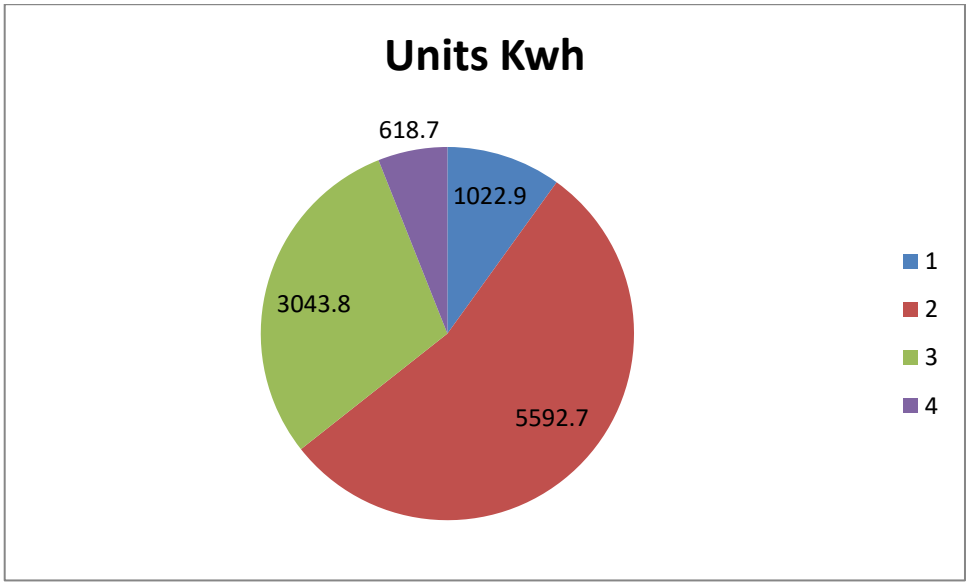


Percentage Share

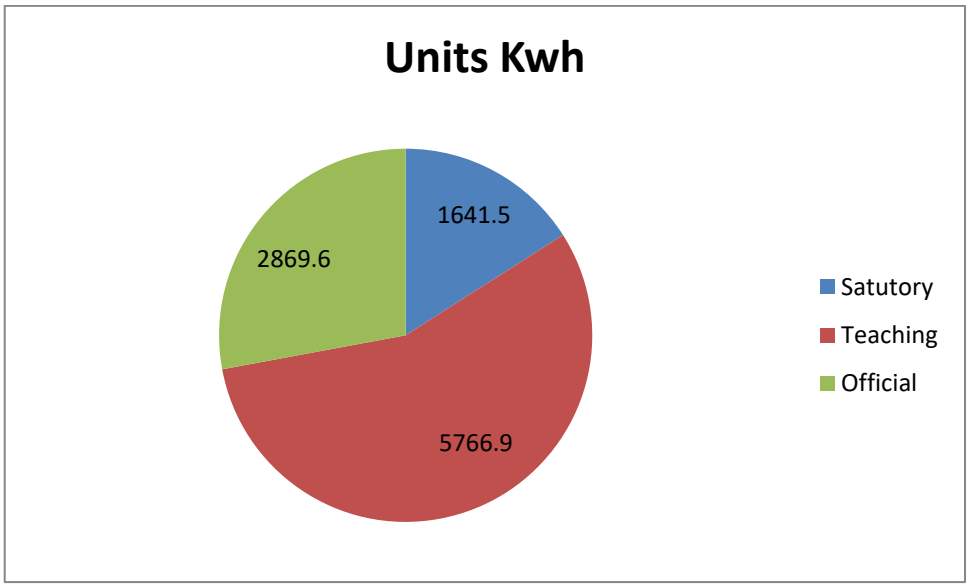


5.5. Specific Consumption

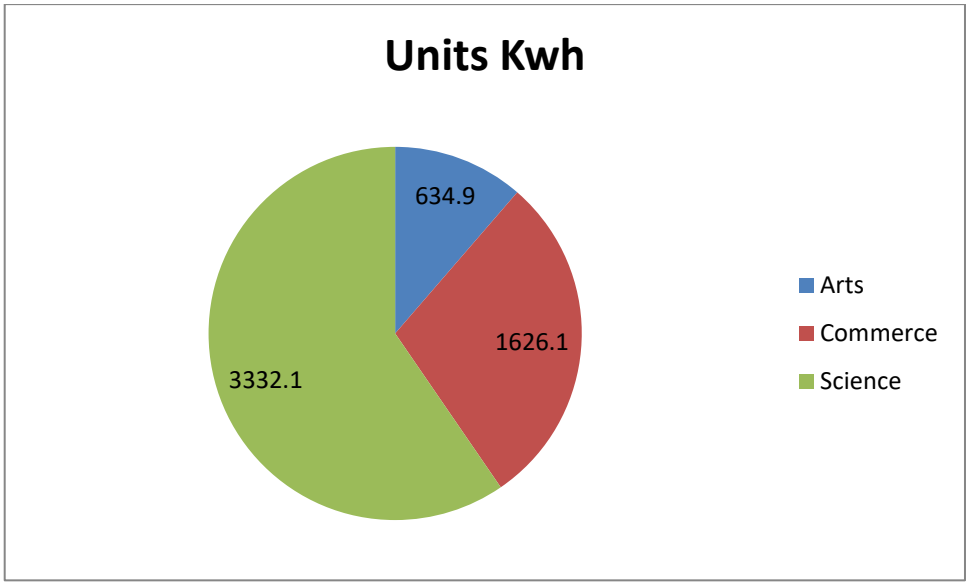
SL No	Time Frame	Consumption %	Units Kwh
1	0000 to 0600 & 2200 to 24000	9.95	1022.9
2	0600 to 0900 & 1200 to 1800	54.41	5592.7
3	0900 to 1200	29.61	3043.8
4	1800 to 2200	6.02	618.7



SL No	Expenses Head	Consumption	Units
		%	Kwh
1	Statutory	15.97	1641.5
2	Teaching	56.11	5766.9
3	Official	27.92	2869.6

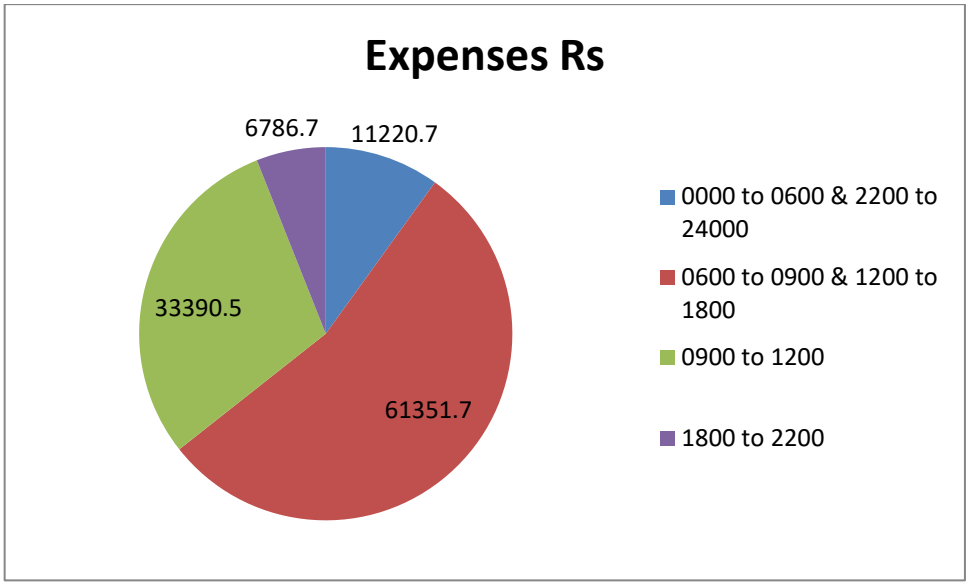


SL No	Expenses Head	Consumption	Units
		%	Kwh
1	Arts	11.35	634.9
2	Commerce	29.07	1626.1
3	Science	59.58	3332.1

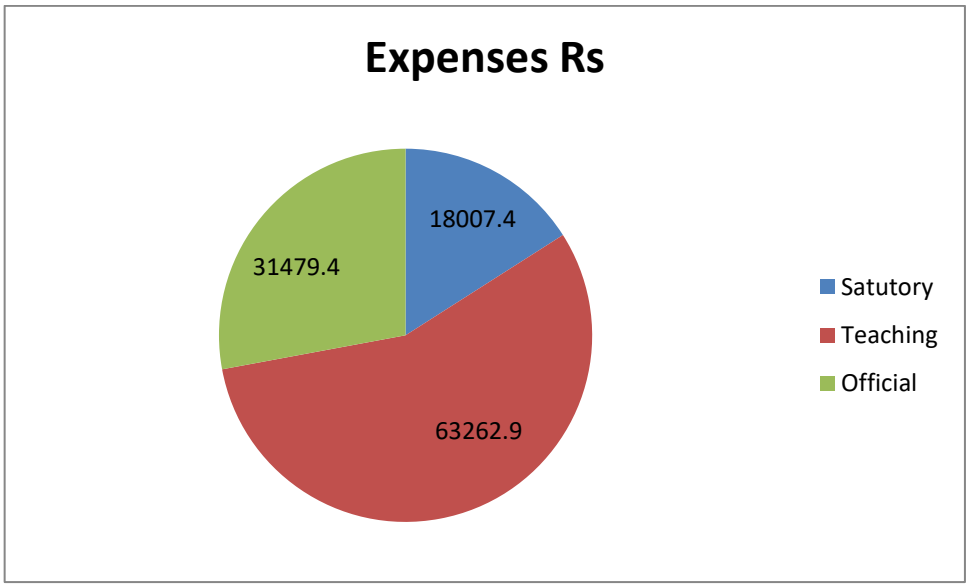


5.6. Specific Expenditure

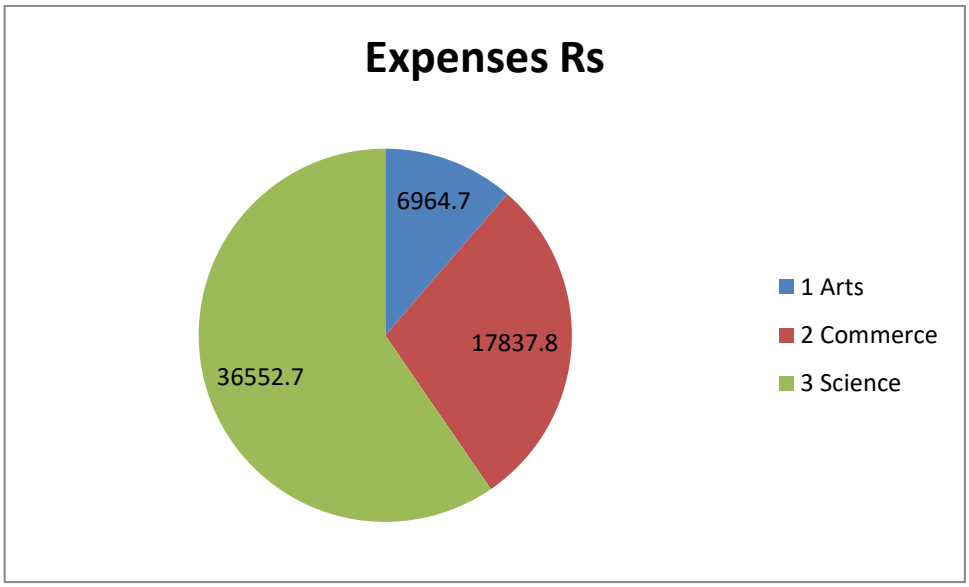
SL No	Time Frame	Expenses Rs
1	0000 to 0600 & 2200 to 24000	11220.7
2	0600 to 0900 & 1200 to 1800	61351.7
3	0900 to 1200	33390.5
4	1800 to 2200	6786.7



SL No	Expenses Head	Expenses
		Rs
1	Statutory	18007.4
2	Teaching	63262.9
3	Official	31479.4

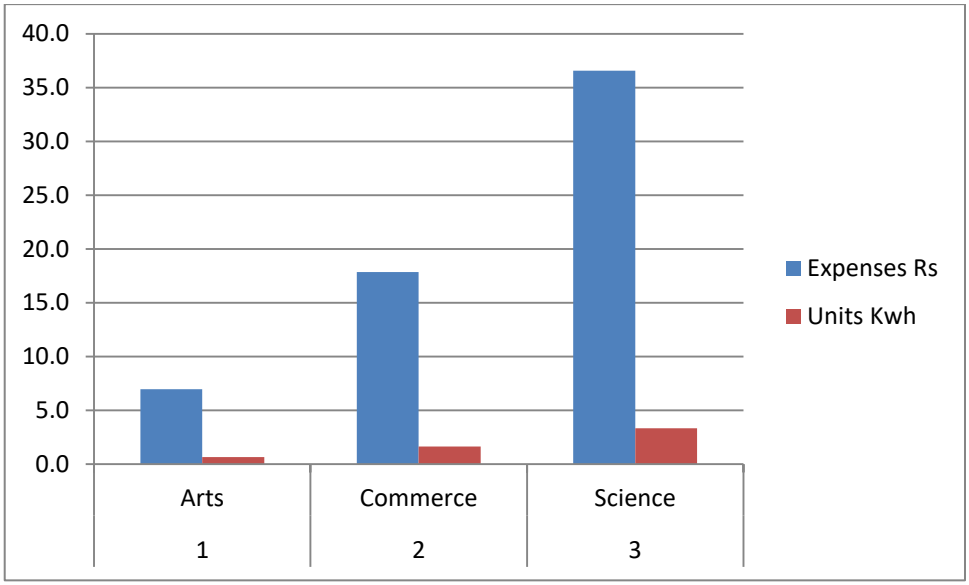


SL No	Expenses Head	Expenses
		Rs
1	Arts	6964.7
2	Commerce	17837.8
3	Science	36552.7



5.7. Expenditure Index

SL No	Expenses Head	Expenses	Units
		Rs	Kwh
1	Arts	7.0	0.6
2	Commerce	17.8	1.6
3	Science	36.6	3.3



5.8. Environmental Impact

Table-1 Specific

Environmental Impact Analysis Report		
Annual Consumption	123005	**KWh**
Annual Green- Impact		
Coal Burned	71618.4	Kg
Diesel Burned	37955.4	Ltr
Natural Gas Burned	1448146	Cub Ft
Trees Cut	3586.8	Nos
Water Consumed	258347.6	Ltr
Life Time Green- Impact		
Coal Burned	4118303	Kg
Diesel Burned	691164.6	Ltr
Natural Gas Burned	26370741.6	Cub Ft
Trees Cut	65317	Nos
Water Consumed	4704509.6	Ltr

Table-2 Area Basis

Environmental Impact Analysis Report		
Annual Consumption	123005	**KWh**
Annual Green- Impact		
Coal Burned	0.90	Kg
Diesel Burned	0.47	Ltr
Natural Gas Burned	18.10	Cub Ft
Trees Cut	0.04	Nos
Water Consumed	3.23	Ltr
Life Time Green- Impact		
Coal Burned	51.48	Kg
Diesel Burned	8.64	Ltr
Natural Gas Burned	329.63	Cub Ft
Trees Cut	0.82	Nos
Water Consumed	58.81	Ltr

Table-3 Footfall Basis

Environmental Impact Analysis Report		
Annual Consumption	123005	**KWh**
Annual Green- Impact		
Coal Burned	21.70	Kg
Diesel Burned	11.50	Ltr
Natural Gas Burned	438.83	Cub Ft
Trees Cut	1.09	Nos
Water Consumed	78.29	Ltr
Life Time Green- Impact		
Coal Burned	1247.97	Kg
Diesel Burned	209.44	Ltr
Natural Gas Burned	7991.13	Cub Ft
Trees Cut	19.79	Nos
Water Consumed	1425.61	Ltr

CO_2 Index

Head	General	Per Square Foot	Per Person
Per Year	78792	0.98	23.88
Lifetime (20Years)	1434622	17.93	434.73

6. Performance Audit

6.1. Power Quality Analysis

Refer Annexure-3

6.2. Motor Driven Systems

NA- Pumping of water done by central pumping system.

6.3. HVAC Systems

NA- Air conditions covered in Loads.

6.4. Compressed Air Systems

NA

6.5. Illumination and Lighting Systems

Please refer Illumination Table in Envelope Analysis column Light (Lux.)

Special Notes:

1. Values given in the table are average/work area.
2. Where ever the Lux is below 100; add extra lights, move work area near window, remove curtains.

6.6. Earthing and Grounding System

Separate New Earthings to be provided as

1. For each building 2 Nos.
2. For Each generator 2 Nos.
3. For Transformer 4 Nos.

Grounding of all metal bodies to be done with earthing of that building.

6.7. Thermography

Refer Annexure-4

7. Conservation Study

7.1. Efficiency and Wastage

7.1.1. Energy Procurement

1. Usage of Electrical energy is best procurement practice.
2. Study PQA report (annexure-1) for betterment of KVAr, PF, KF; it will be applicable when new policy of KVA billing is practiced by government.
3. Run DG set whenever it is acute necessary.
4. Run DG set between 60 to 80% of Loading.

7.1.2. Efficiency

1. Regular cleaning of equipments is suggested.
2. Develop a Standard Operating Procedure and implementation plan for cleaning.
3. Acquire AMC services for Air Conditioners, Computers and Printers.
4. Repair cracks and leakages; it will reduce humidity hence load of air-conditions.
5. Use 26^0 C temperature setting for Acs for maximum efficiency.
6. Install Load manager for critical conditions

7.1.3. Reuse/Recycle

1. No feasible opportunity found.

7.1.4. Fuel/Energy Substitution

1. NA

7.1.5. Use of Renewable Energy

1. Building has good open Terrace usage of SOLAR GCRT system.
2. As per regulations, 40% of Transformer capacity system can be installed; i.e. 40Kwp.
3. This will reduce bills by 50%.

7.1.6. Use of Natural resources

1. Use Natural sunlight by keeping curtains opened will save daytime luminary usage and provide adequate light.

7.1.7. Technology Upgrade

1. Use 20W LED lights for better lighting.
2. Use BLDC Fans to replace existing fans.

7.2. Safety

1. Replace Old SFU with Adequate size of circuit breakers.
2. Replace and reconnect old wirings.
3. Provide New Maintenance free earthing pits for each building, Transformer and DG-SETs.
4. Connect all metal bodies with earthing (Ground).
5. Tighten cable joints.
6. Keep meter cabin cleaned and do not keep any material in it.
7. Install exhaust fans in meter cabins to avoid heating.

8. Disclaimer

The report is generated from data, information, answer to asked questions, standards and procedures defined by different and concerned authorities time to time, available site condition, weather condition, operational and availability conditions provided by beneficiary on the day of survey. If any changes on above said measures on any other parameters affecting these measures may lead to change, alter, in-corrections even falsifying calculations, results, recommendations and suggestions. The values, figures, amounts mentioned are indicative to the site situation and condition; it may not reflect each and every aspect of it. The report is generated restricted to given scope and available conditions and measures.

9. Conclusion

We hereby conclude report for “Energy Audit” of the Work done under scope of WORK ORDER given by your office vide above Reference number; for work: “Energy Audit of Sonopant Dandekar College Buildings, SDSM, Tal. Palghar, Dist. palghar, 401404”. Please study it thoroughly and implement recommendations and suggestions at earliest.

10. Lexicon

Symbol	Abbreviation
A	Ampere
V	Volts
KV	Kilo volts
KVA	Kilo volt ampere
KVAR	Kilo volt ampere reactive
KW	Kilo watts
MD	Maximum demand
%THD	Percentage Total harmonic distortion
% THDv	Percentage voltage Total harmonic distortion
% THDi	Percentage current Total harmonic distortion
% TIHDv	Percentage voltage Total inter harmonic distortion
% TIHDi	Percentage current Total inter harmonic distortion
Voltage sag	Reduction in RMS voltage from 90% to 10% for the time period from 10 msec. to 1 min.
Voltage swell	Increase in RMS voltage from 110% to 180% for the time period from 10 msec. to 1 min.
Transient	Sudden non-power frequency change in the voltage or current from steady state.
%Vunb	Percentage voltage unbalance factor
%Iunb	Percentage current unbalance factor
KF	Crest factor
%U2, U3,……..,U50	Percentage individual voltage harmonics from 2 orders to 50 orders
%I2,I3,……..,I50	Percentage individual current harmonics from 2 orders to 50 orders
Max.val.	Maximum value of the parameter over the measurement period
Avg. val.	Average value of the parameter over the measurement period
Min.val.	Minimum value of the parameter over the measurement period