



**Shivajirao Kadam Institute of Technology
& Management, Tillore Khurd, Indore
(M.P.)
Academic Year 2020-21**



Energy Audit Consultation Report



Shivajirao Kadam Institute of Technology & Management Near Ralamandal Sanctuary, Tillore Khurd, Indore (M.P.)

PREPARED BY

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(Academic Year 2020-21)



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ACKNOWLEDGEMENT

Empirical Exergy Private Limited (EEPL), Indore takes this opportunity to appreciate & thank the management of **Shivajirao Kadam Institute of Technology & Management Near Ralamandal Sanctuary, Tillore Khurd, Indore (M.P.)** for giving us an opportunity to conduct energy audit for the college.

We are indeed touched by the helpful attitude and co-operation of all faculties and technical staff, who rendered their valuable assistance and co-operation the course of study.



Rajesh Kumar Singadiya

(Director)

M.Tech (Energy Management), PhD
(Research Scholar) Accredited
Energy Auditor [AEA-0284]
Certified Energy Auditor
[CEA-7271] (BEE, Ministry of
Power, Govt. of India)

Empanelled Energy Auditor with MPUVN,
Bhopal M.P. Lead Auditor ISO50001:2011
[EnMS) from FICCI, Delhi Certified Water
Auditor (NPC, Govt of India)


Chartered Engineer [M-1699118], The Institution of Engineers (India)
Member of ISHRAE [5815]



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Certificate of Accreditation



BUREAU OF ENERGY EFFICIENCY

Examination Registration No.: **EA-7271**

Accreditation Registration No.: **AEA-284**



Certificate of Accreditation

This is to certify that Mr./Ms. **Shri. Rajesh Kumar Singadiya** having its trade/registered office at has been given accreditation as accredited energy auditor. The certificate shall be effective from **9th** day of **May, 2018**


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

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

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

Your name has been entered at AEA No. **284** in the register of list of accredited energy auditors. Your name shall be liable to be struck out on the grounds specified in regulation 8 of the Bureau of Energy Efficiency (Qualifications for Accredited Energy Auditors and Maintenance of their List) Regulations, 2010.

Given under the seal of the Bureau of Energy Efficiency, Ministry of Power, this **5th** day of **October, 2018**


Secretary,
Bureau of Energy Efficiency
New Delhi



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Green Monitoring Committee



Transnational Knowledge Society's
Shivajirao Kadam Institute of Technology and Management
Skill. Innovation. Transformation

(Approved by AICTE, New Delhi. Affiliated to RGPV, Bhopal and DAVV, Indore. Recognized by DTE, Bhopal, Govt. of Madhya Pradesh)
An ISO 9001:2015 Certified Institute

SKITM/PRI./2021-22/08

DATE 23/08/2021

Green Monitoring Committee

S. No.	Name of Members	Designation	Mobile No.	Email-id
1	Dr. Sanjay T. Purkar	Director	9301223688	sanjaypurkar@skitm.in
2	AVM Praveen Kumar	Dean Student Affairs	9424008366	praveenkumar@skitm.in


Dr. Sanjay T. Purkar

Director

Director
Shivajirao Kadam Inst. of Tech
& MGMT- Technical Campus
INDORE (M.P.)



Audit Team

The study team constituted of the following senior technical executives from **Empirical Exergy Private Limited,**

- ✚ **Mr. Rakesh Pathak,** [Director & Electrical Expert]
- ✚ **Mr. Rajesh Kumar Singadiya** [Director & Accredited Energy Auditor AEA-0284]
- ✚ **Mrs. Laxmi Raikwar Singadiya** [Energy & Chemical Engineer]
- ✚ **Mr. Sachin Kumawat** [Sr. Project Engineer]
- ✚ **Mr. Ajay Nahra** [Engineer]
- ✚ **Mr. Charchit Pathak** [Mechanical Engineer]
- ✚ **Mr. Aakash Kumawat** [Assistant Jr. Engineer]



EXECUTIVE SUMMARY

The executive summary of the energy audit report furnished in this section briefly gives the identified energy conservation measures and other recommendation during the project that can be implemented in a phased manner to conserve energy, increase productivity inside the College campus.

RECOMMENDATION: -

+ *Ceiling Fan*

Replacement of “conventional ceiling fan (75 Watt)” by energy efficient star rated fan or BLDC based energy efficient fan (28 Watt) in class rooms, laboratories and faculties cabin” have great potential for energy saving .

+ *Lighting System*

- Replacement of “conventional tube light (54 Watt)” by energy efficient 20Watt LED lighting efficient class rooms, laboratories and faculties cabin” have great potential for energy saving 29580kWh/year.
- Replacement of CFL (18 Watt) by energy efficient 12 Watt LED lighting efficient have great potential for energy saving 180 kWh/year.
- Replacement of Metal halide 400 Watt by energy efficient 200 Watt LED flood light potential for energy saving 7920kWh/year.

+ *ENERGY MANAGEMENT WORKSHOP AND TRAINING*

Conduct awareness and training programs for faculty, student and non-teaching staffs.
Conduct seminars, workshops and exhibitions on energy management education



CHAPTER-1 INTRODUCTION

1.1 About College

Shivajirao Kadam Institute of Technology and Management (SKITM) was founded in the year 2019, with its first intake as SKITM in 2020, after taking over the Erstwhile Acropolis Technical Campus. SKITM is under the aegis of Transnational Knowledge Society, which was founded in the year 2008. Under the visionary leadership of renowned academican Prof. Shivajirao Kadam, the institution aims to transform the lives of its students and establish itself as the center of excellence in the state of Madhya Pradesh. The institute works on three key principles – Skill, Innovate and Transform. Our unique methodology distinguishes us from the rest of the institutions. We are highly focused on practical aspects of education, we aim to make our students ready to take up the real world challenges which the industry poses at them. We currently have 4 schools which offer B.TECH (CSE, MECH, CIVIL, EC), B.COM, BBA, Integrated BBA-MBA, B.Pharma, MBA as well as Diploma in Mechanical, Civil and Pharmacy. With the unrivalled leadership and the guidance of our Mentors, SKITM is changing the design and nature of education. SKITM will be recognized for the impact its teachings will have on its students and the community at large. Our Extensive Training Sessions, Unique Teaching Methodology, Strong Collaborations, Impactful Certifications and Partnerships make us the up and coming institute in Central India.

Vision

Holistic development of the learner through excellence in education, innovation & research.

Mission

1. To create competitive and technically empowered environment which enable students to develop and discover their potential and become competent to address industrial, societal and global challenges.



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2. To achieve academic excellence in application-oriented research, novelty and creativity leading to emergence of technocrats, leaders, innovators and renowned entrepreneurs.
3. To become a top school in country where students are raised with Holistic learning for inculcating core values of professionalism, gender equality, transparency and ethics.
4. To establish partnership with globally recognized institutions and organizations to foster students with industrial exposure through extensive hands-on training.
5. To ensure overall nurturing and all-round personality development of students by continues monitoring and guidance.



1.2 About Energy Audit

Energy audit helps to understand more about the ways energy is used in any plant and helps in identifying areas where waste may occur and scope for improvement exists. The overall energy efficiency from generation to final consumer becomes 50%.

Energy audit is the most efficient way to identify the strength and weakness of energy management practices and to find a way to solve problems. Energy audit is a professional approach in utilizing economic, financial, and social and natural resources responsibility. Energy audits “adds value” to management control and is a way of evaluating the system.

Empirical Exergy Private Limited (EEPL), Indore M.P. carried out the “Energy Audit” at the site to find gaps in the energy consumption pattern for **Shivajirao Kadam Institute of Technology & Management** technical report is prepared as per the need and the requirement of the project.

1.3 Objectives of Energy Audit

An energy audit provides vital information base for overall energy conservation program covering essentially energy utilization analysis and evaluation of energy conservation measures. It aims at:

- Identifying the quality and cost of various energy inputs.
- Assessing present pattern of energy consumption in different cost centers of operations.
- Relating energy inputs and production output.
- Identifying potential areas of thermal and electrical energy economy.
- Highlighting wastage in major areas.
- Fixing of energy saving potential targets for individual cost centers.
- Implementation of measures for energy conservation & realization of savings.



1.4 Methodology

Methodology adopted for achieving the desired objectives viz.: Assessment of the current operational status and energy savings include the following:

- ✚ Discussions with the concerned officials for identification of major areas of focus and other related systems.
- ✚ Team of engineers visited the site and had discussions with the concerned officials / supervisors to collect data / information on the operations and load distribution within the plant and same for the overall premises. The data was analyzed to arrive at a base line energy consumption pattern.
- ✚ Measurements and monitoring with the help of appropriate instruments including continuous and / or time-lapse recording, as appropriate and visual observations were made to identify the energy usage pattern and losses in the system.
- ✚ Trend analysis of costs and consumptions.
- ✚ Capacity and efficiency test of major utility equipment's, wherever applicable.
- ✚ Estimation of various losses
- ✚ Computation and **in-depth analysis** of the collected data, including utilization of computerized analysis and other techniques as appropriate were done to draw inferences and to evolve suitable energy conservation plan/s for improvements/reduction in specific energy consumption.

1.5 Present Energy Scenario

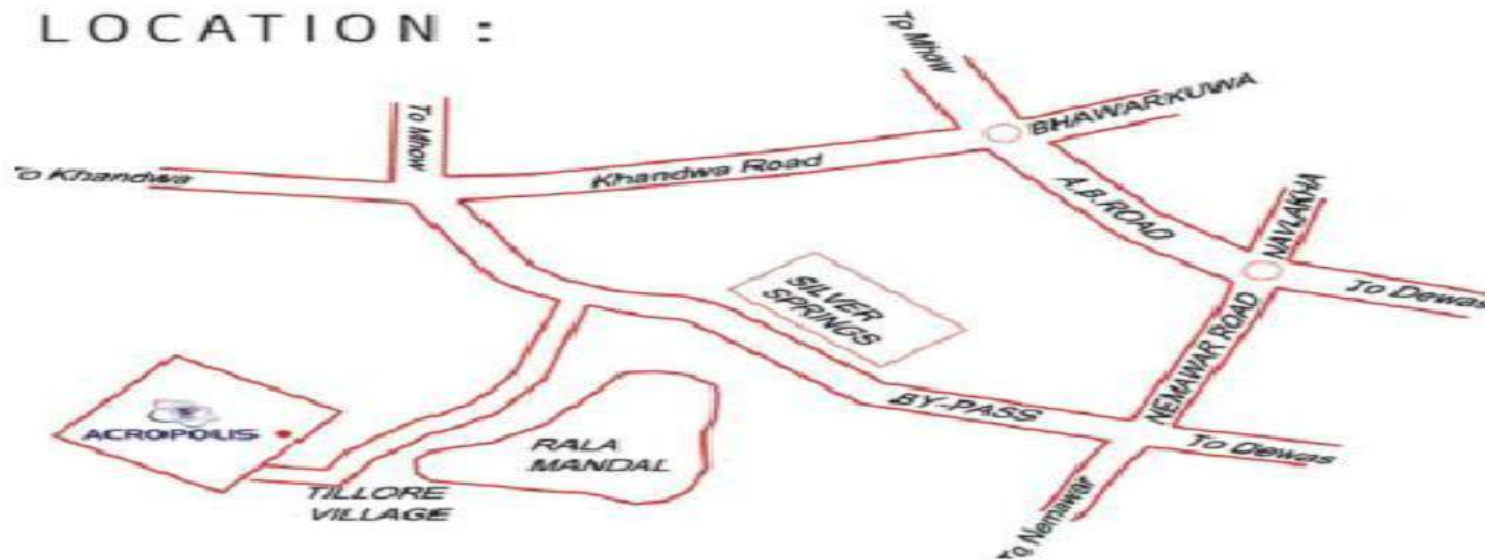
- ✚ College uses energy in the form of electricity purchased from MPPKVCL grid. The college has non industrial 33 KV feeder with contract demand 100 KVA. As per applicable tariff HV-3.2.B non-industrial 33 KV feeder fixed charges is Rs. 460/- per KVA and energy charges Rs. 7.1 per unit.
- ✚ Total billing amount of Shivajirao Kadam Institute of Technology & Management of college is INR 14,84,378/- with respect to annual energy consumption 1,12,332 unit analysis period from Jul-2020 to Jun-2021. Annual Average per unit charges paid by college is Rs.13.31 per unit.



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Satellite Map



Longitude & Latitude : 75° 50' E & 22° 44' N



CHAPTER-02

POWER SUPPLY SYSTEM

2.1 Power Supply System

The power supply for the Shivajirao Kadam Institute of Technology & Management is from MPPKVCL with the help of 33 kV feeder under tariff HV-3.2.B Non-Industrial. There is a transformer has capacity 200 KVA. Detail of the transformer is given in table 2.1

Sr. No.	Items	Technical specification	Unit
1	Make	Sterling	
2	Year	2010	
3	Rating	200	KVA
4	Voltage (HV/LV)	33000/433	V
5	Current (HV/LV)	3.5/266.67	Amp
6	Frequency	50	Hz
7	Impedance	4	%
8	Vector Group	Dy11	
9	Type of cooling	ONAN	
10	Total no. of Tap	5	No.
11	Ideal Tap Position	3	



Fig. 2.1 - Transformer in college



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2.2 Loading of transformer: The load of the transformer is calculated based on maximum demand appear in electricity bill.

Sr. No.	Month & Year	Capacity of the TR (KVA)	MD(KVA)	Loading (%)
1	Jul-20	200	50	25
2	Aug-20	200	55	27.5
3	Sep-20	200	67	33.5
4	Oct-20	200	64	32
5	Nov-20	200	34	17
6	Dec-20	200	30	15
7	Jan-21	200	40	20
8	Feb-21	200	34	17
9	Mar-21	200	59	29.5
10	Apr-21	200	49	24.5
11	May-21	200	28	14

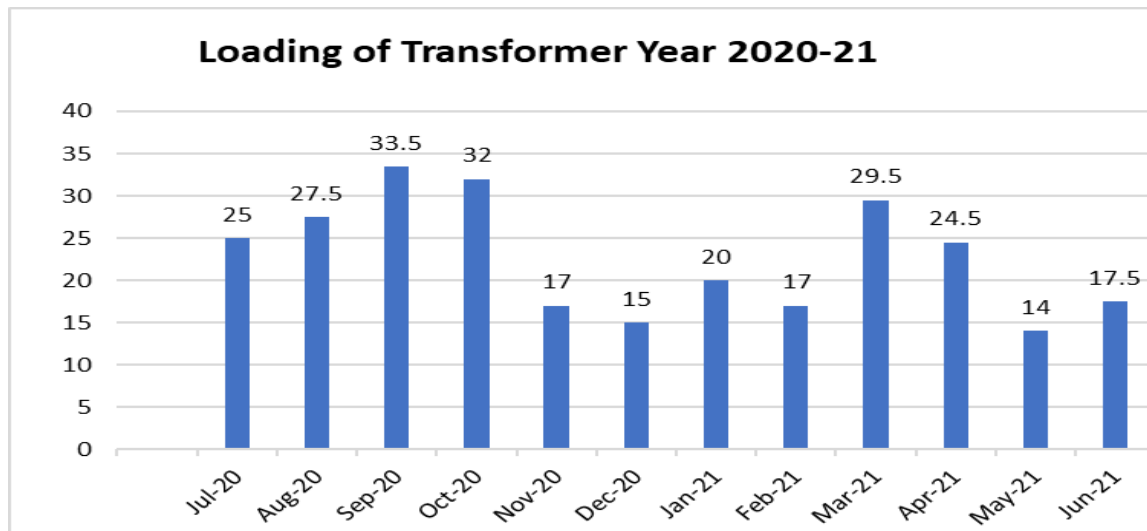


Fig. 2.2- Loading of the transformer Year-2020-21 of Shivajirao Kadam Institute of Technology & Management



2.3 DG Set

There is DG set in college campus. Detailed of the DG set are given table

Table 2.2 Technical specifications for DG set

Sr. No.	Parameter	Technical specification	Units
1	Make	Stanford	
2	Sr. No.	N156278738	
3	Capacity	160	KVA
4	Rated Voltage	415	Volt
5	Full load current	222.6	Amp.
6	Frequency	50	Hz.
7	Power factor	0.8	
8	Speed	1500	RPM
9	Phase	3	





CHAPTER- 3 ELECTRICITY BILL ANALYSIS

3.1 Monthly Electrical Energy Consumption 2020-21

The monthly unit consumption given in table

Table 3.1 Energy consumption and billing amount (the year 2020-21)

Sr. No.	Month & Year	Unit Consumption (kWh)	Energy Charge (Rs/)	Energy Charges (Rs./kWh)
1	Jul-20	9,747	1,12,090	11.5
2	Aug-20	9,348	1,07,722	11.52
3	Sep-20	9,945	1,19,470	12.01
4	Oct-20	10,494	1,42,528	13.58
5	Nov-20	10,401	1,40,233	13.48
6	Dec-20	9,531	1,35,230	14.19
7	Jan-21	9,327	1,36,240	14.61
8	Feb-21	10,083	1,41,886	14.07
9	Mar-21	10,980	1,49,434	13.61
10	Apr-21	9,678	1,16,944	12.08
11	May-21	7,614	1,00,629	13.22
12	Jun-21	5,184	81,972	15.81
	Total	1,12,332	14,84,378	13.31

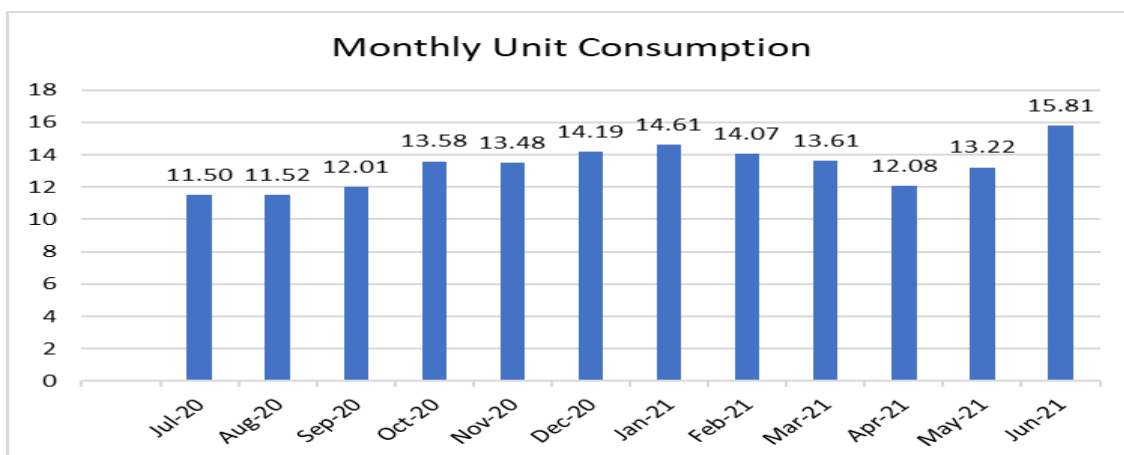


Fig. 3.1- Monthly Unit Consumption Year-2020-21 of Shivajirao Kadam Institute of Technology & Management

Observation - Annual energy consumption of Shivajirao Kadam Institute of Technology & Management is 112332 units and per unit charges is 13.31.



3.2 Monthly demand analysis (2020-21).

The monthly demand consumption for the college is given in the table.

Table 3.2:- Monthly demand analysis (KVA) consumption pattern year 2020-21

Sr. No.	Month & Year	Contract Demand (kVA)	Billing Demand (kVA)	Maximum Demand (kVA)
1	Jul-20	100	50	90
2	Aug-20	100	55	90
3	Sep-20	100	67	90
4	Oct-20	100	64	90
5	Nov-20	100	34	90
6	Dec-20	100	34	90
7	Jan-21	100	40	90
8	Feb-21	100	34	90
9	Mar-21	100	59	90
10	Apr-21	100	49	90
11	May-21	100	28	90
12	Jun-21	100	35	90

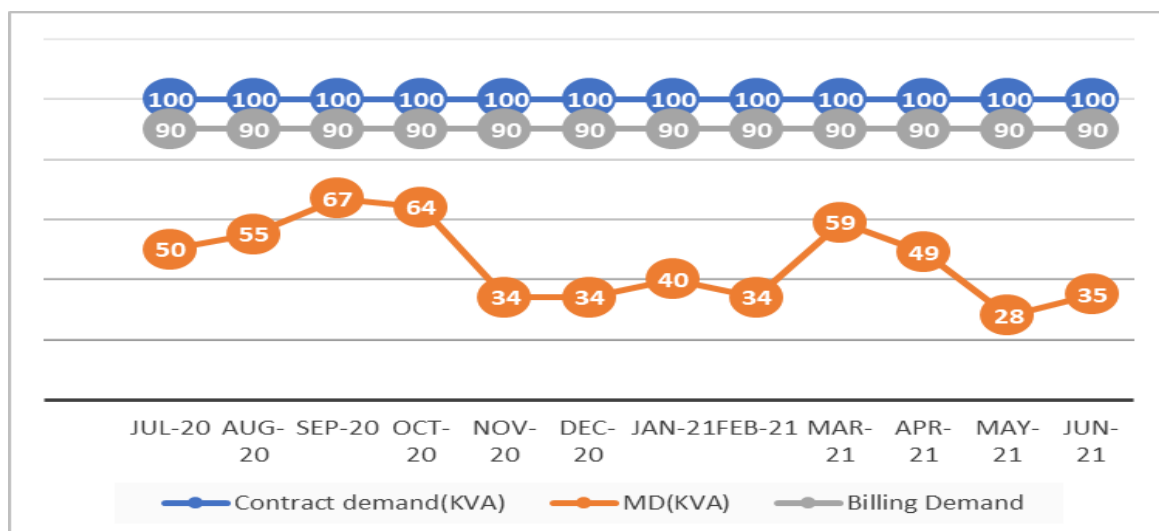


Fig. 3.2- Monthly Billing Demand Analysis Year-2020-21 of Shivajirao Kadam Institute of Technology & Management

Observation - Annual Billing Demand of Shivajirao Kadam Institute of Technology & Management is 549 KVA



3.3 Monthly Power factor analysis Year 2020-21

The monthly power factor for the college is given in the following table.

Table 3.3:- Power factor of the college year 2020-21.

Sr. No.	Month & Year	Power Factor	P.F. Incentive%	P.F. Incentive(Rs.)
1	Jul-20	0.982	5	3490
2	Aug-20	0.984	5	3450
3	Sep-20	0.985	5	3595.12
4	Oct-20	0.989	5	3783.09
5	Nov-20	0.991	7	5249.38
6	Dec-20	0.989	5	3435.93
7	Jan-21	0.984	5	3432.49
8	Feb-21	0.977	3	2229.35
9	Mar-21	0.985	5	4046.13
10	Apr-21	0.981	5	3513.11
11	May-21	0.968	2	1105.55
12	Jun-21	0.969	2	752.72

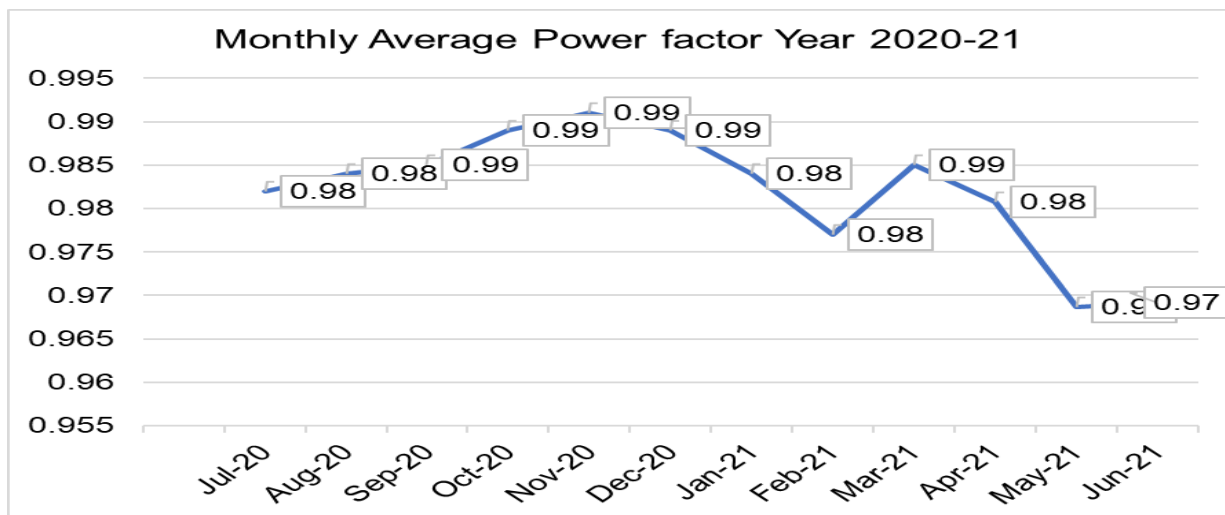


Fig. 3.3- Monthly Average Power Factor Analysis Year-2020-21 of Shivajirao Kadam Institute of Technology & Management

Observation- Annual Power Factor of Shivajirao Kadam Institute of Technology & Management is Average P.F. incentive 4.5% and Average P.F Incentive is 3173. for the year 2020-21.



3.4 Monthly Peak period unit consumption and Off. Peak period unit consumption analysis (Year 2020-21)

The monthly Peak period and Off. Peak Period consumption for the college is given in the following table.

Table 3.4:- Peak Period and Off. Peak Period of the college year 2020-21.

Sr. No.	Month& Year	Total Unit	Peak Period Unit	Off. Peak Period Unit
1	Jul-20	9,747	1,267	2,436
2	Aug-20	9,348	1,295	2,430
3	Sep-20	9,945	1,392	2,649
4	Oct-20	10,494	1,592	2,754
5	Nov-20	10,401	1,725	2,877
6	Dec-20	9,531	1,584	2,610
7	Jan-21	9,327	1,524	2,406
8	Feb-21	10,083	1,767	2,487
9	Mar-21	10,980	1,677	2,469
10	Apr-21	9,678	1,770	2,580
11	May-21	7,614	1,656	2,454
12	Jun-21	5,184	1,119	1,623

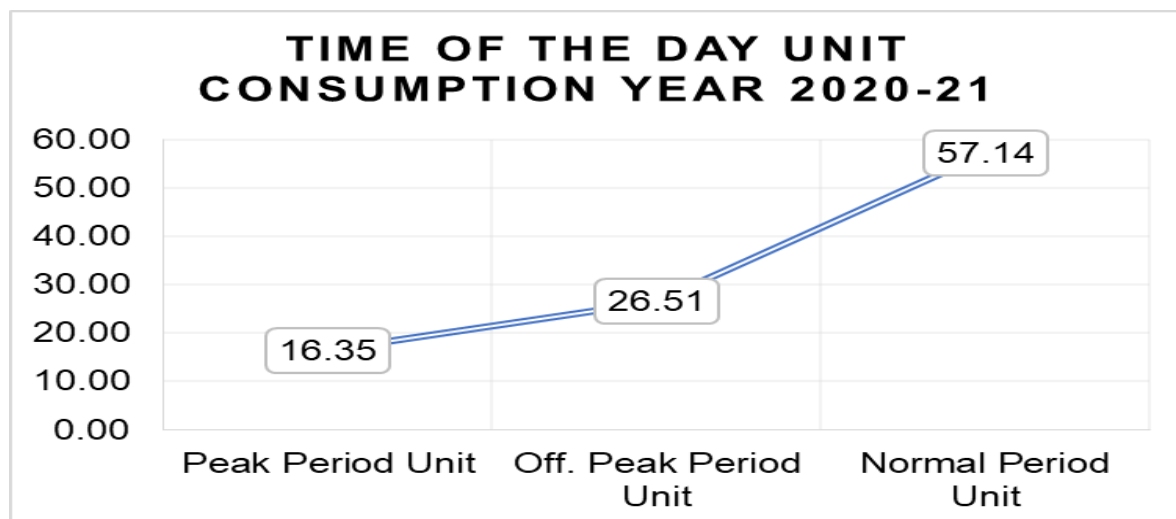


Fig. 3.4: - Time of the day unit consumption year-2020-21 of Shivajirao Kadam Institute of Technology & Management

Observation-The Average Peak Period Unit 16.5%, Off. Peak Period Unit 26.51%, Normal Period Unit 57.14% for the year 2020-21.



3.5 Monthly Average Load Factor analysis (Year 2020-21)

The monthly Avg. Load Factor for the college is given in the following table.

Table 3.4:- Avg. Load Factor of the college year 2020-21.

Sr. No.	Month & Year	Avg. Load factor(%)
1	Jul-20	10.00
2	Aug-20	12.00
3	Sep-20	13.00
4	Oct-20	14.00
5	Nov-20	14.00
6	Dec-20	13.00
7	Jan-21	12.00
8	Feb-21	13.00
9	Mar-21	16.00
10	Apr-21	13.00
11	May-21	10.00
12	Jun-21	7.00

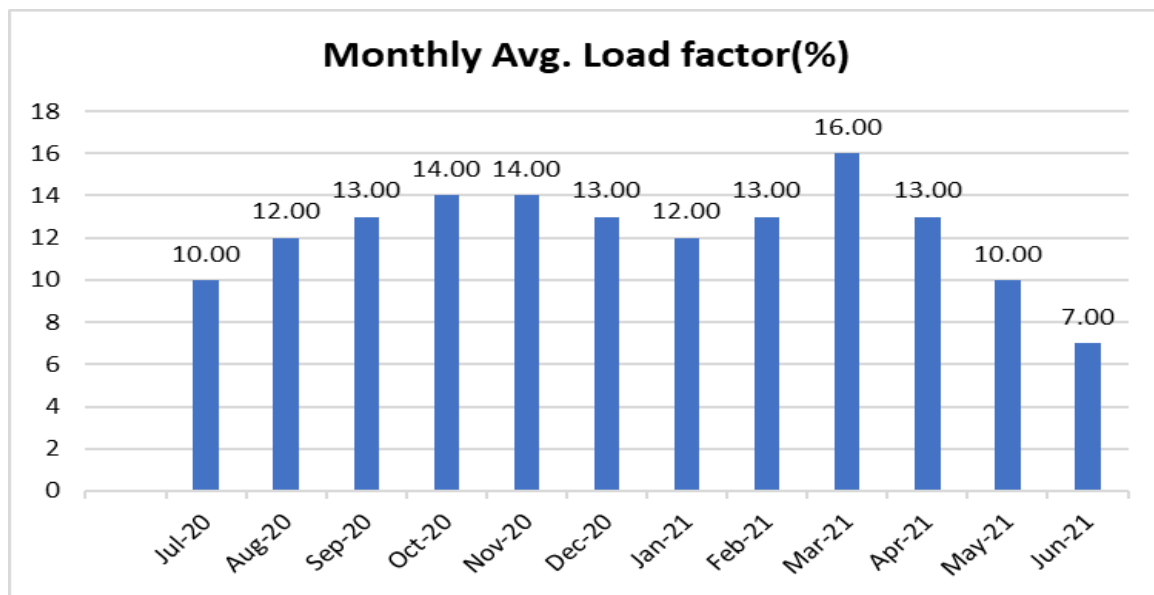


Fig. 3.4: - Monthly Avg. Load Factor year-2020-21 of Shivajirao Kadam Institute of Technology & Management

Observation - Annual Avg. Load Factor of Shivajirao Kadam Institute of Technology & Management is 12%.



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3.6 Connected Load details of institute

M.E. Department					
Sr. No.	Location	Fan	Tube light	PC	CFL
1	118E lab M.D.	5	5	1	0
2	117A Thermal lab	4	6	0	0
3	117B TOM DOM lab	5	7	1	0
4	118A Metopology lab	3	3	0	0
5	118B FM lab	5	4	1	0
6	118C H.M.T(Vibious)	5	5	2	0
7	118D RAC lab	5	5	2	0
8	106A M.M.C lab	4	7	4	0
9	107A CAD lab	7	4	26	0
10	108 Class Room	6	4	0	0
11	109 Class Room	6	4	0	0
12	116C Class Room	4	4	0	0
13	112B HOD Room	1	1	1	0
14	112D	1	1	0	0
15	Toilet	0	1	0	0
15	112C Office ME.	1	1	3	0
6	115 Class Room	6	6	0	0
17	Workshop 005	12	4	0	7
18	005A.B.ICE Auto machine	5	8	0	0
19	Outside Room	4	16	0	0
		85	76	41	7



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E.C.E Department								
Sr. No.	Location	Fan	Tube light	PC	Printer	Cooler	LED	CFL
1	Room No. 202	5	6	4	0	0	0	0
2	Room No. 201	6	4	0	0	0	0	0
3	Room No. 203	4	2	0	0	0	0	0
4	Room No.105A	7	5	10	0	0	0	0
5	Room No.105C	4	4	0	0	0	0	0
6	Room No.105D	4	4	5	0	0	0	0
7	Room No.105E	7	7	0	0	0	0	0
8	Room No.105F	6	6	8	0	0	0	0
9	Room No.104	2	2	0	2	3	0	0
10	Ground floor	5	27	0	0	0	0	0
11	Ground floor	0	0	0	0	0	6	0
12	Ground floor	0	0	0	0	0	0	8



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C.S.E Department					
Sr. No.	Location	Fan	Tube light	PC	A.C.
1	Lab 205A	7	5	8	0
2	Lab 205B	7	5	30	0
3	Lab. N	2	2	8	0
4	C.O	12	8	60	0
5	205E	7	4	30	0
6	205A	7	4	30	0
7	206B	9	6	60	0
8	RAG	2	2	6	0
9	222	6	6	0	0
10	221	4	4	0	0
11	217A	3	3	0	0
12	206D	2	2	8	0
13	Toilet	0	1	0	0
14	Excon Room	4	4	3	0
15	214	4	4	0	0
16	207A	3	2	2	1
17	207B	6	4	0	0
18	20A	4	4	0	0
19	20B	4	4	0	0
20	216	4	4	0	0
21	215	6	6	60	0
22	208	4	4	0	0
23	209	4	4	0	0
24	210	4	4	0	0
25	211	4	4	0	0
26	cabin	24	24	0	0
27	C.S Office	1	2	0	0
28	C.S HOD	1	1	0	1
29	HOD	1	1	0	0
30	HOD	1	1	0	0
31	HOD	5	5	0	0
32	Second floor Outside room	0	6	0	0
33	Third floor	0	7	0	0



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Pharmacy Building							
Sr. No.	Location	Fan	Tube light	PC	Printer	A.C.	Projector
1	Class Room 1	9	12	0	0	0	1
2	Class Room 2	9	11	0	0	0	0
3	Class Room 3	9	12	0	0	0	0
4	Class Room 5	4	7	0	0	0	0
5	Principle Office	4	4	1	1	1	0
6	Computer lab	6	7	22	0	1	0
7	Machine Room II	5	8	0	0	0	0
8	Office	3	4	2	0	0	0
9	Faculty Room II	5	7	5	0	0	0
10	Faculty Room I	5	5	3	0	0	0
11	Machine Room I	5	8	0	0	0	0
12	Central Stair	0	0	0	0	0	0
13	Pharmaceutical Lab III	6	2	0	0	0	0
14	Analysis Lab	6	5	0	0	0	0
15	Instrument Room	4	12	2	0	1	0
16	Pharmacognosy Lab II	6	2	0	0	0	0
17	Microbiology Lab	5	4	0	0	0	0
18	Pharmacognosy Lab I	5	4	0	0	0	0
19	HAP Lab	5	8	0	0	0	0
20	Chemistry lab III	3	6	0	0	0	0
21	Class Room VI	0	8	0	0	0	0
22	Chemistry Lab I	7	5	0	0	0	0
23	Chemistry Lab II	3	6	0	0	0	0
24	Ceutics Lab I	4	5	0	0	0	0
25	Ceutics Lab I	7	6	0	0	0	0
26	Ream	2	2	0	1	0	0
27	GCR	0	1	1	0	0	0
28	Class Room IV	9	11	0	0	0	0
29	Cognecy	4	5	0	0	0	0
30	Exam	0	0	0	1	0	0
31	Exam	2	2	1	1	0	0
32	GCR	0	1	0	0	0	0
33	Class Room IV	0	0	0	0	0	0
34	Cognosy III	0	0	0	0	0	0
35	Washroom	0	3	0	0	1	0
36	Lobby Area	1	20	0	0	0	0



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(M.P.)
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Civil Department						
Sr. No.	Location/RoomNo.	Fan	Tube light	PC	Printer	Wall fan
1	014 B (Office)	2	5	2	2	0
2	017A Lab	10	8	1	0	0
3	016 A	8	14	1	0	0
4	016B	7	13	2	0	0
5	017 B	3	4	0	0	0
6	018 A	5	3	2	0	0
7	018 B	5	5	1	0	0
8	116 A	5	4	0	0	0
9	116 B	3	4	0	0	0
10	Reception	0	0	0	0	1

MBA						
Sr. No.	Location/Room No.	Fan	Tube light/ Ceiling Light	PC	AC	Street light
1	012B	1	1	1	0	0
2	012C	2	3	5	0	0
3	015	6	15	0	2	0
4	011 Class Room	5	4	0	0	0
5	010 Class Room	6	4	0	0	0
6	111 Class Room	6	4	0	0	0
7	110 Class Room	6	4	0	0	0
8	115A	4	4	5	0	0
9	012A Director Sir	1	1	1	1	0
10	Outside institute building	0	0	0	0	20

Canteen	
Fan	Tube light
19	19



3.7 Connected Load sharing Electrical Equipment

Table-3.7 Total load share of electrical equipment in institute.

Sr. No.	Equipment's	Unit Power (watt)	Quantity	Total Power (Watt)	Load share%
1	Tube light (36 watt)	54	435	23490	19.85
3	Ceiling fan	60	519	31140	26.32
4	Computer	60	431	25860	21.86
5	Printer	320	8	2560	2.16
6	A.C.(Split A.C.)	1450	9	13050	11.03
7	Wall Fan	60	1	60	0.05
8	Street light Metal Halid	400	10	4000	3.38
10	Lift	4000	1	4000	3.38
11	Air Cooler	150	3	450	0.38
12	CFL	18	15	270	0.23
14	Bore -1 behind Engg. Block	3730	1	3730	3.15
15	Bore-2 Near Pharmacy block	3730	1	3730	3.15
16	Bore -3 Near CPS Block	3730	1	3730	3.15
17	Bore-4 Near Garden	2238	1	2238	1.89
Total				118308	100.00

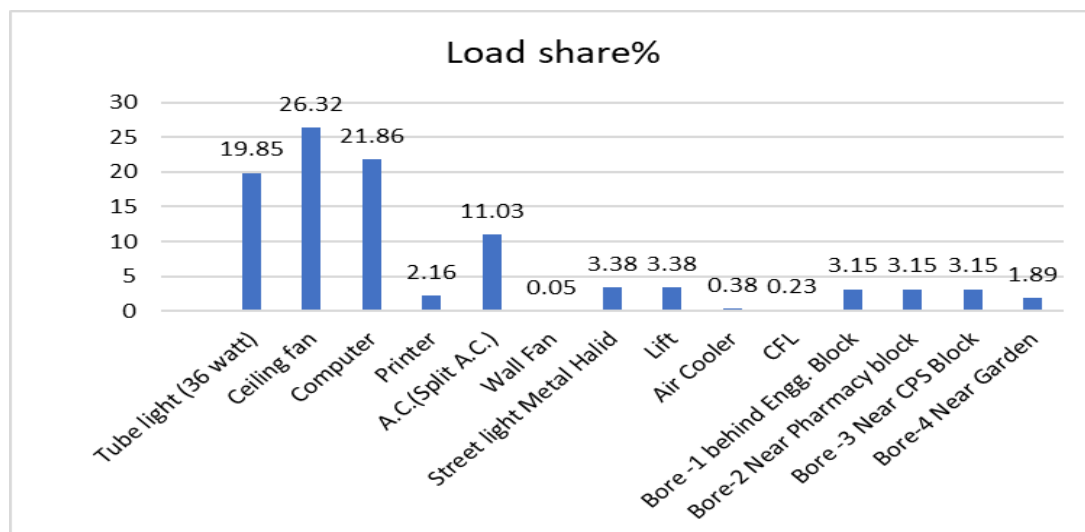


Fig. 3.5 - Connected Load detail



3.8 Photograph of Electrical appliances





CHAPTER- 4

ENERGY CONSERVATION MEASURES

4.1 Case Study

Replacement of 60W conventional ceiling fan by 28W BLDC Energy efficient ceiling fan in institute: -

Sr. No.	Item	Parameter	Unit
1	Rated Power of Ceiling Fan	60	W
2	No. of Fan	519	Nos
3	Working Hrs./Day	8	Hrs./Day
4	Working Days/Year	250	Days/Year
5	Energy Efficient BLDC Fan Rated power	28	W
6	Energy Saving Potential	33,216	kWh/Year
7	Load Factor	0.8	
8	Expected Annual Energy Saving	26,572.8	kWh/Year
9	Per Unit Charges	11.93/-	Rs/kWh
10	Expected Money Saving	3,17,014/-	Rs./Year
11	Cost of New Ceiling Fan	1,600/-	Rs./Pisces
12	Investment on New Fan Purchasing	8,30,400/-	Rs.
13	Maintenance Investment@5%	41,520/-	Rs.
14	Total Investment	8,71,920/-	Rs.
15	Simple Pay Back Period	2.8	Year

Total Calculated Monetary Saving Potential in Ceiling Fan = Rs 3,17,014 /-

Note: - Energy saving depends on the operation hour per day and load factor of the systems.



4.2 Case Study

Replacement of conventional (tube light) 54 Watt by energy efficient 20 Watt LED tube light

Sr. No.	Items	Parameters	Units
1	Total Power Consumption by T-12 conventional tube light (12 Watt Blast Power)	54	Watt
2	No of T-12	435	Nos.
3	Working Hrs./Day	8	Hrs./Day
4	Working Days/Year	250	Days/Year
5	Rated Power of Energy Efficient T-5 (LED)	20	W
6	Energy Saving Potential	29580	kWh/Year
7	Load Factor	0.8	
8	Expected Annual Energy Saving	23664	kWh/Year
9	Overall, Per Unit Charges	13.31	Rs./kWh
10	Expected Money Saving	314967	Rs./Year
11	Cost of T-5	210	Rs./ Pices
12	Investment on New Light Purchasing	91350	Rs.
13	Maintenance Investment@5%	4,568	Rs.
14	Total Investment	95,918	Rs
15	Simple Pay Back Period	4	Month

Total Calculated Monetary Saving Potential in lighting = Rs 3,14,967 /-

Note: - Energy saving depends on the operation hour per day and load factor of the systems.



4.3 Case Study

Replacement of CFL 18 Watt by energy efficient 12 Watt LED light

Sr. No	Items	Parameters	Units
1	CFL	18	Watt
2	No. of CFL	15	Nos.
3	Working Hrs./Day	8	Hrs./Day
4	Working Days/Year	250	Days/Year
5	Rated Power of Energy Efficient (LED)	12	W
6	Energy Saving Potential	180	kWh/Year
7	Load Factor	0.8	
8	Expected Annual Energy Saving	144	kWh/Year
9	Overall, Per Unit Charges	13.31	Rs./kWh
10	Expected Money Saving	1917	Rs./Year
11	Cost of LED	550	Rs./ Pices
12	Investment on New Light Purchasing	8250	Rs.
13	Maintenance Investment@5%	413	Rs.
14	Total Investment	8,663	Rs
15	Simple Pay Back Period	54	Month

Total Calculated Monetary Saving Potential in lighting = Rs 1917 /-

Note: - Energy saving depends on the operation hour per day and load factor of the systems.



4.4 Case Study

Replacement of Metal halide 400 Watt by energy efficient 200 Watt LED flood light

Sr. No	Items	Parameters	Units
1	Metal halide	400	Watt
2	No. of Metal halide	10	Nos.
3	Working Hrs./Day	12	Hrs./Day
4	Working Days/Year	330	Days/Year
5	Rated Power of Energy Efficient (LED)	200	W
6	Energy Saving Potential	7920	kWh/Year
7	Load Factor	0.8	
8	Expected Annual Energy Saving	6336	kWh/Year
9	Overall, Per Unit Charges	13.31	Rs./kWh
10	Expected Money Saving	84332	Rs./Year
11	Cost of 200 Watt LED(Flood light)	4000	Rs./ Pices
12	Investment on New Light Purchasing	40000	Rs.
13	Maintenance Investment@5%	2,000	Rs.
14	Total Investment	42,000	Rs
15	Simple Pay Back Period	6	Month

Total Calculated Monetary Saving Potential in lighting = Rs 84,332 /-

Note: - Energy saving depends on the operation hour per day and load factor of the systems.