

## ENERGY AUDIT REPORT

Client Name	K.E. Society's Rajarambapu Institute of Technology, Rajaramnagar, Islampur. Dist- Sangli.
Project Name	Energy Audit of Rajarambapu Institute of Technology, Rajaramnagar, Islampur. Dist- Sangli.
Date / Year	Year 2016-2017
Submitted by	Dept. of Electrical Engineering , Rajarambapu Institute of Technology, Rajaramnagar , Islampur Dist- Sangli.MH

## ACKNOWLEDGEMENT

We appreciate the interest and participation of Honorable Management and Principal and Faculty in carrying out the energy audit at Rajarambapu Institute of Technology Rajaramnagar. Our special thanks to Technicians and Staff involved for college who have extended their co-operation and courtesy to the energy audit team during the audit.

Our Special thanks to Honorable Management and Director of Rajarambapu Institute of Technology, Islampur for continuous support and providing facilities regarding the energy audit.

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• EXECUTIVE SUMMARY (Lighting Load):

<b>Recommendations</b>	<b>Monthly present expenditure in Rs.</b>	<b>Investment for the saving of expenditure in Rs.</b>	<b>Savings per month in Rs.</b>	<b>Payback period</b>
Instructional Building (Class rooms): Replace 40W Copper choke tube set by 20 W LED Tube set Quantity -116 no	Rs.2493.57 (4Hr. x24 days x 9.0 Rs )	Rs.23200.00 (Rs.200/- qty.)	Cost of energy Rs. 2493.57 -Rs.1246.78 Saving =Rs. 1246.78	1.5 years
Instructional Building (Class rooms): Replace 25W Electronics choke tube set with 20W LED Tube set. Quantity- 03no	Rs.64.80	Rs.600.00	Cost of energy Rs.64.80 - Rs. 51.84 Saving = Rs.12.96	3.8 years.
Dept. Electrical Engineering Replace 40W Copper choke tube set by 20 W LED Tube set Quantity -113 no	Rs.3905.28	Rs.22,600.00	Cost of energy Rs.3,905.28 - Rs.1952.64 Saving Rs. 1952.64	11 months.
Dept. Electrical Engineering Replace 25W Electronics choke tube set with 20W LED Tube set. Quantity- 3no	Rs. 64.80	Rs.600.00	Cost of energy Rs.64.80 - Rs. 52.08 Saving = Rs.12.72	3.9 years.
Principal cabin.: Replace 40W Copper choke tube set by 20 W LED Tube set Quantity -16 no.	Rs.829.40	Rs. 3200.00	Cost of energy Rs. 829.40 -Rs. 414.72 Saving = Rs.414.72	7.7 months.
Administrative office: Replace 25W Electronics choke tube set with 20W LED Tube set. Quantity – 08 no	Rs. 259.20	Rs.1600.00	Cost of energy Rs. 259.20 - Rs. 207.00 Saving = Rs. 52.20	2.55 years.
Administrative office: Replace 40W Copper choke tube set by 20 W LED Tube set Quantity -10 no	Rs.518.40	Rs. 2000.00	Cost of energy Rs. 518.40 - Rs.259.20 Saving = Rs. 259.20	7.7 months.
K.E.S Office: Replace 40W Copper choke tube set by 20 W LED Tube set Quantity -3 no	Rs.155.52	Rs. 600.00	Cost of energy Rs. 155.52 - Rs.77.76 Saving = Rs. 77.76	7.7months.

<b>Recommendations</b>	<b>Monthly present expenditure in Rs.</b>	<b>Investment for the saving of expenditure in Rs.</b>	<b>Savings per month in Rs.</b>	<b>Payback period</b>
K.E.S Office: Replace 25W Electronics choke tube set with 20W LED Tube set. Quantity – 04no	Rs.129.60 4Hr. x24 days x 9.0Rs. )	Rs.800.00	Cost of energy Rs. 129.60 - Rs.103.68 Saving = Rs. 25.92	2.57 years.
K.E.S Office: Replace 13W CFL (PL) set, with 8W LED ceiling set Quantity – 15 no	Rs. 247.32	Rs. 6675.00	Cost of energy Rs. 247.32 - Rs.155.52 Saving = Rs. 91.80	6.05 years.
GB Hall: Replace 36 W CFL (PL) set, with 12W LED ceiling set. Quantity – 04 no	Rs. 186.62	Rs. 2640.00	Cost of energy Rs.186.62 - Rs.62.20 Saving = Rs. 124.41	1.6 year
GB Hall: Replace 12 W CFL (PL) set, with 8W LED ceiling set. Quantity – 16 no	Rs.165.88	Rs.7120.00	Cost of energy Rs. 165.88 - Rs.110.59 Saving = Rs.55.29	10.6 years.
Admission cell: Replace 36 W CFL (PL) set, with 15W LED ceiling set. Quantity – 16 no	Rs. 497.66	Rs.10112.00	Cost of energy Rs.497.66- Rs.207.36 = 290.30	2.9 years.
Admission cell: Replace 14 W CFL (PL) set, with 8W LED ceiling set. Quantity – 15 no	Rs. 181.44	RS.6675.00	Cost of energy Rs181.44 - Rs.103.68 Saving = Rs.77.76	4.2 years.
<b>Dept. Civil Engineering</b> Replace 25W Electronics choke tube set with 20W LED Tube set. Quantity- 57no	Rs. 1231.20	Rs. 11400.00	Cost of energy Rs. 1231.20 - Rs.984.36 Saving = Rs.246.84	3.84 years.
Dept. Civil Engineering Replace 40W copper choke tube set with 20W LED Tube set. Quantity- 38 no	Rs. 1313.28	Rs. 7600.00	Cost of energy Rs. 1313.28 - 656.64 Saving = Rs.656.64	11.5 months.
<b>Dept. Civil Engineering</b> Replace 110W Old fan with 80W energy efficient fan Quantity- 03 no	Rs.285.12	Rs. 4740.00	Cost of energy Rs. 285.12 - Rs.207.36 Saving = Rs.77.76	5years.
<b>Diploma Dept.:</b> Replace 25W Electronics choke tube set with 20W LED Tube set. Quantity- 29no	Rs.626.40	Rs.5800.00	Cost of energy Rs. 626.40 - Rs.501.00 Saving = Rs.125.40	3.85 years.
<b>Diploma Dept.:</b> 40W copper choke tube set with 20W LED Tube set. Quantity- 14 no	Rs.483.84	Rs.2800.00	Cost of energy Rs.483.84 - Rs.241.92 Saving = Rs241.92	11.5months .

<b>Recommendations</b>	<b>Monthly present expenditure in Rs.</b>	<b>Investment for the saving of expenditure in Rs.</b>	<b>Savings per month in Rs.</b>	<b>Payback period</b>
<i>Dept. of IT Engg.: Replace 40W Electronics choke tube set with 20W LED Tube set.- Qty 47no</i>	Rs. 1624.32	9400.00	Cost of energy Rs.1624.32- Rs.812.16 Saving = Rs.812.16	11.5 months
Replace 25W Electronics choke tube set with 20W LED Tube set. Quantity- 44no	Rs. 1490.40	Rs.8800.00	Cost of energy Rs.1490.40 - Rs.760.20 Saving = Rs.730.20	1.05Years
Computer center: Replace 40W Electronics choke tube set with 20W LED Tube set. Quantity- 24 no	Rs.829.44	Rs.4800.00	Cost of energy Rs.829.44 - Rs.414.72 Saving = Rs.414.72	11.5 months
Examination center: Replace 40W copper choke tube set with 20W LED Tube set. Quantity- 12 no	Rs.415.53	Rs. 2400.00	Cost of energy Rs. 415.53 - Rs.207.36 Saving = Rs.208.17	11.5 months.
Examination center: Replace 25W Electronics choke tube set with 20W LED Tube set. Quantity- 4 no	Rs.86.40	Rs.800.00	Cost of energy Rs.86.40 - Rs.67.00 Saving = Rs.17.40	3.8 years.
Finishing School: Replace 40W Polyester choke tube set with 20W LED Tube set. Quantity :- 4 no.	Rs.207.36	Rs. 800.00	Cost of energy Rs.207.36 - Rs.69.17 Saving = Rs.138.24	5.7 months.
Science & Humanity: - 40W copper choke tube set with 20W LED Tube set. Quantity :- 22 no.	Rs.1140.60	Rs.4400.00	Cost of energy Rs.1140.60 - Rs.379.80 Saving = Rs.760.80	11.5 months
Science & Humanity: Replace 25W Electronics choke tube set with 20W LED Tube set. Quantity :- 46 no.	Rs.993.60	Rs.9200.00	Cost of energy Rs.993.60 - Rs.344.88 Saving = Rs.648.72	2.2 years
Computer Science& Engg Dept: Replace 40W copper choke tube set with 20W LED Tube set. Quantity : 57 no.	Rs. 1969.92	Rs. 11400.00	Cost of energy Rs.1969.92 - Rs.984.96 Saving = Rs.984.96	11.5 months
Computer Science& Engg Dept: Replace 25W Electronics choke tube set with 20W LED Tube set. Quantity :- 42 no.	Rs.907.20	Rs.8400.00	Cost of energy Rs.907.20 - Rs.725.40 Saving = Rs.181.80	3.8 years.
Electronics & Tele-communication Engg Dept.: Replace 40W copper choke tube set with 20W LED Tube set. Quantity : 93 no.	Rs.3214.08	Rs.18600.00	Cost of energy Rs. 3214.08 - Rs.1607.04 Saving = Rs.1607.04	11.5 Months.
Electronics & Tele-communication Engg Dept.: Replace 25W Electronics choke tube set with 20W LED Tube set. Quantity :- 38	Rs.820.80	Rs.7600.00	Cost of energy Rs.820.80 - Rs.656.64 Saving = Rs.164.16	3.8 years.

<b>Recommendations</b>	<b>Monthly present expenditure in Rs.</b>	<b>Investment for the saving of expenditure in Rs.</b>	<b>Savings per month in Rs.</b>	<b>Payback period</b>
<i>MBA Dept: Replace 40W copper choke tube set with 20W LED Tube set. Quantity : 61 no</i>	<i>Rs.2108.16</i>	<i>Rs.12200</i>	<i>Cost of energy Rs.2108.16 - Rs1054.08 Saving = Rs.1054.08</i>	<i>11.5 months.</i>
MBA Dept: Replace 25W Electronics choke tube set with 20W LED Tube set. Quantity :- 75 no.	Rs. 1620.00	Rs. 15000.00	Cost of energy Rs.1620.00 - Rs.1296.00 Saving = Rs.324.00	3.8 years.
Electrical & Civil Maintenance Dept: Replace 25W Electronics choke tube set with 20W LED Tube set. Quantity : 14	Rs. 302.40	Rs. 2800.00	Cost of energy Rs302.40 - Rs. 241.80 Saving = Rs.60.60	3.8 years.
Electrical & Civil Maintenance Dept: Replace 40W copper choke tube set with 20W LED Tube set. Quantity : 02 no.	Rs. 68.40	Rs. 400.00	Cost of energy Rs68.40 - Rs. 34.20 Saving = Rs.34.20	11.6 months.
<i>Gymkhana: Replace 40W Polyester choke tube set with 20W LED Tube set. Quantity :- 18 no.</i>	<i>Rs. 622.08</i>	<i>Rs. 3600.0</i>	<i>Cost of energy Rs. 622.08 - Rs. 311.04 Saving = 311.04</i>	<i>11.5 months.</i>
Grahak Bhandar: Replace 60W Polyester choke tube set with 20W LED Tube set. Quantity : 03 no.	Rs. 155.52	Rs.600.00	Cost of energy Rs.155.52 - Rs. 51.84 Saving = Rs.103.68	5.7months
Canteen: Replace 40W copper choke tube set with 20W LED Tube set. Quantity : 05 no.	Rs.172.80	Rs. 1000.00	Cost of energy Rs.172.80 - Rs. 86.40 Saving = Rs.86.40	11.5months
Mechanical & Automobile Building: Replace 40W copper choke tube set with 20W LED Tube set. Quantity : 109 no	Rs.3,767.04	Rs.21800.00	Cost of energy Rs.3767.04 - Rs. 1883.52 Saving = Rs.1883.52	11.5 months
Mechanical & Automobile Building: Replace 25W Electronics choke tube set with 20W LED Tube set. Quantity : 31 no.	Rs. 669.60	Rs.6200.00	Cost of energy Rs.669.60 - Rs. 535.80 Saving = Rs.133.80	3.8 years.
<i>Student Hostel: Replace 40W copper choke tube set with 20W LED Tube set. Quantity : 665 no</i>	<i>Rs.22,982.40</i>	<i>Rs.133,000.00</i>	<i>Cost of energy Rs. 22,982.40 - Rs. 11491.20 Saving = Rs.11491.20</i>	<i>11 months.</i>
Student Hostel: Replace 110W Old fan with 80W energy efficient fan Quantity- 40 no	Rs.7128.00	Rs. 63200.00	Cost of energy Rs. 7128.00 - Rs.5184.00 Saving = Rs.1944.00	3.7 years.



<b>Recommendations</b>	<b>Monthly present expenditure in Rs.</b>	<b>Investment for the saving of expenditure in Rs.</b>	<b>Savings per month in Rs.</b>	<b>Payback period</b>
Student Hostel: Replace 80W CFL with 30W energy efficient LED street light Quantity- 15 no	Rs.1944.00	Rs.20940.00	Cost of energy Rs. 1944.00 - Rs.729.00 Saving = Rs.1215.00	10.7months
Student Hostel: Replace 20W CFL with 8 W energy efficient LED surface Quantity- 120 no	Rs.3888.00 (6hRs.x30 days x 9.0 Rs. )	Rs.53400.00	Cost of energy Rs. 3888.00 - Rs.1555.20 Saving = Rs.2332.80	1.9years.
Student Hostel: Replace 13W CFL (PL) set, with 8W LED ceiling set Quantity – 35 no	Rs. 737.10	Rs.15575.00	Cost of energy Rs. 737.10 - Rs.453.60 Saving = Rs. 283.50	4.5 years.
Student Hostel: Replace 30 W CFL (PL) set, with 18 W LED surface ceiling set Quantity – 120 no	Rs.5835.00	Rs. 112200.00 (Rs.935/ set )	Cost of energy Rs. 5832.00 - Rs.3499.20 Saving = Rs. 2332.80	4 years.
All Workshops & hydraulic testing lab: Replace 60W copper choke tube set with 20W LED Tube set. Quantity : 180 no	Rs. 9331.20	Rs.36000.00	Cost of energy = Rs.9331.20- Rs. 3110.40 Saving =Rs.6220.80	5.7 month

2. SUMMARY OF SAVINGS POTENTIAL OF CLASSROOM, LABORATORIES OFFICE AND STREET LIGHTS.

• **Instructional Building (Class rooms): - 24 days' consumption**

Particulars	Wattage W	Numbers	Load (KW)	Approx. Hr.	Recommendation
Tube set (copper choke)	40	116	4.64	4Hr.	Replace 40W tube set by 20W LED tube set.
Electronic choke tube set	25	13	0.325	4Hr.	Replace 25 W tube set by 20 W LED tube set.
Ceiling fan	80	72	5.76	4Hr.	NIL
Computer set	300	09	2.7	4Hr.	NIL
Projector (Epson )	300	13	3.9	4Hr.	NIL
Water Cooler	700	02	1.4	4Hr.	NIL
Bathroom exhaust fan	12	02	0.024	4Hr.	NIL
Total			18.674	4Hr.	74.696 kWh / day

**Total Lighting load = 4.965 kW Qty 129 nos**

**Led lighting load = Nil Qty : Nil**

• **Department of Electrical Engineering**

Particulars	Wattage W	Numbers	Load (KW)	Approx. Hr.	Recommendation
<b><i>Tube set (copper choke)</i></b>	<b><i>40</i></b>	<b><i>113</i></b>	<b><i>4.52</i></b>	<b><i>4Hr.</i></b>	<b><i>Replace 40W tube set by 20W LED tube set.</i></b>
Electronic choke tube set	25	03	0.075	4Hr.	Replace 25 W tube set by 20 W LED tube set.
Ceiling fan	80	80	6.4	4Hr.	NIL
Computer set	300	73	21.9	4Hr.	NIL
Projector (Epson )	300	01	0.3	4Hr.	NIL
Water Cooler	700	03	2.1	4Hr.	NIL
Bathroom exhaust fan	12	03	0.036	4Hr.	NIL
Air conditioning system	1070	01	1.07	4Hr.	NIL
Total			35.976	4Hr.	143.904kWh / day

**Total Lighting load = 4.595 Kw Qty 116 nos**

**Led lighting load = Nil Qty Nil**

• **Student Hostel 30 Days consumption**

Particulars	Wattage	Numbers	Load (KW)	Approx. Hr.	Recommendation
<b><i>Tube set (copper choke)</i></b>	<b>40</b>	<b>665</b>	<b>26.6</b>	<b>6Hr.</b>	<b><i>Replace 40W tube set by 20W LED tube set.</i></b>
Old Ceiling fan	110	40	4.4	6 Hr.	Replace 110W Old fan with 80W energy efficient fan
C.G Ceiling fan	80	320	25.6	6 Hr.	
CFL	20	100	2.0	6Hr.	Replace CFL with energy efficient LED
CFL	10	57	0.57	6Hr.	Replace CFL with energy efficient LED
Mercury street Light	250	40	10	11 Hr.	
CFL Lamp	5	80	0.4	6Hr.	Replace CFL with energy efficient LED
LED street light	50	2	0.1	11 Hr	Nil
LED Street light	80	1	0.08	11 Hr	Nil
CFL Lamp	20	120	2.4	6Hr.	Replace 20W CFL with 8 W energy efficient LED
CFL Lamp	30	30	0.9	6Hr.	Replace 30W CFL with 18 W energy efficient LED
CFL Lamp	80	15	1.275	6Hr.	Replace 80W CFL with 30 W energy efficient LED
PL Tube	13	35	0.455	6Hr.	Replace 13W CFL with 8 W energy efficient LED
Geezer	3000	14	42	6Hr.	NIL
Solar geezer coil	3000	22	66	6Hr.	NIL
5 HP Motor pump set	3728.5	8	29.82	6Hr.	NIL
3 HP Motor pump set	2237.1	5	11.18	6Hr.	NIL
2 HP Motor pump set	1491.4	2	2.982	6Hr.	NIL
Projector (Epson )	300	01	0.3	4 Hr.	NIL
Computer system	300	10	3	6Hr.	NIL
Printer inkjet	450	04	1.8	2Hr.	NIL
TV set	120	27	3.24	4 Hr.	NIL
Water Cooler	700	20	14	6Hr.	NIL
Air conditioning system	1070	21	22.47	6Hr.	NIL
Induction cooker	3000	17	51	4 Hr.	NIL
Fridge	130	6	0.78	6Hr.	NIL
Total			309.893	6Hr.	1847.358kWh/day

**Total Lighting load = 39.75 kW Qty 945 nos**

**Led lighting load = 0.18 kW Qty 03 nos**

- **Administrative Office**

Particulars	Wattage	Numbers	Load (KW)	Approx. Hr	Recommendation
Tube set (copper choke)	40	30	1.2	6Hr.	Replace 40W tube set by 20W LED tube set.
Electronics choke tube set	25	19	0.475	6Hr.	Replace 25 W tube set by 20 W LED tube set
LED	8	8	0.064	6Hr	NIL
LED	13	3	0.039	6Hr	NIL
Ceiling Fan old	80	61	4.88	6Hr.	NIL
Computer system LCD	300	42	12.6	6Hr.	NIL
Printer HP	750	12	09	6Hr.	NIL
Xerox Machine	1600	03	03	6Hr.	NIL
AC	3250	11	35.75	6Hr.	NIL
Wall fan	60	5	0.3	6Hr.s	NIL
Total			67.393	6Hr.	4040.358kwh/ day

**Total Lighting load = 1.77 kW Qty 60 nos**

**Led lighting load = 0.103 W Qty 11 nos**

- **Civil Engineering Dept.**

Particulars	Wattage	Numbers	Load (KW)	Approx. Hr.	Recommendation
Tube set (copper choke)	40	38	1.52	4Hr.	Replace 40W tube set by 20W LED tube set.
Electronics choke tube set	25	57	0.675	4Hr.	Replace 25 W tube set by 20 W LED tube set
Ceiling Fan CG	80	43	3.44	4Hr.	
Ceiling Fan Old	110	03	0.33	4Hr.	Replace 110W old fan by energy efficient fan(3no).
Computer system LCD	300	61	18.3	4Hr.	NIL
Printer HP	750	05	3.75	4Hr.	NIL
Xerox Machine	1000	01	1.0	4Hr.	NIL
AC	3250	01	3.250	4Hr.	NIL
LCD projector	300	01	0.3	4Hr.	NIL
Total			31.965	4Hr.	127.86kWh/day

**Total Lighting load = 2.195 kW Qty 110 nos**

**Led lighting load = Nil Qty : Nil**

- Information Technology Dept.**

Particulars	Wattage	Numbers	Load (KW)	Approx. Hr.	Recommendation
<i>Tube set (copper choke)</i>	40	47	1.88	4Hr.	<i>Replace 40W tube set by 20W LED tube set.</i>
Electronics choke tube set	25	44	1.1	4Hr.	Replace 25 W tube set by 20 W LED tube set
CFL bulb	15	125	1.875	4Hr.	Nil
CFL bulb	14	24	0.336	4Hr.	Nil
Ceiling Fan CG	80	72	5.76	4Hr.	Nil
Ceiling Fan Old	110	01	0.11	4Hr.	Replace 110W old fan by energy efficient fan(1no).
Computer system LCD	300	197	59.1	4Hr.	Nil
Printer HP	750	07	5.25	4Hr.	Nil
AC	3250	11	35.75	4Hr.	Nil
LCD projector	300	04	1.2	4Hr.	Nil
Wall fan	60	01	0.06	4Hr.	Nil
Table fan	60	04	0.24	4Hr.	Nil
Total			112.26	4Hr.	449.04kwh/day

Total Lighting load = 4.891 kW Qty 240 nos

Led lighting load = Nil Qty Nil

- Central Computer Center**

Particulars	Wattage	Numbers	Load (KW)	Approx. Hr.	Recommendation
Tube set (copper choke)	40	24	0.96	4Hr.	Replace 40W tube set by 20W LED tube set.
Electronics choke tube set	25	31	0.775	4Hr.	Replace 25 W tube set by 20 W LED tube set
LED bulb	18	62	1.116	4Hr.	Nil
Computer system LCD	300	118	35.4	4Hr.	Nil
Printer HP	750	02	1.5	4Hr.	Nil
AC	3250	11	35.75	4Hr.	Nil
LCD projector	300	02	0.6	4Hr.	Nil
Wall fan	60	25	1.5	4Hr.	Nil
Exhaust fan	60	03	0.18	4Hr.	Nil
Total			77.321	4Hr.	309.284kWh/day

Total Lighting load = 2.851 kW Qty 117nos

Led lighting load =1.116 kW Qty 62 nos

- **Mechanical and Automobile Engg Dept.**

Particulars	Wattage	Numbers	Load (KW)	Approx. Hr.	Recommendation
Tube set (copper choke)	40	109	4.36	4Hr.	Replace 40W tube set by 20W LED tube set.
Electronics choke tube set	25	31	0.775	4Hr.	Replace 25 W tube set by 20 W LED tube set
Ceiling Fan CG	80	80	6.4	4Hr.	Nil
Computer system LCD	300	165	49.5	4Hr.	Nil
Printer HP	750	06	4.5	4Hr.	Nil
AC	3250	02	6.5	4Hr.	Nil
LCD projector	300	11	3.3	4Hr.	Nil
Exhaust fan	60	02	0.12	4Hr.	Nil
Total			75.415	4Hr.	301.66kWh/day

**Total Lighting load = 5.135 kW Qty 140 nos**

**Led lighting load = Nil Qty Nil**

- **Computer science and Engg Dept.**

Particulars	Wattage	Numbers	Load (KW)	Approx. Hr.	Recommendation
Tube set (copper choke)	40	57	2.28	4Hr.	Replace 40W tube set by 20W LED tube set.
LED	5	25	0.125	4Hr.	Nil
LED	8	120	0.96	4Hr.	Nil
Electronics choke tube set	25	42	1.05	4Hr.	Replace 25 W tube set by 20 W LED tube set
Ceiling Fan CG	80	98	7.84	4Hr.	Nil
Ceiling Fan old	110	07	0.77	4Hr.	Nil
Computer system LCD	300	206	61.8	4Hr.	Nil
Printer HP	750	07	5.25	4Hr.	Nil
LCD projector	300	07	2.1	4Hr.	Nil
Exhaust fan	60	05	0.3	4Hr.	Nil
TV	120	01	0.12	4Hr.	Nil
AC	3250	10	32.5	4Hr.	Nil
Total			114.11	4Hr.	456.44 kWh /day

**Total Lighting load = 4.415 kW Qty 244 nos**

**Led lighting load =1.085 kW Qty 145 nos**

- **Electronics and Telecommunication Engg Dept.**

Particulars	Wattage	Numbers	Load (KW)	Approx. Hr.	Recommendation
Tube set (copper choke)	40	93	3.72	4Hr.	Replace 40W tube set by 20W LED tube set.
LED Tube set	20	05	0.1	4Hr.	
Electronics choke tube set	25	38	0.95	4Hr.	Replace 25 W tube set by 20 W LED tube set
Ceiling Fan CG	80	110	8.8	4Hr.	Nil
Computer system LCD	300	104	31.2	4Hr.	Nil
Printer HP	750	07	5.25	4Hr.	Nil
LCD projector	300	12	3.6	4Hr.	Nil
AC	3250	01	3.25	4Hr.	Nil
Total			56.79	4Hr.	227.16kWh/day

**Total Lighting load = 4.77 kW Qty 137nos. Led lighting load = 0.1 kW Qty 05 nos**

- **Management Department.**

Particulars	Wattage	Numbers	Load (KW)	Approx. Hr.	Recommendation
<b>Tube set (copper choke)</b>	<b>40</b>	<b>61</b>	<b>2.44</b>	<b>4Hr.</b>	<b>Replace 40W tube set by 20W LED tube set.</b>
Electronics choke tube set	25	75	1.875	4Hr.	Replace 25 W tube set by 20 W LED tube set
Ceiling Fan CG	80	88	7.04	4Hr.	Nil
Computer system LCD	300	114	34.2	4Hr.	Nil
Printer HP	750	04	3.0	4Hr.	Nil
LCD projector	300	10	3.0	4Hr.	Nil
AC	3250	08	26	4Hr.	Nil
Total			77.415	4Hr.	309.66kWh/day

**Total Lighting load = 4.315 kW Qty:- 136 nos.**

**Led lighting load = NIL Qty.: NIL**

- **Workshop No2.**

Particulars	Wattage	Numbers	Load (KW)	Approx. Hr.	Recommendation
<b>Tube set (copper choke)</b>	<b>60</b>	<b>62</b>	<b>3.72</b>	<b>4Hr.</b>	<b>Replace 60W tube set by 20W LED tube set.</b>
Electronics choke tube set	25	02	0.05	4Hr.	Replace 25 W tube set by 20 W LED tube set
Ceiling Fan CG	80	16	1.28	4Hr.	Nil
Ceiling Fan old	110	01	0.11	4Hr.	Nil
Computer system LCD	300	48	14.4	4Hr.	Nil
Printer HP	750	03	2.25	4Hr.	Nil
LCD projector	300	01	0.3	4Hr.	Nil
Wall fan	60	06	0.36	4Hr.	Nil
Total			22.15	4Hr.	88.60kWh/ day

**Total Lighting load = 3.77kW Qty : 64nos. Led lighting load = 00kW Qty : 00 nos**

- **Work shop No1**

Particulars	Wattage	Numbers	Load (KW)	Approx. Hr.	Recommendation
Tube set (copper choke)	60	53	3.18	4Hr.	Replace 60W tube set by 20W LED tube set.
Ceiling Fan CG	80	17	1.36	4Hr.	Nil
Computer system LCD	300	10	3.0	4Hr.	Nil
Printer HP	750	04	3.0	4Hr.	Nil
Industrial fan	1000	17	17	4Hr.	Nil
Industrial Lamp	250	14	3.5	4Hr.	Nil
AC	3250	01	3.250	4Hr.	Nil
Wall fan	60	04	0.24	4Hr.	Nil
Total			34.53	4Hr.	138.12kWh/day

**Total Lighting load = 3.18kW Qty 53 nos**

**Led lighting load = NIL Qty =NIL**

- **Civil Structure PG building**

Particulars	Wattage	Numbers	Load (KW)	Approx. Hr.	Recommendation
Tube set (copper choke)	40	13	0.52	4Hr.	Replace 40W tube set by 20W LED tube set.
LED Tube set	20	01	0.02	4Hr.	
Electronics choke tube set	25	17	0.425	4Hr.	Replace 25 W tube set by 20 W LED tube set
Ceiling Fan CG	80	23	1.84	4Hr.	Nil
Computer system LCD	300	08	2.4	4Hr.	Nil
Printer HP	750	02	1.5	4Hr.	Nil
LCD projector	300	02	0.6	4Hr.	Nil
Industrial Fan	1000	01	1.0	4Hr.	Nil
Total			8.305	4Hr.	33.22kWh/day

**Total Lighting load = 0.965kW Qty =31nos**

**Led lighting load = 0.02kW Qty= 01nos**

- **Gymkhana**

Particulars	Wattage	Numbers	Load (KW)	Approx. Hr.	Recommendation
<b><i>Tube set (copper choke)</i></b>	<b><i>40</i></b>	<b><i>18</i></b>	<b><i>0.72</i></b>	<b><i>4Hr.</i></b>	<b><i>Replace 40W tube set by 20W LED tube set.</i></b>
Electronics choke tube set	25	01	0.025	4Hr.	Replace 25 W tube set by 20 W LED tube set
Ceiling Fan CG	80	02	0.16	4Hr.	Nil
Computer system LCD	300	02	0.6	4Hr.	Nil
Printer HP	750	01	0.75	4Hr.	Nil
Xerox	1600	01	1.6	4Hr.	Nil
Total			3.775	4Hr.	15.1kWh /day

**Total Lighting load = 0.745kW Qty.: 19 nos. Led lighting load = 0.0 kW Qty:- NIL**



- **Canteen**

Particulars	Wattage	Numbers	Load (KW)	Approx. Hr.	Recommendation
Tube set (copper choke)	40	05	0.2	4Hr.	Replace 40W tube set by 20W LED tube set.
LED Tube set	20	04	0.1	4Hr.	
Electronics choke tube set	25	05	0.125	4Hr.	Replace 25 W tube set by 20 W LED tube set
Ceiling Fan CG	80	06	0.48	4Hr.	Nil
Fridge	2200	03	6.6	4Hr.	Nil
Total				4Hr.	Nil

**Total Lighting load = 0.425kW Qty 14nos.**

**Led lighting load = 0.1kW Qty 04 nos.**

- **Advanced Welding shop & fluid mechanics, Sheet metal Shop:**

Particulars	Wattage	Numbers	Load (KW)	Approx. Hr.	Recommendation
Tube set (copper choke)	60	65	3.9	4Hr.	Replace 60W tube set by 20W LED tube set.
Electronics choke tube set	25	35	0.875	4Hr.	Replace 25 W tube set by 20 W LED tube set
Ceiling Fan CG	80	41	3.28	4Hr.	Nil
Computer system LCD	300	05	1.5	4Hr.	Nil
AC	3250	02	6.5	4Hr.	Nil
Exhaust fan	60	03	0.18	4Hr.	Nil
Industrial Fan	1000	03	3.0	4Hr.	Nil
Total				4Hr.	

**Total Lighting load = 4.775kW Qty 100 nos.**

**Led lighting load = 0.0kW Qty 0.0nos.**

- **New Library Building**

Particulars	Wattage	Numbers	Load (KW)	Approx. hrs.	Recommendation
LED Tube Set double side	56	101	5.656	8hRs.	Nil
LED Aslimline	45	57	2.565	8hRs.	Nil
LED Tubo	42	45	1.890	8hRs.	Nil
LED Round Down Light	17	621	10.557	8hRs.	Nil
LED Strip	14.5	13	0.1885	8hRs.	Nil
LED Batten Tube	28	57	1.596	8hRs.	Nil
LED Cob Down Light	9	62	0.558	8hRs.	Nil
LED Projector Light	17	24	0.408	8hRs.	Nil
LED Down Lighter	17	5	0.085	8hRs.	Nil
Sodium vapor Lamp	250	4	1.0	8hRs.	Nil
CFL Bulk head	9	17	0.153	8hRs.	Nil
LED Flood Light	50	4	0.2	8hRs.	Nil
LED Wall Light	13	21	0.273	8hRs.	Nil
Pendant Mounted Light	18X2	34	1.224	8hRs.	Nil
LED Round Lighting	22	32	0.704	8hRs.	Nil
Bollard Light	18	8	0.144	8hRs.	Nil
LED Wall Light	7	11	0.077	8hRs.	Nil
Total		1116	27.9755	8hRs.	223.804 kWh /day

**Total Lighting load = 27.9755kW Qty 1116 nos.**

**Led lighting load = 27.9755kW Qty 1116nos.**

### 3. SUMMARY ANALYSIS OF CURRENT SCENARIO:

#### 3.1 ANALYSIS ENERGY METER.

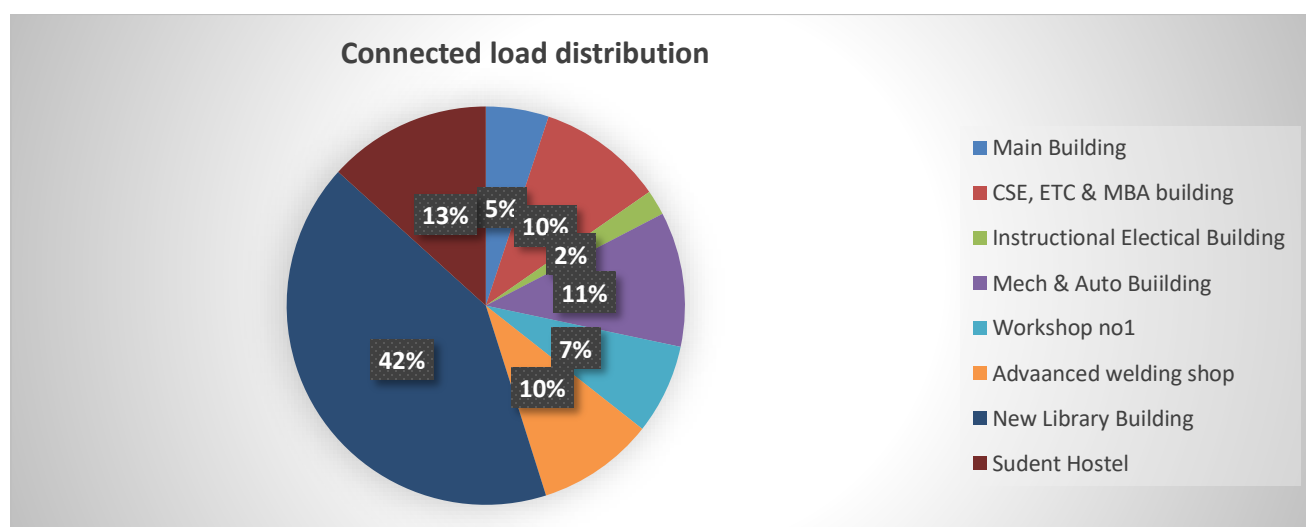
As per MSEDCL tariff HT IX- B Public Service –Other

Consumption Slab (kWh)	Fixed/ Demand Charge Rs./kVA / month	Wheeling Charge (Rs./kWh)	Energy Charge (Rs./kWh)
All Units	250.00	00	8.41
TOD Tariffs ( In addition to above base tariffs )			
22.00 Hr. – 06.00 Hr.			-1.50
06.00 Hr. – 09.00 Hr. 12.00 Hr. – 18. Hr.			0.00
09.00 Hr.– 12.00 Hr.			0.80
18.00 Hr. – 22.00 Hr.			1.10

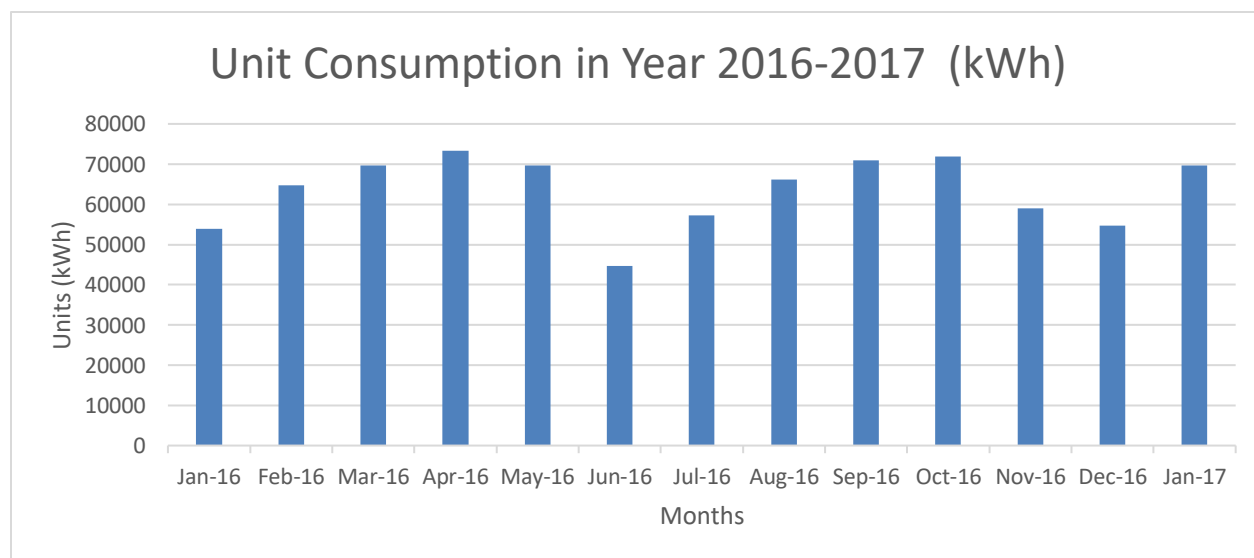
**Approx. unit charges including taxes only: - Rs .9.00 /- Unit**

### 3.12 Connected load distribution at campus:

Sr. No.	Description of Building	Load (kW)
01	Main Building No.1	35
02	Main Building No.2	70
03	Electrical Building	14
04	Workshop No.2 Mech.& AUE Building	75
05	Workshop No.1	50
06	Advance Welding Shop	65
07	New Library Building	285
08	All Hostel Campus	91
	<b>Total</b>	<b>685</b>



**Fig 1:- Institute connected load distribution.**



**Fig. 2:- Unit (kWh) consumption in year 2016-2017**

Average unit rate of MSEDCL tariff for year 2016-2017: - **Rs.9.00 /- per Unit**

**3.14 Table shows the Solar water heater system implemented at hostel.**

Sr. No.	Department	Student Capacity	Required Heat Water per Person / Liter	Total Require Water liter	Total Available Capacity of solar water heater in liter
1	New Ladies Hostel	184	20	3680	4000
2	A Hostel	150	20	3000	2000
3	B Hostel	150	20	3000	2500
4	C Hostel	150	20	3000	2000
5	D Hostel	167	20	3340	2500
6	E Hostel	135	20	2700	2000
7	F Hostel	194	20	3880	2000
<b>Total</b>		<b>1130</b>		<b>22600</b>	<b>18000</b>

Energy Saving and Economy Achievement Calculation:

No. of rooms available in hostel = 376 room.

Minimum single electrical geyser will be required for one room. Therefore, minimum 376 no. of geysers having 2kw capacity will be required.

Power being saved = 376 geysers. x 2kw=752kw / day

Energy being saved = 752kw x 1hr = 752 units per day.

Annual Energy Saving=752 x 300=2, 25, 600/- units

Total amount of energy saved/day = 752 Units x 9.00 Rs. /unit. = Rs. 6,768/- per day

Total amount of energy saved /year (300days) = Rs. 6,768 x 300 = Rs. 20,30,400/year

**Outcome: The implementation of Solar heater system has achieved annual energy saving of 2, 25,600 units and amount Rs. 20,30,400/-**

**3.2 ENVIRONMENTAL CONSCIOUSNESS AND SUSTAINABILITY: -**

- **Percentage of lighting power requirements met through LED bulb in terms of wattage**

$$= \frac{\text{Total LED lighting load (30.6795kW)}}{\text{Total Lighting load (121.4875 kW)}} \times 100 = \mathbf{25.25 \%}$$

Percentage of lighting power requirements met through LED bulb = **25.25 %**

- **Percentage of lighting power requirements met through LED bulb in terms of quantity**

$$= \frac{\text{Total LED lighting in Qty. (1,347 Nos.)}}{\text{Total Lighting in Qty. (3,771 N0s.)}} \times 100 = \mathbf{35.72 \%}$$

Percentage of lighting power requirements met through LED bulb = **35.72 %**

### 3.3 INSTITUTE IN PROCESS TOWARDS ENERGY CONSERVATION:

- Step by step replacing the 40 Watt i.e., T12 Fluorescent Tube Lights in the class rooms and Laboratory rooms and using 12W LED which gives almost same luminous flux.
- Replacing the 80W ceiling fan in class rooms and laboratories by energy efficient fans of 60w is much help to save the energy.

### 4.0 SCOPE OF WORK:

- Detailed examination of the existing energy uses of the facility.
- Measurement and analysis of demand and power factor, energy meter to reduce the energy bill.
- Detailed examination of lighting system and other electrical equipment in laboratory and class rooms.
- Survey report of lighting system in overall institute.

## 5. METHODOLOGY:

### 5.1 SAVING POTENTIAL CALCULATION IN EACH CLASS ROOM AND LABORATORY:

**Assumptions:** - Working hours. of class room, laboratory and office = Approx.4 hrs.  
**Unit for institute energy bill = Approx. Rs.11.02 / kwh**

**Specimen calculation for:**

- Dept. of computer & Engg:

<i>Recommendations</i>	<i>Monthly present expenditure in Rs.</i>	<i>Investment for the saving of expenditure in Rs.</i>	<i>Savings per month in Rs.</i>	<i>Payback period</i>
<i>Student Hostel: Replace 40W copper choke tube set with 20W LED Tube set. Quantity : 665 no</i>	<i>Rs.22,982.40</i>	<i>Rs.133,000.00</i>	<i>Cost of energy Rs. 22,982.40 - Rs. 11491.20 Saving = Rs.11491.20</i>	<i>11 months.</i>

**Specimen calculation for tube set** :- Energy consumption of conventional tube light set :- 40Watt capacity tube set used for 4 hrs. per day so unit consumed by tube is = 0.16 kwh per day and monthly unit consumed

by tube set =  $0.16 \times 24 \text{ days} = 3.84 \text{ kwh / month}$ . Energy consumption of one tube in terms of rupees =  $3.84 \text{ kwh} \times \text{Rs.}9.0 = \text{Rs.}34.56 / \text{month}$

**Specimen calculation for Fan :-** A old fan capacity is 110 W and used for 4 hrs. day so unit consumed by fan is =  $0.44 \text{ kwh per day}$  and monthly unit consumed by fan =  $0.44 \times 24 \text{ days} = 10.56 \text{ kwh / month}$ . Energy consumption of fan in terms of Rs. =  $10.56 \text{ kwh} \times \text{Rs.}9.0 = \text{Rs.}95,04$

Dept. of Civil has three old ceiling fan. So monthly expenditure due to fan is Rs.285.12

Recommendations	Monthly present expenditure in Rs.	Investment for the saving of expenditure in Rs.	Savings per month in Rs.	Payback period
<b>Dept. Civil Engineering</b> Replace 110W Old fan with 80W energy efficient fan Quantity- 03 no	Rs.285.12	Rs. 4740.00	Cost of energy Rs. 285.12 - Rs.207.36 Saving = Rs.77.76	5years.

If old fan will have replaced by new energy efficient (BEE star rating) it will consume energy Rs. 12.60 for one month.

### Evolution of BEE rated Tube

Tube set type	Cost Rs.	Payback	Life	Efficacy
T-8 LED tube light 1.00 inch	1600-2000	3-4 Yrs.	10-15 Yrs.	@100-120 Lumens / watt
T-5 LED tube light 0.625 inch	500	6 month-1yr.	3-4 Yrs.	110 lumens /watt

### Evolution of BEE 5 star rated Fan

Speed	1	2	3	4	5
Wattage	13 W	24 W	30 W	40W	55W

Cost: - Rs. 1700 -2000 and Life: - 10-15 yrs.

### Evolution of regular rated Fan

Speed	1	2	3	4	5
Wattage	14 W	26 W	39 W	48 W	76 W

Cost: - Rs. 1000 -1500 and Life: - 5-10 yrs.

A typical desktop computer uses about up to 250 watts and 20-40 watts for an LCD monitor and don't forget related devices like cable modem uses 7 watts, D-Link DI-604 router uses 4.5 watts,

To calculate your costs, use this formula:

Watts x Hours. Used	x Cost per kilowatt-hour = Total Cost
1000	
1000	

One LCD computer consumes 1.5Kwh (Unit) per day i.e. 14 Rs. Per day (300 W x 5 hrs.)

Old version computer consumes 2.5kwh (unit) per day i.e. Rs. 23.32 per day (500 W x 5 hrs.)

## 6.0 CONCLUSIONS AND GENERAL RECOMMENDATION OF THE AUDIT

- Replace conventional tube light fittings of 40W with T-5 LED Tube light for 400 – 500 lumens light efficacy. Replace 80 W old fan by energy efficient fans.
- Replace old version computer system with energy efficient LCD monitor and new generation energy efficient computer systems.
- Ensure maximum natural daylight and natural ventilation in class rooms, Labs and staff rooms i.e. when it's bright outside in the daytime, turn off the light and open blinds of windows.
- In fact, try to turn on lights in our cabin, labs only after the sun sets. Do your reading and writing near a window or natural illumination.
- Installing occupancy sensors to turn ON-OFF lighting and fan can save considerable energy.
- Overhead projectors, computers and UPS all consume electricity hence be sure to unplug these types of items when they're not in use to achieve energy saving considerably.
- Use power “saving option” (hibernate mode) for computer and possibly switched off when not in use.
- Consider planting trees and shrubs in strategic locations to help to reduce the temperature and airflow in Laboratory, classroom etc. Trees planted on the west and south sides of buildings help to keep the buildings shaded during hotter weather.
- To promote Green Energy and Energy Conservation a roof-top Solar PV plant can be useful.

  
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