Energy Audit Report

of

J.K.K. Munirajah College of Technology, Erode

PRINCIPAL
JKK MUNIRAJAH COLLEGE
OF TECHNOLOGY
T.N. PALAYAM (Po)-638 506.
GOBI (Tk), ERODE (Dt).

Energy Audit

Done by

Sri Energy Solutions

21/08/2020

Project Report Title	:	**Energy Audit**
Client Name	:	**J.K.K. Munirajah College of Technology**
Plant Location	:	**T.N. Palayam Post,** **Gobi Taluk,** **Erode District – 638 506**
Date of Audit	:	**20th August 2020**
Energy Audit by	:	**M/s. Sri Energy Solutions, Udumalpet**
Energy Audit Team	:	**1. M.Rameshkumar., B.E, M.B.A, PGDEEM&EA,** **BEE Certified Energy Auditor** **2. S.Hari Prasad.,B.E** **Trainee Engineer – Energy Audit**

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Acknowledgement

Sri Energy Solutions acknowledge with hearty thanks to **Dr.Munirajahh.J.K.K, Chairman, Mrs.Vasanthakumari Munirajahh.M, Trusty member, Mr.Kirubhakar Murali.M, Trusty member and Mrs.Kasthuripriya, Secretary, J.K.K. Munirajah college of Technology, Erode** for them support for carrying out this audit.

Our special thanks to **Dr.K.Sridharan – Principal, Mrs.V.Mohanapriya – HOD (Civil) and Mr.P.Eswaran – AP (Auto)** for their co-operation and support us to carry out the Energy audit on time.

In addition with this, we are grateful to your staffs **Mr.K.Suresh and Mr.Alagesan** for their co-operation and support us to carry out the Energy audit very effectively.

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Index

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1. Introduction

J.K.K. College of Technology is located at T.N. palayam, Gobi, Erode. This college is having lot of courses in Engineering sector with complete equipped. This institution has One LTCT service, One LT service and one welding service. Also have two backup generators of 125 KVA and 15 KVA capacity. High quality panels and switch gears are connected with this service for giving quality supply to the equipments. The capacity of generator is also well enough to meet the demand. The electrical distribution panel is accompanied with Automatic Power factor panel to maintain the power factor in good range. On the next step, the management decided to conduct the energy audit in their institution to reduce their energy cost.

2. Objectives

The following objectives of Energy Audit are,

- To reduce the energy wastage
- To standardize the preventive maintenance
- To improve the quality of supply
- To improve the service life of equipments
- To improve the safety of equipments and workmen

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3. Executive Summary

- The sanctioned demand of **TNEB supply of 111 KW (04-310-011-381), 19.54 KW (04-310-011-386), 14.5 KW (04-310-011-390) and 60 KW (04-310-011-407)** are well enough to meet the connected load of **247 KW.** Since it is batch process service.
- Standby power source is from **125 KVA and/or 15 KVA** generators is more than enough
- Average monthly Energy consumption is **9,583 units**
- Energy efficient lighting conversion is already in the process
- Total lighting and fan power load is **92.788 KW** and has saving potential of **41.12 KW.** The saving potential is **44.3 %**
- Total Air Conditioner power load is **26.25 KW** and has saving potential of **3.948 KW.** The saving potential is **15%**
- Some panels required earthing connections, which is very essential in safety aspects and to reduce the components failure
- Some windows required cooling sheets to reduce the power consumption of Air conditioners
- We can go for 20 KW Solar power plant to this service and can yield annual saving of **Rs.2,02,500 /-**
- The Annual energy saving by energy efficiency method is **51,400 units**
- The Annual energy saving by solar power plant is **27,000 units**
- The overall annual cost saving by implementing the recommendations mentioned in this report is **Rs.5,88,000 /-**

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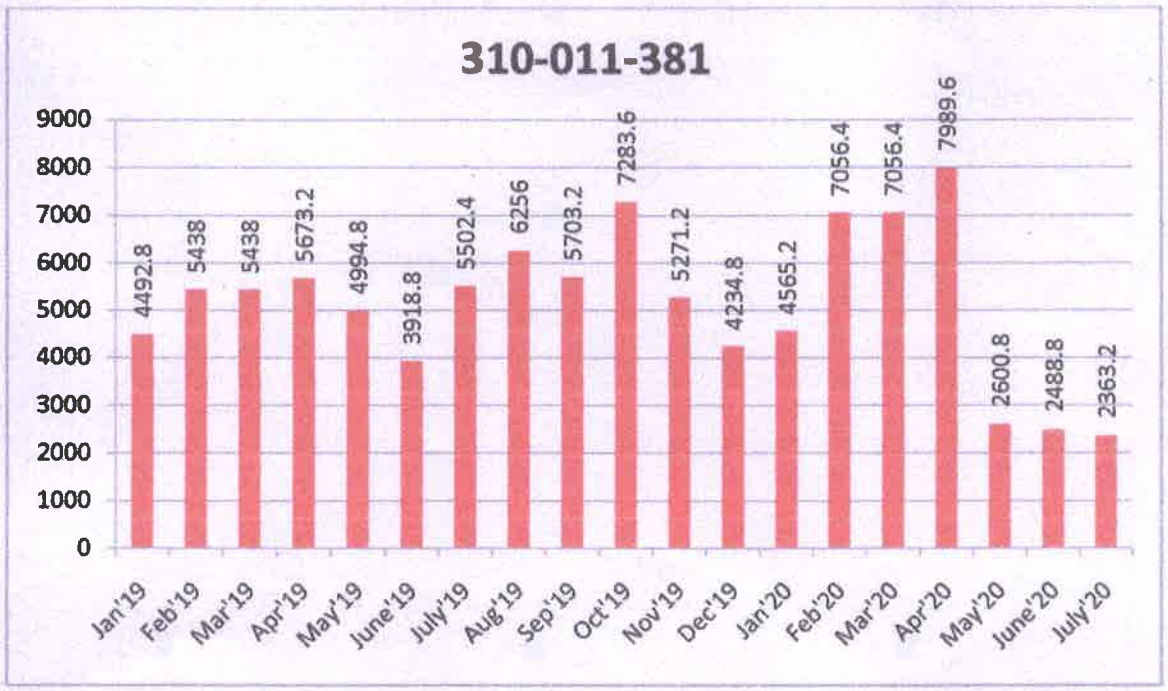
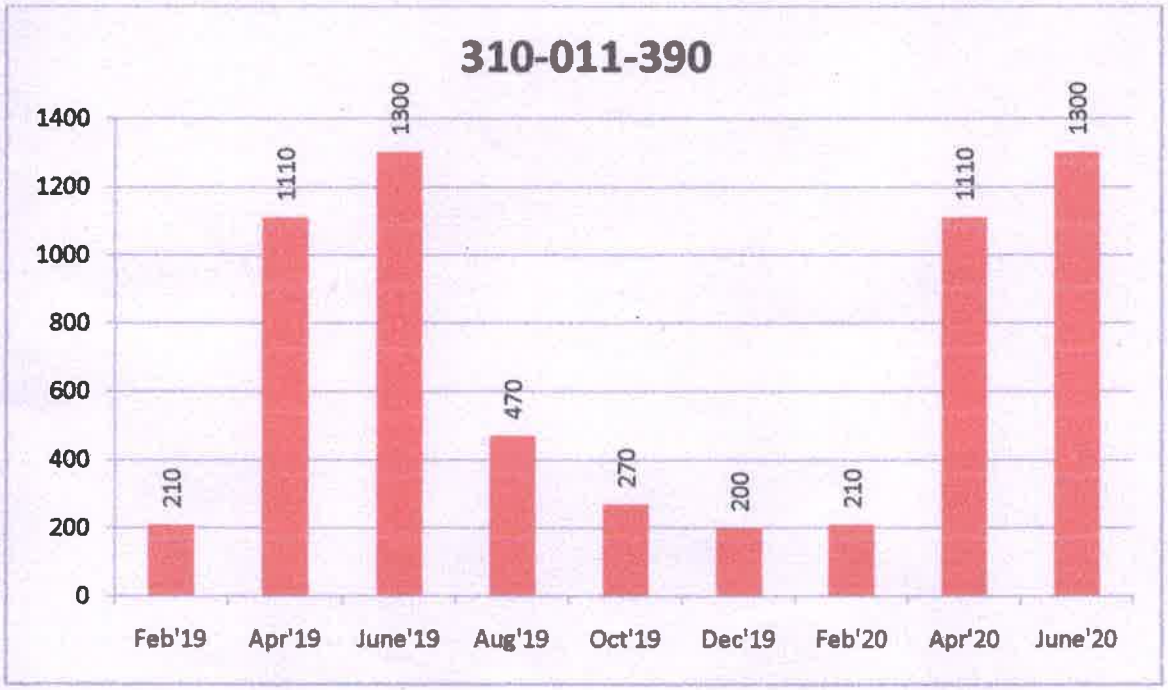
4. TNEB Energy Consumption Trend





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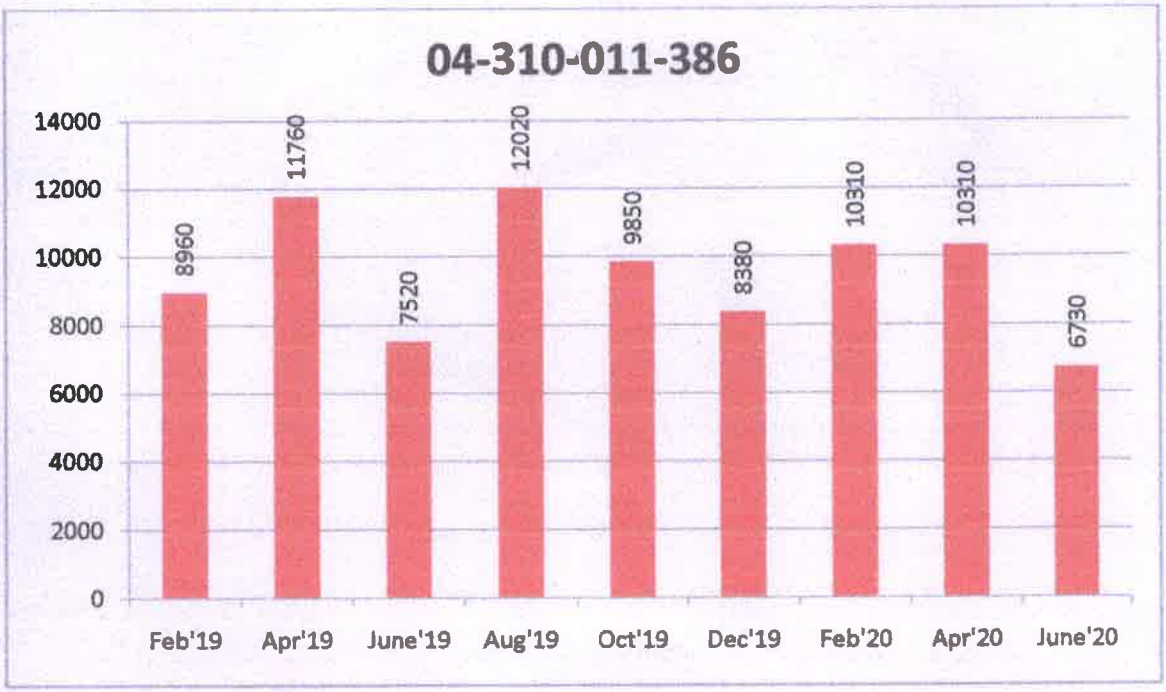

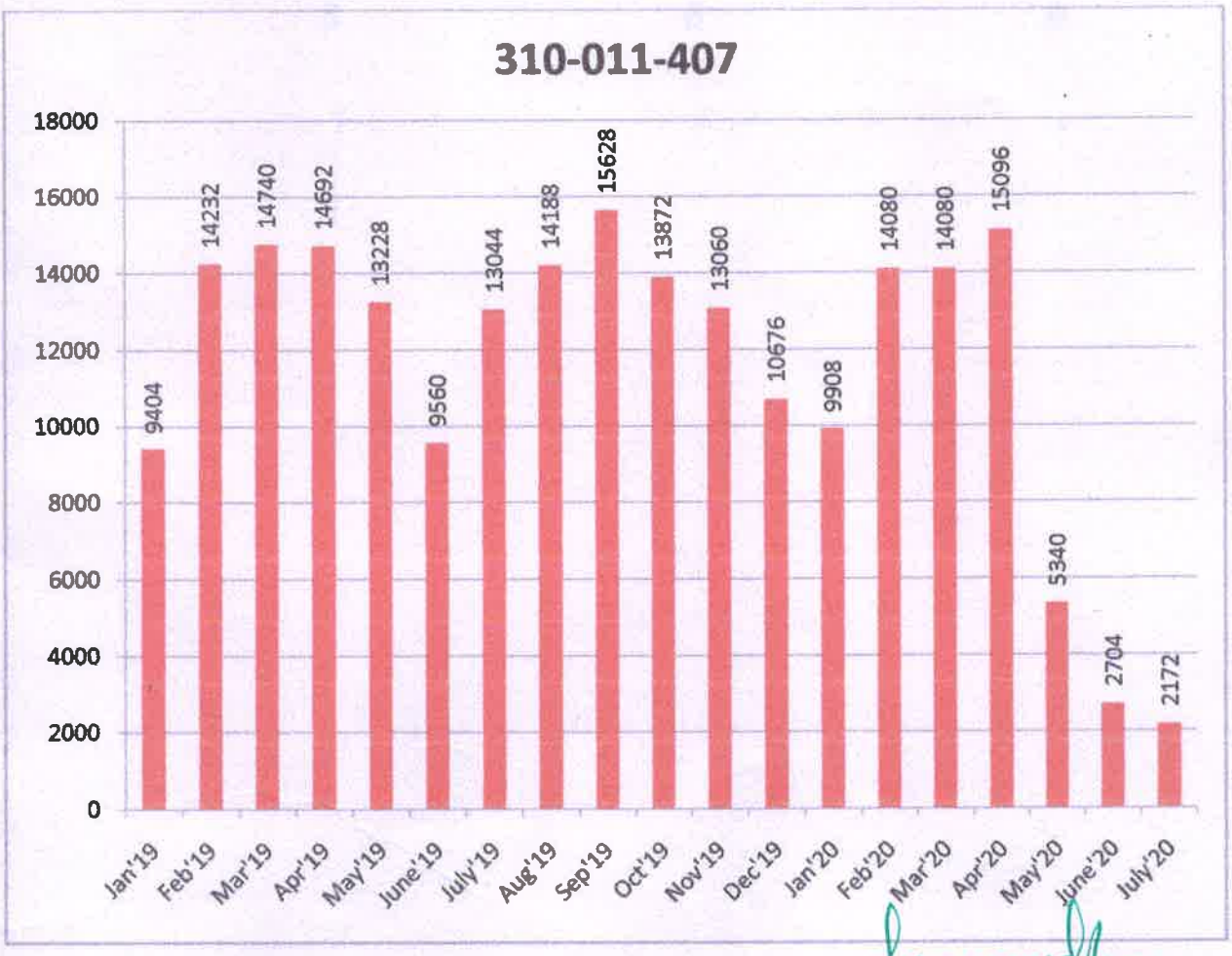

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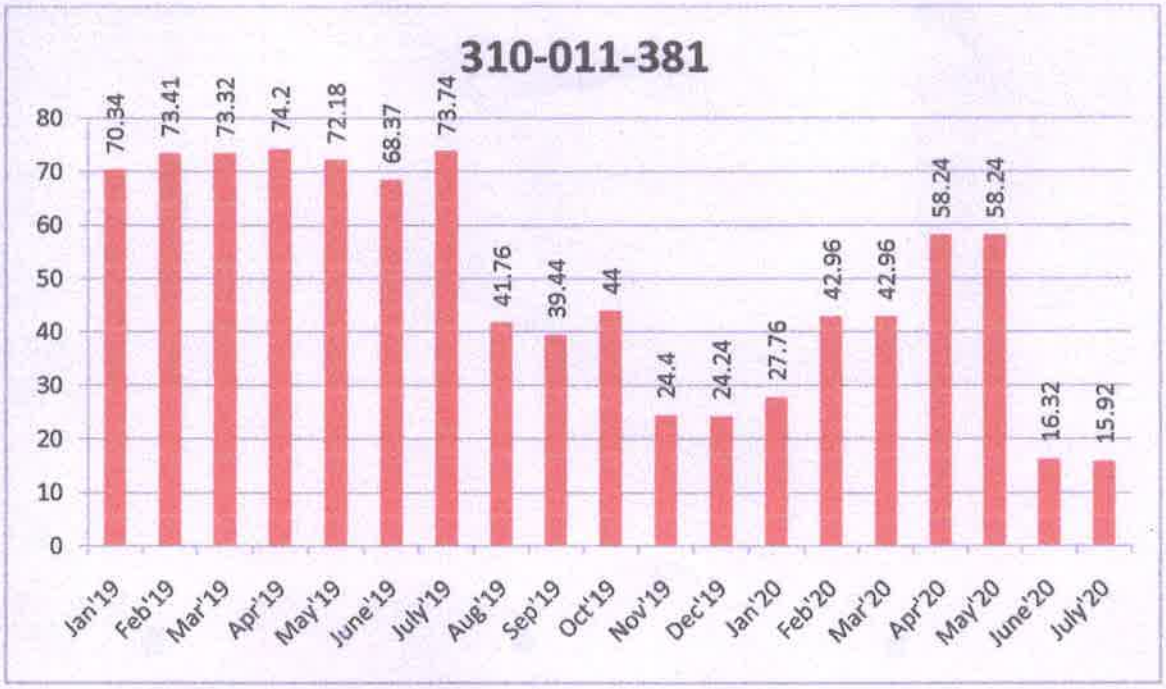
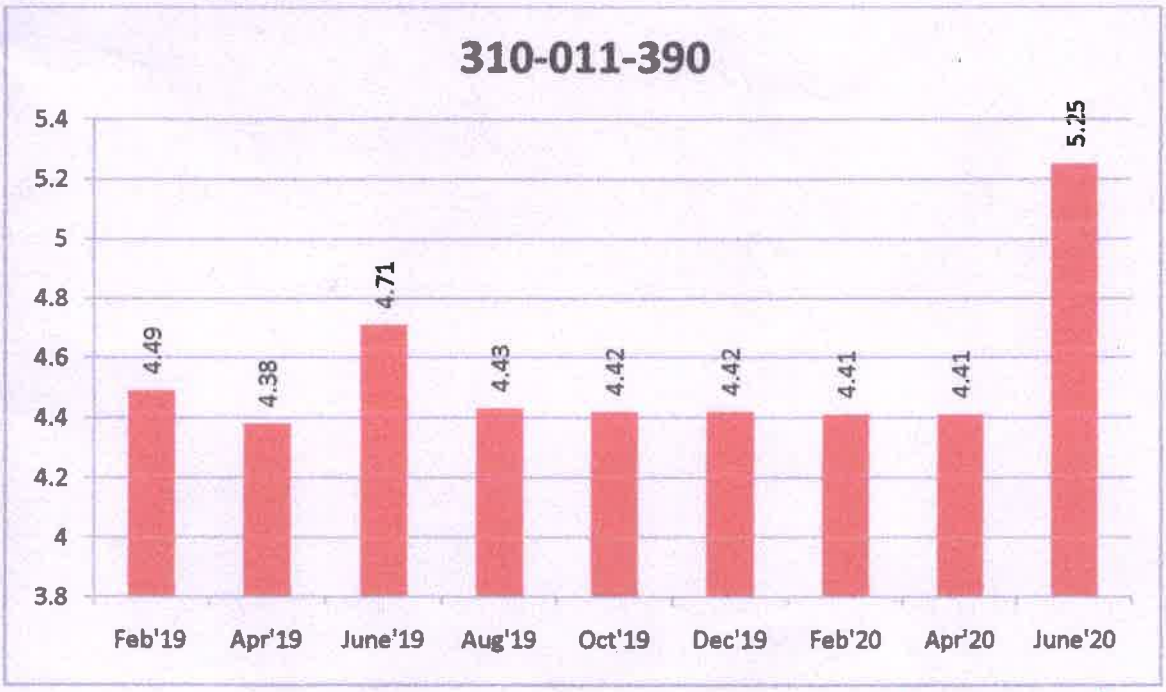
5. TNEB Power Demand Trend





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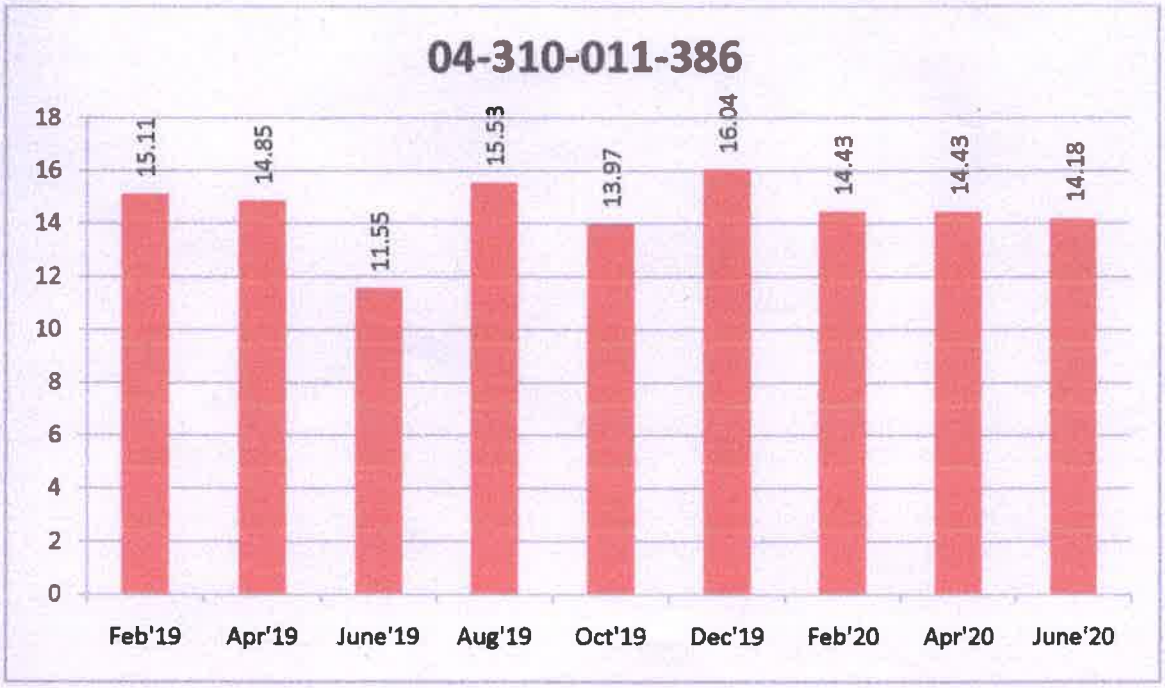

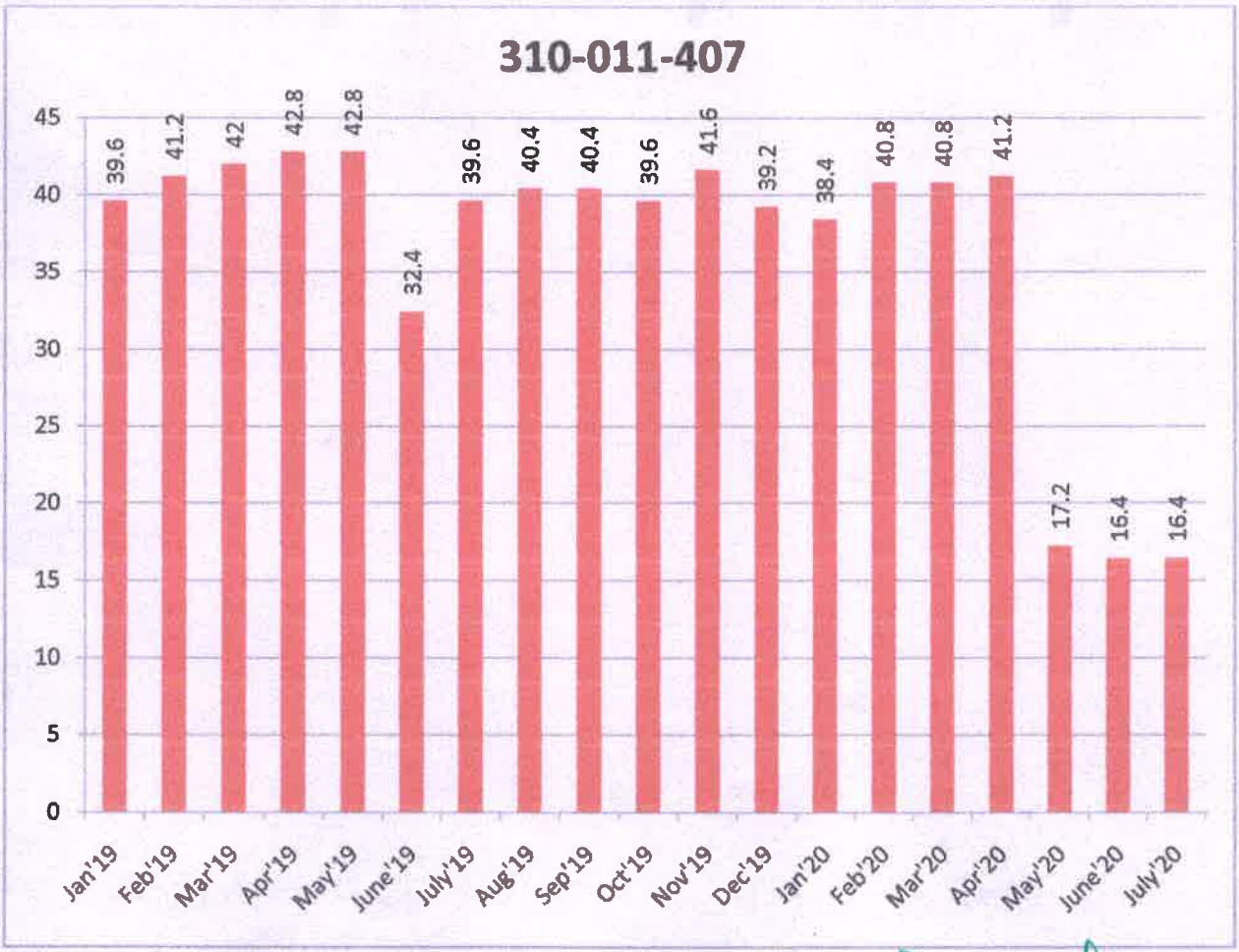

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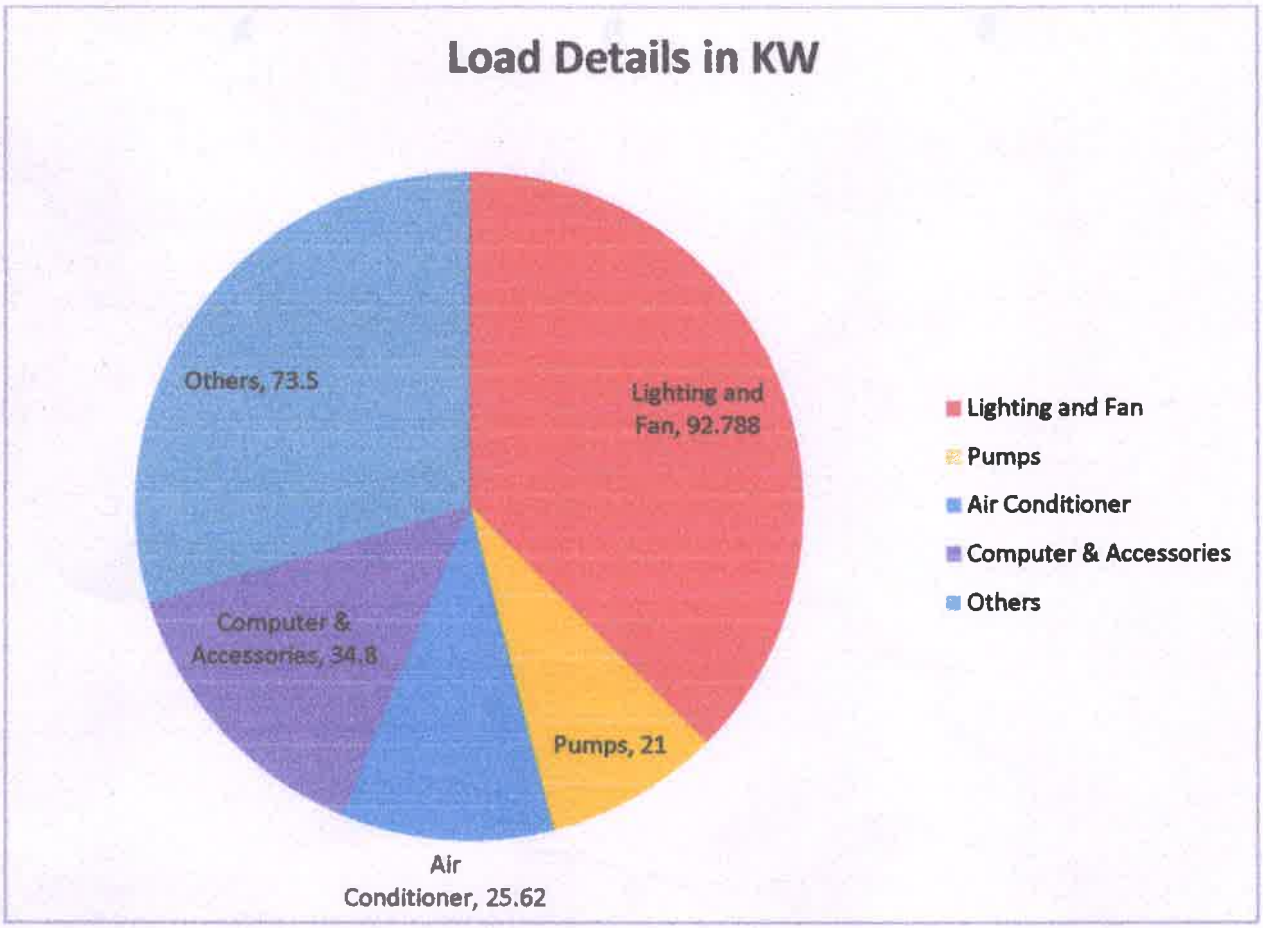
6. Energy Consumption Analysis

Load Type	Load Details in KW
Lighting and Fan	92.788
Pumps	21.000
Air Conditioner	25.620
Computer & Accessories	34.800
Others	73.500
Total	**247.708**



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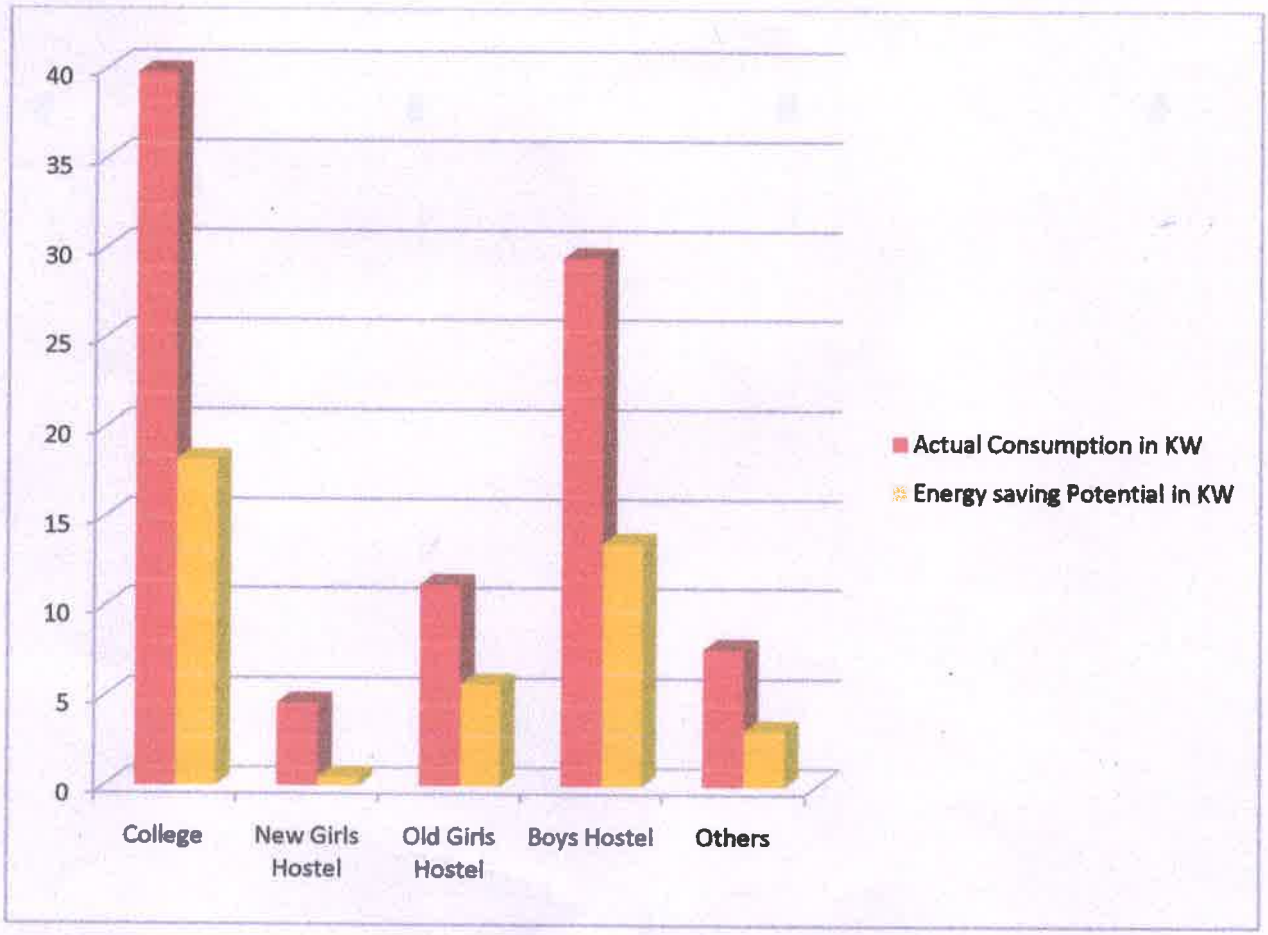
7. Lighting and Fan Power Consumption Analysis

Building	Actual Consumption in KW	Energy saving Potential in KW
College	39.8	18.2
New Girls Hostel	4.625	0.5
Old Girls Hostel	11.22	5.72
Boys Hostel	29.493	13.56
Others	7.65	3.14
Total	92.788	41.12



Energy consumption indicated in KWH

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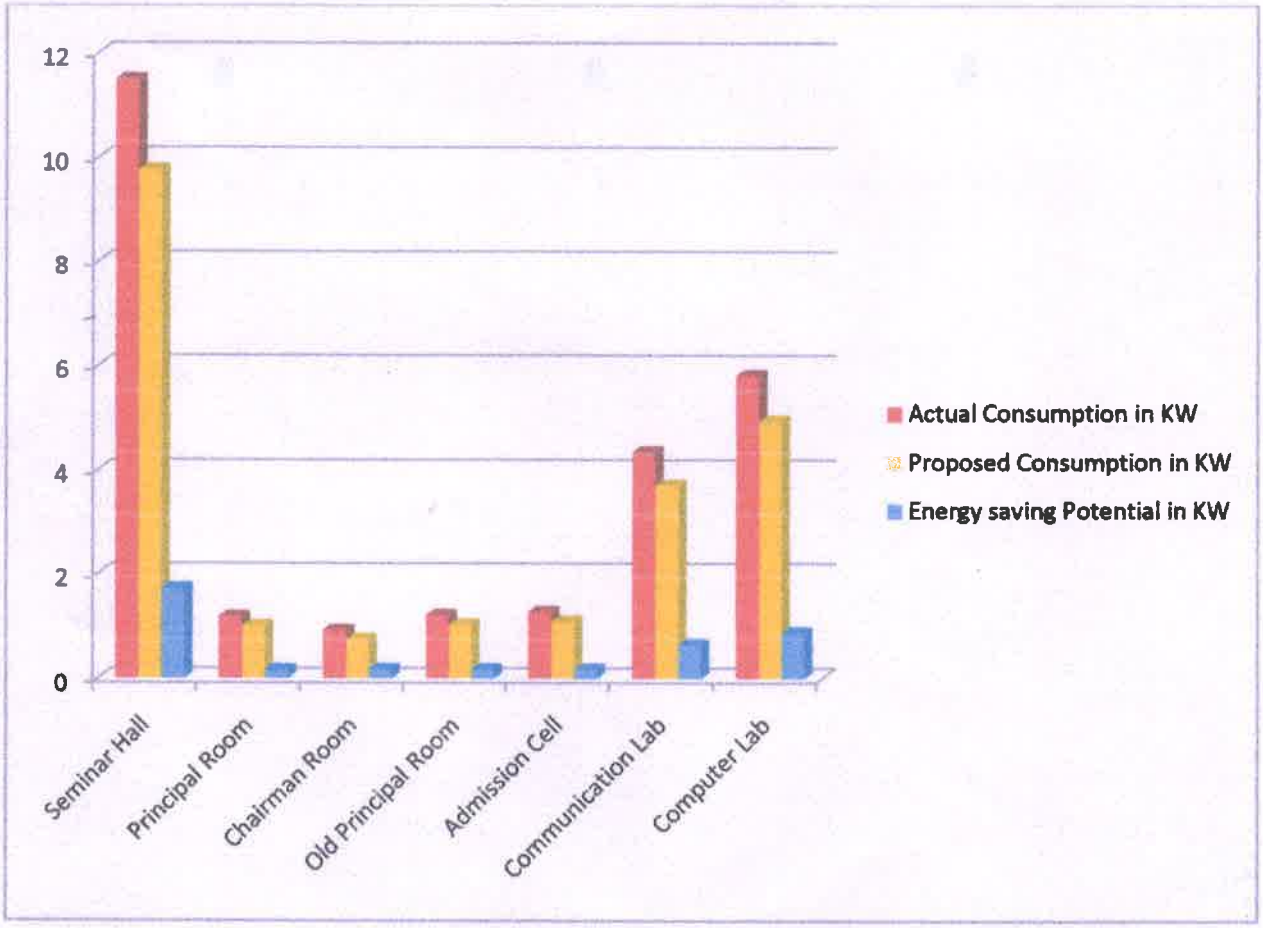
8. AC Energy Consumption Analysis

AC Location	Actual Consumption in KW	Proposed Consumption in KW	Energy saving Potential in KW
Seminar Hall	11.5	9.775	1.725
Principal Room	1.18	1.01	0.17
Chairman Room	0.92	0.75	0.18
Old Principal Room	1.21	1.03	0.18
Admission Cell	1.27	1.09	0.18
Communication Lab	4.35	3.71	0.64
Computer Lab	5.82	4.947	0.873
Total	26.25	22.312	3.948



Energy consumption indicated in KWH

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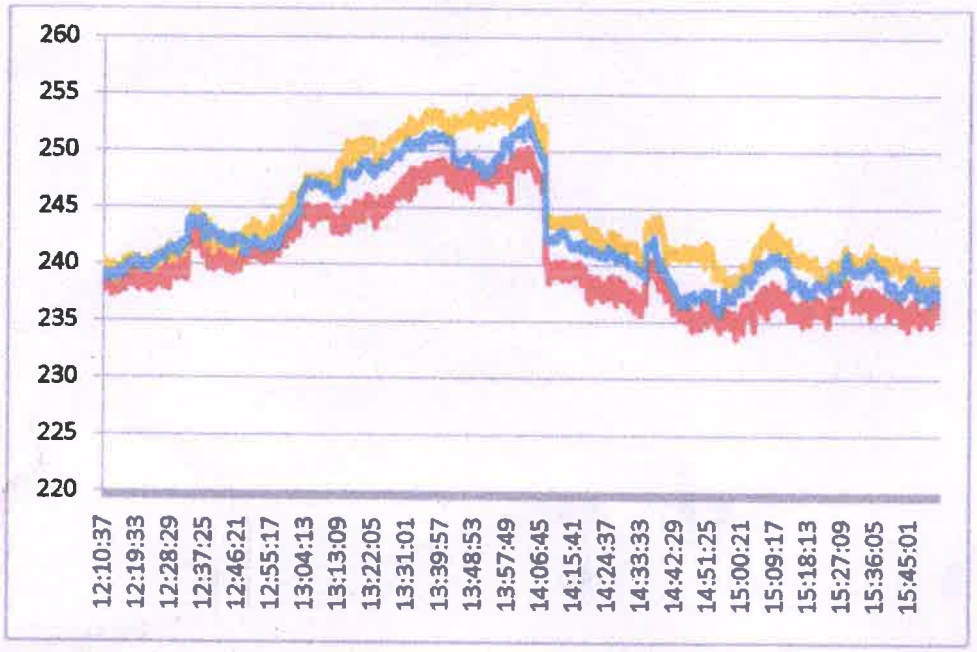
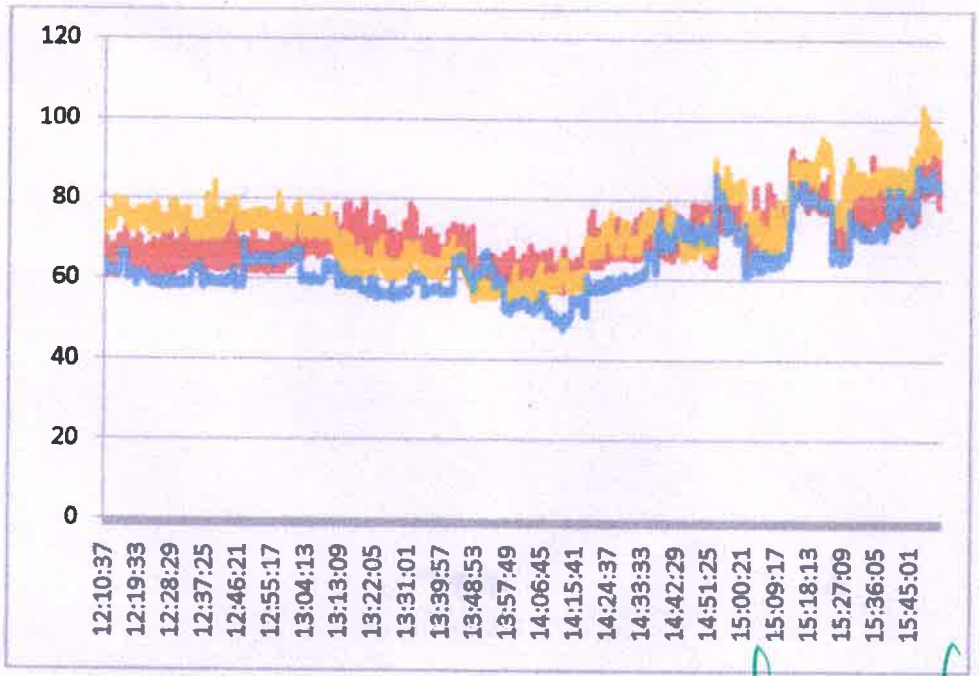
9. Main Incoming Trends

Voltage Trend



Current Trend



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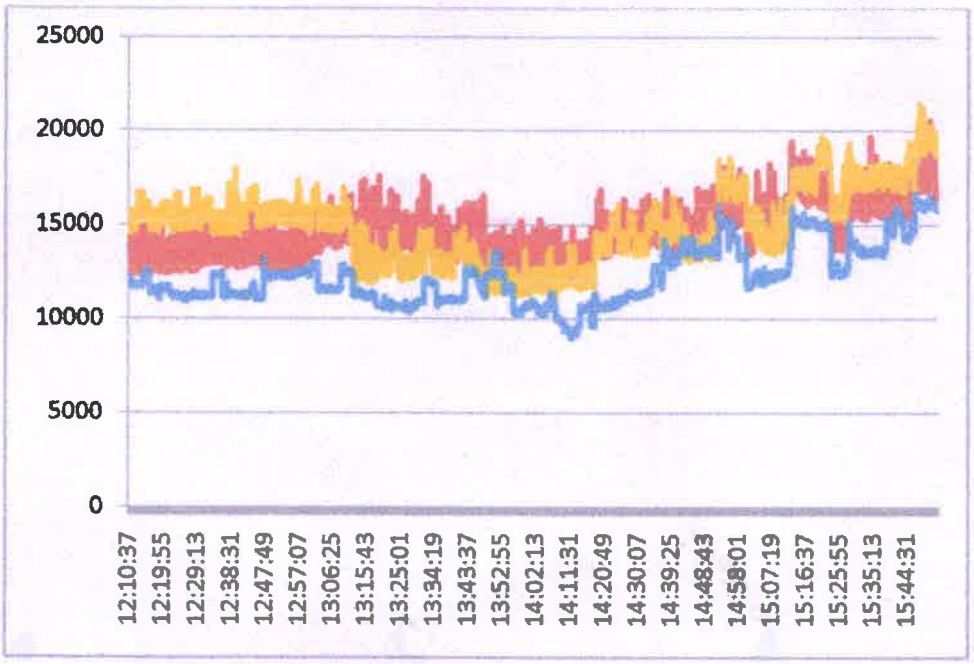
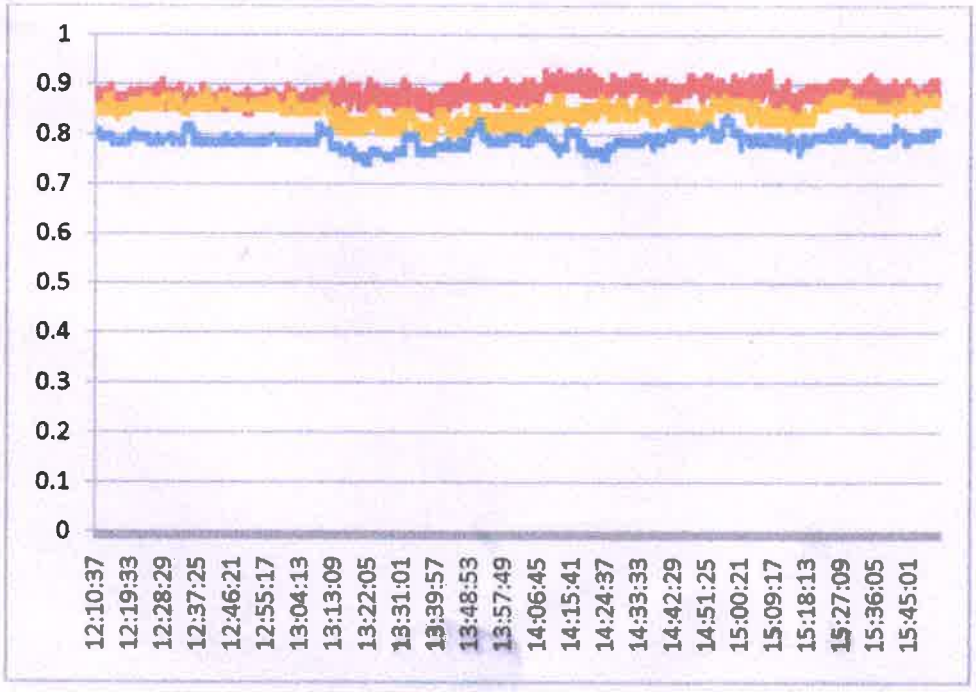
Power Trend



Power Factor Trend



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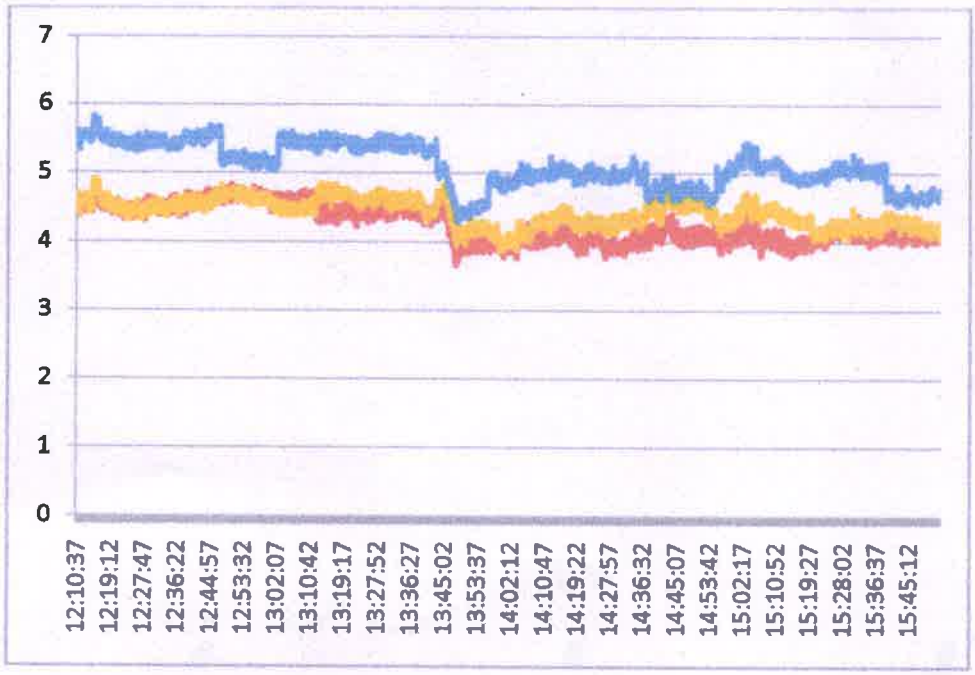
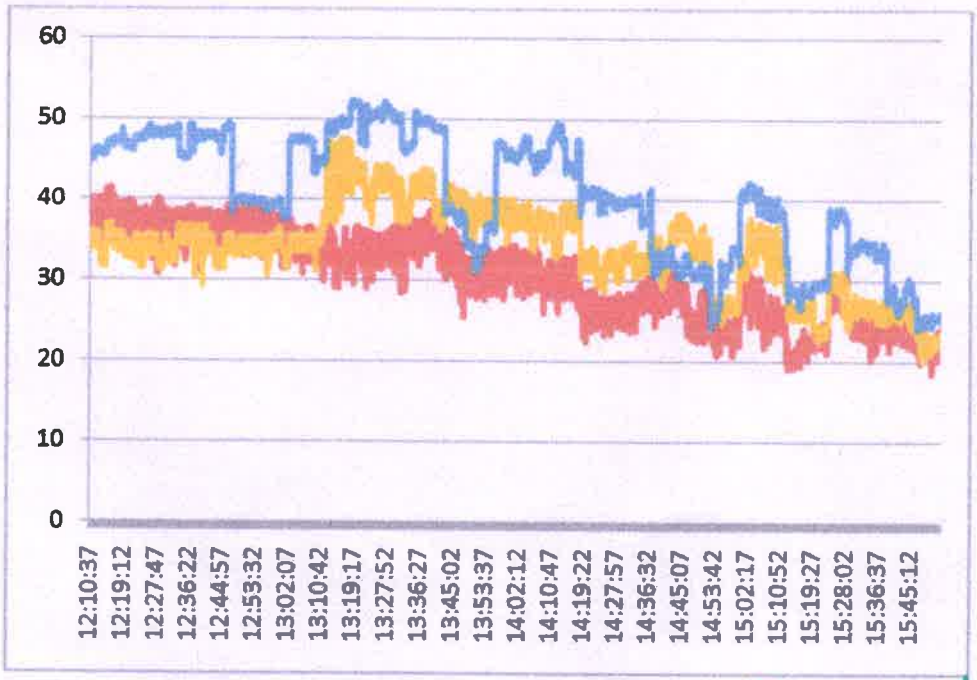
Voltage Harmonics Trend



Current Harmonics Trend



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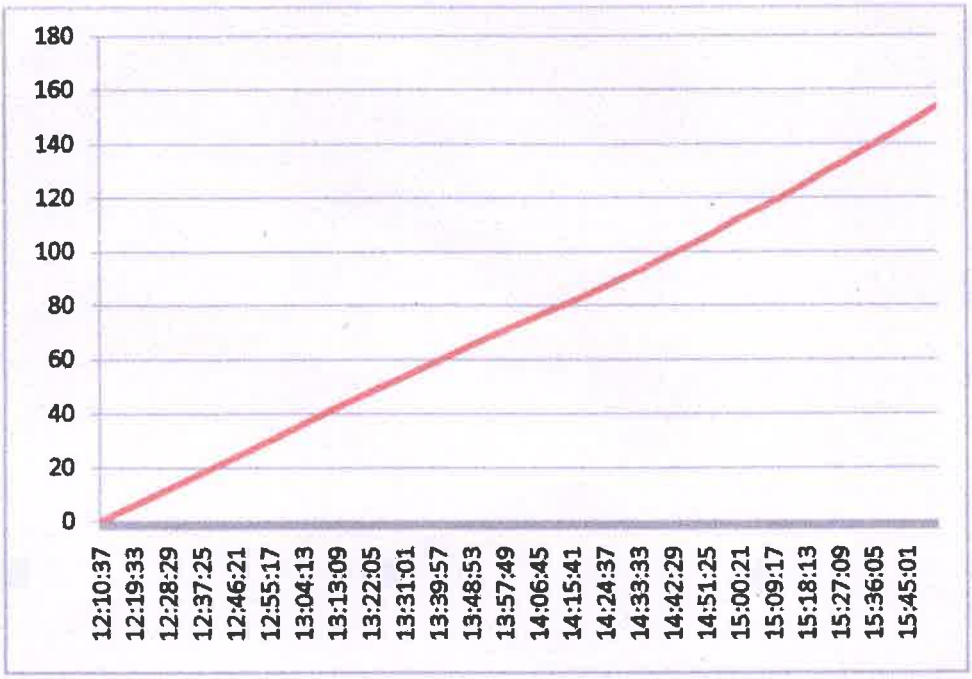
Active Energy Consumption



Key Points

- Average energy consumption is 28 KWH per hour in day time
- Both voltage harmonics and current harmonics are on higher side requires harmonics mitigation equipments at all UPS and Lighting Circuits
- Isolated earthing is needed for all UPS
- Some of the tube lights are conventional 40W bulbs and the same should be replaced with 20W LED tube light which gives same illumination. This saves 50% of energy bill.
- Fans which are used also conventional type 75W fans and the same should be replaced with 35W BLDC Fan which saves 53% energy bill.
- Power factor is in mid range. But still we can improve by the balancing the load in all phases up to the maximum extend and providing load side capacitors to the pumps.

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10. Lighting And Fan Energy Saving Potential

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Total	92.788	41.12

- In most of the places conventional tube lights are used which consumes around 40 watts. For the same light output we can use LED tube light which consumes 20 watts only. This action will reduce the power consumption by 50%.
- In the same way, the fans used in all places except news girl hostel are conventional type. The energy consumption of conventional fan is 75 watts and whereas for super fan it is only 35 watts. Hence we can save 53% of energy used in fan application
- In hostel and mess areas we can utilize PIR sensor based lighting system which will reduce energy consumption further. We can utilize PIR sensor at Varandha, Bath rooms, Toilets and mess area
- Even in recent advancement BLDC fans comes with auto speed reduction options which will reduce energy consumption further
- We may utilize auto diminishing controller for street light application will support our energy conservation activity.

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11. **AC Energy Saving Potential**

AC Location	Actual Consumption in KW	Proposed Consumption in KW	Energy saving Potential in KW
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Total	26.25	22.312	3.948

Air conditioner manufacturers make use of Thermodynamic thermostats alone when controlling compressors. Even with modern inverter drives this approach delivers limited opportunities for energy saving. Energy saver is comes with two temperature sensors for determining when work is needed from the air-conditioner.

The first sensor replicates the function of the thermodynamic (temperature) thermostat and is employed by energy saver to deliver the required fixed minimum room temperature as a priority.

The second sensor measures the temperature of the cold-supply air from the air-conditioner and this is used as a proxy to determine when the compressor has completed its hydraulic work of fully compressing the refrigerant gas.

Hence we can connect all the AC's with energy saver will leads to lot of Energy saving.

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12. Solar Power Plant

The maximum power consumption is between 9AM to 4 PM. Hence we can go for solar power plant which will reduce our TNEB power consumption and supports our green initiative. Based on the study we can go for 20KW plant as of now and can be connected at college panel. Thereby the power generated from the solar power plant can be utilized well enough.

20KW Solar power plant supply cost	=	9,55,500 /-
20KW Solar Power Plant Erection Cost	=	1,05,200 /-
Total solar power plant cost	=	10,60,700 /-
Depreciation cost of solar power plant	=	1,59,105 / -
Solar cost after depreciation	=	9,01,595 /-
Annual Solar Power generation	=	20 X 4.5 X 300
	=	27,000 KWH
Annual cost saving by using solar	=	27,000 X 7.5
	=	2,02,500 /-
Payback period of solar power Plant	=	5 years

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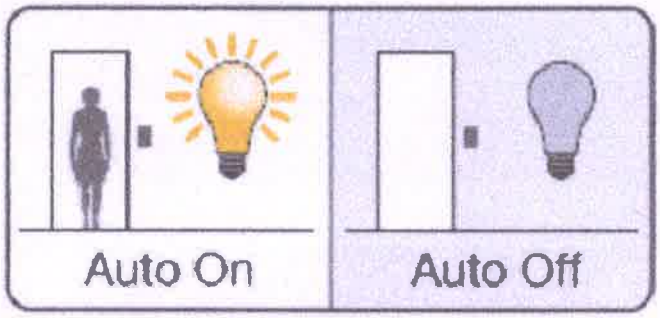
13. Points for Improvement

- Provide double earth to all the motors and panel boards as a safety measures.
- Provide MPD in all pumping application which is will protect your pumps from dry run.
- Provide automatic lighting on-off and trim control in all Street light and Varandha lighting circuits. Occupancy sensors function by switching the lights ON and OFF based on the occupancy of the room and are a smart way to save energy in commercial organizations.



- Use 5 star rated AC's in next replacement period will yield energy saving in AC's Energy consumption

Star Level	Energy Efficiency Ratio (From 01-01-2014 to 31-12-2015)	
	Minimum	Maximum
1 Star*	2.70	2.89
2 Stars**	2.90	3.09
3 Stars***	3.10	3.29
4 Stars****	3.30	3.49
5 Stars*****	3.50	

Energy and Cost Savings for 1.5 Ton Window or Split Air Conditioner at Different Star Ratings (under standard test conditions and as per latest BEE regulations)

Star Rating	Minimum Energy Star (Approx.) Efficiency Ratio (EER)	Maximum Cooling Capacity (Watts)	Input Power (Watts)	Units Consumption/ Day (kWh)	Electricity Cost/Day	Electricity Cost/Month (Rs)	Savings per Month (w.r.t. 1 star) (Rs)
1*	2.7	5,200	1,926	15.4	106	3,234	0
2**	2.9	5,200	1,793	14.34	100	3,011	223
3***	3.1	5,200	1,677	13.42	93.94	2,818	416
4****	3.3	5,200	1,575	12.6	88	2,652	582
5*****	3.5	5,200	1,486	11.89	83	2,497	737

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14.Audit Report

We have conducted the Energy audit at all important power distribution boards up to our maximum possible extend. The following results were obtained. **Measurements were taken at variable load conditions.**

- The energy saving potential in lighting and fans circuit is 44.32 KWH per hour at 100% loading, which is 49.8% saving at present condition.
- The energy saving potential in Air conditioner circuit is 3.948 KWH per hour at 100% loading, which is 15%
- The free energy generation by erecting 20KW solar panels to college load is 2250 KWH per month which is 50% of present energy consumption

For Sri Energy Solutions,

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BEE CERTIFIED ENERGY AUDITOR - EA22309
M.Rameshkumar

BEE Certified Energy Auditor

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Energy Audit Team	:	**1. M.Rameshkumar., B.E, M.B.A, PGDEEM&EA,** **BEE Certified Energy Auditor** **2. S.Hari Prasad.,B.E** **Trainee Engineer – Energy Audit**

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Index

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1. Introduction

J.K.K. Munirajah College of Technology is one of the leading higher education institutions under Anna university, chennai. This college was established by **Dr.J.K.K. Munirajah** in the year of 2008.

This college is located at T.N. palayam, Gobi, Erode. This college is having lot of courses in Engineering sector with complete equipped. It has been providing quality education to the rural and semi-urban students of Erode and Tiruppur district. This institution has three LTCT TNEB services and two backup generators. High quality panels and switch gears are connected with this service for giving quality supply to the equipments. The capacity of generator is also well enough to meet the demand.

This college is located is well away from main road which leads to dust free environment. More over college is concentrating much on Green garden with enough trees and plants. The water supplied inside the campus is good. On the next step, the management decided to conduct the Green audit in their institution to provide effective environment.

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2. Objectives

The main objectives of the green audit are to promote the environment management and conservation in the college campus. The purpose of the audit is to identify, quantify, describe and priorities framework environment sustainability in compliance with the applicable regulations, policies and standards. The main objectives of carrying out Green Audit are,

- To introduce and make aware students to real concerns of environment and its sustainability.
- To secure the environment and cut down the threats posed to human health by analyzing the pattern and the extent of resource use on the campus
- To establish a baseline data to assess future sustainability by avoiding the interruptions in environment that are more difficult to handle and their corrections requires high cost
- To bring out a present status report on environmental compliance

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3. Methodology

In order to perform green audit, the methodology included different techniques such as physical inspection of the campuses, observation and review of the documentation, interviewing key persons, and data analysis, measurements and recommendations. The study covered the following area to summarize the present status of environment management in the campuses:

- Water quality assessment, consumption and management
- Air quality assessment and management
- Electricity consumption and management
- Sound pollution monitoring
- Waste management
- Biodiversity status of the campus

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4. About the College

Institutional Vision

J.K.K. Munirajah college of technology seeks to become a centre of excellence by providing its students a comprehensive education with special emphasis on responsible citizenship, secular outlook, moral values and abiding faith in God expressed in active concern for others.

Objectives of the College

The college endeavors to prepare its students for fulfilling careers by enabling them to realize their full potential and by inculcating in them the spirit of intellectual enquiry, independent thinking, self- reliance, leadership, co- operation, expression of cultural talents and social service.

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5. Water Quality Assessment, Consumption and Management

Water quality analysis was conducted by Eutech PCS multi-parameter tester 35, uc turbidity meter 135 and Lutron DO-5509 meter.

BoreWell Water No.1

Parameter	Value
PH	8
P.Alkalinity	Nil
M.Alkalinity	450 ppm
H.Alkalinity	Nil
Total Alkalinity	450 ppm
Total Hardness	630 ppm
Total Dissolved solids	650 ppm

Borewell Water No.2

Parameter	Value
PH	8
P.Alkalinity	Nil
M.Alkalinity	425 ppm
H.Alkalinity	Nil
Total Alkalinity	425 ppm
Total Hardness	690 ppm
Total Dissolved solids	725 ppm

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Borewell Water No.3

Parameter	Value
PH	8
P.Alkalinity	Nil
M.Alkalinity	525 ppm
H.Alkalinity	Nil
Total Alkalinity	525 ppm
Total Hardness	680 ppm
Total Dissolved solids	850 ppm

RO Water

Parameter	Value
PH	6.5
P.Alkalinity	Nil
M.Alkalinity	50 ppm
H.Alkalinity	Nil
Total Alkalinity	50 ppm
Total Hardness	28 ppm
Total Dissolved solids	60 ppm

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RO Reject Water

Parameter	Value
PH	8
P.Alkalinity	Nil
M.Alkalinity	575 ppm
H.Alkalinity	Nil
Total Alkalinity	575 ppm
Total Hardness	870 ppm
Total Dissolved solids	1025 ppm

Water Doctor No.1

Parameter	Value
PH	6.5
P.Alkalinity	Nil
M.Alkalinity	50 ppm
H.Alkalinity	Nil
Total Alkalinity	50 ppm
Total Hardness	60 ppm
Total Dissolved solids	90 ppm

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Water Doctor No.2

Parameter	Value
PH	6.5
P.Alkalinity	Nil
M.Alkalinity	50 ppm
H.Alkalinity	Nil
Total Alkalinity	50 ppm
Total Hardness	70 ppm
Total Dissolved solids	100 ppm

Kitchen Water

Parameter	Value
PH	6.5
P.Alkalinity	Nil
M.Alkalinity	50 ppm
H.Alkalinity	Nil
Total Alkalinity	50 ppm
Total Hardness	28 ppm
Total Dissolved solids	68 ppm

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Boys Hostel Water

Parameter	Value
PH	8
P.Alkalinity	Nil
M.Alkalinity	450 ppm
H.Alkalinity	Nil
Total Alkalinity	450 ppm
Total Hardness	630 ppm
Total Dissolved solids	650 ppm

Girls Hostel Water

Parameter	Value
PH	8
P.Alkalinity	Nil
M.Alkalinity	425 ppm
H.Alkalinity	Nil
Total Alkalinity	425 ppm
Total Hardness	690 ppm
Total Dissolved solids	725 ppm

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Sample No	Location	MPN Index (per 100ml)	Water Quality
1	Class Room - GF	00	Outstanding (Potable)
2	Class Room - FF	00	Outstanding (Potable)
3	Class Room - SF	00	Outstanding (Potable)
4	Class Room - TF	00	Outstanding (Potable)
5	Staffs Room	00	Outstanding (Potable)
6	Canteen	00	Outstanding (Potable)
7	Tap Water	09	Good (Non-potable)
8	Bore water	54	Average (Non-potable)

- Main water uses in the campus
  - Drinking
  - Canteen
  - Toilet
  - Garden
  - Lab
  - Cleaning
  - Bathrooms
  - Washing
  - Construction works
  - Bus maintenance
- There are water treatment system to purify the water
- Water cooler with drinking water filtration is installed

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- Number of urinals and toilet – 75 Nos
- Number of waterless urinals - Nil
- Number of Bathroom – 220 Nos
- Number of Toilets – 220 Nos
- Number of water taps - 811 Nos
- Number of borewell - ..... 3 Nos
- Number of Open well - ..... 2 Nos
- Water pumps .... 5 Nos
- Quantity of water pumped - .... 160 KL including agriculture purpose
- Water charges paid – No water charges (No municipal water supply, using water from own well)
- Number of water tanks for storage – 10 Nos
- Amount of water stored – 42,000 Liters
- No meters fixed for water management
- Number of leaky water taps – 7 Nos
- There are signs reminding people to turn off the water
- Number of water fountain – 2 Nos
- Time of watering plants – 9AM to 5 PM
- Reasons for water wastage
    - Leakage from water taps
    - Over use of water
    - Overflow of water from motors
    - Unorganized watering of garden

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❖ Overall utilization of water in the college

Sections	Water use / day in KL
Garden	88 KL
College	20 KL
Hostel	44 KL
Bus wash	9 KL
Canteen	7 KL

Water Audit at J.K.K. College of Technology, Erode					
Activity	Water useper activity (litres)	Number of activity /day	Average water use/ person / day (litres)	Number of persons using water	Total water consumption / day (litres)
Hand wash	2L	Twice	1.5 L	626	1250
Bath	20-40	once	30L	50	1500
Toilet flush	6-20	once	10L	500	5000
Drinking (cup)	0.25	twice	0.5L	600	3000
Washing dishes	10	once	10L	450	4500
Leaking/dripping tap (1 drop/ second /day)	10-30	continuous		7	1680
garden use		once			88000
Canteen	All uses	once			7000
Cooking (average)		once			6500
Hostel uses	All uses	Twice	100	312	31200
Vehicle wash	All uses	once	300 L	30	9000
Total Water Use					1,58,630

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6. Air Quality Assessment, Consumption and Management

The following air quality parameters were measured using Airveda and government's official sites.

Parameter	Minimum Value	Maximum Value
PM 2.5	5	14
PM 10	16	22
O_3	19	43
NO_2	11	21
CO	160	330
Temp	25	34
Pressure	817	833
Humidity	45	67
Wind Speed	6	15

Present air pollution level is in the range of good due to less population and lighter transport. Lot of efforts is taking up to reduce the air pollutions. J.K.K. Munirajah college of technology developed good green belt. Still it needs to be improved.

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7. Energy Consumption Analysis

Load Type	Load Details in KW
Lighting and Fan	92.788
Pumps	21.000
Air Conditioner	25.620
Computer & Accessories	34.800
Others	73.500
Total	**247.708**

Building	Actual Consumption in KW	Energy saving Potential in KW
College	39.8	18.2
New Girls Hostel	4.625	0.5
Old Girls Hostel	11.22	5.72
Boys Hostel	29.493	13.56
Others	7.65	3.14
Total	92.788	41.12

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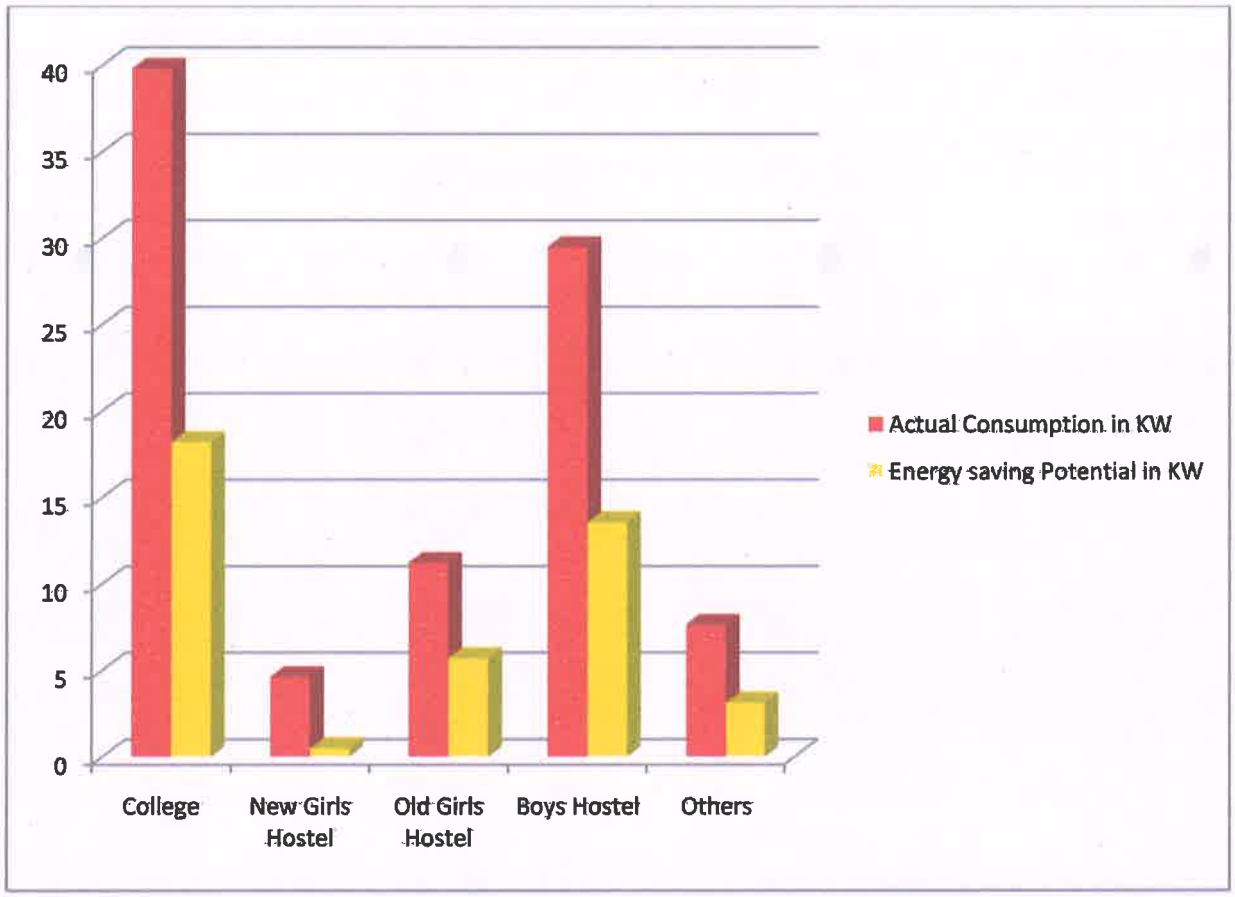
8. Lighting and Fan Power Consumption Analysis



Power consumption indicated in KWH

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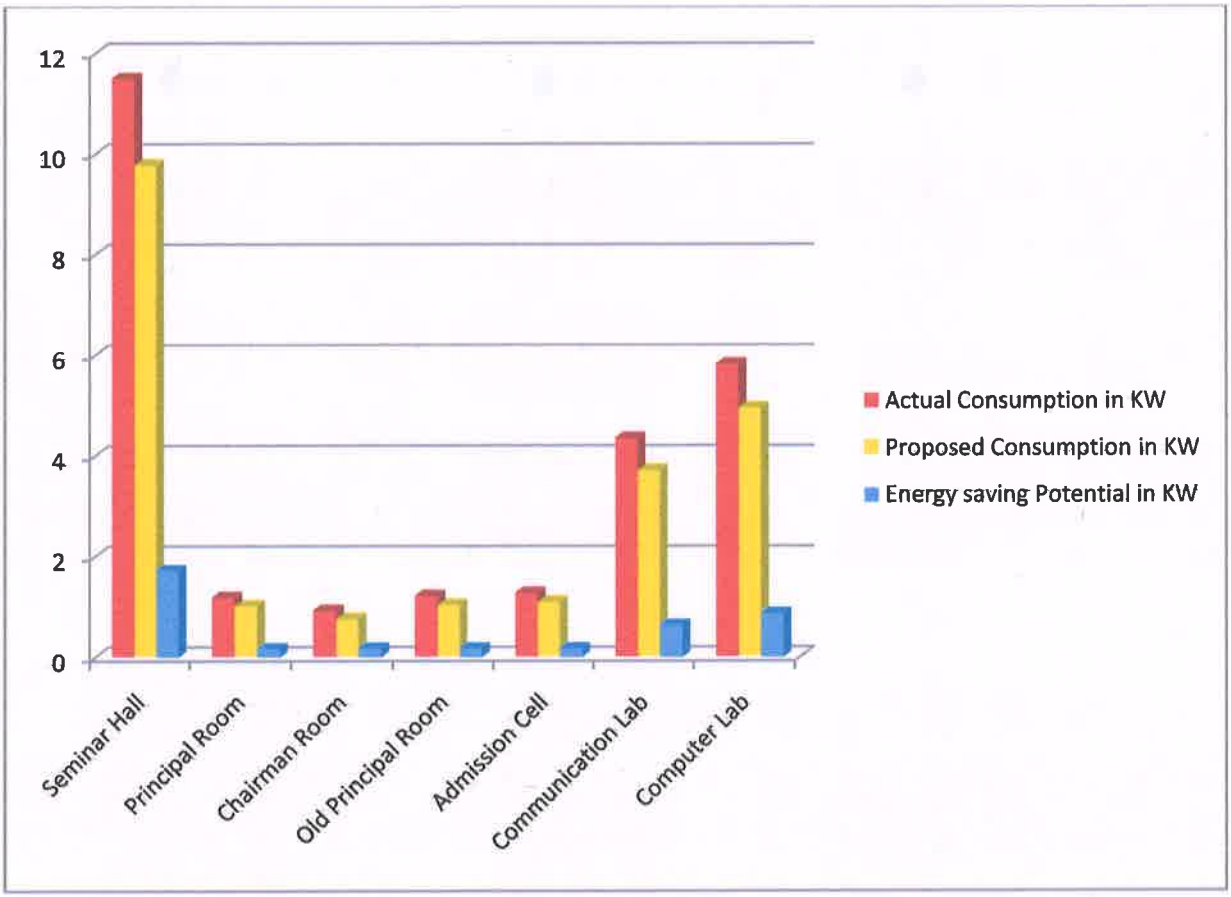
9. AC Power Consumption Analysis

AC Location	Actual Consumption in KW	Proposed Consumption in KW	Energy saving Potential in KW
Seminar Hall	11.5	9.775	1.725
Principal Room	1.18	1.01	0.17
Chairman Room	0.92	0.75	0.18
Old Principal Room	1.21	1.03	0.18
Admission Cell	1.27	1.09	0.18
Communication Lab	4.35	3.71	0.64
Computer Lab	5.82	4.947	0.873
Total	26.25	22.312	3.948



Energy consumption indicated in KWH

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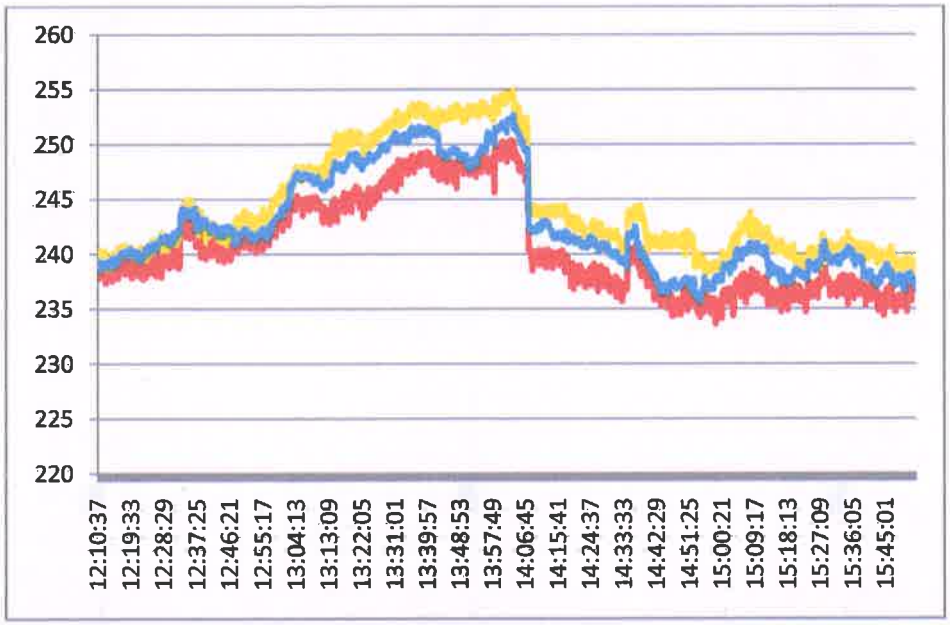
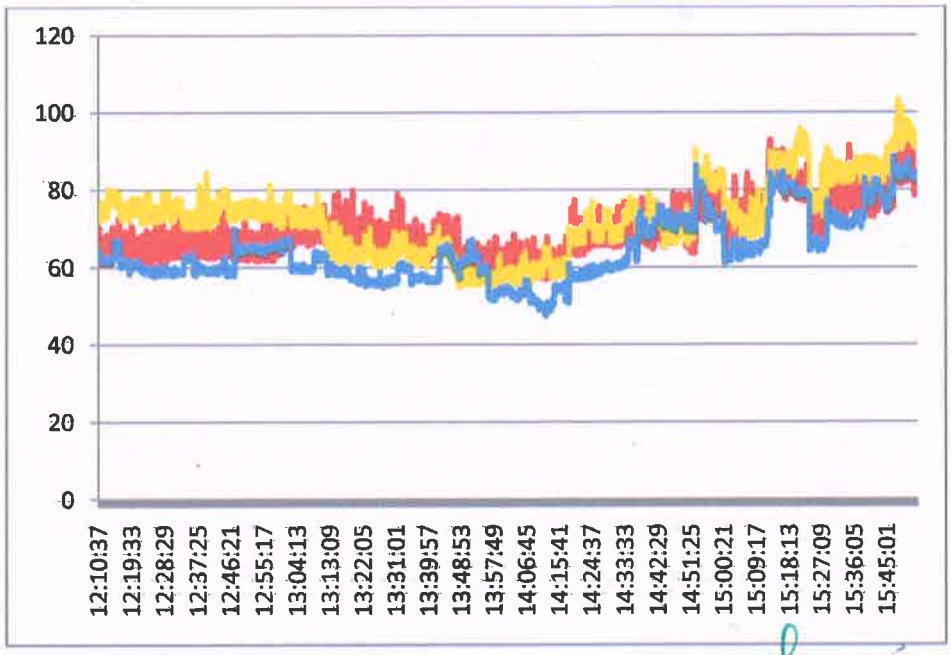
10. Main Incoming Trends

Voltage Trend



Current Trend



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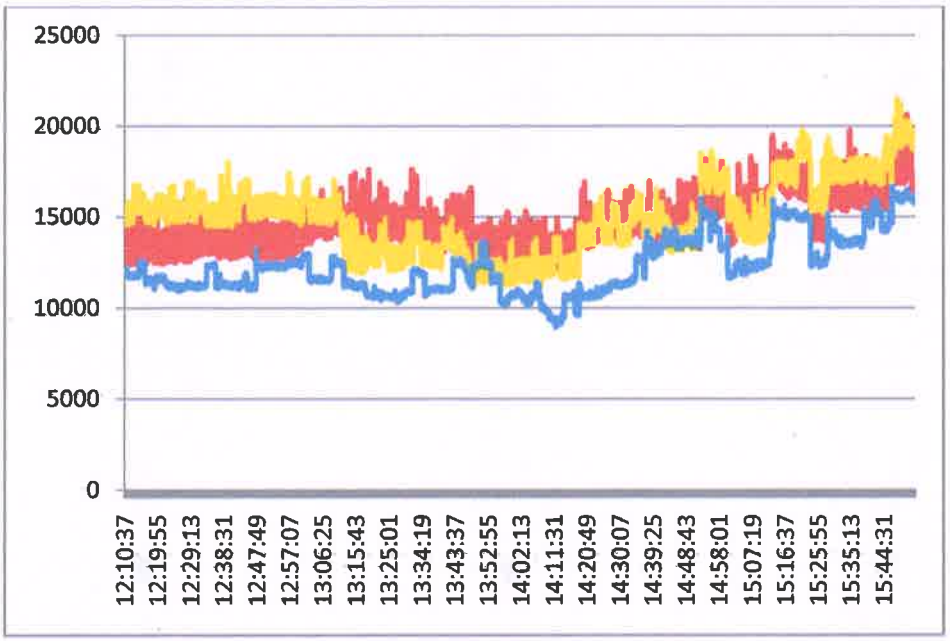
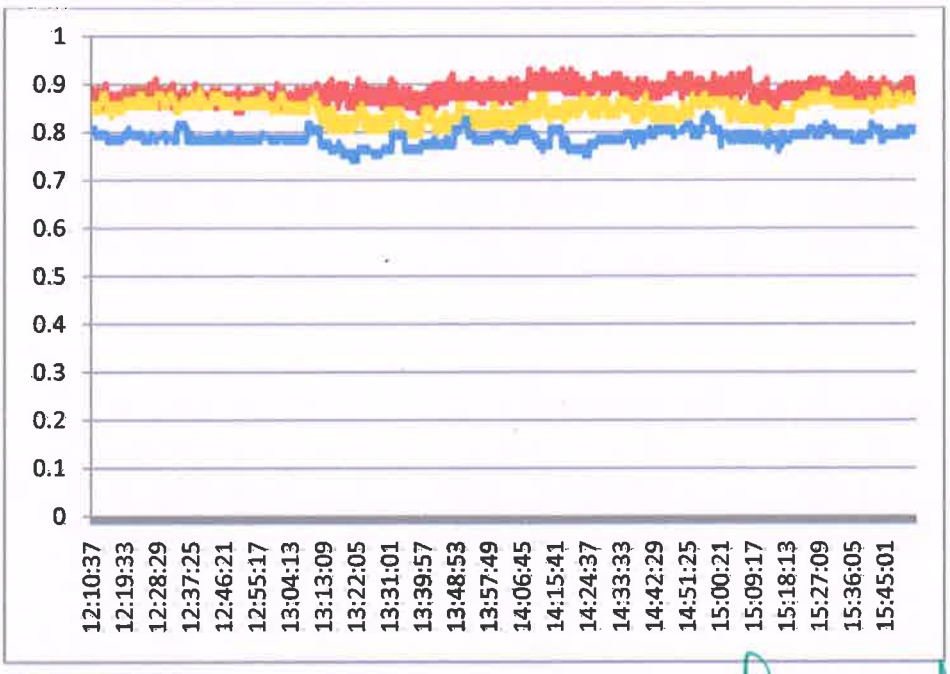
Power Trend



Power Factor Trend



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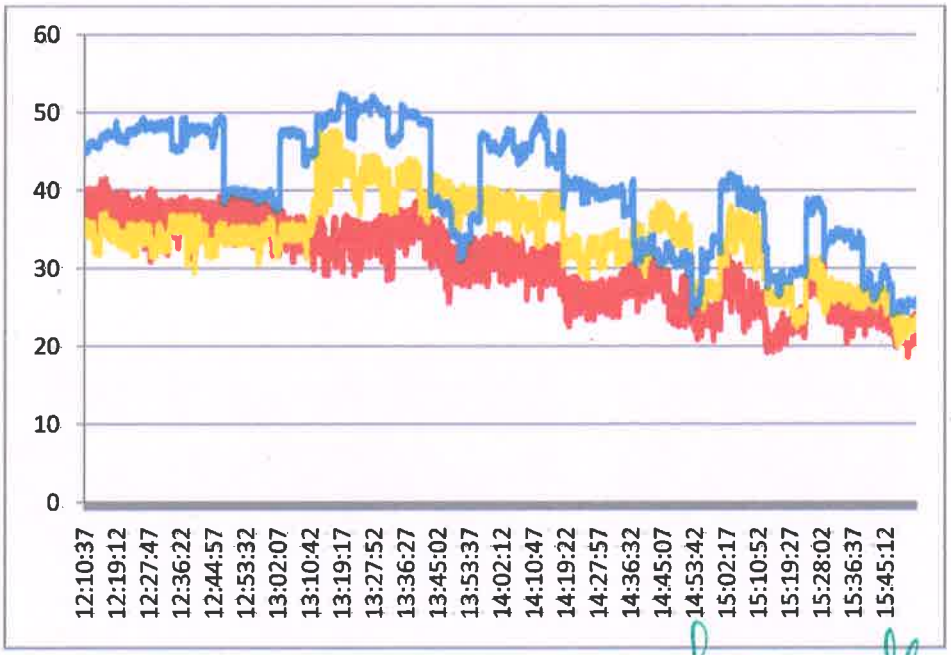
Voltage Harmonics Trend

Current Harmonics Trend



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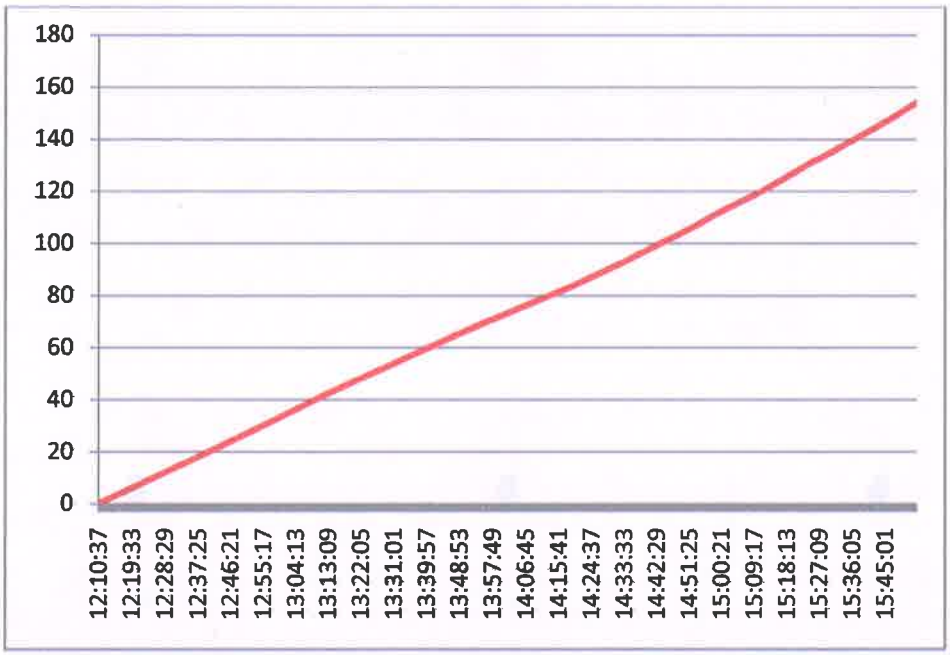
Active Energy Consumption



Key Points

- Average energy consumption is 28 KWH per hour in day time
- Both voltage harmonics and current harmonics are on higher side requires harmonics mitigation equipments at all UPS and Lighting Circuits
- Isolated earthing is needed for all UPS
- Some of the tube lights are conventional 40W bulbs and the same should be replaced with 20W LED tube light which gives same illumination. This saves 50% of energy bill.
- Fans which are used also conventional type 75W fans and the same should be replaced with 35W BLDC Fan which saves 53% energy bill.
- Power factor is in mid range. But still we can improve by the balancing the load in all phases up to the maximum extend and providing load side capacitors to the pumps.

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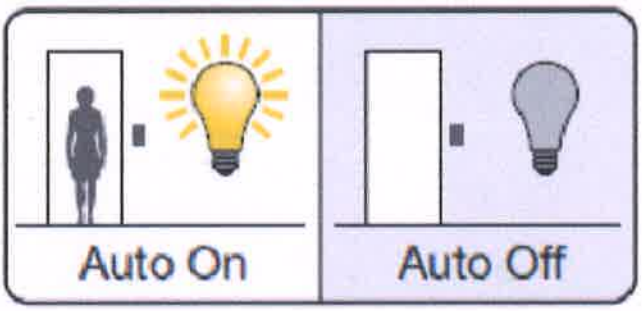
11. Points for Improvement

- Provide double earth to all the motors and panel boards as a safety measures.
- Provide MPD in all pumping application which is will protect your pumps from dry run.
- Provide automatic lighting on-off and trim control in all Street light and Varandha lighting circuits. Occupancy sensors function by switching the lights ON and OFF based on the occupancy of the room and are a smart way to save energy in commercial organizations.



- Use 5 star rated AC's in next replacement period will yield energy saving in AC's Energy consumption

	Energy Efficiency Ratio (From 01-01-2014 to 31-12-2015)	
Star Level	Minimum	Maximum
1 Star*	2.70	2.89
2 Stars**	2.90	3.09
3 Stars***	3.10	3.29
4 Stars****	3.30	3.49
5 Stars*****	3.50	

Energy and Cost Savings for 1.5 Ton Window or Split Air Conditioner at Different Star Ratings (under standard test conditions and as per latest BEE regulations)

Star Rating	Minimum Energy Star (Approx.) Efficiency Ratio (EER)	Maximum Cooling Capacity (Watts)	Input Power (Watts)	Units Consumption/ Day (kWh)	Electricity Cost/Day	Electricity Cost/Month (Rs)	Savings per Month (w.r.t. 1 star) (Rs)
1*	2.7	5,200	1,926	15.4	108	3,234	0
2**	2.9	5,200	1,793	14.34	100	3,011	223
3***	3.1	5,200	1,677	13.42	93.94	2,818	416
4****	3.3	5,200	1,575	12.6	88	2,652	582
5*****	3.5	5,200	1,486	11.89	83	2,497	737

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12. Sound Pollution Monitoring

Sound pollution is another important parameter that is taken into account for green auditing of the college campus. Sound is quantified by the Sound level meter (Lutron – SL4030)

Location	Average Sound Level (db)
Ground Floor	63
First Floor	57
Second Floor	59
Third Floor	55
Canteen	64
Main Gate	59
Hostel	48
Workshop	68
Power House	57
Library	51
Office	59
Principal Room	59
Conference Room	46
Reception	53
Play ground	67

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13. Waste Management

This indicator addresses waste production and disposal of different wastes like food, Paper, Plastic, glass, dust etc. Furthermore, solid waste often includes wasted material resources that could otherwise be channeled into better service through recycling, repair and reuse. For proper segregation and management, proper use of waste bins is the only solutions for waste management purpose in the college campus.

In J.K.K. Munirajah college of Technology, there is a practice of collecting the waste with colour coded bins. Each floor contains two or more sets of colour bins for proper waste management.

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Location	Number of Waste bins
College – Ground Floor	6 Nos
College – First Floor	6 Nos
College – Second Floor	6 Nos
College – Third Floor	6 Nos
Canteen	3 Nos
Hostel	6 Nos

- Total stake holders – 627
- Class rooms – 68
- Staffs Rooms - 3
- Office Rooms – 2
- E-waste – Computer, Electrical and electronics parts – Disposal by selling
- Plastic Waste – Disposal by selling
- Food waste – to municipal waste collection center
- Solid wastes – to municipal waste collection center
- Glass waste – No treatment
- Waste water – Urinals, washing, bathroom in soak Pits
- Napkin incinerator – 1

Quantity of waste generated:-

- Biodegradable – ½ kg/day (office)
- Non biodegradable – 0.1 kg/day (office)
- Biodegradable – 0.1kg/day (labs)
- Non-biodegradable – 0 kg/day (including glass bottles)
- Hazardous waste –50gm/day
- Biodegradable – 25 kgs/day (Canteen)

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14.Green Campus

- Total number of plant species identified – 390
- Tree cover of the campus - 13462 m^2
- Free space in the campus – 52500 m^2
- Garden area inside the college – 3.58 acres
- Total campus area – 25.62 Acres

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15. Carbon Footprint

- Petrol used by two wheelers/day–**100 L**

  (Per person to and fro 40 kms =1L)

- Fuel used by four wheelers (12 Persons) - **24 L**

  (Per person to and fro 40 kms = 2L)

- Fuel for persons (total 312 persons) travelling by common transportation = **461.6 L** (23.08 Ltr per bus)

- Fuel used by DG set - **6 L**

  (Based on average consumption per day)

- **Total fossil fuel use is 591.6 L / day**

- **Total fuel cost per day for transportation = Rs 42,595/-**

  (591.6 L x Rs 72)

- Cost of Gas cylinders used Rs. 54000/month (45 cylinders)

- Amount spent for transportation (office) – Rs. 4500/month (Approx.)

- Amount spent for transportation (canteen) – Rs. 4500/month

- Amount spent for transportation (visitors) – Rs. 13000/year

- Other expenditures for the energy – Rs. 638/day

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Burning of fossil fuels is the main source and cause of carbon dioxide release to the atmosphere. Carbon dioxide release for the stakeholders to reach the college is very high. It is contributing to the global warming and increasing the pace of climate change. If a College bus is fully utilised for the staff and students means carbon dioxide released for the stakeholders' commutation can be reduced. More trees are planted in the campus in order to make a source of sink for the carbon dioxide and for other green house gases.

List of eco friendly activities going on in the campus

- Planting and caring of trees in and around the campus.
- Timely disposal of wastes from the campus.
- Celebration of important days like World Environment Day, Ozone day, with great importance.
- Campus is declared plastic free.
- Management has decided to adopt green protocol
- Distribution of medicinal plant saplings among students

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16. Major Audit Observations

- The environmental awareness initiatives are substantial.
- The installation of solar panels are not initiated and needs to started at soon
- Training in vegetable cultivation and composting practices are inadequate.
- There is no Green policy/ environmental policy statement indicating the commitment of the college towards its environmental performance.
- Gardens inside the college premises are found well maintained.
- Attention needed in developing Herbal Gardens
- Use of notice boards and signs are inadequate to reduce over exploitation of natural resources.
- Programs on green initiatives have to be increased. Campus is declared plastic free, stringent actions should be taken to maintain this.
- Rain water harvesting systems, solar power generation, environmental education programs have to be strengthened.
- Lot of NSS program conducted related cleaning activities in villages around the college are appreciable.
- Water conservation committee is needs to be framed and monitored
- Energy Conservation group also needed
- Separate group is needed to plan and cultivate location based plants to reduce the water consumption of the Garden
- College should take initiative to educate the nearby village peoples about global warming and waste management through their programs

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17. Water Audit Findings

- There is ongoing installation of water consumption monitoring system in the college campus.
- The college does not have waste water treatment for waste water generated from laboratories, canteen, hostel kitchen, toilets, bathrooms and office rooms.
- Automatic switching system is needs to be installed for pump sets used for overhead tank filling.
- College has started to fix the aerators in existing taps to reduce the water consumption
- Display boards against the misuse of water use are needs to be improved.

18. Energy Audit

- The communication process for awareness in relation to energy conservation is found adequate.
- Monthly use of electricity in the college is very optimum
- Objectives for reducing energy, water and fuel consumption are merger.
- There are fans of older generation and non energy efficient which can be phase out by replacing with new energy efficient fans.
- New projects are going out with Energy efficient product is a good sign
- Regular monitoring of equipments and immediate rectification of any problems needed and monitored.
- Use of renewable energy is not sufficient. It needs great attention to reduce green house gas emission.

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19. Waste Audit

- ❖ Solid waste management systems established are sufficient.
- ❖ The college has proper communication with the local body for regular collection of solid waste from the campus.
- ❖ Waste bins in the class rooms, veranda, canteen and campus are adequate.
- ❖ Bio gas plant is not available
- ❖ Proper composting systems are lacking.
- ❖ Green chemistry labs are needs to be introduced.

20. Green Campus Audit

- ❖ Tree cover of the college with respect to the stakeholder strength is enough.
- ❖ Regular planting of trees in the campus are adequate.
- ❖ Display boards to all plants identified are lacking.
- ❖ Water uses for gardens are high.
- ❖ No arboretum is set up in the college campus.
- ❖ There is only very few fruit trees in the college to attract birds.
- ❖ Registry for flora and fauna on the campus is lacking.
- ❖ College needs to plant more herbal plants

21. Carbon Foot Print Audit

- College has not yet taken any initiative for carbon accounting.
- Encourage students to use cycles.
- 591 liters of fossil fuel is burned every day for the functioning of the college. This is too high carbon emission
- A huge amount such as Rs. 42,595 per day is spent as the cost of fossil fuel by the stakeholders.
- Usage of 45 gas cylinders per month is very high.

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22. Preparation of Action Plan

Policies referring to college's management and approach's towards the use of resources need to be considered. The college should have a green policy/environmental policy for its sustainable development. The environmental policy formulated by the management of the college should be implemented meticulously. The college should have a policy on awareness raising or training programs (for ground staff or kitchen staff for example) and college also should have a procurement policy (the College's policy for purchasing materials).

23. Follow Up Action and Plans

Green Audits are exercises which generate considerable quantities of valuable management information. The time and effort and cost involved in this exercise is often considerable and in order to be able to justify this expenditure, it is important to ensure that the findings and recommendations of the audit are considered at the correct level within the organisation and that action plans and implementation programs result from the findings.

Audit follow up is part of the wider process of continuous improvement. Without follow-up, the audit becomes an isolated event which soon becomes forgotten in the pressures of organisational priorities and the passing of time.

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24. Environmental Education

The following environmental education program may be implemented in the college before the next green auditing:-

- Training programs in solid waste management, liquid waste management, setting up of medicinal plant nursery, water management, vegetable cultivation, paddy cultivation, tree planting, energy management, landscape management, pollution monitoring methods, and rain water harvesting methods.

- Increase the number of display boards on environmental awareness such as – save water, save electricity, no wastage of food/water, no smoking, switch off light and fan after use, plastic free campus etc.

- Activate the environmental clubs

- Set up model rainwater harvesting system, rainwater pits, vegetable garden, medicinal plant garden, paddy fields etc. for providing proper training to the students.
- Conduct exhibition of recyclable waste products

- Implement chemical treatment system for waste water from the laboratories.

25. Awareness on Carbon Generation

- Students and Staff members may be made totally aware of pollution caused by use of vehicles.
- The awareness programs on carbon emission at individual as well as social level will help to avoid air and noise pollution in the campus due to vehicles.

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26. Conclusion and Full List of Recommendations

The green audit assists in the process of testing performance in the environmental arena and is fast becoming an indispensable aid to decision making in a college.

The green audit reports assist in the process of attaining an eco friendly approach to the sustainable development of the college. Hope that the results presented in the green auditing report will serve as a guide for educating the college community on the existing environment related practices and resource usage at the college as well as spawn new activities and innovative practices. A few recommendations are added to curb the menace of waste management using eco-friendly and scientific techniques. This may lead to the prosperous future in context of Green Campus and thus sustainable environment and community development.

It has been shown frequently that the practical suggestions, alternatives, and observations that have resulted from audits have added positive value to the audited organisation. An outside view, perspective and opinion often helps staff who have been too close to problems or methods to see the value of alternative approaches. A green audit report is a very powerful and valuable communications tool to use when working with various stakeholders who need to be convinced that things are running smoothly and systems and procedures are coping with natural changes and modifications that occur.

PRINCIPAL
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OF TECHNOLOGY
T.N. PALAYAM (Po)-638 506.
GOBI (Tk), ERODE (Dt).

27. Common Recommendations

- ❖ Adopt an environmental policy for the college as in annexure D
- ❖ Establish a purchase policy for environmental friendly materials
- ❖ Conduct more seminars and group discussions on environmental education
- ❖ Students and staff can be permitted to solve local environmental problems
- ❖ Renovation of cooking system in the canteen to save gas
- ❖ Establish water, waste and energy management systems

28. Criteria Wise Recommendations

Water

- ➢ Remove damaged taps and install sensitive taps is possible.
- ➢ Drip irrigation for gardens and vegetable cultivation can be initiated.
- ➢ Install Meters to monitor the water use
- ➢ Establish water treatment systems.
- ➢ Use waterless urinals
- ➢ Spray the water to the garden in the early morning of the day
- ➢ Use aerator in the taps to reduce the water consumption and wastage
- ➢ Use treated water for bus wash and other toilet use
- ➢ Conduct leak test at least once in two months
- ➢ Use water efficient garden techniques to reduce the water consumptions in garden
- ➢ Rain water harvesting system needs to be improved
- ➢ Awareness programs on water conservation to be conducted.
- ➢ Install display boards to control over exploitation of water.

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JKK MUNIRAJAH COLLEGE
OF TECHNOLOGY
T.N. PALAYAM (Po)-638 506.
GOBI (Tk), ERODE (Dt).

Energy

- Conventional Fans needs to be replaced with energy efficient BLDC Fans.
- Conduct more save energy awareness programs for students and staff.
- Try to install more solar panels to reduce the green house gas emission
- Optimise the energy usage
- Automatic power on/off systems may be introduced.

Waste

- Establish a functional bio gas plant.
- A model solid waste treatment system to be established.
- A model Vermi composting plant to be set up in the college campus.
- Maintain a plastic free campus.
- Avoid paper plates and cups for all functions in the college.

Green Campus

- All trees in the campus should be named scientifically.
- Create more space for planting.
- Grow potted plants at both verandah and class rooms.
- Create automatic drip irrigation system during summer holidays.
- Not just celebrating environment day but making it a daily habit.
- Beautify the college building with indoor plants
- Providing funds to nature club for making campus more green
- Encouraging students not just through words, but through action for making the campus green
- Conducting competitions among departments for making students more interested in making the campus green.

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T.N. PALAYAM (Po)-638 506.
GOBI (Tk), ERODE (Dt).

Carbon footprint

- Establish a system of car pooling among the staff to reduce the number of four wheelers coming to the college.
- Increase effective use of college bus services to the students and staff.
- Encourage students and staff to use cycles.
- Establish a more efficient cooking system to save gas.
- Discourage the students using two wheelers for their commutation.
- More use of generators every day should be discouraged.

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T.N. PALAYAM (Po)-638 506.
GOBI (Tk), ERODE (Dt).

29.Audit Report

We have conducted the Green audit at all important areas up to our maximum possible extend. We found some points in alternate energy use and waste management are needed attention. Overall performance of college is found satisfactory.

For Sri Energy Solutions,

M. RAMESHKUMAR,B.E.,MBA.,
BEE CERTIFIED ENERGY AUDITOR - EA22303

M.Rameshkumar

BEE Certified Energy Auditor

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OF TECHNOLOGY
T.N. PALAYAM (Po)-638 506.
GOBI (Tk), ERODE (Dt).

Annexure – A

Details of the Program offered

- U.G.Courses
  - Computer Science and Engineering
  - Electronics and Communication Systems
  - Mechanical Engineering
  - Electrical and Electronics Engineering
  - Civil Engineering
  - Automobile Engineering
  - Information technology

- P.G.Course
  - Master of Business Administration
  - Master of Computer Application
  - ME – Computer Science and Engineering
  - ME – Applied Electronics
  - ME – Power Electronics and Drives
  - ME –Manufacturing Engineering

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Annexure – E

Center for Sustainability

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T.N. PALAYAM (Po)-638 506.
GOBI (Tk), ERODE (Dt).

Environment Audit Report

of

J.K.K. Munirajah College of Technology, Erode

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Environment Audit

Done by

Sri Energy Solutions

21/08/2020

Project Report Title	:	**Environment Audit**
Client Name	:	**J.K.K. Munirajah College of Technology**
Plant Location	:	**T.N. Palayam Post,** **Gobi Taluk,** **Erode District – 638 506**
Date of Audit	:	**22nd August 2020**
Energy Audit by	:	**M/s. Sri Energy Solutions, Udumalpet**
Energy Audit Team	:	**1. M.Rameshkumar., B.E, M.B.A, PGDEEM&EA,** **BEE Certified Energy Auditor** **2. S.Hari Prasad.,B.E** **Trainee Engineer – Energy Audit**

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T.N. PALAYAM (Po)-638 506.
GOBI (Tk), ERODE (Dt).

Acknowledgement

Sri Energy Solutions acknowledge with hearty thanks to **Dr.Munirajahh.J.K.K, Chairman, Mrs.Vasanthakumari Munirajahh.M, Trusty member, Mr.Kirubhakar Murali.M, Trusty member and Mrs.Kasthuripriya, Secretary, J.K.K. Munirajah college of Technology, Erode** for them support for carrying out this audit.

Our special thanks to **Dr.K.Sridharan – Principal, Mrs.V.Mohanapriya – HOD (Civil) and Mr.P.Eswaran – AP (Auto)** for their co-operation and support us to carry out the Green audit on time.

In addition with this, we are grateful to your staffs **Mr.K.Suresh and Mr.Alagesan** for their co-operation and support us to carry out the Environment audit very effectively.

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OF TECHNOLOGY
T.N. PALAYAM (Po)-638 506.
Gobi (Tk), ERODE (Dt).

Index

PRINCIPAL
JKK MUNIRAJAH COLLEGE
OF TECHNOLOGY
T.N. PALAYAM (Po)-638 506.
GOBI (Tk), ERODE (Dt).

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1. Introduction

J.K.K. Munirajah College of Technology is one of the leading higher education institutions under Anna university, chennai. This college was established by **Dr.J.K.K. Munirajah** in the year of 2008.

This college is located at T.N. palayam, Gobi, Erode. This college is having lot of courses in Engineering sector with complete equipped. It has been providing quality education to the rural and semi-urban students of Erode and Tiruppur district. This institution has three LTCT TNEB services and two backup generators. High quality panels and switch gears are connected with this service for giving quality supply to the equipments. The capacity of generator is also well enough to meet the demand.

This college is located is well away from main road which leads to dust free environment. More over college is concentrating much on Green garden with enough trees and plants. The water supplied inside the campus is good. On the next step, the management decided to conduct the environment audit in their institution to provide effective environment.

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T.N. PALAYAM (Po)-638 506,
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2. Objectives

The main objectives of the environment audit are to promote the environment management and conservation in the college campus. The purpose of the audit is to identify, quantify, describe and priorities framework environment sustainability in compliance with the applicable regulations, policies and standards. The main objectives of carrying out Green Audit are,

- To check that the natural resources are properly utilized and to control the adverse effect on the environment
- To check that proper steps have been undertaken for maintaining health, welfare of the community and also for dispersal of harmful wastes and social risks
- To introduce and make aware students to real concerns of environment and its sustainability.
- To secure the environment and cut down the threats posed to human health by analyzing the pattern and the extent of resource use on the campus
- To establish a baseline data to assess future sustainability by avoiding the interruptions in environment that are more difficult to handle and their corrections requires high cost
- To bring out a present status report on environmental compliance

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T.N. PALAYAM (Po)-638 506.
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3. Methodology

In order to perform environemnt audit, the methodology included different techniques such as physical inspection of the campuses, observation and review of the documentation, interviewing key persons, and data analysis, measurements and recommendations. The study covered the following area to summarize the present status of environment management in the campuses:

- Water quality assessment, consumption and management
- Air quality assessment and management
- Electricity consumption and management
- Sound pollution monitoring
- Waste management
- Biodiversity status of the campus
- Environment awareness development
- Developing green belt
- Encouraging alternate energy use

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T.N. PALAYAM (Po)-638 506.
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4. About the College

Institutional Vision

J.K.K. Munirajah college of technology seeks to become a centre of excellence by providing its students a comprehensive education with special emphasis on responsible citizenship, secular outlook, moral values and abiding faith in God expressed in active concern for others.

Objectives of the College

The college endeavors to prepare its students for fulfilling careers by enabling them to realize their full potential and by inculcating in them the spirit of intellectual enquiry, independent thinking, self- reliance, leadership, co- operation, expression of cultural talents and social service.

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T.N. PALAYAM (Po)-638 506.
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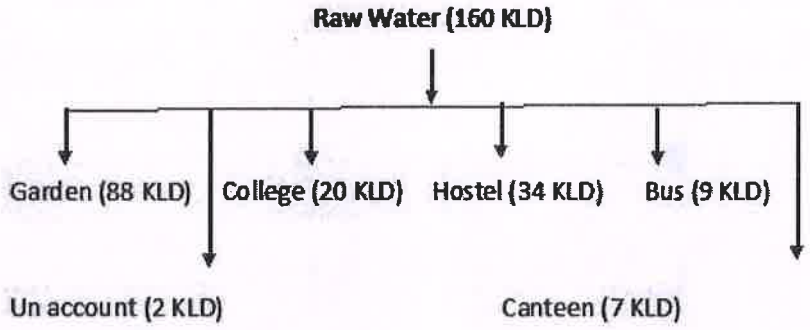
5. Water Quality Assessment, Consumption and Management

In J.K.K. Munirajah college of technology have three bore wells and two open wells. The college extracts around 160 KLD of water from bore well and utilizing to the college uses.

The water balance chart of college is given below,



The MPN index of water samples at different locations are given below,

Sample No	Location	MPN Index (per 100ml)	Water Quality
1	Class Room - GF	00	Outstanding (Potable)
2	Class Room - FF	00	Outstanding (Potable)
3	Class Room - SF	00	Outstanding (Potable)
4	Class Room - TF	00	Outstanding (Potable)
5	Staffs Room	00	Outstanding (Potable)
6	Canteen	00	Outstanding (Potable)
7	Tap Water	09	Good (Non-potable)
8	Bore water	54	Average (Non-potable)

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OF TECHNOLOGY
T.N. PALAYAM (Po)-638 506.
GOBI (Tk), ERODE (Dt).

The following actions can be taken up to reduce the water usage and save environment for future generations

- Fixing of Aerators in all taps
- Scheduled watering to garden especially in early morning or late evening
- Usage waterless urinals
- Storing rain water and maintaining rain water collection pits
- Fixing of metering system to monitor water usage
- Fixing display board to advice about water usage reduction
- Providing trip irrigation to garden to reduce water usage
- Form water conservation committee and use them to reduce water consumption and management
- Conduct water conservation program to students and nearby villages in order to save water
- Construct water treatment plant to treat the waste water and reuse it for bus cleaning and other cleaning purpose
- Conduct water leak test once in a month to reduce water wastage through leak

Most of the above points were discussed with top management and agreed to take immediate actions to conserve water.

College has good practice of using water to garden. Thereby nowhere waste water discharged as it is. Still we can try to treat this waste water and can be used to all other purpose.

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T.N. PALAYAM (Po)-638 506.
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6. Air Quality Assessment, Consumption and Management

The following air quality parameters were measured using Airveda and government's official sites.

Parameter	Minimum Value	Maximum Value
PM 2.5	5	14
PM 10	16	22
O_3	19	43
NO_2	11	21
CO	160	330
Temp	25	34
Pressure	817	833
Humidity	45	67
Wind Speed	6	15

Present air pollution level is in the range of good due to less population and lighter transport. Lot of efforts is taking up to reduce the air pollutions. J.K.K. Munirajah college of technology developed good green belt. Still it needs to be improved.

The location of this college is so away from busy roads. Thereby the college students and staffs are enjoying high quality air and less noise. Moreover the college is maintaining lot of garden and tress to give more than enough clean air than what is required. As per the air sector the college is performing so better.

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OF TECHNOLOGY
T.N. PALAYAM (Po)-638 506.
GOBI (Tk), ERODE (Dt).

7. Energy Consumption Analysis

Load Type	Load Details in KW
Lighting and Fan	92.788
Pumps	21.000
Air Conditioner	25.620
Computer & Accessories	34.800
Others	73.500
Total	**247.708**

Building	Actual Consumption in KW	Energy saving Potential in KW
College	39.8	18.2
New Girls Hostel	4.625	0.5
Old Girls Hostel	11.22	5.72
Boys Hostel	29.493	13.56
Others	7.65	3.14
Total	92.788	41.12

Key Points

- Average energy consumption is 28 KWH per hour in day time
- Both voltage harmonics and current harmonics are on higher side requires harmonics mitigation equipments at all UPS and Lighting Circuits
- Isolated earthing is needed for all UPS
- Some of the tube lights are conventional 40W bulbs and the same should be replaced with 20W LED tube light which gives same illumination. This saves 50% of energy bill.
- Fans which are used also conventional type 75W fans and the same should be replaced with 35W BLDC Fan which saves 53% energy bill.
- Power factor is in mid range. But still we can improve by the balancing the load in all phases up to the maximum extend and providing load side capacitors to the pumps.

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OF TECHNOLOGY
T.N. PALAYAM (Po)-638 506.
GOBI (Tk), ERODE (Dt).

8. Sound Pollution Monitoring

Sound pollution is another important parameter that is taken into account for green auditing of the college campus. Sound is quantified by the Sound level meter (Lutron – SL4030)

Location	Average Sound Level (db)
Ground Floor	63
First Floor	57
Second Floor	59
Third Floor	55
Canteen	64
Main Gate	59
Hostel	48
Workshop	68
Power House	57
Library	51
Office	59
Principal Room	59
Conference Room	46
Reception	53
Play ground	67

This college is located so away from busy roads makes the environment very calm. It offers pleasant environment which is very essential for good education.

PRINCIPAL
JKK MUNIRAJAH COLLEGE
OF TECHNOLOGY
T.N. PALAYAM (Po)-638 506.
GOBI (Tk), ERODE (Dt).

9. Waste Management

This indicator addresses waste production and disposal of different wastes like food, Paper, Plastic, glass, dust etc. Furthermore, solid waste often includes wasted material resources that could otherwise be channeled into better service through recycling, repair and reuse. For proper segregation and management, proper use of waste bins is the only solutions for waste management purpose in the college campus.

In J.K.K. Munirajah college of Technology, there is a practice of collecting the waste with colour coded bins. Each floor contains two or more sets of colour bins for proper waste management.

PRINCIPAL
JKK MUNIRAJAH COLLEGE
OF TECHNOLOGY
T.N. PALAYAM (Po)-638 506.
GOBI (Tk), ERODE (Dt).

Location	Number of Waste bins
College – Ground Floor	6 Nos
College – First Floor	6 Nos
College – Second Floor	6 Nos
College – Third Floor	6 Nos
Canteen	3 Nos
Hostel	6 Nos

Moreover the college has placed lot of display boards to reduce the waste generation which aids to maintain good environment system inside the college campus.

PRINCIPAL
JKK MUNIRAJAH COLLEGE
OF TECHNOLOGY
T.N. PALAYAM (Po)-638 506.
GOBI (Tk), ERODE (Dt).

PRINCIPAL
JKK MUNIRAJAH COLLEGE
OF TECHNOLOGY
T.N. PALAYAM (Po)-638 506.
GOBI (Tk), ERODE (Dt).

10.Green Campus

- Total number of plant species identified – 390
- Tree cover of the campus - 13462 m^2
- Free space in the campus – 52500 m^2
- Garden area inside the college – 3.58 acres
- Total campus area – 25.62 Acres

The college has maintaining lot of Plants and trees which helps the college surrounding looks more pleasant. This gives pleasant air with good thermal comfort to the students. In addition with all the class rooms were equipped with sufficient Window to floor ratio and enough number of ceiling fans.

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OF TECHNOLOGY
T.N. PALAYAM (Po)-638 506.
GOBI (Tk), ERODE (Dt).

11. Carbon Footprint

- Petrol used by two wheelers/day–**100 L**

  (Per person to and fro 40 kms =1L)

- Fuel used by four wheelers (12 Persons) - **24 L**

  (Per person to and fro 40 kms = 2L)

- Fuel for persons (total 312 persons) travelling by common transportation = **461.6 L** (23.08 Ltr per bus)

- Fuel used by DG set - **6 L**

  (Based on average consumption per day)

- **Total fossil fuel use is 591.6 L / day**

- **Total fuel cost per day for transportation = Rs 42,595/-**

  (591.6 L x Rs 72)

- Cost of Gas cylinders used Rs. 54000/month (45 cylinders)

- Amount spent for transportation (office) – Rs. 4500/month (Approx.)

- Amount spent for transportation (canteen) – Rs. 4500/month

- Amount spent for transportation (visitors) – Rs. 13000/year

- Other expenditures for the energy – Rs. 638/day

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OF TECHNOLOGY
T.N. PALAYAM (Po)-638 506.
GOBI (Tk), ERODE (Dt).

Burning of fossil fuels is the main source and cause of carbon dioxide release to the atmosphere. Carbon dioxide release for the stakeholders to reach the college is very high. It is contributing to the global warming and increasing the pace of climate change. If a College bus is fully utilised for the staff and students means carbon dioxide released for the stakeholders' commutation can be reduced. More trees are planted in the campus in order to make a source of sink for the carbon dioxide and for other green house gases.

List of eco friendly activities going on in the campus

- Planting and caring of trees in and around the campus.
- Timely disposal of wastes from the campus.
- Celebration of important days like World Environment Day, Ozone day, with great importance.
- Campus is declared plastic free.
- Management has decided to adopt green protocol
- Distribution of medicinal plant saplings among students

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OF TECHNOLOGY
T.N. PALAYAM (Po)-638 506.
GOBI (Tk), ERODE (Dt).

12. Alternative Energy Use

The college had set up solar based hot water system on girl's hostel which reduces the electricity consumption for water heating purpose.

The above photos shows that the installation 4000 LPH solar hot water system. This gives 4000 liters of hot water in most of the days per annum.

Thereby the energy saved is given below

Energy required to heat the water to 70'C	=	4000 X (70-28)
	=	1,68,000 Kcal/day
Amount of electricity equivalent	=	195 KWH / day
Annual energy saving by using SWH	=	195 X 300
	=	58,500 KWH
Amount of CO_2 reduction by using SWH	=	47.385 MT

By utilizing SWH the college has reduced CO_2 by 47 MT per year

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T.N. PALAYAM (Po)-638 506.
GOBI (Tk), ERODE (Dt)

13. Plastic Awareness Program

The management of J.K.K. Munirajah College of technology conducts lot of programs to avoid plastics in and out of college campus. More over during NSS camp, the students were involved in collecting waste plastic which were spread over the scrap land. The same plastic hands over to corresponding block officer to safe disposal. Thereby the environment of the nearby villages is improved by students of J.K.K. Munirajah College of technology.

PRINCIPAL
JKK MUNIRAJAH COLLEGE
OF TECHNOLOGY
T.N. PALAYAM (Po)-638 506.
GOBI (Tk). ERODE (Dt).

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OF TECHNOLOGY
T.N. PALAYAM (Po)-638 506.
GOBI (Tk), ERODE (Dt).

14. Reducing Fuel Consumption

J.K.K. Munirajah college of technology conducts awareness program on Traffic rules and Voter day in nearby villages. This will improve the safety point of the nearby villages and fuel saving indirectly benefit to the environment. The college uses bi-cycle for the rally taking into consideration of smoke from the fuel vehicle. This will supports environment to reduce air pollution and also initiate to use of bicycle.

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OF TECHNOLOGY
T.N. PALAYAM (Po)-638 506.
GOBI (Tk), ERODE (Dt).

15. Tree Plantation Program

J.K.K. Munirajah college of Technology involved in tree plantation program in and out of the college campus. They had planted wide variety of trees and plants. Also they have take care survival of the same. This will boost environment air system by reducing air pollutions.

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OF TECHNOLOGY
T.N. PALAYAM (Po)-638 506,
GOBI (Tk), ERODE (Dt),

16. Plastic Free Campus

The management of J.K.K. Munirajah college of Technology is keen on avoiding plastic inside the college campus. Hence they had given enough awareness program and displayed lot of boards.

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JKK MUNIRAJAH COLLEGE
OF TECHNOLOGY
T.N. PALAYAM (Po)-638 506.
GOBI (Tk), ERODE (Dt).

17. Rain Water Harvesting

J.K.K. Munirajah College of technology constructed with lot of rain water harvesting pits. This will supports to recharge the ground water level. College has the proposal to store the rain water for their internal use in future. This is the very good step towards the environment protection.

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JKK MUNIRAJAH COLLEGE
OF TECHNOLOGY
T.N. PALAYAM (Po)-638 506.
GOBI (Tk), ERODE (Dt).

18. Floral Diversity

J.K.K. Munirajah college of technology maintains floral diversity in great manner. They are maintaining different kinds of plants and also have plan of herbal garden in near future.

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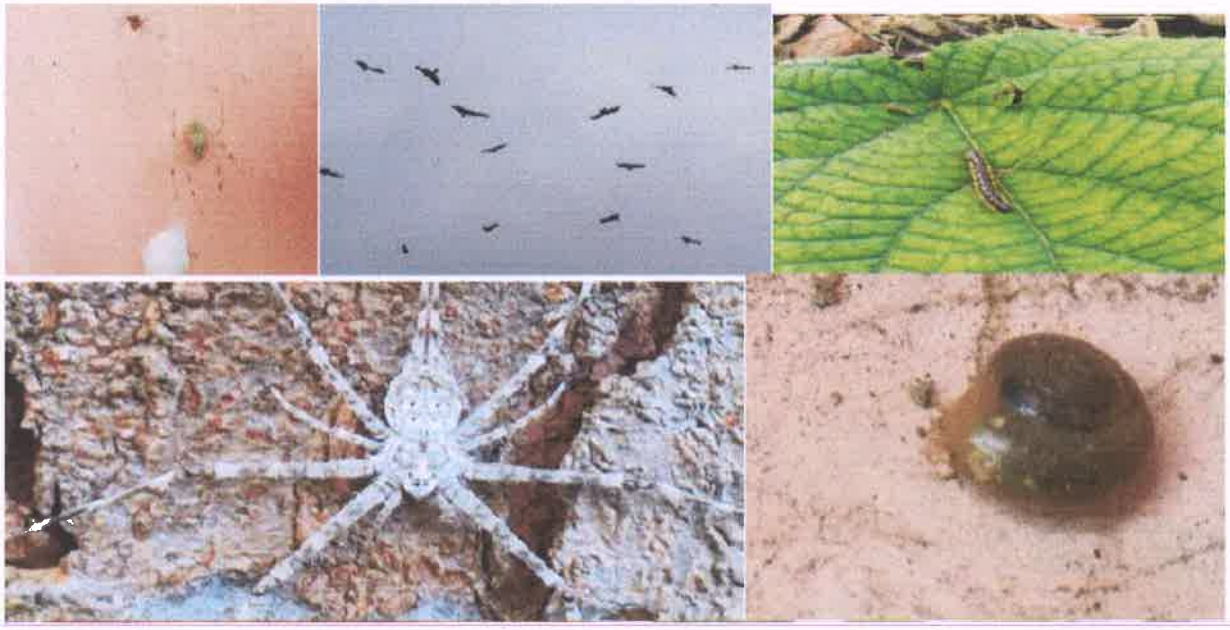
OF TECHNOLOGY
T.N. PALAYAM (Po)-638 506.
GOBI (Tk), ERODE (Dt).

19. Faunal Diversity

J.K.K. Munirajah college of technology maintains faunal diversity in great manner. They are maintaining different kinds of plants to attract different faunal in their campus.



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OF TECHNOLOGY
T.N. PALAYAM (Po)-638 506.
GOBI (Tk), ERODE (Dt).

20. Major Audit Observations

- The environmental awareness initiatives are substantial.
- The installation of solar panels are not initiated and needs to started at soon
- Training in vegetable cultivation and composting practices are inadequate.
- There is no Green policy/ environmental policy statement indicating the commitment of the college towards its environmental performance.
- Gardens inside the college premises are found well maintained.
- Attention needed in developing Herbal Gardens
- Use of notice boards and signs are inadequate to reduce over exploitation of natural resources.
- Programs on green initiatives have to be increased. Campus is declared plastic free, stringent actions should be taken to maintain this.
- Rain water harvesting systems, solar power generation, environmental education programs have to be strengthened.
- Lot of NSS program conducted related cleaning activities in villages around the college are appreciable.
- Water conservation committee is needs to be framed and monitored
- Energy Conservation group also needed
- Separate group is needed to plan and cultivate location based plants to reduce the water consumption of the Garden
- College should take initiative to educate the nearby village peoples about global warming and waste management through their programs

PRINCIPAL
JKK MUNIRAJAH COLLEGE
OF TECHNOLOGY
T.N. PALAYAM (Po)-638 506.
GOBI (Tk), ERODE (Dt).

21. Water Audit Findings

- There is ongoing project of water consumption monitoring system in the college campus.
- The college does not have waste water treatment for waste water generated from laboratories, canteen, hostel kitchen, toilets, bathrooms and office rooms.
- Automatic switching system is needs to be installed for pump sets used for overhead tank filling.
- Fixing aerators to water taps to reduce the water consumption is on the way
- Display boards against the misuse of water use are needs to be improved.

22. Energy Audit

- The communication process for awareness in relation to energy conservation is found adequate.
- Monthly use of electricity in the college is very optimum
- Objectives for reducing energy, water and fuel consumption are merger.
- There are fans of older generation and non energy efficient which can be phase out by replacing with new energy efficient fans.
- New projects are going out with Energy efficient product is a good sign
- Regular monitoring of equipments and immediate rectification of any problems needed and monitored.
- Use of renewable energy is not sufficient. It needs great attention to reduce green house gas emission.

PRINCIPAL
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OF TECHNOLOGY
T.N. PALAYAM (Po)-638 506.
GOBI (Tk), ERODE (Dt).

23. Waste Audit

- ❖ Solid waste management systems established are sufficient.
- ❖ The college has proper communication with the local body for regular collection of solid waste from the campus.
- ❖ Waste bins in the class rooms, veranda, canteen and campus are adequate.
- ❖ Bio gas plant is not available
- ❖ Proper composting systems are lacking.
- ❖ Green chemistry labs are needs to be introduced.

24.Green Campus Audit

- ❖ Tree cover of the college with respect to the stakeholder strength is enough.
- ❖ Regular planting of trees in the campus are adequate.
- ❖ Display boards to all plants identified are lacking.
- ❖ Water uses for gardens are high.
- ❖ No arboretum is set up in the college campus.
- ❖ There is only very few fruit trees in the college to attract birds.
- ❖ Registry for flora and fauna on the campus is lacking.
- ❖ College needs to plant more herbal plants

25. Carbon Foot Print Audit

- College has not yet taken any initiative for carbon accounting.
- Encourage students to use cycles.
- 591 liters of fossil fuel is burned every day for the functioning of the college. This is too high carbon emission
- A huge amount such as Rs. 42,595 per day is spent as the cost of fossil fuel by the stakeholders.
- Usage of 45 gas cylinders per month is very high.

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26. Preparation of Action Plan

Policies referring to college's management and approach's towards the use of resources need to be considered. The college should have a green policy/environmental policy for its sustainable development. The environmental policy formulated by the management of the college should be implemented meticulously. The college should have a policy on awareness raising or training programs (for ground staff or kitchen staff for example) and college also should have a procurement policy (the College's policy for purchasing materials).

27. Follow Up Action and Plans

Green Audits are exercises which generate considerable quantities of valuable management information. The time and effort and cost involved in this exercise is often considerable and in order to be able to justify this expenditure, it is important to ensure that the findings and recommendations of the audit are considered at the correct level within the organisation and that action plans and implementation programs result from the findings.

Audit follow up is part of the wider process of continuous improvement. Without follow-up, the audit becomes an isolated event which soon becomes forgotten in the pressures of organisational priorities and the passing of time.

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28. Environmental Education

The following environmental education program may be implemented in the college before the next green auditing:-

- Training programs in solid waste management, liquid waste management, setting up of medicinal plant nursery, water management, vegetable cultivation, paddy cultivation, tree planting, energy management, landscape management, pollution monitoring methods, and rain water harvesting methods.

- Increase the number of display boards on environmental awareness such as – save water, save electricity, no wastage of food/water, no smoking, switch off light and fan after use, plastic free campus etc.

- Activate the environmental clubs

- Set up model rainwater harvesting system, rainwater pits, vegetable garden, medicinal plant garden, paddy fields etc. for providing proper training to the students.
- Conduct exhibition of recyclable waste products

- Implement chemical treatment system for waste water from the laboratories.

29. Awareness on Carbon Generation

- Students and Staff members may be made totally aware of pollution caused by use of vehicles.
- The awareness programs on carbon emission at individual as well as social level will help to avoid air and noise pollution in the campus due to vehicles.

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30. Conclusion and Full List of Recommendations

The green audit assists in the process of testing performance in the environmental arena and is fast becoming an indispensable aid to decision making in a college.

The green audit reports assist in the process of attaining an eco friendly approach to the sustainable development of the college. Hope that the results presented in the green auditing report will serve as a guide for educating the college community on the existing environment related practices and resource usage at the college as well as spawn new activities and innovative practices. A few recommendations are added to curb the menace of waste management using eco-friendly and scientific techniques. This may lead to the prosperous future in context of Green Campus and thus sustainable environment and community development.

It has been shown frequently that the practical suggestions, alternatives, and observations that have resulted from audits have added positive value to the audited organisation. An outside view, perspective and opinion often helps staff who have been too close to problems or methods to see the value of alternative approaches. A green audit report is a very powerful and valuable communications tool to use when working with various stakeholders who need to be convinced that things are running smoothly and systems and procedures are coping with natural changes and modifications that occur.

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31. Common Recommendations

- ❖ Adopt an environmental policy for the college as in annexure D
- ❖ Establish a purchase policy for environmental friendly materials
- ❖ Conduct more seminars and group discussions on environmental education
- ❖ Students and staff can be permitted to solve local environmental problems
- ❖ Renovation of cooking system in the canteen to save gas
- ❖ Establish water, waste and energy management systems

32. Criteria Wise Recommendations

Water

- ➢ Remove damaged taps and install sensitive taps is possible.
- ➢ Drip irrigation for gardens and vegetable cultivation can be initiated.
- ➢ Install Meters to monitor the water use
- ➢ Establish water treatment systems.
- ➢ Use waterless urinals
- ➢ Spray the water to the garden in the early morning of the day
- ➢ Use aerator in the taps to reduce the water consumption and wastage
- ➢ Use treated water for bus wash and other toilet use
- ➢ Conduct leak test at least once in two months
- ➢ Use water efficient garden techniques to reduce the water consumptions in garden
- ➢ Rain water harvesting system needs to be improved
- ➢ Awareness programs on water conservation to be conducted.
- ➢ Install display boards to control over exploitation of water.

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Energy

- Conventional Fans needs to be replaced with energy efficient BLDC Fans.
- Conduct more save energy awareness programs for students and staff.
- Try to install more solar panels to reduce the green house gas emission
- Optimise the energy usage
- Automatic power on/off systems may be introduced.

Waste

- Establish a functional bio gas plant.
- A model solid waste treatment system to be established.
- A model Vermi composting plant to be set up in the college campus.
- Maintain a plastic free campus.
- Avoid paper plates and cups for all functions in the college.

Green Campus

- All trees in the campus should be named scientifically.
- Create more space for planting.
- Grow potted plants at both verandah and class rooms.
- Create automatic drip irrigation system during summer holidays.
- Not just celebrating environment day but making it a daily habit.
- Beautify the college building with indoor plants
- Providing funds to nature club for making campus more green
- Encouraging students not just through words, but through action for making the campus green
- Conducting competitions among departments for making students more interested in making the campus green.

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Carbon footprint

- Establish a system of car pooling among the staff to reduce the number of four wheelers coming to the college.
- Increase effective use of college bus services to the students and staff.
- Encourage students and staff to use cycles.
- Establish a more efficient cooking system to save gas.
- Discourage the students using two wheelers for their commutation.
- More use of generators every day should be discouraged.

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33.Audit Report

We have conducted the Environment audit at all important areas up to our maximum possible extend. We found some points in alternate energy use and waste management are needed attention. Overall performance of college is found satisfactory.

For Sri Energy Solutions,

M. RAMESHKUMAR,B.E.,MBA.,
BEE CERTIFIED ENERGY AUDITOR - EA22303

M.Rameshkumar

BEE Certified Energy Auditor

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Annexure – A

Details of the Program offered

- U.G.Courses
  - Computer Science and Engineering
  - Electronics and Communication Systems
  - Mechanical Engineering
  - Electrical and Electronics Engineering
  - Civil Engineering
  - Automobile Engineering
  - Information technology

- P.G.Course
  - Master of Business Administration
  - Master of Computer Application
  - ME – Computer Science and Engineering
  - ME – Applied Electronics
  - ME – Power Electronics and Drives
  - ME –Manufacturing Engineering

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Annexure – B

Bus Routes

The college has operates several buses in the following route for the convenience of the students and staffs

Sl.No	Bus Route	Distance in Km
1	Mettupalayam	172
2	Kolathur	170
3	Thiruppur	132
4	Annur	128
5	Edappadi	126
6	Modakuruchi	156
7	Guruvarettiur	116
8	Palakkattur	116
9	Perumanallur	114
10	Varattupallam	110
11	Ellappalayam	108
12	Kadampur	80
13	Chittar	106
14	Bhavanisagar	100
15	Perundurai	100
16	Rettipalayam	98
17	Kottakattupalayam	92
18	Komarapalayam	90
19	Kavilipalayam	104
20	Vellakovil	90

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Annexure – C

Air Pollution Norms

AQI	Air Pollution Level	Health Implications	Cautionary Statement (for PM2.5)
51 -100	Moderate	Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people who are unusually sensitive to air pollution.	Active children and adults, and people with respiratory disease, such as asthma, should limit prolonged outdoor exertion.
101-150	Unhealthy for Sensitive Groups	Members of sensitive groups may experience health effects. The general public is not likely to be affected.	Active children and adults, and people with respiratory disease, such as asthma, should limit prolonged outdoor exertion.

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Annexure – D

Model Environment Policy

J.K.K. Munirajah college of Technology is committed to being environmentally aware, actively support programs that reduce our college's environmental impact and continually improve our environmental performance as an integral part of our business strategy and operating procedures.

We seek to understand the effects our business activities have on the environment by supporting initiatives such as:

- Reduction of material, water and energy consumption
- Waste minimization
- Recycling of all resources

We will encourage our students, suppliers and other stakeholders to do the same.

We recognize that we have a responsibility to the environment to meet or exceed legislative and regulatory requirements.

We will ensure that this policy and all procedures relating to it are understood, implemented and maintained by all company employees

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6	Modakuruchi	156
7	Guruvarettiur	116
8	Palakkattur	116
9	Perumanallur	114
10	Varattupallam	110
11	Ellappalayam	108
12	Kadampur	80
13	Chittar	106
14	Bhavanisagar	100
15	Perundurai	100
16	Rettipalayam	98
17	Kottakattupalayam	92
18	Komarapalayam	90
19	Kavilipalayam	104
20	Vellakovil	90

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Annexure – C

Air Pollution Norms

AQI	Air Pollution Level	Health Implications	Cautionary Statement (for PM2.5)
51 -100	Moderate	Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people who are unusually sensitive to air pollution.	Active children and adults, and people with respiratory disease, such as asthma, should limit prolonged outdoor exertion.
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Thookanaickenpalayam - 638 506. GOBI TK, ERODE DT, Tamil Nadu.

ISO 9001:2008 Certified

CRITERION 7 – INSTITUTIONAL VALUES AND BEST PRACTICES

KEY INDICATOR - 7.1 INSTITUTIONAL VALUES AND SOCIAL RESPONSIBILITIES

Metric No 7.1.6 Quality audits on environment and energy regularly undertaken by the intuition

Beyond The Campus Environmental Promotional Activity

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ACTIVITY NO.1: COVID AWARENESS SPECIAL CAMP

The special camp of Covid awareness was held at JKK Munirajah College of Technology, T.N. Palayam during 05th March 2021, to speak Covid awareness to our peoples, to keep social distance, washing hands and wear the mask.

Our students distributed Mask on 05.03.2021

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Our students distributed Mask on 5.3.2021

Our students distributed Mask on 5.3.2021

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ACTIVITY NO.2: PLASTIC AWARENESS AND PLASTIC COLLECTION PROGRAMME AT SABARIMALAIA from 29.12.2019 to 10.01.2020

Our college and Akhila Bharatha Ayyappa seva sangam (ABASS), Erode organized temple service camp at sabarimala, kerala from 29.12.2019 to 10.01.2020 (11 days). In this service camp our NSS students and staffs were involved in cleaning work, Plastic free awareness programme, Annadhanam distribution, for sabarimala devotees.

NSS STUDENT- PLASTIC FREE AWARENESS

Temple Service Camp at Sabarimala, Kerala on 29.12.2019

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Temple Service Camp at Sabarimala, Kerala on 30.12.2019

Temple Service Camp at Sabarimala, Kerala on 02.1.2020

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ACTIVITY NO.3: PLASTIC AWARENESS AND PLASTIC COLLECTION PROGRAMME on 17.10.2019 at Kallipatti

The National service scheme and Mechanical Department of JKKMCT organized a Plastic awareness and Plastic collection programme on 17.10.2019 in our adopted village-Punjaithuraiyam palayam and Kallipatti. The programme was inaugurated by our Principal, Vice-principal, and Hod's of various Department, Faculty members and Students. In this programme more than 50 students were participated. Our students had created public awareness on the causes, effects and solutions on Plastic Pollution and removed the plastic waste from that village.

Our students collected the single-use plastics like straws, plastic bags, plastic water bottles, plastic covers, etc.

PLASTIC AWARENESS AND PLASTIC COLLECTION

Plastic Collection Programme on 17.10.2019 at Punjaithuraiyam Palayam

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Plastic Collection Programme on 17.10.2019 at Kallipatti

Plastic Collection Programme on 17.10.2019 at Kallipatti

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PLEDGE AT PUNJAITHURAIYAM PALAYAM

PLASTIC AWARENESS AND PLASTIC COLLECTION

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Plastic awareness programme on 17.10.2019 at kallipatti

PLASTIC AWARENESS RALLY

Plastic awareness Rally on 17.10.2019 at Kallipatti Village

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ACTIVITY NO.4: TREE PLANTATION PROGRAMME from 19.09.2019 to 22.09.2019

The National service scheme of JKKMCT organized a tree plantation programme from 19.09.2019 to 22.09.2019 in the college premises. The programme was inaugurated by our Principal, Vice-principal, Hod's of various Department, Faculty members and Students. In this programme more than 100 students were planted 150 samplings of different varieties like ornamental, shadowing and fruit bearing tress inside and outside area of our college campus.

In this activity, our 100 NSS volunteers spreading the message of "Tree plantation can reduce global warming which is the main reason of climate change".

TREE PLANTATION AT COLLEGE CAMPUS

Tree plantation programme on 19.09.2019

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Tree plantation programme on 20.09.2019

Tree plantation programme on 21.09.2019

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ACTIVITY NO.5: TRAFFIC AWARENESS RALLY on 08.07.2019

On behalf of "**TRAFFIC AWARENESS**" our College and Bungalowpudur police station has organized a **Rally on 08th, July, 2019** from T.N.palayam to Bungalowpudur .

The **"Traffic awareness Rally"-** was held in the presence of Our **Chairman Dr.J.K.K.Munirajah, Secretary Mrs.M.Kasthuripriya Krupakarmurali,** Mr.Napoleon, Inspector of police, Bungalowpudur and presided over by **Principal,** J.K.K. Munirajah college of Technology. Quiz competition were conducted nearly 130 students were participated and won the prizes.

TRAFFIC AWARENESS RALLY

Traffic Awareness Rally on 08-07-2019 at T.N.palayam

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Traffic Awareness Rally on 08-07-2019 at T.N.palayam

Traffic Awareness Rally on 08-07-2019 at T.N.palayam

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QUIZ COMPETITION

Traffic Awareness Quiz on 08-07-2019 at T.N.palayam

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ACTIVITY NO.6: RURAL DEVELOPMENT PROGRAMME from 18-02-2019 to 24-02-2019 AT GOVERNMENT HIGHER SECONDARY SCHOOL, DEVARMALAI

THEME: "HEALTHY YOUTH FOR HEALTHY INDIA"

The seven day special camp lead by NSS unit, J K K Munirajah College of Technology, T.N,palayam was held during 18th February, 2019 to 24th February 2019. The major highlights of the camp were rural development programmes, Veterinary Camp, Tree plantation, Free Domestic Appliances Service Camp, Conducting sports competitions and computer training programmes. The Self Motivation Programme, self employment programmes, Road safety rules, Right to Information, Save Electricity, Rain Water Harvesting, Solar Energy Conservation are conducted for all NSS volunteers during this camp.

INAUGURATION OF SPECIAL CAMP- MONDAY 10 AM

On Monday 18th February, 2019 NSS Special camp was inaugurated by Our Chairman Dr.J.K.K.Munirajah, Secretary Mrs.M.Kasthuripriya Krupakarmurali , and presided over by Principal, J.K.K.Munirajah college of Technology. Mrs.K.Kalavathi(Head mistress) were honoured by 'ponnadai' in the function. The inaugural ceremony came to an end by the vote of thanks delivered by A.Vigneshkumar, NSS Programme Officer, J.K.K.Munirajah College of Technology.

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Rural Development programmes on 08.02.2019 at Devarmalai

Rural Development programmes on 08.02.2019 at Devarmalai

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ACTIVITY NO.7 : A FLOOD RELIEF CAMPAIGN FOR GAJA FLOOD on 02.12.2018

Our College organized a flood relief campaign for Gaja flood on 02.12.2018 at Nagapattinum District and Thiruvarur District.

Overall 500 peoples have been benefited through relief kits.

Flood Relief campaign on 02.12.2018 at Nagapattinum

Flood Relief campaign on 02.12.2018 at Nagapattinum

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ACTIVITY NO.8 : SWACHHATA HI SEVA CAMPAIGN from 24.09.2018 to 29.09.2018

The objective of the swachhta hi seva 2018 campaign was to create awareness on construction and use of toilets in a house as well as on general sanitation from 24.09.2018 to 28.09.2018 at Punjai thuraiyam Palayam,Erode-dt.

MASS CLEANING CAMPAIGNS

Cleaning work on 24.09.2018 at Punjaithuraiyam Palayam

Cleaning work on 24.09.2018 at Punjaithuraiyam Palayam

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Cleaning work on 26.09.2018 at Punjaithuraiyam Palayam

Cleaning work on 26.09.2018 at Punjaithuraiyam Palayam

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SWACHH PLEDGE AT PUNJAITHURAIYAM PALAYAM

Swachh Pledge was taken by our students at Punjaithuraiyam Palayam.

Rallies were organized in the thuraiyam palayam villages on the importance of toilets and hygiene,dengue fever awareness and proper drainage system.

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ACTIVITY NO.9: A FLOOD RELIEF CAMPAIGN from

14.08.2018 to 16.08.2018

Our College organized a flood relief campaign from 14.08.2018 to 16.08.2018 at Adimaly, Anachal, Ponmudi, Thokkupara, Mangadavu, Korangati in Idukki district, kerala.

This things packed for Giving to Individual Family

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Our staff members are packing Flood Relief Things

Our College Vechicle is Ready to distribute the Flood Relief Things

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Our College Staffs are Distributing Flood Relief Things

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ACTIVITY NO.10: SWACHH BHARAT SUMMER CAMPAIGN from 24.09.2018 to 29.09.2018

AWARENESS CAMPAIGNS

Swachh Bharat Summer campaign on 24.09.2018 at Punjaithuraiyam palayam

Swachh Bharat Summer campaign on 25.09.2018 at Punjaithuraiyam palayam

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No.of awareness drives conducted : 2

No.of people sensitized : 2000

No. of hours spent :16

The objective of the campaign was to create awareness on construction and use of toilets in houses, as well as on general sanitation on 4.7.2018 &5.7.2018.This awareness programme was done by our volunteers and with punjai thuraiyam palayam government sanitation department.

Pamplets was given to every home and create awareness use of toilets and to stop open defecation.

DOOR TO DOOR VISITS

Awareness on use of toilets at Punjaithuraiyam palayam

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WALL PAINTINGS ON PUBLIC WALLS

Wall Painting at T.N Palayam

Wall Painting at T.N Palayam

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No.of walls painted : 02

Estimated number of people sensitized : 1000

No. of hours spent :16

Student volunteers participated in making wall painting on 9.7.2018 and 10.7.2018 regarding prevention of open field defecation Punjai thuraiyam palayam .It was much useful in creating awareness among Punjai thuraiyam palayam people especially in market area.

The wall painting had the slogans about making clean india. By using water paint we painted the wall with different colours.

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WASTE COLLECTION DRIVES

Waste Collection on 13.07.2018 at Punjaithuraiyam palayam

No.of.households waste collected from : 30

No.of people who participated : 40

No. of hours spent : 08

The unwanted materials are collected from every home on 13.7.2018. The wastes can be classified as wet waste and Dry waste.

By the help of government panchayat union labours we collected the waste material.

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ACTIVITY NO.11: SWACHHATA PAKHWADA-CLEAN INDIA

From 18.09.2017 to 22.09.2017

Our NSS students were participated in that **'Swachhata pakhwada'** action plan from 18.09.2017 to 22.09.2017 and cleaned the area of our College campus and our adopted village Kallipatti (Kanakkam Palayam).

CLEANING ACTIVITY GOVERNMENT HOSPITAL

Visit to Government Hospital at T.N.Palayam to study the hygiene and systems for disposal of garbage and hospital wastes.

Cleaning Activity on 18.09.2017 at T.N.Palayam

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Cleaning Activity on 19.09.2017 at T.N Palayam

Cleaning Activity 22.09.2017 at T.N.Palayam

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