A Report on

ENERGY AUDIT

For the year

2021-2022

GOVERNMENT COLLEGE OF ENGINEERING
&
CERAMIC TECHNOLOGY

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Government College of Engineering & Ceramic Technology

73, Abinash Chandra Banerjee Lane, Beleghata, Kolkata, West Bengal 700010

Energy Audit Report

Government College of Engineering& Ceramic Technology has conducted in house internal energy audit in the month of April, 2022; headed by Principal, Prof. Krishnendu Chakrabarty. The team consisted of the following members:

1. Prof. (Dr.) Krishnendu Chakrabarty, Principal (Coordinator cum Chairman)

2. Prof. (Dr.) Rituparno Sen, Professor (Member)

3. Dr. Debdarpan Khan, Associate Professor (Member)

4. Shri Partha Haldar, Assistant Professor (Member)

5. Dr. Kingshuk Chatterjee, Assistant Professor (Member)

6. Dr. Alok Mukherjee, Assistant Professor (Member)

7. Shri Barun Das, Electrical Supervisor (Member)

The main focus of this audit was to find out if there were any lacunae in the part of the institute regarding energy issues. Furthermore this audit helped to bring awareness of energy conservation values in teachers, staff and students.

The present energy audit identifies and suggests the possible ways to reduce electrical energy consumption. It also recommends steps to be taken by the college authority to reduce energy consumption by replacing the existing less efficient electrical appliances by energy saving ones.

CERTIFICATE

This is to certify that an "Energy Audit" for Government College of Engineering& Ceramic Technology (GCECT), 73, Abinash Chandra Banerjee Lane, Beleghata, Kolkata, West Bengal 700010, has been conducted during the month March, 2022 to assess energy cost, availabilityand reliability of supply of energy, energy conservation technologies and ways to reduce energy consumption.

Place: Kolkata

Date: 20-04-2022

Govt. College of Engg. & Ceramic Technology, 73, A. C. Banerjee Lane, Kol-10, Govt. of West Bengal

Members of the committee:

1. Prof. (Dr.) Krishnendu Chakrabarty, Principal (Coordinator cum Chairman)

2. Prof. (Dr.) Rituparno Sen, Professor (Member)

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CONTENTS

ENERGY AUDIT

Energy is one of the key factors determining the product cost at micro level and the debt burden at the macro level. Energy cost, along with capital production and labour cost, is one of the most significant factors affecting economic activity of any organization. Therefore conservation of energy and search for alternative energy sources is one of the instrumental and most debated topics of analysis in today's world to cope up with probable energy shortage in near future. This demand for listing uses of energy at all levels of activity.

Energy audit of a system is one of the measures to balance the total energy input in the system, with its use in the system and quantify the energy usage of the system. This helps in energy cost optimization, pollution control, safety aspects and better utilization of the resources and devices connected to the system. It also suggests methods to improve the operating and maintenance practices of the system.

Energy audit also deals with the situation of increasing energy cost, availability of resources, reliability of power and energy supplies etc. This audit helps in taking decision on appropriate energy mix using improved energy conservation equipments, instruments and technology.

Thus Energy audit is one of the key and systematic approaches for decision making in the area of energy management of a system. It tries to balance the total energy input vs. use by suggestion of improving and modifying the present operating conditions so as to help the system run with higher efficiency and better regulation.

Energy audit is instrumental for positive orientation to the energy cost reduction, preventive maintenance and quality control programs which are major utility activities. It helps to focus and find out the variations which occur in energy cost and their reasons. It helps in deciding on appropriate energy mix, identifying energy conservation technologies retrofitting for energy conservation equipment. Thus the primary objective of energy audit of a system is to determine how to reduce energy consumption per unit of production output or to lower operating costs.

The present report shows the energy audit of GCECT campus.

The goal of the present energy audit is to identify and suggest the possible ways to reduce energy consumption of the light, fan and air conditioning loads connected in the college and obtain better energy efficiency of the overall system. Thus, we have concentrated only on these types of loads connected in the college premises and not considered any other types of loads such as laboratory equipments, computers etc. connected in college.

1. Introduction

In broad sense energy efficiency means the use of energy without adversely affecting economic growth and development. It includes improving the efficiency of transmission, distribution and extraction so as to increase the productivity of energy use.

2. Steps of Energy Audit

As per the energy conservation act 2001,energy audit is defined as "the verification, monitoring and analysis of use of energy including submission of technical report containing recommendations for improving energy efficiency with cost benefit analysis and an action plan to reduce energy consumption".

The major three phases of energy audit include

(a) Pre audit phase,

(b)Audit phase and

(c) Post audit phase.

The energy audit at GCECT was conducted following the below mentioned:

a) Data collection

In the initial stage of audit and exhaustive set of data collection was performed using different tools such as observation, survey communicating and meeting with responsible persons and taking measurements.

The audit team went to each department, library, canteen and roamed around the inter college campus to collect the different data related to energy sources lighting connection etc.

Details about the general information was collected by observation along with interview of various staff, both technical and non technical

The power consumption of appliances were taken into consideration as per the specification mentioned by the manufacturer of the appliances,the duration of operation time of the appliances was recorded as per their usages, and in some cases by taking an average value.

b) Data analysis

Detailed analysis of the data so collected include (a) calculation of energy consumption (b) analysis of latest electricity bill of one financial year as provided by the CESC.

c) Recommendations

On the basis of the results of data analysis and observations some steps for reducing power consumption was recommended. Proper treatments for the power wasted in different appliances where are also suggested. Use of renewable energy sources in larger and better aspect was also emphasized.

2.1. Pre audit phase

The following were taken into consideration:

1. Listing the various types of electrical energy sources regarding lights, fan and air conditioning; their approximate use in hours in the college premises.
2. Assessment of electricity consumption as per the electric bill of one financial year.
3. Finding out about any energy saving methods employed in the college premises; specifying measures present in the college if any, and suggest some more measures.
4. Finding out how many CFL bulbs are installed in the college premises; also, record approximate energy usage of the bulbs i.e., hours of use per day, for how many days the bulbs glow in a month etc. Compute the energy used by the bulbs per month to obtain the total kilo Watt hour (kWh) power consumed by the bulbs (for example, 40 Watt bulb × 4 hours per day × number of bulbs = total kWh consumed by the bulbs)
5. Finding out how many LED bulbs are installed in the college premises; also, record approximate energy usage of the bulbs i.e., hours of use per day, for how many days the bulbs glow in a month etc. Compute the energy used by the bulbs per month to obtain the total kilo Watt hour (kWh) power consumed by the bulbs.
6. Finding out how many Fluorescent tube lamps are installed in the college premises; also, record approximate energy usage of the lamps i.e., hours of use per day, for how many days the lamps glow in a month etc. Compute the energy used by the lamps per month to obtain the total kilo Watt hour (kWh) power consumed by the lamps.
7. Finding out how many LED tube lamps are installed in the college premises; also, record approximate energy usage of the lamps i.e., hours of use per day, for how many days the lamps glow in a month etc. Compute the energy used by the lamps per month to obtain the total kilo Watt hour (kWh) power consumed by the lamps.
8. Finding out how many fans are installed in the college premises; also, record approximate energy usage of the fans i.e., hours of use per day, for how many days the fans glow in a month etc. Compute the energy used by the fans per month to obtain the total kilo Watt hour (kWh) power consumed by the fans.
9. Finding out how many air conditioners are installed in the college premises; also, record approximate energy usage of the ACs i.e., hours of use per day, for how many days the ACs glow in a month etc. Compute the energy used by the ACs per month to obtain the total kilo Watt hour (kWh) power consumed by the ACs.
10. Finding out how many street lights and garden lights are installed in the college premises; also, record approximate energy usage of the lights i.e., hours of use per day, for how many days the lights glow in a month etc. Compute the energy used by the lights per month to obtain the total kilo Watt hour (kWh) power consumed by the lights.
11. Finding out if there are alternate/nonconventional source of energy (e.g. photovoltaic cells for solar energy, windmill for extracting wind energy, energy efficient stoves etc.) installed in college?

12. Enquiry was also done to find out presence of any automated energy saving systems installed and operative in college premises for conservation of energy.

The above mentioned procedure was carried out to calculate the energy used by the lighting, fan and air conditioning appliances per month, i.e. to obtain the total kilo Watt hour (kWh) of power consumed by any particular type of appliance.

2.2 Audit phase

In Government College of Engineering and Ceramic Technology, energy auditing was done with the help of a team of teachers and teaching staff. The energy audit began with the team reviewing through all the different facilities of the college and determining the types of appliances and utilities such as lights, fans, air conditioning systems, different laboratory equipment etc.; as well as, measuring the usage per item, i.e., energy consumed by the appliances. The team further made an estimation of the total energy use usage by these appliances in terms of Watt hour by identifying the relevant consumption patterns such as, how often these appliances are used. Students and teachers were interviewed to get the details of uses, frequency of operation and general characteristics of the certain appliances.

2.2.1 Data collection

Data collection was done in the sectors such as sources of energy and energy consumption locations. All the records and documents regarding electrical energy usage were verified to clarify the data received through survey in discussion.

2.2.2 Site tour

Site inspection was done with students, staff and teachers. Questionnaires were answered during the site tour and relevant documents were collected/prepared.

2.2.3 Review of documents and records

Documents such as electricity bills, registers of electricity were reviewed.

2.2.4 Site inspection

Each of the classrooms, laboratory, garden, workshop, rooms of offices, library, hostel, parking grounds and others were visited by the team to take into account the different electrical appliances connected in these places.
College building and its premises were visited and analyzed by the energy audit team several times so that no information went missing.

2.2.5 Energy sources and consumption areas

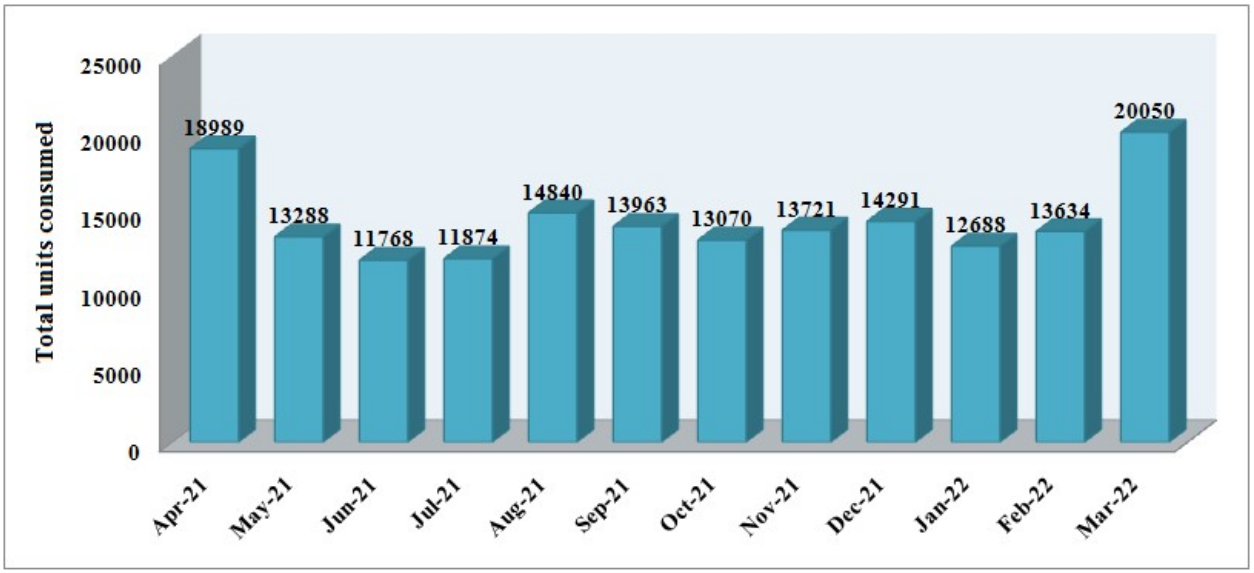
There are several sub units of buildings in the college. These are main building, Annex-I building, Annex-II building, workshop block and hostel building.

2.2.6 Energy sources

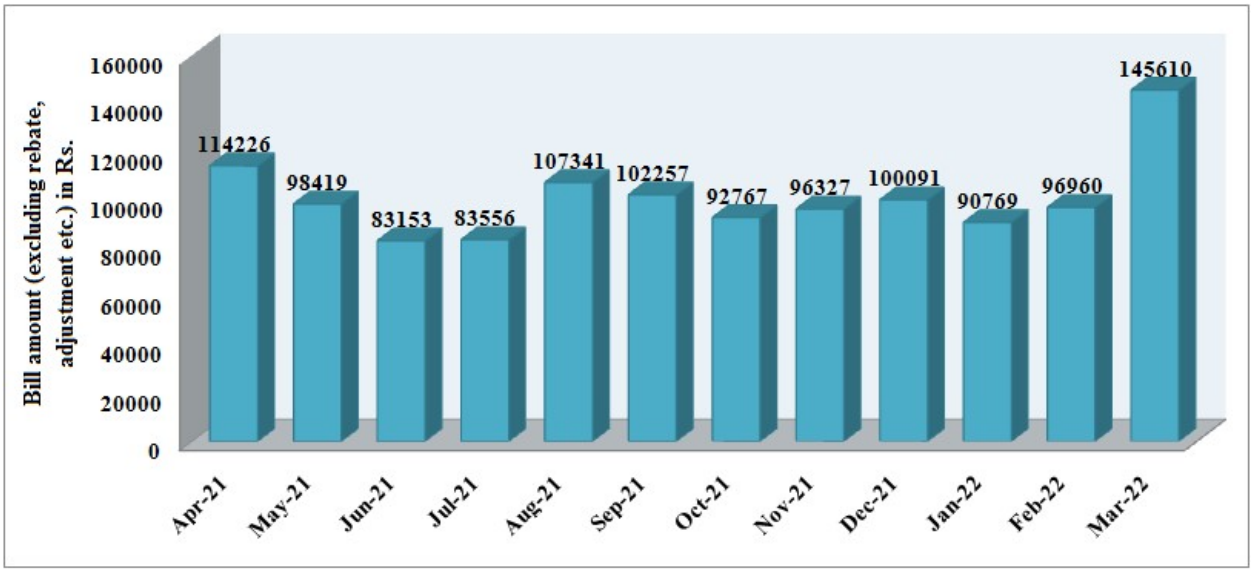
There is a transformer of capacity 250 KVA which has been installed in campus for the distribution of power to different units.
In case of power failure, the college has a diesel generator set to fulfill demands of power. This generator set has a capacity of 250 KVA.
Apart from that, there are 3 numbers of normal panels and 4 numbers of generator panels installed in the campus to ensure safety and easy operation and distribution of the electrical power in the college campus.

2.2.7 Energy consumption during the April 2021 to March 2022:

Month	Total units consumed	Rate Rs./unit	Bill amount (excluding rebate, adjustment etc.) in Rs.
April 2021	18989	7.13	114226.00
May 2021	13288	7.13	98419.00
June 2021	11768	7.13	83153.00
July 2021	11874	7.10	83556.00
August 2021	14840	7.10	107341.00
September 2021	13963	7.10	102257.00
October 2021	13070	7.10	92767.00
November 2021	13721	7.07	96327.00
December 2021	14291	7.07	100091.00
January 2022	12688	7.07	90769.00
February 2022	13634	7.36	96960.00
March 2022	20050	7.42	145610.00



Electrical energy consumption for FY 2021-2022



Electricity bill is Rupees for FY 2021-2022

The above variation in energy consumption has been considered for a duration when the college was not functioning fully due to partial COVID-19 Lockdown. Hence, the consumption of electricity under normal college operation is not truly reflected in the above graphs.

2.2.8 Key findings and observations of energy usage

The base of energy audit is that its findings are supported by documents and verifiable information. The audit processes seeks, on a sample basis, to track past actions, activities, events and procedures to ensure that they are carried out according to system requirements and in the correct manner. Energy audit forms a part of this process. Although they are individual events, the real value of energy audits is the fact that these are carried out at different intervals and their results can illustrate improvement or change over time.

Although audits are carried out using policies procedures documented systems and objectives as a test, there is always an element of subjectivity in an audit. The essence of any energy audit is to find out how well energy management equipments are performing. Each of these components is crucial in ensuring that the organization's energy performance meets a goal set in its energy policy.

The followings are the gross findings regarding lighting, fan and air conditioning appliances from the energy audit done in the college campus:

Table 1. The overall assessment of the connected equipments in college campus

Description	Main Gr Fl	Main 1st Fl	Main 2nd Fl	Main 2.5 Fl	Main 3rd Fl	Main 3.5rd Fl	Main 4th Fl	Main 5th Fl	Workshop block	Annex I (CSE)	Annex II (Canteen)	Gr Fl Gym Block	Garden	Hostel	Auditorium	Total
4' single tube light fitting (LED)	20	17		6	20		6	7	14	10		3		92		**195**
4' double tube light fitting (LED)	21	12	11	16	4		8			11		13		2		**98**
4' single tube light fitting (Fluorescent)	12	10	2		9		18		10	5	32					**98**
4' double tube light fitting (Fluorescent)		2	3		24		44		21		13					**107**
2' X 2' False Ceiling LED fitting	1	28	3			36			13							**81**
9W Round False ceiling fitting (LED)		16				23									57	**96**
36W PL False ceiling fitting (CFL)			9													**9**
CFL Lamp							2			2						**4**
18W CFL single False ceiling fitting								7								**7**
18W CFL double False ceiling fitting								57								**57**
LED Lamp									2		8	2				**12**
Garden Light post LED													12			**12**
Gate light LED													4			**4**
Wall Bracket LED													29			**29**
Sodium/Halogen light													7			**7**
50W Round False ceiling fitting (LED)															10	**10**
LED Flood Light															4	**4**
Air Conditioner (AC)	57									10	17				32	**116**
Ceiling Fan (Old)	20	9	3		19		37		12	1	12					**113**
Ceiling Fan (New)		10	8	16	0		7	66	11	10	10	3		64		**205**
Wall mounted fan (New)		13	10			13		5	13		4					**58**
Exhaust Fan	3	4					3		9		10	4				**33**

2.2.9 Already existing power saving measures

- The college hosts a large set of solar photovoltaic sale to support the existing power consumption with the solar power generated in the system. The solar photovoltaic cell can develop 8kWp of power, which can partially cater the power requirement of the institute.
- The teacher staff students and other members of the college are very much aware to turn off the electrical equipments when they are not in use.

- False ceilings are installed in some of the classrooms for maintaining optimum room temperature inside the classroom
- Most of the resistance regulators of fans are already replaced by the higher efficient electronic or inductive regulators
- Master switches are installed outside the rooms in the floors.
- Most of the CFL bulbs have been replaced by the more efficient LED bulbs
- Most of the fluorescent tube lamps have already been replaced by the more energy efficient LED battens.
- Many of the fluorescent tube lamps have been replaced by more efficient CFL tube lamp sets.
- Computers and other peripheral devices are mostly used in power saving mode or are switched off when they are not in use.
- Most of the classrooms already have curtains in order to prevent sunlight and heat to entering the room and prevents increase of the ambient temperature inside the room. This in turn helps in indirect cooling of the room thereby saving energy. Rooms with provision of air conditioning are already equipped with curtains and glass doors and windows so that the room is well air tight for preventing leakage of cool air outside the room and process of hot and humid air inside the room. This helps in reducing energy consumption by the air conditions.

2.3 Post Audit recommendations for better energy efficiency

Based on the analysis of the power consumption data certain steps have been recommended for improving energy efficiency of the campus. Complete cost analysis of implementation of recommended measures has been performed wherever necessary. Also in number of general measures for energy efficiency has been listed. Described below are some important recommendations for better energy efficiency:

2.3.1 Housekeeping

Although most of the air conditioned rooms have been stalled curtains still the committee recommends the cartons to be checked as well as few cartons need to be replaced or modified to prevent direct sunlight to enter inside the room to avoid heating of cool air. This reduces AC load significantly.

2.3.2 Installation of master switch outside every room

Installation of master switch outside every room helps in reducing energy efficiency in some of the cases. Installing search master switch immediately outside room can make it easy for a person to switch off all the appliances of a room in case someone forgets to switch off my living room. This can help in improving energy efficiency.

2.3.3 Better practices for AC

Air Conditions (ACs) installed in the institute comprise of both split type and window type. These ACs constitutes a large part of the total energy consumption of the campus. But at a few places it was found that AC is not used with best recommended practices; even simple matters

such as insulation and not taking care of properly. Window panes were found broken at a few places also in certain places is found to be used without keeping curtains this practices account for increase in AC load and thus increased electrical energy consumption. Summarized below are some guidelines for most efficient use of ACs:

Proper insulation

Good quality installation must be maintained in the air conditioned rooms by keeping all doors and windows closed properly so as to prevent school near to go out and hot air to come in.

Operation of AC

The Asus should be switched on 15 minutes before actual use and should be switched off before leaving the room.

2.3.4 Installation of automatic water level detector in tanks

The committee suggests installation of automatic water level detector in overhead water storage tanks so that the pumps can be utilized to their full extent without wasting any water by overflow. Installation of such kind of measures will help in conservation of energy, as well prevention ofwater wastage.

2.3.5 Other major recommendations

Replacing old fluorescent tubes with LED battens
Replacing the CFL tube lamps with LED battens
Replacing the 36W PL False ceiling fitting with LED
Replacing the CFL with LED lamps
Replacing the Sodium/Halogen light fitting with LED flood light
Replacing the Old Ceiling Fans with New Ceiling Fans
Replacing the Old Ceiling Fans with BLDC Ceiling Fans

2.3.6 Cost analysis of replacing existing fittings with recommended ones

This example illustrates the cost analysis of Replacing CFL with LED lamps

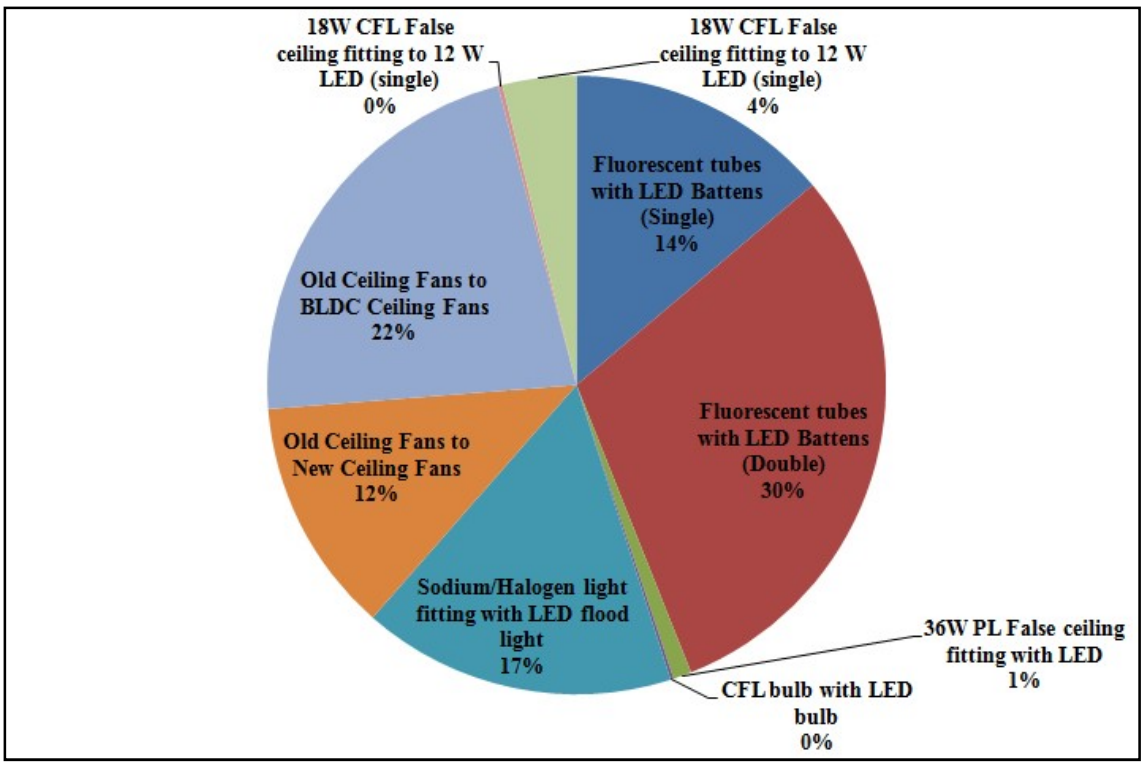
- Total number of CFLs in campus = 4
- Average power of CFL = 18W
- Average power of LED = 12W
- Power Saved per LED = (18-12) = 6W
- Total power saving = 6W × 4 numbers = 24W = 0.024 kW
- Average use per year = 260 days × 7 hours = 1820 hours
- Total energy saved per year = 0.024 kW × 1820 hours = 43.68 kWh
- Cost of energy saving per year = 43.68 kWh × 7 Rs/unit = 305.76 Rs
- Average cost of replacement of each unit = 150 Rs
- Total cost of replacement = 150 Rs × 4 = 600 Rs
- Capital cost recovery time = 600 /305.76 = 1.962 years

Similarly, others recommendations for replacing existing fittings with recommended ones are shown in tabular form as below:

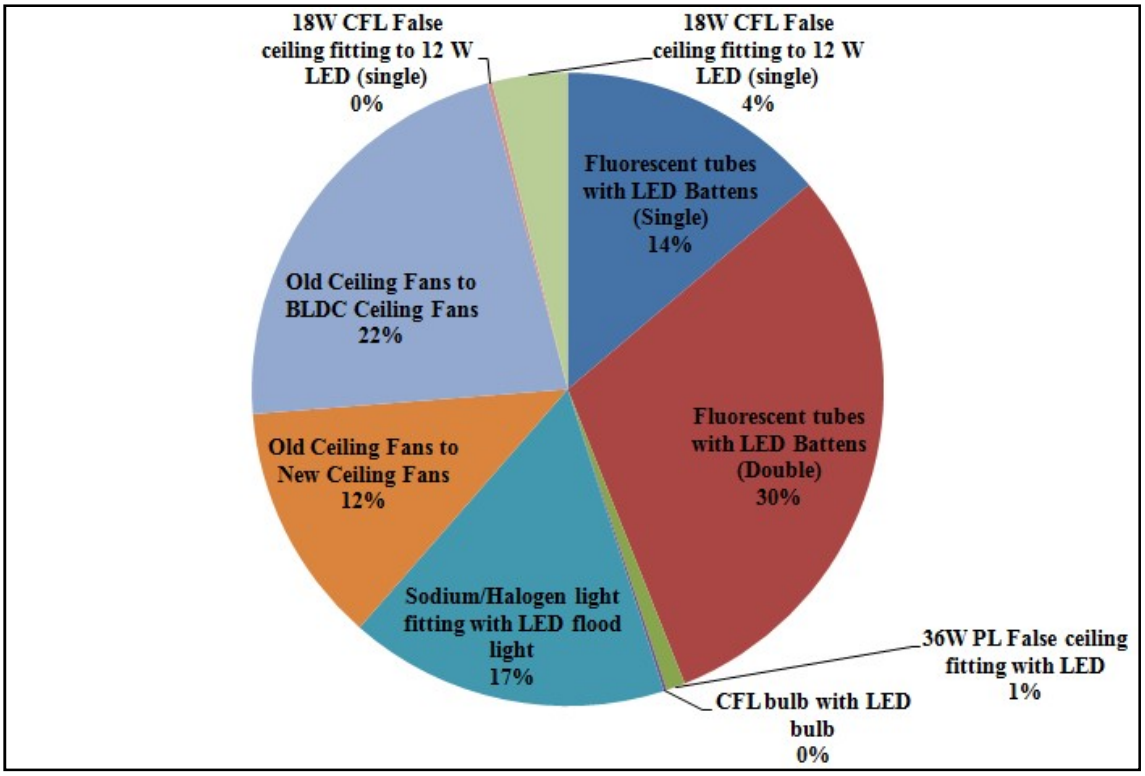
Table2. Recommendations for replacing existing electrical fittings with energy efficient ones with a calculation of predictive capital savings

Denominations	Proposed Replacements								
	Fluorescent tubes with LED Battens (Single)	Fluorescent tubes with LED Battens (Double)	36W PL False ceiling fitting with LED	CFL bulb with LED bulb	Sodium/Halogen light fitting with LED flood light	Old Ceiling Fans to New Ceiling Fans	Old Ceiling Fans to BLDC Ceiling Fans	18W CFL False ceiling fitting to 12 W LED (single)	18W CFL False ceiling fitting to 12 W LED (single)
Total number existing in campus	98	107	9	4	7	113	113	7	57
Average power of existing pattern (Watt)	45	90	36	18	400	80	80	18	36
Average power of proposed pattern (Watt)	20	40	20	12	150	55	35	12	24
Power Saved per unit (Watt)	25	50	16	6	250	25	45	6	12
Total power saving (Watt)	2450	5350	144	24	1750	2825	5085	42	684
Average use per day (hours)	7	7	7	7	7	7	7	7	7
Average number of days used per year	220	220	260	260	365	170	170	220	220
Average use per year (hours)	1540	1540	1820	1820	2555	1190	1190	1540	1540
Total energy saved per year (kWh)	**3773**	**8239**	**262.08**	**43.68**	**4471.3**	**3361.8**	**6051.2**	**64.68**	**1053.4**
Cost of electricity per unit (Rs)	7	7	7	7	7	7	7	7	7
Cost of energy saving per year (Rs)	**26411**	**57673**	**1834.6**	**305.76**	**31299**	**23532**	**42358**	**452.76**	**7373.5**
Average cost of replacement of each unit (Rs)**	230	460	230	150	3000	1500	3200	175	275
Total cost of replacement (Rs)	**22540**	**49220**	**2070**	**600**	**21000**	**169500**	**361600**	**1225**	**15675**
Capital cost recovery time (years)	**0.8534**	**0.8534**	**1.1283**	**1.9623**	**0.671**	**7.2029**	**8.5367**	**2.7056**	**2.1259**

**The prices are only approximate



A comparative view of the total energy saved per year (kWh) using replacements



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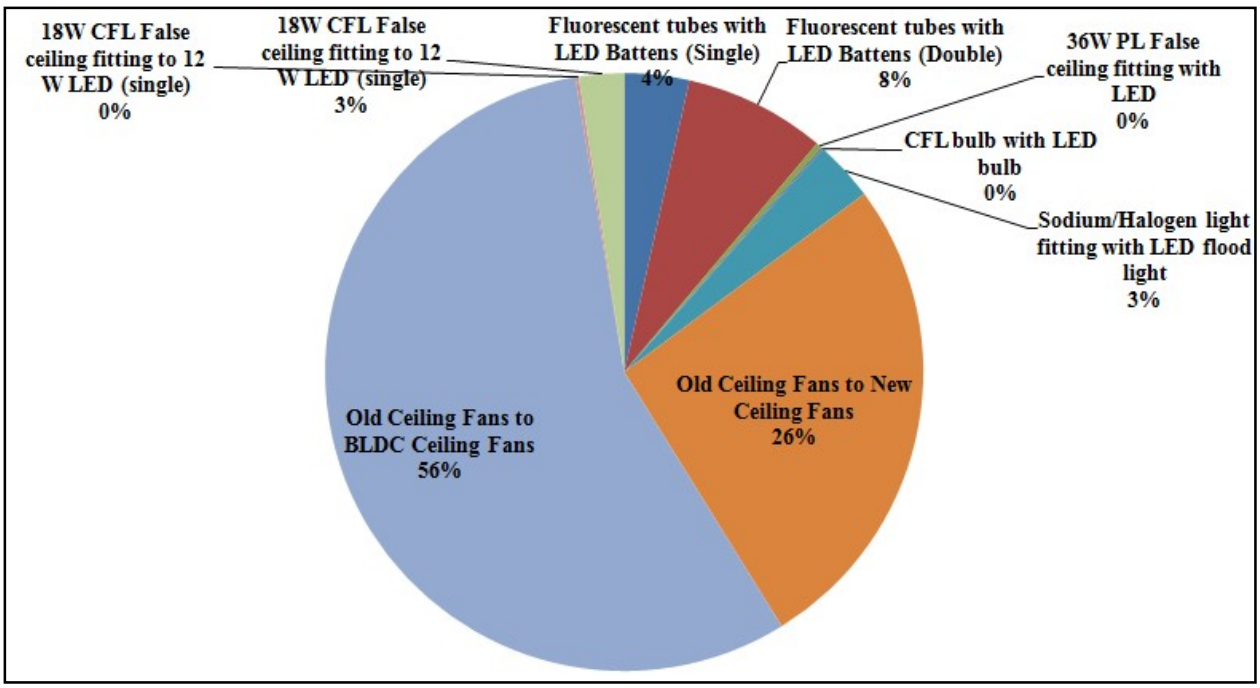
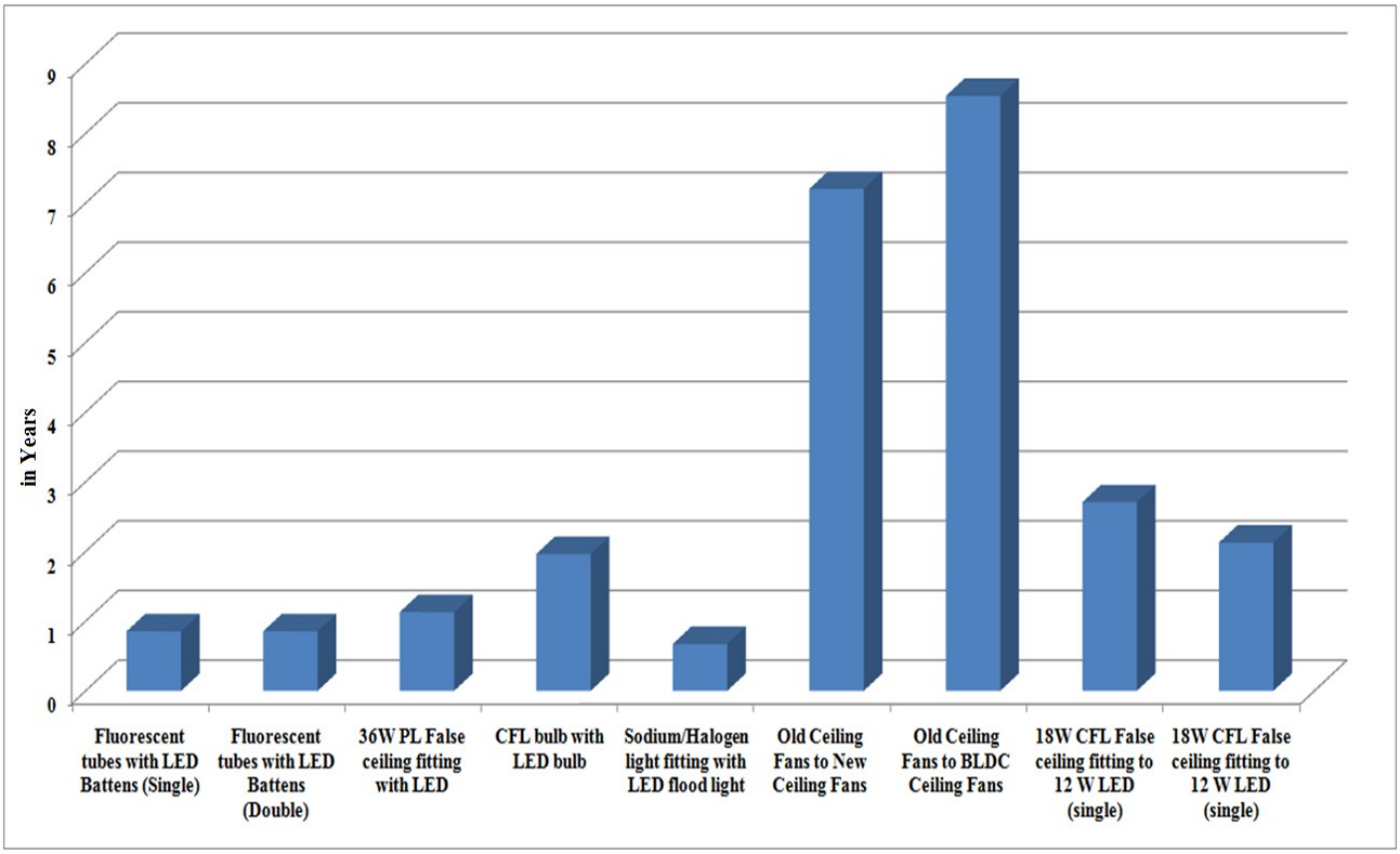


A comparative view of the total cost of replacement (Rs)



A comparative view of the capital cost recovery time (years)

2.4 Assessment of luminance in the classrooms

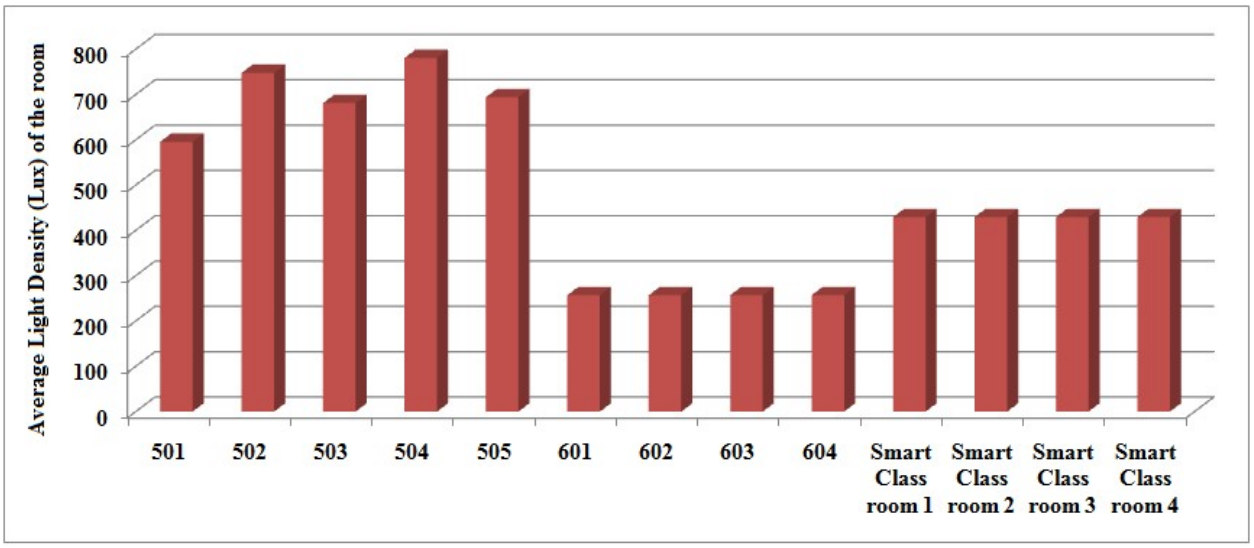
Apart from this conventional energy audit process, the team has also inspected the luminance of the classrooms to examine whether the students are getting the facility of sufficient luminance while reading, writing or copying from the blackboard.

According to many surveys available from different websites, 250lux of luminous level is sufficient in classrooms for studying. For an individual classroom, its area and total lumens produced by all concerned luminous sources in the classroom were taken into consideration for calculating the LUX level of the room using the following formula:

$$Lux\ level\ of\ room = \frac{Total\ lumens\ produced\ by\ all\ sources\ in\ the\ room}{Area\ of\ room\ in\ Sqm}$$

Table 3. Luminance level of class rooms

Description of Lighting Arrangement	Room number												
	501	**502**	**503**	**504**	**505**	**601**	**602**	**603**	**604**	**Smart Class room 1**	**Smart Class room 2**	**Smart Class room 3**	**Smart Class room 4**
Length of the room (m)	6	6	6	6	6	6	6	6	6	5.4	5.4	5.4	5.4
Width of the room (m)	12	12	8.3	8.3	8.3	14	14	14	14	6.9	6.9	6.9	6.9
Area of the room (sqm)	72	72	49.8	49.8	49.8	84	84	84	84	37.26	37.26	37.26	37.26
Number of 4' tube light (LED); 20W, 2000 Lm @ 100 Lm/W	2	1	4	0	0	0	0	0	0	8	8	8	8
Number of 4' single tube light (Fluorescent); 36W, 2160 Lm @ 60 Lm/W	18	24	12	18	16	0	0	0	0	0	0	0	0
Number of 18W CFL; 18W, 1350 Lm @ 75 Lm/W	0	0	0	0	0	16	16	16	16	0	0	0	0
Lumens poduced by 4' single tube light (LED)	4000	2000	8000	0	0	0	0	0	0	16000	16000	16000	16000
Lumens poduced by 4' single tube light (Fluorescent)	38880	51840	25920	38880	34560	0	0	0	0	0	0	0	0
Lumens poduced by 18W CFL	0	0	0	0	0	21600	21600	21600	21600	0	0	0	0
Total Lumens produced	42880	53840	33920	38880	34560	21600	21600	21600	21600	16000	16000	16000	16000
Average Light Density (Lux) of the room	595.6	747.8	681.1	780.7	694	257.1	257.1	257.1	257.1	429.41	429.41	429.41	429.41



A comparative view of the average Light Density (Lux) of the class rooms

From the above Table 3, as well as, from its graphical representation of the above figure, it is observed that barring room no 601, 602, 603 and 604 which have marginal luminous level other class rooms have sufficient luminosity. The luminosity of the rooms with marginal values can be improved by installing more number of energy efficient light fittings e.g. LED lamps or LED battens.

It is to be noted that all the classrooms are equipped with sufficiently large and good number of windows; and the ambient light coming into the rooms through the windows were not considered.

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ENVIRONMENTAL AUDIT

For the year

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&
CERAMIC TECHNOLOGY

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Environmental Audit Report

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The main focus of this audit was to find out if there were any lacunae in the part of the institute regarding environmental issues. Furthermore this audit helped to bring awareness of environmental values in teachers, staff, students and society.

CERTIFICATE

This is to certify that an "Environmental Audit" for Government College of Engineering& Ceramic Technology (GCECT), 73, Abinash Chandra Banerjee Lane, Beleghata, Kolkata, West Bengal 700010, has been conducted during the month March, 2022 to assess environmental status of the college and suggest improvement measures.

Place: Kolkata

Date: 31-03-2022

Govt. College of Engg. & Ceramic Technology
Govt. of West Bengal
73, A. C. Banerjee Lane, Kol. 10

Members of the committee:

1. Prof. (Dr.) Krishnendu Chakrabarty, Principal (Coordinator cum Chairman) K. Chakrabarty

2. Prof. (Dr.) Rituparno Sen, Professor (Member) Rituparno Sen

3. Dr. Debdarpan Khan , Associate Professor (Member)

4. Sri Ambika Prasad Mukhopadhyay, Assistant Professor (Member) Ambika Prasad Mukhopadhyay

5. Dr. Alok Mukherjee, Assistant Professor (Member) Alok Mukherjee

1. Introduction

Environmental audit is essentially an environmental management tool for measuring the effects of certain activities on the environment to identify if it matches with the set criteria or standards. Different organizations of all kinds recognizes the importance of environmental matters and accept that their environmental performance. This audit is duly scrutinized by a number of experts.

In this college, environmental auditing is primarily done to investigate, understand and identify the environmental condition of the institute; as well as, to identify measures for improving existing human activities, with the aim of reducing the adverse effects of these activities on the environment. Here, an environmental auditing committee has been constructed to conduct an in house internal environmental audit to identify the organization's environmental effects in a systematic and documented manner and the committee has produced an environmental audit report.

2. Availability of amenities in the institute

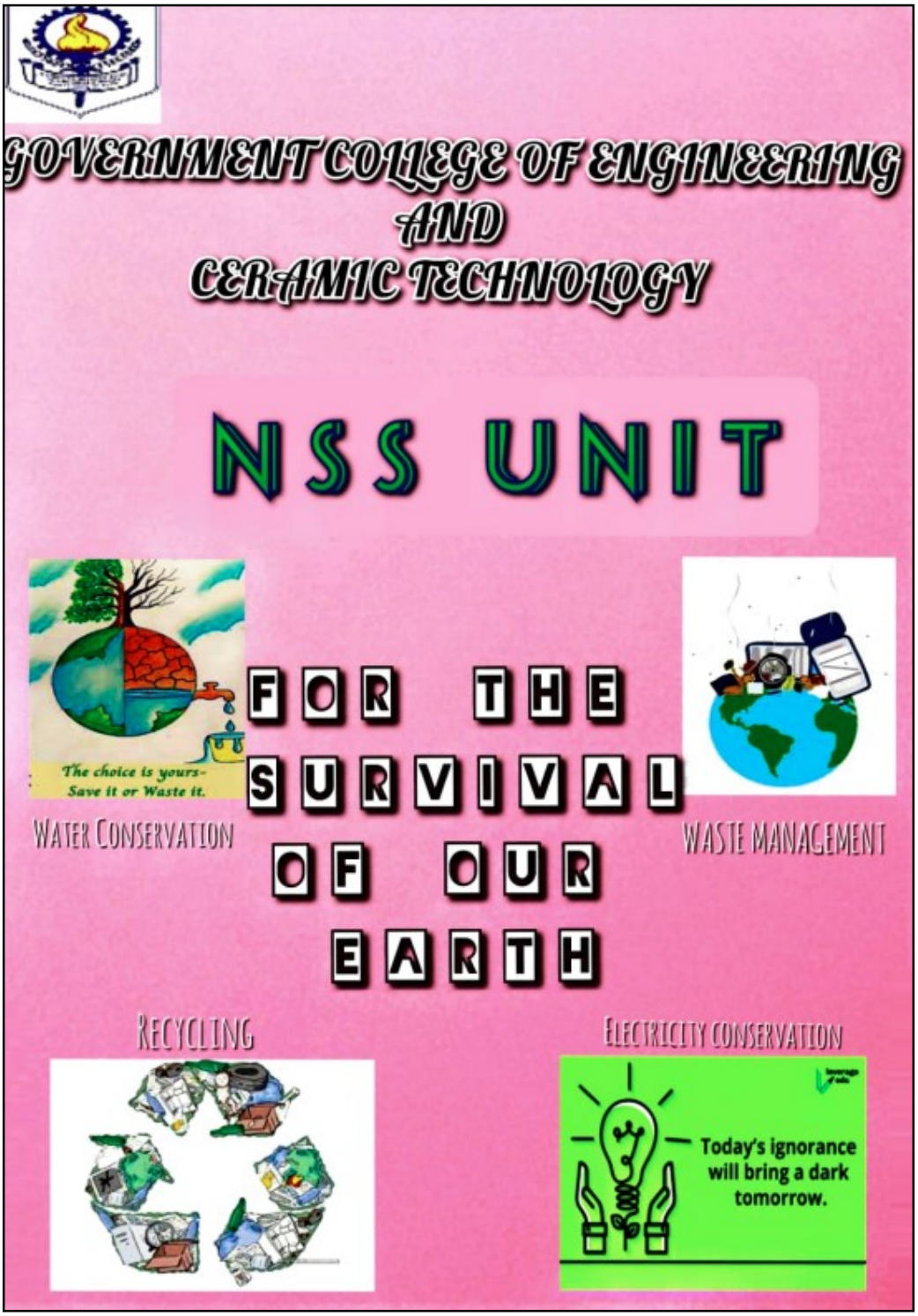
1	Hostel Facility (numbers)	present, boys' hostel, 30 nos. capacity
2	Garden area	present
3	Play ground	present
4	Kitchen	present, boys' hostel, canteen
5	Toilets	present
6	Garbage or Waste Store Yard	present
7	Laboratory	present
8	Canteen	present
9	Guest House	not present

3. Which of the following are found near your institute?

1	Municipal dump yard	no
2	Garbage heap	no
3	Public convenience	yes
4	Sewer line	yes
5	Stagnant water	no
6	Open drainage	no
7	Industry – (Mention the type)	no
8	Bus / Railway station	Bus - **yes**, 100 mts from college gate, Rani Rashmoni Bazar Bus stop Train - **yes**, 3 km from college, Sealdah Railway Station. Metro Rail – **yes,** 1 km from college, at Phool Bagan
9	Public halls	yes, 650 mts from college, Sukanta Mancha

4. Waste Minimization and Recycling

1	Does your institute generate any waste? If so, what are they?	Yes, Solid waste, Canteen waste, paper waste, plastic waste, toiletry waste, etc
2	What kind of waste is generated per day in the institute?	Bio Degradable : yes Non Bio Degradable : yes Hazardous : NIL
3	How is the waste generated in theinstitute managed?	1) Dustbins are present in all the floors as well as in the college campus. 2) There are two vats in the college campus one each for bio-degradable and non-bio-degradable waste respectively. The sanitary waste from college building and hostel are moved to **septic tank** inside the college by underground sewerage lines
4	Is recycled paper used in the institute?	No
5	Is reused paper used in the institute?	Yes., For printing out drafts, class handouts, etc.
6	How the message of recycling to others in the community is spread? Have you taken any initiatives? If yes, please specify.	Through NSS unit of the college by the following measures: Rally, posters by spreading awareness among the local people regarding stopping water wastage, recycling, saving electricity, saving water, tree plantation etc. Some of the awareness initiatives are shown below by the snapshots of posters and other awareness banners.
7	Can you achieve zero garbage in your institute? If yes, how?	No



Poster developed by NSS unit of college

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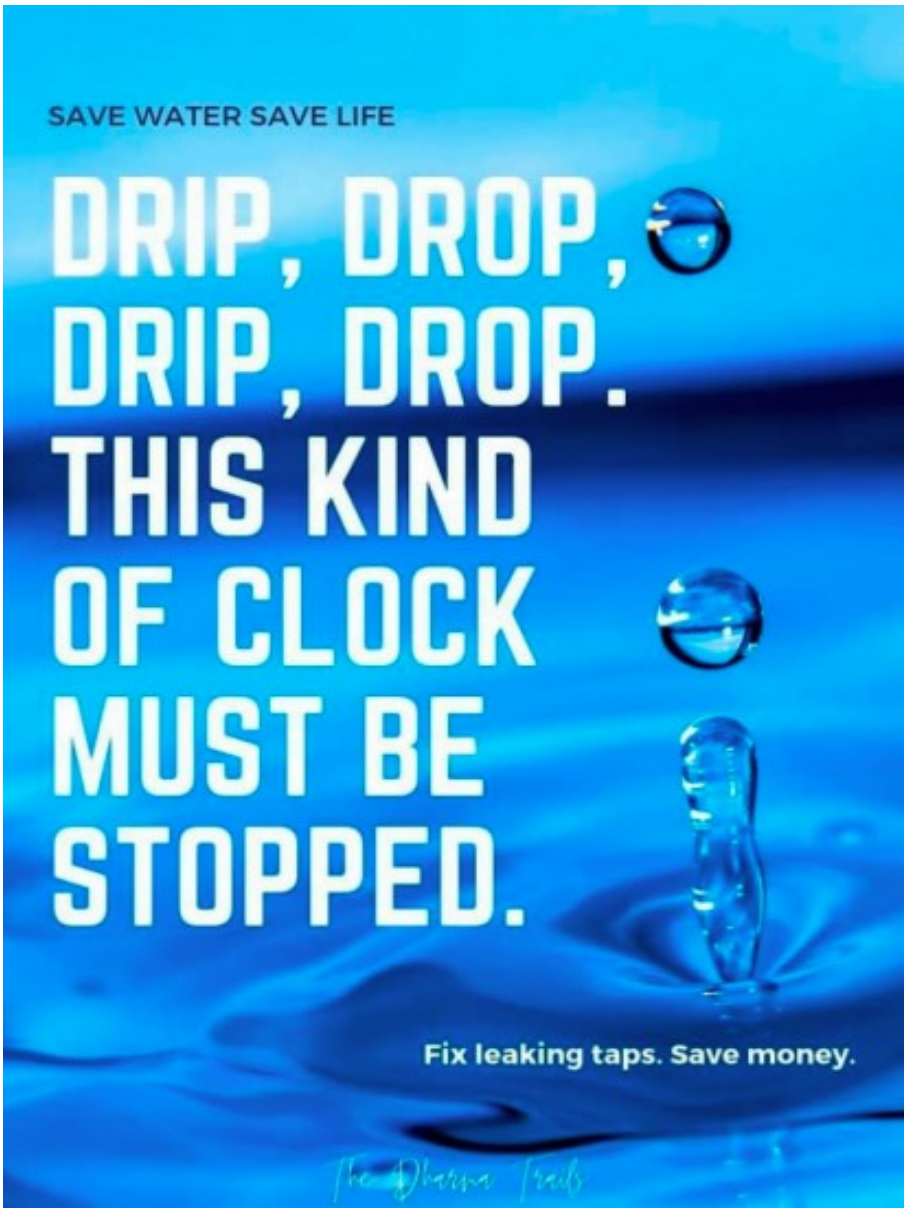
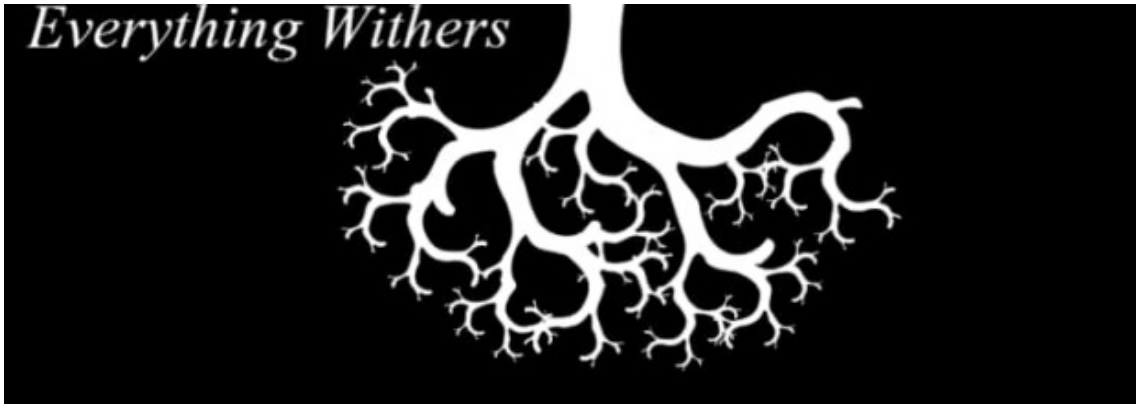


Poster developed by NSS unit of college



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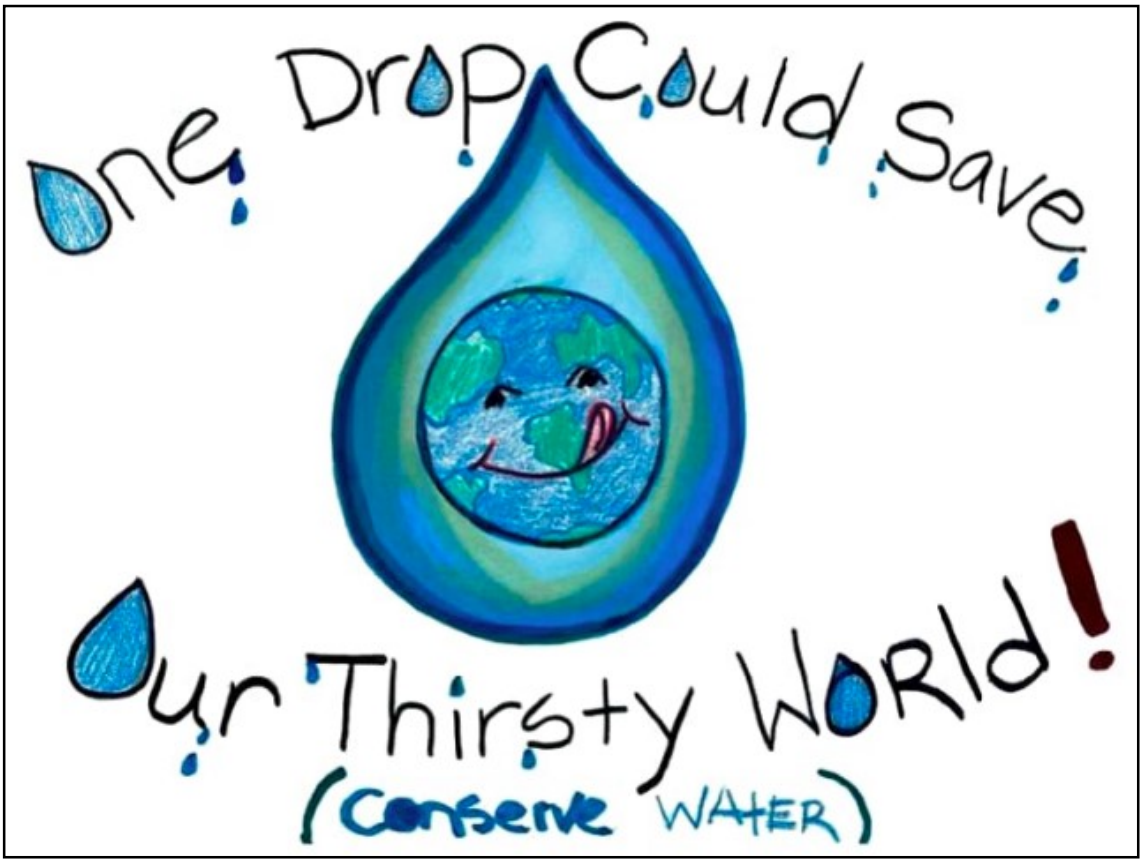
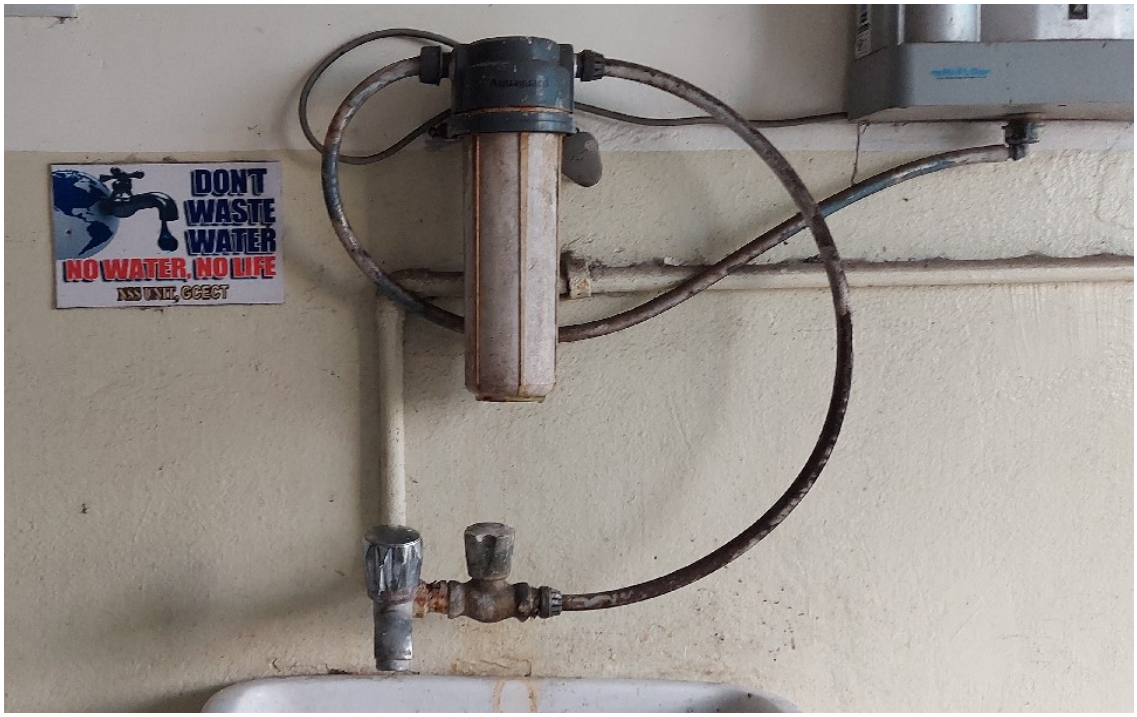


Poster developed by NSS unit of college



Awareness program by the NSS unit of college regarding stopping of waste of water

5. Greening the Campus

1	Is there a garden in your institute?	Yes.
2	Do students spend time in the garden?	Yes
3	Types of Plants in Campus	Trees Shrubs Grass Cover
4	Plants present in the campus	Mango*(Mangifera indica)* Kathal*(Artocarpus heterophyllus)* Kul*(Ziziphus mauritiana)* Khejur*(Phoenix dactylifera)* Chatim*(Alstonia scholaris)* Debdaru*(Polyalthia longifolia)* Palash *(Butea monosperma)* Krishnachura *(Delonix regia)* Bot*(Ficus benghalensis)* Assathya *(Ficus religiosa)* Kathali Chapa *(Artabotrys hexapetalus)* Peyara *(Psidium guajava)* Neem *(Azadirachta indica)*
5	Suggestion of plants to be planted in the campus	There is a good diversity of plants in the campus already present; still more number of such plants might be planted in regular intervals Planting of medicinal plants is a good option
6	Does the College campus have any Horticulture Department	No
7	Number of Staff working in Horticulture Department	Nil
8	Tree Plantation Drives organized by College.	Yes, by NSS unit and Alumni Association of the college
9	Number of Trees Planted in Last FY.	About 50
10	Plant Distribution Program for Students and Community	NIL

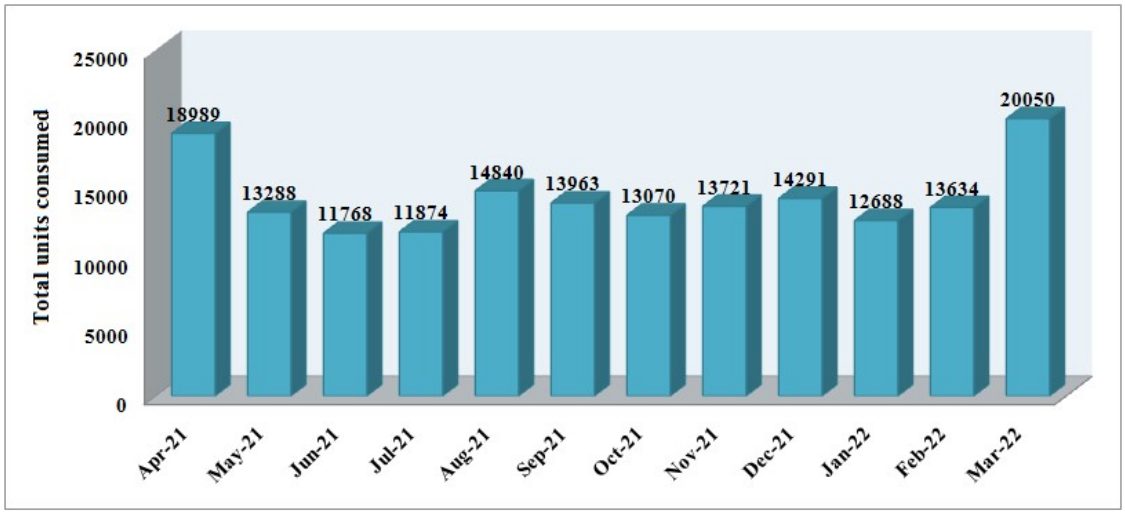
6. Energy

1	List few ways that you use energy in your institute. (Electricity, LPG, firewood, others). Using this list, try to think of ways that you could use less energy every day.	Electricity is saved by use of LED bulbs, LED tubes for illumination. In the hostel LPG is saved by use of Pressure cookers for cooking food. In college canteen Induction cooker is used for efficient use of energy Alternate source of energy i.e. Solar Panel installed for street lighting and other uses in the Institute.
2	Are there any energy saving methods employed in your institute? If yes, please specify. If no, suggest some.	False ceiling are installed in classrooms of top floor for maintaining optimum room temperature inside the classroom. These are also installed in computer labs, Server room and most of the rooms which have air conditioners. Resistance regulators of fans has been replaced by high efficient electronic regulators. Master switches are installed in all floors having class rooms and laboratories to switch of electrical appliances to reduce wastage of electricity in event of non occupancy. Individual rooms are fitted with MCP to reduce wastage of electricity in event of non occupancy. All Air Conditioners of the institute are individually connected to timers to switch off the machines after working hours of the institute to prevent wastage of electricity. In the event of emergency, to switch of the power of the Institute a main switch has been installed. Most of the CFL bulbs have been replaced by the more efficient LED bulbs. Most of the fluorescent tube lamps have already been replaced by the more energy efficient LED tube.

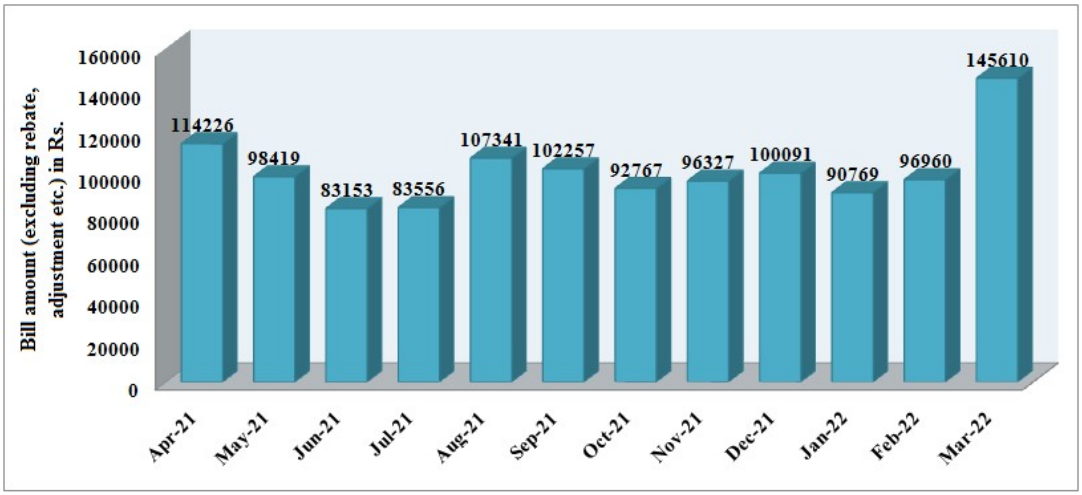
		Computers and other peripheral devices are mostly used in power saving mode or are switched off when they are not in use. Most of the classrooms have curtains / venetian blinds to prevent sunlight and heat from entering the room so that ambient temperature inside the rooms are preserved. Rooms with provision of air conditioning are equipped with curtains / venetian blinds and glass doors and windows so that the room is well air tight for preventing leakage of cool air outside the room.
3	How many CFL/LED bulbs has your institute installed?	195 numbers of LED tube single 98 numbers of LED tube double 81 numbers of LED fitting in false ceiling (2'X2') 96 numbers of 9W LED Round False ceiling fitting 9 numbers of 36W CFL PL False ceiling fitting 4 numbers of CFL lamps 57 numbers of 18W CFL double False ceiling fitting 7 numbers of 18W CFL single False ceiling fitting 12 numbers of LED lamp 12 numbers of Garden Light post LED 4 numbers of Gate light LED 29 numbers of Wall Bracket LED 10 numbers of 50W LED Round False ceiling fitting (in auditorium) 4 numbers of LED Flood Light (in auditorium)
4	Are any alternative energy sources employed/ installed in your institute? (photovoltaic, cells for solar energy, windmill, energy efficient stoves, etc.,) Specify.	Solar photovoltaic cell of 8 kWp installed
5	Do you run “switch off” drills at institute?	No
6	Are your computers put on power-saving mode?	Yes
7	Does your machinery (TV, weighing balance, electric furnace etc.) run on standby modes most of the time?	Yes

7. Electrical energy consumption details of FY 2021-2022

Month	Total units consumed	Rate Rs./unit	Bill amount (excluding rebate, adjustment etc.) in Rs.
April 2021	18989	7.13	114226.00
May 2021	13288	7.13	98419.00
June 2021	11768	7.13	83153.00
July 2021	11874	7.10	83556.00
August 2021	14840	7.10	107341.00
September 2021	13963	7.10	102257.00
October 2021	13070	7.10	92767.00
November 2021	13721	7.07	96327.00
December 2021	14291	7.07	100091.00
January 2022	12688	7.07	90769.00
February 2022	13634	7.36	96960.00
March 2022	20050	7.42	145610.00



Electrical energy consumption for FY 2021-2022



Electricity bill is Rupees for FY 2021-2022

8. Water Conservation

1	List use of water in your institute	Water is used for (1) Drinking,(2) Gardening, (3) Kitchen of hostel and Canteen, (4) Toilets of college, (5)boys' hostel.
2	How does your institute store water? Are there any water saving techniques followed in your institute?	The college has two sources of water (a) ground water (b) piped water supplied by Calcutta Corporation. Water is stored in underground tanks, then pumped to overhead tanks. Piped water is solely used for drinking purpose. Ground water is used for other purposes.
3	If there is water wastage, specify why and how can the wastage be prevented /stopped?	There is no water wastage in the college. Placards are placed in appropriate places so as to aware the user not to waste water
4	Write down few ways that could reduce the amount of water used in your institute	Placards are placed in appropriate places so as to aware the user not to waste water. Water supply system is maintained and monitored on regular basis to avoid leakage and spillage.
5	Record water use from the institute water meter for six months (record at the same time of each day). At the end of the period, compile a table to show how many litres of water have been used.	NA
6	Does your institute harvest rain water?	No
7	Is there any water recycling System.	No

9. Clean Air

1	Are the Rooms in Campus are Well Ventilated?	Yes
2	Window Floor ratio of the Rooms	Very good
3	No. of vehicles	One car
4	No. of vehicles more than five years old	NIL
5	No. of Air conditioned vehicles	NIL
6	Specify the type of fuel used by vehicle	Diesel
7	Air Quality Monitoring Program (If Any)	NIL
8	Generator Set	Yes, 01 Number of Generator Set, Model: Kirloskar, rating: 250 KVA.

10. Animal Welfare

1	List the animals (wild and domestic) found on the campus (dogs, cats, squirrels, birds, insects, etc.)	Indian palm squirrel or three-striped palm squirrel (*Funambulus palmarum* Indian grey mongoose (*Urva edwardsii*) black-rumped flameback woodpecker (*Dinopium benghalense*) Eurasian tree sparrow (*Passer montanus*) house crow (*Corvus splendens*) Indian myna (*Acridotheres tristis*) Indian Pariah dog(*Canis lupus familiaris*) Cat (*Felis catus*) Various insects
2	How many dogs in your area have undergone Animal Birth Control - Anti Rabies?	NA
3	Does your institute have a Biodiversity Programme.	No

11. Environmental Legislative Compliance

1	Are you aware of any environmental Laws pertaining to different aspects of environmental management?	Yes
2	Does your institute have any rules to protectthe	Single use plastic materials are not allowed inside the campus.

	environment?	From time to time NSS unit of the college holds Environmental awareness programs. Students study Environmental Sciences as prescribed by UGC/AICTEin their 3rd/4th sem classes.
3	Is Environmental Ambient Air Quality Monitoring conducted by the Institute?	No
4	Is Water and Wastewater Quality monitoring conducted by the Institute?	No
5	Has stack monitoring of Diesel Generating set done?	No
6	Has any warning notice, letter issued by state government bodies?	No
7	Is there any hazardous waste generated by the Institute?	No
8	Does the institute produce any Bio medical waste?	No

12. Trees present in the college campus

Mango (*Mangifera indica)*

Kathal ***(Artocarpus heterophyllus)***

Kul ***(Ziziphus mauritiana)***

Khejur *(Phoenix dactylifera)*

Chatim *(Alstonia scholaris)*

Debdaru *(Polyalthia longifolia)*

Krishnachura *(Delonix regia)*

Bot *(Ficus benghalensis)*

Peyara *(Psidium guajava)*

Kathali Chapa *(Artabotrys hexapetalus)*

Tree plantation drive of the college

Tree plantation drive of the college

Tree plantation drive of the college

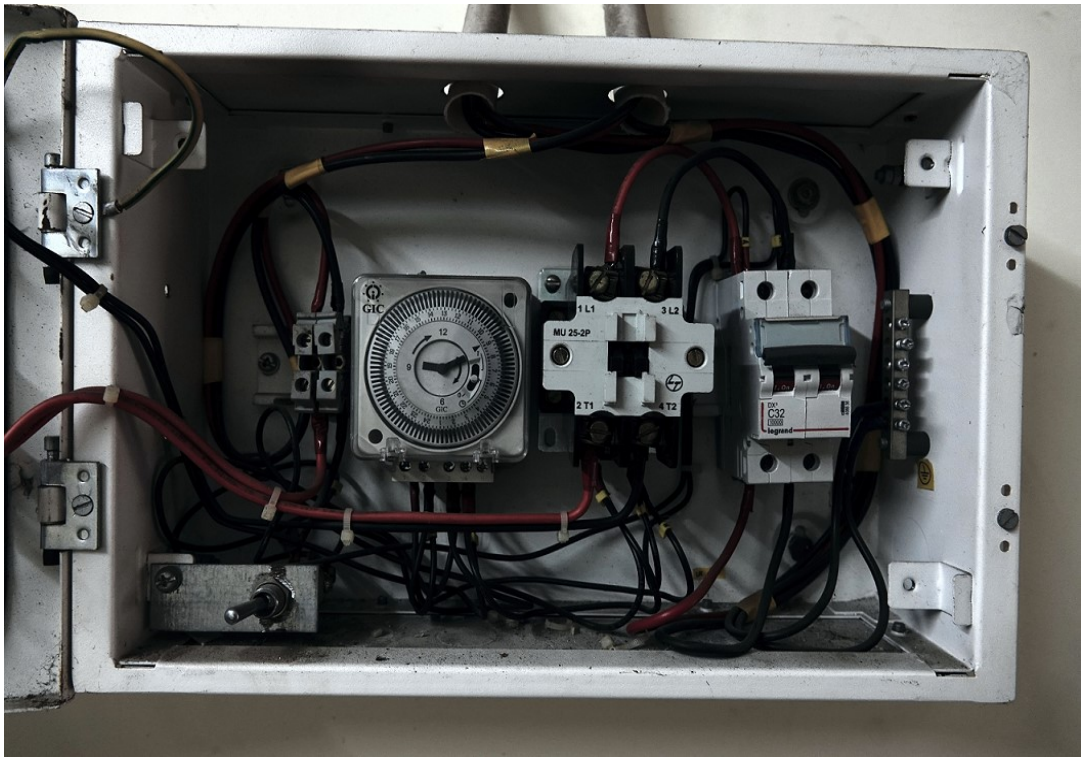
Tree plantation drive of the college

13. Some of the animals present in the college campus

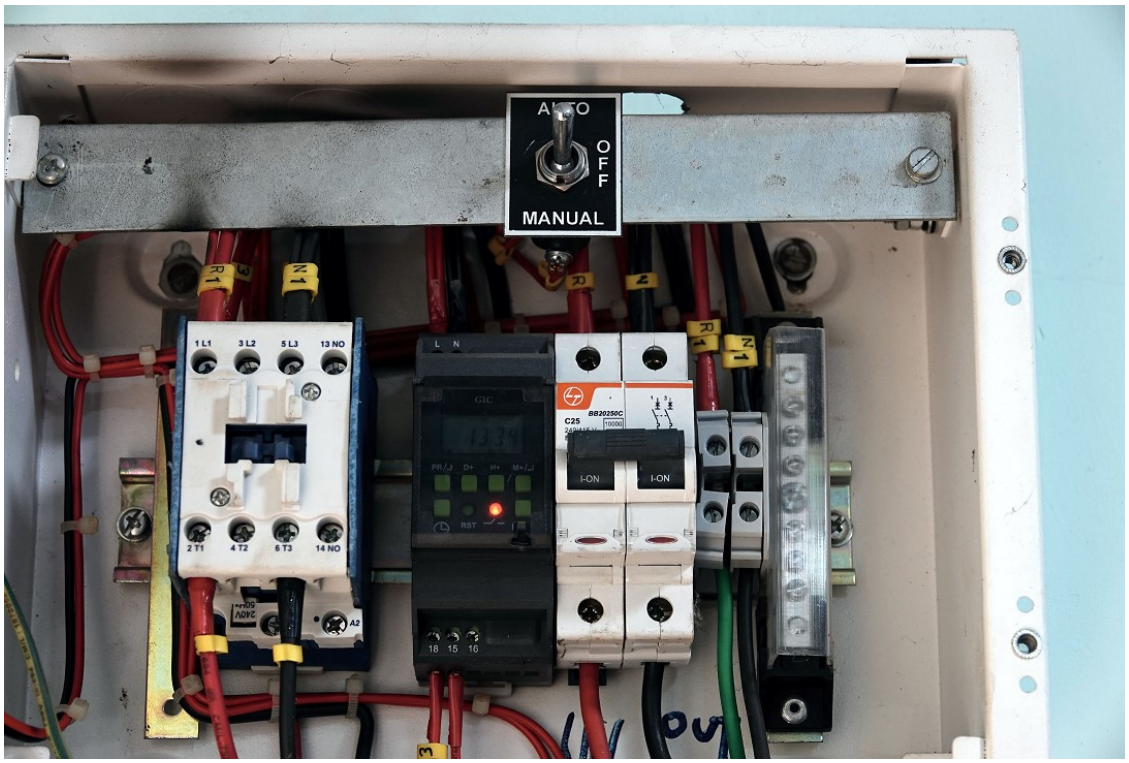
house crow (*Corvus splendens*)

Indian palm squirrel or three-striped palm squirrel (Funambulus palmarum)

14. Energy saving / Safety equipments



Timer for Air Conditioner



Timer for Air Conditioner

Panel of MCBs

Fire Extinguisher installed in college premises

Solar panel on the roof top