MATOSHRI COLLEGE OF ENGINEERING & RESEARCH CENTRE, EKLAHRE

GREEN AUDIT REPORT
2021-2022

Ajinkyatara Consultants

IGBC AP

Prepared By,
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No.AT/58/2021-22

Date: 21/08/2021

To,
The Principal,
Matoshri College of Engineering
& Research Centre,
Eklahre, Nashik 422105

Sub: Submission of Green Building Audit of your institute.

Ref: Your office Work order P.O. No. MES/2020/298-8, dated: 16/03/2021

Dear Sir,

As per above subject and reference, we are appointed for preparation of Green Building Audit Report for Matoshri College of Engineering & Research Centre, Eklahre, Nashik

We here by submit Green Building Audit Report for the same.

Please do the needful!

For Ajinkyatara Consultants

Authorised Signatory

Encl:

1) Green Audit Report 1 copy

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Abstract

Buildings have major environmental impacts during their entire life cycle. The present scenario demands the need to design a responsive building, which address all the issues related to building environment in an integrated and scientific manner. It costs less to maintain a green building that has tremendous environmental benefits and provides a better place for the occupants to live and work in.

This report is comprised of the overall study of the educational campus of the 'Matoshri College of Engineering and Research Centre, Nashik'. It includes site analysis, water efficiency, rainwater harvesting, landscaping, heat island effect, solar efficiency, waste management, work environment with respect to indoor light quality, ventilation, colour application on internal and exterior facades, carbon footprints etc. report also gives some suggestions to improve the performance of building with respect to environment.

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1 Introduction

In the present scenario organizations are facing numerous challenges, issues and risks. One of the biggest one is the 'Global Warming'. Environmental changes, depletion of natural resources. A flexible, secure, dynamic infrastructure has to be devised to help organizations address critical energy and power costs.

In the present scenario, it has become immensely essential to unearth that up to what extent an organization is contributing towards environmental sustainability by adoption of techniques like Green Audit. Green Audit emphasizes the role of methods and practices that reduce a company's environmental impact. Green audit advantage enables and empowers an organization to meet all the Global warming related challenges and at the same time help to contribute back so even an organization can participate and contribute to environmental corporate responsibility.

Energy use in institutions has risen in recent years because of the growth in information technology and air-conditioning. As a result, there has been a strong increase in cooling in warm & cold countries and in electricity consumption.

The institutional sector is emerging as a critical player in India's development process. Driven by the rising scale and intensity of environmental pressures and the society's changing expectations from the institutions, education and the environment, traditionally seen as divergent issues, are steadily coming closer. Realizing the increasing complexities facing the environment, institutions have begun to recognize their responsibility towards maintaining a cleaner, greener environment.

Buildings have major environmental impacts during their entire life cycle. Resources such as ground cover, forests, water, and energy are dwindling to give way to buildings. Resource intensive materials provide structure to a building and landscaping adds beauty to it — in turn using up water and pesticides to maintain it. Energy-consuming systems for lighting, air conditioning, and water heating provide comfort to its occupants. Water, another vital resource for the occupants, gets consumed continuously during building construction and operation. Several building processes and occupant functions generate large amounts of waste, which can be recycled for use or can be reused directly Buildings are thus one of the major pollutants that affect urban air quality and contribute to climate change.

Hence the need to design a responsive building, the essence of which is to address all these issues in an integrated and scientific manner. It is also a proven fact that it costs less to maintain a green building that has tremendous environmental benefits and provides a better place for the occupants to live and work in.

1.4 Methodology

The process adopted for assessment of the site, included a primary inspection of the site, after which details related to site, facilities, services incorporated, analysis of building materials used on site and assessment of energy bills with respect to energy consumption was done.

1.5 Site Visit

Organization	Matoshri College of Engineering & Research Centre.
Site Address:	Eklahare, near Odha-gaon, Aurangabad highway Nashik – 422105
Buildings:	Academic block of Engineering college, workshop building.
Date of visit:	14/08/2021
Visited by:	Ar. Smita Kasarpatil, Er. Gaurav Thakare, Miss. Nilam Wadekar
Visit hosted by:	Prof. Amol Saner, H.O.D., Civil Engineering Dept. Prof. Pramod Sathe, Prof. Nikhil Aher

The campus of Matoshri College of Engineering & Research Centre, Nashik was visited on 14/08/2021. College campus is surveyed with respect to planning, climate, orientation light quality during working hour, landscaping, water efficiency etc.

1.5.1 Site Analysis

The report asses on the basis of study and analysis of the following: -

a) with respect to location of site: -

A. Erosion and Sedimentation Control

B. Site Selection

C. Development density and Community connectivity

D. Alternative transportation

b) Strategies incorporated towards achieving energy efficiency

E. Innovative waste water technologies

a) Storm water design

b) Rain water harvesting

c) Water use reduction

c) Factors considered improving indoor environmental quality

F. Heat Islands Effect

G. Light pollution reduction

H. Materials and resources

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2.0 SITE INTRODUCTION

2.1 Erosion and sedimentation control

The site has effective sedimentation and erosion control plan that confirms to the best management practices. Advocates process like temporary or permanent vegetation, planted trees and soft scapes (lawns). New trees and plants that are non-invasive native species appropriate to the site's location soils and micro climate are there on site. The newly planted trees are located to provide shading in the summer and allow for heat gain in the winter.

Intent Native vegetation is well adapted to the climate and provides excellent hold against erosion, sediment, and provides dust and pollution control. Hence there is preservation of topsoil and existing vegetation.

The trees replanted on-site are in the ratio 1:3 to those removed during construction.

* ***Separate annexure attached along with report, which specifies the number and types of trees planted in the campus***. *(Annexure II)*

Methods incorporated on site:-

1. Provision of lawns (soft-scaping), which not only holds the top soil but also helps penetration of rainwater into ground.

green cover on the site checks soil erosion

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2. Hardscaping provided in the form of interlocking cement tiles, which also reduces the erosion of soil, preserving the top soil.

3. Plantation of native varieties of plants and selection of such varieties have been done that consume not only less water for their growth but also belong to the microclimate and local vegetation.

4. Water efficiency

It can be described as the accomplishment of a function, task, process, or result with the minimal amount of water feasible. An indicator of the relationship between the amount of water required for a particular purpose and the amount of water used or delivered. It differs from water conservation in that it focuses on reducing waste. A proposition is that the key for efficiency is reducing waste not restricting use. It also emphasizes the influence consumers can have in water efficiency by making small behavioral changes to reduce water wastage and by choosing more water efficient products. Examples of water efficient steps include simple measures like, fixing leaking taps, by consumers.

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2.2 Site Selection

Site selection criteria as per LEED India, specifies the following criteria that are listed. The table below confirms these criteria with respect to the proposed site. As the site does not have any of the following parameters, it is suitable for development.

Is a prime farm land	No
Elevation is lower than 5'above the elevation of 100-year flood levels	No
Land specified as habitat for any species by wildlife Institute of India	No
Within 100' of any wetland	No
Prior to acquisition was allotted for any public parkland	No

Strategies incorporated to Reduce Site Disturbance

- Open spaces adjacent to building is equal to the building footprint
- Preservation of topsoil
- Saving existing site vegetation
- Compact parking provided
- Maximum (75%) of indoor areas are day lit, by effective building orientation.
- Water reuse and landscape irrigation scheme is intimately tied with the site design and open spaces allotted.

Open areas equal to building footprint

Preservation of top soil, reduction of heat islands

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Compact parking areas

Effective use of daylighting by orientation of building

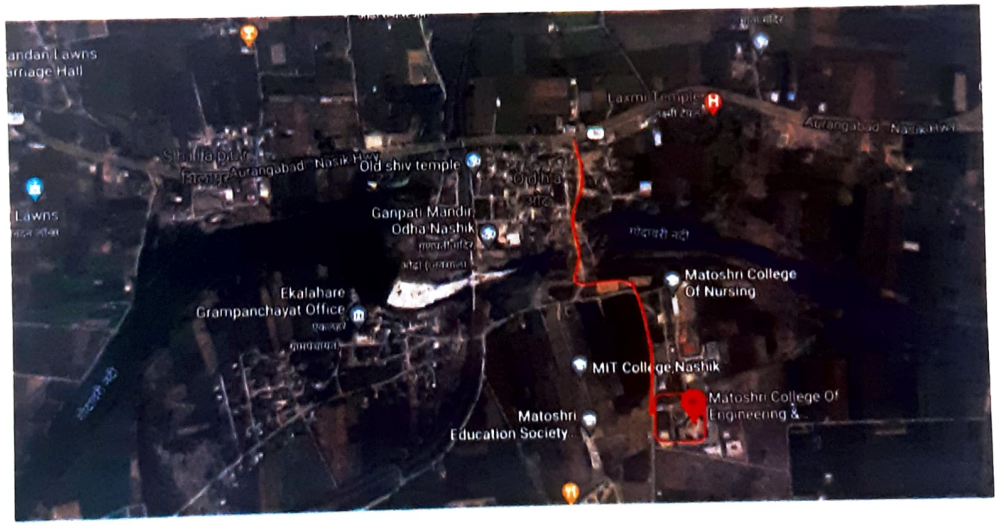
2.3 Development density and community connectivity

The college premise is located on the outskirts of Nashik, which is the major connecting city with rail, road and bus connectivity. Since it is located in taluka, the public density is very less. Though there are community developments around the premises that helps in functioning of day to day activities.

2.4 Alternative transportation

Public transportation Access

Project 3.5 km from the nearest railway station, well accessed by public bus network systems, and campus bus lines used by occupants.



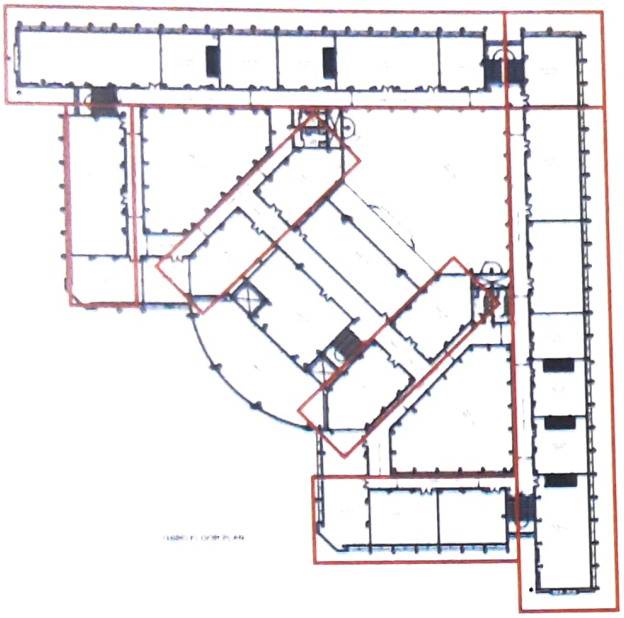
Transit systems

- Railway station 3.5 km
- Mass transit (City Bus Stop) 1.0 km
- Building within 1/2mile of Residential zone/neighborhood.
- Basic services Include: - Bank, Convenience store, Place of worship, Laundry, Medical, Pharmacy, Post Office, Cleaners, Restaurant, Beauty center.

Pedestrian access to nearly all the services mentioned above.

3.1.2 Rain water harvesting

Rain water is harvested form terrace, and ground floor areas, for reusing in watering of lawns.
Surface run off from various ground sources and terraces are collected, filtered and recirculated for gardening and washing purposes.



Total rain water collection =2341680 liter.

Rain water collection pipe, taking the down take to collection tank.

Rainwater harvesting means capturing rain where it falls or capturing the run off of rain water in your own premises. The collected water is also kept clean by filtering and such design of facility that does not allow pollutants to mix with collected water.

There are three methods of water conservation.

a. Rain water collection and storage techniques.
b. Techniques to facilitate ground water recharge.
c. Soil and water conservation techniques.

Calculation of Rain water harvesting

Building population = 2011 Students + 129 Teachers + 116 Admin. & Clerical staff
= 2256 No.

Water Consumption = 45 X 2256 persons = 101520 lit / day

Annual consumption = 101520 x 317 (Working days)

A = 3,21,81,840 lit / Annum

Total rainfall catchments of building = 3393.75 sq m (Terrace area)

Annual average rainfall of Nashik = 690.5 mm = 0.69 m

Water harvesting potential = Rainfall (mm) x Collection efficiency

Total rain water collection = 0.69 X 3393.75
=2341.68 m3 / year
= 2341.68 X 1000 lit

B = 2341680.00 lit

Water requirement that can be fulfill by rainwater harvesting (in %)

(B / A) X 100 = (2341680/ 32181840) X 100

= 7.28 %

Capacity of water tanks = 8.5 X 3.00 X 1.20 X 1000
= 30600.00.....1
= 2 (5.80 X 3.70 X 1.50) X 1000
= 64380.00.....2
= 4.50 X 3.00 X 1.80 X 1000
= 24300.00.....3
= 4.20 X 4.00 X 1.50 X 1000
= 25200.00.....4
= 4.50 X 3.00 X 1.50 X 1000
= 20250.00.....5

1+2+3+4+5 =164730.00 lit

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3.1.3 Water use reduction

The water efficiency of the building is maximized which reduces the burden on municipal water supply. All the pumps are operated by dedicated personnel to avoid wastage / shortage of water .Almost 10% of water is saved by the occupants.

The type of fixtures used in wash rooms are:-

Water closets (western type)

Water closets (Indian type)

Urinals

Faucets

Metering faucets

Conclusion: - While the baseline is good, there are many ways to exceed and achieve maximum standards, thereby achieving greater efficiency.

Methods should be adopted to reduce potable water use by including use of surface runoff water for non-potable applications. This will also benefit in reduced energy use and chemical inputs at municipal water treatment levels.

Energy conservation can be achieved by:-

1. Using aerated flow type taps
2. Minimizing piping distances by proper positioning of water tanks
3. Install low flow flushing cistern (3 lit per flush)
4. Install water efficient urinals
5. Use low flow irrigation systems for garden area.

3.1.4 Solid Waste and Recycling

On site, both the recyclable and the disposable wastes are segregated. Hence every recyclable item has the opportunity to be diverted from the waste and to be sent to landfill.
Composting is also available on site hence all of the organic waste is converted into compost and used on site.

Annual extrapolation of each waste category (by mass)

A. Solid waste

Building population = 2011 Students + 129 Teachers + 116 Admin.& clerical staff

Solid waste generation = 0.042 cu m X 2256 persons
= 94.75 cu m

A septic tank is provided to treat the waste.

Capacity of septic tank = 4.50 X 3.00 X 1.80

= 24.3 cu m

B. Organic waste

Total plot area of site is 40500.00 sq m. 50% of site is landscaped. There are only around 20 evergreen tree verities planted in a front open area. Other landscaped area is covered with lawn and few shrubs are planted along the pathway. Organic waste generated by these plants is disposed off in trenches made in the campus. Manure created by this waste is used for the landscaped area.

C. Paper, Newsprint, and Cardboard

About 700-800 kg per year of the garbage by mass found to be recyclable paper including cardboard and newsprint. Recyclable mixed paper and newsprint represent a strong opportunity for diverting a significant portion of Institute's waste and lowering its carbon and deforestation footprints. Some of the most common paper items from the college area that include: copy/printer paper,

newspapers, and paper packaging. This waste paper is sending for recycling through the venders in city.

D. E- waste

E – Waste is created in the form of CDs. Those are used artistically to create statues, structures, mementoes etc. Thus it avoids their entry in dump yards

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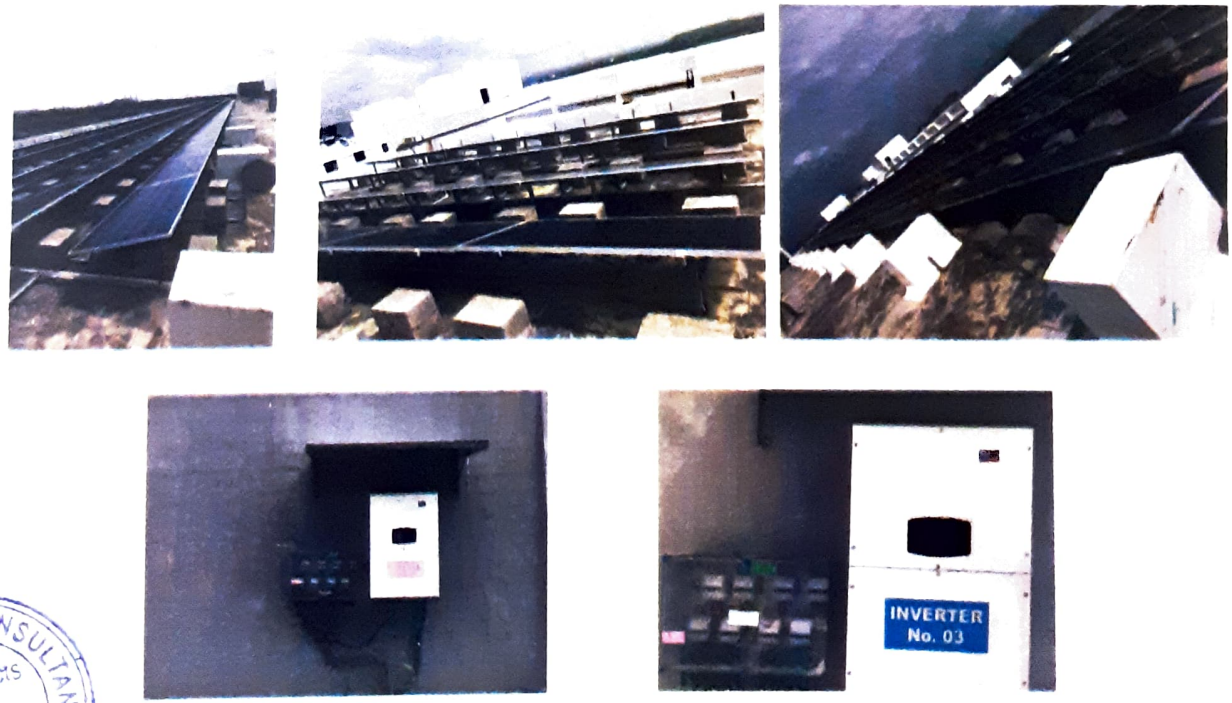
3.1.5 Solar Energy:

Solar energy is radiant light and heat from the Sun that is harnessed using a range of ever-evolving technologies such as solar heating, photovoltaic, solar thermal energy, solar architecture, molten salt power plants and artificial photosynthesis. It is an essential source of renewable energy, and its technologies are broadly characterized as either passive solar or active solar depending on how they capture and distribute solar energy or convert it into solar power. Active solar techniques include the use of photovoltaic systems, concentrated solar power, and solar water heating to harness the energy. Passive solar techniques include orienting a building to the Sun, selecting materials with favorable thermal mass or light-dispersing properties, and designing spaces that naturally circulate air.

The building has 150 KW Solar power plant of PV Modulus of VIKRAM make and Solar grid Inverter of SMA make. Modules are mounted on GI Frame with all the cable and accessories.

It has 3 inverters of 50KW each on rooftop of main building.



150 KW Roof Top Solar Panels and Inverters

Solar energy calculations:

The solar PV energy Output is given by a global formula

E = A x r x H x PR

Where,

A = Total Solar Panel Area = 2292.86 Sqm.

r = Solar Panel yield = 6.54%

H = Annual Average radiation on tilted panels = 2098.75 KWh/m^2.an

PR = Performance ratio = 0.75

Therefore,

E = 2292.86 x 6.54 x 2098.75 x 0.75 = **235892 KWh/an.**

Daily energy output = 235892 / 365

A = 646.28 KW.

Monthly average Unit Consumption by building = 1748 units = 1748 KWH

Estimated daily energy consumption = (1748/30)

B = 58.26 KW

Surplus Energy generated **= B – A** = 646.28 – 58.26 KW

= 588.01 KW

Hence **583.87 KW** surplus energy is generated by employing solar PV panels on roof top.

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4.0 Indoor environment

4.1 Heat island Effect

This occurs when warmer temperatures are experienced in urban landscapes, compared to adjacent rural areas as a result of solar energy retention on constructed surfaces. Principal surfaces that contribute to heat island effects are streets, sidewalks, pathways, parking lots and buildings.

- Strategies incorporated:
- Provision of shady trees within the premises
- Ground cover in the form of landscape, plantations
- Use of light colored high Albedo materials, on the external surfaces to reflect off light and heat.
- Pervious surfaces for percolation of water from soil.

Use of light colors on façade to reflect light and heat

Use of light ground covers and landscapes to reduce heat island effect.

4.2 Light pollution reduction

Details of lighting source: - Lighting fixtures and lamps (Artificial lighting)

Descriptions	Value
Wattage	28
Base	Tube
Diameter	16mm
Length	1149mm
Colour Temperature	4000
EEL	A+
Manufacturers Part Number	63948655
Part L Compliant	No

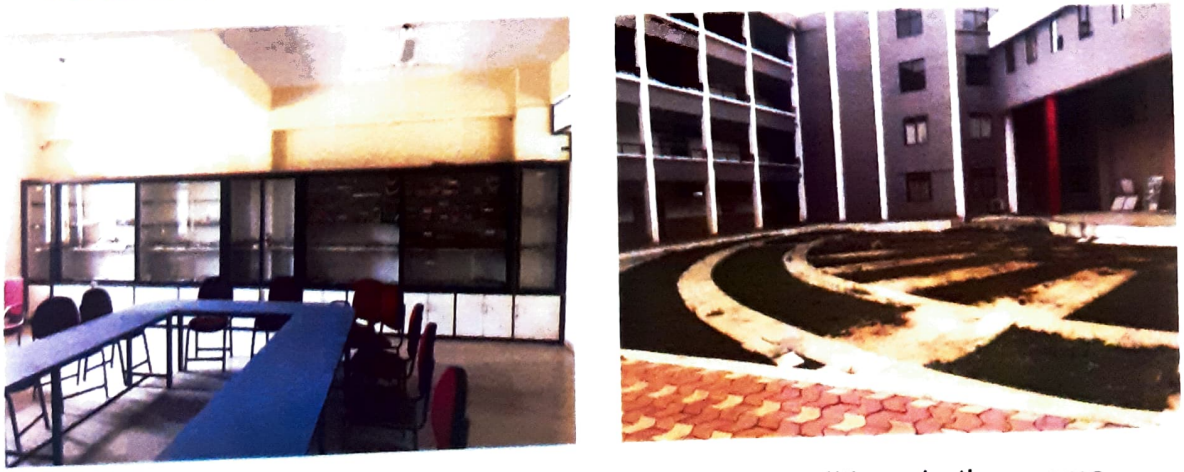
Part Number: F28T5/84 PHI

Use of single 20 W LED Tube & single tube 40 W, 230 V fluorescent light fixtures in the indoor areas.

Average artificial lighting lux of **284 lux** is observed inside the building. Which is well under limit set by National building code.

* ***Separate annexure attached along with report, which specifies the LUX levels at all the rooms in Building.*** *(Annexure I)*

The above pictures show ample natural light conditions in the laboratories.



The above pictures show ample natural light conditions in the rooms

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Conclusion: -The above calculations measure the lux level of artificial lights provided in the rooms. It must be noted that the building has sufficient, unobstructed, natural light from all sides, which brings in plenty of sunlight in the indoor spaces specially class rooms and labs. The natural light available in the rooms is 250-300 lux, which makes it comfortable to use the space during day time, without artificial lights.*(Also shown in pictures above*). The artificial lights hence support during cloudy weather days.

5.0 Estimated Energy consumption

5.1 Energy Consumption

Electricity for light, fan and laboratory equipment's is the main energy consumption in this institute. Only few areas like director's cabin, principal's cabin etc. are air conditioned. There is no hot water supply in the premises. Ample amount of natural light as already shown reduces the dependency on artificial lights, and consequently energy.

5.2 Indoor Environment

Major part of building faces east and south side. Classrooms along these two sides are also facing courtyards from internal side. Bilateral lighting system provides adequate natural light and cross ventilation for these most occupied spaces during working hours. Most of the laboratories are facing north – west are also getting sufficient light.

This campus is located 3 km away from major highway. Adjoining road is internal road with very less vehicular traffic. Students are using public transport or buses provided by institution itself. Also the site is surrounded by farmland. Hence there is no sound and air pollution observed.

5.3 Carbon foot print of institution

Emission factors

Sr. No.	Item	Emission factor
1	Electricity	0.85 kg CO_2 per KWh
2	Petrol	2.296 kg CO_2 per liter
3	Diesel	2.653 kg CO_2 per liter
4	LPG	1.983 kg CO_2 per kilogram

Source:

1. CO_2 emission factor database, version 06, CEA (Government of India), http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm
2. Emission factors are taken from the file "Emission factors from across the sector -tool", extracted from http://www.ghgprotocol.org/calculation-tools/alltools

Annual consumption of resources

- Electricity required per year = 1748 X 12 months = 20976 Kwh
- Petrol required per year = 0 lit.X 12 months = 0 lit.
- Diesel required per year = 1815 X 12 months = 21780 lit.
- LPG required per year = 0 kg X12 months = 0 kg

*Above information is facilitated by administration Dept. of institute.

Actual carbon footprint

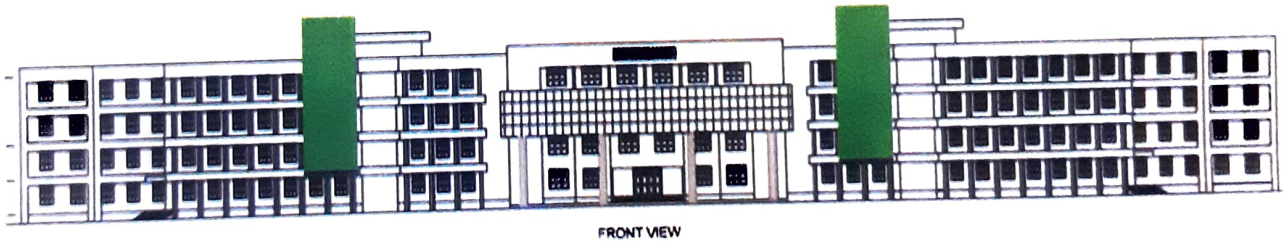
1. Electricity = 20976 X 0.85 = 17829.60
2. Petrol = 0.00 X 2.296 = 0.00
3. Diesel = 21780 X 2.653 = 57782.34
4. LPG = 0.00 X 1.983 = 0.00
5. Total (1+2+3+4) = 75611.94 kg i.e. 75.61 ton
6. 75.61 ton /2256 (no of persons) **= 0.034 ton per person**

6.0 Suggestions

Strategies that can make building energy efficient:-

6.1 Implementation of green wall

A **green wall** is a wall, either free-standing or part of a building, that is partially or completely covered with vegetation and, in some cases, soil or an inorganic growing medium. plants reduce overall building temperatures which helps reduce energy consumption.



FRONT VIEW

Implementation of green walls will also promote conservation of native plant varieties apart from enhancing views, rendering cooler indoor environment and microclimate.

6.2 Solar Energy

A building which not only makes use of efficient building technology but is also geared to energy savings potential, is completed by a façade which apart from its conventional function also contributes to energy generation. India is blessed with ample sunlight, that can be effectively harvested throughout the year. Solar energy if properly harvested can reduce the burden on energy consumption of the buildings, adding on to considerable savings for the users.

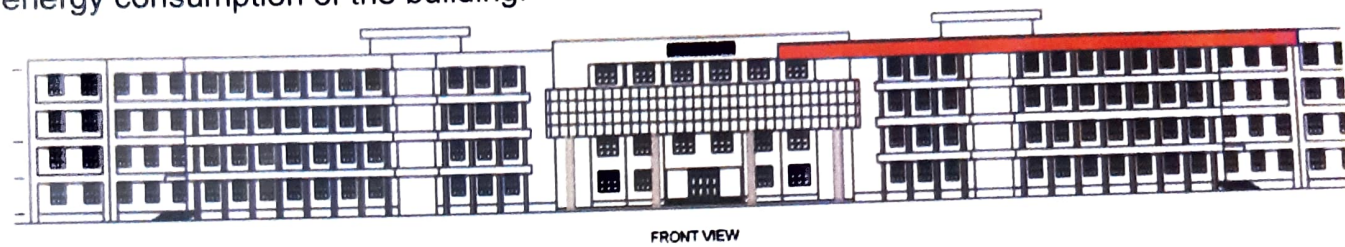
If photovoltaic panels be installed, it will save on electricity consumption of building.

Solar energy calculations:

Average photovoltaic cell energy output = 0.15 Kwh / Sq.m
Total sunlight hours / day = 7 hours
Daily energy output = 0.15 X 7 = 1.05 Kw / Sq.m
Area of photovoltaic cell = 104.44 X 2.40
= 250.65 sq m
Energy output = 250.65 X 1.05
Energy output = 263.18 Kw

Hence 263.18 KW energy can be generated by employing only 8' long solar PV panel on the southern side of building façade. This can bring in considerable savings and make building green.

In addition, if Solar panels are placed on the West facades also this will also add on to capture and conversion, and effective harnessing of solar energy to reduce energy consumption of the building.



FRONT VIEW

Addition of solar PV panels on the western and Southern sides can reduce the energy load of building

7.0 Conclusion

1. The building performs fairly well on the criteria studied through this report. The microclimate solves various heat gain issues which are otherwise a possibility in sites which are located in urban areas.
2. The site doesn't pose connectivity issues and is equally connected through, bus and road networks.
3. There have been measures undertaken by the designers and authorities to add on the existing plantation of the site, and to conserve top soil by landscaping. However, if ground cover and landscaping is increased which is possible by landscaping of open court areas around the building this will help in reducing the heat island effect of the building thereby contributing towards the microclimate.
4. The segregation of waste is a factor where it needs to work on positively as the organic waste generated by the site if be treated there itself by composting, will be beneficial and the waste will be treated at source itself
5. The building is very well oriented to fetch maximum day light in all indoor major function areas such as classrooms and labs. This saves on considerably on artificial lighting requirements.
6. The institute measures and disposes the E-waste generated by selling to scrapyard.

7. The paper waste generated is being reused and sent to the recycling agencies instead of being burnt, thus helping and maintaining the green environment.
8. RO plants with water coolers are located at all suitable locations.
9. No seepages were observed in the building premises.
10. Energy efficient computers and monitors have been procured. Approx. less than 1% computers are having CRT screen. Rest all is having TFT monitors.
11. Electronic communication is encouraged to minimize usage of papers.
12. Most of the paper waste generated by the campus is reused for doubled sided printing.
13. Air Conditioning usage is only limited less than 1% in the campus, thereby making it more 'Green'.
14. The garden areas partly use pipe line irrigation system and partly use Drip irrigation.
15. The provision of impervious floors in the outdoor areas can further be increased by which ground water table of water will benefit, as of now it is only 80%, which should be increased to 90%, by employing perforated pavers, grass joints etc.
16. The building must replace the few existing Fluorescent tube lights to LED light fixtures which will help in reducing the electricity consumption to a large extent. For this institute has taken steps and ordered LED tube lights.
17. The building is also harnessing solar energy which is very welcoming.
18. Students and Staff members are totally aware of pollution that is caused by use of vehicles & bicycles. Still a carbon consumption awareness programme must be undertaken to check and improve the carbon emissions at individual as well as campus level so that it avoids Air and Noise pollution in the campus due to vehicles or any activity in it.
19. The Institute must also provide Solar panels and harness lighting that can be used to lit outdoor areas of campus. Solar lights in the campus can also be provided. It can reduce electrical bills and contribute to Carbon neutrality.
20. The Institute must also take measures to install water closets and fixtures that use less water. Similarly, all the fixtures of the toilets which have water leakage must be checked and replaced. This will not only help in achieving maximum standards, but also greater efficiency.
21. The sewage water is disposed of through storm drainage to septic tank. However, the human intake in premises being very high, it is advisable to propose Sewage Treatment plant which will save the requirement of local water tankers and treated STP water can be used for gardening applications
22. For barrier free access, the ramp need to be provided in the campus at each floor, provision of barrier free toilets, equipped with grab bars and must be done.

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CERTIFICATE

This is to certify that the Green Audit for year 2021-2022 for the **'Matoshri College of Engineering & Research Centre, Eklahare,** was done by us. The building performs good on the criteria's studied through this report. We have covered the area of environmental consciousness, energy conservation, waste management, use of renewable energy, water efficiency etc. All necessary data is provided by institute and the analysis is enclosed in the report.

The aim of conducting green audit is to check the demand on non-renewable resources, check the utilization efficiency of these resources when in use, and check reuse, recycling, and utilization of renewable resources.

While the baseline is good, there are many ways to exceed and achieve maximum standards, thereby achieving greater efficiency of the buildings energy performance, which are mentioned in the Report.

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Ar. Smita Y. Kasarpatil
M. Arch.
I.G.B.C. AP
M.A. (History & Archaeology)
P.G. Diploma in Heritage Management
& Scientific Conservation
M.I.I.A., A.I.V.

IGBC AP

References

No. of Teaching staff	No. of Non-teaching staff
129	116

Total no. of students in campus = 2011

Total occupancy in the campus = 2256

Documents enclosed:

1. Annexure I: Light levels and electrical points in the rooms.
2. Annexure II: List of trees planted in the campus

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References

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1. Annexure I: Light levels and electrical points in the rooms.
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Annexure I:

Sr. no.	Room	Artificial light			Fan	Power Points		MCB	LUX level			
		Fixture	lumens/ fixture	no. of fixtures		3 pin	power points			Near window	Centre of the Room	Passage/ Entrance Side
1	AG 01	Tube Light				7			With Lights on			
		LED Tube light		2					Without Lights	75	80	960
1	AG 02	Tube Light				7			With Lights on			
		LED Tube light		2					Without Lights	68	72	945
1	AG 03	Tube Light			4	7			With Lights on			
		LED Tube light		2					Without Lights	90	85	980
1	AG 04	Tube Light			4	7			With Lights on			
		LED Tube light		2					Without Lights	84	75	940
1	AG 05 PG CO-ORDINATOR (ELETRICAL ENGG)	Tube Light			3	7			With Lights on			
		LED Tube light		2					Without Lights	65	71	958
1	AG 06	Tube Light			3	7			With Lights on			
		LED Tube light		2					Without Lights	68	70	923
1	AG 07	Tube Light			2	7			With Lights on			
		LED Tube light		2					Without Lights	85	85	950
2	AG 08 BASIC ELETRICAL LAB	Tube Light			4	30			With Lights on			
		LED Tube light		1					Without Lights	2100	100	650
3	AG 09 ELETRICAL MACHINES LAB	Tube Light		1	10	10		1	With Lights on			
		LED Tube light		3					Without Lights	1900	162	331
3	AG 10	Tube Light		1	10	10		1	With Lights on			
		LED Tube light		3					Without Lights	2000	185	350
3	AG 11	Tube Light		1	10	10		1	With Lights on			
		LED Tube light		3					Without Lights	1950	170	340
3	AG 12	Tube Light		1	10	10		1	With Lights on			
		LED Tube light		3					Without Lights	2020	180	320
4	AG 13 CHEMISTRY LAB	Tube Light			3	9	2		With Lights on			
		LED Tube light		3					Without Lights	2020	175	320
4	AG 14	Tube Light			3	9	2		With Lights on			
		LED Tube light		3					Without Lights	2050	190	350
5	AG 15 ENVIROMENT LAB	Tube Light			2	31		1	With Lights on			
		LED Tube light		2					Without Lights	1910	58	300.95
	ADMIN OFFICE	Tube Light			3	20	2		With Lights on			
		LED Tube light		4					Without Lights	80.3	82	165

Sr. no.	Room	Artificial light			Fan	Power Points		MCB	LUX level			
		Fixture	lumens/ fixture	no. of fixtures		3 pin	power points			Near window	Centre of the Room	Passage/ Entrance Side
7	BG 01	Tube Light				12		1	With Lights on			
		LED Tube light		3					Without Lights	2800	115.8	3350
7	BG 02	Tube Light				12	1	1	With Lights on			
		LED Tube light		3					Without Lights	2820	120	3343
7	BG 03	Tube Light			6	12		1	With Lights on			
		LED Tube light		3					Without Lights	2690	110	3300
7	BG 04 EXAM CONTROL OFFICE	Tube Light			6	12		1	With Lights on			
		LED Tube light		3					Without Lights	2740	115.8	3343
8	BG 05 GEOLOGY LAB	Tube Light			5	1	2		With Lights on			
		LED Tube light		2					Without Lights	5320	110	320
8	BG 06	Tube Light			5	1			With Lights on			
		LED Tube light		2					Without Lights	5240	120	310
8	BG 07	Tube Light			5	1	1		With Lights on			
		LED Tube light		2					Without Lights	5000	116	345
8	BG 08	Tube Light			6	1			With Lights on			
		LED Tube light		2					Without Lights	5160	180	340
8	BG 09	Tube Light			3	1	1		With Lights on			
		LED Tube light		2					Without Lights	5300	150	330
9	BG10 COMPUTER CENTER (CIVIL)	Tube Light			12			2	With Lights on			
		LED Tube light		3					Without Lights	4090	190	1260
9	BG11	Tube Light			12		1	2	With Lights on			
		LED Tube light		3					Without Lights	4000	195	1240
9	BG12	Tube Light			12		2	2	With Lights on			
		LED Tube light		3					Without Lights	4150	180	1230
9	BG13	Tube Light			12			2	With Lights on			
		LED Tube light		3					Without Lights	3980	210	1240
9	BG14	Tube Light			12		2	2	With Lights on			
		LED Tube light		3					Without Lights	4000	250	1260
10	BG15 TRANSPORTATION LAB	Tube Light			5	7	3	1	With Lights on			
		LED Tube light		2					Without Lights	1000	230	2100
First Floor												
11	BF 01	Tube Light			3	6			With Lights on			
		LED Tube light		3					Without Lights	56	70.6	94.6

Sr. no.	Room	Artificial light			Fan	Power Points		MCB	LUX level			
		Fixture	lumens/ fixture	no. of fixtures		3 pin	power points			Near window	Centre of the Room	Passage/ Entrance Side
11	BF 02	Tube Light			3	6	2		With Lights on			
		LED Tube light		3					Without Lights	58	89	95
11	BF 03	Tube Light			3	6			With Lights on			
		LED Tube light		3					Without Lights	60	71	98
11	BF 04 FE DEAN	Tube Light			3	6			With Lights on			
		LED Tube light		3					Without Lights	53.3	74	90
11	BF 05	Tube Light			3	6	1		With Lights on			
		LED Tube light		3					Without Lights	52	75	92
12	BF 06 PG CO-ORDINATOR (COMPUTER ENGG)	Tube Light			1	6			With Lights on			
		LED Tube light		1					Without Lights	9560	155	150
12	BF 07	Tube Light			1	6	2		With Lights on			
		LED Tube light		1					Without Lights	9500	250	153
12	BF 08	Tube Light			1	6			With Lights on			
		LED Tube light		1					Without Lights	9450	250	154
13	BF 09 HEAD OF DEPT (INFORMATION T)	Tube Light			2	3	1		With Lights on			
		LED Tube light		2					Without Lights	5650	209	707
13	BF 10	Tube Light			2	3	1		With Lights on			
		LED Tube light		2					Without Lights	5600	258	705
13	BF 11	Tube Light			2	3	1		With Lights on			
		LED Tube light		2					Without Lights	5500	230	750
14	BF 12 SOFTWARELAB	Tube Light			13		2	3	With Lights on			
		LED Tube light		3					Without Lights	4950	505	1580
15	BF 13 SEMINAR LAB	Tube Light			2	2			With Lights on			
		LED Tube light		1					Without Lights	7620	210	315
22	BF 14 SOFTWARE LAB II	Tube Light			11		1	2	With Lights on			
		LED Tube light		2					Without Lights	2550	230	1920
16	AF 01	Tube Light			6				With Lights on			
		LED Tube light		1					Without Lights	1620	236	208
16	AF 02	Tube Light			6				With Lights on			
		LED Tube light		1					Without Lights	1500	345	219
16	AF 03 EXAM SECTION	Tube Light			4		1		With Lights on			
		LED Tube light		1					Without Lights	1680	280	200
17	AF 04 RESEARCH LAB (COMPUTER ENGG)	Tube Light			5	9			With Lights on			
		LED Tube light		2					Without Lights	585	60	255

Sr. no.	Room	Artificial light			Fan	Power Points		MCB	LUX level			
		Fixture	lumens/ fixture	no. of fixtures		3 pin	power points			Near window	Centre of the Room	Passage/ Entrance Side
17	AF 05	Tube Light			8	9			With Lights on			
		LED Tube light		2					Without Lights	600	80	256
17	AF 06	Tube Light			6	9	2		With Lights on			
		LED Tube light		2					Without Lights	580	85	320
18	AF 07 HEAD DEPT (HOD COMPUTER)	Tube Light			5	7		1	With Lights on			
		LED Tube light		4					Without Lights	5900	185	708
18	AF 08	Tube Light			6	7		1	With Lights on			
		LED Tube light		4					Without Lights	6000	200	780
19	AF 09	Tube Light			9		2	1	With Lights on			
		LED Tube light		5					Without Lights	5420	280	1150
19	AF 10 SOFTWARE LAB IV	Tube Light			9			1	With Lights on			
		LED Tube light		5					Without Lights	5400	260	1102
20	AF 11 SOFTWARE LAB I	Tube Light			8	3	3		With Lights on			
		LED Tube light							Without Lights	2790	73	236
20	AF 12 SOFTWARE LAB II	Tube Light			8	3	3		With Lights on			
		LED Tube light							Without Lights	2790	73	236
20	AF 13	Tube Light			8	3	3		With Lights on			
		LED Tube light							Without Lights	2800	115	236
20	AF 14	Tube Light			8	3	3		With Lights on			
		LED Tube light							Without Lights	2750	120	236
20	AF 15	Tube Light			8	3	3		With Lights on			
		LED Tube light							Without Lights	2650	150	236
21	AF 16 MICROPROCESSARE LAB	Tube Light			11	2	1	3	With Lights on			
		LED Tube light							Without Lights	2040	46	110
Second Floor												
23	BS 01	Tube Light			5				With Lights on			
		LED Tube light		1					Without Lights	1500	89	15
23	BS 02	Tube Light			4				With Lights on			
		LED Tube light		2					Without Lights	1800	65	35
23	BS 03-A DEPT. LIBRARY	Tube Light			4				With Lights on			
		LED Tube light		2					Without Lights	2050	68	45
23	BS 04	Tube Light			5				With Lights on			
		LED Tube light		2					Without Lights	2100	110	42

Sr. no.	Room	Artificial light			Fan	Power Points		MCB	LUX level			
		Fixture	lumens/ fixture	no. of fixtures		3 pin	power points			Near window	Centre of the Room	Passage/ Entrance Side
23	BS 05	Tube Light			4				With Lights on			
		LED Tube light		2					Without Lights	2000	80	10
24	BS 06	Tube Light			7		6		With Lights on			
		LED Tube light		5					Without Lights	4809	290	600
24	BS 07 COMPUTER LAB	Tube Light			7		6		With Lights on			
		LED Tube light		5					Without Lights	4800	300	650
25	BS 08 POWER ELETRONIC	Tube Light			8	4			With Lights on			
		LED Tube light		2					Without Lights	8680	868	848
26	BS 09	Tube Light			3	9			With Lights on			
		LED Tube light		3					Without Lights	3840	60	55
26	BS 10 TRAINNING & PLACEMENT OFFICE	Tube Light			3	9			With Lights on			
		LED Tube light		3					Without Lights	3680	80	69
34	BS 11	Tube Light			7				With Lights on			
		LED Tube light		2					Without Lights	3750	252	5620
35	BS 12	Tube Light			8	6			With Lights on			
		LED Tube light		2					Without Lights	4460	302	440
35	BS 13	Tube Light			8	6			With Lights on			
		LED Tube light		2					Without Lights	4500	350	450
34	BS 14 CLASS ROOM	Tube Light			7				With Lights on			
		LED Tube light		2					Without Lights	3750	252	5620
35	BS 15 SEMINAR HALL	Tube Light			8	6			With Lights on			
		LED Tube light		2					Without Lights	4460	302	440
27	BOARD ROOM	Tube Light							With Lights on			
		LED Tube light							Without Lights	3610	55	55
28	AS 01	Tube Light			3	16			With Lights on			
		LED Tube light		2					Without Lights	4090	380	534
28	AS 02	Tube Light			3	16			With Lights on			
		LED Tube light		2					Without Lights	4050	320	521
28	AS 03	Tube Light			3	16			With Lights on			
		LED Tube light		2					Without Lights	4000	280	520
28	AS 04	Tube Light			3	16			With Lights on			
		LED Tube light		2					Without Lights	3900	280	578
28	AS 05	Tube Light			3	16			With Lights on			
		LED Tube light		2					Without Lights	3950	310	550

Sr. no.	Room	Artificial light			Fan	Power Points		MCB	LUX level			
		Fixture	lumens/ fixture	no. of fixtures		3 pin	power points			Near window	Centre of the Room	Passage/ Entrance Side
28	AS 06	Tube Light			8	16			With Lights on			
		LED Tube light		2					Without Lights	4100	285	536
28	AS 07 HEAD DEPT.	Tube Light			6	16			With Lights on			
		LED Tube light		2					Without Lights	4090	288	534
33	AS 08 DIGITAL ELETRONIC LAB	Tube Light			3		4		With Lights on			
		LED Tube light		2					Without Lights	1750	232	350
29	AS 09	Tube Light			9	3	1		With Lights on			
		LED Tube light		5					Without Lights	5210	402	1253
29	AS10 COMPUTER LAB	Tube Light			9	3	1		With Lights on			
		LED Tube light		5					Without Lights	5200	450	1250
30	AS 11	Tube Light			6				With Lights on			
		LED Tube light		3					Without Lights	9100	650	298
30	AS 12 SEMINAR HALL(E& TC)	Tube Light			6				With Lights on			
		LED Tube light		3					Without Lights	9200	625	317
31	AS 13	Tube Light			4	25	1		With Lights on			
		LED Tube light		2					Without Lights	2250	265	1780
31	AS 14	Tube Light			4	25	1		With Lights on			
		LED Tube light		2					Without Lights	2198	285	1740
31	AS 15	Tube Light			4	25	1		With Lights on			
		LED Tube light		2					Without Lights	2150	216	1750
31	AS 16 COMMUNICATION LAB	Tube Light			4	25	1		With Lights on			
		LED Tube light		2					Without Lights	2240	205	1800
32	LIBRARY	Tube Light			11				With Lights on			
		LED Tube light		8					Without Lights	2500	3560	2220
					Third Floor							
36	BT 06 CLASS ROOM (MECHANICAL ENGG)	Tube Light			4	14			With Lights on			
		LED Tube light		2					Without Lights	11480	280	230
37	BT 09 BME LAB	Tube Light			4	14			With Lights on			
		LED Tube light		2					Without Lights	2650	238	540
38	BT II MQC & IFP LAB	Tube Light			5	9	3	2	With Lights on			
		LED Tube light		2					Without Lights	2670	233	1970
45	BT 12 SEMINAR HALL	Tube Light			15	2			With Lights on			
		LED Tube light		2					Without Lights	550	4710	600

Sr. no.	Room	Artificial light			Fan	Power Points		MCB	LUX level			
		Fixture	lumens/ fixture	no. of fixtures		3 pin	power points			Near window	Centre of the Room	Passage/ Entrance Side
46	BT 17 CLASS ROOM	Tube Light			6	4			With Lights on			
		LED Tube light		2					Without Lights	2660	280	2140
39	PANTRY	Tube Light							With Lights on			
		LED Tube light							Without Lights	4710		260
40	AT 07 HOD (MECHANICAL ENGG)	Tube Light			2				With Lights on			
		LED Tube light		2					Without Lights	1896	78.7	1909
41	AT 10 FM & SOM LAB	Tube Light			5	20			With Lights on			
		LED Tube light		2					Without Lights	4860	561	1765
42	AT 12 CG LAB	Tube Light			14				With Lights on			
		LED Tube light		4					Without Lights	20000	412	1475
43	AT17 TOM LAB	Tube Light			5				With Lights on			
		LED Tube light		2					Without Lights	910	360	2770
44	AT 19 THERMO & ICE	Tube Light			5	20		1	With Lights on			
		LED Tube light		2					Without Lights	2800	372	961
		Total		**246**	**579**	**706**	**76**	**35**		**3482**	**284**	**882**

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Annexure II:

Plants on Campus

Sr.No.	Botanical name	Common Name	Location on Campus	Nos.
1	Cocos nucifera	coconut	near vollyball court	28
2	Arecaceae	Plam tree	near vollyball court	6
3	Mangifera indica	Mangoes	near vollyball court	2
4	Arecaceae	plam tree	entrance gate	7
5	Thuja occidentalis	Thuja Plant	entrance gate	4
6	Arecaceae	Plam trees	Frant of MBA College and Amphi theater	11
7	Cocos nucifera	coconut	Frant of MBA College and Amphi theater	6
8	Delonix regia	Gulmohor tree	Frant of MBA College and Amphi theater	9
9	Neolamarckia cadamba	kadamb	Frant of MBA College and Amphi theater	1
10	Arecaceae	Plam tree	Entrance lobby	2
11	Cocos nucifera	coconut	near store	11
12	Mangifera indica	Mangoes	near store	2
13	Java Plum	Jamun tree	near store	2
14	Terminalia catappa	Badam	near store	1
15	Grevullea robusta	silver oak	near store	8
16	Prunus avium	Cherry	near store	1
17	Terminalia catappa	Badam	College parking	3
18	Araucaria columnaris	Cook Pine	Civil and AIDS Lab	2
19	Mangifera indica	Mango	Civil	1
20		others	Frant of MBA College and Amphi theater	5
21		others	near vollyball court	8
			Total	**120**

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