

Executive Summary

A nation's growth starts from its educational institutions, where the ecology is thought as a prime factor of development associated with environment. A clean and healthy environment aids effective learning and provides a conducive learning environment. Educational institutions now a day are becoming more sensitive to environmental factors and more concepts are being introduced to make them eco-friendly. To preserve the environment within the campus, various viewpoints are applied by the several educational institutes to solve their environmental problems such as promotion of the energy savings, recycle of waste, water reduction, water harvesting etc.. The activities pursued by colleges can also create a variety of adverse environmental impacts. Environmental auditing is a process whereby an organization's environmental performance is tested against its environmental policies and objectives. Green audit is defined as an official examination of the effects a college has on the environment. As a part of such practice, internal environmental audit (Green Audit) is conducted to evaluate the actual scenario at the campus.

Green audit can be a useful tool for a college to determine how and where they are using the most energy or water or resources; the college can then consider how to implement changes and make savings. It can also be used to determine the type and volume of waste, which can be used for a recycling project or to improve waste minimization plan. Green auditing and the implementation of mitigation measures is a win-win situation for all the college, the learners and the planet. It can also create health consciousness and promote environmental awareness, values and ethics. It provides staff and students better understanding of Green impact on campus. Green auditing promote financial savings through reduction of resource use. It gives an opportunity for the development of ownership, personal and social responsibility for the students

and teachers. If self enquiry is a natural and necessary outgrowth of a quality education, it could also be stated that institutional self enquiry is a natural and necessary outgrowth of a quality educational institution. Thus it is imperative that the college evaluate its own contributions toward a sustainable future. As environmental sustainability is becoming an increasingly important issue for the nation, the role of higher educational institutions in relation to environmental sustainability is more prevalent.

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Marathwada Institute of Technology, CIDCO, Aurangabad

In Marathwada Institute of Technology, CIDCO, Aurangabad the audit process involved initial interviews with management to clarify policies, activities, records and the co-operation of staff and students in the implementation of mitigation measures. This was followed by staff and student interviews, collection of data through the questionnaire, review of records, observation of practices and observable outcomes. In addition, the approach ensured that the management and staff are active participants in the green auditing process in the college.

The baseline data prepared for the Marathwada Institute of Technology, CIDCO, Aurangabad will be a useful tool for campus greening, resource management, planning of future projects, and a document for implementation of sustainable development of the college. Existing data will allow the college to compare its programmes and operations with those of peer institutions, identify areas in need of improvement, and prioritize the implementation of future projects. We expect that the management will be committed to implement the green audit recommendations.

We are happy to submit this green audit report to the Marathwada Institute of Technology, CIDCO, Aurangabad authorities.

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Chapter 1

Introduction

The Marathwada Institute of Technology, CIDCO, Aurangabad, is the premier institute in Marathwada region of Maharashtra State Established in 2001, by G. S. Mandal a parent public charitable trust. The institution has well repute in a relatively short period of time. The institute is affiliated to Dr. Babasaheb Ambedkar Marathwada University, Aurangabad. All degrees are awarded by the Dr. Babasaheb Ambedkar Marathwada University.

The institute is situated in the heart of the city in the CIDCO area sprawling over a campus of 4551 Sq. Meter with magnificent buildings with various Departments, Laboratories, Auto Workshop, WiFi Connectivity and internet Facility. The play ground of 4372 Sq. Meter adjacent to institute building on leased basis. The main building contains School, High School, Junior College (MCVC) and Senior College with UG & PG Computer & Science Courses.

MIT-CIDCO is a vision conceptualized by its founder patron Dr. Y. A. Kawade, President of the trust for a centre for skilled learning for the economically deprived, socially downtrodden and educationally disadvantaged sections of the Marathwada region and its rural/farming community which comprised of the rural unemployed youth.

MIT CIDCO Runs following courses,

Undergraduate Programmes

Department of Computer Science & Information Technology.

B.Sc. (Computer Science) -Intake – 60-Duration-3 Years

B.Sc. (Information Technology) -Intake – 60-Duration-3 Years

Department of AT/WT/RAC.

B.Sc. (Automobile Technology)-Intake – 60-Duration-3 Years

B.Sc. (Workshop Technology) -Intake – 60-Duration-3 Years

B.Sc. (Refrigeration & Air Conditioning) -Intake – 60-Duration-3 Years

Department of Management Science.

B.C.A. (Bachelor of Computer Application)-Intake – 60-Duration-3 Years

Post-graduate Programmes

Department of Computer Science & Information Technology.

M.Sc. (Computer Science) -Intake – 30-Duration-2 Years

M.Sc. (Information Technology) -Intake – 30-Duration-2 Years

The college has a fine infrastructure and adequate physical facilities which include 12 classrooms, a Central Library, 2 seminar halls, examination halls, canteen, football and basketball courts and other sports and games facilities. In addition, there are four well-equipped computer labs, two language labs. The College also provides hostel facility to boys with 42 student accommodation facility students. The buildings and other infrastructural facilities are well-maintained and are put to optimum use.

In keeping with the lofty vision of its founder, MIT CIDCO College is a melting-pot of students from all communities and creeds. The College is open to students of all castes and creed, as envisaged in its lofty vision to cater to the higher education aspirations of the socially, educationally and economically marginalized sections of a rural population belonging to different communities. The College community comprises of 559 students, 22 teachers and 04 members of the non-teaching staff. More than 23% of the students are girls.

The vibrant and productive research community of the college comprise of 18% PhD holders and.

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The college has a well-defined decentralized and participatory organizational structure to coordinate the academic and administrative functions. The organizational structure has different units of statutory bodies.

The dedication of the management and the college community, combined with excellent infrastructural and teaching facilities help maintain high standards in curricular and co-curricular spheres of the institution. It offers an ideal vision of education that is aware of, and responsive to, the challenges of an emerging India in a globalized world, by bringing in a positive difference in the socio-economic-educational status of the state and the nation.

1.1 VISION AND MISSION

Institutional Vision

Human beings are evolving and a key enabler of this evolutionary process is knowledge which is helping us demystify and understand the nature. MIT treats education as continuous process of human development, aptly represented by its vision statement of "Quest For Excellence" in pedagogy.

Mission

The college strives to become a seminal centre for the promotion of the all round development of the students of this region, especially the women students who are socially marginalized and those from a rural background who are economically disadvantaged. We are committed to provide education and training in Science and Vocational education to enable aspiring students to develop their fullest potential in their chosen areas through:

- Structured program evolving with the times.
- Offering opportunities to go beyond prescribed curriculum.
- Collaboration and cooperation with industry and institutions.
- Employee empowerment at all levels.
- Innovation, incubation and entrepreneurship support.
- Dedicated experience and well qualified faculty.
- State of the art, laboratories and libraries.
- Well appointed classrooms and infrastructures.
- Relevant research and development program.

1.2 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.

1.3 Total Campus Area & College Building Spread Area

Campus area	4551 m ²
Built up area	2121.47m ²

1.4 Campus Infrastructure

Students' Hall

The college has a Students' Hall which can accommodate 300 students, aimed at conducting small scale events like department functions, club activities and meetings of various student support organizations.

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Seminar Halls

The college has four seminar halls, equipped with audio-visual facilities for the smooth conduct of seminars, conferences and other activities.

Conference Rooms

There are three conference rooms aimed at providing space for the policy making bodies of the college.

IQAC Multi-purpose Room

The multi-purpose administrative room, which has the offices of the Principal, the Coordinators of IQAC, Academics and UGC is a state-of-the art space for executive meetings and presentations.

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Chapter 2

Pre-Audit Stage

A pre-audit meeting provided an opportunity to reinforce the scope and objectives of the audit and discussions were held on the practicalities associated with the audit. This meeting is an important prerequisite for the green audit because it is the first opportunity to meet the Auditee and deal with any concerns. It was held at Marathwada Institute of Technology, CIDCO, Aurangabad on 10th November, 2016. The meeting was an opportunity to gather information that the audit team can study before arriving on the site. The audit protocol and audit plan was handed over at this meeting and discussed in advance of the audit itself. In Marathwada Institute of Technology, CIDCO, Aurangabad pre-audit meeting was conducted successfully and necessary documents were collected directly from the college before the initiation of the audit processes. Actual planning of audit processes was discussed in the pre-audit meeting. Audit team was also selected in this meeting with the help of staff and the college management. The audit protocol and audit plan were handed over at this meeting and discussed in advance of the audit itself. The audit team worked together, under the leadership of the lead auditor, to ensure completion within the brief and scope of the audit.

2.1 Management's Commitment

The Management of the college has shown the commitment towards the green auditing during the pre-audit meeting. They were ready to encourage all green activities. It was decided to promote all activities that are environment friendly such as awareness programs on the environment, campus farming, planting more trees on the campus etc., after the green auditing. The management of the college was willing to formulate policies based on green auditing report.

2.2 Scope and Goals of Green Auditing

A clean and healthy environment aids effective learning and provides a conducive learning environment. There are various efforts around the world to address environmental education issues. Green Audit is the most efficient and ecological way to manage environmental problems. It is a kind of professional care which is the responsibility of each individual who are the part of economical, financial, social, environmental factor. It is necessary to conduct green audit in college campus because students become aware of the green audit, its advantages to save the planet and they become good citizen of our country. Thus Green audit becomes necessary at the college level.

A very simple indigenized system has been devised to monitor the environmental performance of Marathwada Institute of Technology, CIDCO, Aurangabad. It comes with a series of questions to be answered on a regular basis. This innovative scheme is user friendly and totally voluntary. The aim of this is to help the institution to set environmental examples for the community, and to educate the young learners.

2.3 Benefits of the Green Auditing

More efficient resource management

- ✓ To provide basis for improved sustainability
 - ✓ To create a green campus
 - ✓ To enable waste management through reduction of waste generation, solid- waste and water recycling
 - ✓ To create plastic free campus and evolve health consciousness among the stakeholders
 - ✓ Recognize the cost saving methods through waste minimizing and managing
- Point out the prevailing and forthcoming complications

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- ✓ Authenticate conformity with the implemented laws
- ✓ Empower the organizations to frame a better environmental performance
- ✓ Enhance the alertness for environmental guidelines and duties
- ✓ Impart environmental education through systematic environmental management approach and Improving environmental standards
- ✓ Benchmarking for environmental protection initiatives
- ✓ Financial savings through a reduction in resource use
- ✓ Development of ownership, personal and social responsibility for the College and its environment
- ✓ Enhancement of college profile
- ✓ Developing an environmental ethic and value systems in youngsters.

Green auditing should become a valuable tool in the management and monitoring of environmental and sustainable development programs of the college.

2.3 Target Areas of Green Auditing

Green audit forms part of a resource management process. Although they are individual events, the real value of green audits is the fact that they are carried out, at defined intervals, and their results can illustrate improvement or change over time. Eco-campus concept mainly focuses on the efficient use of energy and water; Minimize waste generation or pollution and also economic efficiency. All these indicators are assessed in process of "*Green Auditing of educational institute*". Eco-campus focuses on the reduction of contribution to emissions, procure a cost effective and secure supply of energy, encourage and enhance energy use conservation, promotes personal action, reduce the institute's energy and water consumption, reduce wastes to landfill, and integrate environmental considerations into all contracts and services considered to have significant environmental impacts. Target areas included in this green auditing are water, energy, waste, green campus and carbon footprint.

➤ Auditing for Water Management

Water is a natural resource; all living matters depend on water. While freely available in many natural environments, in human settlements potable (drinkable) water is less readily available. We need to use water wisely to ensure that drinkable water is available for all, now and in the future. A small drip from a leaky tap can waste more than 180 liters of water to a day; that is a lot of water to waste - enough to flush the toilet eight times! Aquifer depletion and water contamination are taking place at unprecedented rates. It is therefore essential that any environmentally responsible institution should examine its water use practices. Water auditing is conducted for the evaluation of facilities of raw water intake and determining the facilities for water treatment and reuse. The concerned auditor investigates the relevant method that can be adopted and implemented to balance the demand and supply of water. It is therefore essential that any environmentally responsible institution examine its water use practices.

➤ Auditing for Energy Management

Energy cannot be seen, but we know it is there because we can see its effects in the forms of heat, light and power. This indicator addresses energy consumption, energy sources, energy monitoring, lighting, appliances, and vehicles. Energy use is clearly an important aspect of campus sustainability and thus requires no explanation for its inclusion in the assessment. An old incandescent bulb uses approximately 60W to 100W while an energy efficient light emitting diode (LED) uses only less than 10 W. Energy auditing deals with the conservation and methods to reduce its consumption related to

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environmental degradation. It is therefore essential that any environmentally responsible institution examine its energy use practices.

➤ Auditing for Waste Management

Pollution from waste is aesthetically unpleasing and results in large amounts of litter in our communities which can cause health problems. Plastic bags and discarded ropes and strings can be very dangerous to birds and other animals. This indicator addresses waste production and disposal, plastic waste, paper waste, food waste, and recycling. Solid waste can be divided into two categories: general waste and hazardous waste. General wastes include what is usually thrown away in homes and schools such as garbage, paper, tins and glass bottles. Hazardous waste is waste that is likely to be a threat to health or the environment like cleaning chemicals and petrol. Unscientific landfills may contain harmful contaminants that leach into soil and water supplies, and produce greenhouse gases contributing to global climate change.

Furthermore, solid waste often includes wasted material resources that could otherwise be channeled into better service through recycling, repair, and reuse. Thus the minimization of solid waste is essential to a sustainable college. The auditor diagnoses the prevailing waste disposal policies and suggests the best way to combat the problems. It is therefore essential that any environmentally responsible institution examine its waste processing practices.

➤ Auditing for Green Campus Management

Unfortunately, biodiversity is facing serious threats from habitat loss, pollution, over consumption and invasive species. Species are disappearing at an alarming rate and each loss affects nature's delicate balance and our quality of life. Without this variability in the living world, ecological systems and functions would break down, with detrimental consequences for all forms of life, including human beings. Newly planted and existing trees decrease the amount of carbon dioxide in the atmosphere. Trees play an important ecological role within the urban environment, as well as support improved public health and provide aesthetic benefits to cities. In one year, a single mature tree will absorb up to 20 Kg of carbon dioxide from the atmosphere, and release it as oxygen. The amount of oxygen that a single tree produces is enough to provide one day's supply of oxygen for people. So while you are busy studying and working on earning those good grades, all the trees on campus are also working hard to make the air cleaner for us. Trees on our campus impact our mental health as well; studies have shown that trees greatly reduce stress, which a huge deal is considering many students are under some amount of stress.

➤ Auditing for Carbon Footprint

Commutation of stakeholders has an impact on the environment through the emission of greenhouse gases into the atmosphere consequent to burning of fossil fuels (such as petrol). The most common greenhouse gases are carbon dioxide, water vapour, methane, nitrous oxide and ozone. Of all the greenhouse gases, carbon dioxide is the most prominent greenhouse gas, comprising 402 ppm of the Earth's atmosphere. The release of carbon dioxide gas into the Earth's atmosphere through human activities is commonly known as carbon emissions.

An important aspect of doing an audit is to be able to measure your impact so that we can determine better ways to manage the impact. In addition to the water, waste, energy and biodiversity audits we can also determine what our carbon footprint is, based on the amount of carbon emissions created. One aspect is to consider the distance and method traveled between home and college every day. It undertakes the measure of bulk of carbon dioxide equivalents exhaled by the organization through which the carbon accounting is done. It is necessary to know how much the organization is contributing towards sustainable development. It is therefore essential that any environmentally responsible institution examine its carbon footprint.

2.4 Methodology of Green Auditing

The purpose of the audit was to ensure that the practices followed in the campus are in accordance with the Green Policy adopted by the institution. The criteria, methods and recommendations used in the audit were based on the identified risks. The methodology includes: preparation and filling up of questionnaire, physical inspection of the campus, observation and

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review of the document, interviewing responsible persons and data analysis, measurements and recommendations. The methodology adopted for this audit was a three step process comprising of:

22. Data Collection – In preliminary data collection phase, exhaustive data collection was performed using different tools such as observation, survey communicating with responsible persons and measurements. Following steps were taken for data collection:

The team went to each department, centers, Library, canteen etc.

- Data about the general information was collected by observation and interview.
- The power consumption of appliances was recorded by taking an average value in some cases.

2. Data Analysis - Detailed analysis of data collected include : calculation of energy consumption, analysis of latest electricity bill of the campus, understanding the tariff plan provided by the Maharashtra State Electricity Distribution Company Ltd. (MSED). Data related to water usages were also analyzed using appropriate methodology.

23. Recommendation – On the basis of results of data analysis and observations, some steps for reducing power and water consumption were recommended. Proper treatments for waste were also suggested. Use of fossil fuels has to be reduced for the sake of community health. The above target areas particular to the college was evaluated through questionnaire circulated among the students for data collection. Five categories of questionnaires were distributed. The formats of these are given below.

2.6 Survey Forms

Form-I

Green Auditing Marathwada Institute of Technology, CIDCO, Aurangabad

Auditing for Water Management

1. List uses of water in your college.
Drinking, Canteen, Hostel, garden, Wash room etc.
2. What are the sources of water in your college?
-municipal
3. How many wells are there in your college?
-No
4. No. of motors used for pumping water from each well?
-TWO
5. What is the total horse power of each motor?
1 HP (each)
6. What is the depth of each well?
-N.A
7. What is the present depth of water in each well?
-N.A
8. How does your college store water?
-in Water Tank
9. Quantity of water stored in your overhead water tank? (in liters)
-15000 Ltr
10. Quantity of water pumped every day? (in liters)
-10000 Ltr
11. If there is water wastage, specify why.
-Yes (Leakage of tap)
12. How can the wastage be prevented / stopped?
-change the tap

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13. Locate the point of entry of water and point of exit of waste water in your College.
-N.A
14. Where does waste water come from?
From wash room, canteen lines
15. Where does the waste water go?
-Drainage lines of municipal
16. What are the uses of waste water in your college?
-Plantation
17. What happens to the water used in your labs? Whether it gets mixed with ground water?
-N.A
18. Is there any treatment for the lab water?
-N.A
19. Whether green chemistry methods are practiced in your labs?
-N.A
20. Write down four ways that could reduce the amount of water used in your college.
 - a) Recycle of water
 - b) Water harvesting
 - c) Biodegradable toilet
21. Record water use from the college water meter for six months.
- N.A
22. Bimonthly water charges paid to water connections if any
- 1680/ month
23. No. of water coolers. Amount of water used per day? (in liters)
- TWO no.(600 Ltr/Day)
24. No. of water taps. Amount of water used per day?
- 58 no.(4800 Ltr/Day)
25. No. of bath rooms in staff rooms, common, hostels.
- 4
26. Total amount of water used per day?
4800 Ltr
27. No. of toilet, urinals. Amount of water used per day?
Urinals 36 no.& Toilets 13 & Hostel toilet 3 ,Total water used 1500 Ltr
28. No. of water taps in the canteen. Amount of water used per day?
2,100 ltr
29. Amount of water used per day for garden use.
1000 ltr
30. No. of water taps in laboratories. Amount of water used per day in each lab?
1 (100 Ltr)
31. Total use of water in each hostel?
1000 Ltr
32. At the end of the period, compile a table to show how many litres of water have been used in the college for each purpose
yes
33. Is there any water used for agricultural purposes
No
34. Does our college harvest rain water?
No
35. If yes, how many rain water harvesting units are there? (Approx.amount)
36. How many of the taps are leaky? Amount of water lost per day?
4 taps (5 liter/day)
37. Are there signs reminding people to turn off the water? Yes / No
yes
38. Is there any waterless toilets?

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- No
39. How many water fountains are there?
- No
 40. How many water fountains are leaky?
- N.A
 41. Is drip irrigation used to water plants outside? YES/NO
-No
 42. How often is the garden watered?
- showering
 43. Quantity of water used to watering the ground?
- 1000 Ltr
 44. Quantity of water used for bus cleaning? (liters per day)
-100 Ltr
 45. Amount of water for other uses? (items not mentioned above)
- NA
 46. Area of the college land without tree/building canopy.
- 2121.47 sq.mtr
 47. Is there any water management plan in the college?
- NO
 48. Are there any water saving techniques followed in your college? What are they?
- No
 49. Please share Some IDEA for how your college could save more water.

Form II

Green Auditing @ Marathwada Institute of Technology, CIDCO, Aurangabad

Auditing for Energy Management

1. List ways that you use energy in your college.
Tube light, computers, motor etc.
2. Electricity bill amount for the last year
-180000/ Rs
3. Amount paid for LPG cylinders for last one year
-N.A
4. Weight of firewood used per month and amount of money spent? Also mention the amount spent for petrol/diesel/ others for generators?
-1000/ month
5. Are there any energy saving methods employed in your college? If yes, please specify. If no, suggest some.
- No
6. How much money does your college spend on energy such as electricity, gas, firewood, etc. in a month.(Record monthly for the year 2020).How many CFL bulbs has your college installed? Mention use (Hours used/day for how many days in a month)
- 3564000/Rs
7. Energy used by each bulb per month? (for example- 60 watt bulb x 4hours x number of bulbs = kwh).
-
8. How many LED bulbs are used in your college? Mention the use (Hours used/day for how many days in a month)
-N.A.
9. Energy used by each bulb per month? (kwh).
-N.A.

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10. How many incandescent (tungsten) bulbs have your college installed? Mentions use (Hours used/day for how many days in a month)
--N.A.
11. Energy used by each bulb per month? (kwh).
12. How many fans are installed in your college? Mention use (Hours used/day for how many days in a month)
13. Energy used by each fan per month? (kwh)
14. How many air conditioners are installed in your college? Mention use (Hours used/day, for how many days in a month)
15. Energy used by each air conditioner per month? (kwh).
16. How many electrical equipments including weighing balance are installed your college? Mention the use (Hours used/day for how many days in a month)
17. Energy used by each electrical equipment per month? (kwh).
18. How many computers are there in your college? Mention the use (Hours used/day for how many days in a month)
19. Energy used by each computer per month? (kwh)
-118Hrs.day
20. How many photocopiers are installed by your college? Mention use(Hours used/day for how many days in a month).
21. How many cooling apparatus are in installed in your college? Mention use(Hours used/day for how many days in a month)
22. Energy used by each cooling apparatus per month? (kwh) Mention use (Hours used/day for how many days in a month)
- 2 Water cooler and 2 AC
23. Energy used by each photocopier per month? (kwh) Mention the use (Hours used/day for how many days in a month)how many inverters your college installed? Mentions use (Hours used/day for how many days in a month)
24. Energy used by each inverter per month? (kwh)
25. How many electrical equipment are used in different labs of your college? Mention the use (Hours used/day for how many days in a month)
26. Energy used by each equipment per month? (kwh)
-150 (2 hrs /day)
27. How many heaters are used in the canteen of your college ? Mention the use (Hours used/day for how many days in a month)
28. Energy used by each heater per month? (kwh)
-N.A
29. No of street lights in your college?
30. Energy used by each street light per month? (kwh)
-N.A
31. No of TV in your college and hostels?
- N.A
32. Energy used by each TV per month? (kwh)
33. Any other item that uses energy (Please write the energy used per month) Mention the use (Hours used/day for how many days in a month)
34. Are any alternative energy sources/nonconventional energy sources employed / installed in your college? (photovoltaic cells for solar energy, windmill, energy efficient stoves, etc..) Specify.

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- NO
-water pump at well
35. Do you run "switch off" drills at college?
-Yes
36. Are your computers and other equipment put on power-saving mode?
-YES
37. Does your machinery (TV, AC, Computer, weighing balance, printers, etc.) run on standby mode most of the time? If yes, how many hours?
38. What are the energy conservation methods adapted by your college?
39. How many boards displayed for saving energy awareness?
40. How much ash is collected after burning fire wood per day in the canteen?
41. Write a note on the methods/practices/adaptations by which you can reduce the energy use in your college campus in future.
42. Calculation of energy for electrical appliances

Appliance	Power used in (watt)	Usage per day (hours)	Number of appliances	Average kWh per day (Watt X hours X Number X 1000)	Average kWh per month (Watt X hours X Number X 1000 x 30)
Incandescent	60 watt				
Bulb					
CFL	18 W				
Microwave	1000W				
Stove	3000W				
Kettle	2500W				

Form III

Green Auditing @ Marathwada Institute of Technology, CIDCO, Aurangabad

Auditing for Waste Management

1. What is the total strength of students, teachers and Non teaching staff in your College?

	No. of Students	No. of Teachers	No. Non teaching staff
Gents	428	13	2
Ladies	131	9	2
Total	559	22	4

2. Which of the following are available in your College? Give area occupied and number.

Garden area -	500 sq.m	Garbage dump (number)-	12
Play ground area-	1500 sq.m	Laboratory-	13
Kitchen-	N.A	Canteen-	01
Toilets (number)-	16	Car/scooter shed area-	N.A
Number of class rooms-	12	Office rooms-	01
		Others (specify)-	04

3. Which of the following are found near your college?
4. Mark the level of disturbance it creates for the college in a scale of 1 to 9.
- Municipal dump yard

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- Garbage heap
- Public convenience-yes
- Sewer line- yes
- Stagnant water
- Open drainage
- Industry – (Mention the type)
- Bus / Railway station
- Market / Shopping complex / Public halls
- Does your college generate any waste?
- If so, what are they? How much quantity? Number or weight E-waste
- Hazardous waste (toxic)
- Solid waste
- Dry leaves- 2-3Kg/Day
- Canteen waste= 6-8 kg/Day
- Liquid waste
- Glass
- Unused equipment
- Medical waste if any
- Napkins = 10-12 kg/Day
- Others (Specify)
- Is there any waste treatment system in the college?
-YES
- Is there any treatment for toilet/urinal/sanitary napkin waste?

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5. What is the approximate quantity of waste generated per day? 70kg/day
6. Why waste is a problem?
-problem due to irregularity of corporation vehicle
7. Whether waste is polluting ground/surface water? How?
-NO
8. Whether waste is polluting the air of the college? How?
-yes, smoke coming from automobiles
9. How is the waste generated in the college managed? Methods
- Composting
10. How many separate boxes do you think you would need to put into a classroom to start a waste segregation and recycling campaign?
11. What should be the use for each box? (Develop a colour code with reasons)
12. Do you use recycled paper in College?
-NO
13. Is there any waste wealth program practiced in the college?
-NO
14. How would you spread the message of recycling to others in the community? Have you taken any initiatives? If yes, please specify.
-NO
15. Can you achieve zero garbage in your college? (Reduce ,Recycle, Reuse, Refuse) If yes, how?
-NO possible upto zero garbage ,but for sure we can reduce it to 20% by recycle & reuse.

Form IV

Green Auditing @ Marathwada Institute of Technology, CIDCO, Aurangabad

Auditing For Green Campus Management

1. Is there a garden in your college? Area?
-Yes 500 sq.m
2. Do students spend time in the garden?
-Yes
3. List the plants in the garden, with approx. numbers of each species.
- 152 no.
4. Suggest plants for your campus.
-Mango, Custardapple, Neem, Raintree
5. List the species planted by the students, with numbers.
6. Whether you have displayed scientific names of the trees in the campus?

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- No
7. Are there any plantations in your campus? If yes specify area and type of plantation.
- No
8. Is there any vegetable garden in your college? If yes how much area?
- No
9. Is there any medicinal garden in your college? If yes how much area?
- No
10. What are the vegetables cultivated in your vegetable garden?
(Mention the quantity of harvest in each season)
- No
11. How much water is used in the vegetable garden and other gardens? (Mention the source and quantity of water used).
- 1000 ltr/daY BY TUBE WELL
12. Who is in charge of gardens in your college?
-Mr.Sumit Pawar
13. Are you using any type of recycled water in your garden?
- No
14. List the name and quantity of pesticides and fertilizers used in your gardens?
- No
15. Whether you are doing organic farming in your college? How?
- No
16. Do you have any composting pit in your college? If yes What are you doing with the compost generated?
-Yes, 100sqm. Area for dumping organic waste
17. What do you doing with the vegetables harvested? Do you have any student market?
- No
18. Is there any botanical garden in your campus? If yes give the details of campus flora.
- No
19. Give the number and names of the medicinal plants in your college campus.
-5 no.
a) peepal
b) Neem
c) Ashwgandha
d) Behada
e) Hirda
20. Any threatened plant species planted/conserved?
- No
21. Is there a nature club in your college? If yes what are their activities?
- No
22. Is there any arboretum in your college? If yes details of the trees planted.
- No
23. Is there any fruit yielding plants in your college? If yes details of the trees planted.
-Yes

prepared
by Jaiv



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- Mango, custerdapple, guava,
24. Is there any groves in your college? If yes details of the trees planted.
- No
 25. Is there any irrigation system in your college?
- No
 26. What is the type of vegetation in the surrounding area of the college?
- No
 27. What are the nature awareness programmes conducted in the campus? (2017-18)
- No
 28. What is the involvement of students in the green cover maintenance?
-to plant, maintain the water etc.
 29. What is the total area of the campus under tree cover? Or under tree canopy?
-20 Acre
 30. Share your IDEAS for further improvement of green cover.
-we are going to established nature club and organic Nature awareness programme

Form V

Green Auditing @ Marathwada Institute of Technology, CIDCO, Aurangabad

Auditing for Carbon Footprint

1. What is the total strength of students and teachers in your College?

	No. of Students	No. of Teachers	No. Non teaching staff
Gents	428	13	2
Ladies	131	9	2
Total	559	22	4

2. Total Number of vehicles used by the stakeholders of the college. (per day)
-80 no.
3. No. of cycles used
-10
4. No. of two wheelers used (average distance travelled and quantity of fuel and amount used per day)
-40
5. No. of cars used (average distance travelled and quantity of fuel and amount used per day)
- 02
6. No. persons using common (public) transportation (average distance travelled and quantity of fuel and amount used per day)
- 25
7. No. of persons using college conveyance by the students, non teaching staff and teachers (average distance travelled and quantity of fuel and amount used per day)
- 25
8. Number of parent-teacher meetings in an year? Parents turned up (approx.)
- 3-4
9. Number of visitors with vehicles per day?
- 25

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by *Sriv*



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10. Number of generators used per day (hours).01 - Give the amount of fuel used per day.
11. Number of LPG cylinders used in the canteen (Give the amount of fuel used per day and amount spent).
12. Quantity of kerosene used in the canteen/labs (Give the amount of fuel used per day and amount spent).
13. Amount of taxi/auto charges paid and the amount of fuel used per month for the transportation of vegetables and other materials to canteen.
- 450/-month
14. Amount of taxi/auto charges paid per month for the transportation of office goods to the college.
- 550/-month
15. Average amount of taxi/auto charges paid per month by the stakeholders of the college.
16. Use of any other fossil fuels in the college (Give the amount of fuel used per day and amount spent).
17. Suggest the methods to reduce the quantity of use of fuel used by the stakeholders/students/teachers/non teaching staff of the college.
- public transportation is best solution .
- bicycle initiation .

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Faculty In Charge: Director IT, Marathwada
 Non Teaching Staff: Headmaster, Marathwada

Sl. No.	Name of Student	Department
1	KUSHAL K. JAY...	DEPT. OF MGT. SCI.
2	...	DEPT. OF CHEMISTRY
3	...	DEPT. OF CIVIL ENGRG.
4	...	DEPT. OF MECH. ENGRG.
5	...	DEPT. OF ELECT. ENGRG.

Faculty In Charge: Headmaster, Marathwada
 Non Teaching Staff: Headmaster, Marathwada

Sl. No.	Name of Student	Department
1	MOLAN LAXMAN KHATADE	DEPT. OF MGT. SCI.
2	...	DEPT. OF CHEMISTRY
3	...	DEPT. OF CIVIL ENGRG.
4	...	DEPT. OF MECH. ENGRG.
5	...	DEPT. OF ELECT. ENGRG.

Prepared
 by
Ariv



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Chapter 3

Audit Stage

In MIT-CIDCO, Aurangabad green auditing was done with the help of MIT-Center for Analytical Research & Studies which is a recognized laboratory by Central Pollution Control Board, New Delhi. Audit involving different student groups, teaching and non-teaching staff. The green audit began with the teams walking through all the different facilities at the college, determining the different types of appliances and utilities (lights, taps, toilets, fridges, etc.) as well as measuring the usage per item (Watts indicated on the appliance or measuring water from a tap) and identifying the relevant consumption patterns (such as how often an appliance is used) and their impacts. The staff and learners were interviewed to get details of usage, frequency or general characteristics of certain appliances. Data collection was done in the sectors such as Energy, Waste, Greening, Carbon footprint and Water use. College records and documents were verified several times to clarify the data received through survey and discussions. The whole process was completed within five months from August to December, 2018.

3.1 Student - Staff Involved in Green Auditing

General Co-Ordinator	
----------------------	--

1. Water Management

Faculty In Charge: Bhaskar D. Kadam

Non Teaching Staff: Yashwant Deshmukh

Sr No	Name Students	Department
1	RUSHIKESH VIJAY NARWADE	DEPT OF MGT. SCI.
2	BIPIN BHAGWAN GODGHASE	DEPT OF CS&IT(PG)
3	SAGAR RAMESH BANSODKAR	DEPT OF AT/WT/RAC
4	KUNAL RAMESH BARTHUNE	DEPT OF CS&IT(UG)

2. Green Campus Management

Faculty In Charge: Vishal Surawade

Non Teaching Staff: Yashwant Deshmukh

Sl No	Name Student	Department
1	SOHAM LAXMAN KHATADE	DEPT OF MGT. SCI.
2	VRUSHALI KAILAS WALEKAR	DEPT OF CS&IT(PG)
3	SURAJ JASWANT RAMTEKE	DEPT OF AT/WT/RAC
4	VIJAY VAKIL RAJPUT	DEPT OF CS&IT(UG)

3. Carbon Footprint

Faculty In Charge: Quadri S.W



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by *stair*

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Non Teaching Staff: YashwantDeshmukh

Sr. No	Name of Student	Department
1	SHUBHAM VIJAYSING PARDESHI	DEPT OF MGT. SCI.
2	ASHWINI SHIOM PARAYE	DEPT OF CS&IT(PG)
3	FAIZAN ABDUL JAAN KHAN	DEPT OF AT/WT/RAC
4	AVINASH KESHAV PADGHAN	DEPT OF CS&IT(UG)

4. Energy Management

Faculty In Charge: Vishal Surawade

Non Teaching Staff: YashwantDeshmukh

Sr. No	Name of Student	Department
1	RUSHIKESH VIJAY NARWADE	DEPT OF MGT. SCI.
2	BIPIN BHAGWAN GODGHASE	DEPT OF CS&IT(PG)
3	SAGAR RAMESH BANSODKAR	DEPT OF AT/WT/RAC
4	KUNAL RAMESH BARTHUNE	DEPT OF CS&IT(UG)

5. Waste Management

Faculty In Charge: Quadri S.W

Non Teaching Staff: YashwantDeshmukh

Sr. No	Name of Students	Department
1	SAGAR RAMESH BANSODKAR	DEPT OF AT/WT/RAC
2	KUNAL RAMESH BARTHUNE	DEPT OF CS&IT(UG)
3	ASHWINI SHIOM PARAYE	DEPT OF CS&IT(PG)
4	FAIZAN ABDUL JAAN KHAN	DEPT OF AT/WT/RAC

3.2 Student Clubs and Forums Involved

Student Club, Women Cell, Career Guidance Cell, Placement Cell, , N.S.S, N.C.C, and Department level associations.

3.3 Comments on Site Tour

Site inspection was done along with students and staff. Questionnaires were answered during the site tour. Students and staff took much interest in the data collection processes. It was quite interesting and fascinating. It was an environmental awareness program for the students who participated in the green auditing. The experience of green auditing was totally a new experience for most of the students. They have shared their expectations about a green campus and gave suggestions for the audit recommendations.

3.4 Review of Documents and Records

Documents such as admission registers, registers of electricity and water charge remittance, furniture register, laboratory equipment registers, purchase register, audited statements, and office registers were examined and data were collected. College calendars, college magazines, annual report of the college and NAAC self-assessment reports, UGC report etc. were also verified as part of data collection.

3.5 Review of Policies

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by *Striv*



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Discussions were made with the college management regarding their policies on environmental management. Future plans of the college were also discussed. The management would formulate a revised environment /green policy for the college in the light of green auditing. The purpose of the green audit was to ensure that the practices followed in the campus are to be in accordance with the Green Policy adopted by the institution.

3.6 Interviews

In order to collect information for green auditing different audit groups interviewed office staff, Principal, teaching and non-teaching staff, students, parents and other stakeholders of the college. Discussions were also made with the PTA office bearers to clarify doubts regarding certain points.

3.7 Site inspection

College and its premises were visited and analyzed by the audit-teams several times to gather information. Campus trees were counted and identified. Vegetable garden, banana garden, play grounds, canteen, library, office rooms and parking grounds were also visited to collect data. Number and type of vehicles used by the stakeholders were counted and fuel consumption for each vehicle was verified with the user. Number of LPG cylinders used in labs, canteen and hostel kitchen were also counted. Leakage of a few water taps were noticed during the site inspection.

Prepared
by *[Signature]*



Post Audit Stage

The base of any green audit is that its findings are supported by documents and verifiable information. The audit process seeks, on a sampled basis, to track past actions, activities, events, and procedures to ensure that they are carried out according to systems requirements and in the correct manner. Green audits form a part of a process. Although they are individual events, the real value of green audits is the fact that they are carried out, at defined intervals, and their results can illustrate improvement or change over time.

Although green 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 green audit is to find out how well the environmental organization, environmental management and environmental equipment are performing. Each of the three components are crucial in ensuring that the organization's environmental performance meets the goals set in its green policy. The individual functioning and the success of integration will all play a role in the degree of success or failure of the organization's environmental performance.

4.1 Key Findings and Observations

A. Water

1. Main water uses in the campus

Garden

Lab

Cleaning

Canteen

Drinking

Toilets

Bathrooms

Hostel

Washing

Construction works

Office uses

- 2. No water treatment system in place.
- 3. Water cooler with drinking water filtration is installed (4numbers).
- 4. Number of urinals and toilets – 146
- 5. Number of waterless urinals - Nil



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by Shiv

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6. Number of bathrooms – 36
7. Number of water taps – 384 (7 tap are leaky)
8. Water taps in laboratories - 132
9. Number of wells – 1 tube well and 1 open well
10. Number of ponds - 1
11. Water pumps – 2 (3 HP), 2 (7 HP)
12. Quantity of water pumped –78653 liters/day
13. Water charges paid – No water charges(No municipal water supply, Using water from own well)
14. Number of water tanks for water storage -15
15. Amount of water stored – 21650 L

Reasons for water wastage

Leakages from taps over use of water
Overflow of water from motors

Overall utilization of water in the College

Sections	Water Use/day
Toilets and urinals	521 Ltr
Hostel	00 Ltr
Bathrooms	284 Ltr
Canteen	00 Ltr
Garden and ground	6230 Ltr
Laboratories	384 Ltr
Leakage	213 Ltr
Total	7632 Ltr

B. Energy

- ❖ Electricity charges Rs.29200.00/month
- ❖ Number of Gas cylinders used per month - 2
- ❖ Cost of Gas cylinders used Rs. 1750/month
- ❖ Number of Generators – 1
- ❖ Cost of generator fuel – Rs.2900/month



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❖ Total cost of energy – Rs. 43500.00/month

❖ Total number of CFL bulbs – 373

❖ Number of LED lights – 234

❖ Incandescent bulbs – 7

❖ Number of fans – 386

❖ Number of Air conditioners - 46

❖ Number of Tube lights – 413

❖ Total Electrical Equipments – 229

❖ Number of Computers and laptops – 271

❖ Number of Photocopiers – 3

❖ Number of Televisions – 6

❖ Energy generation by solar panels – 2 kW

Energy usage of CFL bulbs in the college

Department/Area	No.Of CFL Bulbs	Power consumed (Watts)	Power in(kW)	Working time (hours per day)	Energy usage per month(kwh)
G.Floor	36	36*18	648	6 hrs	
					c)
Total Energy usage per month (kWh)=648W					d)

Energy usage of Fans in the college

Department/Area	No.Of Fans	Power consumed (Watts)	Power in(kW)	Working time (hours per day)	Energy usage per month(kwh)
Ground	61	61*75	4575	6	
1 st floor	18	18*75	1350	6	
2 nd Floor	31	31*75	2325	6	
3 rd Floor	36	36*75	4200	6	
Total Energy usage per month (kWh)=12450W					

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Energy usage of Air Conditioners in the College

Department/Area	No.Of AC	Power consumed (Watts)	Power in(kW)	Working time (hours per day)	Energy usage per month(kwh)
Ground Floor	04	4*1560	6240	6	
Total Energy usage per month (kWh)=6240W					

Energy usage of Tube lights in the college

Department/Area	No.Of Tube light	Power consumed (Watts)	Power in(kW)	Working time (hours per day)	Energy usage per month(kwh)
GROUND					
1 ST FLOOR	25	25*40	1000	6	
2 ND FLOOR	35	35*40	1400	6	
3 rd flor	46	46*40	1840	6	
Total Energy usage per month (kWh)=4800W					

Electrical Equipments and their energy consumption

Department/Area	Name of the equipment	No.Of Equipment	Power consumed (Watts)	Power in(kW)	Working time (hours per day)	Energy usage per month(kwh)
Ground floor	grinder	1				
	Water pump	1 Hp				
2 nd floor	Door bell	2	2*10	20W		
3 rd floor	Computer	8	8*200	1600		
	printer	1	1*300	300		
	Water cooler	1	1*300	300		
	Xerox machin	1	1*600	600		
First floor	Computer	53	53*200	10600		
	Thumb m/c	02	2*10	20		
PG lab	LED	3	6*20	120		
	Projector LED	1	1*300	300		
	Xerox m/c	02	02*600	1200		
Total Energy usage per month (kWh)=15260W						

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Energy usage of Photocopiers in the College

Department/Area	No.Of Photocopies	Power consumed (Watts)	Power in(kW)	Working time (hours per day)	Energy usage per month(kwh)
Ground floor	2	2*600	1200		
1 st floor	2	2*600	1200		
2 nd Floor					
3 rd floor	1	1*600	600		
Total Energy usage per month (kWh)=3000W					

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Energy usage of Heaters in the College

Department/Area	No. of Heaters	Power consumed (Watts)	Power in(kW)	Working time (hours per day)	Energy usage per month(kwh)
Hostel	3	3*700	2100	06	
Total Energy usage per month (kWh)=2100W					

Energy usage of Amplifiers and CCTV DVR in the College

Name of equipment	No. of Equipment	Power consumed (Watts)	Power in(kW)	Working time (hours per day)	Energy usage per month(kwh)
Ground floor	7	7*40	280	6	
1 st floor	2	1*40	40	6	
2 nd floor	2	2*40	80	6	
3 rd floor	3	3*40	120	6	
Total Energy usage per month (kWh)=520W					

Waste

- ❖ Total Stakeholders – 28
- ❖ Class rooms – 12
- ❖ Staff rooms - 1
- ❖ Office rooms – 4
- ❖ E-wastes- computers, electrical and electronic parts – Disposal by selling
- ❖ Plastic waste- disposal by selling
- ❖ Solid wastes – Damaged furniture, paper waste, paper plates, food wastes – to Municipal waste collection centers
- ❖ Waste water – washing, urinals, bathrooms
- ❖ Glass waste – Broken glass wares from the labs to municipal waste collection centers.
- ❖ Napkin incinerators -5

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Quantity of waste generated:-

- ❖ Biodegradable – 7.2 kg/day (office)
- ❖ Non biodegradable – 4.1 kg/day (office)
- ❖ Biodegradable – N.A.
- ❖ Non-biodegradable – N.A.
- ❖ Hazardous waste –N.A

Canteen waste

- ❖ Biodegradable college canteen – 3 kg/day
- ❖ Non biodegradable – 1.2 kg/day

d) Green Campus

Total number of plant species identified – 163

Tree cover of the campus – 524.5 m²

Free space in the campus –

Fruit Trees in the Campus

Syzygium jambos

Artocarpus integrifolia,

Mangifera indica,

List the Species Planted by the Students, with Numbers.

Neem Tree -4

Mahagani -02

Gooseberry- 5

List of Garden Plants in the Campus

Bougainvillia spectabulos (2)

Cycas

Peace lily

Excoecaria

Mussaenda lutea

Schflera

Euphorbia

Variiegated lily

Foxtail palm

Dracaena CTC Red

Furcaria

Heliconia

Zephyranthes lily

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Black lily
 Mini ervatamia
 Ixora sps
 Hibiscus

List of medicinal plants in the herbal garden

Minienatomia
 Zinigiber officinale
 Saraca asoka
 Azhadiracta India
 Sanseveria roxburghiana. Schult
 Vitex trifolia
 Phyllanthus emblica.L
 Punica granatum
 Ricinus communis
 Piper betle.L
 Saraca indica
 Ocimum sanctum
 Murraya koenigii.Spr.
 Sarcostemma brevistigma.W&A
 Cissus quadrangularis.L
 Aloe vera.L
 Melia azodirachta.L

 Adenocalyma adiatia
 Acacia sundra
 Citrus medica
 Aegi Imarmelos .Corr
 Ervatamia coronaria.Stapf
 Ficus gibbosa,Bl
 Calotropis gigantean,R.Br.
 Glycosmis pentaphylla . Corr
 Tinospora cordifolia.Miers
 Clitorea ternatea.L
 Piper longum.L
 Asparagus racemoses.Wild
 Santalum album.L
 Plumbago zeylanica.L
 Coleus aramaticus.Benth
 Aerva lanata.Juss

Prepared
 by
 Shiv



Marathwada Institute of Technology, CIDCO, Aurangabad

Campus Trees

<u>COMMON NAME</u>	<u>SCIENTIFIC NAME</u>	<u>No. of Plants</u>
1. Coconut	<i>Cocos nucifera</i>	28
2. Mahogany	<i>Swietenia mahogany</i>	02
3. Neermaruthu	<i>Terminalia arjuna</i>	00
4. Bottle brush tree	<i>Callistemon lanceolatus</i>	06
5. Jamun	<i>Syzygium cumini</i>	01
6. Pink shower tree	<i>Cassia javanica</i>	00
7. Tulip tree	<i>Spathodea campamulata</i>	00
8. Cannon ball tree	<i>Couroupita guinensis</i>	00
9. Copper pod tree	<i>Peltaphorum pictoratum</i>	00
10. Drumstick tree	<i>Moringa olifera</i>	02
11. Mast tree	<i>Polyalthia longifolia</i>	00
12. Teak	<i>Tectona grandis</i>	05
13. Mangium	<i>Acacia mangium</i>	00
14. Acacia	<i>Acacia longifolia</i>	02
15. Champak tree	<i>Michelia champaca</i>	00
16. Rain tree	<i>Samanea saman</i>	00
17. Tree jasmine	<i>Murraya paniculata</i>	1
18. Anjili	<i>Artocarpus hirsutus</i>	00
19. Neem	<i>Azadirachta indica</i>	05
20. Chickoo tree	<i>Achras sapota</i>	00
21. Jack fruit tree	<i>Artocarpus heterophyllus</i>	00
22. Pride of India	<i>Lagerstroemia speciosa</i>	00
23. Casuarina tree	<i>Casuarina equisetifolia</i>	00
24. Indian gooseberry	<i>Emblica officinalis</i>	00
25. Devil's tree	<i>Alstonia scholaris</i>	00
26. Rosewood	<i>Dalbergia sisso</i>	04
27. Pink Trumpet tree	<i>Tebubia impeginosa</i>	00
28. Elangi	<i>Mimusops elengi</i>	00
29. Purple orchid tree	<i>Bauhinia purpurea</i>	00
30. Mango tree	<i>Mangifera indica</i>	06
31. Kanikonna	<i>Cassia fistula</i>	00

Crops cultivated in the campus (Area for cultivation- 11.3 %cents)

Banana, Tapioca, Chilly, Cabbage, Tomato, Spinach, Brinjal, Cauliflower, Ladies finger, Pea, Paddy

Campus farming

N.A

Routine Green Practices

World Environment Day – June 5

Awareness seminars are organized on various environmental problems. Distribution of fruit trees, poster exhibition etc. are some activities on that day.

Prepared
by
Stair



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Ozone Day – September 16

Conducted poster competition, Invited lectures etc.

The Green campus drive is an initiative of the college to protect the environment. The college has been declared as a 'No Plastic' zone. The campus protects age old trees in addition to several new trees and plants planted. The campus is lush green with gardens, lawns, flowers and plants wherever there is open space. Rain water is harvested and collected in the well in front of the college. There is a big pond at the far end of the college ground to harvest water. Bio-degradable waste is collected and made into compost. Non-degradable and electronic waste and toxic materials are regularly disposed of. The Nature club of the college has named all the flora of the campus. Important days like World Environment Day, Ozone Day, Hiroshima Day etc are observed and several programmes including processions with

placards, competitions and street plays are conducted by various departments and the Nature Club to create awareness in environment protection and conservation. The department of Zoology regularly conducts weekly quiz on nature and fauna.

e) Carbon Footprint

- ☐ Number of persons using cycles – 12
- ☐ Number of persons using cars – 02
- ☐ Number of persons uses two wheelers – 44
- ☐ Number of persons using other transportations – 21
- ☐ Number of visitors per day – 35
- ☐ Number of Students staying in the hostel – 43
- ☐ Number of Faculty and staff staying in the quarters – 00
- ☐ Average distance travelled by stake holders – 10*2 kms/day
- ☐ Expenditure for transportation per person per day – Rs.40/-

4.2 Evaluation of Audit Findings Water

Water Audit at Marathwada Institute of Technology, CIDCO, Aurangabad					
1	2	3	4	5	6
Activity	Average use per activity	Number of activity /day	water use/ person / day (litres)	Number of persons using	Total water consumption / day (litres)

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	(litres)			water	
Washing hands and face	1L	1 times a day	1L		1622800
Bath	10-30	once	20L		200
Toilet flush	6-20	once	10L	1000	600
Drinking (cup)	0.25	twice	0.5L	2500	600
Washing dishes	5	twice	10L		300
Leaking/dripping tap (1 drop/ second /day)	30-60	continuous			05
garden use	4	once			1000
Cooking (average)					N.A
Hostel uses	All uses	Twice	42	2	1000
Lab uses	3	once	3L		300
Total water use					4800

4800 liters of water is used per day by the college for its different uses. The main source of water is ground water. Water from the public water supply is not utilized. **Almost 500 L** of water is lost per day through the leaking of pipes and other misuses. This can be prevented. If water treatment system is installed at canteen and chemical laboratories the amount of water lost through outlets can be recycled and utilized for gardening and toilet uses. Awareness programs for the management of sustainable water use will be highly beneficial in this college.

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Energy

Energy Utilization

Appliances	Number of appliance	Units of current per month kWh
Computers and laptops	53	10600
Air conditioners	04	8316.00
CFL bulbs		1137.54
Photocopiers		176.00
LED lights	36	168.65
Incandescent bulbs	00	113.52
Fans	61	1631.96
Tube lights	57	1695.76
Electrical Equipments		4267.98
Televisions		24.20
Inverters		264.00
Heaters		269.28
CCTV DVR	07	232.76
Total Energy usage per month (kWh)		24335.77

Current saving methods adopted in the college

- Turn off electrical equipments when not in use
- Use energy efficient light-emitting diode (LED) bulbs instead of incandescent and CFL bulbs
- Maintain appliances and replace old appliances.
- Use computers and electronic equipments in power saving mode.

The total energy utilization of the college for different purposes is approximately **24335.77 units/month**. Increased production of solar energy a type of non-conventional category of energy will be a good energy management system for the

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college. Electricity charges per month are **Rs.91269.38 /month**. Energy saving through the replacement of incandescent bulbs, CFL lamps and tube lights to LED light could be a good option. Energy efficient electrical equipments especially fans and pump sets can

be replaced against old ones.

Awareness programs for the stakeholders to save energy may also increase sustainability in the utilization of various energy source.

Waste

❖ Total Biodegradable waste	= 26.5 kg/day
❖ Non-biodegradable waste	= 2 ¾ kg/day
❖ Hazardous wastes	= 165 grams/day

The composting facility of the college for the treatment of biodegradable waste generated from the canteen, office, vegetable garden, and from the college campus cleaning operations is not adequate. Different methods such as pit composting, vermi-composting, bacterial composting using bacterial consortium may be used to treat the biodegradable waste. Bottles, plastics, cans, broken glass wares, tins etc., may be recycled or sold out. A model solid waste treatment system can be established in the college as a part of awareness program to the students.

Green Campus

Total number of plant species identified – 87

Tree cover of the campus – 489 m²

Garden area inside the college – 33.5 cents

Total area for cultivation:-

Veg. garden area – 21.3 cents

Medicinal plant garden – 8.3 cents

Area for paddy cultivations – 31 cents

The college has ample land surface for greening initiatives. This provide ample surface for greening initiatives. The campus has 31 species of trees. A model arboretum will be ideal for the college. At least 50 different types of trees can be planted in the campus every year. Area demarcated for the establishment of a gardens of medicinal plants, paddy field and vegetable garden, the extent of which may be increased.

Carbon Footprint

Petrol used by two wheelers/day–199 L (Per person to and fro 40 kms =1L)

Fuel used by four wheelers (56Persons) - 104 L (Per person to and fro 40 kms = 2L)

Fuel for persons (total 2513 persons) travelling by common

transportation = 200 L (4L x 50 persons)

Total fossil fuel use is 621 L / day

Total fuel cost per day for transportation = Rs 68310/- (621 L x Rs 110)

Cost of Gas cylinders used Rs. 28710/month (29 cylinders)

Cost of generator fuel – Rs. 19800/month (6 L X 110 per day)

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- Amount spent for transportation (office) – Rs. 6500/month (Approx.)
- Amount spent for transportation (canteen) – Rs. 5000/month
- Amount spent for transportation (visitors) – Rs. 17000/year
- Other expenditures for the energy – Rs. 1580/day

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 plying for the staff and students carbon dioxide released for the stakeholders commutation can be reduced. More trees may be planted in the campus 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

Preparation and distribution of 'Karkidaka kanji' during the month of Malayalam month *Karkidakom*.

4.3 Consolidation of Audit Findings

We hope that students will have developed a greater appreciation and understanding of the impact of their actions on the environment. They have successfully been able to determine the impacts on the environment through the various auditing exercises. Participating in this green auditing procedure they have gained knowledge about the need of sustainability of the college campus. It will create awareness on the use of the Earth's resources in their home, college, local community and beyond.

Major Audit Observations

The environmental awareness initiatives are not substantial.

The installation of solar panels, 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.

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.

Water Audit

There is no water consumption monitoring system in the college campus.

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The college does not have waste water treatment for waste water generated from laboratories, canteen, hostel kitchen, toilets, bathrooms and office rooms.

The waste water from laboratories, canteen and kitchens are not suitably controlled and are not used for gardening.

The college has to take actions to strengthen rain water harvesting. Rain water harvesting for separate buildings are lacking.

Measurement of quantity of water obtained from the rain water harvesting should be done.

Automatic switching system is not installed for pump sets used for overhead tank filling.

Per day use of water is very high and there is no control over wastage of water.

Display boards against the misuse of water use are lacking.

Energy Audit

The communication process for awareness in relation to energy conservation is found inadequate.

Assessment of electrical load calculation is yet to be done by the college. Monthly use of electricity in the college is very high.

Objectives for reducing energy, water and fuel consumption are meager. There are fans of older generation and non energy efficient which can be

phase out by replacing with new energy efficient fans.

Regular monitoring of equipments and immediate rectification of any problems.

Waste Audit

Solid waste management systems established are insufficient.

The college has proper communication with the local body for regular collection of solid waste from the campus.

Implementation of sustainable projects to attain set environmental goals is not in place.

Waste bins in the class rooms, veranda, canteen and campus are inadequate.

Bio gas plant is not working.

Proper composting systems are lacking. Green chemistry labs are not introduced.

Green Campus Audit

Tree cover of the college with respect to the stakeholder strength is not enough.

Regular planting of trees in the campus are inadequate. Paddy cultivation is not done regularly.

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.

Uses of herbs cultivated in the medicinal garden are not displayed.

Carbon Foot Print Audit

College has not yet taken any initiative for carbon accounting.

Adequate common transportation facilities should be provided by the college.

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Encourage students to use cycles.

502 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. 31587 per day is spent as the cost of fossil fuel by the stakeholders. Usage of 28 gas cylinders per month is very high.

4.4 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).

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 organization 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 organizational priorities and the passing of time.

4.5 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.

Awareness on Carbon Consumption

Students and Staff members may be made totally aware of pollution caused by use of vehicles.

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The carbon consumption 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.

4.6 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 organization. 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.

Common Recommendations

- ❖ Adopt an environmental policy for the college
- ❖ Establish a purchase policy for environmental friendly materials
- ❖ Introduce UGC Environmental Science course to all students
- ❖ 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

Criteria Wise Recommendations

Water

- Remove damaged taps and install sensitive taps is possible.
- Drip irrigation for gardens and vegetable cultivation can be initiated.
- Establish rain water harvesting systems for each building.
- Establish water treatment systems.
- Awareness programs on water conservation to be conducted.
- Install display boards to control over exploitation of water.

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Energy

- ☐ Employment of more solar panels and other renewable energy sources.
- ☐ Conduct more save energy awareness programs for students and staff.
- ☐ Replace computers and TVs with LED monitors.
- ☐ More energy efficient fans should be replaced.
- ☐ Observe a power saving day every year.
- ☐ Automatic power switch off systems may be introduced.

Waste

- ☐ Establish a functional bio gas plant.
- ☐ A model solid waste treatment system to be established.
- ☐ Practice of waste segregation to be initiated.
- ☐ A model Vermicomposting plant to be set up in the college campus.
- ☐ Establish 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.

Carbon footprint

- ☐ Establish a system of car pooling among the staff to reduce the number of four wheelers coming to the college.
- ☐ Introduce college bus services to the students and staff.

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- ☐ 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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Chapter 5

Exit Meeting

The exit meeting was conducted by the auditor Prof. Deepak Bornare. It was a mechanism to provide the management and staff a broad feedback on the preliminary findings of the audit team before completing the audited report. The exit meeting was held in the college on 15th December, 2018. Clarification on certain information gathered was sought by the audit team from the management and staff of the college.

Draft Audit Report

The information gathered by the audit team was consolidated as a draft audit report. This draft report was then circulated to the audit team and those directly concerned with the audit to check the report for accuracy. The draft green audit report was also discussed in the exit meeting.

Final Audit Report

The final audit report is the corrected final document which contains the findings and recommendations of the audit. It will also form one of the bases of future audits because the information it contains informs some of the tests and analyses that need to be performed in the future. Final Audit Report was submitted on 5th December, 2021 to the Principal of the college.

Follow Up and Action Plans

Green audits form a part of an on-going process. Innovative green initiatives

have to be designed and implemented every year to make the college

environmentally sustainable. Follow up programs of green auditing

recommendations should be done meticulously before the next audit.

Next Audit

In order to promote continuous improvement it is recommended to conduct the next green auditing during the year 2019.

Transparency of Green Audit Report

Green audit report is one of the useful means of demonstrating an

Organization's commitment to openness and transparency. If an organization

believes it has nothing to hide from its stakeholders, then it should feel

Confident enough to make its green audit reports freely available to those who

request them. As a basic rule, green audit reports should be made available to

all stakeholders.

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