TECHNICAL REPORT OF ENERGY AUDIT

Submitted to

ADICHUNCHANAGIRI INSTITUTE OF TECHNOLOGY,
CHIKKAMAGALURU – 577 102, KARNATAKA.

Date of Audit: 22.06.2022

Submitted by

NATURE SCIENCE FOUNDATION

(A Unique Research and Development Centre for Society Improvement)

ISO 9001:2015, 14001:2015, 45001:2018 & 50001:2018 Certified and MSME Registered Organization

2669, LIG-II, Gandhi Managar, Peelamedu, Coimbatore - 641 004, Tamil Nadu, India.

Phone: 0422 2510006, Mobile: 9566777255, 9566777258

Email: director@nsfonline.org.in, directornsf@gmail.com

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1. Introduction

An energy audit is a survey in which the study of energy flows for the purpose of conservation is examined at an Organization. It refers to a technique or system that seeks to reduce the amount of energy used in the Organization without impacting the output. The audit includes suggestions of alternative means and methods for achieving energy savings to a greater extend. Conventionally, electrical energy is generated by means of fossil fuels, hydraulic and wind. The availability of fossil fuels and their depletion rate, insist the need for alternate energy systems and conservation of electric energy. In general, the primary objective of an energy auditing and management of energy consumption is to offer goods or services at the lowest possible cost and with the least amount of environmental impact (Backlund and Thollander, 2015). The need for an energy audit is to identify the savings potential and cost reducing methods, understand the ways in which fuel is used, where, the waste occurs and find the scope for improvement.

An energy audit is proposed and conducted to ensure that energy saving practices are implemented and followed in Educational Institutions and Industrial sectors in a sustainable way. Preparation and completion of a questionnaire, physical examination of the campus, observation and examination of documentation, key person interviews, data analysis, measurements and suggestions are all part of the audit process. Energy audit involves several facts including energy savings potential, energy management, finding alternatives, etc. (Cabrera *et al*., 2010) With these facts in mind, the audit‟s specific objectives are to assess the competence of the sustainability management and control system, as well as the departments" compliance with applicable rules, policies, and standards. It has the potential to have a significant influence on the organization‟s operational cost as well as the environmental impact (Singh *et al*., 2012).

Energy Conservation Building Code (ECBC) is established in the year 2017 which provides minimum requirements for the energy-efficient design and construction of buildings across India. It also provides two additional sets of incremental requirements for buildings to achieve enhanced levels of energy efficiency that go beyond the minimum requirements (Gnanamangai *et al*., 2021). Bureau of Energy Efficiency (BEE) came into force in 2002 towards implementation of energy saving practices in an Organization. Energy-efficiency labels are information affixed to manufactured products and usually communicate the product energy performance (Ingle, 2014). BEE has developed a scheme for energy efficiency labelling of buildings coinciding with the star ratings of the building at accelerating energy efficiency activities. BEE Star Rating Scheme is based on actual performance of the building as well as equipment in terms of specific energy usage termed as „Energy Performance Indicator" by means of star ratings labelled items used which will be useful for energy savings in a sustainable manner (Mishraand and Patel, 2016).

Energy audit programme provide aid in maintaining a focus on energy price variations, energy supply availability and efficiency, determining an appropriate energy mix, identifying energy-saving technology, retrofitting for energy-saving equipment and so on. In general, an energy audit process dealt with the driving conservation concepts into reality by giving technically possible solutions within a specified time limit while also considering the economic and other organizational issues (Asnani and Bhawana, 2015). It also dealt with the uncover ways to cut operating expenses or reduce energy use per unit of production in terms of savings. It serves as a "benchmark" (reference point) for managing energy in the organization for planning more energy-efficient use across the board (Cabrera *et al*., 2010).

2. Need for an Energy Audit

In an organization, the top three operating expenses are energy labour and materials. Relating the manageability of the cost or potential cost savings in each of the above components, energy management is found to be the top ranker, and thus energy management constitutes the essential part in reducing the cost. Energy Audit helps in understanding the ways energy and fuel are being used in any organization, and identifies the areas where wastes occur and the scope for improvement exists. The Energy Audit gives a positive orientation to the energy cost reduction, preventive maintenance quality control programmes and will help to keep focus on variations which occur in the energy costs, availability, and reliability of supply of energy. The main objective of Energy Audit is to find ways to reduce energy consumption per unit of product output. The Energy Audit provides a "bench-mark" (Reference point) and a basic planning for managing energy and for more effective use of energy throughout the organization.

The Ecofriendly-campus concept essentially focuses on the efficient use of energy conservation and its savings opportunities in a sustainable way. It also gives importance for reduction of contribution to carbon emissions, carbon footprint calculation, use of star rated equipment, encouraging energy use conservation practices in all buildings, reduce the organization‟s energy consumption, reduce wastes to landfill, and integrating environmental considerations into all contracts and services considered to have significant environmental impacts.

Auditing for Energy Management may be studied in terms of energy savings and opportunities. In general, energy cannot be seen, but we know it is there in wire, pipes and other non-living materials because it shows visible effects in the forms of heat, light and power. The energy consumption, energy sources, energy monitoring, lighting, vehicle movement, electrical and electronics appliances, and transportation are addressed by this indicator. Energy usage is an important aspect of campus sustainability and requires no explanation for its inclusion in the assessment. However, energy saving, and opportunities may be taken into consideration while energy is extensively used. An old incandescent bulb uses approximately 50W to 100W while an energy efficient LED uses only less than 10W which shows the positive indication on energy savings. Energy auditing deals with the conservation methods to reduce its consumption related to environmental degradation. In addition, suggestions and recommendations might be given after auditing which in turn useful

for energy savings. Thus it is essential for any environmentally responsible institution to examine its energy use practices at least once in two or three years using internal and external auditors.

The conduct of energy audit using internal and external energy auditors is playing important role in any organization in terms of energy management. The Energy audit is able to measure the impact of energy potential in an organization so that it helps in determining the better ways to manage the impact on environment. In addition to liquid and solid wastes, biomedical and electronic wastes energy potential and biodiversity audits, attempts may be made to measure the carbon footprint in the organization based on the amount of carbon emissions created by the electrical appliances, vehicles, and human population. It takes into consideration the measure of bulk of CO_2 equivalents exhaled by the organization by which the carbon footprint accounting is done. It is necessary to know how much the organization is contributing towards sustainable development in terms of energy management is being done. It is therefore recommended to measure the carbon footprint in each organization which may be useful for maintaining the ecofriendly campus to the stakeholders.

3. Aims and Objectives of an Energy Audit

An energy audit is a useful tool for developing and implementing comprehensive energy management plans of an organization. The aim of an energy audit is to identify the energy efficiency, conservation, and savings opportunities at the premises of the audit sites in a systematic manner. The audit process is carried out as per the following.

- Review of energy saving opportunities and measures implemented in the audit sites.
- Identification of additional various energy conservation measures and saving opportunities.
- Implementation of alternative energy resources for energy saving opportunities and decision making in the field of energy management.
- Providing a technical information on how to build an energy balance as well as guidance to be sought for particular applications.
- Detailed analysis on the calculation of energy consumption, analysis of latest electricity bill of the campus, understanding the tariff plan provided by the central and State Electricity Board.
- List ways that the use of energy in terms of electricity, electric stove, kettle, microwave, LPG, firewood, Petrol, diesel and others.
- Analysis of electricity bill amount for the last two to three years, amount paid for LPG cylinders for last one year and amount paid for water consumption for human beings and watering to the plants.
- Use of incandescent (tungsten) bulb and CFL bulbs, fans, air conditioners, cooling apparatus, heaters, computers, photo copiers, inverter, generators and laboratory equipment and instruments installed in the organization (for example- 60 watt bulb x 6hours x number of bulbs = kwh).
- Alternative energy sources / nonconventional energy sources are employed / installed in the organization (photovoltaic cells for solar energy, windmill, energy efficient stoves, Biogas, etc.).

- Creating awareness among the stakeholders on energy conservation and utilization.

4. Benefits of an Energy Audit

- **Reduced Energy Expenses:** The most obvious benefit is that the less energy the Organization uses, the less money that the Organization will have to spend on energy costs.
- **Identify Problems:** An energy audit can also help to identify any issues that the equipment might have. For example, the auditor could find small leaks in the compressed air system. These leaks would cost a significant amount of money if it is not noticed. Auditors can also detect dangerous health risks like the carbon monoxide that‟s emitted from equipment that hasn‟t been vented properly. With a regular energy audit, the organization will be able to address these kinds of issues promptly to help ensure the health and safety of the staff members.
- **Increased Employee Comfort:** During the audit, the Organization might learn about changes that have been made regarding insulation and air sealing. Completing these enhancements will help create a more reliable and more efficiently cooled or heated space for the employees. In turn, more comfortable employees tend to be more productive, so not only will the Organization save on energy costs, but may also improve overall well-being.
- **Personalized Recommendations:** Working with an energy expert can help learn about new energy-efficient technologies. The professional will customize a plan, recommending which upgrades will give the most return on investment. These might include updated lighting systems, a new HVAC system, weatherization measures like insulation and air sealing, and more. While some of the recommendations might have a substantial up-front cost that many of them will pay for themselves in a short period of time with significantly reduced energy expenses.
- **Show Environmental Concern:** By taking steps to be more energy efficient, the Organization will be showing the employees and clients that the organization cares about the impact on the environment.
- **Increased Property Value:** Using the recommendations of an energy auditor to make facility more energy efficient could also help to increase its overall worth. Things like solar panels, high-efficiency LED lighting, and weatherization procedures are all things that contribute to a higher property value.
- **Longer Equipment Lifespan:** An energy auditor might recommend to update some of the equipment for maximum energy savings. If the Organization decide to upgrade, it will not only save on energy costs, but also expect the equipment to last a long time. This is because newer, more energy-efficient equipment doesn‟t have to work as hard as older, outdated units to provide the same level of performance.
- **Energy audit evaluation:** Energy audits will evaluate the Organization “as a whole”, the aim is to consider a wide range of available alternatives (Electrical, Mechanical, Thermal Water and Transportation).

- **Energy audit Opportunities:** The audit will not only inform about the opportunities but also provide information with financial analysis. This will enable prioritization based on financial benefit and return on investment. It provides technical information regarding the proposed energy conservation measures.
- **Analysing the quality of Energy Audit:** A good quality audit will investigate the historical energy usage and find the essential issues using statistical methods. It Provides information with emissions analysis to help understand the benefits of the decisions from an environmental standpoint. The audit provides benchmark information to help compare the energy use performance with others.

5. Procedures followed in an Energy Audit

In order to conduct an energy audit, several methods are adopted in the audit sites in which walk-through audit is conducted. The balance of total energy inputs with total energy outputs and identification of all energy streams in a facility are taken into account. The amount of energy used by each of its energy streams are calculated as per the methodology mentioned in the Manual of Gnanamangai *et al*. (2021). The top three operating expenses of the Organization are typically observed to be energy (both electrical and thermal), labour and materials. During the audit, physical verification of Lighting, Ceiling, Table and Exhaust Fans, A/C machines, Solar panels, Heaters, Generators, Uninterrupted power supply machines and ventilators load fixtures and verification of installed energy efficient system‟s capacities are carried out. Inspection of when the cost or prospective cost savings in each of the above components are considered, energy always wins, and the energy management task becomes a key cost reduction area. The energy audit assisted in better understanding how energy and fuel are used in the Organization as well as identifying waste factors and development potential towards energy savings opportunities. Finally after the audit process, the energy audit included suggestions for energy cost reduction, preventive maintenance and quality control activities, all of which are critical for the utility operations in the auditee (Organization).

The audit involved visiting the campus and physical verification of the loads and sources installed. The entire campus is divided into different sections and those sections are audited in which electrical fittings and energy supply are monitored. The production process flow is studied and electricity consumption are measured. Location of the electrical machines, conditions of them and their accessories are inspected through physical verification is observed as per the regulation of Indian Green Building Council (IGBC, 2021) and World Green Building Council (WGBC, 2021). The energy bill from the supply utility company (Example: Tamil Nadu Electric Generation and Distribution Corporation Limited, Chennai) is audited and assessed for the load demand requirement and efficient consumption of energy. Stakeholders are interacted with the scope for improvement and energy management during the audit. Potential areas in which the scope of energy conservation and saving opportunities available in the current context have been identified and suggested for implementation to the Organization. The level of carbon dioxide might be measured in different places across the Organization campus using a portable CO_2 Analyzer to calculate the carbon footprint. It may be useful to check where carbon emission is

prominent which could be taken into account to reduce.

The audit involves visiting physical position of load & carry out inventory of load. Due measurement of electrical load of equipment & circuit is carried out. Energy bill received from TNEB is audited & studied for KWH requirement & how efficiently energy is used. Various positions are interacted, familiarized with energy audit & involved for successful & result oriented energy audit. Energy conservation & saving opportunities are identified during round & measurement for implementation.

6. Types of Energy Audit

The Energy Audit types depends on the following factors:

- Industry/ Organization type and its function
- Intense and the extent to which final audit is required, and
- The magnitude of cost reduction

Thus Energy Audit can be classified into the following types.

1) Preliminary Energy Audit
2) Detailed Energy Audit
3) Potential and magnitude of Energy Audit
4) Comprehensive Energy Audit

6.1. Preliminary Energy Audit Methodology

Preliminary energy audit gives a quick access to:

- Estimating and establishing energy consumption in the organization
- Estimate the scope of audit
- Identify the areas of maximum energy consumption
- Identify the areas of improvement
- Setting benchmark
- Performing Preliminary energy audit uses existing data.

6.2. Detailed Energy Audit Methodology

The detailed Energy audit offers the most accurate estimation of energy savings and cost. A comprehensive audit provides a detailed energy implementation plans for a facility, as it evaluates all major energy consumption systems.. It considers the effects of all projects, accounts for the energy use of all major equipment, and includes detailed energy cost saving calculations and project cost. Energy Balance is the key element in detailed energy audit. The estimated use is compared to utility bill charges. There are three phases in detailed energy audit

Phase I - Pre -Audit Phase
Phase II - Audit Phase
Phase III - Post Audit Phase

6.3. Potential and Magnitude of Energy Audit

A systematic and structured method is necessary for an efficient working of energy audit process. An initial site study is carried out for planning the procedures necessary for an audit.

Initial Site Study and Preparation for Detailed Auditing

An initial site study visit might take one or two days and gives the Energy Auditor an opportunity to meet the concerned person (Auditee), to familiarize with the site and to assess the procedures necessary to carry out the energy audit.

During the initial site visit the Energy Auditor carries out the following actions: -

- Discussing the aims of the energy audit with the audit study site"s management.
- Discussing the economic factors associated with the recommendations of the audit.
- Analysing the major energy consumption data with the concerned person.
- Obtaining the available audit site drawings – building layout, electricity distribution, steam distribution, compressed air distribution, etc.
- Conducting Walk-through audit around site.

The main aims of this visit are:

- Finalising the Audit team members
- Identifying and analysing the main energy consuming areas during the audit.
- Identifying existing instrumentation/ additional metering required.
- To decide if any meters will have to be installed prior to the audit eg. kWh, steam, oil or gas meters.
- Identifying the instruments required for carrying out the audit.
- Planning the time management
- Collecting the macro data on major energy consuming areas.
- Conducting awareness meetings/ programmes.

6.4. Comprehensive Energy Audit

A comprehensive audit can take from several weeks to several months depending on the nature and complexity of the site to complete the audit process. Detailed study is carried out to establish, and investigate, energy and material balances for specific departments. Possible checks of plant operations were carried out over extended periods of time, at nights and at weekends as well as during normal daytime working hours, to ensure that nothing is overlooked.

The audit report includes list of energy inputs and product outputs by major department or by major processing function and estimates the efficiency of each step of the Organization. The methods for improving the efficiency will be listed, and it also includes preliminary assessment of the cost of the improvements and expected payback on any capital investment needed. The audit report concludes with specific recommendations for detailed engineering studies and feasibility analysis. The comprehensive energy audit is useful in identifying the major energy consuming areas to be surveyed during the audit and to identify any existing instrumentation/ additional metering required. Proper care should be taken while identifying the

instrumentation required for carrying out the audit and to plan the time management for collecting the macro data from energy consuming areas. The audit report is definitely useful for energy management.

The information to be collected during the detailed audit includes:

1. Energy consumption by type of energy, by department/area, by type of process equipment, by end-use
2. Energy cost and tariff data
3. The distribution and generation of site services (eg. Electricity, Compressed air, steam).
4. Sources of energy and its supply (e.g. electricity from the grid or self-generation)
5. Potential alternative for fuel substitution, process modifications, and the use of co-generation systems (combined heat and power generation).
6. Energy conservation and management awareness training programs within the Organization.

   The audit team collects the following baseline data:
   - Major Equipment details, process/technology used
   - Water consumption
   - Fuel usage
   - Capacity utilisation
   - Electrical energy consumption
   - Steam consumption
   - Yield/ Efficiency

7. Carbon footprint by measuring Carbon dioxide level in the Campus

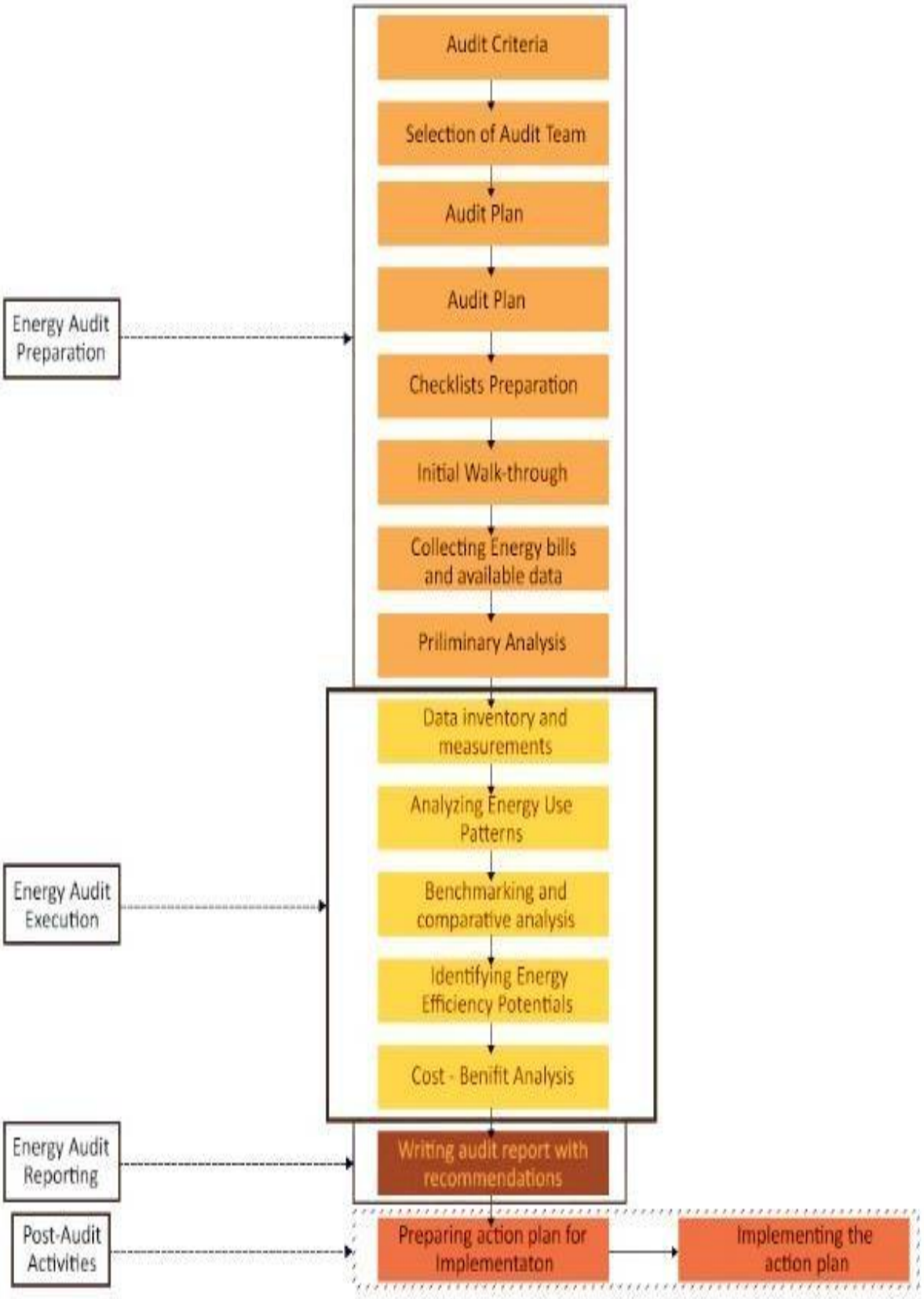
The level of Carbon dioxide is measured in different places across the Organization campus using a portable CO_2 Analyzer (Non dispersive infra-red meter). In addition, CO_2 meter is also displayed the readings of atmospheric temperature, relative humidity, and dew point in the places, where the level CO_2 is measured. The meter started measurements of CO_2 level in the atmosphere after powered ON and updated the readings every second in the display screen. If the operating environment is changed (example from high to low temperature) which took 30 seconds for CO_2 sensor to respond and 30 minutes for flexibility in relative humidity. The meter features an audible alarm to give warnings when CO_2 concentration exceeds the set limit. It emits beeps (Abt.80Db) when CO_2 level goes over the set value and stops when any key (except SET) is pressed, or the readings fall below the set values.

The Carbon footprint per year is calculated (www.carbonfootprint.com) based on electricity usage per year in which CO_2 emission from electricity and the sum of transportation per year in terms of number of the shuttle buses service operated by the Organization and number of cars, motorcycles and trucks entering in the Organization campus. These factors are multiplied with total number of trips in each day and approximate travel distance of vehicles covered in each day with a coefficient (0.01) to calculate the emission of CO_2 in metric tons per year.

Humans contribute to a massive increase of carbon dioxide emissions by burning fossil fuels, deforestation, and other industrial activities. Methane (CH_4) is largely released by coal, oil, and natural gas industries. Anthropogenic activities are responsible for almost all of the increase in greenhouse gases in the atmosphere over the last 150 years. The largest source of greenhouse gas emissions from human activities is from burning fossil fuels for electricity, heat, and transportation.

Calculating Carbon Foot Print

The Methodology of the Audit is presented in the following chart



Flow chart of Energy Audit Methodology

8. Energy Audit Process

Energy audit is a sequence of tasks performed in a planned manner. It requires discussion, survey, collection of data, analysis, and reporting.

Opening Meeting for the conduct of Energy audit

8.1. Steps involved in an Energy Audit

Step 1: Opening meeting among the audit team and auditees
Step 2: Planning and organizing the energy audit
Step 3: Conduct a walk-through audit at different sites
Step 4: Macro data collection and observation
Step 5: Analysis of data collected from the Organization
Step 6: Best practices followed in the Organization towards energy savings
Step 7: Recommendations for further improvement
Step 8: Exit meeting after the audit to discuss about the audit findings

8.2. Systems studied during the Energy Audit

- Physical verification of lighting, fan a/c machines, ventilators load fixtures.
- Verification of installed energy efficient systems.
- Inspection of Solar panel, Generators, Uninterrupted power supply machines.
- Inspect and verify the maintenance aspects of installed Generators and additional backup power sources.
- Analyse the electricity consumption through the supply utility company (Example: Tamil Nadu Electric Generation and Distribution Corporation Limited, Chennai).
- Review the potential usage of alternative energy resources.
- Review the energy conservation awareness among the stakeholders for optimum use of electricity and its savings.

8.3. Planning and organizing the Energy Audit

Planning and organizing are the integral part of the energy audit. An initial visit to the audit sites is organized and the areas to be inspected are listed. Following the listing, information on the energy consumption of various blocks in the recent past is obtained, and a planned analysis is carried out.

8.4. Walk-through Audit Process

Simple audit, screening audit or visual audit are the other names, by which walk-through audits are addressed. The main purpose of the walk-through audit is to obtain general information about the sites in which electrical energy is being used at the maximum. More specific information have been obtained from the maintenance and operational people during the time walk-through audit. It also included a walk- through of the facility to become familiar with the building‟s operation and a brief evaluation of facility utility bills (amount paid for electricity) and other operating data. During the audit the primary problem areas are discovered.

8.5. Macro Data collection and observation

Current level operation and practices within the campus are assessed and then the data regarding the number of electrical loads connected in each section are collected. The power ratings of each component and their respective hours of operation are also observed and documented for preparing the recommendations to the Organization.

8.6. Measurements in the Energy Audit process

An energy audit required measurements, such as the energy identification and quantification, and these quantities necessitate the instruments used in a consistent way. Some of the basic electrical parameters are monitored during the energy audit such as Voltage (V), Current (I), Power factor, active power (Kw), apparent power (demand in Kva), reactive power (Kvar), energy consumption (Kwh), frequency (Hz), harmonics, illumination level, etc. Temperature and heat flow, radiation, air and gas flow, liquid flow, speed, air velocity, noise and vibration, dust concentration, TDS, Ph, moisture content, relative humidity, flue gas analysis – CO_2, O_2, CO, SO_2, NO_2, combustion efficiency are the mechanical, thermal and other parameters that are analysed during the audit depending upon the requirements

9. About the Institution

9.1. Adichunchanagiri Institute of Technology, Karnataka

Adichunchanagiri Institute of Technology (AIT) was established in the year 1980 at Chikmagalur (240 km from Bangalore), with the blessings ofrevered Jagadguru Padmabhushana Sri Sri Sri Dr. Balagangadharanatha Maha Swamiji, pontiff, of Sri Adichunchanagiri Maha Samsthana Math. Chikmagalur city is 20 km from the world-famous sculpture Belur Temple. The Adichunchanagiri Institute of Technology is affiliated to Visvesvaraya Technological University, Belagavi and Recognized by All India Council for Technical Education, New Delhi.

The Institute is Accredited by the National Assessment and Accreditation Council (NAAC) with B+ grade.Institute is Accredited twice by National Board of Accreditation (NBA) and also an ISO 9001:2008 Certified Institution.

The renowned temple of Sringeri Sharadamba and Sri Shankaracharya Mutt is just 100 km away. Spread out over 65 acres of land with green surroundings and picturesque hillocks, the college has a conducive atmosphere for education. The weather is salubrious and pleasant throughout the year. The vision of the Institute is to develop as a center of excellence and to strive for continuous improvement of

technical education and human resource advancement and the mission is to achieve Excellence in Education, Entrepreneurship and Innovation by producing Engineers with high Ethical Standard, Integrity and Credibility.

The Institute has highly qualified and experienced faculty with a reputation in their areas of specialization, well-equipped laboratories, seminar halls with projectors, sufficient books and periodicals in the library, hygienic canteen facility with hostels for both girls and boys, a huge amphitheater for cultural exposure and fleet of buses for transportation. The Institute is providing good training for students to excel in academics as well as in industry requirements and aiming towards 100% placements to give a better future for students.

9.2. About Nature Science Foundation (NSF)

NSF is an ISO 9001:2015 & 14001:2015 certified and registered with Ministry of Micro, Small and Medium Enterprise (MSME), Government of India Organization functioning energetically towards the noble cause of nature conservation and environmental protection. NSF is managed by a board of trustees of NSF Public Charitable Trust under the TN Societies registration Act 1975 (TN Act 27 of 1975) on 29th November, 2017 at Peelamedu, Coimbatore- 641 004, Tamil Nadu, India with Certificate of Registration No. 114 / 2017. In addition, NSF has 12A, 80G and Form 10AC certificates for income tax exemption and implanting various Government schemes. The main motto of the NSF is to “Save the Nature to Save the Future” and “Go Green to Save the Planet”. NSF Branch Offices are also functioning effectively at Gorakhpur, Uttar Pradesh and Faridabad, Haryana, India to adopt the „Go Green Concept‟ in a big way. NSF family is wide spread across India with over 115 state-wise Lead auditors to conduct Green and Environment Audits.

NSF is functioning strenuously to conduct different awareness programmes and implement various schemes to public and school / college students towards the noble cause of nature protection. Some of the programmes are also being organized for the benefit of tribal communities to create the supply chain for biodiversity conservation studies. The objectives along with vision and mission are illustrated to promote educational and environmental awareness programmes through social activities for enhancing the quality of life and to conserve nature from environmental pollutants using traditional and modern technologies for sustainable land management. NSF is educating the tribal community children through social service and towards the upliftment of tribes as a whole and make them as entrepreneurs.

International Eco Club Student Chapter (IECSC) has been established for Student volunteers and faculty members are encouraged to conduct National and International events, Student Technical Symposium, Distinguished lecture programme, Environment day celebration, Ozone day celebration, Project model exhibition, Awareness programmes on Environmental pollution, Biodiversity and Natural resources conservation etc. with the financial support of the Foundation. NSF is being released „Magazine‟ and „Newsletter‟ biannually to share the information about Environmental awareness programmes on biodiversity conservation, seminar on soil conservation, water management and solid waste management, restoration and afforestation programmes in Western Ghats of southern India.

In order to encourage the students, members of faculty, academicians, scientists, entrepreneurs and industrial experts those who are involving in nature protection and biodiversity conservation studies across the world, NSF tributes the deserved meritorious candidates with various awards and honours such as „Best Faculty Award", „Best Women Faculty", „Best Scientist Award", „Best Student Award", „Best Research Scholar Award", „Best Social Worker Award", „Young Scientist Award", „Life-Time Achievement Award" and „Fellow of NSF". These award and honours will be given to the deserved meritorious candidates during the
„Annual Meet and Award Distribution Ceremony" which will be conducted every year during the first week of January.

NSF has introduced various types of Audits such as „Eco Audit", „Green Audit", „Energy Audit", „Hygienic Audit" Water & Soil Audit, Plastic Waste Management Audit, Biomedical Waste Audit, Solid Waste Management Audit, E- Waste Management Audit, Academic & Administrative Audits including ISO certification process to Academic Institutions, R&D Organizations and Industries towards the accreditation process as well as maintaining a hygienic eco-friendly environment to the stakeholders in their campus. All audits will be conducted as per the Checklist prepared by the NSF ISO Criteria and in compliance with Government Law and Environmental Legislations including World / Indian Green Building Council and the concept of Swachh Bharath Abhiyan under Clean India Mission. Green campus and Environment Policy, Purchase Policy, Energy Policy, MoU, International Eco Club student Chapter.

Audit processes are being conducted through the certified Auditors as per the following by the NSF

Audit	**Certified Auditors**	**Certified Auditors**
Green Audit	• IGBC - Indian Green Building Council • GBCRS - Green Building Code and Green Ratings Systems • GRIHA – Green Rating for Integrated Habitat Assessment	➢ Mrs. S. Rajalakshmi ➢ Dr. R. Mary Josephine ➢ Dr. B. Mythili Gnanamangai ➢ Er. Ashutosh Kumar Srivastava ➢ Er. N. Shanmugapriyan
Energy Audit	• BEE - Bureau of Energy Efficiency • LEED - Leadership in Energy and Environmental Design • CII-GreenCo – GreenCo Rating System Felicitator	➢ Er. D. Dinesh kumar ➢ Er. N. Shanmugapriyan ➢ Dr. N. Balasubramaniam ➢ Dr. P. Thirumoorthi ➢ Dr. G. Murugananth
Environment Audit	• IGBC -Indian Green Building Council • ASSOCHAM - Associated	➢ Mrs. S. Rajalakshmi ➢ Dr. A. Geetha Karthi ➢ Dr. R. Mary Josephine

	Chambers of Commerce and Industry of India • FSRS – Fire Safety & Rescue Services	➢ Dr. B. Mythili Gnanamangai ➢ Er. Ashutosh Kumar Srivastava ➢ Er. N. Shanmugapriyan
Hygiene Audit	• FSMS – Food Safety Management System & • Occupational Safety & Health (ISO 22000:2018) • SBICM - Swatch Bharath under India Clean Mission	➢ Mrs. Gaanaappriya Mohan ➢ Er. Ashutosh Kumar Srivastava ➢ Dr. R, Sudhakaran ➢ Dr. N. Saranya
Waste Management Audits	• Water & Soil Audit, Plastic Waste Management Audit, Biomedical Waste Audit, Solid Waste Management Audit, E-Waste Management Audit as per the Checklist of NSF	➢ Mrs. Gaanaappriya Mohan ➢ Er. Ashutosh Kumar Srivastava ➢ Dr. R, Sudhakaran ➢ Er. N. Shanmugapriyan
Academic & Administrative Audits	• Academic & Administrative Audits as per the NAAC Criteria and ISO implantation procedure • In compliance with the Environmental legislations and rules and regulations	➢ Dr. B. Anirudhan ➢ Dr. B. Shreeram
ISO Certification	• QMS (9001:2015), EMS (14001: 2015), OHS (45001: 2018), ISMS (27001:2018), FSMS (22000: 2018), QMSMD (13485: 2016), EnMS (50001: 2018)	➢ Er. Ashutosh Kumar Srivastava ➢ Mrs. S. Rajalakshmi ➢ Dr. A. Geetha Karthi ➢ Mrs. Gaanaappriya Mohan ➢ Dr. R. Mary Josephine

10. Audit Details

Date / Day of Audit	**:**	**22.06.2022**
Venue of Audit	**:**	**Adichunchanagiri Institute of Technology, Chikkamagaluru, Karnataka**
Audited by	**:**	**Nature Science Foundation,** Coimbatore, Tamil Nadu, India.
Audit type	**:**	**Energy Audit**
Name of Auditing Chairman	**:**	**Mrs. S. Rajalakshmi Jayaseelan,** Chairman of NSF & ISO QMS, EMS, OHSMS, EnMS Auditor.
Name of IGBC AP Auditor	**:**	**Dr. B. Mythili Gnanamangai,** Vice Chairman of NSF, Indian Green Building Council Accredited Professional.
Name of Subject Expert-I	**:**	**Mr. B.S.C. Naveen Kumar,** Senior Faculty, Mahatma Gandhi National Council of Rural Education, Ministry of Higher Education, Hyderabad.
Name of Subject Expert-II	**:**	**Dr. D. Vinoth Kumar** Joint Director of NSF & ISO EnMS Auditor.
Name of Subject Expert-III	**:**	**Er. D. Dinesh Kumar,** Certified Lead Auditor, IGBC, ASSOCHEM, GRIHA & LEED
Name of the Energy Auditor	**:**	**Dr. N. Balasubramanian,** Certified Bureau of Energy Efficiency Auditors of NSF.
Name of the Eco Auditor	**:**	**Er. S. Srinivash,** Tamil Nadu Fire and Rescue Services, Coimbatore.
Name of Eco & Green Officer	**:**	**Ms. S. Kavimalar,** Environment, Energy & Green Council Programme Officer, NSF.

11. Observations of the Energy Audit

11.1. Facilities visited during the Energy Audit

Date	Section where Energy Audit is conducted
22.06.2022	Administrative Block
	Power House
	Faculty Rooms
	Classrooms
	Seminar Halls
	Auditorium
	Laboratories
	Computer Centres
	Well, Sump and pumps.
	Sewage Treatment Plant
	Hostel
	Library

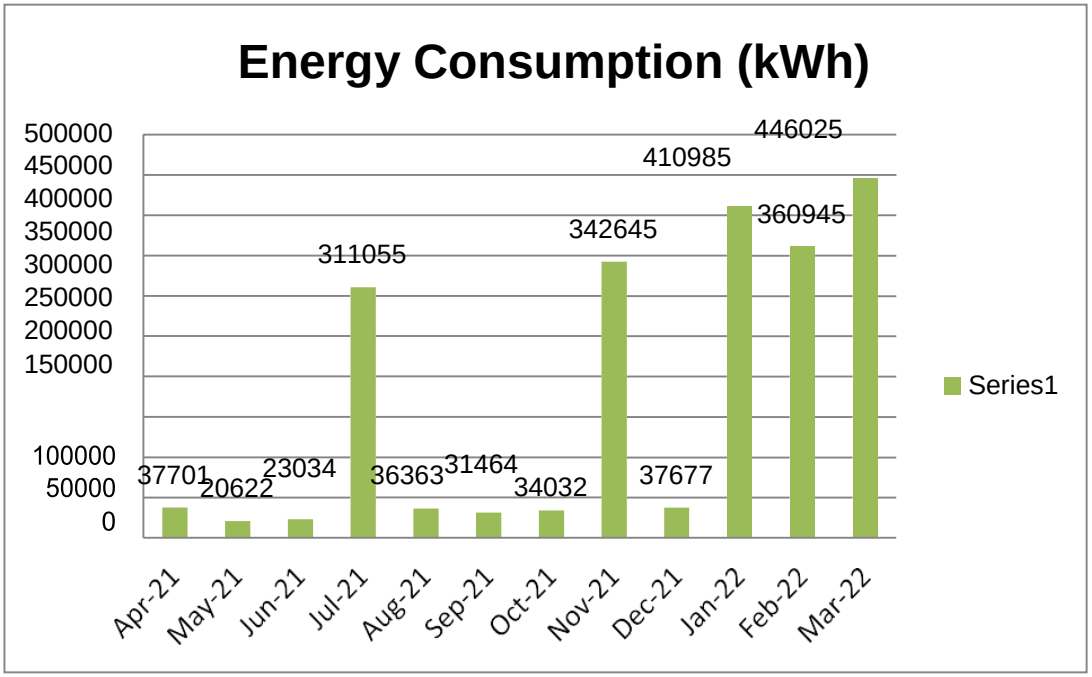
In the sections, the services offered are monitored, verified, and analysed on the aspects of energy consumption. In all these areas lighting systems forms the major consumer of electrical energy. Three phase electricity service connections available in the campus are provided by Southern Power Distribution Company of TS Limited (TSSPDCL Consumer No. MCL923). The electricity consumption charges are audited and studied for the load demand requirement and efficient consumption of energy Stake holders are interacted and the scope for improvement has been discussed. Potential areas in which scope of energy conservation and saving opportunities available have been identified and suggested for implementation.

11.2. Systems Studied during the Energy Audit

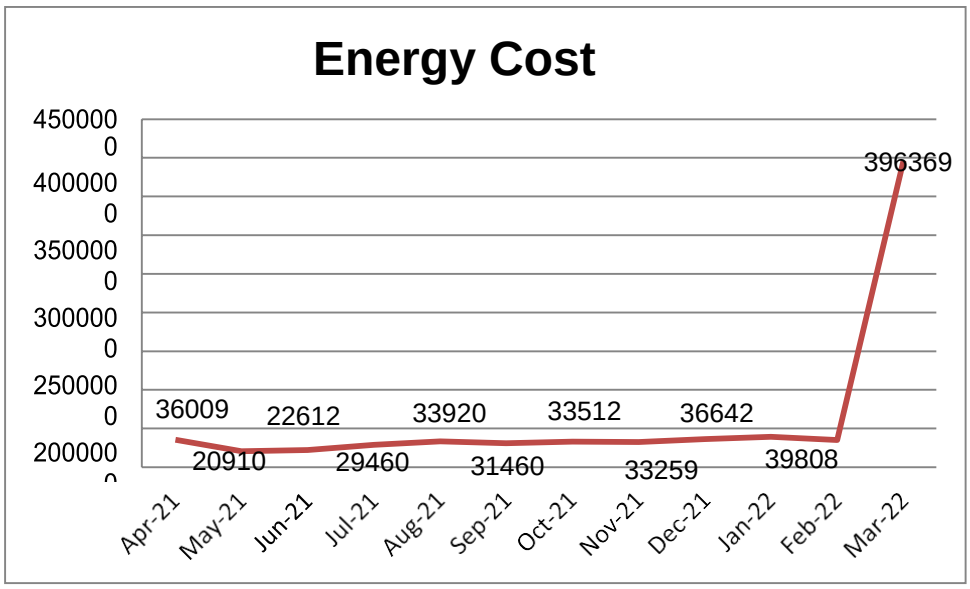
1. Lighting fixtures are verified physically.
2. Installation of energy efficient lighting systems are verified.
3. Installation of safety systems are verified
4. Installation of power backup systems (generators and UPS) are verified on the aspect of maintenance and consumption.
5. Electricity consumption through the TSSPDCL bills was analysed.
6. The energy conservation awareness among the stakeholders for optimum use of electricity and its savings are reviewed.

11.3. Energy Consumption and Cost Profile

The following chart shows the profile of energy consumed and the cost for one year by the stakeholders.



Energy Consumption Profile



Energy cost profile

11.4. Power supply Equipment and Major Loads

Table 1. Major Equipment related to Electrical energy utilization

Sl. No	Major and Minor Equipment, Instrument and Machineries	Rating/Capacity	Quantity (No's)
1	LED Tube Lights	36W	48
2	Fluorescent Lamps (Given Below under tubelights)	60W	80
3	Halogen Lamps	100W	4
4	Sodium Vapour Lamp	250W	18
5	CFL	12 W	120
6	LED Focusing Light	100W	15
7	Tube Lights	36W	360
8	Solar Water Heater	2000LPD	2
9	Solar Panel System	12 V	8
10	UPS	234 kVA	36
11	LCD Projectors	-	40
12	Refrigerators	100L	2
13	Varanda GLS/CFL/TFL Light Load	2 kW	1

14	Varanda LED Light Load	6kW	1
15	Solar Street Lights	25 W	10
16	Lifts	-	-
17	Water Doctors	-	-
18	RO Water Plant & Purification System	25 L & 50L	14
19	AC (Split, Window and Centralized AC)	2	65
20	Stabilizers	50kVA	1
21	Inverters & Converters (Solar Inverter)	2kVA	1
22	Air Cooler	-	-
23	Ceiling Fans	-	300
24	Pedestal Fans	-	6
25	Table Fans	-	-
26	Portable Fans	-	-
27	Generators	75kVA	6
		50k VA	1
28	Pumps	5HP	6
29	Motors	-	-
30	Compressors	3 HP	1
31	Vacuum Cleaner	150W	6
32	Biogas Plant	-	**1**
33	Drip & Sprinklers Irrigation	-	-
34	Ventilators	-	-
35	Exhaust Fans	-	15
36	Insect Trap	-	-
37	Automatic Lights	-	-

38	Internet Connectivity		
39	Podium Containing Mike, Speakers, Amplifiers, Radio, Camera, Sensors, etc.	-	30(Speakers), 15 (Amplifiers)
40.	Computers, Laptops,iPad, Dot matrix Printer, Laser Printers, Xerox Machines, Scanners, Server, Fax Machines, Inverters with UPS	-	2Laptops, 1100Computers,25 Laser Printers, 8Xerox Machine,1 Inverter with UPS
41	**Electrical, Electronics and Engineering Equipment/Machines**		
	DC Series motor	2.5 kW	3
		3.5kW	1
	DC Compound motor	2.5kW	3
		6.5kW	2
	DC Shunt motor	2.5kW	5
		3.7kW	1
	DC Compound generator	2.5kW	4
	DC Series Generator	2.5kW	1
		2kW	1
		2.2kW	1
	Single Phase transformers	1kVA	4
		2kVA	2
	Three Phase transformers	3kVA	2
	Single Phase Auto Transformers	230 V,15A	4
		230V,10A	2
		230 V, 10A	2

		230V, 20A	5
		230V,4A	5
	Three Phase Auto transformers	440V, 10A	3
		440 V, 20A	5
	Single Phase Loading rheostat	5kW	4
		3kW	2
	Three Phase Loading rheostat	8kW	2
		5kW	2
		2.7kW	1
	Single Phase Inductive Load	-	-
	Single Phase Capacitive /load	-	-
	Three Phase Capacitive load	-	--
	Three Phase Inductive Load	415 V	1
	Power Electronics Modules	-	30
	Three Phase Required Cage induction motor	3.7kW	5
	Single phase induction motor	0.75kW	2
		2.5kW	1
		1kW	1
	Three Phase Slip ring induction motor	3.7 kW	1
		3.5kW	1
	Three phase AC generator	3kVA	1
		5kVA	1
	Three Phase Stabilizers	50kVA	1
	Single Phase Stabilizers	5kVA	1
	Synchronizer	-	-

	Half and Fully controlled converters	-	-
	Buck, Boost and buck-boost converters	-	-
	Single Phase and Three phase inverters	-	--
	UPS	5kVA	1
	CRO	-	20
	DSO	-	10
	Microcontroller trainer kits	-	20
	Microprocessor trainer kits	-	-
	Arduino trainer kits	-	-
	Digital Electronic Trainer kits	-	30
	Flipflops	-	-
	Counters	-	-
	Half Adder	-	-
	Full adder circuits	-	-
	DC shunt Generators	2.5kW	4
	Synchronous Motor	3.7kW	1
	AC-DC Rectifier	50A,220V	1
		100A, 220V	1
42.	**Electronics and Communication Engineering Equipment /Machines**		
	Microprocessor trainer kit	-	30
	DC Series motor	-	-
	DC Compound Motor	-	-
	DC Shunt motor	0.5HP	4
	DC Compound generator	-	-

	DC Series Generator	-	-
	Single Phase and Three Phase Transformers	-	-
	Loading rheostat	-	-
	Single Phase and Three phase, Inductive & Capacitive load	-	-
	Power Electronics trainer kits	-	12
	Three Phase Squirel cage induction motor	-	-
	Single Phase & Three Phase induction motor	-	-
	Three Phase Slip ring induction motor	-	-
	AC generator	-	-
	Stabilizers	5kVA	3
	Synchronizer	-	-
	Half Controlled converters	-	2
	Fully controlled converters	-	4
	Buck, Boostand buck-boost converters	-	3
	Single Phase inverters	-	-
	Three Phase Inverters	-	-
	Synchors	-	-
	CRO	-	60
	DSO	-	60
	Microcontroller trainer kits	-	50
	Arduino trainer kits	-	-
	Digital Electronics trainer kits	-	50
	Flipflop,Counters,Half Adder, Full adder circuits	-	-

42.	**Civil engineering / Machines**		
	Compressing Testing Machine	3HP	2
	Universal Testing Machine	3HP	2
	Loading Frame	1.5 HP	1
	Total station,	-	4
	Theodoities	-	12
	Flexure Testing Machine	1.5 HP	1
	Sieve set	1.5 HP	2
	Slump Conce Apparatus	-	1
	Compaction Factor Apparatus	-	1
	Torsion testing Machine	0.37 kW	1
	Izod Impact Testing Machine	-	1
	Hardness Testing Machine	-	2
	Beam Deflection test apparatus	-	1
	Le Chateliers Apparatus	1.5kW	1
	Vicats Apparatus	-	2
	Centrifugal pump	2HP	1
		1HP	3
		1.5HP	2
	Submersible pump, Reciprocating Pump	-	-
	Pelton Wheel turbine	10 HP	1
	Francis Turbines	10HP	1
	Kalpan Turibine	10HP	1
	Conductivity meter	-	11
	Jar Test Apparatus	-	

	BOD incubator	1.5kW	1
	COD Digester	2.5kW	1
	Direct Shear Apparatus	1.5kW	2
	Triaxial Shear Apapratus	1.5kW	1
	Hydrometer	-	1
	Relagtive Density Apparatus	-	-
	Vee Bee Consistometer	1 HP	1
	CBR Apparatus	-	1
	Turbidity meter	-	2
	Spring Testing Machine	-	1
	Laboratory Electric Oven	2kW	6
	Dorry‟s Testing Machine	1.5kW	1

Table 2. Annual Energy Consumption of Fuels

S.No	Month	Units Consumed (kWh)	Diesel Consumption (Litres)	Petrol Consumption (litres)	LPG Consumption (kg)
1.	January	41098.5	7970	225	1460
2.	February	36094.5			
3.	March	44602.5			
4.	April	37701			
5.	May	20622			
6.	June	23034			
7..	July	31105.5			
8.	August	36363			
9.	September	31464			
10.	October	34032			
11.	November	34264.5			
12	December	37677			

Table 3: Energy Consumption and Cost Profile

Sl.No	Months	Rating/Capacity units in kWh	Cost
1	January 2022	410985	398083
2	February 2022	360945	354197
3	March 2022	446025	3963692
4	April 2021	37701	360098
5	May 2021	20622	209108
6	June 2021	23034	226129
7	July 2021	311055	294604
8	August 2021	36363	339206
9	September 2021	31464	314609
10	October 2021	34032	335129
11	November 2021	342645	332591
12	December 2021	37677	366421

Table 4. Transportation Facilities available in the campus

S.No	Type of Vehicle	Fuel Used	No. of Vehicles	Non Pollution Certified (Y/N)
1.	Bus	Petrol	18	Yes, pollution certificate will be provided
2.	Cars	Petrol	1	

Table 5. 11.5 Quantitative and Qualitative Measurement

S.No.	Requirements and checklists of the audit	Conformity		
		Yes	No	NA
1.	Have internal Energy audit procedures been developed and implemented in the Organization?		✓	
2.	Have programmes for the achievement of energy efficiency and conservation objectives been established and implemented as on today in the campus?	✓		
3.	Has a Management Representative, Electrical Engineer, Staff in charge been assigned for energy savings on power consumptions?	✓		
4.	Have programmes for the achievement of prescribed financial outlay for current bills for each building in the campus towards power consumptions?		✓	
5.	Has the organization ensured that personnel performing environmental specific tasks have the required knowledge on energy audit (e.g. education, training programme, seminar,		✓	

	workshop, camp, etc.)?			
6.	Are objectives and targets documented towards energy audit periodically and any Register is made?		✓	
7.	Any analysis of energy flows for energy conservation in terms of the amount of energy input into the system without negatively affecting the output in buildings		✓	
8.	Implications of alternative energy efficiency measures sufficient to satisfy the financial criteria of sophisticated investors		✓	
9.	Identification of the most efficient and cost-effective Energy Conservation Opportunities (ECOs) or Measures (ECMs) taken by the Management		✓	
10.	Are the following energy efficiency and conservation aspects considered in sufficient detail?	✓		
	a. Fluorescent (tube) lights, Incandescent lamp and sodium vapour lights are replaced with CFL / LED	✓		
	b. Number of Uninterruptible power supply (UPS) and Power generators for power back-up to alternative current supply facility in each building	✓		
	c. Number of solar panels, solar lights, solar water heaters, electric water heater installed		✓	
	d. Automatic sprinkler system used for irrigation purpose		✓	
	e. Ultra-violet lights and any other harmful lights used with safety precautions		✓	
	f. Attempt in reducing the energy expense and carbon footprint	✓		
	g. Disposal facility for hazardous arise from electrical gadgets, equipment and installation	✓		
	h. Renewable energy utilization (solar panel, wind mill)		✓	
	i. Natural / Mechanical air ventilation at Indoor / Outdoor auditorium, stadium, seminar halls, etc.	✓		
	j. Sign boards indicating Switch OFF / ON, Danger at Electrical equipment and Power transformers in the campus		✓	
11.	Signing of MoU with Govt. and NGOs to ensure about the energy conservation and efficiency in the campus	✓		
12.	Conduction of awareness programmes and outreach programmes on the energy conservation and efficiency	✓		

13.	The details of public transport, battery operated / electric vehicles, biofuel use, exhaust fans, boiling water system, chillers and geysers on energy savings mode	✓		
14.	Projects and Dissertation works on the energy conservation and efficiency carried out by students and staff members	✓		
15.	Steps taken to take care of daylighting, AC machines heat emission and ecofriendly Refrigerators, etc.	✓		
16.	Use of water metering, IoT based energy efficiency practices, remote waterlines, automation of electrical fittings and gadgets to save energy		✓	
17.	Are all monitoring electrical equipment appropriately maintained and calibrated?	✓		
18.	Are any energy conservation technologies and retrofit for energy conservation equipment being implemented?		✓	
19.	Skylight roof ratio, fenestration plan and Daylight illuminance in building construction towards energy efficiency*			✓
20.	Any Automatic Lighting Shutoff with occupancy Sensors and Timers, Exterior / Interior lighting control facility*		√	✓
21.	Have any rooms and guest suites a master control device at the main room entry that controls all permanently installed luminaires and switched receptacles*			✓
22.	Total electricity usage divided by total campus' population (kWh per person)	✓		
23.	The ratio of renewable energy production divided by total energy usage per year	✓		
24.	Total carbon footprint divided by total campus' population (metric tons per person)		✓	
25.	Elements of green building implementation as reflected in all construction and renovation policies	✓		
26.	Greenhouse gas emission reduction awareness programme to the stakeholders		✓	
27.	Computers, Lap tops, Ipad, Dot matrix Printer, Laser printers, Xerox Machines, Scanners, Server, Fax machine, Inverter with UPS	✓		
28.	**Equipment, Instruments and Machineries related to Life Sciences and Biological Sciences including Biotechnology, Nanotechnology, Food Technology, etc** Electronic Balances, pH Meter, Hot-air-oven,		✓	

	Microwave oven, Laminar Air Flow, Autoclave, Microscopes, Electophonic, Apparatus, Chromatography devices, Grinders, Mixers, Deep Freezers, BOD incubators, COD digester, Extraction apparatus, Incubators, Co2 incubators, Heating Mantle, Vaccum pump, Vortes Mixer, Magnetic stirrer, Gel rocker, Somicator, Growth chambers, Air curtains, Acrators, Spectrophotometers, Calorimeters, Turbidity meter, Colony counter water bath, Dry bath, Thermocycler, Gene gun, Gel documentation system, Trans illuminator, Ice maker, ELISA reader & Water, Aquarium, zebra fish/animal house facility, Mechanical & Orbital Shakers, cyclo mixer, Lyophilizer, Incinerators, Fermenters, Reactors, Particle size Analyser, XRD, FTR, Muffle furnace			
29.	**Chemical Sciences and Engineering Equipment/Machines** Distillation unit, Flow through straight pipe, packed bed distillation, Roll crusher, jaw crusher, sieve analysis machine, Shell and tube heat exchangers, plate and frame filter press, Fume hood, Fluorimeter, Venturimeter, Orifice meter, Nephelometer, Membrane Filtration Apparatus, Sieve set Machine, Jar test apparatus	✓		
30.	**Electrical, Electronics and Communication Engineering Equipment/Machines** DC Shut motor, DC Series motor, DC Compound motor, DC Shunt motor, DC Compound generator, Dc series generator, Single phase & Three phase transformers, Loading rheostat, Single phase & three phase, inductive & capacitive load, Power electronics trainer kits, Three phase squirrel cage indication motor, Three phase slip ring induction motor, AC generator, Stabilizers, synchronizer, Half and fully controlled converters, Buck, Boost and buck-boost converters, Single phase and three phase inverters, synchros, CRO, DS, CRO.	✓		

11.6. Measurement of Carbon dioxide level in the Campus

Despite a massive increase in global warming, environmental changes and human population including many commercial activities now-a-days, the amount of carbon in Earth‟s atmosphere is playing an important role which act as a global indicator for checking the purity of the atmosphere. Using a portable CO_2 Analyzer, the level of carbon dioxide was measured in different places across Adichunchanagiri Institute of Technology, Karnataka. The observation showed that the concentration of

CO_2 in the atmosphere is found to be low which did not exceed the critical limit of CO_2. It is further revealed that all the selected locations are having pure air with good air exchange which are free from pollutants (Table 6).

Carbon footprint, amount of CO_2 emissions associated with all the activities of the College or other entities like building construction and anthropogenic activity by human beings includes direct emissions, such as those that result from fossil-fuel combustion from direct burning, transportation, industrial activities, as well as emissions from electricity generation. In addition, the carbon footprint also contributes to the greenhouse emission.

Table 6. Measurement of CO_2 Concentration in Adichunchanagiri Institute of Technology, Karnataka

Sl.No.	Different locations of the Organization's campus	Carbon dioxide level (ppm)	Remarks
1.	Open Space	391	Aspirational
2.	Class Room (ECE)	558	Within Permissible limits
3.	Civil engineering Lab	468	Within Permissible limits
4.	Mechanical Lab	508	Within Permissible limits
5.	Parking Area	381	Aspirational

Reference of Set values of CO_2 level

As per (ASHARE 62-2019) Indoor air Quality parameters Threshold values

Class A (Aspirational) = Ambient+ 350

Class B (Within Permissible limits) = Ambient + 500

Class C (Marginally Acceptable) = Ambient + 700

a.Calculation of Carbon Footprint at Adichunchanagiri Institute of Technology, Karnataka

The Carbon footprint calculation can be conducted based on the stage of calculation as stated in www.carbonfootprint.com, which is the sum of electricity usage per year.

The CO_2 emission from electricity
= (electricity usage per year in kWh/1000) x 0.84
= (408058.5 kWh/1000) x 0.84
= 342.769 metric tons

Notes:

Electricity usage per year = 342.769 kWh
0.84 is the coefficient to convert kWh to metric tons.

b. Total Carbon dioxide emission per year

Total emission from electricity usage+ transportation (bus, car, motorcycle, trucks) 342.769+19.71+131.4+438=931.879 metric tonnes.

CO_2 level measurement at various locations of Adichunchanagiri Institute of Technology, Karnataka

11.7. Ways to reduce Carbon Footprint

Evaluating and understanding the CO_2 emission can reduce the negative impact on the environment. Tiny changes can bring good impacts like when it comes to transportation, food, clothing, waste, etc., the following tips helps in reducing the carbon footprint.

Food

- Consumption of local and seasonal products.
- Limiting the consumption of meat and beef.
- Adopting sustainable fishing.
- Avoiding plastic packaging and practising the use of reusable bags.
- Sense of buying only necessary things.

Clothing

- Taking good care of clothes.
- Buying second hand products or borrowing
- Using the clothes made from recycled products with eco label

Transport

- Adopting carpooling practice, using cycles and public transport
- Usage of No Pollution certified vehicles.
- **Energy and waste**
- Turning down the heating.
- Short showers
- Proper usage of water while brushing teeth or cleaning the dishes
- Proper care while charging the batteries.
- Selecting star rated equipment and EU Energy labelled products
- Reduce and recycle of wastes.

11.8. Light Intensity Measurement

Light intensity or light output is used to measure whether a particular light source provides enough light for an application needed. There is a well-established light level recommendation for a wide range of applications in lighting industry and also for the type of space. Understanding the light intensity helps to properly evaluate whether the space has adequate lighting conditions or not. Light intensity is measured in terms of lumens per square foot (foot-candles) or lumens per square meter (lux). Measuring the amount of light that falls on a surface allows to evaluate if the particular space has sufficient light to perform the tasks.

A light meter (lux meter) is used to measure the amount of light in a space/on a particular work surface. The light meter consists of a sensor that measures the light falling on it and provides the user with a measurable illuminance reading. Light meters are an especially useful tool for measuring light for safety or over-illumination. The light intensity is usually measured by taking initial reading, where the lightings are turned off (Baseline measurement) and the final reading is taken by turning on the lights in the particular space (illuminated level). Subtracting the baseline measurement from illuminated level gives the light intensity of the particular room/ space.

Light Intensity Measured at various locations of Adichunchanagiri Institute of Technology, Karnataka

Table 7: Light intensity measured at various locations of Adichunchanagiri Institute of Technology, Karnataka

S.No	Location	Light Intensity (Lux)
1.	Auditorium	300-350
2.	Parking Area	150-300
3.	Computer Lab	150-220
4.	Open Space	200-350
5.	Faculty room	300-350

Reference set of values for LUX

Table : 8 Recommended level as per (ASHARE 62-2019) IL-luminance (LUX)

Sl. No	Building	Type of Spaces	IL-luminance (LUX)
1	Places of Assembly	Libraries	500
		Auditorium	100
3	Commercial	Computer room	500
4	Hotels	Lobbies	100
		Reception rooms	300
5	Office	Small office	300
		Conference	500
		Landscaped office	500
6	Restaurants	Cafeterias Area	300
		Kitchens	500
7	College	Classroom	300
		Corridors	100
		Faculty room	300

12. Best Practices followed in the Organization

- Transformer, Generators and UPS are protected properly with fencing and kept awareness boards on „Dangers“ and „Warnings“.
- Most of places, sign board of „Switch ON“ and „Switch OFF“ are kept towards saving energy measures to the stakeholders.
- Electrical wires, switch boxes and stabilizers are properly covered without any damage which will cause any problems to the staff and student members.
- Installed roof top solar power plant.
- Installed automatic switches with sensors.
- HVLS Fans are fitted in the auditorium.
- Water level controllers are used.
- Power factor is maintained near to unity with APFC.
- STP is used for water recycling which is functioning well.

- Replaced old generation computers and TVs with LED monitors.
- Promoting ECON awareness and practice among the stakeholders are being conducted periodical through Association, Clubs, Forums and Chapters.
- Usage energy efficient light-emitting diode (LED) bulbs instead of incandescent and CFL bulbs.
- Maintenance of appliances and replaced old appliances in all laboratories
- Value added / Non-formal / Certificate / Diploma course on „Energy and Environment Management Audits" are being conducted for the benefit of students and research scholars to become a certified Lead Auditor.
- Establishment of a system of carpooling among the staff members and students to reduce the number of four wheelers coming to the College.
- Discouraging the students and research scholars using two wheelers for their commutation in the campus.
- Switching off the lights, fan, air conditioners, equipment and instruments when they are not in use.

Best Practices Followed by the institutions

Walk through audit various Instruments, machines were inspected at Adichunchanagiri Institute of Technology, Karnataka

13. Recommendations for improving the energy efficiency and energy Conservation in the Organization

The energy audit included suggestions for energy cost reduction, preventive maintenance, and quality control activities, all of which are critical for utility operation in the audit sites.

- Procurement of equipment with energy efficiency (4-5 star rated equipment) during replacement may be considered.
- Daylight sensors can be implemented in future.
- Star rated fan can be used in near future.
- DG set Automatic syne can be implemented
- Optimal water usage and temperature settings may be used which are coming under automatic process towards energy savings.
- Continuous monitoring and analysis of energy consumption by dedicated team may be planned within the campus.
- Turn off electrical equipment when not in use
- Use computers and electronic equipment in power saving mode.
- Installation of Biogas plant for hostel kitchen as well canteen.
- Automatic switches with occupancy sensors in common areas
- Inclusion of on campus e-vehicle.
- Monthly use of electricity in the College may be reduced to a greater extent by means of undertaking a periodical energy audit.
- 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 equipment in all laboratories and immediate rectification of any problems.
- Internal energy policy such as preventive maintenance and breakdown maintenance policy should be implemented.
- Separate representative for maintenance to be followed.
- Plan for diesel consumption need to be implemented
- Energy meter in each building to be implemented
- Automotive energy such as solar panel, solar water and wind mill can be implemented to meet 40% of diesel consumption
  IOT based projects such as water sprinkler, Automatic light, A.C turn off, Water flow to be implemented, disposal for E- waste to be implemented.

14. Recommendations on Carbon Footprint in the Organization

- Encourage students and staff members to use bicycles and battery operated vehicles to reduce fuel consumption and carbon emission.
- Establish a more efficient cooking systems like biogas operated machineries to save fossil gas in hostel kitchen and canteen.
- More use of generators, inverters, and UPS every day should be discouraged which could save electrical energy.
- Large number of ventilation and exhaust systems may be placed in auditorium, seminar and conference halls to reduce the carbon dioxide level among the participating students, scholars and staff members.

15. Conclusions

Considering the fact that the organization is a well-established, long time run establishment with good reputation, there is significant scope for conserving energy and make the campus as self-sustained in it. The energy conservation initiatives taken up by the institution are substantial. Energy efficient lighting schemes, awareness created among stakeholders and necessary power backups are being practiced by the institution. There are some best Practices followed on Energy Audit in the Organization like Transformers, Generators and UPS are protected properly with fencing and kept awareness boards on „Dangers‟ and „Warnings‟. It is observed that the most of places, sign board of „Switch ON‟ and „Switch OFF‟ are kept towards saving energy measures to the stakeholders. Electrical wires, switch boxes and stabilizers are properly covered without any damage which will cause any problems to the staff and student members. Few recommendations, in addition, can further improve the energy savings of the Organization. This may lead to the prosperous future in context of Energy Efficiency Campus and thus sustainable environment and community development to the stakeholders in coming years to come.

16. Acknowledgement

Nature Science Foundation, Coimbatore, Tamil Nadu, India is grateful to the Management and Principal of Adichunchanagiri Institute of Technology, Karnataka for providing us necessary facilities and co-operation during the energy audit process. This helped us in making the audit a success. Further, we hope that the best practices on sustainability followed by the Organization and recommendations and suggestions given by the NSF will boost the new generations to take care of the Electrical energy conservation, Energy saving measures and sustainability incompliance with the applicable regulations, policies and standards in the College Campus.

17. References

Asnani, J. and Bhawana, S. 2015. Study of awareness and habits among home makers during purchasing electrical household equipment. *International Journal of Applied Home Science***2** (7&8): 201-206.

Backlund, S. and Thollander, P. 2015. Impact after three years of the Swedish energy audit programme. *Energy*, **82**: 54-60.

Bae, S.H. and Seol, I. 2006. An exploratory empirical investigation of environmental audit programs in S&P 500 companies. *Management Research News* **29** (9): 573-579.

Buckman, A.H., Mayfield, M. and Beck, S.B.M. 2014. What is a smart building?. *Smart Sustainable Built Environment* **3** (2): 92-109.

Cabrera, E., Pardo, M.A., Cobacho, R. and Cabrera, Jr, E. 2010. Energy audit of water networks. *Journal of Water Resources Planning and Management*. **136** (6): 669-677.

Cardozo, N.H., da Silveira Barros, S.R., Quelhas, O.L.G., Filho, E.R.M. and Salles, W. 2019. Benchmarks analysis of the higher education institutions participants of the Green Metric World University Ranking. Springer, Universities and Sustainable Communities: Meeting the Goals of the Agenda 2030, World Sustainability Series. pp. 667-683.

Choy, Er.A. and Karudan, R. 2016. Promoting campus sustainability: A conceptual framework for the assessment of campus sustainability. *Journal of Social Sciences and Humanities* **11** (2): 112-118.

Gnanamangai, B.M., Murugananth, G. and Rajalakshmi, S. 2021. *A Manual on Environment Management Audits to Educational Institutions and Industrial Sectors*. Laser Park Publishing House, Coimbatore, Tamil Nadu, India, p. 203.

Fachrudin, H.T., Fachrudin, K.A. and Utami, W. 2019. Education activities to realize green campus. *Asian Social Science* **15** (8): 18-27.

IGBC, 2021. Indian Green Building Council. https://igbc.in/igbc/

Ingle, A., Moezzi, M., Lutzenhiser, L. and Diamond, R. 2014. Better home energy audit modelling: incorporating inhabitant behaviours. *Building Research &Information***42** (4): 409-421.

Lauder, A., Sari, R.F., Suwartha, N. and Tjahjono, G. 2015. Critical review of a global campus sustainability ranking: Green Metric. *Journal of Cleaner Production* **108**: 852–863.

Leon-Fernandez, Y. and Dominguez-Vilches, E. 2015. Environmental management and sustainability in higher education: The case of Spanish Universities. *International Journal of Sustainability in Higher Education* **16**: 440-455.

Mishraand, U. and Patel, S. 2016. Awareness regarding energy efficiency star labelling on household appliances amongst the consumers of Vadodara city. *International Journal of Applied Home Science***3** (9&10): 330-338

Padmini, E. 2007. *Biocharacterization Calculations and Biostatistics*. Books and Allied (P) Ltd, Kolkata, India.

Peters, G.F. and Romi, A.M. 2014. Does the voluntary adoption of corporate governance mechanisms environmental risk disclosures? Evidence from greenhouse gas emission. *Journal of Business Ethics* **125** (4): 637-666.

Pramanik A.K. 2013. *Environmental Audit and Indian Scenario, Environmental Accounting and Reporting*. Deep and Deep Publications, New Delhi, India. p.312.

Rajalakshmi, S., Kavitha, G. and Vinoth kumar, D. 2021. *Energy and Environment Management Audits*. AkiNik Publishing, New Delhi. 217p.

Shriberg, M. 2002. Institutional assessment tools for sustainability in higher education: strengths, weaknesses, and implications for practice and theory. *International Journal of Sustainability in Higher Education* **3** (3): 254-270.

Singh, M., Singh, G. and Singh, H. 2012. Energy Audit: A case study to reduce lighting cost.*Asian Journal of Computer Science and Information Technology***2** (5): 119-122.

WGBC, 2021. World Green Building Council. https://www.worldgbc.org.

Certificates of

Nature Science Foundation,

Coimbatore, Tamil Nadu.

1.ISO Certificate (QMS 9001:2015)
2.ISO Certificate (EMS 14001:2015)
3.ISO Certificate (OHSMS 45001:2018)
4.ISO Certificate (EnMS 50001:2018)
5.MSME Certificate
6.NGO Darpan NITI Aayog
7.12A Certificate
8.80G Certificate
9.10AC Certificate

QUALITY MANAGEMENT SYSTEM

Certificate of Registration

ROHS

This is to Certify That The Quality Management System of

Nature Science Foundation NSF PROTECT NATURE

NATURE SCIENCE FOUNDATION

LIG II, GANDHIMAA NAGAR, PEELAMEDU, COIMBATORE - 641004, TAMILNADU, INDIA.

has been assessed and found to conform to the requirements of

ISO 9001:2015

for the following scope :

PROVIDING ENVIRONMENT, ENERGY, GREEN AND HYGIENE AUDITS
TO ACADEMIC INSTITUTIONS AND ORGANISATIONS
AS PER THE OWN CHECKLIST AND AWARDS TO
MERITORIOUS CANDIDATES.

Certificate No	**20DQHY90**		
Initial Registration Date	: 08/01/2021	Issuance Date	: 08/01/2021
Date of Expiry*	: 07/01/2024		
1st Surve. Due	: 08/12/2021	2nd Surve. Due	: 08/12/2022

MEMBER OF MULTILATERAL RECOGNITION ARRANGEMENT IAF

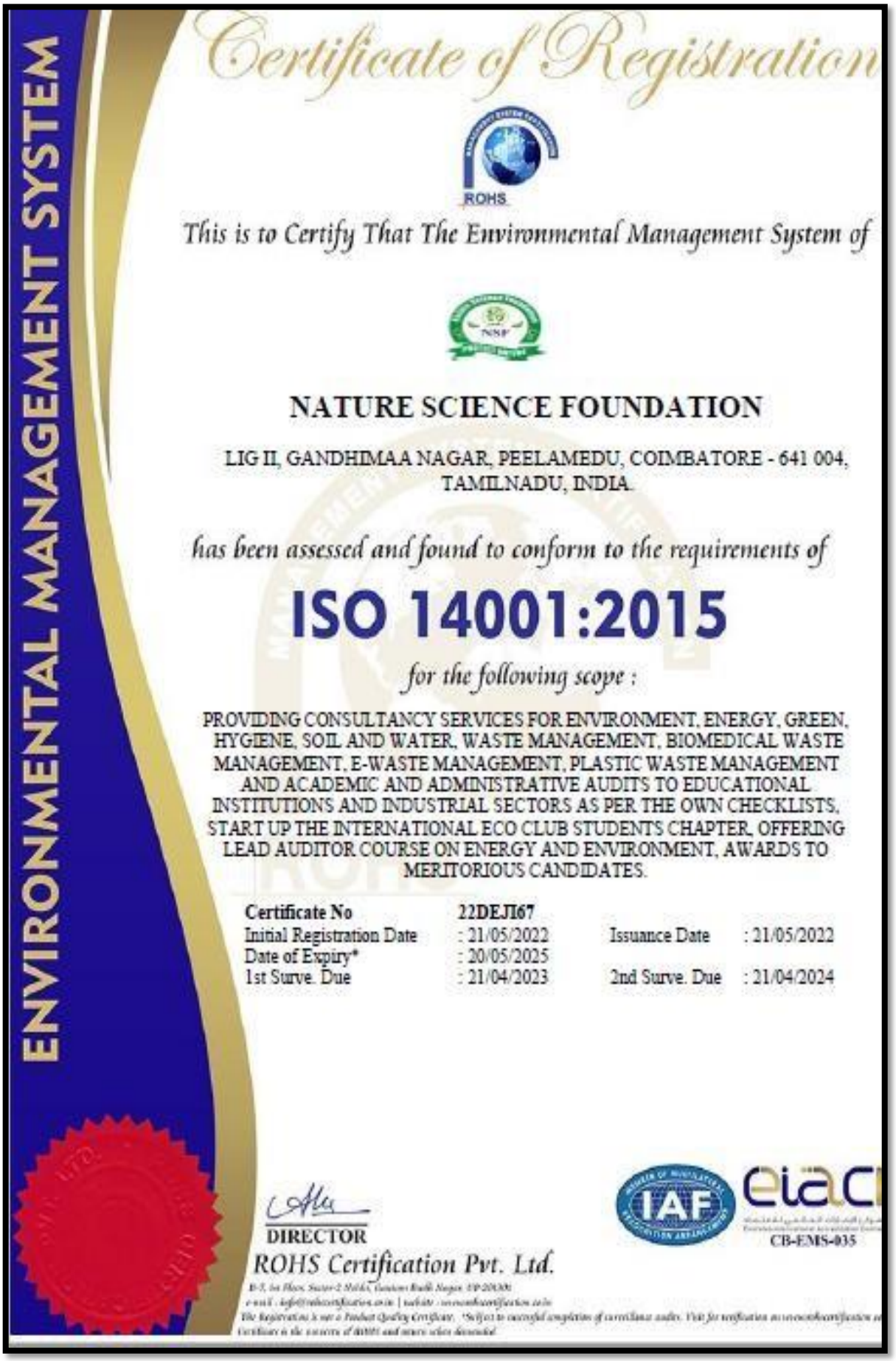
eiaCI مركز الإمارات العالمي للاعتماد Emirates International Accreditation Centre

035-CB-QMS

DIRECTOR

ROHS Certification Pvt. Ltd.

408, Madhuban Building, 55, Nehru Place, New Delhi - 110 019, India
phone : +91.11.41525522 | e-mail : info@rohscertification.co.in | website : www.rohscertification.co.in
*The Registration is not a Product Quality Certificate. *Subject to successful completion of surveillance audits, Visit for verification on www.rohscertification.co.in*
Certificate is the property of ROHS and return when demanded



ENVIRONMENTAL MANAGEMENT SYSTEM

Certificate of Registration

ROHS

This is to Certify That The Environmental Management System of

NSF

NATURE SCIENCE FOUNDATION

LIG II, GANDHIMAA NAGAR, PEELAMEDU, COIMBATORE - 641 004, TAMILNADU, INDIA.

has been assessed and found to conform to the requirements of

ISO 14001:2015

for the following scope :

PROVIDING CONSULTANCY SERVICES FOR ENVIRONMENT, ENERGY, GREEN, HYGIENE, SOIL AND WATER, WASTE MANAGEMENT, BIOMEDICAL WASTE MANAGEMENT, E-WASTE MANAGEMENT, PLASTIC WASTE MANAGEMENT AND ACADEMIC AND ADMINISTRATIVE AUDITS TO EDUCATIONAL INSTITUTIONS AND INDUSTRIAL SECTORS AS PER THE OWN CHECKLISTS, START UP THE INTERNATIONAL ECO CLUB STUDENTS CHAPTER, OFFERING LEAD AUDITOR COURSE ON ENERGY AND ENVIRONMENT, AWARDS TO MERITORIOUS CANDIDATES.

Certificate No	**22DEJI67**		
Initial Registration Date	: 21/05/2022	Issuance Date	: 21/05/2022
Date of Expiry*	: 20/05/2025		
1st Surve. Due	: 21/04/2023	2nd Surve. Due	: 21/04/2024

DIRECTOR

ROHS Certification Pvt. Ltd.

IAF

eiaC

CB-EMS-035

QCS MANAGEMENT PVT. LTD.

MANAGEMENT SYSTEMS CERTIFICATION

Certificate of Registration

ISO 45001:2018 (Occupational Health & Safety Management System)

NATURE SCIENCE FOUNDATION

ADDRESS: NO. 2669, LIG-II, GANDHI MANAGAR PEELAMEDU COIMBATORE - 641 004 TAMIL NADU, INDIA.

Scope of Certification:

PROVIDING TRAINING AND AUDITING SERVICES IN THE FIELD OF GREEN CAMPUS, ENVIRONMENT, ENERGY, OCCUPATIONAL HEALTH AND SAFETY, HYGIENE AND WASTE MANAGEMENT AT EDUCATIONAL INSTITUTES AND INDUSTRIAL SECTOR.

Certificate Number : QCS/EUAS/OHS/002

Issue Date	: 03/08/2022	1ST Surveillance Audit Within	: 02/07/2023
Expiration Date	: 02/08/2023	2nd Surveillance Audit Within	: 02/07/2024
		Re-certification Due Date	: 02/08/2025

Partha Bagchi
(Managing Director)

Validity of this Certificate is subject to Surveillance Audits to be conducted before scheduled due dates of surveillance audits as mentioned on the certificate, failing which the certificate will stand to be withdrawn and need to be treated as an initial certification process to reactivate its continuity on the register of EUAS and QCS . This Certificate is valid when confirmed by data listed on the (Euro Universal Accreditation Systems) EUAS" www.euas-ac.org. The authenticity & validity of this certificate may be re-affirmed by referring to our company website - www.qcspl.com . Lack of fulfillment of conditions as set out on the 'Certification Contract' (Annex 13) may render this certificate invalid. Any alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of law. This certificate remains the property of QCS and to be returned on request.

REGISTERED OFFICE: 37E/1(310) 2ND STREET, MODERN PARK, GREENAGE APARTMENT - 2ND FLOOR, SANTOSHPUR, KOLKATA - 700075, WEST BENGAL, INDIA.
Email: info@qcspl.com. Call: +91 8697724963,+91 8902447427. Website: www.qcspl.com

QRO
QUALITY RESEARCH ORGANIZATION

Certificate of Registration

This is to certify that

NATURE SCIENCE FOUNDATION

LIG II, GANDHIMAA NAGAR, PEELAMEDU, COIMBATORE - 641 004, TAMILNADU, INDIA.

has been independently assessed by QRO
and is compliant with the requirement of:

ISO 50001:2018

Energy Management Systems

For the following scope of activities:

PROVIDING CONSULTANCY SERVICES FOR ENVIRONMENT, ENERGY, GREEN, HYGIENE, SOIL AND WATER, WASTE MANAGEMENT, BIOMEDICAL WASTE MANAGEMENT, E-WASTE MANAGEMENT, PLASTIC WASTE MANAGEMENT AND ACADEMIC AND ADMINISTRATIVE AUDITS TO EDUCATIONAL INSTITUTIONS AND INDUSTRIAL SECTORS AS PER THE OWN CHECKLISTS, START UP THE INTERNATIONAL ECO CLUB STUDENTS CHAPTER, OFFERING LEAD AUDITOR COURSE ON ENERGY AND ENVIRONMENT, AWARDS TO MERITORIOUS CANDIDATES.

Date of Certification: 9th August 2022
1st Surveillance Audit Due: 8th August 2023
2nd Surveillance Audit Due: 8th August 2024
Certificate Expiry: 8th August 2025

Certificate Number: 305022080903EN

QRO QUALITY RESEARCH ORGANIZATION
EGAC CAB # 119005
MEMBER OF MULTILATERAL RECOGNITION ARRANGEMENT IAF

Head of Certification

Validity of this certificate is subject to annual surveillance audits to be done successfully on or before 365 days from date of the audit.
(In case surveillance audit is not allowed to be conducted; this certificate shall be suspended / withdrawn).
The Validity of this certificate can be verified at www.qrocert.org
This certificate of registration remains the property of QRO Certification LLP, and shall be returned immediately upon request.

India Office : QRO Certification LLP
142, IInd Floor, Avtar Enclave, Near Paschim Vihar West Metro Station, Delhi-110063, (INDIA)
Website : www.qrocert.org, E-mail : info@qrocert.org

भारत सरकार
Government of India
सूक्ष्म, लघु एवं मध्यम उद्यम मंत्रालय
Ministry of Micro, Small and Medium Enterprises

UDYAM
REGISTRATION CERTIFICATE

UDYAM REGISTRATION NUMBER	UDYAM-TN-03-0073706
NAME OF ENTERPRISE	M/S NATURE SCIENCE FOUNDATION
TYPE OF ENTERPRISE *	MICRO
MAJOR ACTIVITY	SERVICES
SOCIAL CATEGORY OF ENTREPRENEUR	GENERAL

NAME OF UNIT(S)

S.No.	Name of Unit(s)
1	Green Campus, Energy and Environment Management Audits

OFFICAL ADDRESS OF ENTERPRISE

Flat/Door/Block No.	LIG-II,2669	Name of Premises/ Building	GANDHIMAA NAGAR
Village/Town	Gandhimaanagar S.O	Block	LIG-II
Road/Street/Lane	Peelamedu	City	Coimbatore South
State	TAMIL NADU	District	COIMBATORE , Pin 641004
Mobile	9566777255	Email:	chairmannsf@gmail.com

DATE OF INCORPORATION / REGISTRATION OF ENTERPRISE	28/11/2017
DATE OF COMMENCEMENT OF PRODUCTION/BUSINESS	12/03/2020

NATIONAL INDUSTRY CLASSIFICATION CODE(S)

SNo.	NIC 2 Digit	NIC 4 Digit	NIC 5 Digit	Activity
1	69 - Legal and accounting activities	6920 - Accounting, bookkeeping and auditing activities; tax consultancy	69201 - Accounting, bookkeeping and auditing activities	Services
2	85 - Education	8542 - Cultural education	85420 - Cultural education	Services
3	85 - Education	8549 - Other education n.e.c.	85499 - Other educational services n.e.c.	Services

DATE OF UDYAM REGISTRATION	26/02/2022

* In case of graduation (upward/reverse) of status of an enterprise, the benefit of the Government Schemes will be availed as per the provisions of Notification No. S.O. 2119(E) dated 26.06.2020 issued by the M/o MSME.

Disclaimer: This is computer generated statement, no signature required. Printed from https://udyamregistration.gov.in & Date of printing - 26/02/2022

For any assistance, you may contact:

1. District Industries Centre: COIMBATORE (TAMIL NADU)

2. MSME-DI: CHENNAI (TAMIL NADU)

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BE A CHAMPION with the Ministry of MSME

Please Update Your Profile

Welcome, Nature Science Foundation

Your Unique Id: TN/2018/0187711

PROCEEDINGS OF THE COMMISSIONER OF INCOMETAX (EXEMPTIONS),
III FLOOR, ANNEXE BLDG, NO.121, MAHATMA GANDHI SALAI, CHENNAI-34

Present : G.M.DOSS, I.R.S
Commissioner of Income Tax (Exemptions)

** URNo. AACTN7857J/05/18-19/T-1105 Dated:03/09/2018

Sub: Registration u/s. 12AA of the Income tax Act 1961 - in the case of

"Nature Science Foundation"
LIG-II, 2669, Gandhimaa Nagar, Peelamedu, Coimbatore – 641 004.

Ref : Application in form 10 A filed on 28/03/2018

ORDER UNDER SECTION 12AA OF THE INCOME TAX ACT 1961.

1. The above **Trust/Society/Association/ Company/ others/,** bearing **PAN AACTN7857J** was constituted by **Trust Deed / Memorandum of Association** dated **29/11/2017** registered with **Sub-Registrar's Office/ Registrar of Societies**/Registrar of Companies/others on **29/11/2017.**

2. ~~The Trust Deed / Memorandum of Association has subsequently been amended / modified / altered by a Codicil / Supplementary Deed / Amendment Deed / Alteration to Memorandum of Association/others dated XX/XX duly registered on XX/XX.~~

3. The above **TRUST** filed an application seeking Registration u/s 12 AA of the Income tax Act, 1961.

4. On going through the objects of the **TRUST** and its proposed activities as enumerated in the **Trust Deed / Memorandum of Association,** I am satisfied about the genuineness of the **TRUST** as on date.

5. The application has been entered at **Sl.No.1105** maintained in this office. The above **Trust** is accordingly registered as a **PUBLIC CHARITABLE TRUST** u/s 12 AA of the Income Tax Act, 1961 with effect from **29/11/2017**.

6. It is hereby clarified that the Registration so given to the **Trust/Institution** is not absolute. Subsequently, if it is found that the activities of the **Trust/Institution** are not genuine or are not being carried out in accordance with the objects and clauses of the **Trust Deed / Memorandum of Association** submitted at the time of registration or modified with the approval of the **Commissioner of Income-tax (Exemptions), Chennai** or there is a violation of the provisions of Section – 13, **the** Registration so granted shall be cancelled as provided u/s 12 AA (3) or 12AA(4) of the Income Tax Act. Further, this approval is also subject to the **Trust/Society/Association/Company/ Others/** complying to the provisions of the proviso to sec 2(15) of the Income Tax Act 1961.

7. **Granting of Registration u/s 12AA** does not confer any automatic exemption of income from taxation. The **Trust/Institution** should conform to the parameters laid down in Sections 11, 12, 13 and 115 BBC of the I.T. Act, 1961, to claim exemption of its income on year to year basis before the Assessing Officer.

** This Unique Registration No. URNo. **AACTN7857J/05/18-19/T-1105** Should be mentioned in all your future correspondence.

Sd/-
(G.M.DOSS, I.R.S)
Commissioner of Income-tax(Exemptions), Chennai.

Copy to:
1. The Assessee.
2. The ACIT(Exemptions), Coimbatore Circle.
3. Office Copy.

//CERTIFIED TRUE COPY//

(N SRINIVASA RAO)
Asst. Commissioner of Income-tax (H.Qrs)(Exemptions),
Chennai.

F.2984

GOVERNMENT OF INDIA
INCOMETAX DEPARTMENT
OFFICE OF THE COMMISSIONER OF INCOME TAX (EXEMPTIONS)
Aayakar Bhawan, Annexe III Floor, 121 M.G. Road, Chennai 600 034

URNo. AACTN7857J/05/18-19/T-1105/80G   Date: 10.04.2019

Name of the Trust-/Society /Company/Institution	:	**NATURE SCIENCE FOUNDATION**
Address	:	**LIG II 2669, GANDHIMAA NAGAR, PEELAMEDU, COIMBATORE - 641 004**
PAN	:	**AACTN7857J**
Date of Application	:	**12.11.2018**

APPROVAL UNDER SECTION 80G(5)(vi) OF THE INCOME TAX ACT, 1961

The aforesaid Trust-/~~Society/Company/Institution~~ has been registered u/s.12AA of the Income Tax Act with effect from **29.11.2017** vide **AACTN7857J/05/18-19/T-1105** dated **03.09.2018.** It is certified that donation made to **NATURE SCIENCE FOUNDATION** at **LIG II 2669, GANDHIMAA NAGAR, PEELAMEDU,COIMBATORE - 641 004** shall qualify for deduction u/s 80G(5)(vi) of the Income Tax Act, 1961, subject to the fulfillment of conditions laid down in clauses [i] to [v] of sub-section (5) of section 80G of the I.T Act, 1961.

2. This approval shall be valid in perpetuity with effect from **A.Y. 2019-20** unless specifically withdrawn. **The details and validity of the certificate is available @ office.incometaxindia.gov.in**

3. The Return of Income along with the Income & Expenditure Account, Receipts and Payments Account and Balance Sheet should be submitted annually **to** the Assessing Officer having jurisdiction over the case.

4. No change in the Trust Deed/~~Memorandum of Association~~ shall be effected without the prior approval of the undersigned i.e. **Commissioner of Income Tax (Exemptions), Chennai**.

5. Every receipt issued to a donor shall bear the **Unique Registration Number** i.e. **URNo. AACTN7857J/05/18-19/T-1105/80G** and date of this order i.e. **10.04.2019.**

6. Under the provisions of section 80G(5)(i)(a), the institution/fund registered u/s.12A, u/s.12AA(1)(b) or approved u/s.10(23C), 10(23C)(vi)(via), etc., shall have to maintain separate books of accounts in respect of any business activity carried on and shall intimate this office within one month about commencement of such activity.

Sd/-
(G.M.DOSS, I.R.S)
Commissioner of Income Tax (Exemptions)
Chennai.

Copy to:
1. The applicant
2. Guard File
3. The DCIT(Exemptions) Coimbatore Circle.

//Certified True Copy//

(N. SRINIVASA RAO)
Assistant Commissioner of Income-tax (H.qrs)
(Exemptions), Chennai.

FORM NO. 10AC

(See rule 17A/11AA/2C)

Order for registration

1	PAN	AACTN7857J
2	Name	NATURE SCIENCE FOUNDATION
2a	Address	
	Flat/Door/Building	LIG-II, 2669
	Name of premises/Building/Village	GANDHIMAA NAGAR
	Road/Street/Post Office	Coimbatore South
	Area/Locality	COIMBATORE
	Town/City/District	Gandhimaanagar S.O
	State	Tamil Nadu
	Country	INDIA
	Pin Code/Zip Code	641004
3	Document Identification Number	AACTN7857JE2021501
4	Application Number	739995830271021
5	Unique Registration Number	AACTN7857JE20215
6	Section/sub-section/clause/sub-clause/proviso in which registration is being granted	01-Sub clause (i) of clause (ac) of sub -section (1) of section 12A
7	Date of registration	03-11-2021
8	Assessment year or years for which the trust or institution is registered	From AY 2022-23 to AY 2026-2027
9	Order for registration:	
	a. After considering the application of the applicant and the material available on record, the applicant is hereby granted registration with effect from the assessment year mentioned at serial no 8 above subject to the conditions mentioned in row number 10.	
	b. The taxability, or otherwise, of the income of the applicant would be separately considered as per the provisions of the Income Tax Act, 1961.	
	c. This order is liable to be withdrawn by the prescribed authority if it is subsequently found that the activities of the applicant are not genuine or if they are not carried out in accordance with all or any of the conditions subject to which it is granted, if it is found that the applicant has obtained the registration by fraud or misrepresentation of facts or it is found that the assessee has violated any condition prescribed in the Income Tax Act, 1961.	
10	Conditions subject to which registration is being granted	
	The registration is granted subject to the following conditions:-	

	o. This certificate cannot be used as a basis for claiming non-deduction of tax at source in respect of investments etc. relating to the Trust/ Institution.	
	p. All the Public Money so received including for Corpus or any contribution shall be routed through a Bank Account whose number shall be communicated to Office of the Jurisdictional Commissioner of Income Tax.	
	q. The applicant shall comply with the provisions of the Income Tax Act, 1961 read with the Income Tax Rules, 1962.	
	r. The registration and the Unique registration number has been instantly granted and if, at any point of time, it is noticed that form for registration has not been duly filled in by not providing, fully or partly, or by providing false or incorrect information or documents required to be provided under sub-rule (1) or (2) of rule 17A or by not complying with the requirements of sub- rule (3) or (4) of the said rule, the registration and Unique Registration Number (URN), shall be cancelled and the registration and URN shall be deemed to have never been granted or issued.	
	Name and Designation of the Registration Granting Authority	Principal Commissioner of Income Tax/ Commissioner of Income Tax (Digitally signed)

Digitally Signed by SIBICHEN K MATHEW
Date: 2021.11.03 15:52:36 IST

INCOME TAX DEPARTMENT

Certificates of Energy Auditors

1. ISO Environment Management System (14001:2015) of Mrs. S. Rajalakshmi, Founder & Chairman of NSF.

2. Indian Green Building Council (IGBC AP) Accredited Professional of Dr. B. Mythili Gnanamangai, Vice-Chairman of NSF.

3. Associated Chambers of Commerce and Industry of India (ASSOCHAM), of Dr. B. Mythili Gnanamangai, and Er. Ashutosh Kumar Srivastava, Board of Directors (North Zone) of NSF.

4. Bureau of Energy Efficiency (BEE), LEED AP and GRIHA Certificates of Er. D. Dinesh kumar, Energy Auditor of NSF.

5. ISO Energy Management System (50001:2018) of Dr. D. Vinothkumar, Joint Director of NSF

Exemplar Global

Certificate of Training

TNV hereby certifies that

S. Rajalakshmi

has successfully completed the 5 days

Auditor / Lead Auditor Training Course which meets the training requirements of the Exemplar Global and has been declared as competent in the following competency units

- EM: Environmental Management System
- AU: Management Systems Auditing
- TL: Leading Management Systems Audit Teams

ISO 14001:2015

Issue Date: 17th Jun. 2021
Training Date : 20th to 24th May. 2021
Certificate Number : 2106170721010105

Authorised Signatory
(Pragyesh Singh)

This course is certified by Exemplar Global vide registration number TN006

Note: The course conforms to the principles and practice ... Systems for compliance with standards. This certificate ... this certificate is recognized by Exemplar Global ... ate, please write to Mail: info@isoindia...

IGBC

Confederation of Indian Industry

The Indian Green Building Council

hereby certifies that

B Mythili Gnanamangai

has successfully demonstrated knowledge on the Green Building Design & Construction, Building Standards & Codes, IGBC Resources & Processes and Green Design Strategies & their Impacts, required to be awarded the title of

IGBC Accredited Professional

K S Venkatagiri
Executive Director
CII-Godrej GBC

V Suresh
Chairmar
Indian Green Building Council

Gurmit Singh Arora
Vice-Chairman
Indian Green Building Council

210122

17 April 2021

ASSOCHAM

GEM Certificate

ASSOCHAM hereby certifies that

Dr. B. Mythili Gnanamangai

has successfully passed the

Green and Eco-friendly Movement Certified Professional Test (GEM CP)

with

"Excellent Performance"

on

16 July, 2021

He/she is now eligible to execute the GEM Sustainability Certification Projects.
ASSOCHAM feels proud to award the GEM Certified Professional title to him/her.

Pankaj R. Dharkar
Chairman, GEM

GEM CP 20/649

Deepak Sood
Secretary General, ASSOCHAM

CII
Confederation of Indian Industry

GreenCo

CERTIFICATE

This is to Certify that

A K Srivastava

Is a **"CII-Certified Facilitator on GreenCo Rating System"**,
upon successful completion of
"3rd Edition of Facilitator Development Workshop on GreenCo Rating System"
during 27 - 29 October 2021.

L S Ganapati
CHAIRMAN
CII GREENCO ASSESSOR PANEL

K S Venkatagiri
EXECUTIVE DIRECTOR
CII GODREJ GBC

Certificate No: CII/GCRF/002/2021; Issued date : 5 Nov 2021; Valid till: 5 Nov 2024

ASSOCHAM

GEM Certificate

ASSOCHAM hereby certifies that

Mr. Ashutosh Kumar Srivastava

has successfully passed the
Green and Eco-friendly Movement Certified Professional Test (GEM CP)
with
"Good Performance"
on
03 September, 2021

He/she is now eligible to execute the GEM Sustainability Certification Projects.
ASSOCHAM feels proud to award the GEM Certified Professional title to him/her.

Pankaj R. Dharkar
Chairman, GEM

GEM CP 35/648

Deepak Sood
Secretary General, ASSOCHAM

BUREAU OF ENERGY EFFICIENCY

Examination Registration No. : EA-14056 Serial Number. 9176

Certificate Registration No. : 9176

Certificate For Certified Energy Manager

This is to certify that Mr./Mrs./Ms. Dinesh Kumar D Son/Daughter of Mr./Mrs. R M Dhanasekaran who has passed the National Examination for certification of energy manager held in the month of October 2011 is qualified as certified energy manager subject to the provisions of Bureau of Energy Efficiency (Certification Procedures for Energy Managers) Regulations, 2010.

This certificate shall be valid for five years with effect from the date of award of this certificate and shall be renewable subject to attending the prescribed refresher training course once in every five years.

His /Her name has been entered in the Register of certified energy manager at Serial Number 9176 being maintained by the Bureau of Energy Efficiency under the aforesaid regulations.

Mr./Mrs./Ms. Dinesh Kumar D is deemed to have qualified for appointment or designation as energy manager under clause (/) of Section 14 of the Energy Conservation Act, 2001 (Act No.52 of 2001).

Given under the seal of the Bureau of Energy Efficiency, this 7th day of February, 2013

Digitally Signed: RAKESH KUMAR RAI
Sun Mar 01 10:58:55 IST 2020
Secretary, BEE New Delhi

Secretary
Bureau of Energy Efficiency
New Delhi

Dates of attending the refresher course	Secretary's Signature	Dates of attending the refresher course	Secretary's Signature
22.12.2019			

GRIHA

GREEN RATING FOR INTEGRATED HABITAT ASSESSMENT

GRIHA CERTIFIED PROFESSIONAL CERTIFICATE

This is to certify that

Dinesh Kumar Dhanasekaran

has qualified as a **GRIHA** Certified Professional For V. 2015

Date of issue: 19th June 2020

Note : This certification is valid only for GRIHA version 2015.

Chief Executive Officer
GRIHA Council

LEED AP BD+C

GREEN BUSINESS CERTIFICATION INC. CERTIFIES THAT

DINESH KUMAR D

HAS ATTAINED THE DESIGNATION OF

LEED AP® Building Design + Construction

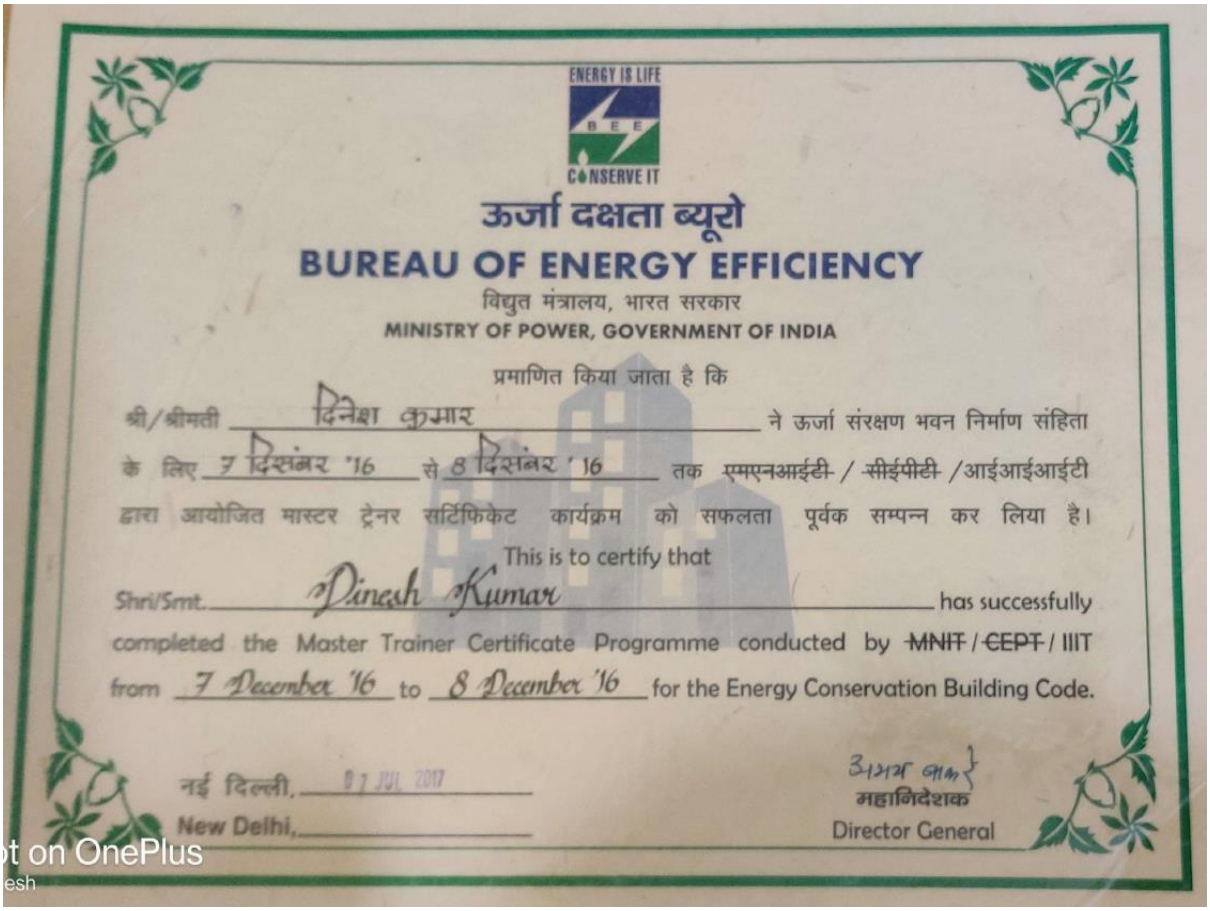
by demonstrating the knowledge and understanding of green building practices and principles needed to support the use of the LEED® green building program.

10531234-AP-BD+C
CREDENTIAL ID

26 DEC 2016
ISSUED

25 DEC 2022
VALID THROUGH

MAHESH RAMANUJAM
PRESIDENT & CEO, U.S. GREEN BUILDING COUNCIL
PRESIDENT & CEO, GREEN BUSINESS CERTIFICATION INC.



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BUREAU OF ENERGY EFFICIENCY

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MINISTRY OF POWER, GOVERNMENT OF INDIA

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श्री/श्रीमती दिनेश कुमार ने ऊर्जा संरक्षण भवन निर्माण संहिता के लिए 7 दिसंबर '16 से 8 दिसंबर '16 तक ~~एमएनआईटी~~ / ~~सीईपीटी~~ /आईआईआईटी द्वारा आयोजित मास्टर ट्रेनर सर्टिफिकेट कार्यक्रम को सफलता पूर्वक सम्पन्न कर लिया है।

This is to certify that

Shri/Smt. Dinesh Kumar has successfully completed the Master Trainer Certificate Programme conducted by ~~MNIT~~ / ~~CEPT~~ / IIIT from 7 December '16 to 8 December '16 for the Energy Conservation Building Code.

नई दिल्ली, 07 JUL 2017
New Delhi,

महानिदेशक
Director General

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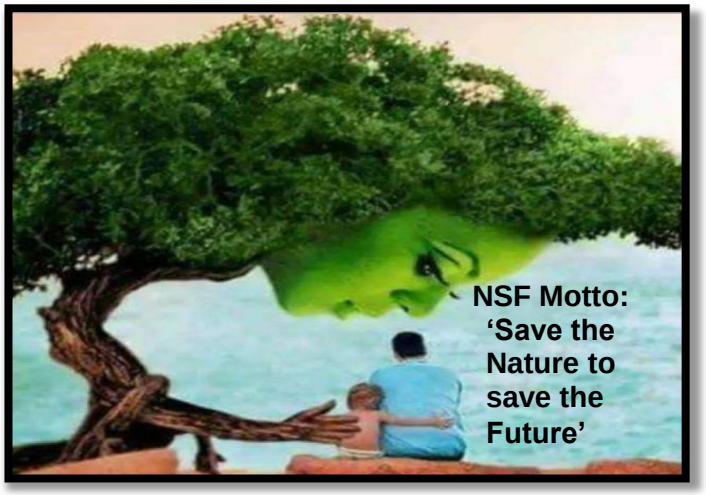
TECHNICAL REPORT OF GREEN CAMPUS AUDIT



Submitted to

ADICHUNCHANAGIRI INSTITUTE OF TECHNOLOGY, CHIKKAMAGALURU – 577 102, KARNATAKA.

Date of Audit: 22.06.2022

Submitted by

NATURE SCIENCE FOUNDATION

(A Unique Research and Development Centre for Society Improvement)

[ISO QMS (9001:2015), EMS (14001:2015), OHSMS (45001:2018) & EnMS (50001:2018) Certified and Ministry of MSME Registered Organization]

2669, LIG-II, Gandhi Managar, Peelamedu

Coimbatore - 641 004, Tamil Nadu, India.

Phone: 0422 2510006, Mobile: 9566777255, 9566777258Email: director@nsfonline.org.in, directornsf@gmail.com

Contents

1. Introduction

Green campus is an area of the Organisation or the Organisation as a whole itself contributing to have an infrastructure or development that is structured/planned to incur less energy, less water, less or no CO_2 emission and less or pollution free environment (Aparajita, 1995). Green Campus Audit is a tool to evaluate environment management system which is systematically executed to protect and preserve the environment. Green campus audit constitutes the environmental friendly practices and education combined to promote sustenance of green environment adopting user-friendly technology within the campus. It creates awareness on environmental ethics, resolves environmental issues and offers solutions to various social and economic needs (APHA, 2017). It strengthen the concept of "Green building" and "Oxygenated building" which in turn provides a healthy atmosphere to the stakeholders.

Green Campus Audit ensures the Organization's campus should be greenish with large diversity of trees, herbs, shrubs, climbers and lawns to reduce the environmental pollution and soil erosion; it is also useful in relation to biodiversity conservation, landscape management, irrigation/economic water utilisation and maintenance of natural topography and vegetation (Gowri and Harikrishnan, 2014, Aruninta *et al*., 2017). The maintenance of an eco-friendly campus ensures a neat and clean environment. For the benefit of stakeholders, solid waste management, recycling of water, disposal of sewage and waste materials (electronic and biomedical wastes), 'zero' use of plastics, etc. should be followed consistently in the organization campus.

Green Campus Audit procedures includes the definition of green audit, methodology on how to conduct Green audit at Educational Institutions and Industrial sectors as per the checklist of Environment Management Systems and International Standards on ISO 14001:2015, Indian Green Building Council, Swachh Bharath Scheme under Clean India Mission to understand the principles and importance of various audits in the context of the organization and risk assessment at 360˚ views. Green campus audit helps the educational institutions/ industries to maintain eco-friendly environment, assures personal hygiene to various stakeholders and supports the nation; on the whole for the noble cause of environmental protection and nature conservation which in turn enhances the quality of life of all living beings (Arora, 2017).

2. Role of Educational Institutions in India

Educational institutions are playing important role in a nation's growth and development which starts from maintenance of green campus without harming the environment. A clean and healthy environment in an Organization determine effective learning skills and offers a conducive learning environment to the students. Educational institutions are insisted by both Central and State Governments to offer eco-friendly atmosphere to the stakeholders. In addition, all the Educational institutions are asked to save the environment for future generations and to resolve the environmental problems (accumulating solid wastes and wastewaters/effluents and their careless disposal, enormous utility of plastics, uneconomical consumption of water, irresponsible in water harvesting and storage procedures, etc.) through Environmental Education. Implementing Swachh Bharath Abhiyan Scheme launched by the Indian Government thro' the Educational institutions plays a major role in terms of giving neat and clean

environment to tribal, rural and urban people across the country, besides the regular and conventional activities carried out by NSS, NCC/Student Force, Nature club, Eco club, Science club, Fine Arts club, Flora and Fauna club, Youth Red cross unit, etc. Seminar, Conference, Workshop, training and awareness programmes on Biodiversity conservation education, environmental awareness programmes, etc. may be conducted periodically by the Management and Administrative people of an Organization to the stakeholders.

Green campus auditing is a systematic method whereby an organization's environmental performance is checked against its environmental strategies and compliances of the Government guidelines. This audit process is definitely useful for the Educational institutions to maintain the campus neatly and can give pure atmosphere to the students and staff members including Management people. It is like an official examination of the environmental effects on an organization's campus as per the Government guidelines. The audit report may be useful to improve the organization's campus significantly by following the recommendations and suggestions given in the report. The green campus audit processes are being undertaken by World / Indian Green Building Council (IGBC), Green Building Code and Green Ratings Systems (GBCRS), Green Rating for Integrated Habitat Assessment (GRIHA), Conideration of Indian Industry GreenCo Rating System (CII-GreenCo) and Associated Chambers of Commerce and Industry of India (ASSOCHAM) along with ISO EMS 14001:2015 criteria and the concept of Swachh Bharath Abhiyan under Clean India Mission

3. Green Campus and Environment Policy

Green campus and environment policy aims to provide an education and awareness in a clean and green environment to the stakeholders with regard to environmental compliance. Scope of the policy applies to all employees and students of the Institution/organisation to provide an ecofriendly atmosphere. Green Campus Policy dealt with cleanliness of the campus maintained through proper disposal of wastes and steps to be followed to recycle the biodegradable wastes and utilization of eco-friendly supplies to maintain the campus free from hazardous wastes/pollutants. The concept of eco-friendly culture is disseminated among the students as well as rural community through various awareness programmes. Attempts are made to minimise the energy usage and substitute the non-renewable energy sources with renewable energy sources. Head of the Organization, Departmental Heads and Senior Managers/ Management Representatives are responsible for monitoring the "Go Green" initiatives of the College/University and maintain a clean/green campus while each and every individual of the organisation should adhere to the policy.

4. Environment Friendly Campus

As stated earlier, Organization is liable to provide an eco-friendly atmosphere along with good drinking water facility to all the stakeholders (students and staff members). Manuring the cultivated plants/grown within the campus may applied with organic manure, cow dung, farmyard manure and vermicompost instead of using chemical fertilizers. All non-compostable and single-use disposable plastic items, plastic utensils, plastic straws and stirrers should be avoided. Demonstration/awareness programme on establishing plastic-free environment and utility of oganic alternatives for all incoming and current students, staff and faculty should be organised. Reduction

of use of papers alternated with e-services, e-circulars, etc. and proper disposal of wastes, recycling and suitable waste management system should be considered to establish environment friendly campus.

5. Aims and Objectives of Green Campus Audit

- To recognise the initiatives taken towards establishing the green campus in terms of gardening.
- To grow a large number of oxygens releasing and carbon dioxide assimilatingplants in the campus to give a pure atmosphere to the stakeholders.
- To identify and provide baseline information to assess threat and risk to the ecosystem due to Organization development.
- To recognise and resolve different environmental threats of the Organization.
- To ensure proper utilization of resources available in the surrounding areas towards future prosperity of the humanity.
- To fix a couple of norms for disposal of all varieties of wastes and use green cover as a carbon sink for pollution free air.
- To assess the greenish nature of an Organization campus in terms of trees, herbs, shrubs, climbers, twins, lianas, lawns and reflected in reducing the environmental pollution soil erosion, biodiversity conservation, landscape management, natural topography and vegetation.

6. Importance of Green Auditing

The Management of the Organization (Auditee) should be exposed their inherent commitment towards making ecofriendly atmosphere through the green auditing and ready to encourage/follow all types of green activities. They should promote all kinds of green activities such as conduct of environment awareness programmes, in-campus farming, planting trees and maintenance of greening, irrigation, use of biofertilizers and avoidance of chemical fertilizers and agrochemicals, etc., prior to and after the green campus auditing (Suwartha and Sari, 2013). The administrative authorities should formulate ‘Green and Environment Policies’ based on technical report of green ampus auditing. A clean and healthy environment will enhance an effective teaching/learning process and creates a favorable learning green environment to the scholars. They should create the awareness on the importance of greenish initiatives through environmental education among the student members and research scholars. Green Audit is the most effective, ecological approach to manage environmental complications.

Green campus audit may be beneficial to the campus in improving the greenery activities which in turn useful to save the planet for future generation. Green campus audit is a kind of professional care and a simple indigenized system about the environment monitoring in terms of planting a huge number of trees which is a duty of each and every individual who are the part of economical, financial, social, and environmental factors. It is necessary to conduct green audit frequently at least once in three years in campus because students and staff members should aware of the green audit and its beneficial effects in order to save planet by means of ‘Go green concept’ which in turn support the institution to set environmental models (‘icon’) for the community. Green audit is a professional and useful measure for an Organization to determine how and where they are retaining the campus eco-friendly manner. It can

also be used to implement the alleviation measures at win-win situation for the stakeholders and the planet. It provides an opportunity to the stakeholders for the development of ownership, personal and social responsibility.

7. Benefits of the Green Auditing

There are several benefits on conduct of green audit by the Organization which may be definitely useful to improve the campus significantly based on the audit report. The green campus audit contained methodology followed and both qualitative and quantitative measurements including physical observation of greeneries in terms of growing of terrestrial and aquatic plants, animals and microflora in the campus. The natural and planted vegetation and their maintenance are also considered in the organization campus through topography, landscape management design and soil erosion control in environment sustainable development. The following are the major benefits of the green auditing.

- Know the status of development of internal and external Green campus audit procedures and implementation scenario in the Organization.
- Establishment d Green campus objectives and targets as on today as per the 'Green and Environment Policy', 'Indian Biodiversity Act' and 'Wildlife Protection Act' of the Ministry of Environment, Forests and Climate Change, New Delhi and World & Indian Green Building Council concepts in accordance with prevailing rules issued by the government/local authorities
- Assigning the roles and responsibilities to the Environmental Engineer and Agriculture Staff who are all responsible to improve green initiatives.
- Development of ownership, personal and social responsibility for the Organization and its environment and developing an environmental ethic and value systems to young generations.
- Enhancement of the Organization profile and reach the global standards in proving the green campus and eco-friendly atmosphere to the stakeholders
- Suggested of availability of Biogas plant to the management to restrict the usage of fossil fuel in cooking purposes.
- Implementing status of the rain harvesting system, water reservoirs, percolation pond, etc. in the campus to increase the ground water level.
- Establishment of terrace garden, herbal garden, kitchen, zodiac, ornamental gardens, etc. for enhancing teaching and learning and commercial exploitation.
- Treated water consumption towards plant cultivation, canteen, hostel, machinery cleaning, transport, toilet use and etc. on water consumption and per capita water consumption per day calculation.
- Studying the campus flora by making a complete data on total number of both terrestrial and aquatic plants, herbs, shrubs, climbers, twins and grasses.
- Survey of campus fauna by conducting the number living and visiting animals, insects, flies, moths and worms in the campus.
- Documentation of the number of oxygen releasing and carbon dioxide assimilating plants planted in the campus to give pure atmosphere to the stakeholders.
- Operation of water irrigation, drip and sprinkler irrigation methods to improve the green campus.
- Studying the biodiversity conservation through Life Sciences and Biological

Sciences people to conserve economically important, rare and endangered plant and animal species in the campus ecosystem.

- Recommendation in use of biofertilizers, organic and green manures, cow dung manures and farmyard manures for the cultivation of plants to protect the environmental health
- Conduct of outreach programmes for dissemination of Green Campus motto and Green pledge initiatives to rural, tribal and urban people through Eco club, Nature club, Science club, Fine Arts club, Youth Red Cross unit, NCC/Student Force and NSS bodies.
- Academic credentials like major and minor Projects, Dissertations and Thesis work on green campus, environment protection and nature conservation by the students and staff members.
- The plants available in the campus must be tagged with their common name and Botanical name for the stakeholders to impart the knowledge on medicinal and ornamental, economic and food values of plant varieties.
- MoU may be signed with Government and non-Governmental Organizations (NGOs) to utilize the resources for nature conservation and environmental protection.
- Implementation of Government schemes (Swatch Bharath Abhiyan under Clean India Mission) to give pure and safe water to rural people and teach the importance of cleanliness of toilets and restrooms.
- Conduction of awareness programmes and cultural activities on global warming, environmental changes and ecosystem maintenance to the stakeholders.
- Steps taken for organic, inorganic, toxic, e-waste, biomedical, food, sewage waste management, segregation of wastes and reuse methods.
- Public transport, low-emitting vehicles and control of car smokes and exhaust towards carbon accumulation in the campus by carbon footprint studies.
- Implementation of advanced methods for watering plantations (Drip irrigation, Sprinkler irrigation, etc.) and use of metering for water utility, IoT based watering, automation, water device, remote water lines, etc.
- Percentage of Organization’s budget for environment sustainability efforts and green campus initiatives planning and efforts.
- Campus facilities for disabled, special needs and/or maternity care including security, safety and health infrastructure facilities for stakeholder’s wellbeing.
- High degree of resource management offers the basis for improved sustainable and creation of plastic free campus to evolve health consciousness among the stakeholders.
- Impart of knowledge on environment through systematic management approach and improving environmentally friendly standards by creating a benchmark for environmental protection initiatives
- Best practices followed on green campus initiatives in the Organization listed and disseminated among the stakeholders.
- Recommendations for improving the green initiatives, planning and efforts in the campus after audit report to improve further.

8. About the Organization

8.1. Adichunchanagiri Institute of Technology,

Adichunchanagiri Institute of Technology (AIT) was established in the year 1980 at Chikkamagalur (240 km from Bangalore), with the blessings of revered Jagadguru Padmabhushana Sri Sri Sri Dr. Balagangadharanatha Maha Swamiji, pontiff, of Sri Adichunchanagiri Maha Samsthana Math. Chikkamagalur city is 20 km from the world-famous sculpture Belur Temple. The Adichunchanagiri Institute of Technology is affiliated to Visvesvaraya Technological University, Belagavi and Recognized by All India Council for Technical Education, New Delhi. The Institute is Accredited by the National Assessment and Accreditation Council (NAAC) with B+ grade. Institute is Accredited twice by National Board of Accreditation (NBA) and also an ISO 9001:2008 Certified Institution.

The renowned temple of Sringeri Sharadamba and Sri Shankaracharya Mutt is just 100 km away. Spread out over 65 acres of land with green surroundings and picturesque hillocks, the college has a conducive atmosphere for education. The weather is salubrious and pleasant throughout the year. The vision of the Institute is to develop as a center of excellence and to strive for continuous improvement of technical education and human resource advancement and the mission is to achieve 13 Excellence in Education, Entrepreneurship and Innovation by producing Engineers with high Ethical Standard, Integrity and Credibility.

The Institute has highly qualified and experienced faculty with a reputation in their areas of specialization, well-equipped laboratories, seminar halls with projectors, sufficient books and periodicals in the library, hygienic canteen facility with hostels for both girls and boys, a huge amphitheater for cultural exposure and fleet of buses for transportation. The Institute is providing good training for students to excel in academics as well as in industry requirements and aiming towards 100% placements to give a better future for students. The main objectives of AIT are

- To create sustainable teaching - learning process in all academic units that promote pedagogical innovations.
- To transform students by facilitating holistic personality development and sustenance of talent.
- To nurture higher commitment towards learning, research and creative thinking among students and faculty members.
- To enhance industry-institute relationship to accelerate students' industry readiness.

The vision is to foster AIT as a centre for nurturing and developing world class Engineers and Managers who convert global challenges into opportunities through value-based quality education. The mission is to impart value-based quality education through effective teaching and learning processes. To nurture creativity, excellence, and critical thinking by applying global competency factors to contribute and excel in the rapidly growing technological world. To continuously develop and improve holistic and innovative personality for global mobility. To make AIT a centre for excellence.

8.2. About Nature Science Foundation (NSF)

NSF is an ISO QMS (9001:2015), EMS (14001:2015), OHSMS (45001:2018) &EnMS (50001:2018) Certified and registered with Ministry of Micro, Small and Medium Enterprise (MSME), Government of India Organization functioning energetically towards the noble cause of nature conservation and environmental protection. NSF is managed by a board of trustees of NSF Public Charitable Trust under the TN Societies registration Act 1975 (TN Act 27 of 1975) on 29th November, 2017 at Peelamedu, Coimbatore - 641 004, Tamil Nadu, India with Certificate of Registration No. 114 / 2017. In addition, NSF has 12AA, 80G and Form 10AC certificates for income tax exemption and implanting various Government schemes. The main motto of the NSF is to "Save the Nature to Save the Future" and "Go Green to Save the Planet". NSF Branch Offices are also functioning effectively at Gorakhpur, Uttar Pradesh and Faridabad, Haryana, India to adopt the 'Go Green Concept' in a big way. NSF family is wide spread across India with over 115 state-wise Lead auditors to conduct Green and Environment Audits.

NSF is functioning strenuously to conduct different awareness programmes and implement various schemes to public and school / college students towards the noble cause of nature protection. Some of the programmes are also being organized for the benefit of tribal communities to create the supply chain for biodiversity conservation studies. The objectives along with vision and mission are illustrated to promote educational and environmental awareness programmes through social activities for enhancing the quality of life and to conserve nature from environmental pollutants using traditional and modern technologies for sustainable land management. NSF is educating the tribal community children through social service and towards the upliftment of tribes as a whole and make them as entrepreneurs.

International Eco Club Student Chapter (IECSC) has been established for Student volunteers and faculty members are encouraged to conduct National and International events, Student Technical Symposium, Distinguished lecture programme, Environment day celebration, Ozone day celebration, Project model exhibition, Awareness programmes on Environmental pollution, Biodiversity and Natural resources conservation and etc. with the financial support of the Foundation. NSF is being released 'Magazine' and 'Newsletter' biannually to share the information about Environmental awareness programmes on biodiversity conservation, seminar on soil conservation, water management and solid waste management, restoration and afforestation programmes in Western Ghats of southern India.

In order to encourage the students, members of faculty, academicians, scientists, entrepreneurs and industrial experts those who are involving in nature protection and biodiversity conservation studies across the world, NSF tributes the deserved meritorious candidates with various awards and honours such as 'Best Faculty Award', 'Best Women Faculty', 'Best Scientist Award', 'Best Student Award', 'Best Research Scholar Award', 'Best Social Worker Award', 'Young Scientist Award', 'Life-Time Achievement Award' and 'Fellow of NSF'. These award and honours will be given to the deserved meritorious candidates during the 'Annual Meet and Award Distribution Ceremony' which will be conducted every year during the first week of January.

NSF has introduced various types of Audits such as 'Eco Audit', 'Green Audit', 'Energy Audit', 'Hygienic Audit' Water & Soil Audit, Plastic Waste Management Audit, Biomedical Waste Audit, Solid Waste Management Audit, E-Waste Management Audit, Academic & Administrative Audits including ISO certification process to Academic Institutions, R&D Organizations and Industries towards the accreditation process as well as maintaining a hygienic eco-friendly environment to the stakeholders in their campus. All audits will be

conducted as per the Checklist prepared by the NSF ISO Criteria and in compliance with Government Law and Environmental Legislations including World / Indian Green Building Council and the concept of Swachh Bharath Abhiyan under Clean India Mission. Green campus and Environment Policy, Purchase Policy, Energy Policy, MoU, International Eco Club student Chapter.

Table 1. The AIT Campus facility details

S.No.	Details of Area	Total area
1.	Total Campus area	2,16,140 sq.mt
2.	Total Built up area	36,000 sq.mt
3.	Covered Car parking area	33500 sq. ft
4.	Forest vegetation	45%
5.	Planted vegetation	55%

9. Audit Details

Date / Day of Audit	**:**	**22.06.2022**
Venue of Audit	**:**	**Adichunchanagiri Institute of Technology, Chikkamagaluru**
Audited by	**:**	**Nature Science Foundation,** Coimbatore, Tamil Nadu, India.
Audit type	**:**	**Green Campus Audit**
Name of Auditing Chairman	**:**	**Mrs. S. Rajalakshmi Jayaseelan,** Chairman of NSF & ISO QMS, EMS, OHSMS, EnMS Auditor.
Name of IGBC AP Auditor	**:**	**Dr. B. Mythili Gnanamangai,** Vice Chairman of NSF & Indian Green Building Council Accredited Professional.
Name of Lead Green Auditor	**:**	**Dr. R. Mary Josephine,** Plant Taxonomist & Principal, St Joseph College for Women, Tiruppur, TN.
Name of Subject Expert-I	**:**	**Dr. D. Vinoth Kumar** Joint Director of NSF & ISO EnMS Auditor.
Name of Subject Expert-II	**:**	**Mr. B.S.C. Naveen Kumar,** Senior Faculty, Mahatma Gandhi National Council of Rural Education, Ministry of Higher Education, Hyderabad.
Name of Subject Expert-III	**:**	**Er. D. Dinesh Kumar,** Certified Lead Auditor, IGBC, ASSOCHEM, GRIHA & LEED
Name of the Energy Auditor	**:**	**Dr. N. Balasubramanian,** Certified Bureau of Energy Efficiency Auditor of NSF.
Name of Eco & Green Officer	**:**	**Ms. R.S. Thulaja,** Environment, Energy & Green Council Programme Officer, NSF.

10. Procedures followed in Green Campus Audit

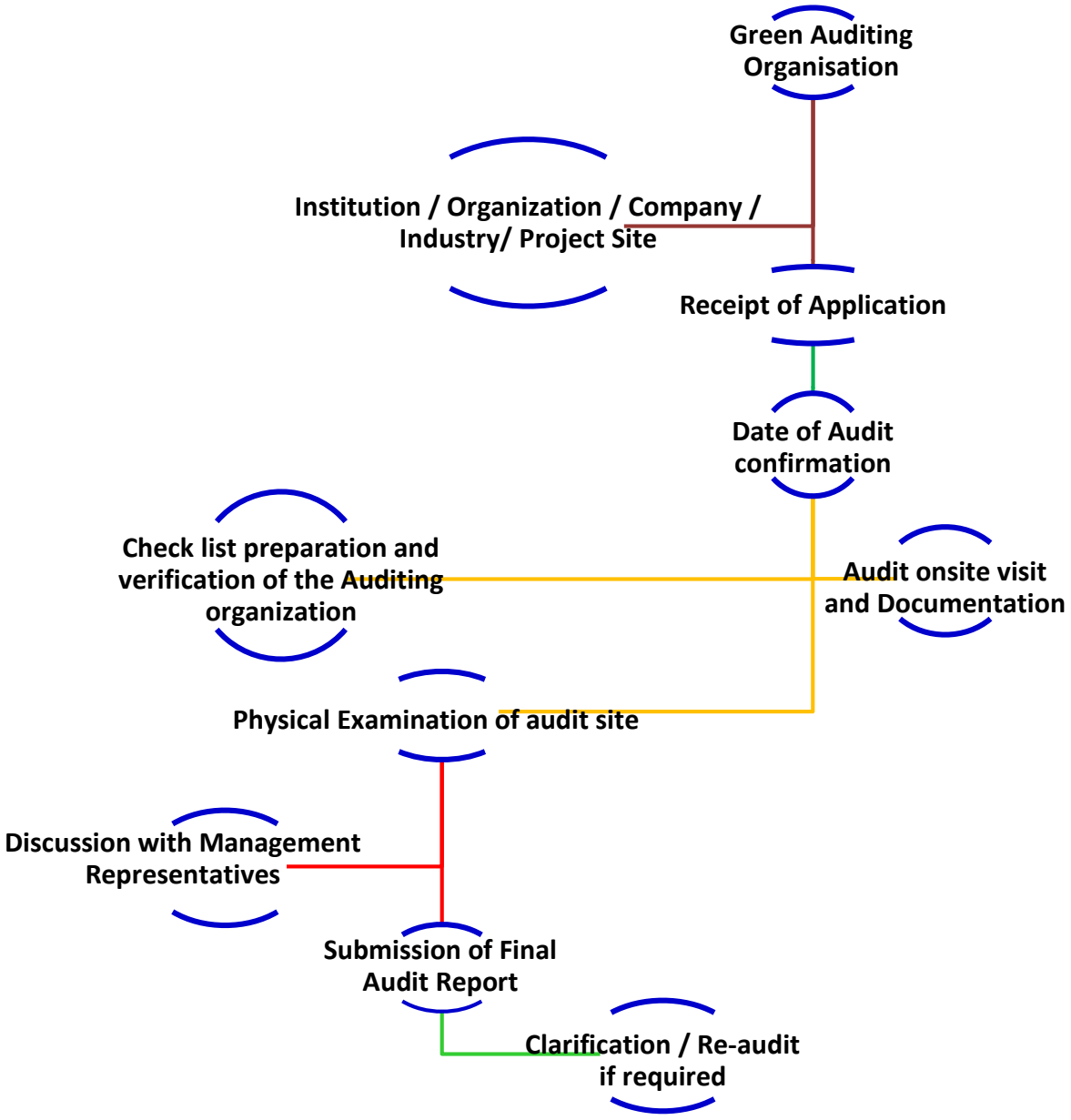
Green campus audit is a structured process of documenting the credentials in terms of number of trees, herbs, shrubs, lawns, climbers and lianas reflected in reducing the environmental pollution and soil erosion and useful for biodiversity conservation, landscape management, natural topography and vegetation. It is a kind of a professional tool for assessing the green campus. Green audit projects the best environmental practices and initiatives taken in the organisation at the prescribed site of audit that brings added value to the organisation in maintaining the eco-friendly campus to the stakeholders. First step of the audit is ensuring that the organization has a central role in building the green campus, in order to validate the same (Adeniji, 2018).Green campus is not intended for the self-sustainability of the building alone, italso involves in propagation of the green campus initiatives so as to be adopted by any individuals and organization at a minimum cost. Green campus audit has been conducted as per the checklist of Nature Science Foundation, Coimbatore, Tamil Nadu, India (www.nsfonline.org.in) through the authenticated Professionals for people qualified to investigate and evaluate the campus for validating the best environmental practices (Staniskis and Katiliute, 2016, SCSR, 2018). Professional team of ISO Environment Management Audit (14001:2015), Indian Green Building Council Accredited Professionals, Experts of Green campus Lead Auditors and Botanists / Zoologists / Biotechnologists were selected to conduct the Green campus audit process.

During the audit, the nature of plants and animals / bird's species thriving within the campus were recorded. Establishment of lawns, trees, herbs, shrubs and climbers and establishment of terrace / kitchen / herbal / zodiac / ornamental / medicinal garden / Aquarium and aquatic (hydrophytes) plants in the campus were recorded. Labelling of common names and Botanical names of plants were observed. The operation of the water irrigation system, trip and sprinkler irrigation methods and use of recycled water for irrigation purpose or any other purpose in the campus area were noted.

Attempts made for water scarcity during summer season towards the maintenance of plants and frequency of watering for plantations in the campus were noted. Biodiversity conservation education, projects, awareness programmes, etc., through Indian Biodiversity Act and Ministry of Environment, Forests and Climate Change, Government of India and the conduct of outreach programmes for dissemination of Green campus motto were recorded (Venkataraman, 2009). Conduct of outreach programmes for dissemination of Green campus motto to the students and staff members including public domain and signing of MoU with Government and Non-Governmental Organizations to ensure green campus activities for future generation were noted (Lauder *et al*., 2015; Brindusa *et al*., 2007). Technology driven solutions initiated by the Green campus organization can also be disseminated and documented successively for propagating the attitude of the Green campus in wider masses.

Projects, Dissertations and Thesis are the academic effort credentials that always fosters the innovative ideas on thinking and implementation of new innovative approaches towards the green campus. These should be disseminated through presentations and publications in social media, books, magazines and journals so as to spread the innovative ideas and methods to the broad public. These efforts taken by the students and staff were deliberated while conducting the Green campus audit. Green audit processes are taking place as per the following flow-chart starting from the receipt of application forms from the auditee (organization) and ending upon the submission of final report to the concerned organization (Leal Filho *et al*., 2015). During the audit

process, the best environmental / greenery practices followed and new initiatives undertaken in the organization to reduce the environmental pollution and steps taken for nature conservation that brings added value to the organization in maintaining the eco-friendly campus were assessed. In addition, supporting activities of the scholars and staff with regard to "Vision and Mission" of the greenery activities of the Organization is also evaluated.



Flow-chart of Green Campus Audit Procedures

10.1. Onsite Green Campus Audit activities

1. Opening meeting is the first step between the audit team and auditee along the Management Representatives where the purpose of the audit, procedures to be adopted for the conduct of the audit, verification of the documents and the time schedules were discussed, in brief.
2. Followed by opening meeting, onsite inspection will be conducted which is the second step in the audit where the Audit team members visited different sites in the AIT campus and required photographs were taken then and there for preparing the audit report.

3. During the onsite phase of visit, it is vivid how the various facilities made by the AIT Management to the stakeholders without disturbing the landscape, natural topography and vegetation to ensure the green campus.
4. It is observed how the environment is protected in the campus and by what means an eco-friendly atmosphere is being given to the stakeholders. The assessment reveals the strengths and weaknesses of the Auditee's Management controls and risks associated with their failure in creating Green campus facilities.
5. Collecting audit proofs *ie*, data collection and information from the auditee as per the audit protocol were carried out.
6. An exit meeting was conducted to describe the findings of the audit with Management Representatives and staff members along with the audit team in brief.

10.2. Pre-Audit stage activities

A pre-audit meeting (opening meeting) is conducted with Management and Administrative people along with staff coordinators of Energy and Environment audit process, wherein, audit protocol and audit plan were discussed in brief. The purpose of this meeting is to provide a chance to emphasize the scope and objectives of the audit and discussions held on the feasibilities associated with the audit (Marrone *et al*., 2018). Pre-audit stage activities are an essential prerequisite for the green audit to meet the auditee and to gather information about the campus and required documents were collected directly from the Organization before the start of the audit processes (Fachrudin *et al*., 2019). Audit team was selected by the Nature Science Foundation as per the checklist comprised of Lead Auditor of ISO (EMS 14001:2015), Botanist, Agriculture and Horticulture Scientists from Conventional and Technical Universities across India, Accredited Professionals from Indian Green Building Council, Hyderabadand Associated Chambers of Commerce and Industry of India, New Delhi.

Auditing Team of the Nature Science Foundation, Coimbatore, Tamil Nadu at Adichunchanagiri Institute of Technology, Chikkamagaluru, Karnataka

Energy and Environment audit activity at the AIT by the NSF Audit Team

10.3. Target Areas of Green Auditing

Green campus audit is nothing but a professional tool to assess the greenery activities in the educational institutions and give a value addition to the campus and considered as a resource management process. Eco-campus concept mainly concentrate on the efficient use of energy and water; minimize waste generation or pollution and also improve the economic efficiency. Green campus audit process may be undertaken at frequent intervals and their results can demonstrate improvement or change over time. Eco-campus focuses on the reduction of carbon emissions, water consumption, wastes to landfill and enhance energy use conservation to integrate environmental considerations into all contracts and services considered to have significant environmental impacts (Choy and Karudan, 2016).

There are several targets listed in the Green audit process in which a few are taken into consideration as per the Indian scenario is concerned. They are water use efficiency, energy use efficiency, solid, e-waste biomedical, food, sewage waste management and reuse methods, planting of oxygen releasing and carbon dioxide assimilating plants, landscape management, topology, vegetation, soil erosion control, carbon footprint due to use of vehicles, electricity and fossil fuels (León-Fernández and Domínguez-Vilches, 2015). drinking water quality supply, Biogas plant, rain harvesting system, water reservoirs, percolation pond, establishment of various herbal, terrace and ornamental, gardens, campus and flora fauna, water irrigation, implementation of Government schemes, conduction of awareness programmes management, public transport, low-emitting vehicles and control of car smokes and exhaust, Organization's budget for greenery activities, campus facilities for disabled, persons needs special attention and or maternity care, security, safety and health infrastructure facilities for stakeholder's wellbeing (Nunes *et al*., 2018).

10.4. Flora and Fauna diversity of study area

The AIT Campus is situated in Chikkamagaluru, Karnataka, India. It is located about 17.2 km from B G Nagar railway station. At present, the campus is quite clean, green and with much less pollution when compared to the rest of the city. Study/documentation of biodiversity provides a useful measure of the quality of the environment and the ecological studies are important aspects of environment, in view of the consideration of environmental quality and natural flora and fauna conservation.

10.4.1. Topography

The AIT consists of an environment of Tropical and deciduous type with a mixture of teak, located at a minimum elevation of 955 m above mean sea level and maximum elevation of 1090 m above mean sea level. The district is between 12° 54′ 42′′ and 13° 53′ 53′′ North latitude and between 75° 04′ 46′′ and 76° 21′ 50′′ east longitude.

10.4.2. Geology and Soil condition

The geology of AIT comprises hard rocks of granite and Black soil.

10.4.3. Climatic conditions

Considering climate condition, Chikkamagaluru generally has a moderate to cool climate. The temperature of the city varies from 11-20 °C during winter to 25-32 °C during summer. The average normal rainfall is 53.32 cm annum The driest month is January, with 7 mm | 0.3 inches of rain. Most precipitation falls in July, with an average of 320 mm | 12.6 inch.

Table 2. Soil edaphic and environmental parameters of the AIT

S.No	Details of Parameters	Data collected
Soil edaphic parameters		
1.	Soil pH	6.43
2.	Soil types	Black soil, red soil, Gravel soil.
3.	Total organic carbon	4.5%
4.	Electrical conductivity	0.11 dSm^{-1}
5.	Water holding capacity	80%
6.	Total Nitrogen	4.0 ppm
7.	Available Phosphorous	6.0 ppm
8.	Exchangeable Potassium	3 ppm
1.	Minimum Temperature	14°C
2.	Maximum Temperature	31°C
3.	Minimum Relative humidity	45%
4.	Maximum Relative humidity	79%
5.	Annual Average Rainfall	2075 mm
6.	Annual Average Sunshine	6 hrs/avg.day
7.	Wind speed	3 k/hr.

11. Identification of Plant Species

11.1. Identification of Flowering Plant Species

Various vascular plant species were collected across the AIT campus and subjected to botanical identification (botanical name, family, habitat, and economic importance) and anthropogenic disturbances to the natural vegetation in campus. Plants were freshly collected and their digital photographs were also taken. The collected plant specimens have been identified using taxonomic literatures (Gamble and Fischer, 1972; Matthew, 1983; Nair and Henry, 1983; Henry *et al*., 1989; Chandrabose and Nair, 1988). Further, their identification was confirmed by matching with authentic specimens in the Madras Herbarium (MH), Botanical Survey of India (BSI), Southern Circle, Coimbatore, Tamil Nadu, India.

11.2. Identification of Non-Flowering Plant Species

11.2.1. Lichen Identification

Lichen specimens were collected from the AIT campus and then identified based on the lichen identification key of Awasthi (2007). Representative lichen specimens were identified based on thalli morphology such as rhizine, cilia and pseudocephellae and reproductive structures (fruiting bodies) such as apothecia, perithecia, soredia, soralia, conidia and isidia embedding on the thalli surface using a stereo microscope (CZM4, Labomed, India). In the present study, Anatomy of the thallus were carried out in order to document micro morphological features such as medulla thickness, upper and lower surface of thallus, lobes, size and shape of spores. Thin section of apothecia and perithecia was made to observe the nature ascus spores and the arrangement of the algal and fungal layers in the thallus; respectively. Spot tests featured the use of chemical reagents to detect lichen substances by appearances of the characterized colour changes on lichen thallus was noted. The lichen chemistry was analyzed according to Culberson and Kristinson (1970) methods. The colour spot test was done

on medulla of lichen thallus using test reagents of potassium hydroxide (K), calcium hypochlorite (C) and paraphenylene di amine (PD). Lichen was identified based on colour spot test using the procedure defined by Orange *et al*. (2001).

To authenticate the identified lichen samples, the representative samples were compared with the voucher specimens at the Lichen Herbarium Centre of National Botanical Research Institute (NBRI), Lucknow, Uttar Pradesh, India and Department of Botany, Bharathiar University, Coimbatore, Tamil Nadu. The lichen species might be confused with other species unless their morphological, biochemical and anatomical features were closely monitored. Therefore, apart from microscopic observation, spot tests, chemical profiling and TLC tests, attempts were made to compare the representative samples with voucher specimens.

11.2.3. Identification of Algae Genera

Algae are the members of a group of predominantly aquatic photosynthetic organisms of the kingdom *Protista* followed by terrestrial algae found in freshwater and slump areas. Algae are non-flowering and lower group of plants which are green in colour because of presence of chlorophyll pigments in the body called thallus. Algae adopt diverse life cycles, and by size, they range from microscopic *Micromonas* to giant kelps that reach 60 metres (200 feet) in length. Their photosynthetic pigments highly varied when compared to that of higher plants; their cells have features not foundamong plants and animals. In addition to their ecological roles as oxygen producers, they serve as food base for almost all aquatic life; algae are economically important asa source of crude oil and as sources of food and a number of pharmaceutical and industrial products for humans. Algae are defined as eukaryotic (nucleus-bearing) organisms that photosynthesize. They lack specialized multicellular reproductive structures of plants, but they always contain fertile gamete-generating cells surroundedby sterile cells. Algae also lack true roots, stems, and leaves features they share with the avascular lower plants (e.g., mosses, liverworts, and hornworts). Algae identification key consists of couplets of characteristics using algal description of the specimen based on morphological characterization from 58 Genera to species level identification as per the comprehensive key.

12. Identification of Mammals, Birds, Reptiles, Amphibians and Termites

Birds were observed by visual sightings and by calls also the avifaunal data were observed through the Nikon 8 x 40 binoculars and photographs were taken by Canon 600 D camera (55 – 250 mm). The recorded data was noted in the field work note. Later, the birds were identified with the help of field guide- "Birds of Indian subcontinent" by Richard Grimmett, and the IUCN category of the birds were also noted with the same. The point count and transect line methods were used to record the number of bird species in the study area in which regular visits and personal visits were carried out (Ferenc *et al*., 2014). The surveys were conducted to understand the distribution of bird species in relation to habitats and nesting behaviour of birds in the study area. Based on survey richness and abundance of bird species were calculated using Shannon-weaver diversity index. Based on available data and species were selected for nest site selection study. Selected species of birds was analyses for its nest site characteristics between the habitats and also plant species preference was enumerated and assessed. The number of

breeding bird species and nests found in different habitats as depend variables such as biotic and biotic factors as the independent variable (Jayson and Mathew, 2000).

Reptiles and Amphibians are identified based on colourtion, markings on the skin, background colour generally brown, Males often have a flecked pattern on back. Occasionally they are in green, leading to mistaken identification as sand lizard, Males have thicker base to tail and brighter, speckled underside. Newborn young are dark in colour, almost black. A rare species, almost entirely confined to heathland sites in Dorset, Hampshire and Surrey, and sand dunes on the Mersey and Welsh Coast. The most common reptile found in a variety of habitats, including gardens. Spends most of its time underground or in vegetation litter. Most likely to be found underneath objects lying on the ground, or in compost heaps. Snakes are identified based on cream, yellow or white collar behind the head, bordered to the rear by black marks. Body colour ranges from bright green to dark olive, but mostly the latter. Darker specimens can appear black from a distance. Truly black grass snakes are rare. Males are predominately brown, females are grey. Dark butterfly shape on top of head may be noted. Pairs of spots, sometimes fused as bars, running along back with black line running through eyeare recorded. Males typically grey with a black zigzag stripe, females generally brownwith a dark brown zigzag stripe (Beebee and Griffiths, 2000).

13. Green Campus Audit Observations

It covers both qualitative and quantitative measurements including physical observation of greeneries in terms of growing of terrestrial and aquatic plants, animals and microflora in natural and planted vegetation and their maintenance. Topography, landscape management design and soil erosion control are playing important role in environment sustainable development in the campus. An account of a large number of Oxygen releasing and Carbon dioxide assimilating plants planted in the Campus are taken into consideration to give pure atmosphere to the stakeholders. Establishment of different types of gardens in the campus, rainwater harvesting system, operation of water irrigation, drip and sprinkler irrigation methods may be adopted to improve the green campus. Similarly, biodiversity conservation strategies are very essential to conserve a variety of plant and animal species in the campus ecosystem. Biofertilizers, organic and green manures, cow dung manures and farmyard manures may be used for the cultivation of plants which may be protected the environmental health that will not cause any air, water and soil pollution. The various Clubs, Forums, Cells, Associations and Student / Staff Chapters such as Eco club, Nature club, Science club, Fine Arts club, Flora and Fauna club, Youth Red Cross, NCC/Student Force and NSS bodies maybe involved in green campus initiatives, planning and efforts among stakeholders. Outreach programmes may be conducted for dissemination of Green Campus motto and Green pledge initiatives to rural, tribal and urban people. Academic credentials like taking up major and minor Projects, Dissertations and Thesis work by the students and staff members may be taken into account towards green campus initiatives, planning and efforts. Best practices followed on green campus initiatives in the Organization and recommendations for greening are illustrated in the audit report as well.

Table 3. Qualitative Measurements of Green Auditing

S.No	Requirements and checklists of the audit	Conformity		
		Yes	No	NA
1.	Have internal Green campus audit procedures been developed and implemented in the Organization?	✓		
2.	Have programmes for the achievement of Green campus objectives and targets been established and implemented as on today?	✓		
3.	Whether Green campus audit and Environment audit are simultaneously carried out or separately carried out?	✓		
4.	Whether Indian Biodiversity Act as per the Ministry of Environment, Forests and Climate Change, New Delhi, Wildlife protection act and World & Indian Green Building Council concepts followed?	✓		
5.	Have responsibilities been assigned for programmes at each appropriate function and level? (Environmental Engineer & Agriculture Staff working for environment monitoring)	✓		
6.	Are the following environmental aspects considered in sufficient detail?			
	a. Drinking water / RO water / Borewell water / Open well water / Pond water / Municipal or Corporation water use and to check quality of water through Physico-chemical properties analysis	✓		
	b. Wastewater treatment facility	✓		
	c. Sufficient number of trees, shrubs, herbs and lawns	✓		
	d. Solid waste management facility	✓		
	e. Availability of Biogas plant		✓	
	f. Rain harvesting system, water reservoirs, etc.	✓		
	f. Aquarium and aquatic (hydrophytes) plants	✓		
	g. Establishment of terrace garden, herbal garden, kitchen, zodiac, ornamental gardens, etc.		✓	
	h. Natural Topography or Forest, Planted vegetation	✓		
	i. Water well, Bore well, lake, water reservoir facility	✓		
	j. Water consumption towards plant cultivation, canteen, hostel, machinery cleaning, transport, toilet use	✓		
	k. Treated water consumption towards plant cultivation, machinery cleaning, transport, toilet use and etc.	✓		
	l. Per capita water consumption per day calculated (45L/P/C/D)	✓		
7.	Whether plants are tagged properly with their common name and Botanical name for stakeholders?		✓	
8.	Signing of MoU with Govt. and NGOs to disseminate Green campus motto and pledge	✓		
9.	Biodiversity conservation of plants, animals and wildlife, genetic resources (Endangered and endemic species) at		✓	

	each appropriate function and level?			
10.	Are any biofertilizers, organic manures, farmyard manures, vermicompost, green manures and chemical fertilizers used for maintaining plants?	✓		
11.	Establishment of herbal garden, zodiac garden, medicinal garden, kitchen garden, terrace garden and ornamental plants garden in the campus		✓	
12.	Implementation of Government schemes (Swatch Bharath Abhiyan under Clean India Mission)	✓		
13.	Functioning of Nature club, Eco club, Cell, Forum, Association, NCC/Student Force, NSS bodies and Social Service League for students and staff members on biodiversity conservation, green campus development, etc.	✓		
14.	Conduction of awareness programmes and cultural activities on global warming, environmental changes and ecosystem maintenance to the stakeholders	✓		
15.	Conduction of outreach programmes for dissemination of green campus initiatives, natural resources, environmental pollution and biodiversity conservation to rural, tribal and urban people	✓		
16.	Implementation of composting pits, vermicompost unit, recycling of kitchen wastes collected from Hostels, Canteens, Cafeteria, Food court and other places	✓		
17.	Maintenance of plantations in the campus and steps taken for water scarcity during summer season to maintain plants	✓		
18.	Steps taken for organic, inorganic, toxic, e-waste, biomedical, food, sewage waste management, segregation of wastes and reuse methods	✓		
19.	Public transport, low-emitting vehicles and control of car smokes and exhaust towards environment monitoring	✓		
20.	Observation on the site preservation, soil erosion control and landscape management	✓		
21.	Projects and Dissertation works and Scholarly publications on environmental science and management carried out by students and staff members	✓		
22.	Implementation of advanced methods for watering plantations (Drip irrigation, Sprinkler irrigation, etc.)	✓		
23.	Use of metering for water utility, IoT based watering, automation, water device, remote water lines, etc.		✓	
24.	Percentage of Organization's budget for environment sustainability efforts	✓		
25.	Campus facilities for disabled, special needs and or maternity care including security, safety and health infrastructure facilities for stakeholder's wellbeing	✓		

Table 4. Quantitative Measurements of Green Auditing

S.No.	Details of Plant and animal species	Numbers / Percentage
1.	Total number of Flowering plant species inside the Campus	123 species belonging to 72 Genera, 52 Families.
2.	Total number of Non-Flowering plant species inside the Campus	75
3.	Total number of living Mammals inside the Campus	NIL
4.	Total number of visiting Mammals inside the Campus	3 species belongings Squirrel, Shrew and Mouse
5.	Total number of living Birds inside the Campus	20 species belonging Stork, Heron, Pigeon, Myna, Robin, Sparrow, Dove and owl.
6.	Total number of visiting Birds inside the Campus	5 species belonging Cormorant, Kingfisher, bee-eater, Bulbul and Drongo.
7.	Total number of Aquarium	Percolation Pond 2, Openwell water Facility -2
8.	Total number of Aquatic (hydrophytes) plant species	Two species belonging to *Lotus and Water Hyacinth,*
9.	Total number of Grasshopper and Termites	Grasshopper: 6 species Termites: 4 species
10.	Total number of Amphibians and Reptiles	Amphibians: 8 species Reptiles: 6 species
11.	Total number of Butterflies and Mosquitos	Butterflies: 13 species Mosquitos: 03 species
12.	Percentage of Forest Vegetation	45 %
13.	Percentage of Planted Vegetation	12.5%
14.	Percentage of Water consumption to total human population	2.78%
15.	Percentage of Water consumption to total flora and fauna	11.7%
16.	Per capita water consumption per day	67.8%

13.3. Flora and Fauna diversity in the AIT Campus
13.3.1. Flora diversity in the AIT Campus
13.3.1.1. Flowering plants diversity in the AIT Campus

Ensuring the rich biodiversity in the green campus is an important parameter which reflects the real-time ecosystem. Plants are indicators for assessing the varying levels of environmental quality. In general, plants improve the outdoor air quality with increased oxygen levels and reduced temperature and carbon dioxide. The green and varying colour of the flowering plants improve the ambience of the Organization environment. The record on maintenance of the plant biomass and its management are important with respect to green campus initiatives. The existence of such plants and birds in the green campus may be recorded for the rich flora and fauna which are being considered as a value addition to the campus.

The observations indicated that the AIT campus has more than 80 % of wild as well as native plant species and the other 25% plant species are ornamental in nature coming under the planted vegetation. Native plant traits promote the indigenous fauna at the site area. Hence, the accountancy of 40 % of the wild traits are leveraged for the native animals and birds. The most probable natural vegetation of AIT campus is the dry deciduous type. The remnants of this past vegetation are found in the campus.

The most plants recorded are *Roystonea regia, Araucaria columnaris, Azadirachta indica, Araucaria heterophylla, Bauhinia variegate, Callistemon lanceolatus, Bambusa vulgaris, Cassia fistula, Cocos nucifera, Delonix regia, Mangifera indica,, Dypsis lutescens , Michelia champaca, Polyalthia longifolia,* and *Terminalia arjuna* which are dominant trees species characteristic to the vegetation within the campus. Some of the shrub species like *Abutilon indicum, Caesalpinia pulcherrima, Canna indica, Hamelia patens, Hibiscus rosa-sinensis, , Microcos panicula* and *Plumeria obtusa* are also rather common in the campus.

Ground flora is comparatively sparse, but fairly rich in undistributed areas. Some of the common weeds like *Achyranthes aspera and Alternanthera sessilis* are found to be predominant. Species such as *Aristida pinnata, Asystasia gangetica, Bidens pilosa, Chenopodium albumsp, Evolvulus alsinoides,Oldenlandia corymbosa, Parietaria officinalis* and *Turnera subulata* are some common herbs in the campus.

Certain common climbers found among the shrubs are *Allamanda cathartica, Clitoria ternatea, Combretum indicum, Epipremnum aureum, Passiflora incarnata, Pyrostegia venusta, Thunbergia grandiflora* and *Tribulus cistoides.* This campus is rich in grass species like *Dactyloctenium aegyptium, Chloris barbata* and *Cynodon dactylon.*

Most of the species found are common in the campus, some of the species *Cucumis dipsaceus* Ehrenb, *Bothriochloa compressa* (Hook.F.), *Chloris bournei* Rang & Tadul.are rare species. Some endemic grass species like *Andropogon pumilus* Roxb., *Caralluma bicolor* Ramach., *Panicum psilopodium* Trin., and *Perotis indica* (L.) Kuntze are also occurring in the campus. Number of above species decreased in number and a few face the danger of going extinct due to anthropogenic activities (regular clearing and construction activities). Hence in terms of conserving the available floral biodiversity, it is pertinent to set up abotanical garden within the campus and cultivate

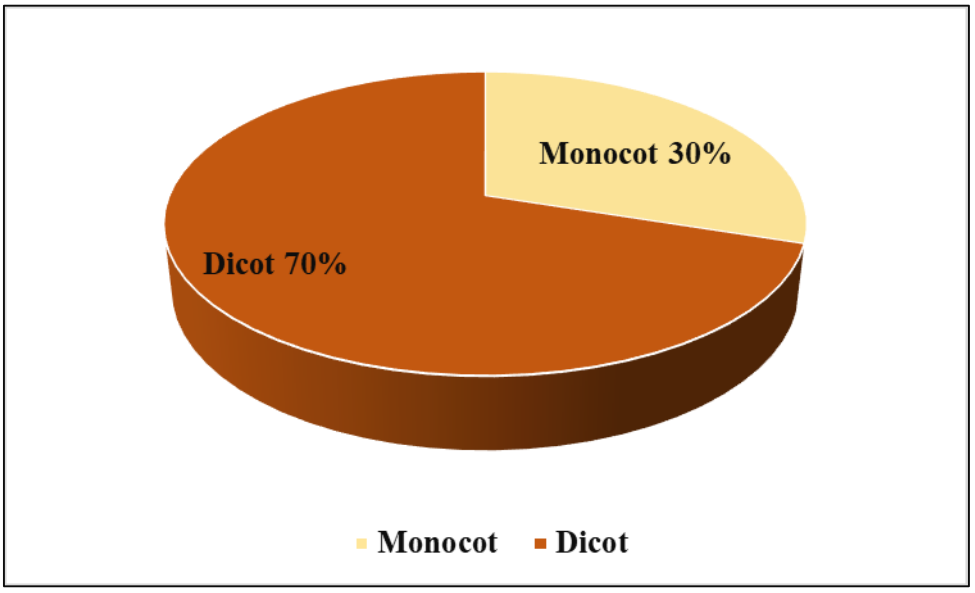
them while protect the ones that grownaturally on the grounds upon the vegetation maintenance.

Invasive species

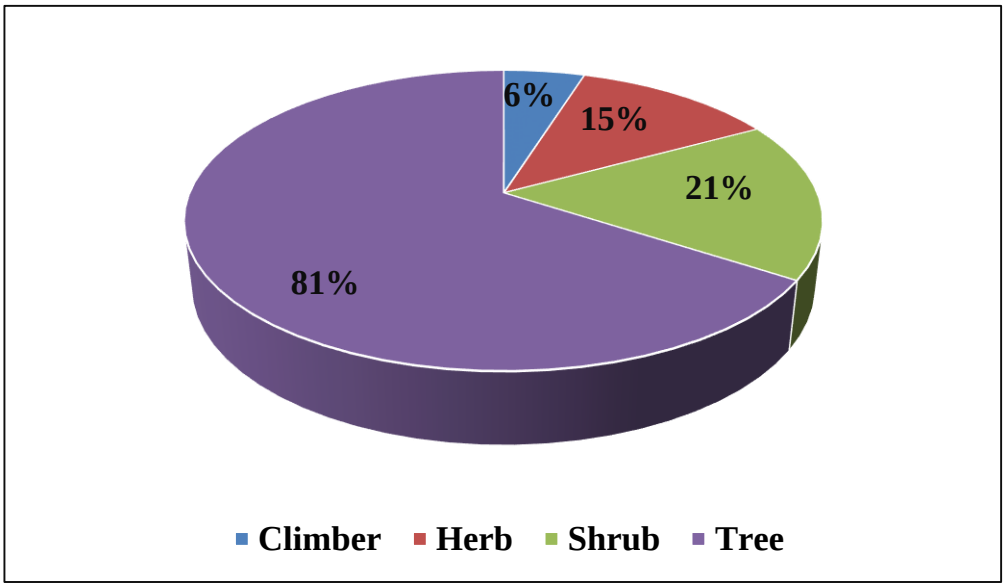
The campus has 33 invasive species such *as Senna spectabilis, Hypoestes phyllostachya, Maesopsis eminii, Mikania micrantha, Helianthus tuberosus, Hieracium umbellatum, Hamelia patens, Jatropha integerrima, Lantana camara, Eupatorium cannabinum Solanum violaceum, Calophyllum inophyllum and Roystonea regia.* These invasive species are indicated as disturbances to the natural setting in the vegetated areas.

The alien / exotic species *viz., Tabernaemontana divaricata, Muntingia calabura, Pyrostegia venusta, Cassia siamea, Annona squamosa* occur in the campus. Two Threatended species such as *Manilkara elengi and Swietenia mahagoni* were also observed in the campus.

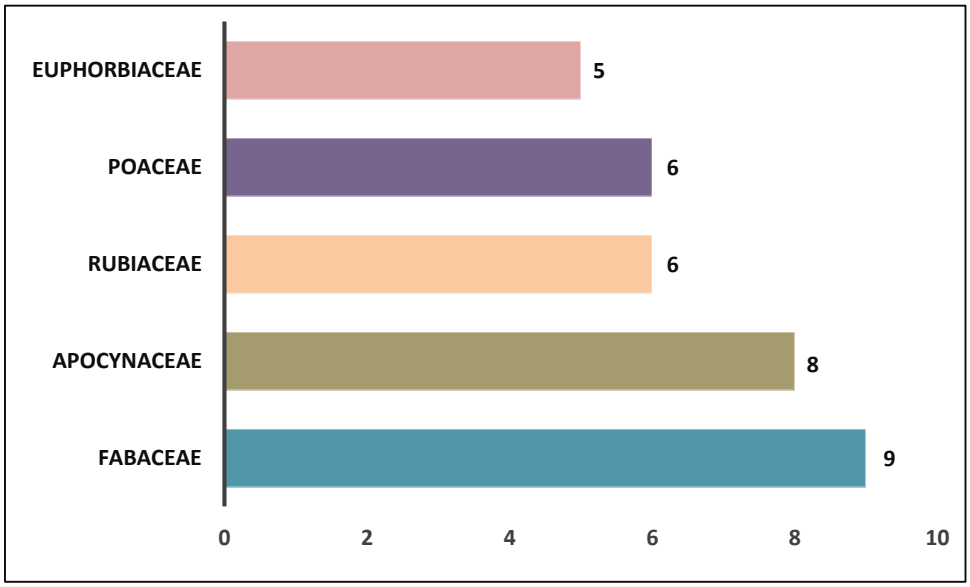
Some of the species are utilized as fruit yielding like *Mangifera indica, Manilkara zapota, Musa paradisiaca, Phyllanthus acidus, Syzygium cumini, Syzygium fruticosum, Phyllanthus emblica, Prunus amygdalus* and *Psidium guajava.*



Systematic groups of the plants in the AIT campus



Analysis of habit-wise distribution of plant species in the campus area



Plant families with higher number of species in the campus area

The biodiversity of AIT Campus comprises a sum of 123 species belonging to 72 genera under 52 families besides the lichens, mycoflora, pteridophytes and bryophytes. Among the documented higher plants, Dicots are dominating with 70 % followed by monocots 30%. Over all analysis revealed that trees weredominating flora (81%) followed by herbs, shrubs and climbers which accounts 15, 21 and 6 respectively. Among the documented dicots, Polypetalae formed a majorproposition with 25 families, 27 genera and 60 species; Gamopetalae with 10 families, 23 genera and 28 species while Monochlamydeae with 10 families, 12 genera and 20 species. In monocots, spreading over 10 genera belonging to 15 species. At the time of green campus audit at AIT campus, a total of 33 invasive floral species were recorded. These invasive species show disturbances to the natural setting in the vegetated sector.

Table 5. List of Flowering plants in the AIT Campus

Sl. No	Common Name	Botanical Name	Family	Habitats
1	Monkey Bush	*Abutilon indicum*	Malvaceae	Shrub
2	Auri	*Acacia auriculiformisa*	Mimosaceae	Tree
3	Goat Weed	*Ageratum conyzoides*	Asteraceae	Herb
4	Floss Flower	*Ageratum houstonianum*	Asteraceae	Tree
5	Women's tongue	*Albizia lebbeck*	Mimosaceae	Tree
6	Allamanda	*Allamanda cathartica*	Apocyanaceae	Climber
7	White cheesewood	*Alstonia scholaris*	Apocynaceae	Tree
8	Sessile joyweed	*Alternanthera sessilis*	Amaranthaceae	Herb
9	Soursop	*Annona muricata*	Annonaceae	Tree
10	Custard apple	*Annona reticulata*	Annonaceae	Tree
11	Sugar Apple	*Annona squamosa*	Annonaceae	Tree
12	Burflower - tree	*Anthocephalus chinensis*	Rubiaceae	Tree
13	Black currant tree	*Antidesma ghaesmbilla*	Phyllanthaceae	Tree
14	Aloewood	*Aquilaria malaccensis*	Thymelaeaceae	Tree
15	Christmas Tree	*Araucaria columnaris*	Araucariaceae	Tree
16	Norfolk Island pine)	*Araucaria heterophylla*,	Araucariaceae	Tree
17	Ganges Primrose	*Asystasia gangetica*	Acanthaceae	Herb
18	Star fruit	*Averrhoa carambola*	Oxalidaceae	Tree
19	Neem	*Azadirachta indica*	Meliaceae	Tree
20	Orchid tree	*Bauhinia variegata*	Fabaceae	Tree
21	Common bamboo	*Bambusa vulgaris*	Poaceae	Tree
22	Thorny bamboo	*Bambusa arundinacea*	Poaceae	Herb
23	Silk cotton tree	*Bombax insigne*	Malvaceae	Tree
24	Toddy Palm	*Borassus flabellifer*	Arecaceae	Tree
25	Gray Nicker	*Caesalpinia bonducella*	Caesalpiniaceae	Shrub
26	Peacock flower	*Caesalpinia pulcherrima*	Caesalpiniaceae	Shrub
27	Leopard tree	*Caesalpinia ferrea*	Fabaceae	Tree
28	Alexandrian laurel balltree	*Calophyllum inophyllum*	Calophyllaceae	Tree
29	Giant milkweed	*Calotropis gigantea*	Apocynaceae	Shrub
30	Apple of Sodom	*Calotropis proceri*	Apocynaceae	Shrub
31	Wild guava	*Careya arborea*	Lecythidaceae	Tree
32	Papaya	*Carica papaya*	Caricaceae	Tree

33	Golden Shower Tree	*Cassia fistula*	Mimosaceae	Tree
34	Kassod tree	*Cassia siamea*	Fabaceae	Tree
35	Periwinkle	*Catharanthus roseus*	Apocynaceae	Shrub
36	Feather finger	*Chloris virgata*	Poaceae	Herb
37	Swollen finger grass	*Chloris barbata*	Poaceae	Herb
38	Lemon	*Citrus limon*	Rutaceae	Tree
39	Mandarian orange	*Citrus reticulata Blanco*	Rutaceae	Tree
40	Clausaena	*Clausaena heptaphylla*	Rutaceae	Tree
41	Aparajita vine	*Clitoria ternatea*	Fabaceae	Climber
42	Coconut tree	*Cocos nucifera L.*	Arecaceae	Tree
43	Rangoon creeper	*Combretum indicum*	Combretaceae	Climber
44	Sago palm	*Cycas revoluta*	Cycadaceae	Tree
45	Bermudagrass	*Cynodon dactylon*	Poaceae	Herb
46	Coco-grass	*Cyperus rotundus*	Cyperaceae	Herb
47	Rice sedge	*Cyperus difformis*	Cyperaceae	Herb
48	Basterd Rosewood	*Dalbergia lanceolaria*	Fabaceae	Tree
49	Flame of the forest	*Delonix regia*	Caesalpinaceae	Tree
50	Sweet William	*Dianthus barbatus*	Caryophyllaceae	Herb
51	Clove pink	*Dillanthus caryophyllus.*	Caryophyllaceae	Tree
52	Ebony	*Diospyros montana*	Ebenaceae	Tree
53	Abyssinian Gooseberry	*Dovyalis abyssinica*	Salicaceae	Tree
54	Indian olive	*Elaeocarpus floribundus*	Elaeocarpaceae	Tree
55	Money plant	*Epipremnum aureum*	Areceae	Climber
56	Lemon-scented gum	*Eucalyptus citriodora*	Myrtaceae	Tree
57	Tasmanian blue gum	*Eucalyptus globosus*	Myrtaceae	Tree
58	Indian tree Spurge	*Euphorbia tirucalli*	Euphorbiaceae	Tree
59	Mexican fire plant	*Euphorbia heterophylla*	Euphorbiaceae	Tree
60	The common fig	*Ficus carica*	Moraceae	Tree
61	Hairy fig	*Ficus hispida*	Moraceae	Tree
62	Scared fig tree	*Ficus religiosa*	Moraceae	Tree
63	Coffee plum	*Flacourtia jangomus*	Flacourtiaceae	Tree
64	Giant Cabuya	*Furcraea foetida*	Asparagaceae	Shrub
65	Female karata	*Furcraea tuberosa*	Asparagaceae	Shrub
66	White teak	*Gmelina arborea*	Verbenaceae	Tree
67	Silky Oak	*Grevillea robusta*	Proteaceae	Tree

68	Firebush	*Hamelia patens*	Rubiaceae	Shrub
69	Jerusalem artichoke	*Helianthus tuberosus*	Astraceae	Herb
70	Chinese hibiscus	*Hibiscus rosa-sinensis*	Malvaceae	Shrub
71	Roselle	*Hibiscus sabdariffa*	Malvaceae	shrub
72	Pignut	*Hyptis suaveolens*	Lamiaceae	Shrub
73	Arabian Nights	*Jasminum sambac*	Oleaceae	Shrub
74	Peregrina	*Jatropha integerrima*	Euphorbiaceae	Shrub
75	Pride of India	*Lagerstroemia speciosa*	Lythraceae	Tree
76	The Indian ash tree	*Lannea coromendalica*	Anacardiaceae	Tree
77	Common Lantana	*Lantana camara*	Verbenaceae	Shrub
78	Saipan mango	*Mangifera odorata*	Anacardiaceae	Shrub
79	Mango tree	*Mangifera indica*	Anacardiaceae	Tree
80	Bullet wood	*Manilkara elengi*	Sapotaceae	Tree
81	Sapota	*Manilkara zapota*	Sapotaceae	Tree
82	Chinaberry tree	*Melia azedarach*	Meliaceae	Tree
83	Champak	*Michelia champaca*	Magnoliaceae	Tree
84	Touch-me-not	*Mimosa pudica*	Fabaceae	Shrub
85	Tanjong Tree	*Mimusops elengi*	Sapotaceae	Tree
86	Indian mulberry	*Morinda citrifolia*	Rubiaceae	Tree
87	Indian mulberry	*Morinda tinctoria*	Rubiaceae	Tree
88	Drumstick tree	*Moringa oleifera*	Moringaceae	Tree
89	Cherry Tree	*Muntingia calabura*	Muntingiaceae	Tree
90	Curry Leaf Tree	*Murraya koenigii*	Rutaceae	Tree
91	Banana	*Musa paradisiaca*	Musaceae	Tree
92	Night flowering jasmine	*Nyctanthes arbor-tristis*	Oleaceae	Tree
93	Diamond flower	*Oldenlandia corymbosa*	Rubiaceae	Herb
94	Chay root	*oldenlandia umbellata*	Rubiaceae	Herb
95	Tree bean	*Parkia roxburghii*	Mimosaceae	Tree
96	Passion flower vine	*Passiflora incarnata*	Passifloraceae	Climber
97	Copperpod	*Peltophorum pterocarpum*	Caesalpiniaceae	Tree
98	Date palm	*Phoenix canariensis*	Arecaceae	Tree
99	Otaheite Gooseberry	*Phyllanthus acidus*	Phyllanthaceae	Tree
100	Indian goose berry	*Phyllanthus emblica*	Phyllanthacea	Tree
101	Bridal Bouquet	*Plumeria pudica*	Apocynaceae	Shrub
102	Great White Frangipani	*Plumeria obtusa*	Apocynaceae	Shrub

103	Asoka tree	*Polyalthia longifolia*	Annonaceae	Tree
104	Indian kino	*Pterocarpus marsupium*	Fabaceae	Tree
105	Red Sandal wood	*Pterocarpus santalinus*	Fabaceae	Tree
106	Pomegranate	*Punica granatum*	Lythraceae	Tree
107	Sandal wood	*Santalum album*	Santalaceae	Tree
108	Agati	*Sesbania grandiflora*	Fabaceae	Tree
109	Toothbrush tree	*Streblus asper*	Moraceae	Tree
110	False lime	*Suregada multiflora*	Euphorbiaceae	Tree
111	American mahogany	*Swietenia mahagoni*	Meliaceae	Tree
112	Rose Apple	*Syzygium jambos*	Myrtaceae	Tree
113	Pinwheel Flower	*Tabernaemontana divaricata*	Apocynaceae	Shrub
114	Teak	*Tectona grandi*	Lamiaceae	Tree
115	Yellow bells	*Tecoma stans*	Bignoniaceae	Climber
116	Toon tree	*Toona ciliate*	Meliaceae	Tree
117	Pigeon wood	*Trema orientalis*	Cannabaceae	Tree
118	False White teak	*Trewia nudiflora*	Euphorbiaceae	Tree
119	Yellow alder	*Turnera ulmifolia*	Turneraceae	Herb
120	White buttercup	*Turnera subulata*	Turneraceae	Herb
121	Zunna berry	*Ziziphus glabrata*	Rhamnaceae	Tree
122	Indian jujube	*Ziziphus mauritiana*	Rhamnaceae	Tree
123	Jackel jujube	*Ziziphus oenoplia*	Rhamnaceae	Shrub

Dypsis lutescens

Cycas revoluta

Phoenix reclinata

Quercus myrsinifolia

Junglans olanchana

Phyllostachys aureosulcata

Dracaena fragrans

Tectona grandis

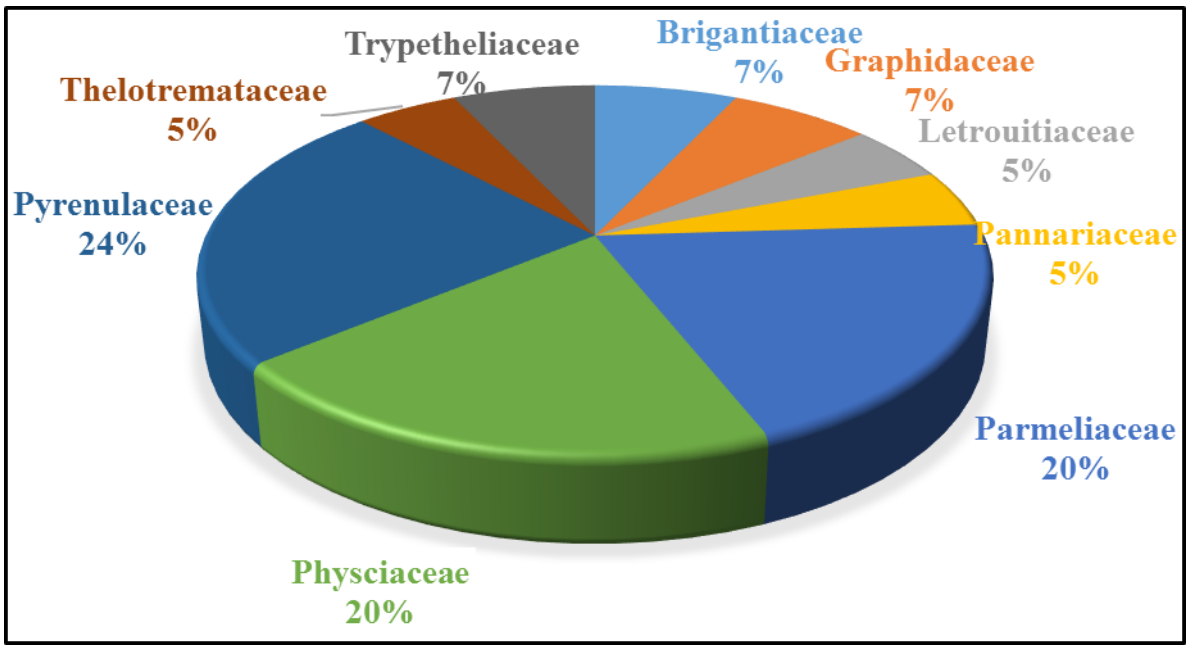
Agapanthus sp

13.3.1.2. Lichen diversity in the AIT College campus

Lichens are one of the most fascinating symbiotic organisms found worldwide. The lichens species are ubiquitous and common inhabitants of the bark of the tree, rock surface, soil etc. They are a lower group of plants coming under non-flowering plants that live in a variety of substrates under a wide range of environmental conditions with or without causing harm to the hosts. Ecologically, lichen plays important roles in soil formation; re-establishes life on earth; fixes atmospheric nitrogen; plant's health, ecology distribution, and in the formation of organic matter of habitat which in turn benefitting mosses in nutrient availability. A unique synergetic association between a fungal and an algal species results in lichens and occupied in plant kingdom. In this relationship both the organisms are mutually benefited.

The algal partner may be cyanobacteria or the blue green algae and this is responsible for the process of photosynthesis. The algae thus provide food or nutrition for the fungi too. The fungal partner in turn provides space and protection for the algae. The lichen is an autotrophicorganism in the sense that they can produce their own food by the process of photosynthesis. Even though the lichen is made up of two different organisms, the characteristics of the lichen are entirely different from the original characteristics of thealgal and the fungal partner. Lichens are classified as micro lichens and macro lichensin which the microlichens cover the substrate on which they grow in the form of a crustwhereas macro lichens grow in the form of a bush or a leaf like structure. The major forms of lichens are a) Foliose lichens exhibit a flat leaf like thallus, b) Fruticose lichensexhibit erect, pendulous and bushy thallus and c) Crustose lichens exhibit flat crust shaped thallus.

Lichen diversity recorded in the AIT campus showed a total of 25 differlichens species representing 16 genera and 11 families. The observation on lichen diversity revealed that three types of lichens growth forms. The lichens belonging to the genus,*Brigantiaea, Buellia, Trypethelium, Letrouitia Anthracothecium Pyrenula* and *Graphis* sp. were accounted 68% diversity coming under crustose lichens. Ten species of foliose lichens belonging to the genus, *Pannaria Canoparmelia*, *Parmotrema*, *Hypotrachyna, Pyxine* and *Physcia* were accounted to about 28% of lichens. One single species of *Usnea* accounted for fruticose lichens.



Lichen Families in AIT Campus

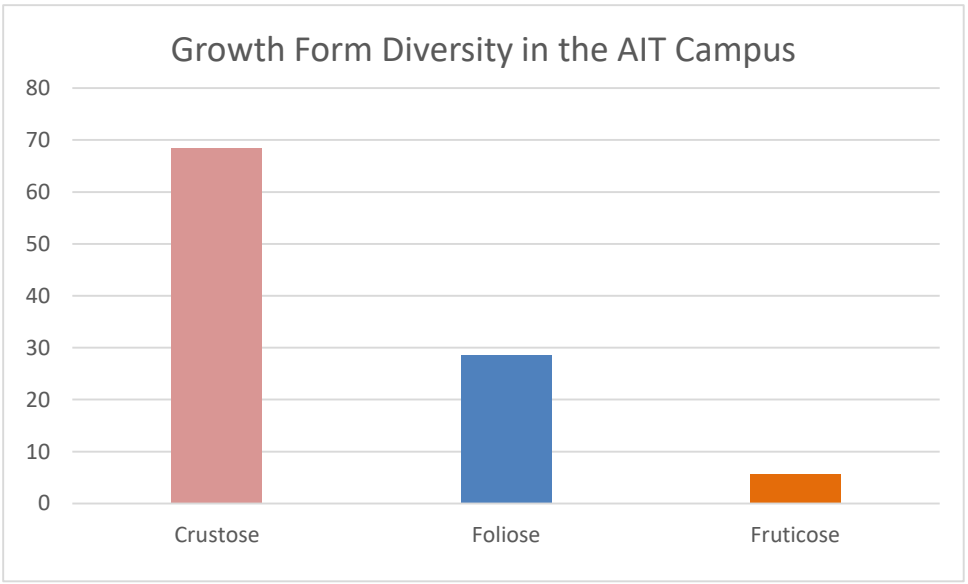


Table 6. Lichen diversity of the AIT campus with respect to family, substratum and growth forms in genus and family wise classification

S. No	Lichen diversity	Family	Growthforms
1.	*Anthracothecium assamiense*	Pyrenulaceae	Crustose
2.	*Anthracothecium corticatum*	Pyrenulaceae	Crustose
3.	*Anthracothecium macrosporum*	Pyrenulaceae	Crustose
4.	*Brigantiaea leucoxantha*	Brigantiaceae	Crustose
5.	*Brigantiaea nigra*	Brigantiaceae	Crustose
6.	*Buellia conformis*	Physciaceae	Crustose
7.	*Canoparmelia texana*	Parmeliaceae	Foliose
8.	*Usnea undulata*	Parmeliaceae	Fruticose

9.	*Usnea pictoides*	Parmeliaceae	Fruticose
10.	*Trypethelium tropicum*	Trypetheliaceae	Crustose
11.	*Trypethelium eluteriae*	Trypetheliaceae	Crustose
12..	*Pyxine minuta*	Physciaceae	Foliose
13.	*Pyxine cocoes*	Physciaceae	Foliose
14..	*Pyrenula subglabriuscula*	Pyrenulaceae	Crustose
15.	*Pyrenula nitens*	Pyrenulaceae	Crustose
16.	*Pyrenula interducta*	Pyrenulaceae	Crustose
17.	*Physcia tribacia*	Physciaceae	Foliose
18.	*Physcia alba*	Physciaceae	Foliose
19.	*Phaeographina wattiana*	Graphidaceae	Crustose
20..	*Pannaria stylophora*	Pannariaceae	Foliose
21.	*Myriotrema terebrans*	Thelotremataceae	Crustose
22.	*Letrouitia domingensis*	Letrouitiaceae	Crustose
23.	*Hypotrachyna awasthii*	Parmeliaceae	Foliose
24.	*Graphis guimarana*	Graphidaceae	Crustose
25.	*Everniastrum nepalense*	Parmeliaceae	Foliose

13.3.3. Algal diversity in the AIT campus

Microcystis, Oscillatoria, Oedogonium, Spirogyra, Volvox, Chlamydomonas, Scytonema and *Cladophora spp.* belonging to the class of Cyanophyceae, Chlorophyceae and Bacillariophyceae are the predominant species found in the campus.

The families Chlorellaceae, Closteriaceae, Desmidiaceae, Radiococcaceae, Ulotrichaceae, Uronemataceae and Oedogoniaceae were represented by single genus and species. Chlorophyceae plays an important role in both terrestrial and aquatic ecosystem as most of the members are found to be ecologically important. The highest diversity of Chlorophyceae indicated relatively good health of atmosphere. The presence of these algal species in abundance can be concluded that the AIT Campus ecosystem has high amount of organic nutrients in soil and rock. Generally, occurrence of abundant algal flora at a place indicates the availability of abundant nutrients along with conducive favourable environmental conditions.

13.3.1.3. Mushrooms diversity in the AIT campus

Mushrooms, edible basidiomycete, represent white rot fungi which contained higher number of proteins, rich in minerals with medicinal properties. At present three mushroom varieties (white mushroom, the paddy-straw mushroom and the oyster

mushroom) are being cultivated in India. These are most popular, economically sound to grow and is extensively cultivated throughout the world. Due to moderate temperature requirement for luxuriant growth, its cultivation is restricted to the cool climatic zones and during winter months in the plains of Coimbatore region. Mushroom growth yield is influenced by the type of compost, spawn, temperature, percentage of moisture and also affected by the pests and disease-causing agents. There has been extensive discussed in recent years, as far as the production of fungal protein from domestic, agricultural and industrial wastes. Since mushrooms have a very short life span, it should reach to consumers within a short time or immediately canned. Mushroom growth is determined by means of carbohydrate content in the substrates like paddy straw, sugarcane molasses, saw wood dust and other plant waste materials.

The AIT campus has various mushroom types covering poisonaous, edible and medicinal varieties such as white mushroom (*Agaricus bisporus* and *A. laccata*), the paddy-straw mushroom (*Volvariella vovvacea*), oyster mushroom (*Pleurotus sajor-caju* and *P. florida*), button mushroom (*Omphalotus olearius*) and other mushroom types such as *Amauroderma conjunctum, Termitomyces fuliginosus, Pycnoporus cinnabarinus* and *Volvariella bombycina.*

13.3.2. Fauna Diversity in the AIT campus

13.3.2.1. Birds Diversity in the AIT campus

The observations on fauna diversity indicated that the AIT campus has a large number of living as well as visiting animals, birds, reptiles and insects including termites. A total number of 20 birds belonging to 15 different species representing 12 families and 10 orders were recorded from different habitats during winter and summer. During this study, Passeiformes constituted the predominating group representing 8 families. Out of 20 bird species, 10 species were found to be migratory to favourable environment and high availability of food resources.

Table 7. Birds Diversity in the AIT campus

S.No	Common Name	Scientific Name
1.	Lesser Whistling Teal	*Dendrocygna javanica*
2.	Asian Openbill Stork	*Anastomus oscitans*
3.	Indian Pond Heron	*Ardeola grayii*
4.	Little Egret	*Egretta garzetta*
5.	Black Kite	*Milvus migrans*
6.	Common Pigeon	*Columba livia*
7.	Common Myna	*Acridotheres tristis*
8.	Oriental Magpie Robin	*Copsychus saularis*
9.	Asian Pied Myna	*Gracupica contra*
10.	House Sparrow	*Passer domesticus*
11.	Eurasian Tree Sparrow	*Passer montanus*
12.	Spotted Dove	*Spilopelia chinensis*
13.	Eastern Jungle Crow	*Corvus levaillantii*

14.	Greater Flameback	*Chrysocolaptes guttacristatus*
15.	Purple sunbird	*Cinnyris asiaticus*

Table 8. Total number of visiting birds in the AIT campus

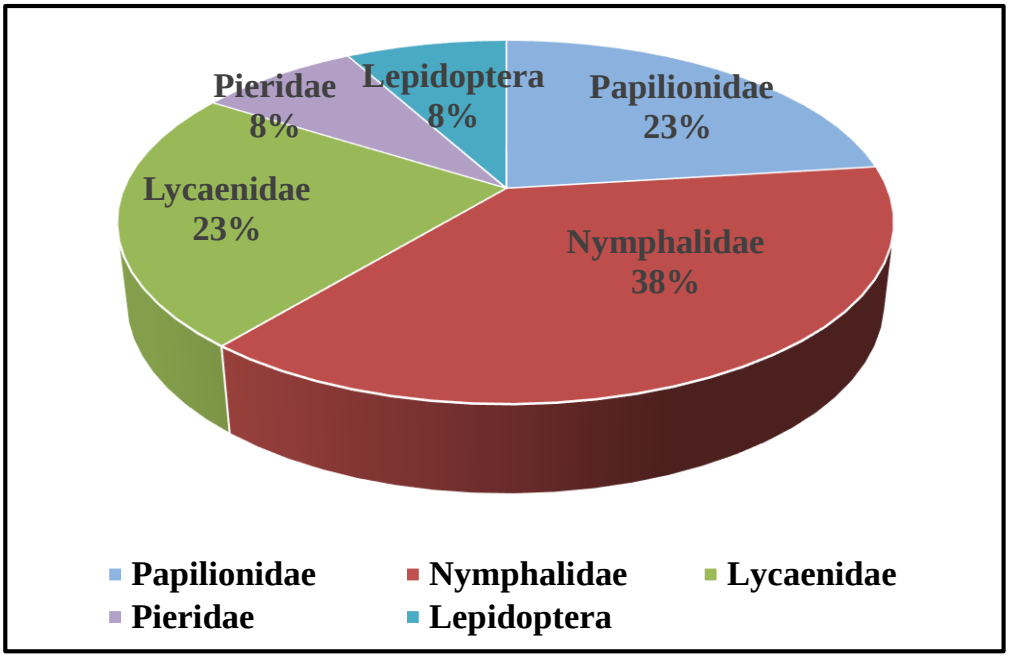
S.No	Common Name	Scientific Name
1.	Little Cormorant	*Phalocrocorax niger*
2.	Common Kingfisher	*Alcedo atthis*
3.	Green bee-eater	*Merops orientalis*
4.	Red vented Bulbul	*Pycnonotus cafer*
5.	Black Drongo	*Dicrurus macrocercus*

13.3.2.2. Butterflies' diversity in the AIT campus

The AIT campus has five family level diversities such as Papilionidae, Pieridae, Nymphalidae, Lycaenidae and Hesperiidae in which Common butterflies' species such as Mormon, Emigrant, Pansy are commonly found.

Table 9. List of Butterflies recorded in the AIT campus

S.No.	Common Name	Scientific Name	Family
1.	Common Mormon	*Papilio polytes*	Papilionidae
2.	Great Mormon	*Papilio memnon*	Papilionidae
3.	Common Birdwing	*Troides helena*	Papilionidae
4.	Chocolate Pansy	*Junonia iphita*	Nymphalidae
5.	Lemon Pansy	*Junonia lemonias*	Nymphalidae
6.	Common Sailor	*Neptis hylas*	Nymphalidae
7.	Common pierrot	*Talicada nyseus*	Lycaenidae
8.	Lemon emigrant	*Catopsilia pomona*	Pieridae
9.	Common seargent	*Athyma perius*	Nymphalidae
10.	Common lescar	*Pantoporia hordonia*	Nymphalidae
11.	Jezelbel	*Delias eucharis*	Lepidoptera
12.	Limeblue	*Chilades lajus*	Lycaenidae
13.	Tiny Grass Blue	*Zizula hylax*	Lycaenidae



Butterfly Diversity in the AIT campus

13.3.2.3. Mammals' diversity in the AITcampus

Mammals, a group of vertebrate animals (class: Mammalia), characterized by the presence of mammary glands (where females produce milk for feeding/nursing their young), a neocortex (a region of brain), fur or hair and three middle ear bones. These characteristic features differentiate them from reptiles and birds. Observation on diversity of mammals in the AIT campus indicated that around 6 Mammal genera are commonly distributed.

13.3.2.4. Amphibians' diversity in the AIT campus

Amphibians (class: Amphibia) are ectothermic, tetrapod vertebrates. All living amphibians represent the group Lissamphibia and they inhabit a wide variety of habitats. Most of them living within terrestrial, fossorial, arboreal or freshwater aquatic ecosystems. Amphibians naturally start out as larvae living in water, but some species bypass this by developed behavioral adaptations. Observation made on diversity of Amphibians in the AIT indicated that around 3 species are Amphibians are commonly distributed.

Generally, amphibians undergo metamorphosis from larva with gills to air-breathing adult with lungs. Skin of the Amphibians served as a secondary respiratory organ while very few terrestrial salamanders and frogs lack lungs and they rely entirelyon their skin for respiration. With their complex reproductive needs and permeable skins, amphibians are often ecological indicators. In recent decades, there has been a drastic decline in populations of many amphibian species around the globe.

Historically, amphibians evolved in the Devonian period from sarcopterygian fish with lungs and bony-limbed fins, which were helpful them to adapt to dry land conditions. Their spread was higher and predominant during Carboniferous and Permian periods and they were later displaced by reptiles and other vertebrates. Over a period, amphibians shrank in size and their diversity decreased drastically, leaving only the modern subclass Lissamphibia. Modern amphibian orders include Anura (the frogs), Urodela (the salamanders) and Apoda (the caecilians). Number of known amphibians species is nearly 70% are frogs. Observation made in the AIT Campus on diversity of

Amphibians revealed that around 3 species of Amphibians are commonly disseminated. The commonly found amphibians are Common Toad (*Duttaphyrnus melanosticus*), Common Tree Frog (*Polypedates teraiensis)* and Pygmy Toad (*Microhyla berdmorei).*

13.3.2.5. Grasshopper diversity in the AIT Campus

Grasshoppers, a group of insects belonging to the suborder Caelifera and they are probably most ancient living group of chewing herbivorous insects. They are typically ground-dwelling insects with powerful hind legs which allow them to escape from threats by leaping dynamically. As a hemimetabolous insects, they do not undergo complete cycle of metamorphosis. In other word, they hatch from an egg into a nymph or "hopper" which undergoes five moults, to become identical to that of an adult. Grasshoppers hear through the tympanal organ which can be found in the first segment of the abdomen attached to the thorax; its sense of vision is compound eyes. Under certain environmental conditions, some grasshopper species at high population densities can change colour and behaviour besides form swarms. Grasshoppers are plant-eaters; few species at times become as a serious pest of cereals, vegetables and pasture, especially when they swarm to destroy the crops over huge contiguous areas. Surveillance audit at AIT campus on diversity of Grasshoppers demonstrated that 6 species of Amphibians are commonly distributed which includes *Eyprepocnemis alacris, Cyrtacanthacris tartarica, Crucinotacris decisa, Aulacobothrus luteipes* and *Sathrophyllia rugosa*

13.3.2.6. Termites Diversity in the AIT Campus

Termites are most successful groups of insects on earth, colonising most landmasses. Their colonies range in size from a few hundred individuals to enormous societies with several million individuals. Eusocial insects, commonly Termites, are taxonomically ranking as infraorder. Isoptera, or alternatively as epifamily Termitoidae, within the order Blattodea (along with cockroaches). Although Termites are habitually known as "white ants", they are not ants and they are not closely related with them. Earlier, Termites were classified as a separate order from cockroaches. Recent phylogenetic studies revealed that they evolved from cockroaches, as they are deeply nested within the group and the sister group found to wood eating cockroaches of the genus *Cryptocercus*. More recent estimates suggest that they have originated during the Late Jurassic period evidenced with the first fossil records in the Early Cretaceous. Termites mostly nourish on cellulose based dead plant material (wood, leaf litter), soil and animal dung. Three species of Termites (*Odontotermes anamallensis, Trivitermes fletcheri* and *Nasutitermes indicola)* recorded during on-site Green Campus audit at campus and they are belonging to the Genera *Odontotermes, Trivitermes* and *Nasutitermes.*

13.4. An account of more Oxygen releasing and Carbon dioxide assimilating plants in the AIT Campus

There are some plants which are being considered highly efficient in oxygen releasing and carbon dioxide assimilating (Carbon sinks) which in turn reflected the quality of the green campus. If more oxygen is made available in the campus naturally, the stakeholders may be free from various cardiovascular and pulmonary problems and breathing troubles. *Sansevieria zeylanica* (commonly known as snake plant or the mother-in-law's tongue plant) and Gerbera Daisy (*Gerbera jamesonii*) plants are unique for oxygen release during night time and they are able to purify the atmospheric air in terms of removal of toxic gases. Although options are available to enhance the level of oxygen by reducing CO_2 with the aid of oxygenators and air purifiers, there are certain alternatives to improve the air quality which is beneficial for both body and mind. Green campus audit at AIT campus revealed that the campus is well distributed with more oxygen releasing and CO_2 assimilating plants such as Neem, Tasmanian blue gum, Java Plum/Jamun, Arjun tree, Pipal Tree, Asoka tree, Banyan tree, Tanjong Tree, Curry Leaf Tree, Mango tree and Teak. There are 11 plant species whichare able create an eco-friendly atmosphere in terms of reducing erosion, moderating the climate, improving air quality and supporting wildlife besides they are economically important and valued for different medicinal aspects.

The ornamental plants such as Indian mulberry (*Morinda citrifolia*), Java Plum / Jamun (*Syzygium cumini*), Champak (*Michelia champaca*), Kassod tree (*Cassia siamea*) and White cheesewood (*Alstonia scholari*) are made available. In addition, medicinal plants such as *Albizia lebbeck*, *Annona squamosa*, *Azadirachta indica*, *Melia azedarach*, *Morinda tinctoria*, *Phyllanthus emblica*, *Pterocarpus marsupium*, *Tabernaemontana divaricate* and *Tectona grandis* are available in the

Oxygen releasing and Carbon dioxide assimilating plants in the AIT Campus

Table 10. List of Oxygen releasing and Carbon dioxide assimilating, Ornamental / Medicinal plants in the AIT Campus

S.No	Plant Name (Kanada Name)	Plant Name (English)	Scientific Name	Grouping / Nature	Characteristic Features of the plant
1.	Bevina mara	Neem	*Azadirachta indica*	Dicots	O_2 releasing Plant
2.	Ṭyāsmēniyan nīli gam	Tasmanian blue gum	*Eucalyptus globosus*	Dicots	CO_2 assimilating Plant / Medicinal Plant
3.	Nerale Hannu	Java Plum/Jamun	*Syzygium cumini*	Dicots	Ornamental Plant
4.	Matthimara	Arjun tree	*Terminalia arjuna*	Dicots	O_2 releasing Plant
5.	Arashi	Pipal Tree/Sacred Fig	*Ficus religiosa*	Dicots	O_2 releasing Plant
6.	Achenge	Asoka tree	*Polyalthia longifolia*	Dicots	CO_2 assimilating Plant
7.	Aalada mara	Banyan tree	*Ficus benghalensis*	Dicots	O_2 releasing Plant
9.	Karibevu	Curry Leaf Tree	*Murraya koenigii*	Dicots	O_2 releasing Plant
10.	Amangara gida	Mango tree	*Mangifera indica*	Dicots	O_2 releasing Plant
11.	Thega/ Saguvani	Teak	*Tectona grandis*	Dicots	CO_2 assimilating Plant

13.5. Lawns, Trees, Herbs, Shrubs, Climbers and Lianas in the AIT Campus

Lawns are gazing features of unutilized land made to cover the soil with green grass for the ambience of the place to have a greenish look. Lawn provides a hollow space among the building structures. The shaded trees in between the grass lawn, pathways and garden benches are meaningful lineaments to the green campus. The advantage of lawn is that it prevents the unintended weeds growth in the unutilized landscape areas. Trees that are native to land with medicinal value, ethnicity and environmental value add an advantage to green building. Purpose of trees is to provide shade, atmospheric CO_2 sequestration and supply of oxygen that serves the purpose of a green campus. Herbs are small plants with medicinal values and shrubs are small plants with thick stems and can hold soil to some extent than the herbs and serve the purpose of soil erosion. Climbers can grow with the support of wall structures and the climbers can enhance the wall value with greeneries.

The AIT campus has a huge number of trees, herbal plants, bushes, climbers, lianas, twiners and lawns. It is further observed that all the plants are growing profusely and showing healthier free from pests and diseases attack. The commonly available native as well as wild shrub species in the AIT campus are Monkey Bush (*Abutilon indicum*), Blue weed (*Ageratum houstonianum*), Peacock flower (*Caesalpinia pulcherrima*), Red Powder Puff (*Calliandra haematocephala*), Indian shot (*Canna indica*), Periwinkle (*Catharanthus roseus*), Rusty kamala (*Mallotu stetragona*), Elm-Leaf Grewia (*Microcos panicula*) and Lily of the Valley shrub (*Pieris japonica*)

Similar to that of shrubs, there are 21% kinds of herbs available in the AIT campus. The predominant species of herbs available in the AIT campus are Ganges Primrose (*Asystasia gangetica*), Lamb's quarters (*Chenopodium albumsp*), Common twayblade (*Neottia ovata*), Diamond flower (*Oldenlandia corymbose*) and Upright pellitory (*Parietaria officinalis*)

The existence of climber, creepers, twiners and lianas species available which accounted more than 6 species in the AIT campus are Allamanda (*Allamanda cathartica*), Aparajita climbing vine (*Clitoria ternatea*), Rangoon creeper (*Combretum indicum*), Money plant (*Epipremnum aureum*), Flame plant (*Pyrostegia venusta*) and Bengal clock plant (*Thunbergia grandiflora*). The major grasses are Periapullu (*Aristida pinnata*) and Crowfoot grass (*Dactyloctenium aegyptium*). Weak stemmed creeper plants grow alongside the ground,depends another plant support, or climb up a wall by means of extending stems or branches. Climbers, include herbs or shrubs, whose stems are weak, which needs support to grow, where it climbs up trees and walls and grow vigorously without any pest and disease attack which are observed in the AIT campus.

13.6. Establishment of different Gardens in the AIT Campus

Growing many types of herbal plants having medicinal importance in the campus becomes more attractive and useful if concept gardens are maintained. Medicinal plant gardens can contain the locally available medicinal plants, RET (Rare Endangered Threatened) listed plants and those plants are most useful in terms of economic importance. The tree garden / arborea can be planted based on the zodiac signs which

would attract the public and students, faculties, staff members, employees and educate them based on their uses. In the tree gardens, trees as linings all over the campus can act as oxygen corridors. Native trees along with trees like *Azadirachta* and *Ficus* species can be cultivated at the maximum as these plants are used to remove thedust particles and carbon lead from the air and purifies the air considerably. Similarly,the ornamental plants with beautiful flowers can be maintained in the frontage gardensof campus for attraction and good ambience. This will give an overall aesthetic look and also provide fresh air for healthy respiration to the stakeholders.

In AIT, they are planted ornamental plants for the display of appealing characteristic features including: varying types of leaves and their texture, flowers and their fragrance, fruit, stem and bark. In some places, plants unusual features also planted to be of interest, such as the prominent thorns of cactus and snake cactus. There are 10 varieties of ornamentals plants that are maintaining the surroundings of the college campus. In front of principal's room, cafeteria, college grounds and many places are planted with ornamentals plants of nearly 25 plants in different places. These plants are making the college campus pleasantly and decoratively. Every year they try to plant new varieties with help of Environmental department. Once in three months the unwanted barks of the plants are cut it down, to make the beautification of their campus. No plant is cut unless it becomes dead. Not only can visitors enjoy seeing the ornamentals plants and also humming birds, butterflies shelter in that. This environment makes campus greenish and pleasant.

13.7. Natural Topography and Vegetation

Natural topography means the original geographical features of the campus, around 30-35% of the organization should have the natural features like rocks, water resources, slopes, landscape, pathways, etc. and the altered topography can be accounted for, it is facilitated. The vegetation in the land alone is considered as they are part of the natural topography. The vegetation in the artificially created structures are also accounted for when it is reported more than 30% of the claimed green campus audit site. Vegetation is the cultivation of a bunch of plants irrespective of the plant *taxa* for the covering of the area or ground topography. Natural topography is better appreciated with wild vegetation than the artificially created topography like pathways and parking areas. The observation at the AIT campus indicated that more than 25% natural topography and vegetation have been maintained properly. Further, there was no anthropogenic activity in some of the interior side of the campus.

13.8. Rainwater Harvesting System and Percolation Pond

Rainwater harvesting system is a traditional old practice not only in drought prone areas and also in areas having seasonal rainfall. The Indian traditional rainwater harvesting is being practiced in various parts of the country to improve the ground waterstatus. Now the threatening features of the lower ground level of water has created a revamp of newly featured rainwater harvesting systems. Indian traditional rainwater harvesting systems are constructed based on three modes either direct pumped, indirectpumped or by gravity alone in the campus. In addition, lakes, bonds, water channels and any other water reservoir methods are considered as the rainwater harvesting system. The green campus should have adopted any of the above said modes

of rainwater harvesting or any new methods that has the benefit of conserving the water resource as well. A small square shaped pit containing gravels and sands constructed nearthe building for rainwater harvesting and connected with pipes from the roof of the building to pit. During the audit, there are was a well-developed rain harvesting system of water channels connected with a round shaped pit observed with the AIT campus. Rainwater harvesting structures and recharge wells have been commissioned in the campus at different locations.

13.9. Landscape design and Soil Erosion control

Landscape management is the maintenance of land to make sure that backgrounds can fulfil the needs and objectives in an effective and sustainable manner for current and future members. It is an action that forms a perception of viable expansion, to ensure the preservation of a panorama, in order to help and harmonize alterations which are supplemented through social, monetary and environmental methods. Landscape design is an important feature for any disasters to control especially with respect to the soil erosion. In general, soil erosion occurs if the design of the land is not altered so as to prevent the slope features by strong vegetation and use of a plant buffer zone as safe for escape of nutrients or fertilizers entering the streams. When the slope features are altered, adequate vegetation can alone be enough to prevent soil erosion. The observation revealed that the A campus has very good landscape design without disturbing the natural vegetation. Contour ploughing is being done at right angles to the slope wherever possible and ridges and furrows are properly maintained to break the flow of water down to the empty land. These activities are widely adopted to control soil erosion in the campus.

13.10. Operation of Water irrigation, Drip and Sprinkler Irrigation methods

Maintaining the green campus and water conservation mechanisms should be applied efficiently in the campus. Well planned water irrigation systems like sprinklers and drip should be implemented in the entire green area of the campus for an effective water management system. This can be implemented only when the plantations are well planned. The tree growing areas can be connected with drip irrigation and medicinal plants growing areas and flower gardens can be connected with sprinkler irrigation. The AIT campus has taken sufficient efforts to maintain the plants greenish and frequency of watering to the plants. A register is maintained to note down the timing of watering the plants and quantity of water poured every time. Internal auditing of time of plantation, number of times the plants are watered and growth parameters of the plants in the campus is beings carried out.

13.11. Importance of Biodiversity Conservation

The campus should be a mini biodiversity conservation area, wherein, more greenery due to native plant species, medicinal plant garden, concept gardens, flowering plants that attract bees, birds, beetles and other animals like squirrels should be monitored as ecosystems. Shade giving trees in the paths, flowering trees in the avenues and fruit trees at the back yards also would attract birds, bees, butterflies and squirrels.The AIT campus is free of exotic plants that cause threat to the natural vegetation. It is like a mini bio-reserve rich in native species and endemic plants. A complete data on the soil type, water holding capacity and soil nutrition in the campus is being thoroughly studied internally or with the Government agriculture departments. It is useful for cultivation of various native and wild plant species and also helps in choosing the proper irrigation system.

13.12. Pedestrian Path facility at the AIT campus

The concept of pedestrian path is to give safe space to walk freely by the pedestrian. It is very important in the green campus in terms of freely walk pedestrians or people going on foot without any obstacles. The pedestrian path is otherwise called as zebra crossing by the combination of black and white stripes remained to characterize the zebra. This path is specially designed space to the stakeholders to walk freely without any disturbance. It is useful for cross walk and easy to recognize to walk by means of wide black and white colour combination of lines and authorize to walk while crossing and walking on the foot. In addition, pedestrian path is created in the green campus along with road side which meant for walking only using special cement bricks and stones. The pedestrian path aims to end circulation not only cars, buses, vans, trucks and other vehicles but also giving safe space to the pedestrians, where cross and pass-through blocks and also forcing vehicles to comply with it. The AIT campus is having very good pedestrian path for stakeholders.

13.13. Use of Biofertilizers, Organic and Green manures

Natural or eco-friendly methods should be used to grow plants vigorously in thecampus which could reduce the environmental pollution. Use of biofertilizers, organic manures (cow dung, vermicompost and plant wastes and litters) and green manures to grow healthy plants in the medicinal plant garden, kitchen garden and terrace garden should be ensured to keep the campus organic. The plant waste such as fallen leaves, stems, fruits, nuts, seeds and other plant parts should be used to make green manures. A concrete or ground level green manure production unit and vermicomposting units will help to convert all the plant and animal based wastes into green/organic manures. This will be a healthy way of solid litter waste management in the campus. Minimal use of chemical fertilizers as part of integrated nutrient management system is acceptable but nil use of chemical fertilizers is highly appreciable and also helps to keep the campus more of an organic ecosystem. The soil, air, water and sunlight are the four major natural resources any campus gets. Proper use and conservation of these resources are mandatory in green campus audit sites. The available resources and their utilization should be accounted for from time to time. Management of the right way of utilization of these resources with the vision of sustainability should be carried out by framing a committee led by the Head of the Institution concerned. Biofertilizers such as Nitrogen fixing bacteria, Potassium and Phosphorus solubilizing bacteria, Potassium mobilizing fungi (VAM), farm yard manure, dried cow dung manure, vermicompost manures and biofungicides and biopesticides are extensively used in the AIT to cultivate plants. Agrochemicals, chemical fertilizers (urea, murate of potash, sulphate of potash, rock phosphate, etc.), pesticides and fungicides are not used. These practices are very well appreciated because air, water and soil pollution due to use of agrochemicals is eradicated which in turn to improve the soil health significantly.

13.14. Conduct of Outreach programmes for dissemination of Green Campus motto and Green pledge initiatives by Eco club, Nature club, Associations, Cells, Forums, NCC/Student Force and NSS bodies in Green Campus initiatives

Professional implementation of all the Eco plans in the campus should be done through the Eco clubs, Nature clubs, Science clubs, Youth Red cross units, Fine Arts clubs, Women cell, Associations, Forums, SSL, NCC (National Cadet Corps) and NSS (National Service Scheme). All the students, members of staff and employers should be mandatory members of the club and should do tree planting and maintenance of greenery in the campus periodically. Conducting frequent seminars, conferences, workshops, awareness rallies, etc. on topics relevant to the environment is necessary to educate and create awareness among the students and staff members. In addition, student's associations, cells, clubs and forums should be the first hand receivers of all the new plans proposed by the Government such as Swachh Bharath Abhiyan and Jal Shakti Abhiyan under

Clean India Mission and implement the same in the campus. The AIT has well developed, NSS, Swatch Bharath Abhiyan under Clean India Mission. These bodies are actively involved in mass cleaning programme across Hosur municipality. The AIT is conducting a large numberofactivities to conserve the nature and to teach about the importance of environment torural, tribal and urban people.

Awareness programmes on the green campus initiatives and dissemination of green motto and pledges are accounted in a sustainable manner. Its benefits and self-sustainability are being projected for wider centric on earth and Ecology conservation. Innovative practices that add up credentials in implementing the green campus which needs to be promoted in the awareness programme to the students and staff members including public domain. Technology driven solutions initiated by the green campus organization are periodically disseminated and documented successively for propagating the attitude of the green campus in wider masses. The AIT has taken sufficient attempts to disseminate the green campus motto and green pledge such as plastic carry bags eradication drive with Hosur municipal employees.

The AIT is implemented the Government schemes (Swatch Bharath Abhiyan under Clean India Mission) to give pure and safe water to rural people and teach the importance of cleanliness of toilets and restrooms to people living in Hosur. These activities are very important in view of the instantaneous vicinity to undertake progressive programmes and conducted Participatory rural appraisal programmes. It is involving the socioeconomic position of the inhabitants, natural resources, traditional knowledge systems, cropping patterns, etc. of the rural and tribal people. The AIT is also focusing on the development of women through Women Empowerment cell. It provides awareness to overcome women exploitation and d women entrepreneurs.

The AIT helps to develop social commitment and to expose the students to get sensitized to social realities and to build a link between the student community and the wider community. It initiated many soft skill training programmes to improve the skill set of the students. This has equipped them to face interviews, participate in group discussions with self-confidence and gain better placements.

13.15. Establishment of Aquarium and Aquatic plants

Growing fishes in the small ponds will keep the environment pleasant. In the closed environment like corridors and the front offices, auditoriums and galleryclasses placing the fish aquarium as well as plant aquarium will improve the scenic value of the place bringing peace to the people. The fish water waste alsocan be used as manure for growing potted indoor plants.Growing *Lotus, Lilly, Hydrilla* and other water plants will give a pleasant and calm environment and growing like *Guppies* can keep the water clean and neat. The fountains and small ponds can be built in thefrontages to give an aesthetic look and also growing water plants in these ponds will help to maintain the aesthetic sense of the environmentin greenish. The AIT campus has implemented a good aquatic ponds in which aquatic plants and birds will live generously.

13.16. Academic credentials: Projects, Dissertations and Thesis work

Project, Dissertation and Thesis works are academic effort credentials that always fosters the innovative ideas on thinking and implementation of new innovative approaches. Applied research work of the faculties, staff and student members should be implemented within the campus owing to the credential of the research. Those works

indicating the significance of empowering the green campus can be implemented or adopted in other organizations. If the innovation is capable of developing into entrepreneurship, then it is highly appreciable. The Report of projects and dissertations which are productive in methodologies should be disseminated through presentation and publication in social media, books, magazines and journals so as to spread the innovative ideas and methods to the broad public. The AIT faculty members and students from various subject domains are started a doing extensive project work related to nature conservation, environmental pollution, soil and water analysis.

Campus cleaning programme in AIT, Chikkamagaluru, Karnataka

Creating awareness programme on World Environment day By AIT, Chikkamagaluru, Karnataka

14. Best practices followed on Green Campus initiatives in the Organization

1. NSS activities at AIT conducted Medical Camp, , Blood Donation camp, Eye checkup Camp, Women Empowerment programme, Yoga Day Event, Swatch Bharat campaign Road Safety Programme, Awareness about Education to Government School Students and Planted the saplings in different places.

2. A well-established Rainwater harvesting system s to recharge ground water status by collecting rainwaters from the campus coinciding with the contour of the terrain and natural drains.

3. It is observed that the AIT is maintaining more than 70% of the green cover area after building construction as per the guidelines of World Green Building Council and Indian Green Building Council to provide a healthy environment and ecofriendly atmosphere to the stakeholders. It is calculated that the natural vegetation was 45 %and planted vegetation was 55%.

4. The AIT campus is established in Chikkamagaluru, Karnataka, India which provide pure atmosphere to the stakeholders under natural environment, topology, landscape and soil erosion. The campus is established without disturbing the natural vegetation along with the artificially created topography like pathways and parking areas.

5. In view of floral biodiversity in the AIT campus, a sum 123 species belonging to 72 Genera under 52 families covering trees, herbs, shrubs, climbers, lianas, twiners and lawns and 6 species belonging to Lichens, Pteridophytes, Bryophytes and Mycoflora like Mushrooms were recorded. It is observed that all the plants are growing profusely and showing healthier free from pests and diseases.

6. In view of faunal biodiversity in the AIT campus, a total of 6 living Mammals representing six Genera under six families, visiting Mammal species (3) belongingto three Genera under three families, 15 species of birds, 6 species of Grasshopper,4 species of Termites, 8 species of Amphibians, 6 species of Reptiles, 13 species of Butterflies and Three species Mosquitos were recorded and documented.

7. The AIT has established rainwater harvesting models, percolation pond to recharge the borewells by collecting rainwaters from the building roofs, open areas and playgrounds including unexplored areas which are channelized to flow of rainwaters to increase the ground water level.

8. The campus has a maximum number of more oxygen releasing and carbon dioxide assimilating plants such as *Azadirachta indica, Eucalyptus globosus, Syzygium cumini, Terminalia arjuna, Ficus religiosa, Polyalthia longifolia, Ficus benghalensis, Minusops elengi, Murraya koenigii, Mangifera indica* and *Tectona grandis.*

15. Recommendations for Greening

- The name board may be kept in each plant species in which the common name along with binomial name may be mentioned. The year of planting and economic importance with medicinal values if any may be mentioned in some plants so that the oldest as well as useful herbal plants may be identified in the campus.

- A well-established Biogas plant for energy efficiency management and to reduce the fossil fuel expenditure as well as impact on the environment may be created. The treated effluent from biogas plant may be diverted to the STP for storage and utilized for irrigation purpose.

- Honey Bee hives may be kept in the campus which is free from student's mobilization. Honeybees are natural pollinators help to increase the yield potential of plants (flowers, fruits and vegetables) upto 33%.

- Automatic water irrigation systems like drip and sprinkler irrigation methods adopted may be extended in the entire green area of the campus which in turn are useful to reduce the operation costs under energy conservation policy.

- To ensure Miyawaki Forest system, one student one plant concern to enrich the campus Green which provide an ecofriendly campus to the stakeholders.

16. Conclusion

The Adichunchanagiri Institute of Technology (AIT) is affiliated to Visvesvaraya Technological University, Belagavi and Recognized by All India Council for Technical Education, New Delhi.The AIT is to cater the needs of the nation in the development of technocrats and to provide facilities for educating and training men and women to meet the entrepreneurial and management needs. The management has created adequate infrastructural facilities and sufficient funds and is keen on developing the institution for higher education. The Organization has taken enormous efforts to maintain green campus to the students, research scholars, staff members and parents in a sustainable manner which reflects theimportance of the environment and stakeholders. It is conducting a large number of activities for the benefit of rural and tribal community people without disturbing the natural environment, topology, landscape management and vegetation. The AIT Campus is maintaining more than 70% of the green cover area after building construction along with the natural vegetation was 45 % and planted vegetation was 55%.

The natural topography and very good landscape design without disturbing the natural vegetation are being maintained by the AIT. A maximum number of more oxygen releasing and carbon dioxide assimilating plants are being maintained to provide pure atmosphere to the stakeholders. The installation of a rainwater harvesting system, percolation ponds and drip irrigation system to conserve rainwater and ground water are noteworthy in the campus. The Organization has created medicinal, herbal and ornamental gardens at small scale level for establishing a massive reforestation / afforestation planting programme in which a large number of trees and shrubs species were planted together for providing an eco-friendly atmosphere to the stakeholders in a sustainable manner.

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18. References

Adeniji, A.A. 2018. *Audit and Assurance Services. Lagos: Value Analyst Concept of Green Audit*. New Age International, New Delhi, India.

Aparajita, G. 1995. Environmental Audits- a Mean to Going Green. *Development Alternatives* **5** (4): 7-9.

APHA, 2017. *Standard methods for the estimation of water and wastewater*. Vol. II, 15th edn, Washington, US.

Arora, D.P. 2017. Environmental Audit–need of the hour. *International Journal of Advanced Research in Engineering & Management* **3** (4): 25-31.

Aruninta, A., Kurazumi, Y., Fukagawa, K. and Ishii, J. 2017. The integration of human thermal comfort in an outdoor campus landscape in a tropical climate. *International Journal of GEOMATE* **14** (44): 26-32.

Awasthi, D.D. 2007. *A Compendium of the macrolichens from India, Nepal and Sri Lank*. Bishen Singh Mahendra Pal Sin, Dehradun, Uttar Pradesh, India, 278p.

Beebee, T.J.C. and Griffiths, R.A. 2000. Amphibians and Reptiles. A Natural History of the British Herpetofauna. The New Naturalist Library, London, UK.

Brindusa M. Sluser, Caliman, F.A., Betianu, C. and Gavrilescu, M. 2007. Methods and procedures for environmental risk assessment. *Environmental Engineering and Management Journal* **6** (6): 573-592.

Carbon footprint calculation. www.carbonfootprint.com.

Chandrabose, M. and Nair, N.C. 1988. Flora of Coimbatore, Bishen Singh and Mahendra Pal Singh, Dehra Dun, India.

Choy, Er.A. and Karudan, R. 2016. Promoting campus sustainability: A conceptual framework for the assessment of campus sustainability. *Journal of Social Sciences and Humanities* **11** (2): 112-118.

Culberson, C.F. and Kristinsson, H.D. 1970. A standardized method for the identification of lichen products. *Journal of Chromatography A*. **46**: 85-93.

Fachrudin, H.T., Fachrudin, K.A. and Utami, W. 2019. Education activities to realize green campus. *Asian Social Science* **15** (8): 18-27.

Ferenc, M., Sedlacek, O., Fuchs, R., Dinetti, M., Fraissinet, M. and D. Storch 2014. Are cities different?. Patterns of species richness and beta diversity of urban bird communities and regional species assemblages in Europe. *Global Ecology and Biogeography* **23**: 479-489.

Freidenfelds, D., Kalnins, S.N. and Gusca, J. 2018. What does environmentally sustainable higher education institution mean?. *Energy Procedia* **147**: 42-47.

Gamble, J.S. and Fischer, C..E.C 1972. *The Flora of the Presidency of Madras*. Vols. 1 - 3. Rep. Ed. 1957. Adlard and Sons Ltd., London, UK.

Gowri, S. and Harikrishnan, V. 2014. Green computing: Analyzing power consumption using local cooling. *International Journal of Engineering Trends and Technology* **15** (3): 105-107.

Goyal, E. and Gupta, M. 2014. Moving toward socially and environmentally responsible management education-Case study of Mumbai. *Journal Applied Environmental Education & Communication* **13**: 146-161.

Henry, A.N., Chitra, V. and Balakrishnan, N.P. 1989. Flora of Tamil Nadu. Vol. 3. Botanical Survey of India, Coimbatore, Tamil Nadu, India.

Jayson, E.A. and D.N. Mathew, 2000. Diversity and species-abundance distribution of birds in the tropical forests of Silent Valley, Kerala. *Journal of the Bombay Natural History Society* **97** (3): 390–399.

Lauder, A., Sari, R.F., Suwartha, N. and Tjahjono, G. 2015. Critical review of a global campus sustainability ranking: Green Metric. *Journal of Cleaner Production* **108**: 852–863.

Leal Filho, W., Muthu, N., Edwin, G. and Sima, M. 2015. Implementing campus greening initiatives: approaches, methods and perspectives. Springer, London, UK.

León-Fernández, Y. and Domínguez-Vilches, E. 2015. Environmental management and sustainability in higher education: The case of Spanish Universities. *International Journal of Sustainability in Higher Education* **16**: 440-455.

Marrone, P., Orsini, F., Asdrubali, F. and Guattari, C. 2018. Environmental performance of universities: Proposal for implementing campus urban morphology as an evaluation parameter in Green Metric. *Sustainable Cities and Society* **42**: 226-239.

Matthew, K.M. 1983. The flora of Tamilnadu Carnatic. The Repinat Herbarium, Tiruchirapalli, Tamil Nadu, India.

Nair, N.C. and Henry, A.N. 1983. Flora of Tamil Nadu, India. Ser. 1: Analysis. Vol. 1. Botanical Survey of India, Coimbatore, Tamil Nadu, India.

NCP, 2016. *National Environmental Policy-2006*, Government of India, Ministry of Environment and Forest, New Delhi.

Nunes, B.T., Pollard, S.J.T., Burgess, B.J., Ellis, G., de los Rios, I.C. and Charnley, F. 2018. University contributions to the circular economy: Professing the hidden curriculum: Professing the hidden curriculum. *Sustainability* **10** (8): 112-119.

Orange, A., James, P.W. and White, F.J. 2001. Microchemical methods for the identification of lichens. British Lichen Society, London, UK, 375p.

Ounsaneha, W., Chotklang, N., Laosee, O. and Rattanapan, C. 2017. Predictors of ehavior intention to develop a green university: A case of an undergraduate university in Thailand. *International Journal of GEOMATE*. **15** (49): 162-216.

Pradip, J.S. and Patil, P.D. 2014. Green Audit - A tool for attaining sustainable development and achieving competitive advantage. *IBMRD's Journal of Management & Research,* **3** (1): 85-93.

Report of Green Audit, 2018. *Report of Green Audit Nitte Meenakshi Institute of Technology, Chennai, Tamil Nadu, India.* https://www.google.com /search?q =Green+Audit+ Report+Nitte+Meenakshi+Institute+Of+Technology&sxsrf

Ribeiro, J.M.P., Barbosa, S.B., Casagrande, J.L., Sehnem, S., Berchin, I.I., da Silva, C.G., da Silveira, A.C.M., Zimmer, G.A.A., Faraco, R.A. and de Andrade Guerra, J.B.S. 2017. Promotion of sustainable development at universities: The adoption of green campus strategies at the University of Southern Santa Catarina, Brazil. Springer Nature, Handbook of Theory and Practice of Sustainable Development in Higher Education. pp. 471-486.

Satean, G. 2017. The need to go beyond "Green University" ideas to involve the community at Naresuan University, Thailand. Springer Nature, Sustainability Through Innovation in Product Life Cycle Design. pp. 841-857.

SCSR, 2018. Sustainability Curriculum in UK University Sustainability Reports by Katerina Kosta, Springer, Implementing Sustainability in the Curriculum of Universities. World Sustainability Series, pp. 79-97.

Staniskis, J.K. and Katiliute, E. 2016. Principles, implementation and results of the new assessment and accreditation system "Engineering education for sustainable industries". Springer Nature, New Developments in Engineering Education for Sustainable Development. pp. 283-294.

Suwartha, N. and Sari, R.F. 2013. Evaluating UI Green Metric as a tool to support green universities development: Assessment of the year 2011 Ranking. *Journal of Cleaner Production* **61**: 46–53.

Verma, S., Ahmad, M. and Parwal, R. 2012. Green audit - A Boom to human civilization. *International Journal of Trends in Economics Management & Technology*, **1** (6): 82-86.

Venkataraman, K. 2009. India's Biodiversity Act 2002 and its role in conservation. *Tropical Ecology* **50** (1): 23-30.

Annexure - I

Methodology for Flora and Fauna Identification

I. Identification of Flowering Plant Species

Various vascular plant species were identified based on the following identification key by adopting the polyphasic taxonomic approach

Key to Plant Families Identification

1a. Seeds enclosed in fruit wall, Perianth Present… 2
b. Seeds not enclosed in fruit wall, perianth absent….....Gymnosperm
2a. Leaves usually net veined seeds-2..... 3
b. Leaves parallel veined, seeds-1… 66
3a. Petals free.....4
b. petals connate 41
4a. Corolla and calyx present… 5
b. Corolla and calyx absent….....24
5a. calyx of united sepals; ovary inferior 31
b. Calyx of distict or unit sepals; ovary syncarpous… 6
6a. Sepals imbricate in bud.....7
b. Sepals valvate in bud… 24
7a. Sepals more or less united at the base… 19
b. Sepals free.....8
8a. Stamens more than 12..... 9
b. Stamens 10 or fewer 13
9a. Sepals 2-3….....11
b. Sepals 4 or more….....10
10a. Stamens inserted on the disck… ..... Cleomaceae
b. Stamens inserted of the gynophore ..... Capparaceae
11a. Trees, Petals more or like the sepals; carpels free ..... Mangnoliaceae
b. Herbs, petals coloured unlike the sepals; carpels united… 12
12a. Plants with yellow sap, Flowers pedicelled .....Papaveraceae
B. Plants with watery sap, Flowers sessile… ..... Portulacaceae
13a. Flowers unisexual, gynoecium apocarpus….....Menispermaceae
b. Flowers bisexual, gynoecium Syncarpous… 14
14a. Petals 4, Stamens 6.....Brassicaceae
b. Petals 5, Stamens ∞.....15
15a. Ovary1, loculated.....16
b. Ovary 2-more loculated… 17
16a. Flowers actinomorphic, placentas free- central ..... Caryophyllaceae
b. Flowers zygomorphic, placentas parietal .....Viloaceae
17a. Filaments of anthers more or less united.....Polygalaceae
b. Filaments of anthers more or less united..... 1
18a. Leaves stipulate; stamens 5 or 10 19
b. Leaves exstipulate; stamens usually 8 .....Sapindaceae
19a. Style 5; stamen 5 .....Oxalidaceae
b. Style many; stamens 10 ..... Zygophyllaceae
20a. Leaves pellucid-gland dotted ..... Rutaceae

b. Leaves not gland dotted 21
21a. Placentas parietal; Fruit elongated ..... Moringaceae
b. Placentas axile; Fruits not elongated 22
22a. Ovules and seeds pendulous; sometimes horizontal..... Meliaceae
b. Ovules and seeds erect or ascending 23
23a. Stamens alternate with the petals ..... Anacardiaceae
b. Stamens opposite the petals ..... Vitaceae
24a. Leaves simple; Flowers 3-merous… .....Annonaceae
b. Leaves compound; Flowers 4-6 merous 25
25a. Filaments of anther united into a columnar toothed cup… 26
b. Filaments of anther free; rarely connate at the base in ring.....28
26a. Stamens 15; anther united ..... Stericuliaceae
b. Stamens 2; anther free….....27
27a. Anther unilocular; pollen muricate ..... Malvaceae
b. Anther bilocular; pollen smooth ..... Bombacaceae
28a. Stamens 4-5; usually embraced and adnate to the base of the petal….....29
b. Stamen many; atleast twice as many as and free from the petals.....30
29a. Shrub ..... Lythraceae
b. Straggler.....Rhamnaceae
30a. Anther dehisce by slits; fruits capsule .....Tiliaceae
b. Anther dehisce by spores; fruits drupe.....Elaeocarpaceae
31a. Ovary sycarpous; placentas 3-5, parietal.....32
b. Ovary 1 or more free, placentas basal 33
32a. Climbing herbs tendril .....Passifloraceae
b. Erect shrubs or trees with tendril .....Turneraceae
33a. Ovules arising from the inner angles or from base of the carpels or loculi 34
b. Ovules pendulous form the apex of the carpels or locules… .....Combretaceae
34a. Carpels solitary; fruits legume….....35
b. Carpels more than 1; fruits otherwise….....37
35a. Flowers zygomorphic; petals imbricate….....36
b. Flowers actinomorphic; petals valvate… .....Mimosaceae
36a. Upper petals outermost stamens monodelphous or diadelphous… .....Fabaceae
b. Upper petals innermost stamens always free.....Caesalpiniaceae
37a. Flowers unisexual .....Cucurbitaceae
b. Flowers bisexual.....38
38a. Ovary 1-celled….....Cactaceae
b. Ovary more than 1 celled….....39
39a. Carpels free if ultimately united the styles distinct… 40
b. Carpels and styles united throughout….....Myrtaceae
40a. Flowers in dichasial – polychasial cyme… .....Molluginaceae
b. Flowers in clustered, cymes or solitary .....Aizoaceae
41a. Ovary inferior, stamens as many as the corolla lobes… 42
b. Ovary superior, stamens numerous 43
42a. Anther free; ovary 2-loculed; stipulate… .....Rubiaceae
b. Anther syngenesious; ovary 1-loculed, exstipulate… ..... Asteraceae
43a. Ovary 1-loculed; placentation free central.....Plumbaginaceae
b. Ovary 2-many loculed; placentation axile or parietal 44
44a. Ovary 3 or more carplelled….....Sapotaceae
b. Ovary 2-carpelled….....45

45a. Corolla actinomorphic…..46
b. Corolla zygomorphic…..50
46a. Plants leafless; parasitic… ..... Cuscutaceae
b. Plants leafy ; not parasitic.....47
47a. Leaves opposite; stamens 2…… - 48
b. Leaves alternate; stamens 4 or more.....49
48a. Leaves not scabrid, corolla tube white: fruits berry ..... Oleaceae
b. Leaves scabrid; corolla tube orange; fruits capsules ..... Nyctanthaceae
49.a. Anther inseperratable; corona present ..... Asclepidiaceae
b. Anther seperatable; corona absent ..... Apocyanaceae
50a. Corolla lobes imbricate ;fruit drupe ..... Boraginaceae
b. Corolla lobes plicate; fruit capsule ..... Convolvulaceae
51.a Ovary cells many ovulated..... Solanaceae
b. Ovary cells 1-4 ovuled…..52
52.a Carpels 2 or more ovulated ; fruits dehiscent 53
b. Carpels 1 –ovulated ; fruits indehiscent 57
53.a Fruits dehiscent; seeds supported on reticulae… ..... Acanthaceae
b. Fruits indehiscent; seeds not supported on reticulae…..54
54.a. Leaves compound; fruits elongated; seeds winged ..... Bignoniaceae
b. Leaves simple;fruits not elongated, seeds not winged… 55
55.a. Ovules many on swollen placentas; seeds albuminous ..... Scropulariaceae
b. Ovules 2 lobed placenta ; seeds not albuminous… 56
56.a Flowers solitary; axile placentation ..... Pedaliaceae
b. Flowers raceme; axile placentation ..... Marytiniaceae
57.a Ovary entire, style terminal..... Verbinaceae
b. Ovary 4 –lobed, style gynobasic..... Lamiaceae
58.a Flower bisexual.....59
b. Flower unisexual 62
59.a. Ovary inferior.....60
b. Ovary superior 61
60.a Ovary 4-6 loculated; ovules many..... Aristolochiaceae
b. Ovary 1-loculated; ovules 1-4..... Santalaceae
61.a Perianth not tubular ..... Amarathaceae
b. Perianth trubular ..... Nyctaginaceae
62a. Leafless trees; brachlets ribbed and joined at the nodes… ..... Casuarinaceae
b. Leaves well developed ; brachlets not ribbed and not joined at the nodes…..63
63 a. Ovary 1- loculed; ovules 1-2 in each loule…..64
b. Ovary 2 or more loculed;ovules 1 or 2 in each locule…..65
64a. Leaves glandular… ..... Euphorbiaceae
b. Leaves eglandular… ..... Urticaceae
65a. Filaments inflexed in bud with reversed anther… ..... Moraceae
b. Filaments not inflexed in bud, not with reversed anther..... Ulmaceae
66a. Terrestrial or epiphytic…..67
b. Aquatic, marsh or riparian ..... Cyperaceae
67a. Arbrorescent woody; leaf blade many nerved articulate with sheath. Bambusaceae
b. Herbs with herbaceous culms; leaf blade sessile not articulate with sheath…..68
68a. Perianth 0 or reduced to scale…..Araceae
b. Perianth present…..69
70a. Plant armed… 71
b. Plant unarmed… 72

71a. Plants Xerophytic; leaves fibrous… .....Agavaceae
b. Plants not xerophytic; leaves nor fibrous… .....Lilliaceae
72 a. Perianth segments connate… ..... Amaryllidaceae
b. Perianth segments free… 73
73a. Outer perianth calycine; inner coroline… .....Commelinaceae
b. Outer and inner perianth… 74

II. Identification of Non-Flowering Plant Species

Lichen samples were identified based morphological, biochemical and anatomical features and representative samples were compared with the voucher specimens at the Lichen Herbarium Centre of National Botanical Research Institute (NBRI), Lucknow, Uttar Pradesh, India.

Key to identify the Lichen Genera

Key to Genera

1 a. Photobiont cyanobacteri urn..... *Leptogium cyanascens.*
1 b. Photobiont green alga.....2
2. Thallus leprose, crustose……..Group I
3. Thallus foliose… .....Group II
4. Thallus fruticose… .....Group III

Group I

1 a. Thallus leprose, ...*Chrysothrix chlorina*
1 b. Thallus crustose. ..... *Graphis* sp

Group II

1 a. Lower side of thallus pseudocyphellae, photobiont Nostoc .....*Pseudocyphellaria*
1 b. Thallus lacking pseudocyphellae
2.a. Upper cortex thick walled longitudinally oriented, conglutinate hyphae… 3
2 b. Upper cortex otheriwse… 4
3 a. Thallus lower side canaliculated zeorin, norstictic and salazinic acids, and unknown pigments and triterpenoids present… ..... *Heterodermia leucomelos*
3 b. Thallus lower side no canaliculated only in medulla……*Heterodermia diademata*
4 a. Cilia bulbate at the base, thallus grey to grey brown .....*Bulbothrix*
4 b. Cilia present or absent, not bulbate..... 5
5 a. Rhizines dichotomously branched present throughout the margins. ..*Hypotrachyna*
5 b. Rhizines restricted to center of lower surface, margin bare, smooth shining….....6
6 a. Lobes narrow, long, dichotomously branched, canaliculate.....*Everniastrum*
6 b. Lobes otherwise. 7
7 a. Lobe margins ciliate….....8
7 b. Lobe margins eciliate….....9
8 a. Salazinic acid present K+ Red cortex….....10
8 b. Salazinic acid absent.....11
9 a. Thallus with is idia… .....*Parmotrema tinctorum*
9.b Thallus with soredia… 12
10 a. thallus emaculate… *P.stuppeum*
10 b. thallus maculate… .....*P.reticulatum*
11 a. Protolichesternic acid in medulla.....*P.grayanam*
11 b. Alectoronic acid in medulla….....*P. nilgherrense*
12 a. Thallus large lobed, loosely attached, mainly corticolous.....*P. austrosinense*
12 b. Thallus smaller, closely to strongly attached, saxicolous.....*P.defectum*

Group III

1 a. Squamules in thallus ..... *Cladonia* sp
1 b. Squamules absent in thallus.....2
2 a. Thallus flat, strap shaped or palmately lobed. ..... *Ramalina*
2 b. Thallus round to angular in section 3
3 a. Thallus bright yellow to orange, K+ purple. ..... *Teloschistes*
3 b. Thallus greenish grey or yellowish grey pendent or erect… 4
4 a. Medulla K+ red Stictic acid present ..... *Usnea stigmatoides*
4 b. Medulla K- norstictic psoromic acid present ..... *Usnea dasaea*

III. Identificayion of Algae Genera

Algae identification key consists of couplets of characteristics using algal description of the specimen based on morphological characterization from 58 Genera to species level identification as per the comprehensive key.

Key to identify the Algae species

1A. Plant pigments contained in chromatophores or chloroplasts---------- 10
IB. Plant pigments not contained, but diffused through protoplast ---------- 2
2A. Plants filamentous; cells arranged in trichomes ---------- 4
2B. Plants colonial, not filamentous 3
3A. Cells in regular rows, in multiples of four; ---------- *Agmenellum*
3B. Cells somewhat evenly arranged toward periphery of spherical colony; barely visible gelatinous strands radiate from center of colony to cells *Gomphosphaeria*
3C. Colony asymmetrical; cells very dense and unevenly distributed --------- *Anacystis*
4A. Filaments straight or slightly flexed 6
4B. Filaments curved, twisted, or spiralled ---------- 5
5A. Heterocysts and akinetes present ---------- *Anabaena*
5B. Heterocysts absent ..... *Raphidiopsis*
6A. Heterocysts present 9
6B. Heterocysts absent 7
7A. Filaments without a sheath; cells discoid ---------- *Oscillatoria*
7B. Filaments with distinct sheath 8
8A. Trichomes tangled; sheaths confluent ---------- *Phormidiwn*
8B. Trichomes separate; sheaths not confluent ----------*Lyngbya*
9A. Heterocysts terminal---------- *Cylindrospermum*
9B. Heterocysts intercalary ----------*Ahphanizomenon*
10A. Cell walls without punctae or striae---------- 31
10B. Cell walls rigid, ornamented with punctae or striae---------- 11
11A. Frustules adiametric, two or more times longer than wide, elongate---------- 15
11B. Frustules isodiametric, generally shorter in length than in diameter, round or elliptical or ovoid or nearly so 12
12A. Frustules elliptical or ovoid or nearly so ----------14
12B. Frustules discoid or nearly so 13
13A. Valves radially punctate ---------- *Stephanodiscus*
13B. Valves with two concentric regions, the inner being smooth---------- *Cydotella*
14A. Frustules with marginal keel containing a raphe ---------- *Surirella*
14B. Frustules with a pseudoraphe or with a raphe not in a marginal keel--- *Cocconeis*
15A. Frustules cylindrical arranged end to end into filament ---------- *Melosira*
15B. Frustules not arranged into filaments ----------16
16A. Frustules with a raphe in at least one valve ----------21
16B. Frustules without a raphe in either valve, pseudoraphe evident---------- 17

17A. Frustules united in zigzag chains ---------- *Tabellaria*
17B. Frustules not in zigzag chains ---------- *Pseudoraphe*
18A. Frustules united laterally ..... *Fragilaria* 18B. Frustules not united laterally ..... 1919A. Frustules united apically forming spokelike colony ---------- *Asterionella*
19B. Frustules not forming spokelike colony ---------- 20
20A. Frustules needle shaped without costae ---------- *Synedra*
20B. Frustules with prominant costae ---------- *Diatom*
21A. Frustules sigmoid or "S" shaped ---------- *Gyrosigma*
2IB. Frustules not sigmoid 22
22A. Frustules longitudinally symmetrical, other than lunate in valve view --------- 25
22B. Frustules with raphe in both valves, longitudinally asymmetrical, lunate -------23
23A. Valves with transverse costae ---------- *Epithemia*
23B. Valves without transverse costae 24
24A. Raphe a smooth curve with well defined central and polar nodules----- *Cymbella*
24B. Raphe not a smooth curve, gibbose with marginal central nodule ------- *Amphora*
25A. Frustules with raphe in both valves ---------- 27
25B. Frustules with pseudoraphe in one valve and raphe in other valve ---------- 26
26A. Frustules wedge-shaped in girdle view and cuneate in valve *Rhoicosphenia*
26B. Frustules shaped otherwise ---------- *Achnanthes*
27A. Raphe extended length of valve; polar nodules; central nodules lacking -*Eunotia*
27B. Raphe restricted to polar regions ..... 28 28A. Raphe located in a canal ..... *Nitzschia* 28B. Raphe not located in a canal ..... 29 29A. Frustules with symmetrical valves ..... 30 29B. Frustules with valves symmetrical but asymmetrical ---------- *Gomphonema*
30A. Valves with transverse costae ---------- *Pinnularia*
30B. Valves with transverse punctae ---------- *Navicula*
31A. Cells solitary 45
31B. Cells colonial or grouped 32
32A. Cells enclosed in conical to cylindrical lorica; joined lorica have treelike appearance ..... *Dinobryon*
32B. Cells and lorica without treelike appearance ---------- 33
33A. Colony discoid, one cell in thickness; cells in concentric rings -------- *Pediastrum*
33B. Colony not discoid ..... 3434A. Colonies spherical or globose ..... 40 34B. Colonies not spherical ..... 35 35A. Colony with elongate cells radiating from common center ---------- *Actinastrum*
35B. Colony with cells not radiating from common center ---------- 36
36A. Colony with four to eight cells positioned in linear series ---------- *Scenedesmus*
36B. Colony with cells not in linear series ---------- 37
37A. Colony with arcuate to lunate cells with apices acutely ---------- *Selenastrum*
37B. Colony with spherical to broadly ellipsoidal cells ---------- 38
38A. Cells without spines or setae ---------- *Crucigenia*
38B. Cells with spines or setae 39
39A. Cells quadrate, closely apposed; free face of each cell with spines ----*Tetrastrum*
39B. Cells quadrate and united; free face cell with long delicate setae--- *Micractinium*
40A. Colony with biflagellated cells ---------- *Pandorina*
40B. Colony with nonflagellated cells 41
41A. Cells lunate to sickle shaped ---------- *Kirchneriella*

41B. Cells spherical or nearly so 42
42A. Cells borne terminally on dichotomously branched threads ----- *Dictyosphaerium*
42B. Cells not on dichotomously branched threads ---------- 43
43A. Colony a hollow sphere ..... *Coelastrum* 43B. Colony not a hollow sphere ..... 44 44A. Colony surrounded by gelatinized and expanded parent cell wall ---------- *Oocystis*
44B. Colony with cells equidistant and toward periphery ---------- *Sphaerocystis*
45A. Cells with median constriction dividing cell into two distinct halves - *Cosmarium*
45B. Cells without pronounced median constriction ---------- 46
46A. Cells nonflagellated ..... 53 46B. Cells flagellated ..... 4747A. Cell walls without polygonal plates ---------- 49
47B. Cell walls with polygonal plates ..... 48 48A. Cells walls of thick plates with distinct sutures ---------- *Peridinium*
48B. Cells walls with faintly distinct plates and sutures ---------- *Glenodinium*
49A. Cells uniflagellate ..... 52 49B. Cells biflagellate ..... 5050A. Cells with two flagella of equal length ---------- *Chlamydomonas*
50B. Cells with two flagella of unequal length ---------- 51
51A. Cells with single chromatophore ---------- *Chroomonas*
51B. Cells with 2 large chromatophores ---------- *Cryptomonas*
52A. Cells surrounded by distinct lorica ---------- *Trachelomonas*
52B. Cells without lorica; fusiform to acicular shaped; posterior end ---------- *Euglena*
53A. Cells acicular to fusiform with ends tapering into long spines -------- *Schroederia*
53B. Cells without ends tapering into long spines ---------- 54
54A. Cells without setae ..... 56 54B. Cells with setae ..... 5555A Cells with subpolar or both subpolar and equatorial long setae ---------- *Chodatella*
55B Cells with multiple peripheral long delicate setae ---------- *Golenkinia*
56A Cells long, slender, and tapered at both ends ---------- *Ankistrodesmus*
56B Cells flattened or isodiametric, triangular, quadrangular ---------- *Tetraedron*

IV. Identification of Major Groups of Mushrooms

Mushrooms are belonging to fungal kingdom which are edible and non-edible in nature. They represented in various colours starting from white, black, brown, red and pale yellow rot fungi. They are identified based on the following characterization key

Key to identify the Mushrooms species

1. Mushroom growing on other mushrooms or the decayed remains--------- *Mycotrophs*
2. Growing shelflike on wood (or, if not, then gills *concentric* rather than radial); mushroom *very* tough and leathery, corky, or woody (try tearing it in half); gills tough and hard, sometimes maze-like; cap frequently (but not always) with concentric zones of colour ..... *Polypores*
3. Gills running down the stem, not platelike and thus not easily separable from the cap and stem (try removing an entire "gill" with your fingers or a sharp object); mushroom usually *not* growing on wood ---------- *Chanterelles and Trumpets*
4. Gills not as above; mushroom growing on wood or elsewhere ---- *Gilled Mushrooms*
5. Stem absent--or, if present, lateral, Flesh in stem tough ---------- *Polypores*
6. Raphe a smooth curve with well defined central and polar nodules --------- *Cymbella*
7. Raphe not a smooth curve, gibbose with marginal central nodule ---------- *Amphora*
8. Frustules with raphe in both valves 27

9. Frustules with pseudoraphe in one valve---------- 26
10. Colony with cells not radiating from common center ----------36
11. Colony with four to eight cells positioned in linear series ----------*Scenedesmus*
12. Colony with cells not in linear series ----------37
13. Colony with arcuate to lunate cells with apices acutely---------- *Selenastrum*
14. Cells acicular to fusiform with ends tapering into long spines ----------*Schroederia*
15. Cells without ends tapering into long spines---------- 54
16. Cells without setae 56
17. Cells with setae 55
18 Cells with subpolar or both subpolar and equatorial long setae---------- *Chodatella*
19. Raphe extended length of valve; polar nodules; central nodules lacking ----*Eunotia*
20. Raphe restricted to polar regions 28
21. Raphe located in a canal *Nitzschia*
22. Filaments with distinct sheath 8
23. Trichomes tangled; sheaths confluent ----------*Phormidiwn*
24. Trichomes separate; sheaths not confluent---------- *Lyngbya*
25. Heterocysts terminal ---------- *Cylindrospermum*
26. Heterocysts intercalary ---------- *Ahphanizomenon*
27. Cell walls without punctae or striae 31
28. Cell walls rigid, ornamented with punctae or striae---------- 11
29. Frustules adiametric, two or more times longer than wide, elongate ---------- 15
30. Frustules isodiametric, generally shorter than round or elliptical or ovoid --------12
31. Frustules elliptical or ovoid or nearly so ----------14
32. Frustules discoid or nearly so 13
33. Valves radially punctate ----------*Stephanodiscus*
34. Valves with two concentric regions, the inner being smooth---------- *Cydotella*
35. Frustules with marginal keel containing a raphe ----------*Surirella*
36. Frustules with a pseudoraphe or with a raphe not in a marginal keel ---- *Cocconeis*
37. Cap round in outline; pore surface not running down the stem, or only slightly running down the stem; spore print not white---------- *Boletes*
38. Mushroom with spines or "teeth"--either on the underside of a cap, or hanging from a branched structure, or clumped in an indistinct mass ----------*Toothed Mushrooms*
39. Mushroom covered in some part with a foul-smelling slime; arising from a soft underground "egg"; variously shaped (like a club or stick, like crab claws, like a lantern, like a Wiffle ball, etc.); frequently found in woods ----------*Stinkhorns*
40. Mushroom more or less shaped like a ball, or like a ball raised up on a stem, or like a ball set on a starfish *Puffballs*
41. Cap shape convex to centrally depressed or vase-shaped; undersurface, smooth, wrinkled, or gill-like; fruiting embedded---------- *Chanterelles*
42. Cap shape oval, pointed, lobed, saddle-shaped, irregular, or thimble-like (never vase-shaped or convex); undersurface absent, or hard to see or define; many (but definitely not all) species fruiting---------- *Trumpets*
43. Stem completely hollow, or hollow with cottony fibers inside; cap with pits and ridges, or longitudinally wrinkled, or fairly smooth (never lobed or convoluted); without reddish or reddish brown shades; found in spring----------*Morels & Verpas*
44. Found in summer and fall (or spring in warm coastal areas); cap lobed, saddle-shaped, or irregular and whitish, greyish, brownish, or black; stem surface ribbed or "pocketed" in some species - *Saddles*
45. Found in summer and fall (or spring in warm coastal areas); cap lobed, saddle-shaped, or irregular and whitish, greyish, brownish, or black-------- *Oddballs & Misfits*

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NAME OF ENTERPRISE	M/S NATURE SCIENCE FOUNDATION
TYPE OF ENTERPRISE *	MICRO
MAJOR ACTIVITY	SERVICES
SOCIAL CATEGORY OF ENTREPRENEUR	GENERAL

NAME OF UNIT(S)

S.No.	Name of Unit(s)
1	Green Campus, Energy and Environment Management Audits

OFFICAL ADDRESS OF ENTERPRISE

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Village/Town	Gandhimaanagar S.O	Block	LIG-II
Road/Street/Lane	Poolamedu	City	Coimbatore South
State	TAMIL NADU	District	COIMBATORE , Pin 641004
Mobile	9566777255	Email:	chairmannsf@gmail.com

DATE OF INCORPORATION / REGISTRATION OF ENTERPRISE	28/11/2017
DATE OF COMMENCEMENT OF PRODUCTION/BUSINESS	12/03/2020

NATIONAL INDUSTRY CLASSIFICATION CODE(S)

SNo.	NIC 2 Digit	NIC 4 Digit	NIC 5 Digit	Activity
1	69 - Legal and accounting activities	6920 - Accounting, bookkeeping and auditing activities; tax consultancy	69201 - Accounting, bookkeeping and auditing activities	Services
2	85 - Education	8542 - Cultural education	85420 - Cultural education	Services
3	85 - Education	8549 - Other education n.e.c.	85499 - Other educational services n.e.c.	Services

DATE OF UDYAM REGISTRATION	26/02/2022

* In case of graduation (upward/reverse) of status of an enterprise, the benefit of the Government Schemes will be availed as per the provisions of Notification No. S.O. 2119(E) dated 26.06.2020 issued by the M/o MSME.

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Present : G.M.DOSS, I.R.S
Commissioner of Income Tax (Exemptions)

** URNo. AACTN7857J/05/18-19/T-1105 Dated:03/09/2018

Sub: Registration u/s. 12AA of the Income tax Act 1961 - in the case of

"Nature Science Foundation"
LIG-II, 2669, Gandhimaa Nagar, Peelamedu, Coimbatore – 641 004.

Ref : Application in form 10 A filed on 28/03/2018

ORDER UNDER SECTION 12AA OF THE INCOME TAX ACT 1961.

1. The above **Trust/~~Society/Association/ Company/ others/~~,** bearing **PAN AACTN7857J** was constituted by **Trust Deed / ~~Memorandum of Association~~** dated **29/11/2017** registered with **Sub-Registrar's Office/ ~~Registrar of Societies~~**/~~Registrar of Companies/others~~ on **29/11/2017.**

2. ~~The Trust Deed / Memorandum of Association has subsequently been amended / modified / altered by a Codicil / Supplementary Deed / Amendment Deed / Alteration to Memorandum of Association/others dated XX/XX duly registered on XX/XX.~~

3. The above **TRUST** filed an application seeking Registration u/s 12 AA of the Income tax Act, 1961.

4. On going through the objects of the **TRUST** and its proposed activities as enumerated in the **Trust Deed / ~~Memorandum of Association,~~ I** am satisfied about the genuineness of the **TRUST** as on date.

5. The application has been entered at **Sl.No.1105** maintained in this office. The above **Trust** is accordingly registered as a **PUBLIC CHARITABLE TRUST** u/s 12 AA of the Income Tax Act, 1961 with effect from **29/11/2017**.

6. It is hereby clarified that the Registration so given to the **Trust/~~Institution~~** is not absolute. Subsequently, if it is found that the activities of the **Trust/~~Institution~~** are not genuine or are not being carried out in accordance with the objects and clauses of the **Trust Deed / ~~Memorandum of Association~~** submitted at the time of registration or modified with the approval of the **Commissioner of Income-tax (Exemptions), Chennai** or there is a violation of the provisions of Section – 13, **the** Registration so granted shall be cancelled as provided u/s 12 AA (3) or 12AA(4) of the Income Tax Act. Further, this approval is also subject to the **Trust/Society/Association/Company/ ~~Others~~/** complying to the provisions of the proviso to sec 2(15) of the Income Tax Act 1961.

7. **Granting of Registration u/s 12AA** does not confer any automatic exemption of income from taxation. The **Trust/~~Institution~~** should conform to the parameters laid down in Sections 11, 12, 13 and 115 BBC of the I.T. Act, 1961, to claim exemption of its income on year to year basis before the Assessing Officer.

** This Unique Registration No. URNo. **AACTN7857J/05/18-19/T-1105** Should be mentioned in all your future correspondence.

Sd/-
(G.M.DOSS, I.R.S)
Commissioner of Income-tax(Exemptions), Chennai.

Copy to:
1. The Assessee.
2. The ACIT(Exemptions), Coimbatore Circle.
3. Office Copy.

//CERTIFIED TRUE COPY//

(N SRINIVASA RAO)
Asst. Commissioner of Income-tax (H.Qrs)(Exemptions),
Chennai.

F.2984

GOVERNMENT OF INDIA
INCOMETAX DEPARTMENT
OFFICE OF THE COMMISSIONER OF INCOME TAX (EXEMPTIONS)
Aayakar Bhawan, Annexe III Floor, 121 M.G. Road, Chennai 600 034

URNo. AACTN7857J/05/18-19/T-1105/80G

Date: 10.04.2019

Name of the Trust ~~/Society /Company/Institution~~	:	NATURE SCIENCE FOUNDATION
Address	:	LIG II 2669, GANDHIMAA NAGAR, PEELAMEDU, COIMBATORE - 641 004
PAN	:	AACTN7857J
Date of Application	:	12.11.2018

Received S. Ponnusamy 17/07/19
Rajes. 17/07/2019

APPROVAL UNDER SECTION 80G(5)(vi) OF THE INCOME TAX ACT, 1961

The aforesaid Trust ~~/Society/Company/Institution~~ has been registered u/s.12AA of the Income Tax Act with effect from **29.11.2017** vide **AACTN7857J/05/18-19/T-1105** dated **03.09.2018.** It is certified that donation made to **NATURE SCIENCE FOUNDATION** at **LIG II 2669, GANDHIMAA NAGAR, PEELAMEDU,COIMBATORE - 641 004** shall qualify for deduction u/s 80G(5)(vi) of the Income Tax Act, 1961, subject to the fulfillment of conditions laid down in clauses [i] to [v] of sub-section (5) of section 80G of the I.T Act, 1961.

2. This approval shall be valid in perpetuity with effect from **A.Y. 2019-20** unless specifically withdrawn. **The details and validity of the certificate is available @ office.incometaxindia.gov.in**

3. The Return of Income along with the Income & Expenditure Account, Receipts and Payments Account and Balance Sheet should be submitted annually **to** the Assessing Officer having jurisdiction over the case.

4. No change in the Trust Deed/~~Memorandum of Association~~ shall be effected without the prior approval of the undersigned i.e. **Commissioner of Income Tax (Exemptions), Chennai**.

5. Every receipt issued to a donor shall bear the **Unique Registration Number** i.e. **URNo. AACTN7857J/05/18-19/T-1105/80G** and date of this order i.e. **10.04.2019.**

6. Under the provisions of section 80G(5)(i)(a), the institution/fund registered u/s.12A, u/s.12AA(1)(b) or approved u/s.10(23C), 10(23C)(vi)(via), etc., shall have to maintain separate books of accounts in respect of any business activity carried on and shall intimate this office within one month about commencement of such activity.

Sd/-
(G.M.DOSS, I.R.S)
Commissioner of Income Tax (Exemptions)
Chennai.

Copy to:
1. The applicant
2. Guard File
3. The DCIT(Exemptions) Coimbatore Circle.

//Certified True Copy//

(N. SRINIVASA RAO)
Assistant Commissioner of Income-tax (H.qrs)
(Exemptions), Chennai.

FORM NO. 10AC

(See rule 17A/11AA/2C)

Order for registration

1	PAN	AACTN7857J
2	Name	NATURE SCIENCE FOUNDATION
2a	Address	
	Flat/Door/Building	LIG-II, 2669
	Name of premises/Building/Village	GANDHIMAA NAGAR
	Road/Street/Post Office	Coimbatore South
	Area/Locality	COIMBATORE
	Town/City/District	Gandhimaanagar S.O
	State	Tamil Nadu
	Country	INDIA
	Pin Code/Zip Code	641004
3	Document Identification Number	AACTN7857JE2021501
4	Application Number	739995830271021
5	Unique Registration Number	AACTN7857JE20215
6	Section/sub-section/clause/sub-clause/proviso in which registration is being granted	01-Sub clause (i) of clause (ac) of sub -section (1) of section 12A
7	Date of registration	03-11-2021
8	Assessment year or years for which the trust or institution is registered	From AY 2022-23 to AY 2026-2027
9	Order for registration:	
	a. After considering the application of the applicant and the material available on record, the applicant is hereby granted registration with effect from the assessment year mentioned at serial no 8 above subject to the conditions mentioned in row number 10.	
	b. The taxability, or otherwise, of the income of the applicant would be separately considered as per the provisions of the Income Tax Act, 1961.	
	c. This order is liable to be withdrawn by the prescribed authority if it is subsequently found that the activities of the applicant are not genuine or if they are not carried out in accordance with all or any of the conditions subject to which it is granted, if it is found that the applicant has obtained the registration by fraud or misrepresentation of facts or it is found that the assessee has violated any condition prescribed in the Income Tax Act, 1961.	
10	Conditions subject to which registration is being granted	
	The registration is granted subject to the following conditions:-	

	o. This certificate cannot be used as a basis for claiming non-deduction of tax at source in respect of investments etc. relating to the Trust/ Institution.	
	p. All the Public Money so received including for Corpus or any contribution shall be routed through a Bank Account whose number shall be communicated to Office of the Jurisdictional Commissioner of Income Tax.	
	q. The applicant shall comply with the provisions of the Income Tax Act, 1961 read with the Income Tax Rules, 1962.	
	r. The registration and the Unique registration number has been instantly granted and if, at any point of time, it is noticed that form for registration has not been duly filled in by not providing, fully or partly, or by providing false or incorrect information or documents required to be provided under sub-rule (1) or (2) of rule 17A or by not complying with the requirements of sub- rule (3) or (4) of the said rule, the registration and Unique Registration Number (URN), shall be cancelled and the registration and URN shall be deemed to have never been granted or issued.	
	Name and Designation of the Registration Granting Authority	Principal Commissioner of Income Tax/ Commissioner of Income Tax (Digitally signed)

Digitally Signed by SIBICHEN K MATHEW
Date: 2021.11.03 15:52:36 IST

Certificates of Green Campus Auditors

1. ISO Environment Management System (14001:2015) of Mrs. S. Rajalakshmi, Chairman of NSF.
2. ISO Environment Management System (14001:2015 TUV NORD) of Dr. A. Geethakarthi, NSF Environment Auditor.
3. Indian Green Building Council (IGBC AP) Accredited Professional of Dr. B. Mythili Gnanamangai, Vice-Chairman of NSF.
4. Associated Chambers of Commerce and Industry of India (ASSOCHAM), of Dr. B. Mythili Gnanamangai, Vice-Chairman of NSF.
5. Associated Chambers of Commerce and Industry of India (ASSOCHAM), of Er. Ashutosh Kumar Srivastava, Board of Directors (North Zone) of NSF.
6. Botanist and Subject Expert of Plant Taxonomy of Dr. D. Vinoth kumar, Joint Director of NSF.
7. Bureau of Energy Efficiency (BEE) and National Productivity Council of Er. N. Dineshkumar and Dr. N. Balasubramanian, Energy Auditors of NSF.


vidya dadati vinayam
Exemplar Global
NEUTRAL
VERITAS
TRANSPARENT
Certificate of Training
TNV hereby certifies that
S. Rajalakshmi
has successfully completed the 5 days
Auditor / Lead Auditor Training Course which meets the training requirements of the Exemplar Global and has been declared as competent in the following competency units
- EM: Environmental Management System
- AU: Management Systems Auditing
- TL: Leading Management Systems Audit Teams
ISO 14001:2015
Issue Date: 17th Jun. 2021
Training Date : 20th to 24th May. 2021
Certificate Number : 2106170721010105
Authorised Signatory
(Pragyesh Singh)
This course is certified by Exemplar Global vide registration number TN006669
Note: The course conforms to the principles and practice of audits of Management Systems for compliance with standards. This certificate remains the property of TNV and this certificate is recognized by Exemplar Global. For verification of this certificate, please write to Mail: info@isoindia.org

TÜV NORD

PR315: ISO 14001:2015 Lead Auditor (Environmental Management Systems) Training course

Certificate of Achievement

Geethakarthi Alagarsamy

has successfully completed the above mentioned course and examination.

23rd - 27th March 2019

COIMBATORE, INDIA

Certificate No. 35242817 02

Delegate No. 171136

for TÜV NORD CERT GmbH

Essen, 2019-04-26

The course is certified by CQI and IRCA (Certification No. 18125). The learner meets the training requirements for those seeking certification under the IRCA EMS Auditor certification scheme.

TÜV NORD CERT GmbH Langemarckstraße 20 45141 Essen www.tuev-nord-cert.com

CQI | IRCA

CERTIFIED COURSE

IGBC

Confederation of Indian Industry

The Indian Green Building Council

hereby certifies that

B Mythili Gnanamangai

has successfully demonstrated knowledge on the Green Building Design & Construction, Building Standards & Codes, IGBC Resources & Processes and Green Design Strategies & their Impacts, required to be awarded the title of

IGBC Accredited Professional

K S Venkatagiri
Executive Director
CII-Godrej GBC

V Suresh
Chairmar
Indian Green Building Council

Gurmit Singh Arora
Vice-Chairman
Indian Green Building Council

210122

17 April 2021

GEM Certificate

ASSOCHAM

Celebrating 101 Years

ASSOCHAM hereby certifies that

Dr. B. Mythili Gnanamangai

has successfully passed the

Green and Eco-friendly Movement Certified Professional Test (GEM CP)

with

"Excellent Performance"

on

16 July, 2021

He/she is now eligible to execute the GEM Sustainability Certification Projects.
ASSOCHAM feels proud to award the GEM Certified Professional title to him/her.

Pankaj R. Dharkar
Chairman, GEM

GEM CP 20/649

Deepak Sood
Secretary General, ASSOCHAM

GEM Certificate

ASSOCHAM

Celebrating 101 Years

ASSOCHAM hereby certifies that

Mr. Ashutosh Kumar Srivastava

has successfully passed the

Green and Eco-friendly Movement Certified Professional Test (GEM CP)

with

"Good Performance"

on

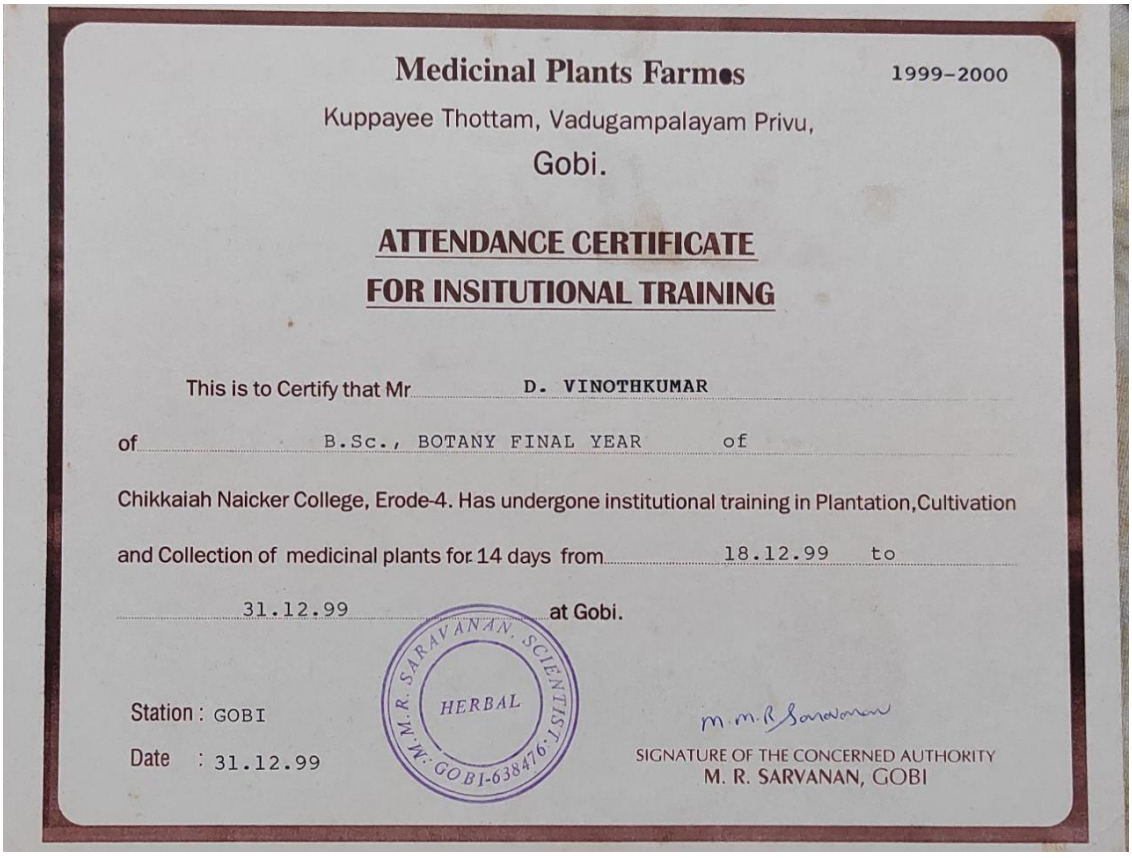
03 September, 2021

He/she is now eligible to execute the GEM Sustainability Certification Projects.
ASSOCHAM feels proud to award the GEM Certified Professional title to him/her.

Pankaj R. Dharkar
Chairman, GEM

GEM CP 20/666

Deepak Sood
Secretary General, ASSOCHAM



Medicinal Plants Farmes 1999-2000

Kuppayee Thottam, Vadugampalayam Privu,

Gobi.

ATTENDANCE CERTIFICATE

FOR INSITUTIONAL TRAINING

This is to Certify that Mr D. VINOTHKUMAR

of B.Sc., BOTANY FINAL YEAR of

Chikkaiah Naicker College, Erode-4. Has undergone institutional training in Plantation,Cultivation and Collection of medicinal plants for 14 days from 18.12.99 to 31.12.99 at Gobi.

Station : GOBI

Date : 31.12.99

M.M.R. SARAVANAN, SCIENTIST, GOBI-638476 HERBAL

SIGNATURE OF THE CONCERNED AUTHORITY

M. R. SARVANAN, GOBI

BUREAU OF ENERGY EFFICIENCY

Examination Registration No. : EA-14056 Serial Number. 9176

Certificate Registration No. : 9176

Certificate For Certified Energy Manager

This is to certify that Mr./Mrs./Ms. Dinesh Kumar D Son/Daughter of Mr./Mrs. R M Dhanasekaran who has passed the National Examination for certification of energy manager held in the month of October 2011 is qualified as certified energy manager subject to the provisions of Bureau of Energy Efficiency (Certification Procedures for Energy Managers) Regulations, 2010.

This certificate shall be valid for five years with effect from the date of award of this certificate and shall be renewable subject to attending the prescribed refresher training course once in every five years.

His /Her name has been entered in the Register of certified energy manager at Serial Number 9176 being maintained by the Bureau of Energy Efficiency under the aforesaid regulations.

Mr./Mrs./Ms. Dinesh Kumar D is deemed to have qualified for appointment or designation as energy manager under clause (*l*) of Section 14 of the Energy Conservation Act, 2001 (Act No.52 of 2001).

Given under the seal of the Bureau of Energy Efficiency, this 7th day of February, 2013

Digitally Signed: RAKESH KUMAR RAI
Sun Mar 01 10:58:55 IST 2020
Secretary, BEE New Delhi

Secretary
Bureau of Energy Efficiency
New Delhi

Dates of attending the refresher course	Secretary's Signature	Dates of attending the refresher course	Secretary's Signature
22.12.2019			

Regn. No. EA-7391

Certificate No. 5093

National Productivity Council

(National Certifying Agency)

PROVISIONAL CERTIFICATE

This is to certify that Mr. / Ms. N.Balasubramaniam

son / daughter of Mr. M.Nanjukuttigounder

has passed the National Certification Examination for Energy Auditors held in December - 2009, conducted on behalf of the Bureau of Energy Efficiency, Ministry of Power, Government of India.

He / She is qualified as Certified Energy Manager as well as Certified Energy Auditor.

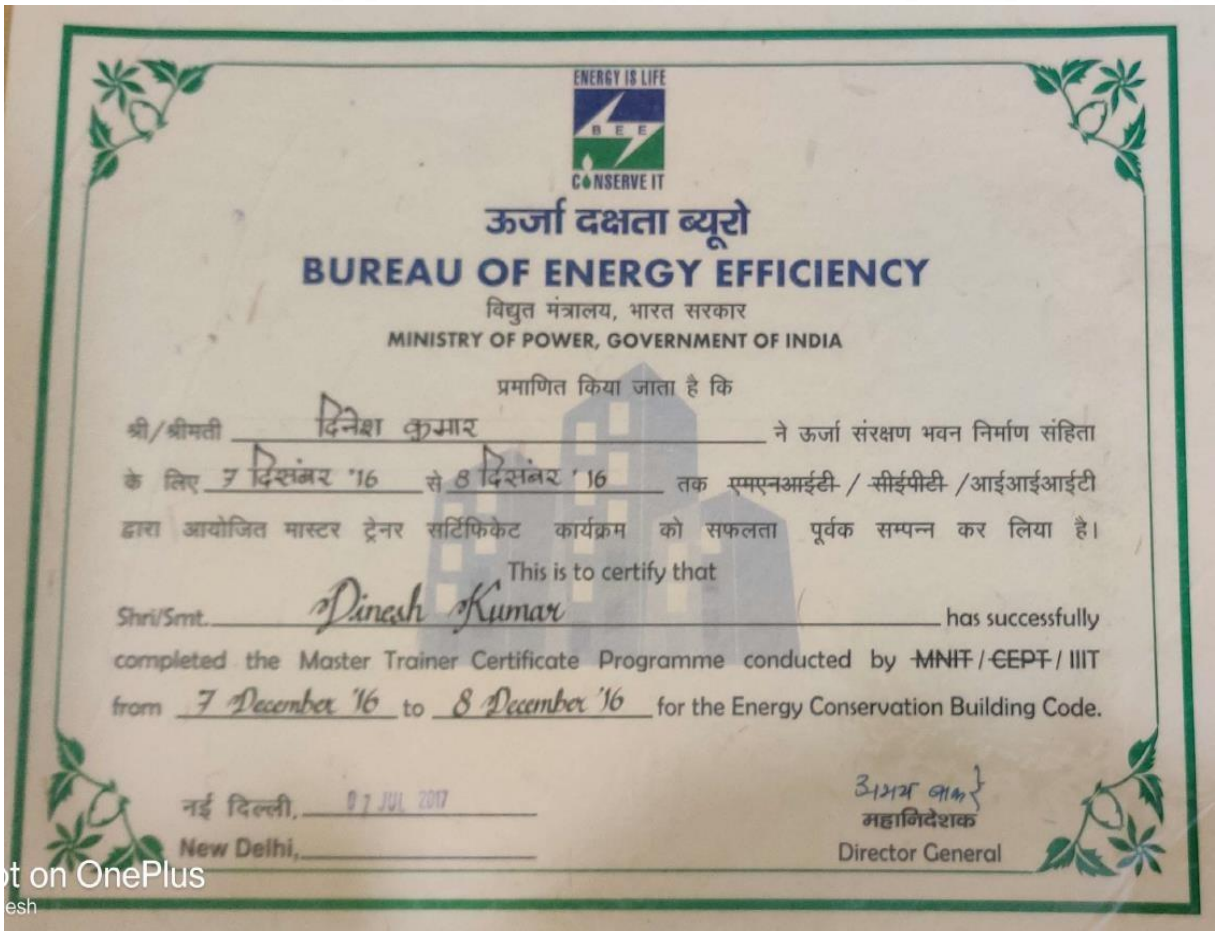
He / She shall be entitled to practice as Energy Auditor under the Energy Conservation Act 2001, subject to the fulfillment of qualifications for the Accredited Energy Auditor and issue of certificate of Accreditation by the Bureau of Energy Efficiency under the said Act.

This certificate is valid till the issuance of an official certificate by the Bureau of Energy Efficiency.

Place : Chennai, India

Date : 11th February 2010

Controller of Examination



LEED AP BD+C

GREEN BUSINESS CERTIFICATION INC. CERTIFIES THAT

DINESH KUMAR D

HAS ATTAINED THE DESIGNATION OF

LEED AP® Building Design + Construction

by demonstrating the knowledge and understanding of green building practices and principles needed to support the use of the LEED® green building program.

10531234-AP-BD+C
CREDENTIAL ID

26 DEC 2016
ISSUED

25 DEC 2022
VALID THROUGH

Mahesh Ramanujam

MAHESH RAMANUJAM
PRESIDENT & CEO, U.S. GREEN BUILDING COUNCIL
PRESIDENT & CEO, GREEN BUSINESS CERTIFICATION INC.

GRIHA

GREEN RATING FOR INTEGRATED HABITAT ASSESSMENT

GRIHA CERTIFIED PROFESSIONAL CERTIFICATE

This is to certify that

Dinesh Kumar Dhanasekaran

has qualified as a **GRIHA** Certified Professional For V. 2015

Date of issue: 19th June 2020

Note : This certification is valid only for GRIHA version 2015.

Chief Executive Officer
GRIHA Council

TECHNICAL REPORT OF WASTE MANAGEMENT AUDIT

Submitted to

ADICHUNCHANAGIRI INSTITUTE OF TECHNOLOGY, CHIKKAMAGALURU – 577 102, KARNATAKA

Date of Audit: 22.06.2022

Submitted by

NATURE SCIENCE FOUNDATION

(A Unique Research and Development Centre for Society Improvement)

ISO 9001:2015, 14001:2015, 45001:2018 & 50001:2018 Certified and Ministry of MSME Registered Organization

No. 2669, LIG-II, , Gandhi Managar, Peelamedu

Coimbatore - 641 004, Tamil Nadu, India.

Phone: 0422 2510006, Mobile: 9566777255, 9566777258

Email: director@nsfonline.org.in, directornsf@gmail.com

Contents

1. Introduction

Waste management audit is all about the “Waste control or waste disposal is all the behaviours and acts necessary to handle the waste from its inception to its final disposal. This involves, but is not limited to, storage, transport, management and recycling of waste along with control and enforcement. It also covers the legislative and regulatory system for waste control, including recycling guidelines. Wastes are generated from several sources such as domestic, industries, agriculture and commercial activities which in turn to cause environmental pollution. Domestic waste include kitchen wastes like vegetables, fruits, and other food waste, Sewage-human excreta and waste from bathrooms and kitchens, Garbage-newspapers, rags, hair, house dust and others wastes like plastic bags, bottles, tins and etc. In general, domestic waste is referred to as refuse (Amasuomo and Baird, 2016). About 90% of domestic wastes are directly dumped on land thereby increasing land or soil pollution. All Industries generate waste materials either directly or indirectly. The wastes typically include ashes, rubbish, building material wastes, toxic wastes, metal containers, plastic containers, paints, oils, and other complex synthetic materials. The industrial wastes include (i) Mining operations leave tailings (rocks of little or no value) as waste, (ii) Metallurgical industries release waste like slag and scrap metal, (iii) Paper and pulp mills release effluents containing wood chips, bits of bark, cellulose fibres, and a number of chemicals, (iv) Oil refineries and petrochemical units release a mixture of wastes containing hydrocarbons, organic acids, and sulphur compounds and (v) Food processing units such as dairy, breweries, and meatpacking units release organic wastes.

Modern techniques employed in agriculture and the use of a variety of chemicals have contributed to the production of large quantities of agricultural waste. The agricultural waste includes (i) Agricultural wastes include crop residues like husk and straws, farm animal waste, and chemicals like pesticides, rodenticides, fungicides, herbicides, and fertilizers, (ii) These wastes can enter the water table as runoff from agricultural fields and (iii) Chemicals used in agriculture are toxic in nature. A lot of wastes is generated from commercial establishments such as restaurants, hotels, markets, offices, printing shops, auto repair shops, medical institutions, and hospitals. Nuclear reactors produce toxic, radioactive substances, such as heavy water or spent nuclear fuel. Radioactive waste is hazardous to all life forms as well as to the environment. These are the substances that have characteristics of ignitability or corrosivity or reactivity or toxicity. All waste generated from different sources can be grouped into biodegradable waste and non-biodegradable wastes. Biodegradable waste can be decomposed by the action of microorganisms. Domestic sewage, newspaper, and vegetable matter are biodegradable and under rotting. Non-biodegradable waste cannot be decomposed easily by microorganisms due to complex chemical constituents. Polythene bags, plastics, glass, aluminium cans, iron nails and DDT are some of the non-biodegradable waste materials (Aye and Widjaya, 2006).

Due to the increasing population and subsequent urbanization, production and consumption processes have increased because of which waste generation has increased rapidly in India. As a result of industrialization and the shifting of people from rural to urban areas in search of jobs, there has been an increase in the urban population, as a result of which waste generation has also increased tremendously. Industrialization has

brought both positive as well as negative impacts on the world. And, solid waste generation and its improper management is one of the negative consequences of industrialization. Unscientifically, disposal of solid waste in open dumps and landfills creates problems for public health and the environment. Hence, safe disposal with effective waste management is necessary. Waste management is concerned with how solid waste can be transformed and turned into a useful resource. Currently, India's population is around 1.50 billion, or 140 crores, which is showing an increase of 0.91 billion during 2020. As per an estimate, a total of 1,30,000 to 1,50,000 metric tonnes (MT) of municipal solid waste is being generated in India every day. That means around 330-550 grams of waste is generated per urban inhabitant per day. In this way, it adds up to roughly 50 million MT per year, and if it is calculated considering the current rates, this will increase to ~125 million MT per year by 2031 (Kumar *et al*., 2020).

As per a recently published study, around 62 million tonnes of waste are currently being generated in our country which may increase by up to 165 million tonnes by 2030 (Kumar *et al*., 2020). Of the total generated solid waste, only 75-80% of the municipal waste gets collected and only 22–28% of this waste is processed and treated. So, the rest of the waste (approx. 72–78%) is left untreated and dumped in open areas, which is leading to environmental and health hazards. Therefore, it is necessary that every household, including business owners all around the world, adopt solid waste management (Bioswas *et al*., 2017; Vinothkumar *et al*., 2021).

Waste Management Audit procedures includes the definition of Waste Management audit, methodology on how to conduct Waste Management audit at Educational Institutions and Industrial sectors as per the checklist of Environment Management Systems and International Standards on ISO 14001:2015, World Green Building Council, Swachh Bharath Scheme under Clean India Mission to understand the principles and importance of various audits in the context of the organization and risk assessment at 360˚ views (Gnanamangai *et al*., 2021). Waste Management audit helps the educational institutions/ industries to maintain eco-friendly environment, assures personal hygiene to various stakeholders and supports the nation; on the whole for the noble cause of environmental protection and nature conservation which in turn enhances the quality of life of all living beings (Arora, 2017; Demirbas, 2021).

2. Role of Educational Institutions in India

Educational institutions are playing important role in a nation's growth and development which starts from maintenance of Different wastes without harming the environment (Chan and Lam, 2018). A clean and healthy environment in an Organization determine effective learning skills and offers a conducive learning environment to the students. Educational institutions are insisted by both Central and State Governments to offer eco-friendly atmosphere to the stakeholders (Rajalakshmi *et al*., 2021). In addition, all the Educational institutions are asked to save the environment for future generations and to resolve the environmental problems (accumulating solid wastes and wastewaters/effluents and their careless disposal, enormous utility of plastics, uneconomical consumption of water, irresponsible in water harvesting and storage procedures, etc.) through Environmental Education. Implementing Swachh Bharath Abhiyan Scheme launched by the Indian Government thro' the Educational

institutions plays a major role in terms of giving neat and clean environment to tribal, rural and urban people across the country, besides the regular and conventional activities carried out by NSS, NCC/Student Force, Nature club, Eco club, Science club, Fine Arts club, Flora and Fauna club, Youth Red cross unit, etc. Seminar, Conference, Workshop, training and awareness programmes on environmental Waste Management awareness programmes may be conducted periodically by the Management and Administrative people of an Organization to the stakeholders.

Waste Management auditing is a systematic method whereby an organization's environmental performance is checked against its environmental strategies and compliances of the Government guidelines. This audit process is definitely useful for the Educational institutions to maintain the campus neatly and can give pure atmosphere to the students and staff members including management people (Vergara and Tchobanoglous, 2012). It is like an official examination of the environmental effects on an organization's campus as per the Government guidelines. The audit report may be useful to improve the organization's campus significantly by following the recommendations and suggestions given in the report. The Waste Management processes are being undertaken by ISO EMS 14001:2015 criteria and the concept of Swachh Bharath Abhiyan under Clean India Mission (Gnanamangai *et al*., 2021).

3. Waste Management and Environment Policy

Waste management and environment policy aims to provide an education and awareness in a clean environment to the stakeholders with regard to environmental compliance. Scope of the policy applies to all employees and students of the Institution/organisation to provide an ecofriendly atmosphere (Ghiani *et al*., 2014). Waste Management Policy dealt with cleanliness of the campus maintained through proper disposal of wastes and steps to be followed to recycle the biodegradable wastes and utilization of eco-friendly supplies to maintain the campus free from hazardous wastes /pollutants (Cardenas and Halman, 2016). The concept of eco-friendly culture is disseminated among the students as well as rural community through various awareness programmes. Head of the Organization, Departmental Heads and Senior Managers/ Management Representatives are responsible for monitoring the "waste management" initiatives of the College / University and maintain a clean campus while each and every individuals of the organisation should adhere to the policy.

4. Environment Friendly Campus

As stated earlier, Organization is liable to provide an eco-friendly atmosphere along with waste management facility to all the stakeholders (students and staff members). All non-compostable and single-use disposable plastic items, plastic utensils, plastic straws and stirrers should be avoided. Demonstration/awareness programme on establishing plastic-free environment and utility of organic alternatives for all incoming and current students, staff and faculty should be organised. Reduction of use of papers alternated with e-services, e-circulars, etc. and proper disposal of wastes, recycling and suitable waste management system should be considered to establish environment friendly campus. Environment Friendly Campus is playing an important role in terms of imposing waste management scheme which in turn useful to maintain the soil health and increased productivity (Sridhar and Adeoye, 2015).

5. Importance of Waste Management Auditing

The Management of the Organization (Auditee) should be exposed their inherent commitment towards making ecofriendly atmosphere through the Waste Management and ready to encourage/follow all types of waste management activities. They should promote all kinds of waste management activities such as conduct of environment awareness programmes, usage of segregation bins, avoiding of single use plastics, utility of organic alternatives prior to and after the Waste Management (Suwartha and Sari, 2013). The administrative authorities should formulate 'Waste Management Policies' based on technical report of Waste Management auditing. A clean and healthy environment will enhance an effective teaching/learning process and creates a favourable learning clean environment to the scholars. They should create the awareness on the importance of waste management through environmental education among the student members and research scholars. Waste Management is the most effective, ecological approach to manage environmental complications.

Waste Management may be beneficial to the campus in improving the greenery activities which in turn useful to save the planet for future generation. It is necessary to conduct Waste Management audit frequently at least once in three years in campus because students and staff members should aware of the Waste Management and its beneficial effects in order to save planet by means of 'Go green concept' which in turn support the institution to set environmental models ('icon') for the community. Waste Management is a professional and useful measure for an Organization to determine how and where they are retaining the campus eco-friendly manner (Kaseva and Gupta, 1996). It can also be used to implement the alleviation measures at win-win situation for the stakeholders and the planet. It provides an opportunity to the stakeholders for the development of ownership, personal and social responsibility.

6. Broad Categories of Waste

6.1. Municipal Solid Waste (MSW): It is commonly known as garbage collected by the municipality and/or disposed of at the municipal waste disposal site. Based on the sources of waste generation, it is further categorised into residential, commercial, institutional, and municipal services. MSW include food items, packaging materials, newspapers, clothes, containers, bottles, batteries, and durable goods like furniture, etc., generated by households, offices, hotels, shops, schools, and other institutions (USEPA, 2020). Some fractions of demolition and construction debris, hazardous waste materials such as used electric light bulbs, batteries, automotive parts, and a very small quantity of biomedical waste such as discarded medicines and used syringes, are often found in collected municipal solid waste. Once collected, they are sorted and treated for recycling and reuse before their final disposal.

6.2. Biomedical waste: Biomedical waste or hospital waste is the waste created by healthcare activities such as diagnosis, treatment, immunization, or any kind of research activity or in the production or testing of biologicals. It contains hazardous materials such as needles and syringes, chemicals, pharmaceuticals, medical devices, and radioactive materials and infectious materials such as unwanted microbiological cultures and stocks, bandages and soiled dressings, body parts, other human or animal tissue, diagnostic samples, discarded blood, etc.

6.3. Plastic waste: Plastic wastes are the discarded products made of plastic, such as packaging material, carry bags, pouches, etc. whose life is over and are of no use as prescribed in the Plastic Waste Management Rules, 2016. They are recyclable materials. It is necessary to manage plastic waste properly because the accumulation of plastic discarded objects causes adverse effects on wildlife, the marine environment, and human beings. Plastic waste can be easily seen everywhere on land and in oceans, lakes, rivers, ice, and air, which causes damage to humans and the whole environment.

6.4. Electronic waste: Electronic waste, also known as "E-waste," refers to unwanted or useless electronic or electrical products that are non-working, broken, rejected, or have reached the end of their useful life. Some examples of electronic waste are computers, cell phones, tablets, televisions, photocopiers, fax machines, etc. They are dangerous in nature due to toxic chemicals they release and can harm the environment. Although they can be refurbished, reused, or recycled.

6.5. Bio-waste: Bio-waste is biodegradable waste, which consists of mainly organic waste. It includes green waste generated from paper waste, gardens and parks, food and kitchen waste from households, restaurants, and food processing waste from food processing plants. In the landfill directives, it is defined as ‘waste capable of undergoing anaerobic or aerobic decomposition, such as food and garden waste, and paper and cardboard. Bio-waste is a fuel resource that may be used to produce heat and electricity.

6.6. Construction and demolition (C&D) waste: C&D waste comprising of building materials, construction debris and rubble generated during the redevelopment, construction, repair and demolition of any civil structure. Though it is kept as a separate category, some of the fraction of C&D waste is also found in municipal solid waste. The waste was disposed of at the disposal facilities which contains high proportion of recyclable materials, which are used to make construction materials. The C&D waste may have some hazardous substances which should be disposed of separately.

6.7. Industrial waste: Industrial waste is generated as a result of industrial processes. They are categorized mainly as hazardous waste and non-hazardous waste. Though industrial waste is not considered as municipal solid waste and is not mixed with it, in some places, non-hazardous waste is disposed of with municipal waste. In this case, the industries arrange for waste transportation to the disposal site and may be responsible for disposal fees. According to the legislation and current practises, the municipality should explicitly define its responsibility for industrial waste management. This would assist in the quantity and classification of hazardous and non-hazardous industrial wastes, as well as municipal and non-municipal wastes.

6.7. Food waste: It refers to the decrease in mass (quantitative) or nutritional value (qualitative) of food - edible parts - throughout the supply chain that was intended for human consumption. It also refers to food that gets spilled, spoilt or otherwise lost, or incurs reduction of quality and value during its process in the food supply chain before it reaches its final product stage. It is typically taking place at production, post-harvest, processing, and distribution stages in the food supply chain.

7. Scope of Waste Management Audit

Waste management audit is sought to examine whether the institution / industries / pharmaceutical / hospitals had identified waste as a risk to environment and health, accurately assessed the amount of different kinds of waste being generated in the institution/industries/pharmaceutical/hospitals and drafted a policy on waste management which focused on waste minimisation and waste reduction, as compared to waste disposal, as the more effective ways to manage waste (Rajeshwari *et al*., 2015; Trung and Kumar, 2015). In addition, the waste management audit sought to examine whether all kinds of waste had been covered under legislation for safe disposal and whether agencies had been allocated responsibility and accountability for the management of waste.

8. Benefits of the Waste Management Auditing

There are several benefits on conduct of Waste Management by the Organization which may be definitely useful to improve the campus significantly based on the audit report. The Waste Management contained methodology followed and both qualitative and quantitative measurements including physical observation of availability of adequate dust bins, usage of personnel protected materials, separate transportation trolley and method of disposal of waste. The waste management scheme is essential to impose the soil health and increased productivity in an organization (Brunner and Rechberger, 2014). The following are the major benefits of the waste management process.

- Availability of adequate number of user-friendly dust bins as per Guidelines (Red, Yellow, Blue, and Black & Green Bins) in the campus for various wastes' collection, segregation and disposal.
- Maintenance of 'Record Register' for waste disposal and puncture proof containers for sharps / blue bags in the campus.
- Availability and usage of personal protected materials like Gloves, Caps, Masks, Aprons & Gum boots etc. as per the Guidelines in the campus.
- Availability of 1% fresh Sodium hypochlorite or Bleaching Powder solution as per guidelines for maintaining the pest and disease free hygiene environment.
- Proof of Licensed companies signed MoU with the organization for wastes collection and disposal as per the Central and State Government regulation.
- Norms are being followed by the Organization as per the Central and State Government Pollution Control Board.
- Different Forms, Formats, Annual Report, etc. are available for waste collection and mode of transportation.
- Availability of a trained dedicated with skilled personals for waste management in each campus in department / sector wise.
- Checking whether e-wastes, bio (wood) wastes, construction wastes, plastic wastes, hazardous wastes and biomedical wastes mixed at the source of generation.
- Checking whether the waste collected in covered bins and is the bins filled up to more than ¾ th level.
- Checking whether the bins are cleaned with soap and disinfectant regularly and is the stored waste kept beyond 48- 72 hrs.
- Checking whether the waste transported in closed containers or open bags and are

the waste collection bins/Trolleys/wheel barrow used for transporting wastes.

- Checking whether the concept of E-Waste, Plastic Waste, Biomedical waste management is followed in the campus.
- Whether E-Waste management practices included in the purchase policy of electronic items and observe the E-waste refurbished and used again in the institution.
- Whether the importance waste and their implications on environmental and personal hygiene through awareness programmes are conducted for stakeholders.
- Signing MOU with Government and NGOs ensure proper handling of waste materials and reuse of construction and wood wastes in the same campus.

9. About the Organization

9.1. Adichunchanagiri Institute of Technology

Adichunchanagiri Institute of Technology (AIT) was established in the year 1980 at Chikmagalur (240 km from Bangalore), with the blessings of revered **Jagadguru Padmabhushana Sri Sri Sri Dr. Balagangadharanatha Maha Swamiji**, pontiff, of Sri Adichunchanagiri Maha Samsthana Math.

Chikmagalur city is 20 km from the world-famous sculpture Belur Temple. The renowned temple of Sringeri Sharadamba and Sri Shankaracharya Mutt is just 100 km away. Spread out over **65 acres** of land with green surroundings and picturesque hillocks, the college has a conducive atmosphere for education. The weather is salubrious and pleasant throughout the year.

The Institute has highly qualified and experienced faculty with a reputation in their areas of specialization, well-equipped laboratories, seminar halls with projectors, sufficient books and periodicals in the library, hygienic canteen facility with hostels for both girls and boys, a huge amphitheater for cultural exposure and fleet of buses for transportation.

The Institute is providing good training for students to excel in academics as well as in industry requirements and aiming towards 100% placements to give a better future for students

9.2. About Nature Science Foundation (NSF)

NSF is an ISO 9001:2015 & 14001:2015 certified and registered with Ministry of Micro, Small and Medium Enterprise (MSME), Government of India Organization functioning energetically towards the noble cause of nature conservation and environmental protection. NSF is managed by a board of trustees of NSF Public Charitable Trust under the TN Societies registration Act 1975 (TN Act 27 of 1975) on 29th November, 2017 at Peelamedu, Coimbatore- 641 004, Tamil Nadu, India with Certificate of Registration No. 114 / 2017. In addition, NSF has 12A, 80G and Form 10AC certificates for income tax exemption and implanting various Government schemes. The main motto of the NSF is to “Save the Nature to Save the Future” and “Go

Green to Save the Planet". NSF Branch Offices are also functioning effectively at Gorakhpur, Uttar Pradesh and Faridabad, Haryana, India to adopt the 'Go Green Concept' in a big way. NSF family is wide spread across India with over 115 state-wise Lead auditors to conduct Green and Environment Audits.

NSF is functioning strenuously to conduct different awareness programmes and implement various schemes to public and school / college students towards the noble cause of nature protection. Some of the programmes are also being organized for the benefit of tribal communities to create the supply chain for biodiversity conservation studies. The objectives along with vision and mission are illustrated to promote educational and environmental awareness programmes through social activities for enhancing the quality of life and to conserve nature from environmental pollutants using traditional and modern technologies for sustainable land management. NSF is educating the tribal community children through social service and towards the upliftment of tribes as a whole and make them as entrepreneurs.

International Eco Club Student Chapter (IECSC) has been established for Student volunteers and faculty members are encouraged to conduct National and International events, Student Technical Symposium, Distinguished lecture programme, Environment day celebration, Ozone day celebration, Project model exhibition, Awareness programmes on Environmental pollution, Biodiversity and Natural resources conservation and etc. with the financial support of the Foundation. NSF is being released 'Magazine' and 'Newsletter' biannually to share the information about Environmental awareness programmes on biodiversity conservation, seminar on soil conservation, water management and solid waste management, restoration and afforestation programmes in Western Ghats of southern India.

In order to encourage the students, members of faculty, academicians, scientists, entrepreneurs and industrial experts those who are involving in nature protection and biodiversity conservation studies across the world, NSF tributes the deserved meritorious candidates with various awards and honours such as 'Best Faculty Award', 'Best Women Faculty', 'Best Scientist Award', 'Best Student Award', 'Best Research Scholar Award', 'Best Social Worker Award', 'Young Scientist Award', 'Life-Time Achievement Award' and 'Fellow of NSF'. These award and honours will be given to the deserved meritorious candidates during the 'Annual Meet and Award Distribution Ceremony' which will be conducted every year during the first week of January.

NSF has introduced various types of Audits such as 'Eco Audit', 'Green Audit', 'Energy Audit', 'Hygienic Audit' Water & Soil Audit, Plastic Waste Management Audit, Biomedical Waste Audit, Solid Waste Management Audit, E-Waste Management Audit, Academic & Administrative Audits including ISO certification process to Academic Institutions, R&D Organizations and Industries towards the accreditation process as well as maintaining a hygienic eco-friendly environment to the stakeholders in their campus. All audits will be conducted as per the Checklist prepared by the NSF ISO Criteria and in compliance with Government Law and Environmental Legislations including World / Indian Green Building Council and the concept of Swachh Bharath Abhiyan under Clean India Mission. Green campus and Environment Policy, Purchase Policy, Energy Policy, MoU, International Eco Club student Chapter.

Audit processes are being conducted through the certified Auditors as per the following by the NSF

Audit	Certified Auditors	Certified Auditors
Green Audit	• IGBC - Indian Green Building Council • GBCRS - Green Building Code and Green Ratings Systems • GRIHA – Green Rating for Integrated Habitat Assessment	➢ Mrs. S. Rajalakshmi ➢ Dr. R. Mary Josephine ➢ Dr. B. Mythili Gnanamangai ➢ Er. Ashutosh Kumar Srivastava ➢ Er. N. Shanmugapriyan
Energy Audit	• BEE - Bureau of Energy Efficiency • LEED - Leadership in Energy and Environmental Design • CII-GreenCo – GreenCo Rating System Felicitator	➢ Er. D. Dinesh kumar ➢ Er. N. Shanmugapriyan ➢ Dr. N. Balasubramaniam ➢ Dr. P. Thirumoorthi ➢ Dr. G. Murugananth
Environment Audit	• IGBC -Indian Green Building Council • ASSOCHAM - Associated Chambers of Commerce and Industry of India • FSRS – Fire Safety & Rescue Services	➢ Mrs. S. Rajalakshmi ➢ Dr. A. Geetha Karthi ➢ Dr. R. Mary Josephine ➢ Dr. B. Mythili Gnanamangai ➢ Er. Ashutosh Kumar Srivastava ➢ Er. N. Shanmugapriyan
Hygiene Audit	• FSMS – Food Safety Management System & • Occupational Safety & Health (ISO 22000:2018) • SBICM - Swatch Bharath under India Clean Mission	➢ Mrs. Gaanaappriya Mohan ➢ Er. Ashutosh Kumar Srivastava ➢ Dr. R, Sudhakaran ➢ Dr. N. Saranya
Waste Management Audits	• Water & Soil Audit, Plastic Waste Management Audit, Biomedical Waste Audit, Solid Waste Management Audit, E-Waste Management Audit as per the Checklist of NSF	➢ Mrs. Gaanaappriya Mohan ➢ Er. Ashutosh Kumar Srivastava ➢ Dr. R, Sudhakaran ➢ Er. N. Shanmugapriyan
Academic & Administrative Audits	• Academic & Administrative Audits as per the NAAC Criteria and ISO implantation procedure	➢ Dr. B. Anirudhan ➢ Dr. B. Shreeram ➢ Dr. R. Mary Josephine

	• In compliance with the Environmental legislations and rules and regulations	
ISO Certification	• QMS (9001:2015), EMS (14001: 2015), OHSMS (45001: 2018), ISMS (27001:2018), FSMS (22000: 2018), QMSMD (13485: 2016), EnMS (50001: 2018)	➢ Er. Ashutosh Kumar Srivastava ➢ Mrs. S. Rajalakshmi ➢ Dr. A. Geetha Karthi ➢ Mrs. Gaanaappriya Mohan ➢ Dr. K. Sreedharan

10. Audit Details

Date / Day of Audit	**:**	**22.06.2022**
Venue of Audit	**:**	**Adichunchanagiri Insttute of Technology, Chikkamagaluru, Karnataka**
Audited by	**:**	**Nature Science Foundation,** Coimbatore, Tamil Nadu, India.
Audit type	**:**	**Waste Management Audit**
Name of Auditing Chairman	**:**	**Mrs. S. Rajalakshmi Jayaseelan,** Chairman of NSF & ISO QMS, EMS, OHSMS, EnMS Auditor.
Name of Lead WM Auditor	**:**	**Dr. B. Mythili Gnanamangai,** Vice Chairman of NSF, Indian Green Building Council Accredited Professional.
Name of ISO OHSMS Auditor	**:**	**Dr. K. Sreedharan,** Lead Auditor, ISO Occupational Health & Safety Management System (45001:2018)
Name of CII-SWM Auditor	**:**	**Er. Ashutosh Kumar Srivastava,** CII Certified Expert, Sustainable Waste Management Associated Chambers of Commerce and Industry
Name of the Hygiene Auditor	**:**	**Mrs. Gaanappriya Mohan** ISO FSMS OHS Hygiene Auditor, NSF.
Name of Subject Expert-I	**:**	**Mr. B.S.C. Naveen Kumar,** Senior Faculty, Mahatma Gandhi National Council of Rural Education, Ministry of Higher Education, Hyderabad.
Name of Subject Expert-II	**:**	**Dr. M. Ravichandran,** Lead Auditor & Associate Scientist, Bayer Bioscience, Pvt. Ltd. Hyderabad, AP.
Name of Subject Expert-III	**:**	**Er. D. Dinesh Kumar,** Certified Lead Auditor, IGBC, ASSOCHEM, GRIHA & LEED
Name of Eco & Green Officer	**:**	**Mrs. M. Priya,** Environment, Energy & Green Council

Programme Officer, NSF.

11. Procedures followed in Waste Management Audit

Waste Management is a structured process of documenting the credentials in terms of availability of adequate Dust bins, usage of personnel protected materials, separate transportation trolley and method of disposal of waste. it is a kind of a professional tool for assessing the waste management in the campus. Waste Management projects the best environmental practices and initiatives taken in the organisation at the prescribed site of audit that brings added value to the organisation in maintaining the eco-friendly campus to the stakeholders. First step of the audit is ensuring that the organisation has a central role in building the waste management, in order to validate the same (Adeniji, 2018).

Waste management is not intended for the self-sustainability of the building alone, it also involves in propagation of the waste management initiatives so as to be adopted by any individuals and organization at a minimum cost. Waste Management has been conducted as per the checklist of Nature Science Foundation, Coimbatore, Tamil Nadu, India (www.nsfonline.org.in) through the authenticated Professionals for people qualified to investigate and evaluate the campus for validating the best environmental practices (Staniskis and Katiliute, 2016). Professional team of ISO Environment Management Audit (14001:2015), Indian Green Building Council Accredited Professionals, Experts of waste management Lead Auditors were selected to conduct the Waste Management process.

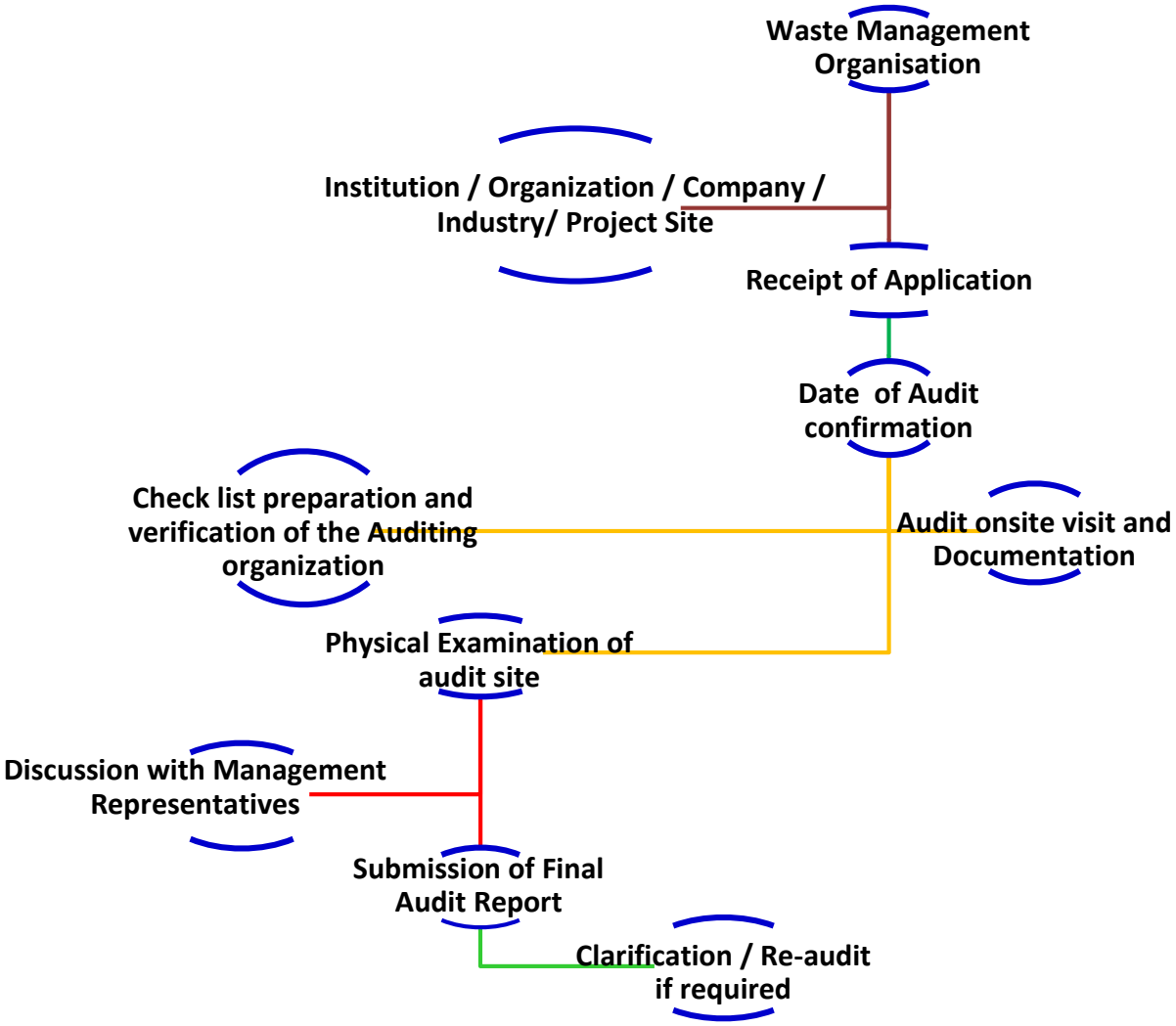
During the audit, Availability of Adequate number of Dust Bins as per Guidelines (Red, Yellow, Blue, and Black & Green Bins) in the campus for various wastes' collection, segregation and disposal, maintenance of 'Record Register' for waste disposal and puncture proof containers for Sharps / Blue Bags in the Campus, Availability and usage of personal protected materials like gloves, Caps, masks, aprons and gum boots etc. as per the guidelines of Tchobanaglous *et al*. (2007), PIB GoI (2016) and Tewari (2021) in the campus, Availability of 1% fresh Sodium hypochlorite or Bleaching Powder solution as per guidelines is checked to assess the personal and hygiene environment. Checking whether e-wastes, wood wastes, construction wastes, plastic wastes, hazardous wastes and biomedical wastes mixed at the source of generation, checking whether the waste collected in covered bins and is the bins filled up to more than ¾ th level are monitored. In addition, checking whether the bins are cleaned with soap and disinfectant regularly and is the stored waste kept beyond 48- 72 hrs, checking whether the waste transported in closed containers or open bags and are the waste collection bins/Trolleys/wheel barrow used for transporting wastes are also monitored ring the audit process. Checking whether the E-Waste refurbished and used again in the institution are also done during the audit process as per the protocol of Gnanamangai *et al*. (2021).

Projects, Dissertations and Thesis are the academic effort credentials that always fosters the innovative ideas on thinking and implementation of new innovative approaches towards the waste management. These should be disseminated through presentations and publications in social media, books, magazines and journals so as to

spread the innovative ideas and methods to the broad public. These efforts taken by the students and staff members were deliberated while conducting the waste management. Waste management processes are taking place as per the following flow-chart starting from the receipt of application forms from the auditee (organization) and ending upon the submission of final report to the concerned organization (Leal Filho *et al*., 2015). During the audit process, the best environmental practices followed and new initiatives undertaken in the organisation to reduce the environmental pollution and steps taken for nature conservation that brings added value to the organisation in maintaining the eco-friendly campus with respect to waste management process were assessed (WGBC, 2021). In addition, supporting activities of the scholars and staff with regard to "Vision and Mission" of the waste management activities of the Organization is also evaluated.

11.1. Onsite Waste Management Audit activities

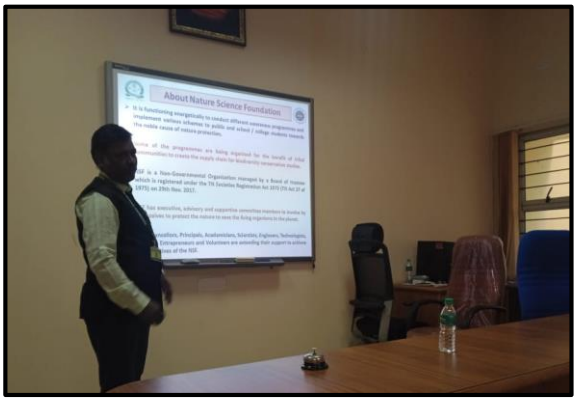
Opening meeting is the first step between the audit team and auditee along the Management Representatives where the purpose of the audit, procedures to be adopted for the conduct of the audit, verification of the documents and the time schedules were discussed, in brief. Followed by opening meeting, onsite inspection will be conducted which is the second step in the audit where the Audit team members visited different sites in the campus and required photographs were taken then and there for preparing the audit report. During the onsite phase of visit, it is vivid how the various facilities made by the Adichunchanagiri Institute Of Technology Management to the stakeholders to ensure the waste management in the campus. It is observed how the environment is protected in the campus and by what means an eco-friendly atmosphere is being given to the stakeholders. The assessment reveals the strengths and weaknesses of the Auditee's Management controls and risks associated with their failure in creating waste management facilities. Collecting audit proofs *ie*, data collection and information from the auditee as per the audit protocol were carried out. An exit meeting was conducted to describe the findings of the audit with Management Representatives and staff members along with the audit team in brief.



Flow-chart of Waste Management Audit Procedures

11.2. Pre-Audit stage activities

A pre-audit meeting (opening meeting) is conducted with Management and Administrative people along with staff coordinators of waste management audit process, wherein, audit protocol and audit plan were discussed in brief. The purpose of this meeting is to provide a chance to emphasize the scope and objectives of the audit and discussions held on the feasibilities associated with the audit (Marrone *et al.*, 2018). Pre-audit stage activities are an essential prerequisite for the Waste Management to meet the auditee and to gather information about the campus and required documents were collected directly from the Organization before the start of the audit processes (Fachrudin *et al.*, 2019). Audit team was selected by the Nature Science Foundation as per the checklist comprised of Lead Auditor of ISO (EMS 14001:2015), Environmental and CII certified Waste management sustainability professional from Conventional and Technical Universities, agencies, certifying bodies across India and Accredited Professionals from World Green Building Council.

Opening meeting with the Principal, Management Representatives, IQAC Coordinator, Staff Coordinators of Adichunchanagiri Institute of Technology, Chikkamagaluru and Audit Team of the Nature Science Foundation, Coimbatore, Tamil Nadu

11.3. Target Areas of Waste Management Auditing

Waste Management is nothing but a professional tool to assess the waste management activities in the educational institutions and give a value addition to the campus and considered as a resource management process. Waste management process may be undertaken at frequent intervals and their results can demonstrate improvement or change over time. Eco-campus focuses on the reduction of carbon emissions, water consumption, wastes to landfill and enhance energy use conservation to integrate environmental considerations into all contracts and services considered to have significant environmental impacts (Choy and Karudan, 2016). There are several target listed in the waste management process in which a few are taken into consideration as per the Indian scenario is concerned. They are the various sources (source of plastics, wood, e-waste, biomedical, construction and demolition waste and hazardous waste), segregation of waste, storage area of the waste, collection and transport units, processing units and the landfills.

12. Impact of Waste on Health and Environment

Waste represents a threat to the environment and human health if not handled or disposed of properly. Surface and ground water contamination takes place when waste reach water bodies. Residues from waste can change the water chemistry, which can affect all levels of an ecosystem. The health of animals and humans are affected when they drink the contaminated water. A specific environmental hazard caused by waste is leachate, which is the liquid that forms, as water trickles through contaminated areas leaching out the chemicals. Movement of leachate from landfills, effluent treating plants and waste disposal sites may result in hazardous substances entering surface water, ground water or soil. Waste contaminates soil and can harm plants when they take up contaminants from their roots. Eating plants or animals that have accumulated soil contaminants can adversely affect the health of humans and animals. Emissions from incinerators or other waste burning devices and landfills can cause air contamination. Incinerators routinely emit dioxins, furans and polychlorinated by-phenyls, which are deadly toxins, causing cancer and endocrine system damage. Landfills are a big source of release of greenhouse gases, which are generated when organic waste decomposes in

landfills. E-waste contains a mix of toxic substances such as lead and cadmium in circuit boards; lead oxide and cadmium in monitor cathode ray tubes; mercury in switches and flat screen monitors; cadmium in computer batteries; polyvinyl chloride in cable insulation that release highly toxic dioxins and furans when burned to retrieve copper from the wires. Thus, improper handling of waste has consequences both on the environment as well as on the health of the people.

13. Management of Wastes

Waste management can be simply defined as the collection, transport, recovery and disposal of waste together with monitoring and regulation of the waste management process. Waste prevention means measures aiming at the reduction of the quantity and harmfulness for the environment of diverse waste streams. Prevention is the most desirable waste management option as it eliminates the need for handling, transporting, recycling or disposal of waste. It provides the highest level of environmental protection by optimising the use of resources and by removing a potential source of pollution. The most popular types of waste management are Recycling, Incineration, Landfill, Biological Reprocessing and Animal feed. According to United Nations Environment Programme (UNEP), waste management includes both the components of prevention and disposal of waste. Rather than regarding ‘waste’ as a homogenous mass that should be buried, they argued that it was made up of different materials that should be treated differently i.e. some should not be produced, some should be reused, some recycled or composted, some should be burnt and others buried. According to this hierarchy, the priority of any country should be to extract the maximum practical benefits from products and prevent and minimize the waste that is generated. Thus, strategies for waste disposal should focus on waste prevention and minimization through 7R’s - Recycle, refuse, Reduce, Reuse, Repair, Re-gift and Recover.

Incineration is the disposal of waste materials by means of burning. The power produced by burning waste materials to produce heat, energy or steam. One of the drawbacks of this disposal process is that it can be a source of air pollution. Landfills includes the collection, transportation, disposal and burying of waste in designated property. Landfill sites are a significant cause of health and environmental problems that concern many communities. The gas from theses landfills is often incredibly dangerous. Chemical waste materials, such as kitchen waste and paper goods, can be reused after a procedure called biological reprocessing which is another popular system amongst the varied types of waste management. Multiple physiological systems, including recycling and biomass gasification, are used in biological reprocessing. Composting is a normal biological mechanism that is carried out under control conditions. One of the ends of the stock is natural gas, which is used to produce heat and electricity. Biological reprocessing is commonly used for the disposal of industrial waste. Food waste can be preserved by manure and livestock feed and this is also one of the ecological types of waste management methods.

The three types of waste management based on the nature are (i) Solid Waste Management, (2) Liquid Waste Management and (3) Biomedical Waste Management. The term solid waste refers to all discarded and thrown away solid and semi-solid wastes arising from human and animal activities. These may be classified as municipal wastes, industrial waste, and hazardous waste. The use and throw culture of advanced societies has led to a tremendous increase in the generation of solid waste. To overcome the major causes of solid waste, we have to practice the rules of no littering zone, separate the dry waste and wet waste and dump it into the municipal vans, avoid usage of plastic, etc. liquid waste management is the practice followed to remove or prevent the discharge of pollutants to the drain system or to watercourses as a result of the creation, collection, and disposal of non-hazardous liquid materials.

To overcome the problem of liquid waste, we should stop dumping the oil containers on the ships, which disturb marine life, stop washing animals across the rivers, etc. Process of treating Liquid Waste by the Management includes (i) Primary treatment: Screening, grit removal, and sedimentation (settling), (ii) Secondary or biological treatment: Biological processes and additional settling and (iii) Tertiary or advanced treatment: Not all sewage treatment plant requires tertiary (advanced) treatment. Biological wastes are generated during the diagnosis, testing, treatment, research, or production of biological products for humans or animals. Major sources of biomedical waste are hospitals, blood banks, labs, etc. Process of treating Biomedical Waste Management includes (i) Incineration, (ii) Autoclaves, (iii) Mechanical / Chemical Disinfection, (iv) Microwave, (v) Irradiation and (vi) Vitrification. Waste management involves a process whereby wastes are collected, transported, and disposed of in the best possible way of limiting or eliminating the harmful effect of wastes. This aspect of environmental management is as important as other public amenities or infrastructures without which the life of a contemporary man would be extremely difficult.

14. Observations of Waste Management

During the waste management audit processes, how the organization is managing the various waste materials like e-wastes, wood wastes, construction wastes, plastic wastes, hazardous wastes and biomedical wastes in the campus effectively without harming the environment. It is ensured that a proper storage of the wastes as per their classification, characterization, mode of treatment and disposal and analysis of disposal and recycling process of wastes as per the guidelines of MOEF, CPCB & DPCC are carried out.

14.1. Qualitative Measurements of Waste Management

S.No.	Requirements and checklists of the audit	Conformity		
		Yes	No	Remarks
1.	Adequate number of Dust Bins as per Guidelines (Red, Yellow, Blue, and Black & Green Bins) are made available in the campus for various wastes, collection, segregation and disposal.	√		
2.	Record Register for waste disposal and Puncture proof Containers for Sharps / Blue Bags are made available in the campus	√		
3.	Mutilators (Needle / syringe cutters) and calibrated weighing machines for biomedical wastes collection*			√
4.	Personal protected materials like Gloves, Caps, Masks, Aprons & Gum boots etc. used are adequately made available as per the Guidelines in the campus.	√		
5.	Around 1% fresh Sodium hypochlorite or Bleaching Powder solution is made available as per guidelines*			√
6.	Mercury Spill Management, kit, Post Exposure Prophylaxis Kit and Blood spill Management kit are available*			√
7.	Proof of Licensed Companies signed MoU with the Organization for wastes collection as per the Govt. regulation	√		
8.	Norms are being followed by the Organization as per the Central and State Government Pollution Control Board	√		
9.	Different Forms, Formats, Annual Report, etc. are available for waste collection and mode of transportation	√		
10.	Availability of a trained dedicated with skilled personals for waste management.	√		
11.	Is the waste segregated at the site of generation? If not, where are they segregated?		√	
12.	Is the infectious waste and non infectious waste mixed at the source of generation?*			√
13.	Is e-wastes, wood wastes, construction wastes, plastic wastes, hazardous wastes and biomedical wastes mixed at the source of generation?			√

14.	Is the waste covered in covered bins? and Is the bins filled up to more than ¾ th level ?	√		
15.	Is the bins cleaned with soap and disinfectant regularly and bins are overfilled? And is the stored waste kept beyond 48-72 hrs?*			√
16.	Is the waste transported in closed containers or open bags? and Are the waste collection bins/Trolleys/wheel barrow used for transporting wastes?	√		
17.	Is the personal protective gears like mask and gloves used while collecting the wastes from the site of deposition?	√		
18.	Whether the concept of E-Waste management is followed in the campus?	√		
19.	Has a Management Representative, E-Waste Specialist, Laboratory Staff been assigned?	√		
20.	Whether E-Waste management practices included in the purchase policy of electronic items?	√		
21.	Whether an authorised refurbrisher appointed to manage the E-waste	√		
22.	Are the E-Waste refurbished and used again in the Institution?		√	
23.	Whether the importance waste and their implications on environmental and personal hygiene through awareness programmes are conducted for stakeholders?	√		
24.	Signing MOU with Government and NGOs ensure proper handling of waste materials	√		
25.	Whether construction and wood wastes are subjected to reuse them in the same organization campus?		√	
26.	Whether plastic wastes are burnt inside the campus? Any air pollution due to plastic materials burning takes place ?		√	
27.	Projects and dissertation works, scholarly publication on various wastes and their management carried out by staff members and students	√		
28.	Whether hazardous wastes are properly discarded in which acids, solvents and salts are disposed after diluting with water and poured after buried in the soil	√		
29.	Have programmes for the achievement of plastic free area objectives and targets been established and implemented as on today? Any display board is made in the campus?	√		
30.	Are recycling of plastic polymers promoted in the campus among the stakeholders?	√		
31.	Wood waste are collected and recycled properly and they used for fuel and degradation / green manuring purposes?	√		
32.	Residual wastes are properly disposed in the campus after burring the soil with proper dilution with water	√		

* Applicable for Hospitals/Labs/Pharmaceutical Industrial sectors

14.2. Plastic Waste Management

Plastics fuelled scientific and technological innovations due to their flexibility, durability, water resistance, and affordability. The most extensively used techniques of plastic waste management across the globe are mechanical recycling, incineration and landfilling. Recycling of plastic is considered as environmental friendly and the most effective way of plastic waste management. The other method of plastic waste management is incineration. The non recyclable plastic waste irrespective of segregation, cross contamination, additives and impurities are burned through incinerators. Landfilling is another method of plastic waste management. But unsanitary landfill or dumping of waste leads to tremendous space constraints, leaching of harmful chemicals and can also result in open surface fire in dumps, often resulting in the release of harmful air pollutants like dioxins and furans. Waste management audit conducted at Adichunchanagiri Institute of Technology is ensured the methodology adopted to reduce the use of plastics among the stakeholders. The institute is collecting plastic items periodically and subjected to proper segregation into recyclable and non-recyclable wastes in appropriate colour coded and labelled bins. After segregation of plastic wastes, they are given to the Karnataka Municipal Corporation for its further disposal and recycling processes as per the Central and State Government policies. The College Campus has taken sufficient attempts not to use single use plastics in the campus and 'say no to plastics' in places like canteen, hostel dining halls, seminar halls, corridors, etc. to the students, parents and public. The Management insisted the people use eco-friendly bags made from organic materials like plant fibres which are easily decomposable in nature. These efforts are very much essential to keep the environment neat and clean to conserve nature.

14.3. Construction and Demolition (C&D) Waste Management

The waste comprising of building materials, bris and rubble resulting from construction, re-modelling, repair and demolition of any civil structure. According to Technology Information, Forecasting and Assessment Council's (TIFAC), highest waste generation comes from demolition and construction of buildings. The typical composition of Indian C&D wastes are concrete, soil, sand, gravel, bricks, wood, asphalt and metal. Recycling of C&D wastes is important as it helps to reduce the dependence on natural resources and eliminates adverse environmental impacts. Recycling of C&D wastes has the additional advantage of controlling the quantum of C&D wastes destined for disposal at landfills besides reducing transportation costs. The list of reuse and salvage materials include appliances, bathroom fixtures, bricks, blocks, masonry stone, structural steel, cabinets, carpeting, ceiling tiles, timber and timber based boards, door and window frames and shutters, flooring tiles, stone tiles/platforms, insulation, landscaping materials, lighting fixtures, metal framing including for partitions and ceiling, panelling, pipes, antique mouldings, accessories and hardware of furniture, PVC water tanks, roofing sheets used for garages, outdoor areas, fabric of tensile structures etc. Waste management audit conducted at the Campus is ensured the C&D wastes properly reused in the campus. C&D waste management activities such as segregation, reuse and recycling are properly done without harming the environment. The College has performed the estimation of the amount and type of recyclable and non-recyclable

waste materials that are expected to be generated on site. Listed all expected quantities of each type of waste and recycled into aggregates which are effectively used in the construction of pillars and pathways. One of the innovation followed by the institute is reuse of Ash waste into building blocks which is also collected from other industries.

Reuse of Ash Waste into building blocks at AIT, Chikkamagaluru, Karnataka

14.4. Biowastes Management

Biowastes are originated from plants animals and food wastes which also affect the environment to a greater extend. Depending on the biowastes quality, it can be recycled or reused for energy production. Plant wastes can be reused as a building material, recycled into mulch for landscaping, pulp for paper production, and used as a fuel. The rising cost of waste material disposal and a growing environmental consciousness also contribute to the increasing importance of waste wood recycling. The reason for recycling waste wood is world approaching closer to global warming and reduce their global footprints. AIT Campus has taken sufficient efforts to collect the various biowastes across the campus and recycle them properly without harming the environment. Recycles biowastes are reused for plant cultivation as manuring.

14.5. Hazardous Wastes

Hazardous-waste management, the collection, treatment, and disposal of waste material that, when improperly handled, can cause substantial harm to human health and safety or to the environment. Hazardous wastes can take the form of solids, liquids, sludges, or contained gases, and they are generated primarily by chemical production, manufacturing, and other industrial activities. They may cause damage during inadequate storage, transportation, treatment, or disposal operations. Improper hazardous-waste storage or disposal frequently contaminates surface water and groundwater supplies as harmful water pollution and can also be a source of dangerous land pollution.

Adichunchanagiri Institute of Technology has taken pioneering efforts to dispose the hazardous waste properly that are generated from various Department laboratories. The Campus did not dispose the chemical wastes in regular trash or in the drainage system. Acids, solvents, salts, reagents and cancer-causing substances (carcinogens) will cause cancer to the stakeholders those who doing research and/or experiments. Acids and Reagents are carefully mixed with 2 to 5 gallons of water and diluted solution poured slowly down the sink followed by flushing with large quantum of water without splashes. Most chemical wastes must be disposed of safely without affecting the environment, soil health and water quality as per the directions of World Hazardous Waste Programme. The Management has a certain protocol to dispose waste as well as expiry chemicals properly. But there are some proper records for disposing of acids, reagents, carcinogenic and hazardous chemicals as per the rule of Central and State Pollution Control Board.

14.6. Electronic Waste

Electronic waste, as known as e-waste, is generated when any electronic or electrical equipment becomes unfit for the intended use or if it has crossed its expiry date. E-waste posses the huge risk to humans, animals, and the environment. E-waste typically consists of plastics, metals, cathode ray tubes (CRTs), printed cables, circuit boards, and so on. The presence of toxic substances like liquid crystal, lithium, mercury, nickel, selenium, polychlorinated biphenyls (PCBs), arsenic, barium, brominates flame retardants, cadmium, chrome, cobalt, copper, and lead makes it very hazardous, in case e-waste get dismantled and processed in a crude manner with the rudimentary techniques. The computers, mainframes, servers, monitors, printers, scanners, compact discs (CDs), copiers, calculators, battery cells, cellular phones, fax machines, transceivers, TVs, medical apparatus, iPods, refrigerators, washing machines, and air

conditioners are examples of e-waste when they become unfit for its use. If these electronic items are discarded with other household garbage, the toxics pose a threat to both health and vital components of the ecosystem.

According to E-Waste Management Rules, 2016 (Ministry of Environment, Forest and Climate Change, Government of India), electronic waste or e-waste includes old and non-functional electrical and electronic appliances. As per the Rules, the producer of the electrical and electronic equipment shall be responsible to collect and channelize the e-wastes generated under the criteria Extended Producer Responsibility. In compliance to the E-Waste Management Rules, 2016, Government of India, e-waste materials were collected from the AIT are being segregated and then sold to Authorised Agencies which are approved by the Pollution Control Board (PCB) for handling e-waste. Segregation of e-waste helps in proper management of e-wastes are segregated from other waste and collected in red coloured bin. Due to this e-waste activity disposal, the e-waste pollution is significantly reduced in the Campus.

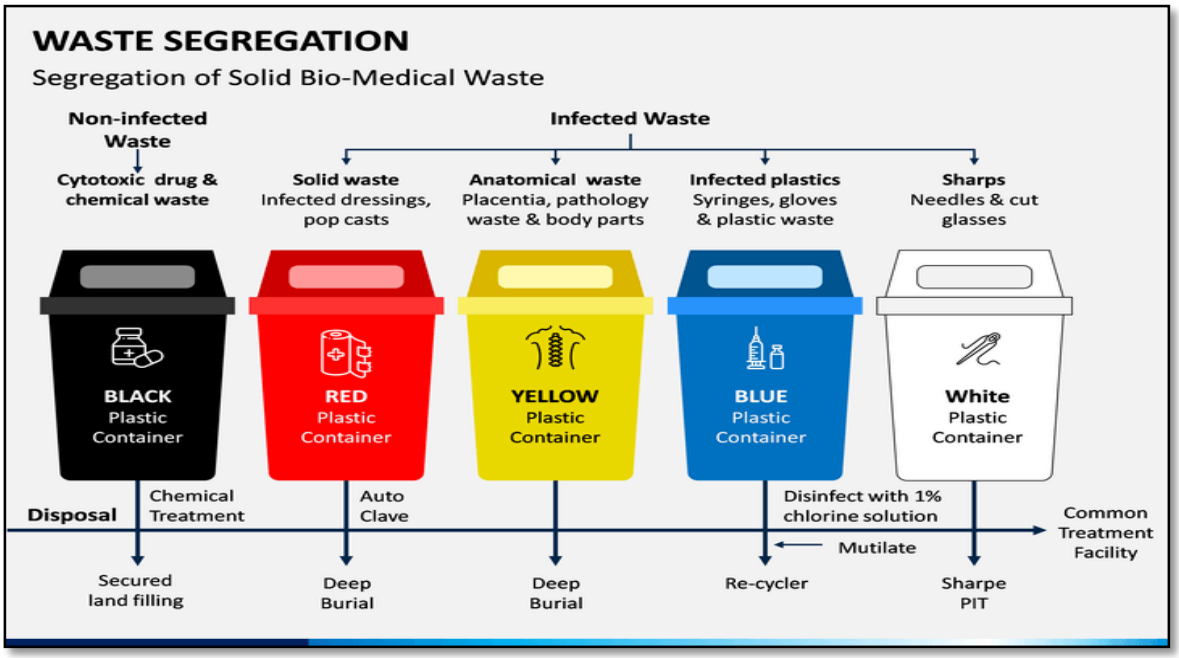
Segregation of E-Waste at Adichunchanagiri Institute of Technology, Chikkamagaluru, Karnataka

14.7. Biomedical Wastes Management

Biomedical waste comprises of all liquid and solid wastes generated from medical establishments and activities involving biological materials. Besides health care, the relevant activities include clinical research, research involving animals, animal farms, dead animals, and others. The generation of biomedical waste is not restricted to specific activity or organisations. It can originate from homes during dialysis and using insulin injections, animal health

activities in rural areas, butchering of sick animals in butcher houses, medical shops, use of sanitary napkins and ear buds, use of diapers, and air ports when passengers through away restricted medicines without prescription. Negligence in biomedical waste management contributes to environmental pollution, sickness of humans/animals, and depletes natural as well as financial resources.

Typical biomedical waste management steps are includes (1) segregation into various components, (2) waste handling and storage, (3) transportation, (3) treatment and disposal. Rural areas and areas where service of common biomedical waste treatment and disposal facility (CBMWTDF) are not available Health Care Establishments (HCE) shall dispose through captive facility to avoid spreading of infection and toxicity. A location for storage of biomedical waste should be earmarked inside the establishment generating such waste. Biomedical waste, in bags/containers, should be stored in a separate room, place or building of a size suitable to the quantities of waste generated. Colour coding basically exists to allow to easily distinguish the different types of biomedical waste, by sorting them into different categories, each pertaining to a single colour. Unless a cold storage room is available, healthcare waste should not exceed 48 h during the winter and 24 h during the summer in warm climate regions, 72 h in cool season and 48 h in hot season in regions with temperate climate.



14.8. Solid Waste Management

The term, solid waste control refers to the method of accumulating and treating solid wastes by following eco- friendly methods. It also offers solutions for recycling objects that do not belong to garbage. In the solid waste management, the wastes are accrued from different parts and are disposed of based on degradability materials like paper and non- degradability materials like glasses, plastics and metals. Integrated Solid Waste Management (ISWM) is an activity that promotes reduction of waste, recycling, composting, and disposal besides offering methods/solution to manage stable wastes in

the context of protect all living organisms in the ecosystem. As per Solid Waste Management Rules, 2016 (Ministry of Environment, Forest and Climate Change, Government of India), solid waste refers to solid or semi-solid wastes generated from domestic, commercial, institutional, catering, and markets and other non-residential wastes (street sweepings, silt removed or collected from surface drains, horticulture/agriculture and dairy waste, bio-medical waste excluding industrial waste, and e-waste, battery/radio-active waste). According to the rules, the local authorities are responsible to collect, treat and dispose the solid wastes. The 'Central Board of Solid Waste Management' is the monitoring authority and is responsible for granting authorization to local bodies for processing and disposal of solid waste.

Table 1. Wastes Management Strategies in Adichunchanagiri Intitute of Technology, Chikkamagaluru, Karnataka

S.No	Kinds of Wastes	Collection (kg/year)	Collection frequency	Name of the Agency
1.	Plastic wastes	100-200	Monthly	Karnataka Municipal Corporation
2.	Construction and demolition wastes	Quantity is not known	Weekly	Utilized by the Campus premises itself
3.	Biowastes	300-500	Daily	Recycled in the Campus premises itself as manuring
4.	E-wastes	100-200	Yearly	Karnataka Municipal Corporation
5.	Biomedical wastes	2-5	Need based	Biomedical Waste Corp. Ltd.,
6.	Hazardous wastes	Quantity is not known	Weekly	Karnataka Municipal Corporation

The Campus has a very good solid waste recycling unit which operates a few vehicles to collect wastes using compostable bags across the campus. Both degradable and non-degradable items are being collected from different Department laboratories, canteens, cafeteria, stationary shops and hostels every day and dumped in the place which is subsequently segregated based on the nature of degradability. The segregated items are neatly packed in eco-friendly covers and subjected to degradation without harming the environment. In addition, dust bins are kept in different places across the campus to provide a dust free atmosphere to the stakeholders. The dust bins are labelled properly for the indication of degradable and non-degradable items. These bio composts are utilized for cultivation of plants in the campus and enhance the health of soils and population density of beneficial microorganisms to a greater extend.

14.9. Biogas plant facility

A biogas plant is the structure where it is produced by fermenting biomass (cow dung and plant waste products). This is done by developing methane-containing fuel that is usually present in energy crops like corn, or waste substances (manure or organic food waste). The fermentation residue left over from the substrates at the end of fermentation can be used as fertilizer. Biogas is produced by the microbial/bacterial decomposition of the substrate under anaerobic situations. This is implemented by pumping the substrate into the fermenters. The substrate is stored beneath anaerobic conditions and is periodically shifted *via* agitators to avoid the formation of surface scum and sinking layers which allows the biogas to rise greater effortlessly. Installing biogas in educational institutions and industries help in the waste management process, as the wastes accumulated in canteen, hostels, mess and restaurants can be used for biogas plant, which in turn can be used for cooking. This fulfils two purposes simultaneously by energy saving and waste management. The Campus is in the initial development process for setting up biogas plant in the campus.

14.10. Vermicompost, Organic and Green manures

Natural or eco-friendly methods should be used to grow plants vigorously in the campus which could reduce the environmental pollution. Use of biofertilizers, organic manures (cow dung, vermicompost and plant wastes and litters) and green manures to grow healthy plants in the medicinal plant garden, kitchen garden and terrace garden should be ensured to keep the campus organic. The plant waste such as fallen leaves, stems, fruits, nuts, seeds and other plant parts should be used to make green manures. A concrete or ground level green manure production unit and vermicomposting units will help to convert all the plant and animal-based wastes into green/organic manures. This will be a healthy way of solid litter waste management in the campus. Minimal use of chemical fertilizers as part of integrated nutrient management system is acceptable but nil use of chemical fertilizers is highly appreciable and also helps to keep the campus more of an organic ecosystem. The soil, air, water and sunlight are the four major natural resources any campus gets. Proper use and conservation of these resources are mandatory in Waste Management sites. Biofertilizers such as Nitrogen fixing bacteria, Potassium and Phosphorus solubilizing bacteria, Potassium mobilizing fungi (VAM), farmyard manure, dried cow dung manure, vermicompost manures and biofungicides and biopesticides are extensively used in Campus to cultivate plants. Agrochemicals, chemical fertilizers, pesticides and fungicides are not used. These practices are very well appreciated because air, water and soil pollution due to use of agrochemicals is eradicated which in turn to improve the soil health significantly. AIT is in the initial development process for setting up manuring facilities in the campus which in turn useful to adopt the green and environmental safe practices.

14.11. Napkin disposal facility

Menstrual Hygiene Management (MHM) is an indispensable part of the Swachh Bharath Mission Guidelines (SBM-G) for adolescent girls and ladies. As in step with MHM hints, ‘Safe disposal’ method making sure that the process of destruction of used

and dirty materials is performed without human touch and with minimum environmental pollutants and 'Unsafe disposal' method throwing used material into ponds, rivers, or inside the fields exposes others inside the vicinity to decaying material and must be averted. Some of the unsafe practices of napkins include throwing them unwrapped into fields and rooftops, wrapping them in paper/ plastic bags and throwing them outdoors or in dustbins, burying them for de-composting, throwing them in latrine / toilets, burning it. These unsafe practices are to be avoided and rather health practices can be adopted. The Campus Management is implementing the safe practices of disposing of napkins using small scale incinerators in ladies' hostels. Incinerator's facility and disposal structures in the proper directions and other social stigmas connected to menstruation influences the sanitary waste disposal conduct of women within the campus is very much appreciated. The Management is taking care of adolescent girls and ladies significantly in their personal hygiene.

14.12. Environmental Education on Waste Management

An environmental study is the learning principle of the ecosystem and how it will expand sustainable techniques to defend the surroundings. It enables people to develop an understanding of the environment in which we live and helps to overcome tough environmental troubles affecting nature. In addition, the physical aspects of the environment should be studied, it also emphasizes the need to conserve biodiversity and undertake an extra sustainable way of life and make use of sources in a responsible manner. To create attention amongst today's generation on pressing environmental troubles, the University Grants Commission (UGC) in India has made it mandatory for the Universities and Autonomous Colleges to introduce a course in 'Environmental studies' and teach to the students about the ecosystem, pollution and problems associated with the environment. Environmental education refers to structured efforts to deliver how natural environments function, how human beings can manage to protect the ecosystems in sustained manner. It is a multi-disciplinary field integrating Biology (Botany and Zoology), Chemistry, Physics, Ecology, Environmental Science & Engineering, Earth Science, Atmospheric Science, Mathematics, and Geography. These subjects may be useful to convey the importance of ecosystem, ecology and environment to the students and scholars.

15. Action Plan and Suggestions for Waste Reduction in the Organization

Preparing one's own waste reduction action plan allows one to rethink procedures to produce less waste or redesign processes and hence boost efficiency. There are eight steps to be taken by the Organization as per the following:

Step 1: Review the site waste audit report and ensure 3R's actions to be followed

Review site Waste Audit Report and gather information about the 3R's actions that are currently in place, such as waste reduction strategies, quantity of current waste Reduction, Reuse, Recycling, and analysis of operating costs after following 3R's.

Step 2: Using the 3Rs, identify major waste reduction opportunities

Examining the materials that make up a substantial part of the waste produced is a key aspect in identifying 3R's potential for waste reduction. Consider the cost of waste disposal, the potential for source separation, the potential to reduce, reuse, or recycle,

the complexity of handling, and current and potential regulatory requirements.

Step 3: Determine waste reduction after identifying potential areas

Possible impacts of other priorities on the 3R's should be investigated when developing a waste reduction action plan in which review the costs and benefits of each waste reduction opportunity. Be aware of anticipated landfill closures, increased tipping fees, or other factors that may affect the disposal of waste and ensure the availability of on-site storage space and storage space with adequate fire safety should be considered.

Step 4: Figure out why waste is produced?

When evaluating waste reduction possibilities, the Organization should start by asking, "Why is this material being used?". It may reveal the possibilities for reducing, reusing, or recycling the waste significantly. There are some questions such as 1) where waste can be eliminated during the operations by reducing the use of specific materials or procedures, 2) where other materials that can be reused or recycled can be used, 3) where it is possible to utilise disposable materials and 4) where can we put controls in place to limit waste production during the operations?

Step 5: Evaluate impact of material purchasing practices on waste reduction

Material purchasing procedures involve a lot of waste reduction possibilities. Actions to change the materials used to manufacture the products or provide very good services which may involve discussions with suppliers. Replacing non-recyclable materials with reusable or recyclable materials gives economic benefits and greater waste diversion.

Step 6: Achievable waste reduction action plan

A waste reduction action plan is a compilation of the identified waste reduction opportunities and the actions intended to be taken in reducing waste. At this stage, realistic waste reduction targets should be set. Excessive over-targeting could have negative effects on employee attitudes and confidence in future work plans. The work plan focuses on the wastes for which reduction measures, actions and objectives have been specified. The format enables us to identify activities on specific waste materials as well as the total amount of waste reduced, reused, and recycled.

Step 7: Identify the waste reduction, reuse, and recycling opportunities

The following are some opportunities to improve the management of waste products:

a) Reduce Waste

Employees at campus facility may already be employing a variety of waste-reduction techniques. Some disposable products may have already been replaced with reusable products in the facility. Use fewer disposable supplies and equipment that we use. Focus on strengthening purchasing rules in administrative departments to reduce the amount of incoming packaging.

b) Minimize Paper Usage

Avoiding the waste of paper by implementing double-sided printing and photocopies. E-mail memos and reports to staff or clients instead of providing hard

copies. Encourage staff to save digital copies of documents instead of printing them. Remove names from mailing lists if magazines or catalogues are no longer needed.

c) Bulk Purchasing

To get volume discounts, look into buying in bulk. Bulk purchases frequently come with less packaging than items purchased individually.

d) Disposable / Reusable / Eco-friendly Packaging

Request loose products rather than individually packed ones when purchasing supplies. Instead of using disposable tape dispensers, use permanent tape dispensers. Request that the package be "taken back" by the vendor or it should be reusable or eco-friendly.

e) Cafeteria Waste

Single-serve condiment containers should be avoided. Customers that bring their own coffee/travel mug should receive a discount. To cut down on waste, go over the menus again, focusing on portion sizes. Start a "litter less lunch" campaign to encourage employee or students to bring lunches in reusable containers. Napkin dispensers might help to avoid using too many napkins.

f) Washrooms

Replace disposable hand towel dispensers with hand dryers where possible.

g) Manufacturing Technology

Where possible, adopt newer production technologies that reduce material usage. Due to older technology, make sure that process start-up and/or cut-off tolerances aren't exorbitant. To avoid waste, improve process controls.

h) Reuse Equipment

Reusable things can be donated or sold. The organisations are typically interested in equipment and supplies that are no longer needed.

i) Donate Left Over or Unused Food

Donations of consumable fresh foods and out-of-date packaged foods are welcomed by many food banks. To determine if it can assist in this way, contact the local social organisations.

j) Recycle Waste

Many recyclable materials, such as corrugated cardboard, office paper, newspaper, glass, aluminium, steel, plastic products, and food waste, have markets. As the markets grow, more items may be added to the recycling list.

k) Use of Recyclable Materials

Look for ways to include recycled materials in products development. The success of recycling is dependent on stable material markets. It can also contribute to the environment by buying products containing recycled materials.

l) Internal Recycling

Recycle the own products' materials. Where feasible, introduce processes to support internal recycling of waste materials.

m) Employee Training on Source Separation

Make sure that the segregation in different types of waste materials at source of origination. All personnel should be trained in source-separation techniques and given enough well-labelled containers and storage facilities to collect recyclable material.

n) Organic and Inorganic Wastes

Examine the options for composting and look into composting organic materials like food waste, leaves and yard trash, and paper towels with private operators or the local Government sectors.

o) Internet or Business Directory

Find recycling companies in the Organization campus area by using a local business directory or by doing a search on the internet.

Follow 3Rs: Reduce , Reuse and Recycle

Reduce

- Buy less and use less.
- Purchase recycled papers.
- Use softcopy instead of hard copy
- Purchase environmentally friendly office supplies.
- Choose to purchase items with less packaging.
- Double-side printing and photocopying.
- Use one-sided printed paper instead of throwing in trash.
- Set printer to print double sided as a default setting.
- Print notices on half-sheets.
- Use emails instead of faxes.
- Post newsletters online.
- Avoid printing out emails.
- Host paper-free meetings by setting the agenda on the board.
- Use fewer paper towels in the washroom or replace them with electric hand dryer.
- Use refillable soap dispenser in washroom
- Encourage waste-free lunches.
- Reduce the use of tetra-packs by using refillable containers.
- In the dining area replace the paper napkins with the cloth napkins.
- Purchase condiments, sweeteners, salt, and pepper in bulk.
- Use dispensers instead of individually packaged servings.

Reuse

- Replace disposable items with reusable items and learn to share or donate to avoid the landfill.
- Reuse the other side of used paper.

- Use reusable coffee cups and water bottles.
- Stock cafeteria with reusable or biodegradable plates, cups, and cutlery.
- Donate uneaten lunch items to a "share a lunch" program.
- Donate used computers, eyeglasses, cell phones, clothes, textbooks, and other items.
- Host a clothing swap/sale/collection.
- Host a schoolyard/garage sale-type fundraiser.

Recycle

- Divert garbage by recycling items such as paper, glass, plastics, cans, tetra packs, and cardboard.
- Recycle special items such as batteries, electronics, cell phones, and computers.
- Compost organic waste.
- Limit contamination of recycled items by ensuring they are clean.
- Recycle ink and toner products.
- Ensure correct disposal methods are used for chemicals.

Step 8: Recommendations for Sustainable Waste Management

- A proper step may be taken to minimize the environmental degradation by means of developing 'Sanitation and hygiene policy', 'Waste management policy', 'Green campus and Environment policy', 'Energy policy' and 'Purchase policy' in collaboration with Governmental and Non-Governmental Organizations.

- Helpline numbers for waste collection may be made available in the Campus which may be useful for door-to-door collection of wastes thus avoiding improper disposal by individuals.

- The concept of eco-friendly culture and sensitize the students to minimize the use of plastics, non-biodegradable materials and exploitation of natural resources which pose the environmental hazards may be carried out.

- Waste disposal management for both dry and wet wastes should be proper in which from collection to disposal of the waste, together with monitoring and regulation of the same may be undertaken. Attempts may be made to segregate the wastes and to convert organic wastes into fertilizing material through recycling and composting processes which may be used for vegetation purpose.

- Students may be taken to some industrial areas including the waste management sites to teach about the recycling of wastewaters, solid wastes, natural ecosystem, pollution-free environment and environmental education.

16. Best Practices on Waste Management Initiatives followed in the Organization

1. The Campus has taken green and environmental protection initiatives in a substantial manner by means of creating solid waste management, wastewater treatment, sanitation, and natural vegetation in the campus without harming the environment.

2. Various kinds of degradable and non-degradable wastes such as plastics, construction & demolition, biowastes, hazardous, electronic, biomedical, solid & liquid wastes, organic & inorganic wastes are segregated properly and subjected recycle and/or given to Karnataka Municipal Corporation for their further processing.

3. The Management is also taking efforts in establishing vermicompost, organic and green manures facilities, identification of waste reduction reuse, and recycling opportunities, origination of wastes, use of disposable / reusable / eco-friendly packaging materials in the campus in a big way.

4. The Organization is created massive facilities for solid waste management and wastewater treatment to purify the wastewaters to manage both solid wastes and wastewaters effectively without harming the environment.

5. The dust bins and eco-friendly trashes are kept in different places across the campus to provide a dust free atmosphere to the stakeholders which are labelled properly for the indication of degradable and non-degradable items.

6. The management has created a very good campus ecosystem for making a coexisting and sustainable environment which includes natural and planted vegetation supporting a rich biodiversity of flora and fauna.

7. 'Eco Club' and 'Nature Club' along with NCC / NSS Units are functioning well and conducting a large number of awareness programmes related to nature conservation and environmental protection.

8. Swachh Bharath Abhiyan and National service schemes are implemented effectively towards sanitation, solid waste management and refining drinking water quality to promote cleanliness to rural and tribal people across the Chikkamagaluru city.

17. Conclusion

Adichunchanagiri Institute of Technology, Chikkamagaluru, Karnataka is a well-established Institute in India in terms of academic and social activities. The Management is taking enormous efforts continuously in providing an eco-friendly atmosphere to the students, research scholars, parents and staff members. It is observed that the green and environmental protection initiatives are substantial by means of creating solid waste management, wastewater treatment, sanitation, and natural vegetation in the campus without harming the environment. Various kinds of degradable and non-degradable wastes such as plastics, construction & demolition, biowastes, hazardous, electronic, biomedical, solid & liquid wastes, organic & inorganic wastes are segregated properly and subjected recycle and/or given to Karnataka Municipal Corporation for their further processing. The Management is also taking efforts in

establishing vermicompost, organic and green manures facilities, identification of waste reduction reuse, and recycling opportunities, origination of wastes, use of disposable / reusable / eco-friendly packaging materials in the campus in a big way. The College has ‘solid waste management and wastewater treatment facility to recycle the solid wastes and wastewaters; respectively. The campus ecosystem is supported a rich biodiversity of flora and fauna which is making a sustainable environment and eco-friendly campus due to effective waste management implantation policy. Waste management audit is carried out to provide an indication on how the environmental organization system is working towards the noble cause of environmental protection and nature conservation. To conclude the waste management audit report, the College is an eco-friendly campus and providing very good amicable atmosphere to the stakeholders.

18. Acknowledgement

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19. References

Adeniji, A.A. 2018. *Audit and Assurance Services. Lagos: Value Analyst Concept of Green Audit*. New Age International, New Delhi, India.

Amasuomo, E. and Baird, J. 2016. The concept of waste and waste management. *Journal of Management and Sustainability* **6** (4): 88-96.

Arora, D.P. 2017. Environmental Audit–need of the hour. *International Journal of Advanced Research in Engineering & Management* **3** (4): 25-31.

Aye, L. and Widjaya, E.R. 2006. Environmental and economic analyses of waste disposal options for traditional markets in Indonesia. *Waste Management* **26** (10): 1180-1191.

Bioswas, A.K., Kumar, S., Babu, S.S., Bhattacharyya, J.K. and Chakrabarti, T. 2017. Studies on environmental quality in and around municipal solid waste dump site. *Resources Conservation and Recycling* **55**: 129–134.

Biswas, A. and Parida, S. 2021. Waste-Wise Cities: Best practices in municipal solid waste management, Centre for Science and Environment and NITI Aayog, New Delhi, India. https://www.downtoearth.org.in

Brunner, P.H. and Rechberger, H. 2014. Waste to energy - key element for sustainable waste management. *Waste Management* **37**: 3-12

Cardenas, I.C. and Halman, J.I.M., 2016. Coping with uncertainty in environmental impact assessments: Open techniques. *Environment Impact Assessment Review* **60**: 24–39.

Chan, W.W. and Lam, J. 2018. Environmental Accounting of Municipal Solid Waste Originating from Rooms and Restaurants in the Hotel Industry. *Journal of Hospitality & Tourism Research,* **25** (4): 371-385.

Choy, Er.A. and Karudan, R. 2016. Promoting campus sustainability: A conceptual framework for the assessment of campus sustainability. *Journal of Social Sciences and Humanities* **11** (2): 112-118.

Demirbas, A. 2021. Waste management, waste resource facilities and waste conversion processes. *Energy Conversion & Management*, **52** (2): 1280-1287.

Ghiani, G., Laganà, D., Manni, E., Musmanno, R. and Vigo, D. 2014. Operations research in solid waste management: A survey of strategic and tactical issues. *Computers & Operations Research* 44 (4): 22-32.

Gnanamangai, B.M., Murugananth, G. and Rajalakshmi, S. 2021. *A Manual on Environment Management Audits to Educational Institutions and Industrial Sectors*. Laser Park Publishing House, Coimbatore, Tamil Nadu, India, p. 127.

Gnanamangai, B.M., Rajalakshmi, S., Srivastava, A.K., Sudhakaran, R., Murugananth, G. and Thirumoorthi, P. 2022. Energy Audit Procedures And Energy Savings Opportunities In Educational Institutions And Industrial Sectors. *International Journal of Advanced Research*. **10** (5): 592-601.

Kaseva, M.E. and Gupta, S.K. (1996). Recycling—an environmentally friendly and income generating activity towards sustainable solid waste management. Case study—Dar es Salaam City, Tanzania. *Resources Conservation & Recycling, 17*(4), 299-309.

Kumar, S., Stephen, R.S., Geoff, F., Costas, V., Kumar, S.J., Shashi, A., Rena, Kumar, R.H. and Christopher, C. 2020. Challenges and opportunities associated with waste management in India. *Royal Society Open Science* **4**: 160764.

Leal Filho, W., Muthu, N., Edwin, G. and Sima, M. 2015. *Implementing campus greening initiatives*. Springer, London, UK.

PIB GoI, 2016. Press Information Bureau, Government of India. 'Solid Waste Management Rules Revised After 16 Years; Rules Now Extend to Urban and Industrial Areas': Javadekar, Central Monitoring Committee Under Environment Secretary to Monitor Implementation. https://pib.gov.in/newsite/ printrelease. aspx?relid=138591.

Rajalakshmi, S., Kavitha, G. and Vinoth kumar, D. 2021. Energy and Environment Management Audits. AkiNik Publishing, New Delhi. 217p.

Rajeshwari, K.V., Lata, K., Pant, D. C. and Kishore, V.V.N. 2015. A novel process using enhanced acidification and a UASB reactor for biomethanation of vegetable market waste. *Waste Management & Research* **19** (4): 292-300.

Staniskis, J.K. and Katiliute, E. 2016. Principles, implementation and results of the new assessment and accreditation system 'Engineering education for sustainable industries'. Springer Nature, New Developments in Engineering Education for Sustainable Development. Thailand, pp. 283-294.

Sridhar, M.K.C. and Adeoye, G.O. 2015. Organo-mineral fertilizers from urban wastes: developments in Nigeria. *Journal of Waste Management* **68**: 91-111.

Suwartha, N. and Sari, R.F. 2013. Evaluating UI Green Metric as a tool to support green universities development: Assessment of the year 2011 Ranking. *Journal of Cleaner Production* **61**: 46-53.

Tchobanaglous, G., Theisen, H. and Eliassen, R. 2007. Solid wastes: Engineering

principles and management issues. McGraw Hill Publications, New York, USA.

Tewari, S. 2021. Why India's solid waste management system needs a digital overhaul. *Down To Earth* **24**: 131-137.

Trung, D.N. and Kumar, S. 2015. Resource use and waste management in hotel industry. *Journal of Cleaner Production* **13** (2): 109-116.

USEPA 2020. https://archive.epa.gov/epawaste/nonhaz/municipal/web/html/

Vergara, S.E. and Tchobanoglous, G. 2012. Municipal Solid Waste and the Environment: A Global Perspective. *Environment and Resources* **37**: 277-309.

Vinothkumar, D., Sreenivasan, P.V., Rajalakshmi, S., Vanitha, S. and Gnanamangai, B.M. 2021. Environment and Green Campus Audits. AkiNik Publishing, New Delhi.

Vinothkumar, D., Pirathiba, S., Rajalakshmi, S., Sri Santhya, V., Saranya, N. and Anirudhan, B. 2022. A case study on water management strategies documented under environmental audit at Nehru Arts and Science College, Coimbatore, Tamil Nadu, India. *International Journal of Current Advanced Research* **11** (5): 960-964.

WGBC, 2021. World Green Building Council. https://www.worldgbc.org.

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Certificates of
Nature Science Foundation,
Coimbatore, Tamil Nadu.

1.ISO Certificate (QMS 9001:2015)
2.ISO Certificate (EMS 14001:2015)
3.ISO Certificate (OHSMS 45001:2018)
4.ISO Certificate (EnMS 50001:2018)
5.MSME Certificate
6.NGO Darpan NITI Aayog
7.12A Certificate
8.80G Certificate
9.10AC Certificate

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has been assessed and found to conform to the requirements of

ISO 9001:2015

for the following scope :

PROVIDING ENVIRONMENT, ENERGY, GREEN AND HYGIENE AUDITS
TO ACADEMIC INSTITUTIONS AND ORGANISATIONS
AS PER THE OWN CHECKLIST AND AWARDS TO
MERITORIOUS CANDIDATES.

Certificate No	**20DQHY90**		
Initial Registration Date	: 08/01/2021	Issuance Date	: 08/01/2021
Date of Expiry*	: 07/01/2024		
1st Surve. Due	: 08/12/2021	2nd Surve. Due	: 08/12/2022

DIRECTOR

MEMBER OF MULTILATERAL RECOGNITION ARRANGEMENT IAF

eiac
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Emirates International Accreditation Centre
035-CB-QMS

ROHS Certification Pvt. Ltd.

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ENVIRONMENTAL MANAGEMENT SYSTEM

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has been assessed and found to conform to the requirements of

ISO 14001:2015

for the following scope :

PROVIDING CONSULTANCY SERVICES FOR ENVIRONMENT, ENERGY, GREEN, HYGIENE, SOIL AND WATER, WASTE MANAGEMENT, BIOMEDICAL WASTE MANAGEMENT, E-WASTE MANAGEMENT, PLASTIC WASTE MANAGEMENT AND ACADEMIC AND ADMINISTRATIVE AUDITS TO EDUCATIONAL INSTITUTIONS AND INDUSTRIAL SECTORS AS PER THE OWN CHECKLISTS, START UP THE INTERNATIONAL ECO CLUB STUDENTS CHAPTER, OFFERING LEAD AUDITOR COURSE ON ENERGY AND ENVIRONMENT, AWARDS TO MERITORIOUS CANDIDATES.

Certificate No	**22DEJI67**		
Initial Registration Date	: 21/05/2022	Issuance Date	: 21/05/2022
Date of Expiry*	: 20/05/2025		
1st Surve. Due	: 21/04/2023	2nd Surve. Due	: 21/04/2024

IAF MEMBER OF MULTILATERAL RECOGNITION ARRANGEMENT

eiaCI Emirates International Accreditation Centre

CB-EMS-035

DIRECTOR

ROHS Certification Pvt. Ltd.

B-7, 1st Floor, Sector-2 Noida, Gautam Budh Nagar, UP-201301

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*The Registration is not a Product Quality Certificate. *Subject to successful completion of surveillance audits. Visit for verification on www.rohscertification.co.in*

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QCS MANAGEMENT PVT. LTD.

MANAGEMENT SYSTEMS CERTIFICATION

Certificate of Registration

ISO 45001:2018 (Occupational Health & Safety Management System)

NATURE SCIENCE FOUNDATION

ADDRESS: NO. 2669, LIG-II, GANDHI MANAGAR PEELAMEDU COIMBATORE - 641 004 TAMIL NADU, INDIA.

Scope of Certification:

PROVIDING TRAINING AND AUDITING SERVICES IN THE FIELD OF GREEN CAMPUS, ENVIRONMENT, ENERGY, OCCUPATIONAL HEALTH AND SAFETY, HYGIENE AND WASTE MANAGEMENT AT EDUCATIONAL INSTITUTES AND INDUSTRIAL SECTOR.

Certificate Number : QCS/EUAS/OHS/002

		1ST Surveillance Audit Within	: 02/07/2023
Issue Date	: 03/08/2022	2nd Surveillance Audit Within	: 02/07/2024
Expiration Date	: 02/08/2023	Re-certification Due Date	: 02/08/2025

Partha Bagchi
(Managing Director)

Validity of this Certificate is subject to Surveillance Audits to be conducted before scheduled due dates of surveillance audits as mentioned on the certificate, failing which the certificate will stand to be withdrawn and need to be treated as an initial certification process to reactivate its continuity on the register of EUAS and QCS . This Certificate is valid when confirmed by data listed on the (Euro Universal Accreditation Systems) EUAS" www.euas-ac.org. The authenticity & validity of this certificate may be re-affirmed by referring to our company website - www.qcspl.com . Lack of fulfillment of conditions as set out on the 'Certification Contract' (Annex 13) may render this certificate invalid. Any alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of law. This certificate remains the property of QCS and to be returned on request.

REGISTERED OFFICE: 37E/1(310) 2ND STREET, MODERN PARK, GREENAGE APARTMENT - 2ND FLOOR, SANTOSHPUR, KOLKATA - 700075, WEST BENGAL, INDIA.
Email: info@qcspl.com. Call: +91 8697724963,+91 8902447427. Website: www.qcspl.com

QRO
QUALITY RESEARCH ORGANIZATION

Certificate of Registration

This is to certify that

NATURE SCIENCE FOUNDATION

LIG II, GANDHIMAA NAGAR, PEELAMEDU, COIMBATORE - 641 004, TAMILNADU, INDIA.

has been independently assessed by QRO
and is compliant with the requirement of:

ISO 50001:2018

Energy Management Systems

For the following scope of activities:

PROVIDING CONSULTANCY SERVICES FOR ENVIRONMENT, ENERGY, GREEN, HYGIENE, SOIL AND WATER, WASTE MANAGEMENT, BIOMEDICAL WASTE MANAGEMENT, E-WASTE MANAGEMENT, PLASTIC WASTE MANAGEMENT AND ACADEMIC AND ADMINISTRATIVE AUDITS TO EDUCATIONAL INSTITUTIONS AND INDUSTRIAL SECTORS AS PER THE OWN CHECKLISTS, START UP THE INTERNATIONAL ECO CLUB STUDENTS CHAPTER, OFFERING LEAD AUDITOR COURSE ON ENERGY AND ENVIRONMENT, AWARDS TO MERITORIOUS CANDIDATES.

Date of Certification: 9th August 2022
1st Surveillance Audit Due: 8th August 2023
2nd Surveillance Audit Due: 8th August 2024
Certificate Expiry: 8th August 2025

Certificate Number: 305022080903EN

EGAC
CAB # 119005

MEMBER OF MULTILATERAL RECOGNITION ARRANGEMENT
IAF

Head of Certification

Validity of this certificate is subject to annual surveillance audits to be done successfully on or before 365 days from date of the audit.
(In case surveillance audit is not allowed to be conducted; this certificate shall be suspended / withdrawn).
The Validity of this certificate can be verified at www.qrocert.org
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142, IInd Floor, Avtar Enclave, Near Paschim Vihar West Metro Station, Delhi-110063, (INDIA)
Website : www.qrocert.org, E-mail : info@qrocert.org

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Government of India
सूक्ष्म, लघु एवं मध्यम उद्यम मंत्रालय
Ministry of Micro, Small and Medium Enterprises

UDYAM
REGISTRATION CERTIFICATE

UDYAM REGISTRATION NUMBER	UDYAM-TN-03-0073706
NAME OF ENTERPRISE	M/S NATURE SCIENCE FOUNDATION
TYPE OF ENTERPRISE *	MICRO
MAJOR ACTIVITY	SERVICES
SOCIAL CATEGORY OF ENTREPRENEUR	GENERAL

NAME OF UNIT(S)

S.No.	Name of Unit(s)
1	Green Campus, Energy and Environment Management Audits

OFFICAL ADDRESS OF ENTERPRISE

Flat/Door/Block No.	LIG-II,2669	Name of Premises/ Building	GANDHIMAA NAGAR
Village/Town	Gandhimaanagar S.O	Block	LIG-II
Road/Street/Lane	Peelamedu	City	Coimbatore South
State	TAMIL NADU	District	COIMBATORE , Pin 641004
Mobile	9566777255	Email:	chairmannsf@gmail.com

DATE OF INCORPORATION / REGISTRATION OF ENTERPRISE	28/11/2017
DATE OF COMMENCEMENT OF PRODUCTION/BUSINESS	12/03/2020

NATIONAL INDUSTRY CLASSIFICATION CODE(S)

SNo.	NIC 2 Digit	NIC 4 Digit	NIC 5 Digit	Activity
1	69 - Legal and accounting activities	6920 - Accounting, bookkeeping and auditing activities; tax consultancy	69201 - Accounting, bookkeeping and auditing activities	Services
2	85 - Education	8542 - Cultural education	85420 - Cultural education	Services
3	85 - Education	8549 - Other education n.e.c.	85499 - Other educational services n.e.c.	Services

DATE OF UDYAM REGISTRATION	26/02/2022

* In case of graduation (upward/reverse) of status of an enterprise, the benefit of the Government Schemes will be availed as per the provisions of Notification No. S.O. 2119(E) dated 26.06.2020 issued by the M/o MSME.

Disclaimer: This is computer generated statement, no signature required. Printed from https://udyamregistration.gov.in & Date of printing - 26/02/2022

For any assistance, you may contact:

1. District Industries Centre: COIMBATORE (TAMIL NADU)

2. MSME-DI: CHENNAI (TAMIL NADU)

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Login/Register
NGO DARPAN
In order to strengthen services of the portal, Government has decided to make PAN Number of VOs/NGOs mandatory.
Please Update Your Profile
Welcome, Nature Science Foundation
Your Unique Id: TN/2018/0187711

PROCEEDINGS OF THE COMMISSIONER OF INCOMETAX (EXEMPTIONS),
III FLOOR, ANNEXE BLDG, NO.121, MAHATMA GANDHI SALAI, CHENNAI-34

Present : G.M.DOSS, I.R.S
Commissioner of Income Tax (Exemptions)

** URNo. AACTN7857J/05/18-19/T-1105 Dated:03/09/2018

Sub: Registration u/s. 12AA of the Income tax Act 1961 - in the case of

"Nature Science Foundation"
LIG-II, 2669, Gandhimaa Nagar, Peelamedu, Coimbatore – 641 004.

Ref : Application in form 10 A filed on 28/03/2018

ORDER UNDER SECTION 12AA OF THE INCOME TAX ACT 1961.

1. The above **Trust/~~Society/Association/ Company/ others/~~,** bearing **PAN AACTN7857J** was constituted by **Trust Deed / ~~Memorandum of Association~~** dated **29/11/2017** registered with **Sub-Registrar's Office/ ~~Registrar of Societies~~**/~~Registrar of Companies/others~~ on **29/11/2017.**

2. ~~The Trust Deed / Memorandum of Association has subsequently been amended / modified / altered by a Codicil / Supplementary Deed / Amendment Deed / Alteration to Memorandum of Association/others dated XX/XX duly registered on XX/XX.~~

3. The abcve **TRUST** filed an application seeking Registration u/s 12 AA of the Income tax Act, 1961.

4. On going through the objects of the **TRUST** and its proposed activities as enumerated in the **Trust Deed / ~~Memorandum of Association,~~ I** am satisfied about the genuineness of the **TRUST** as on date.

5. The application has been entered at **Sl.No.1105** maintained in this office. The above **Trust** is accordingly registered as a **PUBLIC CHARITABLE TRUST** u/s 12 AA of the Income Tax Act, 1961 with effect from **29/11/2017**.

6. It is hereby clarified that the Registration so given to the **Trust/~~Institution~~** is not absolute. Subsequently, if it is found that the activities of the **Trust/~~Institution~~** are not genuine or are not being carried out in accordance with the objects and clauses of the **Trust Deed / ~~Memorandum of Association~~** submitted at the time of registration or modified with the approval of the **Commissioner of Income-tax (Exemptions), Chennai** or there is a violation of the provisions of Section – 13, **the** Registration so granted shall be cancelled as provided u/s 12 AA (3) or 12AA(4) of the Income Tax Act. Further, this approval is also subject to the **Trust/~~Society/Association/Company/ Others~~/** complying to the provisions of the proviso to sec 2(15) of the Income Tax Act 1961.

7. **Granting of Registration u/s 12AA** does not confer any automatic exemption of income from taxation. The **Trust/~~Institution~~** should conform to the parameters laid down in Sections 11, 12, 13 and 115 BBC of the I.T. Act, 1961, to claim exemption of its income on year to year basis before the Assessing Officer.

** This Unique Registration No. URNo. **AACTN7857J/05/18-19/T-1105** Should be mentioned in all your future correspondence.

Sd/-
(G.M.DOSS, I.R.S)
Commissioner of Income-tax(Exemptions), Chennai.

Copy to:
1. The Assessee.
2. The ACIT(Exemptions), Coimbatore Circle.
3. Office Copy.

//CERTIFIED TRUE COPY//

(N SRINIVASA RAO)
Asst. Commissioner of Income-tax (H.Qrs)(Exemptions),
Chennai.

F.2984

GOVERNMENT OF INDIA
INCOMETAX DEPARTMENT
OFFICE OF THE COMMISSIONER OF INCOME TAX (EXEMPTIONS)
Aayakar Bhawan, Annexe III Floor, 121 M.G. Road, Chennai 600 034

URNo. AACTN7857J/05/18-19/T-1105/80G　　　　Date: 10.04.2019

Name of the Trust-~~/Society /Company/Institution~~	:	NATURE SCIENCE FOUNDATION
Address	:	LIG II 2669, GANDHIMAA NAGAR, PEELAMEDU, COIMBATORE - 641 004
PAN	:	AACTN7857J
Date of Application	:	12.11.2018

Received | 17/07/19
17/07/2019

APPROVAL UNDER SECTION 80G(5)(vi) OF THE INCOME TAX ACT, 1961

The aforesaid Trust-~~/Society/Company/Institution~~ has been registered u/s.12AA of the Income Tax Act with effect from **29.11.2017** vide **AACTN7857J/05/18-19/T-1105** dated **03.09.2018.** It is certified that donation made to **NATURE SCIENCE FOUNDATION** at **LIG II 2669, GANDHIMAA NAGAR, PEELAMEDU,COIMBATORE - 641 004** shall qualify for deduction u/s 80G(5)(vi) of the Income Tax Act, 1961, subject to the fulfillment of conditions laid down in clauses [i] to [v] of sub-section (5) of section 80G of the I.T Act, 1961.

2. This approval shall be valid in perpetuity with effect from **A.Y. 2019-20** unless specifically withdrawn. **The details and validity of the certificate is available @ office.incometaxindia.gov.in**

3. The Return of Income along with the Income & Expenditure Account, Receipts and Payments Account and Balance Sheet should be submitted annually **to** the Assessing Officer having jurisdiction over the case.

4. No change in the Trust Deed/~~Memorandum of Association~~ shall be effected without the prior approval of the undersigned i.e. **Commissioner of Income Tax (Exemptions), Chennai**.

5. Every receipt issued to a donor shall bear the **Unique Registration Number** i.e. **URNo. AACTN7857J/05/18-19/T-1105/80G** and date of this order i.e. **10.04.2019.**

6. Under the provisions of section 80G(5)(i)(a), the institution/fund registered u/s.12A, u/s.12AA(1)(b) or approved u/s.10(23C), 10(23C)(vi)(via), etc., shall have to maintain separate books of accounts in respect of any business activity carried on and shall intimate this office within one month about commencement of such activity.

Sd/-
(G.M.DOSS, I.R.S)
Commissioner of Income Tax (Exemptions)
Chennai.

Copy to:
1. The applicant
2. Guard File
3. The DCIT(Exemptions) Coimbatore Circle.

//Certified True Copy//

(N. SRINIVASA RAO)
Assistant Commissioner of Income-tax (H.qrs)
(Exemptions), Chennai.

FORM NO. 10AC

(See rule 17A/11AA/2C)

Order for registration

1	PAN	AACTN7857J
2	Name	NATURE SCIENCE FOUNDATION
2a	Address	
	Flat/Door/Building	LIG-II, 2669
	Name of premises/Building/Village	GANDHIMAA NAGAR
	Road/Street/Post Office	Coimbatore South
	Area/Locality	COIMBATORE
	Town/City/District	Gandhimaanagar S.O
	State	Tamil Nadu
	Country	INDIA
	Pin Code/Zip Code	641004
3	Document Identification Number	AACTN7857JE2021501
4	Application Number	739995830271021
5	Unique Registration Number	AACTN7857JE20215
6	Section/sub-section/clause/sub-clause/proviso in which registration is being granted	01-Sub clause (i) of clause (ac) of sub -section (1) of section 12A
7	Date of registration	03-11-2021
8	Assessment year or years for which the trust or institution is registered	From AY 2022-23 to AY 2026-2027
9	Order for registration:	
	a. After considering the application of the applicant and the material available on record, the applicant is hereby granted registration with effect from the assessment year mentioned at serial no 8 above subject to the conditions mentioned in row number 10.	
	b. The taxability, or otherwise, of the income of the applicant would be separately considered as per the provisions of the Income Tax Act, 1961.	
	c. This order is liable to be withdrawn by the prescribed authority if it is subsequently found that the activities of the applicant are not genuine or if they are not carried out in accordance with all or any of the conditions subject to which it is granted, if it is found that the applicant has obtained the registration by fraud or misrepresentation of facts or it is found that the assessee has violated any condition prescribed in the Income Tax Act, 1961.	
10	Conditions subject to which registration is being granted	
	The registration is granted subject to the following conditions:-	

	o. This certificate cannot be used as a basis for claiming non-deduction of tax at source in respect of investments etc. relating to the Trust/ Institution.	
	p. All the Public Money so received including for Corpus or any contribution shall be routed through a Bank Account whose number shall be communicated to Office of the Jurisdictional Commissioner of Income Tax.	
	q. The applicant shall comply with the provisions of the Income Tax Act, 1961 read with the Income Tax Rules, 1962.	
	r. The registration and the Unique registration number has been instantly granted and if, at any point of time, it is noticed that form for registration has not been duly filled in by not providing, fully or partly, or by providing false or incorrect information or documents required to be provided under sub-rule (1) or (2) of rule 17A or by not complying with the requirements of sub- rule (3) or (4) of the said rule, the registration and Unique Registration Number (URN), shall be cancelled and the registration and URN shall be deemed to have never been granted or issued.	
	Name and Designation of the Registration Granting Authority	Principal Commissioner of Income Tax/ Commissioner of Income Tax (Digitally signed)

Digitally Signed by
SIBICHEN K MATHEW
Date: 2021.11.03
15:52:36 IST

Certificates of Waste Management Auditors

1. ISO Environment Management System (14001:2015) of Mrs. S. Rajalakshmi, Chairman of NSF.
2. ISO Environment Management System (14001:2015 TUV NORD) of Dr. A. Geethakarthi, NSF Environment Auditor.
3. ISO Occupational Health and Safety, Management Systems Auditing (45001:2018) of Er. Ashutosh Kumar Srivastava, Board of Directors (North Zone) of NSF and Dr. K. Sreedharan, Lead Auditor of NSF
4. Indian Green Building Council (IGBC AP) Accredited Professional and Associated Chambers of Commerce and Industry of India (ASSOCHAM) of Dr. B. Mythili Gnanamangai, Vice-Chairman of NSF.
5. CII Certified Experts in Sustainable Waste Management of Er. Ashutosh Kumar Srivastava.
6. Associated Chambers of Commerce and Industry of India (ASSOCHAM) of Er. Ashutosh Kumar Srivastava.
7. Botanist and Subject Expert of Plant Taxonomy of Dr. D. Vinoth kumar, Joint Director of NSF.
8. Bureau of Energy Efficiency (BEE) and National Productivity Council of Er. N. Dinesh kumar and Dr. N. Balasubramanian, Certified Energy Auditors of NSF.


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TNV hereby certifies that
S. Rajalakshmi
has successfully completed the 5 days
Auditor / Lead Auditor Training Course which meets the training requirements of the Exemplar Global and has been declared as competent in the following competency units
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- TL: Leading Management Systems Audit Teams
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Issue Date: 17th Jun. 2021
Training Date : 20th to 24th May. 2021
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Authorised Signatory
(Pragyesh Singh)
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TÜV NORD

PR315: ISO 14001:2015 Lead Auditor (Environmental Management Systems) Training course

Certificate of Achievement

Geethakarthi Alagarsamy

has successfully completed the above mentioned course and examination.

23rd - 27th March 2019

COIMBATORE, INDIA

Certificate No. 35242817 02

Delegate No. 171136

for TÜV NORD CERT GmbH

Essen, 2019-04-26

The course is certified by CQI and IRCA (Certification No. 18125). The learner meets the training requirements for those seeking certification under the IRCA EMS Auditor certification scheme.

TÜV NORD CERT GmbH Langemarckstraße 20 45141 Essen www.tuev-nord-cert.com

CQI | IRCA

CERTIFIED COURSE

Exemplar Global

Certificate of Training

TNV hereby certifies that

ASHUTOSH KUMAR SRIVASTAVA

Has successfully completed the 40 hours

Auditor / Lead Auditor Training Course which meets the training requirements of the Exemplar Global and has been declared as competent in the following competency units

- OH: Occupational Health and Safety
- AU: Management Systems Auditing
- TL: Leading Management Systems Audit Teams

ISO 45001:2018

Issue Date: 28th Sep. 2021

Certificate Number : 2109281221030101

Authorised Signatory

(Pragyesh Singh)

This course is certified by Exemplar Global vide registration number TN00

Note: The course conforms to the principles and practices of auditing of Management Systems for compliance with standards. This certificate remains the property of TNV and this certificate is recognized by Exemplar Global. For verification of this certificate, please write to Mail: info@isoindia.org

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A K SRIVASTAVA

is a

CII Certified Expert in Sustainable Waste Management

K S Venkatagiri
Executive Director
CII-Godrej GBC

Pradeep Bhargava
Chairman
Environment & Recycling Council

Hussain Shi
Chairman
GreenCo Education C

IGBC

-Learning

Issued by CII Sohrabji Godrej Green Business Centre | Issued on 11 July 2020 | CIIGBC-SWM-0720-008

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Is conferred upon

SREEDHARAN .K

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Conducted during 9th to 11th June ,2021

Regional Director
National Productivity Council , Bhubaneswar, India

NPCBBSR/W66/9-11/6/2021/1

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CII
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The Indian Green Building Council

hereby certifies that

B Mythili Gnanamangai

has successfully demonstrated knowledge on the Green Building Design & Construction, Building Standards & Codes, IGBC Resources & Processes and Green Design Strategies & their Impacts, required to be awarded the title of

IGBC Accredited Professional

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Executive Director
CII-Godrej GBC

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Indian Green Building Council

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17 April 2021

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16 July, 2021

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Chairman, GEM

GEM CP 20/649

Deepak Sood
Secretary General, ASSOCHAM

GEM Certificate

ASSOCHAM hereby certifies that

Mr. Ashutosh Kumar Srivastava

has successfully passed the

Green and Eco-friendly Movement Certified Professional Test (GEM CP)

with

"Good Performance"

on

03 September, 2021

He/she is now eligible to execute the GEM Sustainability Certification Projects.
ASSOCHAM feels proud to award the GEM Certified Professional title to him/her.

Pankaj R. Dharkar
Chairman, GEM

GEM CP 20/666

Deepak Sood
Secretary General, ASSOCHAM

Medicinal Plants Farmes 1999-2000

Kuppayee Thottam, Vadugampalayam Privu,
Gobi.

ATTENDANCE CERTIFICATE
FOR INSITUTIONAL TRAINING

This is to Certify that Mr D. VINOTHKUMAR

of B.Sc., BOTANY FINAL YEAR of

Chikkaiah Naicker College, Erode-4. Has undergone institutional training in Plantation, Cultivation and Collection of medicinal plants for 14 days from 18.12.99 to 31.12.99 at Gobi.

M.R. SARAVANAN, SCIENTIST, GOBI-638476 HERBAL

Station : GOBI

Date : 31.12.99

SIGNATURE OF THE CONCERNED AUTHORITY
M. R. SARVANAN, GOBI

BUREAU OF ENERGY EFFICIENCY

Examination Registration No. : EA-14056 Serial Number. 9176

Certificate Registration No. : 9176

Certificate For Certified Energy Manager

This is to certify that Mr./Mrs./Ms. Dinesh Kumar D Son/Daughter of Mr./Mrs. R M Dhanasekaran who has passed the National Examination for certification of energy manager held in the month of October 2011 is qualified as certified energy manager subject to the provisions of Bureau of Energy Efficiency (Certification Procedures for Energy Managers) Regulations, 2010.

This certificate shall be valid for five years with effect from the date of award of this certificate and shall be renewable subject to attending the prescribed refresher training course once in every five years.

His /Her name has been entered in the Register of certified energy manager at Serial Number 9176 being maintained by the Bureau of Energy Efficiency under the aforesaid regulations.

Mr./Mrs./Ms. Dinesh Kumar D is deemed to have qualified for appointment or designation as energy manager under clause (*l*) of Section 14 of the Energy Conservation Act, 2001 (Act No.52 of 2001).

Given under the seal of the Bureau of Energy Efficiency, this 7th day of February, 2013

Digitally Signed: RAKESH KUMAR RAI
Sun Mar 01 10:58:55 IST 2020
Secretary, BEE New Delhi

Secretary
Bureau of Energy Efficiency
New Delhi

Dates of attending the refresher course	Secretary's Signature	Dates of attending the refresher course	Secretary's Signature
22.12.2019			

Regn. No. EA-7391

Certificate No. 5093

National Productivity Council

(National Certifying Agency)

PROVISIONAL CERTIFICATE

This is to certify that Mr. / Ms. N.Balasubramaniam

son / daughter of Mr. M.Nanjukuttigounder

has passed the National Certification Examination for Energy Auditors held in December - 2009, conducted on behalf of the Bureau of Energy Efficiency, Ministry of Power, Government of India.

He / She is qualified as Certified Energy Manager as well as Certified Energy Auditor.

He / She shall be entitled to practice as Energy Auditor under the Energy Conservation Act 2001, subject to the fulfillment of qualifications for the Accredited Energy Auditor and issue of certificate of Accreditation by the Bureau of Energy Efficiency under the said Act.

This certificate is valid till the issuance of an official certificate by the Bureau of Energy Efficiency.

Place : Chennai, India

Date : 11th February 2010

Controller of Examination

ENERGY IS LIFE

BEE

CONSERVE IT

ऊर्जा दक्षता ब्यूरो

BUREAU OF ENERGY EFFICIENCY

विद्युत मंत्रालय, भारत सरकार

MINISTRY OF POWER, GOVERNMENT OF INDIA

प्रमाणित किया जाता है कि

श्री/श्रीमती दिनेश कुमार ने ऊर्जा संरक्षण भवन निर्माण संहिता के लिए 7 दिसंबर '16 से 8 दिसंबर '16 तक ~~एमएनआईटी~~ / ~~सीईपीटी~~ /आईआईआईटी द्वारा आयोजित मास्टर ट्रेनर सर्टिफिकेट कार्यक्रम को सफलता पूर्वक सम्पन्न कर लिया है।

This is to certify that

Shri/Smt. Dinesh Kumar has successfully completed the Master Trainer Certificate Programme conducted by ~~MNIT~~ / ~~CEPT~~ / IIIT from 7 December '16 to 8 December '16 for the Energy Conservation Building Code.

नई दिल्ली, 07 JUL 2017

New Delhi,

महानिदेशक

Director General