TECHNICAL REPORT OF ENVIRONMENT AUDIT

Submitted to

ST. ANN'S COLLEGE FOR WOMEN, MEHDIPATNAM, HYDERABAD - 500 028, TELANGANA, INDIA.

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1. Introduction

Environment (Eco) audit is quantitative and qualitative data to track air, soil and water waste, and to gain actionable insights to improve the operational performance in the atmosphere. This audit is generally used to observe the clean and green environment of an organization. It provides a 360˚ view of a surrounding campus and makes it easy for Owners / Managers / Environmentalists to collaborate, measure, control, and reduce environmental impacts. Finally, it leads to enhancing the quality of life for human beings, animals and plants. Eco audit initiatives are the need of the hour across the world due to changing environmental conditions and global warming due to increasing human population and anthropogenic activities (Maltby, 1995; Haahkim and Yunus, 2017). It aims to make a sustainable and friendly environment for the stakeholders.

In other words, Environment audit is a well-developed process of extracting information about an Organisation that provides a realistic assessment of how the Organizations take steps towards caring the environment. In this context, to conserve eco-friendly atmosphere of an organization, well-developed environmental objectives and targets should be undertaken to reduce the harmful effects to a greater extent. The audit process can remarkably minimize the environmental pollution in the campus which in turn reduces the impact of global warming scenario. As per the Government law, the environmental legislations should be followed by all the Institutions and Organizations and make sure that their activities should not degrade the environment (Ramachandra and Bachamanda, 2007). An environmental audit gained momentum, in order to create awareness on environmental compliance and implementation gaps in the management system, along with related corrective measures.

The environment audit involves systematic documentation of periodic objective review by a regulated entity on available facilities, their operations and practices related to resolve the environmental requirements. Environment audit include personnel observation, monitoring, data collection, recording/documentation and analysis of various components in an organization related to the environment with cordial support of the management (Conde and Sanchez, 2017). In general, environmental audit is planned to achieve an optimum resource utilisation and improved process performance in the audit sites. Venkataraman (2009) stated that it is a ‘Common Sense Approach’ to identify the problems and solve those problems pertaining to curb eco-friendly atmosphere (APHA, 2017). Environmental audit enables an overall and complete overview at the audit sites to facilitate our understanding of flow of materials and to focus the priority areas where waste reduction is achieved thereby cost saving is made possible (Gowri and Harikrishnan, 2014).

Environmental audits ensure that the environment is not disturbed from its balanced existence, so that it provides an eco-friendly atmosphere to the stakeholders. Similar to that of Environmental audit, green campus audit is also a type of assessment to ensure that the Institution and Organization campus should grow a large number of trees, shrubs, herbs, lawns, climbers, twins and lianas in their campus to enrich with oxygen and assimilate more amount of carbon dioxide to provide a healthy atmosphere to the stakeholders (Aparajita, 1995). Environmental audit provides vivid dimensions on how waste materials are being managed and the source of wastes along with the solutions for environmental degradation is managed. Environmental Management

System (ISO EMS 14001:2015) should be implemented by every Organization to ensure that the eco-friendly campus is being given to the stakeholders. Eco-friendly youth leadership programmes, green campus practices, social responsibility and Institutional values comprehending the relationship with the ecosystem for a sustainable environment are being evaluated (IGBC, 2021).

Environmental audit plays a vital role in keep tracking on organizations policy commitments with regard to environmental management and its performance. Audit reports can provide key information to the management in relation to risk areas, progress towards strategic objectives and targets (Adeniji, 2018). Purpose of the audit is to determine performance of the environmental management systems and equipment related to environmental safety. This is also to verify compliance with the appropriate national/local laws and regulations/norms of regulatory bodies to minimize the human exposure to risks from environmental-, health- and safety- aspects.

In order to satisfy the purpose of audit, it is essential that audits should be considered as the responsibility of the company/organisation. Audit work can be undertaken voluntary for the benefit/advantage of the company and it can be executed with the help of environmental auditing authorities. As mentioned earlier, it helps in the proper natural resource utilization and on the whole, it improves environmental quality.

As stated earlier, environmental auditing is essential tool to monitor the effects of human activities on the environment with respect to set principles/standards. On the basis of various standards and focus of the audit, there are different types of environmental audit existed. At present most of the organisations/institutions recognised the importance of environmental issues and accepted to scrutinise their performance by recognised bodies to minimise the ill effects of their activities and to ensure their sustainable industrial developments.

An environmental auditor will study an organization's performance towards the environment sustainability in a systematic manner which in turn to document the activities carried out for environmental conservation. Environmental organization management systems and equipment are performing with the aims of:

i. Facilitating management control of environmental practices.
ii. Assessing compliance with company policies.
iii. Facilitating professional competence
iv. Implementing works without harming the environment
v. Practicing the environmental conservation
vi. Sustainability in energy utilization

2. Role of Educational Institutions in India

In view of providing eco-friendly atmosphere to the stakeholders, educational institutions are focussed on establishing and maintenance of eco-friendly campus without harming the environment. A clean and healthy surrounding in an organization determine the effective learning and provides a favourable learning environment to the students. Educational institutions are insisted by both Central and State Governments to provide eco-friendly atmosphere to the stakeholders. In addition, all the educational institutions are asked to save the environment for future generations and to solve the

problems associated with environment (recycling the of solid wastes and wastewaters, plastic free zone, napkin disposal, water consumption, rainwater harvesting and storage mechanisms, etc.) through Environmental Education. Implementation of Swachh Bharath Abhiyan Scheme by the Indian Government through Educational institutions imparted neat and clean environment at tribal, rural and urban areas across the country. 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.

Similar to that of green campus auditing, environment auditing is a kind of professional tool to identify organization's environmental performance aligning with its policies and compliances of the Government guidelines. This audit process is definitely useful for the Educational institutions to maintain the eco-friendly campus in a sustainable manner and can give eco-friendly atmosphere to the students and staff members. Environmental audit is like an official examination of an organization's campus as per the Government guidelines. Audit report may be useful to improve the organization's campus significantly by following the recommendations and suggestions specified in the report. Conducting an environmental audit is no longer an option but a sound precaution and a proactive measure in today's heavily regulated conditions. There are some minor differences between green campus auditing and environment auditing with respect to natural and planted vegetation along with flora and fauna in the campus and carbon footprint in which carbon dioxide level is assessed in the campus in using the number vehicles, fossil fuel usage, electrical energy utilization efficiency and human population.

Environmental auditing concerned with following aspects: 1) Assessing compliance with pertinent constitutional and internal requirements, 2) providing management control over environmental activities, 3) Endorsing good environmental management, 4) Maintaining credibility with the public, 5) Creating awareness among the staff on their commitment towards environmental policy, 6) Enduring improved opportunities and 7) Establishing the performance baseline for developing an Environmental Management System (EMS).

3. Energy and Environment Policy

The energy and environment policies aims to afford an understanding/awareness on clean and green environment to the stakeholders in relation to environmental compliance. Scope of this policy applies to all employees and students of the Institution to establish and sustain an Eco-friendly atmosphere. Policy making dealt with cleanliness on the campus is maintained through proper recycling of wastes and/or disposal of hazardous wastes and utilization of eco-friendly supplies. Disseminating the concept of eco-friendly culture among the students and rural community through various awareness programmes (seminars / conferences, reuse and recycle the waste materials) is one of the environmental policies. Attempts are made to limit energy usage and also substitute non-renewable energy sources with renewable energy sources. The Head of the Organization, Department Heads and Senior Managers including Management Representatives are responsible for monitoring the go green initiatives of the College / University and maintain a clean/green campus. In addition, the staff and

student volunteers from Nature club, Eco clubs, Science club, Fine Arts club, Youth Red cross unit, Student Force, NCC and NSS units are committed to establish green campus and strictly follow the environmental policies in the Organization.

4. Environment friendly campus

Literally, Eco-friendly means earth-friendly/environment friendly or not hazardous to the environment. The term commonly refers to the products that contribute to green living or practices that help conserve the natural resources like water and energy. Environment friendly processes are sustainability and marketing terms referring to goods and services, laws, guidelines and policies that claim reduced, minimal, or no harm upon ecosystems. Companies and Educational Institutions use the ambiguous terms to promote goods and services including working atmosphere/learning conditions, at times with additional, more specific certifications (eco-labels). Their overuse can be referred to as “green washing”. To ensure the successful meeting of Sustainable Development Goals (SDGs) companies and Educational Institutions are advised to implement environmental friendly processes in their production as well as providing good ambience to the stakeholders in their work place. The International Organization for Standardization has developed ISO 14001:2015, 14020 and ISO 14024 to establish principles and procedures for environmental labels and declarations that certifies the environment friendly campus. Specifically, these standards communicate with avoidance of financial conflicts of interest, utility of sound scientific methods and accepted/standard test procedures and honest and transparent setting of standards.

Environment friendly campus is meant for providing eco-friendly as well as hygienic atmosphere to the stakeholders without harming the environment. In order to provide efficient eco-friendly atmosphere to the stakeholders, the organization should take responsibility in making good drinking water facility to the students and staff members, use of the organic manure, cow dung, farmyard manure and vermicompost for manuring the plants, avoidance of non-compostable, single-use disposable plastic items, single-use plastic utensils, plastic straws and stirrers, commitment to plastic-free alternatives to bags, boxes, containers and etc. and reduction of use of papers alternated with e-services and e-circulars, etc. and proper disposal of wastes, recycling and suitable waste management system. These parameters should be considered while implementing the environment friendly campus in an organization.

To set a pure atmosphere in an organization campus, waste disposal management should be proper which in turn to confine the environmental pollution. Waste management is an activity that starts from inception of waste to its final disposal. In other words, it includes a chain of action i.e. collection, transport, treatment and disposal of waste, together with monitoring and regulation. Dry waste includes paper, cardboard, glass, tin cans, etc., while wet waste refers to organic waste such as vegetable pods, left-over food, etc. Separation of waste material is necessary for the accountability of amount of waste being generated followed by proper recycling through the composting process and used as a fertilizing material.

5. Environmental Management Plan (EMP)

A clean environment is required for progressive success of an organization to safeguard the upcoming generations to ensure in safe use of air, land and water resources. The management of any organization should attempt to continuously to improve the environmental performance and to prevent/minimise the pollution. All the stakeholders of the organization are expected to support our environmental goals while providing clean and environment friendly work culture. Main purpose of the EMP is to determine the environmental protection measures to be followed during in day-to-day's activities of the organization and confirm to minimize environmental effects are met. Environmental protection is an imperative component of overall preparation and execution of eco-friendly and green campus of an organization. It addresses the issues start from sanitation pertaining to human health/various stakeholders of an organization and protection of plants, animals and microorganisms including wildlife habitats. Environmental Management Plan (EMP) is an integrated document with various approvals, authorizations and specific components and/or activities that to be carried out in the campus without harming the environment. EMP is committed to regulate its assets with its core values to protect the health/safety of people/environment and to comply with Environment Health and Safety laws, regulations and Health and Safety standards. EMP should provide a reference document as per the legislative requirements for employees when planning and/or performing specific activities in the campus surroundings. In line with the Environment Policy, impact on the physical, chemical and biological environment should be determined along with statutory requirements and other environmental commitments.

Table 1. Environmental Management Plan and Execution in the Organization sites

S.No.	Monitoring areas	Parameters Monitored	Monitoring frequency	Reason for monitoring parameters
1.	Dredging	Erosion, landscape, sedimentation, vegetation, disposal of dredging	Continuous	Dredging results in disturbance of Benthic community and causes soil erosion and sedimentation
2.	Marine Ecology	Biodiversity survey and conservation	Continuous	Unmitigated operations may result in loss of biodiversity as per the Indian Biodiversity Act
3.	Vegetation (Flora and Fauna)	Survey of macro and micro plants, animals (mammals, birds, moths, houseflies, reptiles, amphibians, termites) and soil and air microbial biodiversity	Continuous	Conservation of macro and micro plant, animals (mammals, birds, moths, houseflies, reptiles, amphibians, termites) and soild and air microbial biodiversity conservation for future

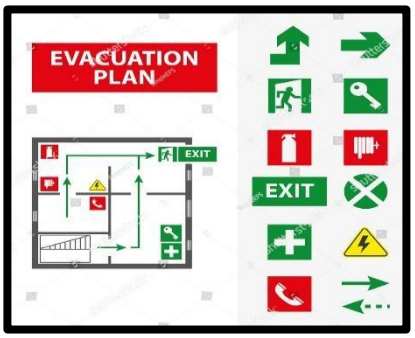
				generations through modern technology
4.	Air Emission	O_2, CO, CO_2, SO_2, NO_2 level in the open, car parking and indoor areas	Monthly monitoring	Unmitigated operations may result in deterioration of air quality
5.	Solid Waste	Solid waste quality and quantity, solid waste disposal, reuse, solid waste treatment	Monthly monitoring	Compliance of Environmental Laws and Legislative policy
6.	Waste water	Primary, secondary and tertiary pollutants and their recycling, waste water minimization, storage and handling, reuse, treatment before disposal	Monthly monitoring	Minimize the water pollution and to provide quality water as per the Central Pollution Board
7.	Soil	Soil contamination, soil edaphic parameters, soil, gravel and sand composition, water holding capacity, soil erosion	Half yearly	Soil surface and water pollution cause diseases as per the Compliance of Environmental Laws and Legislative policy
8.	Noise	Noise intensity, causes and impact, remedies, standard operating procedure	Monthly monitoring	Uncontrolled noise cause nuisance which affect the health
9.	Occupational Safety & Health	Safety, health and welfare of people at occupation, measures taken, Fire safety, First aid box, Safety protocol, Hospital facility	Continuous	Department of Occupational Safety & Health
10.	Land reclamation	Soil quality, soil micro and macro elements, soil composition	Half yearly	Legal obligation and structure protection, prevention of soil erosion and sedimentation to the port
11.	Restoration of the sites	Forest vegetation, plant vegetation, visual analysis, Photographic records	Continuous	Maintain the soil fertility and soil original reclamation

6. Environmental health and safety management system

It is outlined the mitigate measures and the best management practices followed in the organization in terms of developing eco-friendly and green campus. It is suggested to perform complete assessment and control of entirely possible hazardous and risks arise in the organization without harming the environment. It is to ensure that no significant adverse environmental health and safety impacts by carrying out various infrastructure facilities created to improve the human eco-system of the organization may be implemented. The facility should be designed to include fire protection equipment/system including flame, multiple gas, smoke and low- and high temperature detectors/ alarms and automated and manual shut-down systems in terms of planning and implementing the best practices of environmental health and safety management system.

High level of automation, periodical preventative maintenance and safeguards the environmental pollution besides the provision for safe emergency shut-downs/exits should be maximized in the organization. In addition, all the employees and management people should be trained properly about environmental health and safety measurements which will be useful for protecting the environment without causing any adverse effect on the environment. All personnel should be advised to undertake an extensive workshop/training programmes to ensure safe operating practices.

7. Evacuation Plan in Human Eco-system of the Organization



The management of an Organization should ensure the safety measures to the stakeholders which in turn improve the human eco-system. The alarm signals such as Bells, Horns, Sirens, Verbal (i.e. shouting) may be used to begin evacuation of the facility in the organization if any unfavourable situation takes places like uncertain firing, explosion of acids and gasses, earth quake, electrical current circuits explorations and etc. Evacuation map and important phone numbers (Police, Ambulance, Fire stations, State Office of Emergency Services, National Response Centre, Division of Occupational Safety and Health, Regional Water Quality Control Board, Pollution and threatened hazardous management & control board and Nearest Hospital) may be prominently displayed throughout the facility. Internal facility alarms as well as communications systems, wherever applicable, to notify all facility personnel should be activated. Waste storage areas and waste disposal zone, polluted soil or surface water regions should be demarcated in the organization. The emergency equipment like fire extinguisher, emergency notification and first aid box should be placed in all the dangerous zones to minimize the major environmental impact and problems. It should be developed and practiced a spill clean-up procedure where to find emergency equipment and how to use it properly should be trained to all the stakeholders.

The chemicals/hazardous waste handlers and managers should be regularly trained properly thro' periodical training programmes, workshops, conferences and seminars in order to impart knowledge on the latest developments in chemicals disposal methodologies and hazardous management policies. Safe method of handling (including from storage to disposal) of hazardous materials, and personnel rescue procedures should be known by the chemical handlers, hazardous waste handlers and managers. An areas that are disturbed or polluted by means of discarding the wastewaters, effluents, solid wastes may be recovered and restored by clean-up procedures. This areas may be brought in use after a chain of actions like stabilisation, smoothening, mulching, seed sowing and fertilization as per standard practice. The temporary erosion controls may be removed and permanent landscaping and erosion control measures should be installed wherever required as part of final facility restoration. Restoration of disturbed facility includes planting of various vegetation (trees, shrubs, and herbs) and replanting may be performed in compliance with applicable environmental specifications.

8. Waste Management Plan of the Organization

Waste includes solid wastes, plant litres, bio-medicals, electronic, organic kitchen and food wastes, plastic wastes, wastes, wastewater, effluents, hazardous waste materials, acids and chemicals. Waste Management Plan (WMP) provide guidelines and streamline the process of waste collection, separation, quantification, storage, transportation and disposal/recycling of wastes within the organization without harming the environment. Waste management is one among the critical operating policies of the organisation. Designed procedures are to assist wide effort to safeguard the environment and to satisfy the laws/legislative policies and regulations regarding proper waste management.

Organization should examine/inspect waste management related facilities and activities which directly resulting in executing the scope and amendments of WMP. Guidelines for each and every step of waste management associated with organization may be undertaken. It should be taken into account while WMP in prepared and executed in the organization. It may be noted that abandoned materials and materials intended to be recycled are also considered as wastes. It is important to understand the above concept because even though something is going to be recycled, it must be managed until it is actually recycled. The wastes are categorized as hazardous and non-hazardous wastes depending upon the quantum of causing the adverse effect to the environment. The hazardous waste should be disposed properly by ignitability, corrosivity, reactivity, irritability and toxicity behaviours.

All recommended safety and handling procedures must be followed appropriately not only by the Management and concerned individuals also follow the norms. Waste production should be eliminated regularly and the material only for its planned purpose should be stored. Attempts should be made to curtail waste production, reprocess/recycle the same and then properly dispose in accordance with the norms. All hazardous waste shall be segregated individually as well as non-hazardous wastes at the point of its generation. For the collection of waste, containers can be used and must be

properly and clearly labelled. Also, if the waste is hazardous, it should be clearly labelled on the container along with its hazardous characteristics (e.g. flammable, toxic, radioactive, etc.). As depicted, containers with colour coding for easy identification should be kept to collect and segregate common wastes across the campus/at all the facilities organic food waste shall be collected in separate containers especially from dining hall, canteen and food courts.

9. Methods of Disposal of wastes

Recycling and reuse methods may be adopted to minimize the quantity of wastes that are generated from the organization requiring proper ways of disposal. Quite a few waste materials can be reused within the facilities/campus while others can be recycled only in the specific sites. The recycling of used oils, acids, solvents and chemicals is possible in some of the laboratories; plastics and e-wastes including batteries may be revert back to manufacturer/authorised dealers/distributor while it should not be sold to the unauthorized contractors / companies, who may not have proper recycling facilities and to avoid misuse or to reduce associated liabilities

Coding system for different type of waste

Waste material	(Colour or code)
Glass	(blue);
Metals	(green);
Plastic	(white);
Oily rags	(black);
Used oil	(red);
Rubbish / trash	(yellow)

On-site Disposal facilities: Burial pits may be created in which waste should be buried and covered with soil sufficiently as 'daily cover' to reduce the environmental issues like unpleasant odour from decaying / degrading waste, spreading of waste into nearby areas in response to blowing wind and to avoid vermin and disease spreading vectors, flies, mosquitoes, etc.

Reserve pits: Reserve pits are used temporarily to store drilling waste, chemical waste, oily sludge and contaminated soil. These pits should be appropriately designed and furrowed to eradicate soil-, groundwater-/surface water-contamination.

Incineration: Incineration is another type of waste disposal wherein incinerator are used. Prior to burning, items that are not to be burned should be segregated and incinerated ash shall be buried in the lined landfill as it may contain heavy metals.

Evaporation Ponds: Evaporation ponds are used to eradicate the produced water at some facilities. It may be noted that all evaporation ponds should be lined properly.

10. Aims and Objectives of Environment Audit

Primary objective of an Environment audit is to promote the environment safety management and preservation for future generations. The purpose of environmental audit is to recognise, enumerate, describe and arrange/organise the framework of sustenance of environment in compliance with the appropriate/valid rules, regulations and requirements. In general, environment audit can be achieved by creating awareness on the importance of safeguarding the environment among students, faculties and staff members, including public domain. Environmental audit programme conventionally designed and implemented judiciously which can boost the sustainable healthier

environment of an organisation. It is helpful to monitor the optimum utilization of the resources and evaluating the company at National and International levels. Major objective of environment audit confined to:

a. Protecting the environmental health and minimise the threats posed to human safety by the performance of the Organization.
b. Create consciousness among the stakeholders about the importance of requirement of clean environment and conservation of the same as per the Environment Management Systems (ISO standard of 14001:2015) and Environmental Legislations by the Organization.
c. To establish a baseline information about the eco-friendly environment in the campus to the stakeholders for future sustainability.
d. Review the disposal of solid- and liquid-waste within the campus and ascertain the sources of waste generation to mitigate with possible solutions in relation to environmental compliance.
e. To conduct outreach programmes to the rural, tribal and urban community people on the environment damage and conservation.
f. To correlate the flora and fauna with environmental sustainability in the audit sites to provide a healthy atmosphere to the members of the Organization.
g. To take steps to minimize the environmental pollution and degradation by means of developing ‘Sanitation and hygiene policy’, ‘Water conservation policy’, ‘Waste management policy' and ‘Green campus and Environment policy’ by the Organization.
h. In accordance with legislative compliances, to adopt measures to reduce waste generation and both solid and water waste recycling.
i. Establishing plastic free campus/zone with the help of management and the stakeholders and to evolve health consciousness among the stakeholders.
j. Propose the utility of alternative energy for the conservation of conventional energy resources.
k. Evaluation and documentation of wastewater quality, its characteristics and their effects on the living system.
l. In order to classify the solid and hazardous wastes, their source of generation, quantities and characteristics with respect to prevent environmental hazards.
m. To introduce and implement the time saving technologies in production as well as providing eco-friendly ambience in an organization following the latest IT based techniques and to minimize the wastes through modern cleaner technologies.
n. Maintenance of Labour/Occupational health & medicine followed by proper documentation of environmental compliance status.
o. Annual environmental auditing will render educated and technically sound personals with practical knowledge to overcome existing environment issues.

11. Importance of Environment Auditing

The generic term ‘Environmental auditing’ is to examine the management practices and to evaluate performance of an Organization in relation to environmental issues. World along with Indian Green building Council (IGBC), Associated Chambers of Commerce and Industry of India (ASSOCHAM), Green Building Code and Green Ratings Systems (GBCRS), Green Rating for Integrated Habitat Assessment (GRIHA), Bureau of Energy Efficiency (BEE), Leadership in Energy and Environmental Design

(LEED), CII-GreenCo – GreenCo Rating System (CII-GRS), Food Safety Management System & Occupational Safety & Health (FSMS), Swatch Bharath under India Clean Mission (SBICM) and International Standard Organization (ISO 2021) have formulated a series of standards in the field of environmental auditing. These standards are basically intended to guide organizations and auditors on the general principles common to the execution of environmental audits. In order to set a pure atmosphere free from pollution to the stakeholders in an organization campus, waste disposal management and recycling activities should be proper to restrict the environmental pollutions.

Management of the Organization (Auditee) should be shown their inherent commitment towards making eco-friendly atmosphere through the Environment auditing and ready to encourage all types of Environment related activities. They should promote all kinds of Environment related activities such as conduct of environment awareness programmes, campus farming, planting trees and maintenance of greening, irrigation, use of bio fertilizers and avoidance of chemical fertilizers and agrochemicals etc., before and after the environment auditing.

Environment audit may be beneficial to the campus in improving the greenery activities which in turn useful to save the planet for future generation. Environment audit is a kind of professional care and a simple indigenized system about the environment monitoring in terms of planting a large number of trees which is the responsibility of each and every individual. It is necessary to Environment audit frequently at least once in three years in campus because students and staff members should aware of the Advantages of Environment audit is to save the planet by means of 'Go green concept' and help the institution to set a "bench-mark" (icon) to the community. It provides an immense opportunity for the development of ownership, personal and social responsibility for the stakeholders.

Scope of an audit can vary from simple compliance testing to a more rigorous examination, depending on the apparent requirements of the management. Environment audit is applied not only to operational environmental, health and safety management monitoring, but increasingly applied to product safety and product quality management besides the areas like loss prevention. Environmental studies includes the site history, storage of materials (above and below ground), the disposal of liquid or hazardous wastes properly in onsite and offsite. It also pays attention in oil or chemical spill prevention. In the subset of safety it includes special procedures for confined space entry, work on electrical equipment, breaking into pipelines, having fire fighting equipment's, conducting safety training programmes for the stakeholder's, etc. Waste disposal measures and methods have already detailed in this report.

12. Environmental Audit Schemes and their Components

Environmental audit schemes are useful to the entire management system in terms of its being an asset or a liability for the industry`s environmental performance besides with a broad spectrum of objectives for a green environment.

- The scheme renders ways and means to reducing all types of solid, water, electronic and biomedical wastes.
- It authenticate the assessing compliance with regulatory requirement.
- The system provides prevention control of effect of pollutant in water and soil.

- It promotes relationship among the qualified technicians, professionals and individuals,
- Central as well as State Pollution Control Boards, other public authorities, NGOs and industrial association etc. responsible for the conduct of environmental audit as well as environmental audit schemes
- Environmental Audit Scheme has three following important components.

Central and State Pollution Control Boards: The Board plays participatory role in implementing the environmental audit effectively by preparing format of audit report on all aspect of environmental protection. The board appoints internal auditors to prepare industries audit report and then evaluation followed by verification of audit reports. Initiating the action on evaluated report of environmental audit is also equally important in terms of implementation.

Internal Auditor: Team of selected auditor consist of experienced experts from various fields. A qualified internal auditor should be required as per the rules of State Pollution Control Board with well-equipped laboratory facility for analysis of water and air samples.

External Auditor: Experienced expertise were appointed as External Auditor appointed/approved by the State Pollution Control Board. Evaluated and verified reports along with their comments were sent to the State Pollution Control Board for further action.

13. Role of Environmental Audit and Environmental Management System

A vital role of an environmental audit (EA) is to recognise the areas for development, but an audit does not, in itself, provide the methods to implement changes. However, EA should set the agenda of an environmental management system. System of EA provides a mechanism for methodically handling the environmental matters of an Organization while EMSs provide a framework to 1) identify the environmental effects and document regulatory requirements, 2) set the objectives and targets for ensuing environmental performance/programmes, 3) implement protocols and procedures for achieving the objectives/ targets and 4) undertake audits to measure environmental performance and its efficacy measures to attain the well-defined objectives/targets. All the events pertaining to environmental effects, regulations, objectives and targets and the procedures are usually documented. As far as stakeholders are concerned EMS usually rely heavily on documentation and verification.

14. Target Areas of Environmental Auditing

- Auditing for Water Management (Wastewaters and Industrial effluents)
- Auditing for Waste Management (Solid, Electronic and Biomedical)
- Auditing for Energy Management (Electrical energy and Fossil Fuel use)
- Auditing for Soil Analysis (Soil health, degradation and conservation)
- Auditing for Carbon Footprint (Electrical, vehicles and human population)
- Auditing for Green Campus facility (Correlated with Green Campus Audit)
- Auditing with the Organization’s Management for financial allotment
- Auditing with the Stakeholders for their contribution on environment studies
- Environmental Education and Implementing Swachh Bharath Abhiyan Scheme

15. Procedures followed in Environment Audit

15.1. Environment Systems Audit

Environmental audit involves monitoring an Organization concerning about the green campus, environment, sanitation and hygiene policies. It is a regular process that is conducted periodically by a regulated entity to check whether an Organization meets the requirements of environmental compliance. The process of environmental audit includes examining, collecting, evaluating, documenting data and analyzing various components related to environmental aspects (IGBC, 2021; WGBC, 2021). Environmental audit was carried out as per the procedures mentioned of the Manual of Gnanamangai *et al*. (2021). The environmental audit possesses the following characteristic features in which various aspects of wastes generation and steps taken by the Organization to reduce both solid and liquid wastes without harming the environment.

- Identification of various sources to generate wastes and types of degradable and non-degradable wastes in the campus.
- Collection of information related to type of operations, use of various raw materials and products that generate wastes.
- Finding the highlights of inefficiencies in the process that generate wastes and areas that are to be monitored with extra care.
- Setting up the target for reduction of wastes and source of waste generation without affecting the environmental health.
- Steps taken to minimize the environmental pollution and degradation by means of developing internal policy methods.
- Suggestion of cost effective waste management strategies and zero waste discharge in the Organization.
- Creation of awareness among stakeholders on the benefits of reducing wastes without damaging the ecosystem.
- Aids in increase of process efficiency and status report with regards to environmental compliance and management.
- Converting the waste materials into fertilizing materials by following the method of recycling and composting processes

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15.2. 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 gas analyser). 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 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/day and approximate distance covered by the vehicle / day (in km) with a coefficient (0.01) to calculate the emission of CO_2 in metric tons per year.

15.3. Steps involved in the Process of Environmental Audit

Step #1: Opening meeting among the audit team and auditees, discussed about the audit procedure and document verification.

Step #2: Visited the on-site of the audit along with the audit team and auditees.

Step #3: Walked around campus to check the facility as walk-through audit and took photographs for preparing the audit report.

Step #4: Monitor the components as per the environmental audit checklist (Sanitation and hygiene, water conservation, waste management and green campus and environment policies).

Step #5: Noted down what all components are present and what are all not available in the campus as of environmental audit components listed by NSF ISO- EMS checklist.

Step #6: Identified the issues in the campus with respect to the environmental compliance and merits/weaknesses of the Auditee's Management controls and risks associated with the audit.

Step #7: Looked into other items to be monitored as per the NSF checklist with respect to Ecology and Environment studies.

Step #8: Exit meeting held after the audit in which the audit findings with the members of the Organization was discussed.

Step #9: Prepared and distributed the findings as a Report and Certificate along with the recommendations including the best practices followed by the Auditee.

Step #10: Comparison between the last audit report with the present audit report in which the number of suggestions and recommendations were taken into consideration and rectified significantly by the Management.

Step #11: Observed the audit process undertaken by the certifying agency between the last audit and current audit processes, whether the same certifying agency has undertaken the audit process or not?

Opening Meeting with the Principal and Management Representatives of St. Ann's College for Women, Hyderabad with the Audit Team of the Nature Science Foundation

16. Benefits of an Environmental Audit

Environmental audit provides the following benefits to the Organization:

- Discover various issues related to the environment in the Organization.
- Compute the issues, identify and assess the impact of the issues.
- Provide suggestions to minimize the issues found in the Organization. On conducting an Environmental audit, it provides the following results:
- Conservation of resources and reduction of raw materials.
- Minimizing wastes, control of pollution and reduction of costs.
- Improvement in working conditions and improvement in process efficiency.
- Improved corporate image and marketing opportunities.
- Apprehensions about the environmental impact of the Organization.
- Progressive development of ownership, personal and social responsibility in relation to the organisation and its environment.
- Preparation of Environmental management plan and monitoring.
- Assessment of environmental input and risks to the ecosystem.
- Identifying areas of strength and weakness for improvements.
- Evaluation of pollution control status, verification of compliance with environment laws.
- Assuring safety aspects of all living organism in the ecosystem
- Improved production with minimum resource utilisation including manpower and development and marketing.
- Planning for pollution control, waste prevention, reduction/recycling/reuse methods.
- Providing an opportunity for management to give credit for good environmental performance.
- On the whole environmental audit minimize the environmental problem locally which in turn accountable at regional, national and international level.
- Identification of various sources to generate wastes and types of wastes
- Types of degradable and non-degradable wastes in the campus.
- Setting up the target for reduction of wastes and source of waste generation without affecting the environmental health through policy.

17. Phases of an Environmental Audit

The environmental audit encompasses three phases viz., pre-audit, during- audit and post-audit. These phases involve various components to resolve the problems in the campus as well (Arora, 2017; Gnanamangai *et al*., 2021).

17.1. Pre-Audit

Pre-audit involves the following components:

- Planning the environmental audit
- Selecting the audit team based on experience and expertise
- Scheduling the audit facility and venue of audit
- Scrutinizing the audit application and checklist
- Opening meeting between audit team and auditee
- Acquiring the background information of the organization
- Visiting the site of audit by the audit team and coordinators
- Audit programme and briefing
- Collection of data and documents verification
- Discussion with the auditee for data verification

17.2. During-Audit

- During the audit, the following components are involved:
- Understanding scope of the audit
- Analysing strength and weakness of the internal controls audit
- Conducting the on-site audit
- Appraising the onsite observations during audit
- Noting down the key observations and taking photographs
- Clarifications if required during the audit site and document verification

17.3. Post-Audit

- Post-audit involves the following components:
- Identification of the best practices followed by the Organization
- Compiling a report of the data collected
- Distributing the report and certificate to the Organization
- Preparing an action plan to overcome the flaws
- Providing suggestions to implement the action plan
- Setting up the future environmental aims and objectives

18. Components of an Environmental Audit

Environmental audit has ten components, namely:

- Sanitation and hygiene policy
- Green and Environment policy
- Water conservation policy
- Water management policy
- Waste management policy
- Rainwater harvesting policy
- Environment conservation policy
- Waste management initiatives
- Environment management policy
- Environment monitoring policy

18.1. Sanitation and Hygiene Policy

In this component, the following are being considered:

- Physical appearance and overall ambience
- Adequacy of toilets (Student/Employee: toilet ratio)
- Gender balance and disabled-friendly toilets (Male: Women)
- Water taps and sanitation plumbing, adequacy and efficiency
- Adequate clean drinking water facilities
- Kitchen staff apparel and hygiene
- Canteen and hygiene maintenance
- Kitchen hygiene and fly proof condition
- Cutlery, crockery and utensils hygiene
- Dining hall hygiene and bad odour free
- Cleaning equipment and consumables

18.2. Water Conservation Policy

In this component, the following are being considered:

- Know the source of the campus water availability
- Monitor overhead tanks for periodical cleaning

- Reuse of treated water, recycling, leakages etc.
- Drip irrigation / sprinkler irrigation system for watering to plants
- Water efficient dispensing mechanism in campus

18.3. Rainwater Harvesting Policy

In this component, the following are being considered:

- Implementation of rainwater harvesting system
- Functioning status of rainwater harvesting system
- Connectivity between rainwater harvesting and open wells and bore wells

18.4. Waste Management Policy

In this component, the following are being considered:

- Is the campus a 'Plastic free zone'?
- What are the methods adopted for waste segregation and storage?
- Disposal of solid wastes, reuse and recycling process
- Vermicompost, cow dung and organic manure units
- Availability of Biogas plant and its implementation status
- Installation of incinerators and their functioning status
- Adequate number of waste bins, separate bins for dry and wet wastes
- Food waste dumped status methods of disposal

18.5. Waste Management Initiatives

In this component, the following are being considered:

- Sign boards indicating energy / water conservation in respective places
- Awareness sign boards on usage of tobacco and tobacco free campus
- Awareness sign boards on plastic usage and plastic free campus
- Programmes related to waste segregation / waste disposal systems
- Sufficient ventilation facility
- Social responsible activities to rural, tribal and urban areas

18.6. A good environmental audit

- Defines waste generation sources and quantification of its types
- Collects information on raw material, unit operations, products and water usage
- Highlights process efficiencies and areas to be focused
- Helps in planning targets for waste reduction, development of cost effective waste management approaches and create awareness among the workforce regarding the benefits of waste reduction
- Helps to improve process efficiency
- Assess the quantity of water usage within the company.
- Find out various sources of organic and solid waste generation and mitigation possibilities.
- Document the waste disposal system
- Release of standing order report on environmental compliance.
- Waste minimization opportunities realized, that contributes to reduction in operating price.
- Increased worker cognizance of environmental standards and responsibilities.
- Improve employee relations and morale.
- Improve the image of organization and its good will.

19. About the Organization

19.1. St. Ann's College for Women, Hyderabad

St. Ann's College for Women was established in 1983 with 2 undergraduate courses and 106 students. Today it has emerged as an institution of excellence, enshrining its ideal "Light of Life". The enduring appeal of the college is its ability to cut through social, financial, cultural and linguistic diversity. Being a missionary college, its effort is to foster a rich campus culture, reinforcing the need for an ethical component, integrity and social concern; which in addition to academic excellence and skill enhancement constitutes the whole educational experience. Committed as it is to the ideals of higher education with its vision of academic excellence, skill enhancement and value enrichment, quality consciousness has permeated every aspect of the institution's ethos.

The vision, empowerment of Women through education is being manifested with moving one step at a time and punctuated by leaps. The college was accredited with an 'A^{+}' grade by NAAC (3rd cycle) with a CGPA of 3.31. The other milestones are that the college enjoyed two cycles of 'College with Potential Excellence' status by UGC. The College is also certified ISO 9001: 2015 for providing Educational Services and ISO 14001:2015 for maintaining of Greenery and Environmental Activities. The college has an active Institution's Innovation Council (IIC) established under AICTE and Ministry of Education, Govt. of India and had undertaken various activities to promote innovation and start up in campus and received 3.5 stars the college was conferred the status of Autonomy by the UGC from the academic year 2015-16 onwards.

The college continues to grow in quality, impact and reach. In the wake of the information explosion, the changing times require that we continually expand and evaluate our academic aspirations. The institution continues to maintain its dedication to excellent teaching while promoting research activities and reaching out to the community. The college strives to maintain an environment which encourages all employees to upgrade their personal and professional goals and aspirations as we work towards achieving the mission of the college. The college provides a work environment in which everyone, staff and students alike accept responsibility to contribute to the success of the institution and are empowered to do so.

At present, the college has a strength of over 3960 students and 136 well qualified staff members, belonging to as many as 30 different departments. The faculty at St. Ann's is the most valuable resource that brings along an incomparable set of skills and knowledge.

The faculty boasts of varied backgrounds in terms of specialization and experience. The academic, social and spiritual elements of St. Ann's college come together, to offer the students a world of opportunity.

Our Motto: The Light of Life

Wisdom through knowledge is the essence of education. The light that can be spread through the medium of learning dispels the darkness of ignorance and doubt. Tagore expresses this in his inimitable poetry "Let all that is dark within me burst into flame and the veil of error be torn away" The Bible says, "Let there be light". God commands Light to appear in order to dispel darkness. The Upanishad says, "from darkness lead us to light" all these profound sayings emphasise the need for light in our lives.

The candle, a symbol of light, with its gentle glow, spreading lustre and warmth all-around, symbolizes our institution which imparts **knowledge**, **awareness** and consciousness. Our Institution prepares the students to be useful to society, to enrich their lives and spread warmth all around.

The three hearts, one merging with the other symbolize the material, intellectual and spiritual aspects of life. They represent the values we impart to our students: education for livelihood, for learning and for ethical and moral enrichment.

19.2. About Nature Science Foundation (NSF)

NSF is an ISO 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 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	➢ Dr. S. Rajalakshmi ➢ Dr. R. Mary Josephine ➢ Dr. B. Mythili Gnanamangai ➢ 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	➢ Dr. A. Geetha Karthi ➢ Dr. S. Rajalakshmi ➢ Dr. R. Mary Josephine ➢ Dr. B. Mythili Gnanamangai ➢ Er. N. Shanmugapriyan
Hygiene Audit	• FSMS – Food Safety Management System &	➢ Mrs. Gaanaappriya Mohan ➢ Dr. R, Sudhakaran

	• Occupational Safety & Health (ISO 22000:2018) • SBICM - Swatch Bharath under India Clean Mission	➢ 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 ➢ 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)	➢ Dr. S. Rajalakshmi ➢ Dr. A. Geetha Karthi ➢ Mrs. Gaanaappriya Mohan ➢ Dr. R. Mary Josephine

Table 2. Total Campus Area, Building Spread Area, Vehicles and human population

S.No.	Details of Area	Total area
1.	Total Campus area	4Acres 36 Guntas
2.	Total Built up area	15,684.9sq.mtrs
3.	Covered Car parking area	
4.	Air-conditioned area	1341.54 sq.mtrs
5.	Non-Air-conditioned area	14343.36 sq.mtrs
9.	Forest vegetation	Nil
10.	Planted vegetation	23%
9.	Total number of Girl students	3960
10.	Total number of Boy students	27
11.	Total number of Teaching Staff	136
12.	Total number of Non-teaching staff	86
13.	Total number of College Vehicles	Nil

St. Ann's College for Women - Infrastructure

St. Ann's College for Women – Laboratories Infrastructure

St. Ann's College for Women –Auditorium, Seminar Halls & Canteen Infrastructure

20. Audit Details

Date / Day of Audit	**:**	**28.02.2023**
Venue of Audit	**:**	**St. Ann's College for Women**, Mehdipatnam, Hyderabad - 500 028.
Audited by	**:**	**Nature Science Foundation,** Coimbatore, Tamil Nadu, India.
Audit type	**:**	**Environment Audit**
Name of Auditing Chairman	**:**	**Dr. 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	**:**	**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. M. Nithya,** Environment, Energy & Green Council Programme Officer, NSF.

Auditing Team of the Nature Science Foundation, Coimbatore, Tamil Nadu at the St. Ann's College for Women, Hyderabad, Telangana

21. Qualitative and quantitative measurements of the Environment Audit

It covers both qualitative and quantitative measurements including physical observation of eco-friendly environment set-up. The qualitative and quantitative measurements such as achievement of environmental objectives and targets by implementing agency (Auditee), appointment of Environmental Engineers and Agriculture Staff working for environment monitoring, Drinking water / RO water / Borewell water / Open well water / Pond water / Municipal or Corporation water facility to the stakeholders and periodical checking of drinking water quality through Physico-chemical properties analysis, Wastewater treatment facility, Hazardous and toxic material disposal facility, Solid waste management facility, Renewable energy utilization (Solar panel, wind mill, solar water heater, etc,), Air ventilation at Indoor / Outdoor auditorium, seminar / conference halls, classrooms, canteen, staff rooms, laboratories, restrooms, etc., Availability of Biogas plant, Rain harvesting system, water reservoirs, etc.

Incinerator for napkin disposal use, Housekeeping, storage, areas, piping, plumping and etc. facility, Sign boards indicating plastic free campus, tobacco free campus, don't waste water, don't walk on the lawns, don't plug flowers, etc. The ratio of Environment sustainability courses (Environmental Science, Engineering, Technology, Management, Monitoring, Climate change, Global warming, etc.) to total courses / subjects to under graduate and post graduate course students including research scholars, Per capita water consumption per day and carbon footprint in the Organization campus due to an extensive use of vehicles, electricity usage and human population load are also analysed during the environment audit. These qualitative and quantitative measurements 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 are a quite a few methods are already under implementation in the Institute in order to establish the green campus. 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, SF or NSS bodies may be involved in green campus as well as eco-friendly atmosphere initiatives, planning and efforts among stakeholders. Outreach programmes may be conducted for dissemination of natural resources management, environmental pollution studies, green and eco-friendly atmosphere pledge initiatives to rural, tribal and urban people across the country. Signing of MoU with Govt. and NGOs to ensure eco-friendly campus maintenance, conduct of awareness programmes and cultural activities for environmental monitoring and ecosystem maintenance to the stakeholders.

Waste management methods, documentation of energy utilisation and carbon footprints were given due importance in the audit in relation to healthier environment under climate change and global warming scenario. In addition, academic credentials

like taking up major and minor Projects, Dissertations, Thesis work and Scholarly publications on environmental science, engineering, technology and management domains carried out by students and staff members may be taken into account towards environment sustainability management. Best practices followed on green campus and eco-friendly set-up initiatives, planning and efforts in the Organization and recommendations for improvement are illustrated in the audit report as well.

Table 3. Qualitative Measurements of Environmental Audit

S.No	Requirements and checklists of the audit	Conformity		
		Yes	No	NA
1.	Have Internal Environment Audit procedures been developed and implemented in the Organization?	Yes		
2.	Have programmes for the achievement of environmental objectives and targets been established and implemented as on today?	Yes		
3.	Have responsibilities been assigned for programmes at each appropriate function and level? (Environmental Engineer and Agriculture Staff working for environment monitoring in the campus)	Yes		
4.	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	Yes		
	b. Wastewater treatment facility		No	
	c. Hazardous and toxic material disposal facility	Yes		
	d. Solid waste management facility	Yes		
	e. Renewable energy utilization (Solar panel, wind mill, solar water heater, etc.)	Yes		
	f. Air ventilation at Indoor / Outdoor auditorium, seminar / conference halls, classrooms, canteen, staff rooms, laboratories, restrooms, etc.	Yes		
	g. Acoustic proof in indoor auditorium, seminar / conference halls	Yes		
	h. Availability of Biogas plant	Yes		
	i. Rain harvesting system, water reservoirs, etc.	Yes		
	j. Incinerator for napkin disposal use	Yes		
	k. Housekeeping, storage, areas, piping, plumping and etc. in a proper way	Yes		
	l. Sign boards indicating plastic free campus, tobacco free campus, don’t waste water, don’t walk on the lawns, don’t plug flowers, etc.	Yes		
	m. The ratio of Environment sustainability courses (Environmental Science, Engineering, Technology,	Yes		

	Management, Monitoring, Climate change, Global warming,) to total courses / subjects			
	n. Per capita water consumption per day	YeS 0.12 litres/ day		
5.	Signing of MoU with Govt. and NGOs to ensure ecofriendly campus maintenance	Yes		
6.	Implementation of Government schemes (Swachh Bharath Abhiyan under Clean India Mission)	Yes		
7.	Functioning of Nature club, Eco club, Cell, Forum, Association, SF (NCC), NSS bodies and Social Service League for students and staff members on environment conservation, pollution control and nature protection.	Yes		
8.	Conduction of awareness programmes and cultural activities for environmental monitoring and ecosystem maintenance to the stakeholders	Yes		
9.	Conduction of outreach programmes for dissemination of natural resources and environmental pollution	Yes		
10.	Implementation of composting pits, vermicompost unit, recycling of kitchen wastes collected from canteens, and other places	Yes		
11.	Steps taken for organic, inorganic, toxic, e-waste, biomedical, food, sewage waste management, segregation of wastes and reuse methods	Yes		
12.	Public transport, low-carbon emitting vehicles, battery operated vehicles, bicycles, biofuel use and control of car smokes and exhaust with respect to routine FC services	Yes		
13.	Observation on the site preservation, soil erosion control and landscape management		NA	
14.	Projects and Dissertation works and Scholarly publications on environmental science, engineering, technology and management carried out by students and staff members	Yes		
15.	Steps taken to take care of daylighting, AC machine heat and carbon dioxide emission & carbon sequestration*		NA	
16.	Eco-friendly Refrigerants, instruments and materials use including Energy efficiency measures taken *		NA	
17.	Mechanism of monitoring environmental parameters (Temperature, Relative humidity, Rainfall, Sunshine, Wind speed, dew point)*		NA	
18.	Are the required resources (e.g. personnel skill development, procurement, finance, etc.) for implementation and control of the environmental management system provided by Management?	Yes		

19.	Any mosquitos and vectors and predators identified in the campus which are the root cause of various diseases spreading to students?			No
20.	Any Digital / Automatic technology is adopted to reduce consumption of paper, gas, water, energy, etc.	Yes,		
21.	Are all monitoring equipment appropriately maintained and calibrated?	Yes		
22.	Impactful Organization programmes on climate change, global warming, environmental protection, etc.	Yes		
23.	New initiatives to decrease private vehicles on campus to reduce carbon emission	Yes		

* Applicable for Industrial sectors
** A minimum of 50% criteria should be attained

Table 4. Quantitative Measurements of Environmental Audit

S.No	Requirements and checklists of the audit	Available / Not Available
1.	Number of RO water Plant in the campus for drinking water	RO Plant 1 RO water purifiers2 Steel water filters 2/floor =6
2.	Number of Borewell water and Open well water facility	2 Borewell
3.	Number of Percolation Pond and Check Dam facility	NA
4.	Number of Wastewater treatment facility	Nil
5.	Number of Solid waste management facility	Organic manure pits 2, Vermicompost pit 1, Kitchen waste composting units 2
6.	Number of Renewable energy utilization (Solar panel and solar water heater)	Solar Lamps 5
7.	Number of Rain harvesting system and water reservoirs	7
8.	The ratio of Environment sustainability courses (Environmental Science, Engineering, Technology, Management, Monitoring, Climate change, Global warming) to total courses / subjects	12 Courses (Details attached)
9.	Functioning of Nature club, Eco club, Association, and NSS on environment conservation, environmental pollution, nature protection and natural resources maintenance.	1.Dharini Eco Club 100 students /year enroll 2.NSS unit with 200 students/year enroll 3.NCC 40 students /year Enroll
10.	Signing of MoU with Govt. and NGOs to ensure eco-friendly campus maintenance	1.Youth for Seva 2.Green Waves Environmental Solutions

		3.Apna Green Biodegradable pads 4.ITC Paper board/Earthbox 5.Zoological Survey of India 6.Telangana Forest Department
11.	Implementation of Government schemes (Swachh Bharath Abhiyan under Clean India Mission) programmes conducted	Yes every year
12.	Number of composting pits and vermicompost unit for recycling of kitchen wastes and plant leaf litters degradation	Organic manure pits 2, Vermicompost pit 1, Kitchen waste composting units 2
13.	Per capita water consumption per day	0.12litres/day
14.	Carbon footprint in the campus due to Electrical energy usage	690.7 tons
15.	Carbon footprint in the campus due to Vehicles usage	Only vehicles of students and staff are parked in the parking area ,no outside vehicles are allowed Majority students use Public transport-Bus,Metrorail
16.	Carbon footprint in the campus due to Petroleum gas usage	NA
17.	Carbon footprint in the campus due to Human population load	10%
18.	Carbon footprint in the campus due to use of Petrol and Diesel for operating Generators for power generation	One Generator

22. Observations of the Environment Audit

22.1. Plastics use and their impact on the environment

The Ministry of Environment, Forest and Climate Change, Government of India has advised the Plastic Waste Management Rules, 2016. A Central Pollution Control Board report specified that the total annual plastic waste generation is quite huge and accounts around 3.3 million metric tonnes/year for which the data were collected from 60 major cities in India. The country generates around 26,000 tonnes of plastic waste/day out of which 60% of plastic produced is recycled. It doesn't

degradable, rot, like paper or organic waste like food and hence, it can hang around in the environment for hundreds of years. More than eight million tonnes of plastic escapes from the land cover and enters the world's oceans each year while only 9 per cent of the total plastic waste in the world is recycled. It is observed that 96% of plastic wastes are collected and segregated by the respective urban bodies in which the recyclable plastic waste are sold to the recyclers and non-recyclable plastic waste are sent for co-incineration in cement plants. People should be probed to use reusable substances and initiate models which allow up-cycling of waste for better use. This will help to reduce plastic waste from urban local bodies, as well as curb the value for waste among the citizens. Plastic waste management is very important, because plastic not only pollute the environment, it destroys food chains.

People use plastic bags and plastic ware items every day to hold objects like meals, clothes, grocery and stationary items, which can be bought from shops. Generally, the plastic items are non- degradable in nature that lead to soil pollution and affect the soil health significantly. Most of the plastic items are considered as solid waste and enhance the unwanted animal choking, water pollution, blockage of channels, rivers and streams, and landscape disfigurement. According to the World Health Organization (WHO) report, plastic items take at least 400 years to decompose completely in the soil which illustrates the subsequent effects on the environment. Plastic pollutants form a basis for damage to the healthier environment besides the living organisms in the ecosystem. It impacts all organisms in the food chain from tiny species to big ones. And hence, reduction of plastic usage is the need of the hour to protect at least the present-day natural resources. There is a need to reduce the plastic use to effectively limit plastic waste in the campus.

St. Ann’s College for Women has taken sufficient attempts not to use plastics in the campus and displayed a slogan ‘say no to plastics’ in places like canteen, dining halls, seminar halls, corridors, etc. to the students, parents and public. The College 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.

22.2. Solid Waste Management Practices at the St. Ann’s College for Women

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.

St. Ann's College for Women 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 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. Degradable wastes were sent to compost yard. 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.

22.2.1. Waste Management Practices

Waste management has a common mandate that the "Producer Owns the Responsibility". The community that generates waste should develop more responsibility in handling the waste with more care thus reducing negative impact on the environment. In a study conducted in 2013 by 'M/S Hand in Hand India Ltd.' In St. Ann's College for Women had quantified a daily average of wastes in which food waste is about 37%, recyclable waste is about 27% and other organic waste is about 36%. The study revealed that the solid wastes need to be professionally handled. The solid wastes are collected from different places of campus and segregated based on bio-degradable and non-degradable materials subsequently subjected for recycling and degradation processes like composting. Details of the waste management practices in college are 1) Bio-degradable waste handling, 2) Sewage Treatment Plant 3) Bio-gas plant, 4) Disposal of E-Waste and 5) Rain Water Harvesting System. Regarding the food wastes, a portion of food wastes being pulverized and used in the bio-gas digester and the balance quantity is sent to piggeries. Organic wastes like dry leaves, vegetable cuttings, etc. are sent for bio-composting.

Eco Club Waste Management Practices of St. Ann's College for Women:

1. Sanitary Pad disposal pouch making
2.Paper bag making from newspapers-No Plastic bag Day
3.Up cycling waste activity at St.Ann's
4.Kitchen waste composting activity for NSS & Eco club students
5.Encourage use of biodegradable sanitary pads-Sale & Awareness

6.Menstrual Waste Management Awareness Activity Guest Lecture
7.Up cycling of Plastic and E waste Workshop at JNTU
8.Collection of plastic and handed over to green waves for recycling

Eco club & NSS organized Recycling Championship for Collection of Dry Waste In College 2022

1. 2500 Kgs of Dry waste was contributed by students for recycling
2. Faculty and all Departments also participated in the Championship
3. Highest contributors were recognized with trophies and appreciation certificates

22.2.2. Bio-degradable and Non-degradable waste materials Management Practice

For the purpose of segregation of waste (Organic, recyclable, non-recyclable and e-waste) at source and collecting the same 'Waste Bins' are placed at designated locations in the St. Ann's College for Women *Viz.* Students and Staff rooms, Students Service Centre, Sports Complex and Guest rooms. A Contractor is engaged for the collection and further process of waste generated within the campus where biodegradable wastes subjected to preparation of organic compost.

22.2.3. Disposal of E-Waste at the St. Ann's College for Women

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 (telephones, cellular telephones, computers, laptops, television sets, refrigerators, washing machines, air-conditioners, fluorescent and other mercury containing lamps etc.). 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. E-waste Management Rules applicable not only to Manufacturer/Producer, it is also applicable to Consumers, Collection Centre/Dealer, Retailer, Dismantler and Recycler. In compliance to the E-Waste Management Rules, 2016, Government of India, e-waste materials were collected from the Campus are being segregated and then sold to Authorised Agencies which are approved by the Pollution Control Board (PCB) for handling e-waste. Due to this e-waste activity disposal, the e-waste pollution is significantly reduced in the College Campus. However, a proper method of e-waste disposal should be done in coming years in collaboration with Telangana State Pollution Control Board as per the E-Waste Management Rules, 2016.

- The electronic items and computers that are not used but are in good working condition with a longer life-period are donated to schools like Nirmala Vidhyalaya, Kalwakurthy ,
- St. Ann's English Medium High School, Dondapadu
- Vijaya Mary English Medium School-Guntur
- Obsolete items are given to vendors for recycling
- Eco club regularly organise E-waste collection drives and hands over collected material to Green Waves Environomental Solutions for proper disposal

Token of appreciation for St. Ann's College for Women
E-Waste Disposal Activities

22.2.4. Construction & Demolition of Waste Management

The Ministry of Environment, Forest and Climate Change, Government of India has notified the Construction and Demolition Waste Management Rules, 2016 exclusively to manage waste (building materials, debris and rubble) from construction activities like new construction, re-modelling, repair and demolition. According to the Rules, the local authorities need to ensure proper management of construction and demolition wastes. State Pollution Control Board is to grant authorization for the waste processing facility and to monitor the implementation of these Rules. One of the best waste management practices is rebuilding of construction waste into pillars, pathway road. College was in the initial stage of construction and Demolition waste management practice.

22.2.5. Hazardous Waste Management

According to the Hazardous and Other Wastes (Management and Trans Boundary Movement) Rules 2016 (The Ministry of Environment, Forest and Climate Change, Government of India) under Environment (Protection) Act, 1986 Hazardous waste refers to "any waste which by reason of characteristics such as physical, chemical, biological, reactive, toxic, flammable, explosive or corrosive, causes danger or is likely to cause danger to health or environment, whether alone or in contact with other wastes or substances". Hazardous waste generator shall follow various steps (minimising the utility of hazardous elements, prevention, recovery, reuse by co processing, recycling, and safe disposal) of hazardous waste. The State Board of 'Hazardous Waste Management' is taking operative steps in handling and management of hazardous wastes, its treatment and disposal in an environmentally safe manner.

St. Ann's College for Women has taken pioneering efforts to dispose the hazardous waste properly that are generated from various Department laboratories. Acids, solvents, salts, reagents and cancer-causing substances (carcinogens) like Acetaldehyde, Acrylamide, Aristolochic acids, Arsenic and its derivatives, Azathioprine, Benzene, Ethidium bromide, Ethylene oxide, Formaldehyde, Hexachloroethane, Hydrazine sulfate, Hydrazobenzene, Lead compounds, Naphthalene, Naphthylamine, Selenium sulfide, Streptozotocin, Styrene, Sulfallate, Tetrachloroethylene, Urethane, Vinyl chloride, Vinyl fluoride and etc. will cause cancer to the stakeholders those who doing research and/or experiments.

The other carcinogenic materials such as Aflatoxins, Alcoholic beverages, Areca nut, Asbestos (all forms), Coal, indoor emissions from household combustion, Glass wool fibers (inhalable), Leather dust, Ionizing radiation, Solar radiation, X-ray and Gamma radiation, Iron and steel founding (workplace exposure), Tobacco smoke, Welding fumes, Wood dust, Painter (workplace exposure), Rubber manufacturing place, Salted fish (Chinese-style), Silica dust, Crystalline, in the form of quartz or cristobalite will cause various types of cancer to the students and staff members. Hepatitis B virus, Hepatitis C virus, Human immunodeficiency virus type 1 (HIV-1), Human papilloma virus (HPV) and Human T-cell lymphotropic virus type I act as carcinogenic to humans were properly autoclaved and disposed.Acids and Reagents should be 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. It's very important to note that always add the chemical to the water and not the water to the chemicals. Disposal of acids with very low pH (<2) found to be safely. If the acid doesn't contain heavy metals/toxic substances, neutralize the pH to a less acidic level (pH 6.6-7.4) allows to dispose of the substance in the standard sewer system. Chemical wastes are regulated by the Environmental Protection Agency (EPA) through the Resource Conservation and Recovery Act (RCRA). Chemical waste cannot be disposed of in regular trash or in the drainage system. 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. Carcinogenic substances should not disposed of from the laboratories directly through drains or by evaporation into the atmosphere, nor should they be buried since they might be released later.

Carcinogenic substances should be treated strictly as per the protocol and the degraded products should be non-toxic and non- carcinogenic in nature. Procedures involved in treatment and disposal do not result in exposure to the personnel in charge of the work and the procedures on treatment and disposal do not end with contamination of equipment or workplace. Biological and animal wastes, human or animal blood and body fluids can be disseminated through drains (sanitary sewer), under running water after it has been decontaminated by autoclave or using chemicals. In addition, animal wastes and microorganisms including some biological waste materials should be disinfected with liquid detergents and disinfectant solution and then poured down the drainage after dilution with water (pH 6.6-7.4). The campus has a certain protocol to dispose waste as well as expiry chemicals properly. But there is no proper record for disposing of acids, reagents, carcinogenic and hazardous chemicals as per the rule of Central Pollution Control Board.

22.2.6. Waste Disposal and Tracking Form

Name of the Organization : **St. Ann's College for Women**
Address of the Organization : Mehdipatnam, Hyderabad - 500 028, Telangana, India
Date of Waste Disposal : From April 2020 to March 20223
Reporting Team and details : IQAC and NAAC Teams

Table 5. Details of waste disposal and tracking form

S.No.	Types of Waste	Approximate Quantity / Unit Disposed	Disposal Location (On-site / Off-site)	Authorized Company responsible for recycling
1.	Acids and Bases	--	Acids & Bases onsite after lots of dilution into the sinks	--
2.	Aerosol Cans (Empty)	--	--	--
3.	Agriculture Waste	Available	--	Garden waste compost in Organic manure pit
4.	Aluminium, Metal Cans, Tins	Available	--	Empty plastic Chemical bottles handed over to ITC paperboard
5.	Asbestos	--	--	--
6.	Batteries (Dry)	--	--	--
7.	Batteries (Lead Acid)	--	--	--
8.	Biomedical Waste	Very minimum	--	Incinerated after collection in a BioHazard collecting cover
9.	Car exhaust	--	--	--
10.	Charcoal	NA	--	--
11.	Clinical Waste	NA	--	--
12.	Cloth Materials Waste	Available	--	Green waves Environmental solutions
13.	Construction Waste	--	--	--
14.	Condensate Waste	NA	--	--
15.	Crude Oil	NA	--	--
16.	Descaling Acids	NA	--	--

17.	Drilling Fluids / Solids	NA	--	--
18.	Drums and Containers (Empty)	--	--	--
19.	Effluents from major equipment	NA	--	--
20.	Electrical Waste (Wires, Switches, Fans, A/C machines, Holders, Meters, Coils, etc.)	Available	--	Croma
21.	Electronic Waste (Computer, Laptop, CD, Pen drive, Key boards, Mouse, Printers, UPS)	Available	--	Croma
22.	Fertilizer Waste	NA	--	--
23.	Filters	--	--	--
24.	Fluorescent Light Tubes	Available	--	Muncipal waste
25.	Food Waste	Available	--	Composting
26.	Furniture Items	Available	--	Muncipal waste
27.	Garbage and Cardboards	Available	--	ITC Paperboard
28.	Glass Bottles	Available	--	Muncipal waste
29.	Glassware items Waste	Available	--	Reused in chemistry dept as artifacts
30.	Glycols	NA	--	
31.	Hazardous Waste	Very minimum	--	Microbial cultures autoclaved and discarded
32.	Household items	NA	--	--
33.	Human Waste	--	--	--
34.	Inert Waste	--	--	--
35.	Laboratory Wastes	Available	--	Muncipal waste
36.	Lights and Bulbs	--	--	--
37.	Kitchen Waste	Available	--	composted

38.	Metal Waste		--	
39.	Napkins	Available	--	Incinerated
40.	Oil Contaminated Soil	NA	--	--
41.	Oily Sludge & Rags (Used)	NA	--	--
42.	Packaging Waste	Available	--	ITC Paperboard
43.	Paint Waste	--		--
44.	Paper Waste	Available	--	ITC Paperboard
45.	Pathological Wastes	NA	--	--
46.	Pigging Wastes	--	--	--
47.	Plant Wastewater	--	--	--
48.	Plastic Waste	Available	--	ITC Ppaer board
49.	Plasticware items Waste	--	--	--
50.	Produced Water Waste	--	--	--
51.	Radioactive Waste	NA	--	--
52.	Rinsate Waste		--	--
53.	Rubber Waste	NA	--	--
54.	Salts used in Laboratories (Used & Expiry Chemicals)	Stockpiling of chemicals avoided	--	--
55.	Sanitary Wastewater	--	--	--
56.	Scale (Pipe and Equipment)	--	--	--
57.	Sewage Sludge	--	--	--
58.	Solvents	--	--	--
59.	Sludge and allied	--	--	--
60.	Trash (i) Glass (ii) Metal (iii) Plastic (iv) Oils (v) General Trash	--	--	--

61.	Synthetic Dyes, other items	NA	--	--
62.	Textile Waste	NA	--	--
63.	Used Engine Oil	NA	--	--
64.	Wastewaters (Liquid Waste: Detergents, Soap, Oil, etc)	--	--	--
65.	Wood Waste	--	--	--

22.2.7. Auditing for Energy Conservation and Management

Energy cannot be seen but we recognise its existence because of its properties in the forms of heat, light and power. Energy use is clearly an important feature of campus sustainability and needs no explanation for it inclusion in the assessment. For example, an old incandescent bulb uses ~60 to 100W while light emitting diode (LED) uses <10 W. Energy auditing offers a guide line to save energy by adopting conservation methods which include1) Reducing the risk of energy scarcity, 2) Reducing the greenhouse gas emissions, 3) Renewables have overhead costs too and 4) Energy Management saves costs. An energy audit is a useful tool for developing and implementing comprehensive energy management plans.

Scope 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 to review of energy saving opportunities and measures implemented in the audit sites and to identify the various energy conservation measures and saving opportunities. In addition, Implementation of alternative energy resources for energy saving opportunities and decision making in the field of energy management along with creating awareness among the stakeholders on energy conservation and utilization are being carried out.

St. Ann’s College for Women has a substantial the energy conservation initiatives with very good savings opportunities. 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.

Adaptation of drip and sprinkler irrigation and solar streetlights in the campus to minimize the energy potential are well appreciated. Few recommendations, in addition, can further improve the energy savings of the Organization. This may lead to the flourishing future in the context of Energy Efficiency Campus and thus sustainable eco-

friendly environment and community development to the stakeholders in coming years to come. Many of the classrooms and corridors in the college use LED bulbs in place of incandescent lights. A few Solar Lamps are also installed in the college campus to light walkways, sports ground and quadrangle. College replaced old refrigerators with Energy Star Refrigerators. All life sciences and physical sciences labs have Energy star certified refrigerators. The more energy efficient a model, the less energy it will use and the less it will cost to run**.**

Energy Conservation and Management Activities in St. Ann's College for Women, Hyderabad, Telangana.

22.3. Biogas plant facility at the St. Ann's College for Women

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, 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. St. Ann's College for Women has biogas plant in the campus.

Biogas plant facility at the St. Ann's College for Women, Hyderabad, Telangana

22.4. 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 green campus audit sites. 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 bio fungicides 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.

- Organic manure pit: Garden waste is collected in a pit and the manure is used for the garden and nursery which is maintained by Department of Botany
- Organic waste of the campus is converted into a vermicompost pit maintained by the Department of Zoology

Composting and Vermicomposting Activities in
St. Ann's College for Women, Hyderabad, Telangana

22.5. Recycling of Wastewaters at the St. Ann's College for Women

Wastewater recyclers are important features in any Organization or Industry. Once for all the implementation should follow the proper guidelines for wastewater treatment system discharge standards as per Central Pollution Control Board (CPCB). The main feature of these discharge standards is the treated water should not be harmful to the biodiversity, resources and the environment. If an industry or Organization has the wastewater treatment plan, proper records on the analysis of water input and output parameters including the running time of the wastewater treatment plant; its operation cost, its maintenance and the reuse records of the treated water should be well accounted. A typical wastewater treatment system should be based on the waste characterization and the treatment of wastes which can be modified so as to fit into the motto of treating the wastewater which in turn to release of safe water.

22.6. Establishment of Eco-friendly Campus at the St. Ann's College for Women

Eco-friendly environment is very essential to any Organization is concern in terms of protection of earth planet. Go green concept is the ideal way to conserve the environment. Eco-friendly products also prevent contributions to air, water and land pollution to a greater extent and designed to have little or no damage to the environment. Products, events, and services that are eco-friendly lead less cost without harming the earth as well as lead less pollution. Anthropogenic activities *viz*., deforestation, construction of new establishments, besides pollution, global warming are the major threat to the environment. Air pollution is instigated by solid and liquid particles and certain gases that are suspended in the air. All-natural products ensure safety from all dangerous chemicals and allows the humans to avoid risky additives. On the whole using eco-friendly natural products improves quality of life without harmful effects. In order to save the environment, college has taken sufficient attempts by means of creating environment awareness programme to the rural, tribal and urban people across the country and also offering various core and elective courses to the students and scholars in their curriculum. The 5000 sq. ft. botanical garden is a consortium of fruits, vegetables, medicinal, ornamental plants, and pond ecosystem. Green corridor Activity was conducted by Eco Club and Rotaract club increase the number of potted plants in the college corridors. This can further reduce the carbon footprint. The college campus is greener with fair biodiversity. Most of the trees and plants have their scientific names displayed on them. The campus of the college itself is environmental friendly with trees, garden, medicinal plants, vegetable garden, lotus ponds Green lawns adorned with ornamental plants and shady trees make the campus look beautiful. Though space is limited, every vacant corner of the campus has been planted with trees, shrubs, creepers, turfs and other plant species to make it look greener and more vibrant.

St. Ann's College for Women Eco Friendly Campus – Greenery View

Aquarium in St. Ann's College for Women Campus

Medicinal Garden in St. Ann's College for Women Campus

Nursery in St. Ann's College for Women Campus

22.7. 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 have to 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 can be adopted. The Campus Management is implementing the safe practices of disposing of napkins using small scale incinerators. 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 College is taking care of adolescent girls and ladies significantly in their personal hygiene.

Napkin Collection and disposal facility in St. Ann's College for Women, Hyderabad, Telangana

22.8. Environmental Education

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 Various field.

Curriculum On Environment

ENVIRONMENTAL SCIENCES

SYLLABUS

SEMESTER -I

UNIT- I

Fundamentals of Environment & Ecosystem diversity

Definition, Scope and Importance of Environment Science

Components of environment & ecosystem, structure & function of ecosystem

Genetic, Species & Ecosystem diversity. Biogeographical classification of India- biodiversity at global, National & local levels. India as a mega diversity nation. Hot spots of Biodiversity, Endangered & endemic species of India

Threats to Biodiversity – habitat loss, poaching of wildlife, man-wildlife conflicts

Conservation of Biodiversity: In-situ & Ex-situ conservation of Biodiversity

UNIT- II

Social Issues & the Environment

Introduction to Renewable and Non-Renewable Resources, Use of Alternate energy sources, Sustainable development – water conservation, rain water harvesting, watershed management.

Equitable use of resource for sustainable life style, Role of an individual in conservation of natural resources.

Environmental ethics – Issues & possible solutions, consumerism & waste products, public awareness & people's participation.

UNIT- III

Environmental pollution

Definition, causes, effects & control measures – air pollution, water pollution, marine pollution, soil pollution, noise pollution, Nuclear hazards:

Role of individual in pollution prevention.

Disaster management: Floods, earthquakes, cyclones & landslides. Firework hazards & safety measures

UNIT- IV

Global warming and climate change

Earth's climate through ages; trends of global warming and climate change; the potential of different greenhouse gases (GHGs) causing the climate change; weather patterns, sea level rise.

Ozone layer – importance, depletion and causes; effects of ozone depletion; Acid rain & its impact on agriculture & human communities

Mitigation measures & solutions to overcome climate change; Clean development mechanism.

UNIT- V

Solid waste management

Introduction: sources and generation of solid waste, their classification and chemical composition, characterization of municipal solid waste, hazardous and bio medical waste.

Impact of solid waste on environment, human and plant health. Effect of industrial waste on air, water, soil. Industrial waste management and its importance.

4R-reduce, reuse, recycle and recover; segregation of waste-Dry waste and wet waste. Biological processing-composting, anaerobic digestion, aerobic treatment: mechanical & biological treatment, green technique for waste treatment.

Environmental Education in St. Ann's College for Women Campus

22.9. Public transport, Low emitting vehicles and Control of Car smokes

A smart method is to pick out public transportation as much as feasible without polluting the environment by way of driving a car or bike. It additionally often is cheaper, and it leaves much tear in personal automobile expenses. Public transportation cars together with buses reduce carbon emissions which greatly decreases the development of smog within the towns. This means that human beings have healthy air to respire. Comparing a bus travelling with seven people to one single person using a vehicle, it's been observed that buses are the most effective by producing 1/5 the quantity of carbon gas emissions compared to the findings of the car effects. This is a huge decrease in discharge of natural resources per person. Public transportation is better for the surroundings which have been proven through research on emissions. Other than this, it also gives more benefits like less noise and traffic congestion. Whenever possible, try to take public transport in place of one's own vehicle. Fewer miles means approaching fewer emissions.

It is observed that staff members and students are coming to college every day using their own vehicles (Cars and Bikes / Scooters) which accounted to be moderate in numbers. Some of the students and scholars are coming to the campus using their own bicycles and battery bikes which is highly appreciated in view of making pollution free environment in addition to that college is providing bicycle to maintain eco-friendly in the campus and to reduce carbon-di-oxide.

Two Wheelers are parked at appropriate places in St. Ann’s College for Women, Hyderabad, Telangana.

Four Wheelers are parked at appropriate places in St. Ann's College for Women, Hyderabad, Telangana

22.10. Ventilation and Exhaust systems in Buildings

Ventilation is necessary in the buildings and continuous air flow removes 'stale' air and replace it with 'fresh' air which facilitates to moderate internal temperatures, reduce the accumulation of moisture, odours and other gases. In addition, ventilation create air movement which improves the comfort of occupants. Mechanical (or 'forced') ventilation tends to be driven by exhaust fans to replace stable air with fresh air along with moderating the optimum temperature to the occupants. Natural ventilation is driven by pressure differences from one part of the building to another. Internal partitions may prevent the air paths, hence the creation of draughts adjacent to openings for adequate flow of air. Natural ventilation can be wind driven, or buoyancy driven. If air quality is poor, nature ventilation by means of opening windows may be adopted to use in the building. It may also be useful to reduce the noise level to a greater extent. It is recorded that the St. Ann's College for Women has a large number of ventilators for effective air circulation

Sufficient Ventilation in St. Ann's College for Women Campus Buildings

22.11. Measurement of Carbon dioxide level in the Campus

Climatic conditions of the earth changed now-a-days due to a massive increase in global warming and environmental changes including human population and human activities. In addition, primarily fossil fuel burning, and an extensive usage enhances heat-trapping greenhouse gas levels in the atmosphere which lead to assimilation of carbon dioxide. Global warming is driven by human-induced emissions of greenhouse gases which resulted in paramount shifts in weather patterns. It is playing an important role to act as a global indicator for checking the purity of the atmosphere. In general, a portable CO_2 Analyzer is used to measure the level of carbon dioxide in the atmosphere at different places across the campus. 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 without any air contaminants with good air exchange/circulation in the campus. Some of the places like Bank, Post Office, ATM Centre and Examination Centre are recorded with high level of carbon dioxide level due to student mobilization and the maximum number of electrical items fixed from which the carbon dioxide emission and poor ventilation were observed followed by all laboratories and seminar and auditorium halls (Table 1).

Table 6. Measurement of CO_2 concentration in the St. Ann's College for Women

S.No.	Different locations of the Organization's Campus	Carbon dioxide level (ppm)	Remarks
1.	Parking area	459	CO_2 level is low
2.	Library	420	CO_2 level is low
3.	Open Place	408	CO_2 level is low
4.	Classroom	536	CO_2 level is low
5.	Computer Lab	421	CO_2 level is low

Reference of Set values of CO_2 level

- 250-350 ppm: Usual level found in occupied spaces with good air exchange along with pure air. Normal Outdoor ambient concentrations.
- 350-600 ppm: Moderate level associated with complaints of drowsiness and poor air quality. Minimal air quality complaints.
- 600-1000 ppm: Inadequate ventilation and critical level complaints lead headaches, sleepiness, and stagnant, stale, stuffy air. Poor concentration, loss of attention, increased heart rate and slight nausea may present.

22.12. Atmospheric Oxygen level measurements analysis and interpretation

Oxygen level refers to the amount of oxygen available within the atmosphere or water bodies. Oxygen is produced/released as a by-product of photosynthesis, the metabolic activity of all green plants besides certain microbes. Production and burial of plant litres over a period resulted in rise in oxygen levels. Oxygen plays a paramount role in metabolic activities like respiration and the energy-producing chemistry of all living organisms. In order to quantify the oxygen level, Oxygen Meter is used and it

also records the ambient Temperature The atmosphere contains 18-21% oxygen concentration, 75-78.5% nitrogen and 2-3% other gases like carbon dioxide, neon, and hydrogen. The amount of oxygen level in the atmosphere is determined by abiotic factors like altitude, latitude and longitude and biotic factors like plantations in the surroundings. If oxygen level is low in the atmosphere lead to headaches and shortness of breath to human beings. If it excess, it causes oxygen toxicity and oxygen poisoning by creating coughing, breathing trouble and damage the lungs to human beings.

Table 7. The Oxygen concentration in the St. Ann's College for Women

S.No	Location	Oxygen Level (%)	Remarks
1.	Class Room	17.3	O_2 level is good
2.	Library	18.2	O_2 level is good
3.	Open Place	18.6	O_2 level is good
4.	Faculty Room	17.5	O_2 level is good

22.13. Auditing for Carbon Footprint at Educational Institutions

Carbon footprint means of measuring/recording the greenhouse gases (GHG) emissions of an organization within its defined boundary. The carbon footprint is one of the components of Ecological Footprint, since it is one competing demand for biologically productive space. Burning fossil fuel (such as petrol, diesel and kerosene) emits Carbon which accumulate in the atmosphere if there is not sufficient bio capacity dedicated to absorb the same. Commutation of stakeholders has an impact on the environment through the emission of greenhouse gases into the atmosphere consequent to burning of fossil fuels. The most common greenhouse gases are carbon dioxide, methane, nitrous oxide and ozone; among them, carbon dioxide is the prominent one, comprising 402 ppm in the atmosphere. An important aspect of doing an audit is to access the impact within defined boundary which can helpful to derive better ways to minimise its impact. It is necessary to assess the Carbon foot prints of an organisation to understand how far they contributing towards sustainable development. It is therefore essential that any environmentally responsible organizations should examine their carbon emission and subjected to calculate carbon footprint. During audit, observation on carbon footprint due to electricity consumption per year at the campus showed 690.7 tons Carbon equivalents. It is calculated based on CO_2 emission from electricity consumption per year in kWh/1000 units.

The carbon footprint due to transportation (Shuttle services) per year at campus showed 0 metric tons. It is workout based on the number of the shuttle bus in the college, total trips for shuttle bus service/day, approximate travel distance of a vehicle/day (in kilometers) and number of working days. Similar to that of the carbon footprint due to transportation in shuttle services, Carbon footprint due to car usage per year is calculated where number of cars entering into the campus, approximate travel distance of a vehicle/day inside campus (in kilometers) and number of working days per year is taken into consideration. The recorded value of carbon footprint due to car usage per year is 0.584 metric tons. The Carbon footprint due to Motorcycle's usage per year is 5.11 metric tons where the calculation adopted for cars are applicable here again. The overall

results indicated that total carbon emission at the St. Ann's College for Women per year is 696.39 metric tons which is the sum of the carbon emission from electricity plus transportation (bus, car, motorcycle) per year.

Calculation of Carbon Footprint Per Year at the St. Ann's College for Women

The method of carbon footprint calculation adopted from www.carbonfootprint.com for deriving Carbon emission due to electricity usage and transportation (shuttle bus services, Car and Motorcycles).

a. Electricity usage per year

The CO_2 emission from electricity

= 690.7 tons

Notes:

Electricity usage per year = 690.7 tons

0.84 is the coefficient to convert kWh to metric tons.

b. Transportation per year (Shuttle)

CO_2 emission due to shuttle bus transportation

= (Number of shuttle bus in the campus x total trips for shuttle bus service each day x approximate travel distance of a vehicle each day inside campus only (in kilometers) x 365/100) x 0.01

= [(0x 2 x 1 x 365)/100)] x 0.01

= 1.314 metric tons

Notes:

365 is the number of working days per year

0.01 is the coefficient to calculate the emission in metric tons per 100 km for bus

c. Transportation per year (Car)

CO_2 emission due to car usage

= (Number of cars entering the campus x 2 x approximate travel distance of a vehicle each day inside campus only (in kilometers) x 365/100) x 0.02

= [(4 x 2 x 1 x 365)/100)] x 0.02

= 0.584 metric tons

Notes:

365 is the number of working days per year

0.02 is the coefficient to calculate the emission in metric tons per 100 km car

d. Transportation per year (Motorcycles)

CO_2 emission due to motorcycles

= (Number of motorcycles entering the campus x 2 x approximate travel distance of a vehicle each day inside campus only (in kilometres) x 365/100) x 0.01

= [(70 x 2 x 1 x 365)/100)] x 0.01

=5.11 metric tons

Notes:

365 is the number of working days per year

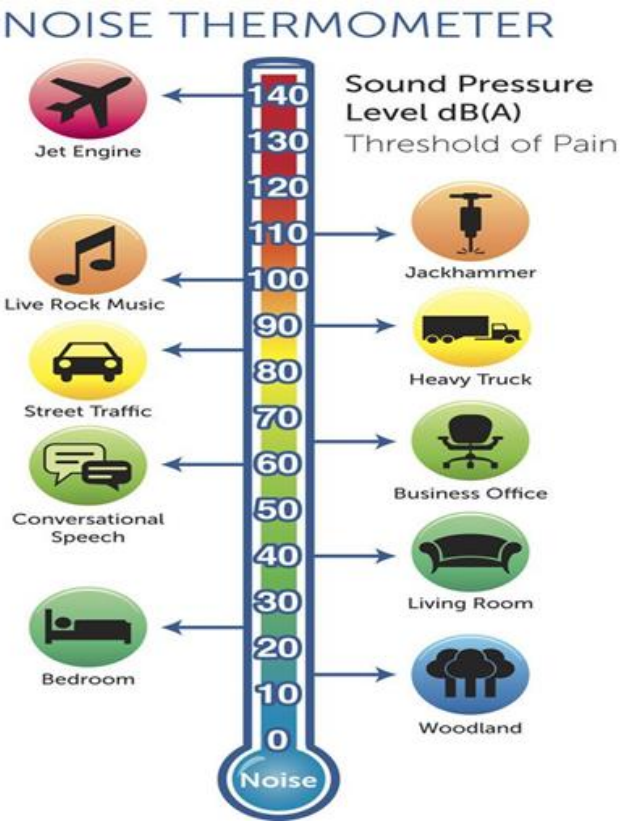
0.01 is the coefficient to calculate the emission in metric tons per 100 km for motorcycles

e. Total Carbon emission per year

= total emission from electricity usage + transportation (bus, car, motorcycle)
= 690.7 + (0 +0.584 + 5.11)
= 696.39 metric tons

22.14. Noise level Measurements, Analysis and Interpretation

Noise is all unwanted sound or set of sounds that causes annoyance or can have a health impact and noise level is measured in decibels (dB). Noise pollution is defined as consistent exposure to elevated sound levels that may cause adverse effects in humans or other living organisms. World Health Organization (WHO) defined environmental noise (sound produced by transport, industrial activities, construction sites, public works and services, cultural, sporting and leisure activities and neighbourhood) as noise from all sources with the exception of workplace noise and recognizes that noise pollution is an increasing problem. Prolonged exposure to loud noises (75 dB (A) over eight hours a day for years) can lead to hearing loss. The body can also respond to lower noise levels. Level of noise are expected to be within 55 dB in residential areas, including institutions. Classroom noise levels are supposed to be around 50 dB. From the graph above, it is evident that most of the noise level values across campus are above the normal permissible range. Near the chapel however noise levels are within range and lowest at 55.4 dB. This is because minimum people are present near the chapel. Sound levels in other areas of campus are largely due to the interactions of people on campus than any other causes like construction or traffic. Sound Level Meter / Noise Thermometer are used to measure the noise level in the surroundings which converts the sound signal to an equivalent electrical signal and the resulting sound pressure level in decibels (dB) referenced to 20 μPa.



Level of noise in various locations and working places

Table 8. Noise level at the St. Ann's College for Women

S.No	Locations	Measurements (dB)	Major Noise Sources	Remarks
1.	Common Room	54	Celling and exhaust fans	No Noise Pollution
2.	Reception Room	60	Noise from people around	No Noise Pollution
3.	Library hall	49	Students and staff members	No Noise Pollution
4.	Conference hall	55	Speakers	No Noise Pollution
5.	Class Rooms	55	Students	No Noise Pollution
6.	Staff Rooms	50	Staff members	No Noise Pollution

Table 9. Noise Level Standard Prescribed by Central Pollution Control Board, India Government

Area Code	Zone	Limits in dB (A) Leq	
		Day Time	Night Time
A	Industrial	75	70
B	Commercial	65	55
C	Residential	55	45
D	Silence	50	40

22.15. Auditing for Water Management at the St. Ann's College for Women

Water is a natural resource which is an essential element for all life organisms. It has been reported that on earth only 3% is of fresh water and two-thirds of the same is locked up as ice caps and glaciers. Of Out of remaining one percent, a fifth is available at remote areas and much seasonal rainfall and floods cannot easily be used. At present only about 0.08 percent of all the world's fresh water is exploited by mankind (in terms of sanitation, drinking, manufacturing, leisure and agriculture). Water management (management of water resources under set policies and regulations) is important since it helps determine future irrigation expectations. Once water is an abundant natural resource and becoming a more valuable commodity due to droughts and over exploitation. While freely available in many natural environments, in human settlements potable (drinkable) water is less readily available. At this juncture, it is time to use water wisely to ensure that drinkable water is available to all, at present and in the future.

22.15.1. Water Management Activities

In order to conserve water resources, it is essential that any environmentally responsible institution should examine its water use practices. Water auditing is conducted for the appraisal of facilities of raw water intake and determining the facilities for water treatment and reuse. Auditor concerned investigates the relevant method that

can be adopted and implemented to balance the demand and supply of water. St. Ann's College for Women is taking enough attempt to manage wastewater that are coming out from various Department laboratories and canteens. In general, water management activities are very important in terms of conserving water and its resources for future generations which in turn useful to reduce the land contamination.

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22.15.2. Role of Higher Education Institutions in Water Conservation

- Build unanimity on the need for water conservation within the campus (with students, administration, faculty and other internal stakeholders).
- Initiate unanimous water conservation measures in collaboration with nearby village residents, local administration/"Grama sabha" and internal/external stakeholder institutions (schools, self-help groups, health centres, and village panchayats).
- Facilitate strategic measures to become self-sufficient in water requirement and efficient water usage by adoption of suitable standards and accepted parameters.
- Facilitate specific methods for making the village as water sufficient and water efficient by following best available standards and accepted parameters
- Periodical monitoring of existing water management system in the campus with participation and transparency
- Generate case studies on best water conservation practices adopted in the campus and in the villages. This can serve as models for other institutions and villages to adopt.
- The team that would be involved in all aspects of water management (exploring, surveying, fact-finding, recording, planning, taking action and monitoring) will also include all relevant stakeholders' viz., citizens, student teams, their teachers, village leaders apart from administrative officials concerned in both campuses and villages.
- A couple of environmentally-concerned-inclined faculty members or village community leaders may be given the responsibility to lead the water conservation movement in the respective realms.
- Water Conservation Initiative can be a successful only if the Head of the Institution ignites the spirit of everybody in the organization. She/he needs to direct the departments, pay attention to the findings of student teams and ensure that their valuable suggestions are followed in letter and spirit by all students, faculty members as well as administrative, non-teaching and support staff.
- A motivated leader can bring a sea-change in the system and therefore she/he is the cornerstone of this campaign. An advisory committee may be constituted to guide the initiative on water conservation.

22.15.3. Physical Appearance and Overall Ambience on Water Conservation

Water Conservation

Water Conservation strategies broadly rely on a) adequacy of water, b) elaborate plumbing facilities with adequate, suitable water taps and sanitary fixtures, c) establishing water use efficient toilets with two levels of flushing facilities, d) well organised water usage, e) dedicated staff for water management including inspection, f) periodic service/repairs/corrective measure of leaks in taps and pipes, g) improved sanitization for cleanliness, h) use of carbonated water, i) planting and maintenance of indigenous variety of plants and less water consuming plants, and j) organising water conservation workshops to the faculty and students and conducting awareness programme on water conservation for the benefit of public.

Water Conservation Activities - Sprinkler Irrigation in St. Ann's College for Women Campus, Hyderabad, Telangana.

Renovation of Traditional and other Water Bodies/Tanks

Renovation of Tanks and water bodies include a) groundwater recharge and maintenance of water balance, b) reuse and recharge structures and preservation of existing water bodies, c) watershed development and biomass management and finally d) adopting land and water management protocol.

Rainwater Harvesting

Rainwater harvesting programme concerned with a) installation of rain gauge rain recording system a) equipment, b) establishment of implements for rainwater harvesting within the campus, c) creating rainwater harvesting pits inside the campus and d) creating awareness on rainwater harvesting among the stakeholders and public through workshops and seminars.

Rainwater Harvesting Unit in St. Ann's College for Women Campus, Hyderabad, Telangana.

Leakages

Leakage accounts a largest share of wastage of available water resource as well as unauthorized water use. Each source meter required to be tested for its accuracy, either by reviewing available meter test results or retesting the meter. System valves mandatorily reviewed periodically to detect malfunction. For instance, altitude control valves on storage tanks might be damaged or installed improperly, allowing the tank to overflow. These valves need periodic inspection, more so when there is observed leakage or overflow. Pressure relief valves set too low might cause spill when pressures reach the high range. These pressure relief valves need to be calibrated accordingly. When leakage problems are discovered during routine inspections, possible water losses need to be estimated and corrective action can be taken up immediately.

Other Interventions

Other interferences are given attention on priority basis that include i) technological and sociological interventions, ii) planning, preparing and reporting mechanisms, iii) appropriate display, publicity and sharing of knowledge, iv) treating personnel/concerned staff with respect and considering their welfare, v) adhering to reporting mechanisms and vi) more importantly, monitoring and taking corrective measures with respect to water management by enthusiastic designated staff.

22.15.4. Water Quantity Estimation

The quantity of water required for municipal uses for which the water supply scheme has to be designed which requires data on a) Water consumption rate (Per Capita Demand in litres per day per head) and b) Population to be served.

Quantity = Per capita demand x Human population

22.15.5. Water Consumption Rate

Since several variables are influenced water consumption by various stakeholders of an organization, it is hard enough to precisely assess the water quantity demanded by the public. Water required by various set-ups, which a city may have, is listed hereunder:

Table 10. Water consumption for various purposes at the St. Ann's College for Women

S.No	Types of Consumption	Normal Range (lit/capita/day)	Average	Percentage
1.	Domestic Consumption at Canteen	100	55	-
2.	Industrial and Commercial Demand at Laboratories	-	-	-
3.	Public Uses including Fire Demand, Transport washes	20	-	-
4.	Losses and Waste as routine consumption	5	1	-
5.	Daily use (Day-to-day use)	10	5	-

22.15.6. Estimation of Water requirements for drinking and domestic use

(Source: National Building Code 2016 BIS)

As a general rule the following rates per capita per day may be considered for domestic and non-domestic needs. For Communities with population 20,000 to 1,00,000 together with flushing the per capita per day rates may be considered for domestic and non-domestic needs ranges from 100 to 135 lphd.

Table 11. Water requirements calculation

S.No	Educational Institutions water requirements	Domestic use (lphd)	Flushing (lphd)	Total use (lphd)
1.	Without Boarding Facility	155	220	375
2.	With Boarding Facility	-	-	-

22.15.7. Fire Fighting Demand

The per capita fire protection demand is very less on an average basis but the quantum of water is required is very huge. The rate of fire demand is sometimes treated as a function of population and is worked out from following empirical formulae:

Table 12. Per capita fire demand calculation

S.No	Authority	Formulae (P in thousand)	Q for 1 lakh Population)
1.	American Insurance Association	Q (L/min)=4637 $\sqrt{P}$ (1-0.01 $\sqrt{P}$))	6578.5

2.	Kuchling's Formula: per capita fire demand	Q (L/min)=3182 √P	4611.1
3.	Freeman's Formula: per capita fire demand	Q (L/min)= 1136.5(P/5+10)	11842.3
4.	Ministry of Urban Development Manual Formula	Q (kilo liters/d)=100 √P for P>50000	144.9

22.15.8. Factors affecting per capita demand of water consumption

As stated earlier, so many factors affecting the precise calculation of per capita demand of water consumption which include, a) Size of the city: Per capita demand for big cities are generally huge when compared to that of smaller towns where big cities have skewered houses. b) Existence of number of industries. c) Prevailing environmental conditions. d) Habits of people and their economic status. e) Quality of water plays an important role in water consumption rate. If water is aesthetically and medically safe, the consumption will increase as people will not resort to private wells, etc. f) Pressure in the distribution system. g) Efficiency of water works administration: Leaks in water mains and services; and unauthorized use of water can be kept to a minimum by surveys. h) Cost of water and i) Policy of metering and charging method: Water tax is charged in two different ways: on the basis of meter reading and on the basis of certain fixed monthly rate.

22.15.9. Fluctuations in Rate of Demand/consumption of water

- Average Daily per Capita Demand = Quantity Required in 12 Months/ (365 x Population); If this average demand is supplied at all the times, it will not be sufficient to meet the fluctuations.
- Seasonal variation: The demand peaks during summer. Firebreak outs are generally more in summer, increasing demand.
- Daily variation in water demand depends on human activities. People draw out more water on Sundays and Festival days, thus increasing demand on these days.
- Hourly variations in water demand is widely varied. During active household working hours i.e. from six to ten in the morning and four to eight in the evening, the bulk of the daily requirement is taken. During other hours the requirement is negligible.
- Adequate quantity of water must be available to meet the peak demand. To resolve all the fluctuation issues, the supply pipes, service reservoirs and distribution pipes must be properly proportioned. The water is supplied by pumping directly and the pumps and distribution system must be designed to meet the peak demand. Effect of monthly variation impacts the design of storage reservoirs and hourly variations influences the design of pumps and service reservoirs. It may be noted that as the population decreases, the fluctuation rate increases.

Maximum daily demand = 1.8 x average daily demand

Maximum hourly demand of maximum day i.e. Peak demand

= 1.5 x average hourly demand

= 1.5 x Maximum daily demand/24

= 1.5 x (1.8 x average daily demand)/24

= 2.7 x average daily demand/24
= 2.7 x annual average hourly demand

22.16. Auditing for Waste Management

Waste management reduces the effect of waste in the environment and improves the ecological conditions, so on. Auditing for waste management can helps in reuse/recycle resources, such as; paper, cans, glass, and so on. Pollution from waste is aesthetically unpleasing and results in large amounts of litter in the ecosystem which can cause health problems. The most important reason for audit for waste management is simply relies on environment protection and human health. Various type of waste management practices, from collection to disposal of solid, liquid, gaseous, or hazardous substances were illustrated in this report earlier (Section 22.2.). Particularly, information on waste management practices (Section, 22.2.1), biodegradable and non-biodegradable waste materials management (Section, 22.2.2.), disposal of e-waste (Section, 22.2.3.) and management of hazardous waste (Section, 22.2.5.) were detailed elaborately. It is needless to say production of waste to be minimised to ensure the sustainable environment of any organisation. In this connection, auditor diagnoses the prevailing was management/collection to disposal policies and suggests the possible ways to combat the issues related with waste management for adoption.

22.17. Biomedical Waste

The Ministry of Environment, Forest and Climate Change, Government of India has issued the Bio-Medical Waste Management Rules, 2016. As per the rules, bio-medical waste represents any waste materials which is generated during diagnosis, treatment or immunization of human beings or animals besides research activities pertaining to the production or testing of biological or in health camps. The biomedical waste generator and the operator of the common bio-medical waste treatment and disposal facility (CBMWTF) shall be responsible for safe handling and disposal of the same. The State Government of Health shall ensure for implementation of the rule in all health care facilities. SPCB shall issue authorization to the health care facilities and CBMWTF. It shall monitor the compliance of various provisions of the rules. Central Pollution Control Board has so far authorized 25426 Private and Government hospitals in the State under the rules. Hospitals have made agreement with the CBMWTF for the collection, transport, treatment and scientific disposal of the biomedical waste. The CBMWTF consists of autoclave, shredder, incinerator and secured land fill facilities.

22.18. Climatic condition

Prevailing climatic conditions of the campus revealed that it experiences warm conditions almost most part of the year. Rise in day temperature starts after March and attains the peak during May where temperature maximum ranges between of 35 and 42˚C with a daily record of 41˚C. Mean minimum temperature ranges between 12 and 22°C. Mehdipatnam district experienced the annual rainfall ranging between 500 and 630 cm for the last two decades. Since the district located on the mountain pass, it experiences south west monsoon from June to August. South west monsoon is irregular as the masses of clouds are intercepted only very little rains in September. After a warm, humid break in September, regular monsoon starts from October to;; early November. Out of total rainfall, 25% received during south west monsoon, 49% between October and November and remaining 21% during September.

Table 13. Soil edaphic and Environmental conditions of the St. Ann's College for Women

S.No	Details of Parameters	Data collected
Soil Edaphic parameters		
1.	Soil pH	5.5 to 7.5
2.	Soil type	Red Sandy soil
3.	Total Organic carbon	0.7 mg/kg
4.	Electrical conductivity	0.15 ds/m
5.	Water holding capacity	10..2 %
6.	Total Nitrogen	0.53 mg/kg
7.	Available Phosphorous	0.97 mg/kg
8.	Exchangeable Potassium	3.25 mg/kg
9.	Available Mg and Mn contents	11.3% & 0.007 %
10.	Available Zn and Fe contents	0.39 mg/kg& 3.61 mg/kg
Environmental parameters		
1.	Minimum Temperature	66°F
2.	Maximum Temperature	93°F
3.	Minimum Relative humidity	12 %
4.	Maximum Relative humidity	40%
5.	Annual Average Rainfall	1.55 cm
6.	Annual Average Sunshine	8 hr/day
7.	Wind speed	8.5 km/h

22.19. Safety measures and Green building conservation code

Environmental safety measures are very important in college buildings as far as students, staff members and other stakeholders are concerned and it requires vigilance and awareness. Colleges and Universities work to foster safe environments; however, students honestly share equal responsibility. College/university Management should extend by issuing noble guidance and the best safety tools. The organization should have a police force, escort services, call boxes, first aid box, fire extinguishers, fire alarms, security systems and staffs towards the safety measures. St. Ann's College for Women has very good safety measures as per the green building conservation code such as fire extinguisher and fire bell and alarms in all the places. In addition, in all the places, 'Exit', 'Entry' and other sign boards kept across the places to give cent percent safety to the stakeholders.

Safety measures in St. Ann's College for Women Campus

Sign Boards and Health Care Activities in St. Ann's College for Women Campus.

Laboratories Safety Measures in St. Ann's College for Women Campus

22.20. Implementing Swachh Bharath Abhiyan Scheme under Clean India Mission

Swachh Bharath Abhiyan under Clean India Mission is the new initiative and a step towards sanitation, solid waste management and cleanliness to promote cleanliness across India. It is the country-wide campaign applied on a large scale in India for both the rural and urban places, producing needs for the bathrooms and providing hygienic atmosphere amongst the population by household member's was the main purpose of this. This scheme is implemented by the Educational Institutions covering Universities, Colleges and Schools, Government Departments, Companies and Public sectors across the country to give a safe pollution free environment, eliminate the open defecation, improve solid waste management and sanitation and refining drinking water quality to the stakeholders. The initiative is easily attainable by the support of Government employees, management representatives, staff members and students.

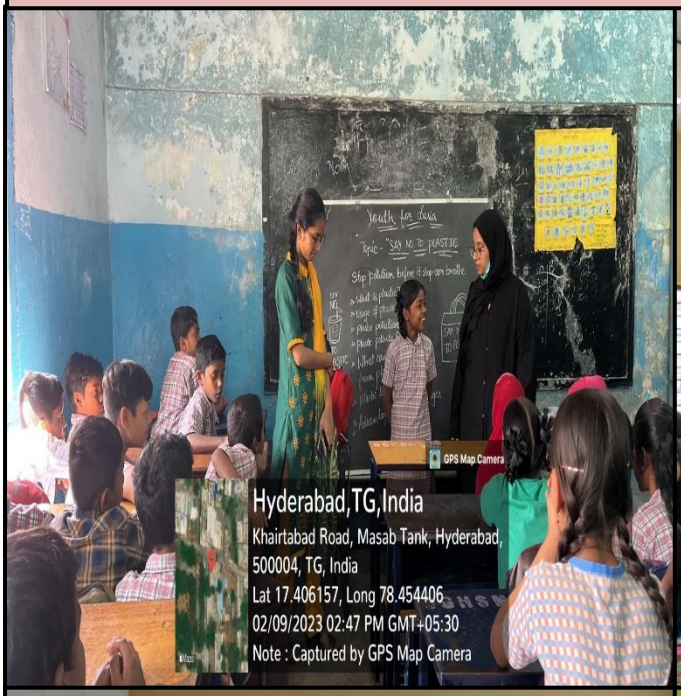
The students of College conduct more awareness programmes on cleanliness, ill-effects of use of plastics, solid waste management and sanitation and importance of environment to the rural people across Ranga Reddy, Nizamabad and Medak Districts through NSS and College Students Force units. The students collected and disposed of the wastes in the trash by using eco-friendly covers. They created awareness among the rural and urban people to keep the surroundings clean and hygiene. A sizable number of programmes and rallies are conducted periodically during the celebration of various events such as 'Independence Day', 'Republic Day', 'World Environmental Day' and 'Biodiversity Conservation Day' events. 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) otherwise known as St. Ann's College for Women NSS (National Service Scheme) units. 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. College Campus has well NSS, Swatch Bharath Abhiyan under Clean India Mission. These bodies are actively involved in tree planting programmes and cleaning the surrounding areas of tribal, rural and urban people across Tamilnadu.

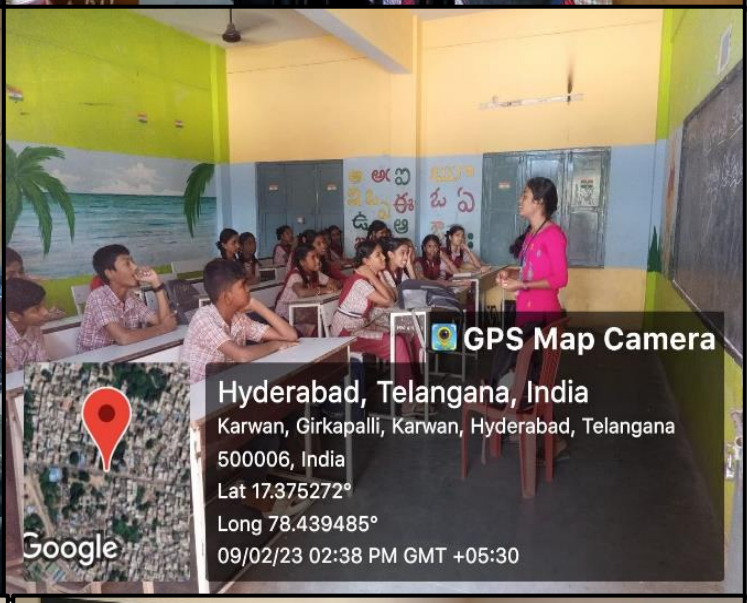
The Campus is conducting a large number of activities to conserve the nature and to teach about the importance of environment to rural, tribal and urban people. Awareness programmes on the green campus initiatives and dissemination of green motto and pledges are accounted in a sustainable manner. Its 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 College has taken sufficient attempts to disseminate the green campus motto and green pledge as well as awareness programmes such as ‘Don’t cut trees’, ‘Don’t use plastic bags’, ‘Don’t waste waters’, ‘Plastic Free Zones’ and ‘Preserve the Natural Resources’ and etc. among the students and staff members in the campus. St. Ann’s College for Women is implemented the Government schemes (Swatch Bharath Abhiyan under Clean India Mission) to provide pure and safe water to and teach the importance of cleanliness of toilets and restrooms to rural people living in nearby hills. These activities are very important in view of the immediate vicinity to undertake all developmental activities and conduct Participatory rural appraisal programmes which is associated with socioeconomic status of the inhabitants living nearby hills, natural resources, traditional knowledge systems, cropping patterns, etc. The College is also converging interest on the progressive development of women, youth, children and in particular, “dalits” and to identify the extension and training needs of the target group through the Department of Women Studies and Career Guidance. The College provides the vocational training on (goat farming, mushroom cultivation, vermicomposting, bee keeping, ornamental fisheries, organic farming and medicinal plant cultivation) to marginal farmers in order to overcome seasonal employment the problem. The Campus helps to cultivate social commitment and to expose the students to get exposure to the social realities and to build a relation between student community and the other communities which in turn facilitate social interaction, inter-personal communication skills and develop emotional maturity of students. The College also supports the students to improve their personality. On the whole, the Institution accelerates the activity of preparing the students to face emerging tasks by developing qualities such as cooperation, team spirit, leadership, discipline and development of creative talents including to boost their self-confidence.

Students of Eco club participated in “My Earth, My Responsibility”
Plantation at Neknampur lake near Taramati Baradri.
Around 3000 saplings were planted as part of
Haritha haram at Khajaguda lake.

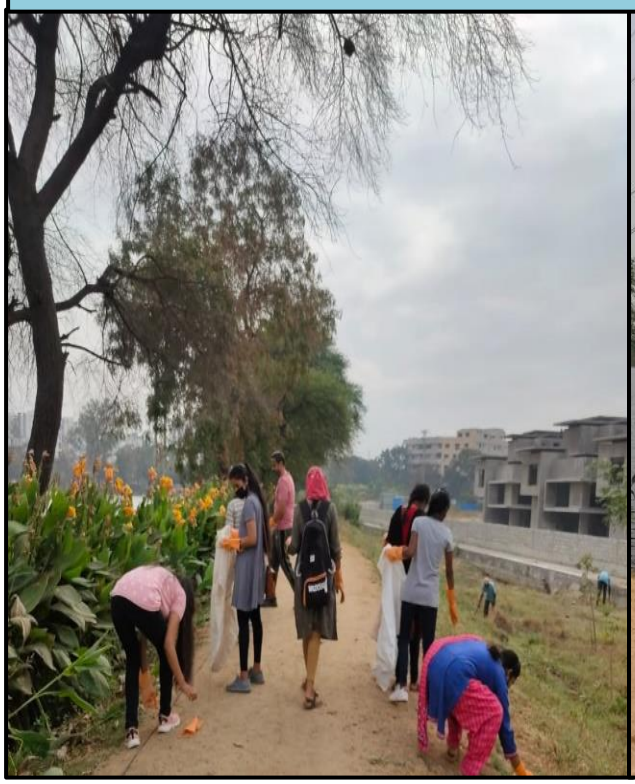
Centre for Women's Studies organizes session at 7 govt school on Swachh Bharat (Clean India campaign), Say No to Plastci and Pollution Control





Functioning of Eco club Activities of St. Ann's College For Women, Hyderabad, Telangana

Lake Cleaning Drive –Neknampur by St. Ann's College For Women Students, Hyderabad, Telangana



23. Best Practices on Environment Audit Initiatives followed in the Organization

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

2. It is observed that the Organization is created massive facilities for solid waste management, E- Waste Management Activities in a proper way.

3. The dust bins and ecofriendly 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.

4. There is a Reverse Osmosis (RO) water unit to produce RO water which is periodically tested for the physico-chemical properties and all water parameters with water quality analysis meter designed by St. Ann's College for Women Campus

5. 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.

6. 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.

7. Swachh Bharath Abhiyan under Clean India Mission is implemented effectively towards sanitation, solid waste management and refining drinking water quality to promote cleanliness to rural and tribal people across the Mehdipatnam District.

8. In addition to Natural Ventilation and Exhaust fans are made available in all buildings to replace 'stale' air with 'fresh' air which helps to create favourable micro climate during the occupied periods.

9. The carbon footprint with respect to the concentration of CO_2 in the atmosphere is found to be low which did not exceeds the critical limit of CO_2 coinciding with pure air circulation without any contaminants in the campus.

10. NSS activities at St. Ann's College for Women conducted Medical Camp, Drug Abuse Campaign, 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.

24. Recommendations for sustainable environment

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

- 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.
- Policy on paper usage may be initiated with certain guidelines to reduce the number of papers that are being used by the students for assignments, mini-projects and final year projects which in turn to reduce 60% usage of paper as a commitment to curb the environmental damage.
- The College can operate some battery cars for internal mobility for all stakeholders who wish to use it inside the Campus to minimize the car smokes and exhaust to a greater extend towards to minimize the carbon emission.
- The treated effluent from biogas plant may be diverted to the STP for storage and utilized for irrigation 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.
- The college may encourage the students to use by cycle for maintaining eco-friendly Campus.
- The College can implement wastewater treatment to purify the wastewaters using activated-sludge to manage both solid wastes and wastewaters effectively without harming the environment.

25. Conclusion

St. Ann's College for Women, Hyderabad, Telangana is a well-established College in India in terms of academic activities, efforts are continuously made in providing an eco-friendly atmosphere to the students, research scholars, parents and staff members. The environmental protection initiatives are substantial by means of creating solid waste management, wastewater treatment, sanitation, rainwater harvesting system and natural vegetation in the Campus without harming the environment. College has 'solid waste management and wastewater treatment facility to recycle the solid wastes and wastewaters; respectively. The Campus has some Technology Missions related to Green Campus and Environment sustainability as well. A campus ecosystem is supported a rich biodiversity of flora and fauna which is making a sustainable environment and eco-friendly campus. Swachh Bharath Abhiyan is implemented effectively by the campus to promote sanitation and cleanliness to the rural/tribal people across the Mehdipatnam District, Telangana. Environmental audit is carried out to provide an indication to company management about how the environmental Organization system and equipment's are performing. As a result, the best practicable means can be applied to preserve air, water, soil, plant and animal life from the adverse effect.

To conclude an environment audit report, the St. Ann's College for Women is an eco-friendly campus and providing pure atmosphere to the stakeholders and supports the nation as a whole in future generations. Further, we hope this will boost the new generation to take care of the environment and propagate these views for many generations to come by the Organization.

Wind up Meeting with the Principal and Management Representatives of St. Ann's College for Women, Hyderabad, Telangana with the Audit Team of the Nature Science Foundation

26. Acknowledgement

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27. References

Abba, M., Said, R.M., Abdullah, A. and Mahat, F. 2018. The relationship between environment operational performance and disclosure of Nigerian listed companies. *Journal of Environmental Accounting and Management*, **6** (1): 1-15.

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

Aerts, W., Cormier, D. and Magnan, M., 2008. Corporate environmental disclosure, financial markets and the media: An international perspective. *Ecological Economics* **64** (3): 643-659.

Alba-Hidalgo, D., del Alamo, J.B. and Gutierrez-Perez, J. 2018. Towards a definition of environmental sustainability evaluation in higher education. **In**: *World Higher Education Policy.* Oxford University Press, London, UK, Vol. 31, pp. 447-470.

AOAC, 1990. *Official Methods of Analysis of the Association of Official Analytical Chemists*, Ed, Helrich, K. 15th Edition, AOAC Inc., USA, Vol 1 & 2, pp. 2246-2248.

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

APHA, 2017. *Standard Methods for the Estimation of Wastewaters*. 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.

Astriani, N. 2016. Legal Policy of Water Resources Management by Local Governments: A Review of Right to Water in Indonesia. *Hasanuddin Law Review* **2** (2): 250-257.

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.

Ballou, B., Chen, P.C., Grenier, J.H., and Heitger, D.L. 2018. Corporate social responsibility assurance and reporting quality: Evidence from restatements. *Journal of Accounting and Public Policy,* **37** (2): 167-188.

Bardati, D.R. 2006. The integrative role of the campus environmental audit: experiences at Bishop's University, Canada. *International Journal of Sustainability in Higher Education* **7** (1): 57-68.

Braam, G.J.M., Uit de Weerd, L., Hauck, M., and Huijbregts, M.A.J., 2016. Determinants of corporate environmental reporting: the importance of environmental performance and assurance. *Journal of Cleaner Production* **129**: 724-734.

Breiting, S. and Mogensen, F. 1999. Action competence and environmental education. *Cambridge Journal of Education* **29** (3): 349-353.

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.

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

Carbon footprint calculation. www.carbonfootprint.com.

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.

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.

Conde, M.C. and Sanchez, J.S. 2017. The school curriculum and environmental education: A school environmental audit experience. *International Journal of Environmental & Science Education* **5** (4): 477-494.

Costantino, F., Di-Gravio, G. and Tronci, M. 2018. Environmental Audit improvements in industrial systems through FRAM. *FAC PapersOnLine* **11**: 1155–1161.

Dagiliut, R. and Liobikien, G. 2014. University contributions to environmental sustainability: challenges and opportunities from the Lithuanian case. *Journal of Cleaner Production* **108**: 891-899.

Erol, G.H. and Gezer, K. 2006. Prospective of elementary school teachers attitudes toward environmental problems. *International Journal of Environmental and Science Education*, **1** (1): 65-77.

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.

Ghaffarianhoseini, A., Berardi, U., AlWaer, H., Chang, S., Halawa, E., Ghaffarianhoseini, A. and Clements-Croome, D. 2016. What is an intelligent building? Analysis of recent interpretations from an international perspective. *Architectural Science Review* **59** (5): 338-357.

Ghaffarianhoseini, A., AlWaer, H., Ghaffarianhoseini, A., Clements-Croome, D. Berardi, U., Raahemifar, K. and Tookey, J. 2018. Intelligent or smart cities and buildings: a critical exposition and a way forward. *Intelligent Buildings International*, **10** (2): 122-129.

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.

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.

Haahkim, W. and Yunus, A. 2017. Environmental audit as an Instrument for environnemental protection and management. *The Business and Management Review* **9** (2): 228-232.

Handy, S.L., Boarnet, M.G., Ewing, R. and Killingsworth, R.E. 2002. How the built environment affects physical activity: views from urban planning. *American Journal of Preventive Medicine* **23** (2S): 64–73.

Hertwich, E.G. 2005. Consumption and the rebound effect: An industrial ecology perspective. *Journal of Industrial Ecology*, **9** (1-2): 85-98.

Hoque, A.A. and Sultana, T. 2017. Environmental sustainability practices in South Asian university campuses: an exploratory study on Bangladeshi universities. *Springer Nature*, **19** (6): 2163–2180.

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

Irwansyah. 2017. Research-Based Environmental Law: The Debate Between Ecology Versus Development. *Sriwijaya Law Review* **1** (1): 44-66.

Irwansyah, Wardhani, H. and Ahsan, Y. 2017. Environmental audit for environmental protections and Management. *The Business and Management Review* **9** (2): 228-232.

ISO, 2021. International Organization for Standardization. https://www.iso.org/home.html.com

Kevin, O., Stanton, J., Bilderbeck, M. and Spinetto, J. 2017. Case study of a voluntary aviation safety and environmental accreditation programme. *Safety Science* **96**: 41-51.

Khoufi, N. and Khoufi, W. 2018. An empirical examination of the determinants of audit report delay in France. *Managerial Auditing Journal*, **33** (8/9): 700-714.

Kosajan, V., Chang, M., Xiong, X., Feng, Y. and Wang, S. 2018. The design and application of a Government environmental information disclosure index in China. *Journal of Cleaner Production* **202**: 1192-1201.

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*. Springer, London, UK.

León-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.

Maltby, J. 1995. Environmental audit: theory and practices, *Managerial Auditing Journal*, **10** (8): 15-26. https://doi.org/10.1108/02686909510147372.

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.

Marwa, M., Salhi, B. and Jarboui, A. 2020. Environmental Audit and Environmental Disclosure Quality. *Scientific Annals of Economics and Business* **67** (1): 1-DOI: 10.2478/saeb-2020-0007.

Murdifin, I., Pelu, M.F.A., Perdana, A.A.H., Putra, K., Arumbarkah, A.M., Muslim, M. and Rahmah, A. 2019. Environmental disclosure as corporate social responsibility: Evidence from the biggest nickel mining in Indonesia. *International Journal of Energy Economics and Policy* **9** (1): 115.

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

Ningsih, D.F., Junaid, A. and Mursalim, M. 2020. Point of view research accounting and auditing. *Research Accounting and Auditing* **1** (3): 101-109.

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.

Ounsaneha, W., Chotklang, N., Laosee, O. and Rattanapan, C. 2017. Predictors of behavior intention to develop a green university: A case of an undergraduate university

in Thailand. *International Journal of GEOMATE*. **15** (49): 162-216.

Patten, D.M. 2002. The relationship between environmental performance and environmental disclosure: a research note. Accounting, Organizations and Society, **27** (8): 763-73.

Patriarca, R., Di Gravio, G., Costantino, F., Tronci, M., 2017. The Functional Resonance Analysis Method for a systemic risk based environmental auditing in a sinter plant: A semi-quantitative approach. *Environment Impact Assessment Review* **63**: 72–86.

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

Ponmurugan, P. 2018. *Biotechnology Techniques in Biodiversity Conservation*. New Age International, New Delhi, India.

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.

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

Prasad, M., Mishra, T. and Kalro, A.D. 2017. Environmental disclosure by Indian companies: an empirical study. *Environment, Development and Sustainability* **19** (5): 1999-2022.

Rajalakshmi, S., Sreenivasan, P.V., Vinoth kumar, D., Athulya, K., Yaazhini, J., Kavimalar, S., Gnanamangai, B.M. Robinson, J.P. and Kavitha, G. 2021. Importance of Environment and Green Campus Audits to Educational Institutions. AkiNik Publishing, New Delhi. In Press.

Ramachandra, T.V. and Bachamanda, S. 2007. Environmental audit of Municipal solid waste management. *International Journal Environmental Technology and Management*. 7 (3/4): 369–391.

Ramachandra T.V. and Saira Varghese K. 2003. Exploring possibilities of achieving sustainability in solid waste management. *Indian Journal Environmental Health* **45** (4): 255-264.

Ragazzi, M. and Ghidini, F. 2017. Environmental sustainability of universities: critical analysis of a green ranking. *Energy Procedia*, **119**: 111-120.

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.

Sallis, J.F. 2009. Measuring physical activity environments: a brief history. *American Journal of Preventive Medicine* **36** (4 Suppl.): S86–S92.

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. Thailand, pp. 841-857.

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.

Sharma, D.K. 2020. An Effective Implementation of Environmental Audit (A Case Study of Hindustan Copper Ltd.). *TEST Engineering and Management* **83**: 5370-5379.

Sharp, L. 2002. Green campuses: the road from little victories to systemic transformation. *International Journal of Sustainability in Higher Education* **3** (2): 128-145.

Setyowati, M., Kusumawanto, A. and Prasetya, A. 2017. Study of waste management towards sustainable green campus in Universitas Gadjah Mada. *Journal of Physics: Conference Series*, **1022**: 1547-1553.

Singhania, M. and Gandhi, G. 2015. Social and environmental disclosure index: Perspectives from Indian corporate sector. *Journal of Advances in Management Research*, **12** (2): 192-208.

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.

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.

Thompson, D. 2002. *Tools for Environmental Management*, New Society Publishers, Gabriola Island, BC.

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.

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

Wang, Y., Shi, H., Sun, M., Huisingh, D., Hanssonn, L. and Wang, R. 2013. Moving towards an ecologically sound society? Starting from green universities and environmental higher education. *Journal of Cleaner Production* **61**: 1-5.

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

Woo, J. and Choi, K.S. 2013. Analysis of potential reductions of greenhouse gas emissions on the college campus through the energy saving action programs. *Environmental Engineering Research* **18** (3): 191-197.

York, R. and Rosa, E.A. 2003. Key challenges to ecological modernization theory: Institutional efficacy, case study evidence, units of analysis, and the pace of eco-efficiency. *Organization and Environment* **16** (3): 273-288.

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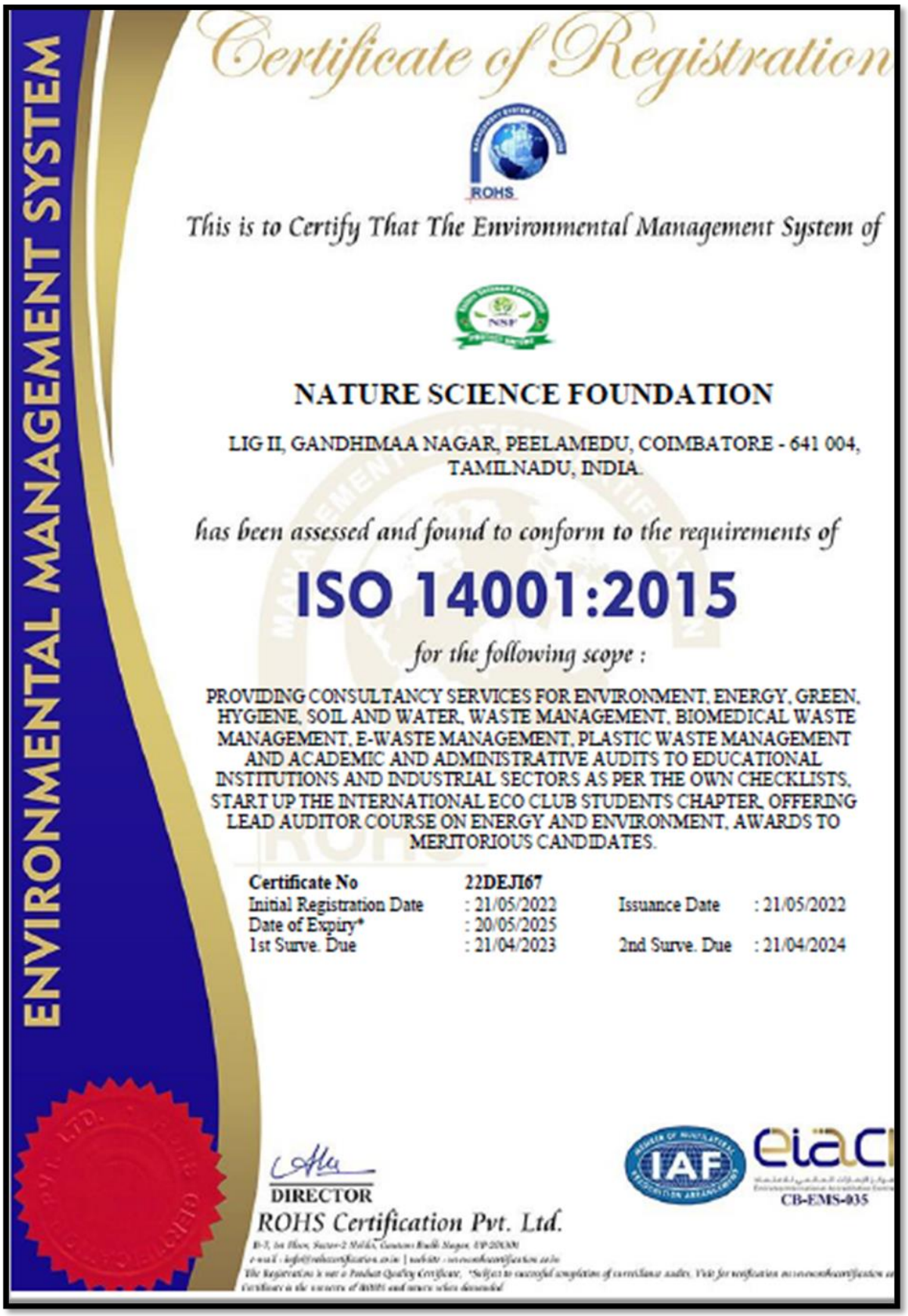

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MAJOR ACTIVITY	SERVICES
SOCIAL CATEGORY OF ENTREPRENEUR	GENERAL

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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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 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 / Rajes E. Ponnuswamy 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

INCOME TAX DEPARTMENT

Certificates of Environment 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, and Er. Ashutosh Kumar Srivastava, Board of Directors (North Zone) of NSF.

5. Bureau of Energy Efficiency (BEE), LEED AP and GRIHA Certificates of Er. D. Dineshkumar, Energy and Environment Auditor of NSF.

6. Tamil Nadu Fire and Rescue Service Certificate of Er. S. Srinivash, 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 TN006

Note: The course conforms to the principles and practice 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

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

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

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			

TAMILNADU FIRE & RESCUE SERVICES

THIRUVALLUR DISTRICT

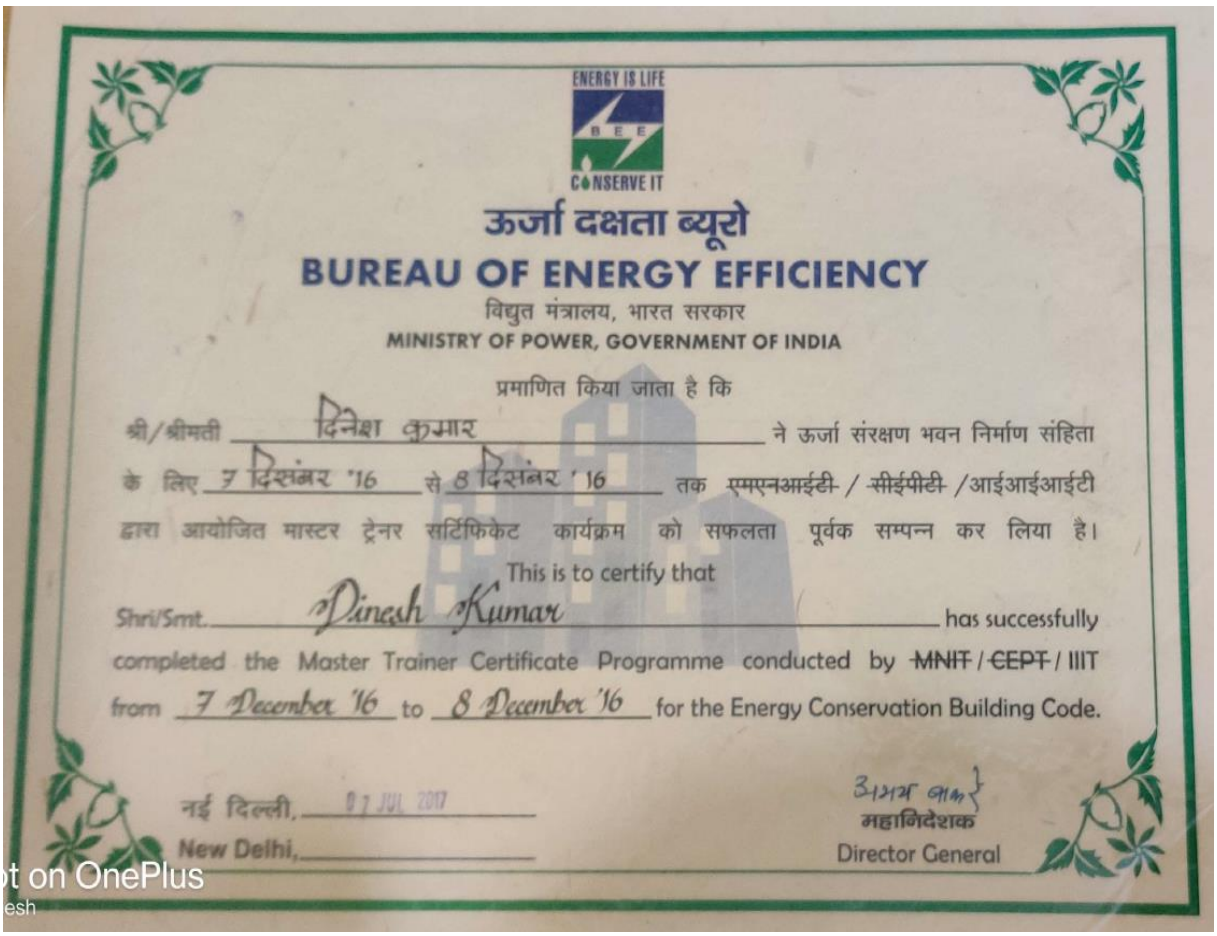
THIRUVALLUR

CERTIFICATE

This is to certify that Mrs. / Mr S. SRINIVASH S/o B. SWAMIYAPPAN 4/855, St. Xavier's Street, Pannur, Thiruvallur District has under gone the "Basic Fire Fighting & Rescue Operation" Training course conducted from 11.08.2016 to 26.08.2016 by Tamil Nadu Fire & Rescue Services Department at Thiruvallur District, Thiruvallur as per G.O.M.S. No.713, dated 17.08.2005 Home (Police XVII) Department, Government of Tamil Nadu.

Station: Thiruvallur.
Date: 20.9.16

District Officer 20.9.16
Fire & Rescue Services
Thiruvallur District
Thiruvallur



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CONSERVE IT

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BUREAU OF ENERGY EFFICIENCY

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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

Regn. No. EA-7391

Certificate No. 5093

National Productivity Council

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

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

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