VINAYAKA MISSION'S
RESEARCH FOUNDATION
(Deemed to be University under section 3 of the UGC Act 1956)

ADVANCING THE 2030 AGENDA

ANNUAL SUSTAINABLE DEVELOPMENT GOALS REPORT

2025

SUSTAINABLE DEVELOPMENT GOALS

17 GOALS ONE SHARED FUTURE


SDG7

SDG 7 Event List

S. No.	Date	Event / Activity	Organising Institution / Department
1	09 December 2025	National Energy Conservation Day – Energy Audit Exercise and Model Competition	Environmental Science Club, in collaboration with the Institution's Innovation Council (IIC)
2	14 March 2025	Green Audit Report	VMKVEC, Salem
3		Solar Panel Power generation Details	All Campuses

DETAILED EVENT REPORTS

1. National Energy Conservation Day – Energy Audit Exercise and Model Competition

Date: 09 December 2025

Organising institution / department: Environmental Science Club, in collaboration with the Institution's Innovation Council (IIC)

Event report: On the occasion of National Energy Conservation Day – 2025, the Environmental Science Club, in collaboration with the Institution's Innovation Council (IIC), organised an Energy Audit Exercise and Model Competition on 09 December 2025, themed "Sustainable Energy and Citizen Participation." Seven teams took part in the Energy Audit Exercise, assessing campus energy usage and presenting their findings, while four teams showcased innovative and sustainable solutions in the Model Competition.



Report No: NSF/PR/7.5 /02 File No: 48

Report of Green, Environment, Energy, Waste Management, Soil &Water, Air Quality and Hygiene Audits



Submitted to

VINAYAKA MISSION'S KIRUPANANDA VARIYAR ENGINEERING COLLEGE, PERIYA SEERAGAPADI, SALEM-636 308, TAMIL NADU, INDIA

Date of Audit: 05.03.2025
Date of Issue: 14.03.2025
Date of Validity:04.03.2027

Regd. No. 114 / 2017

IB 121

Submitted by

NATURE SCIENCE FOUNDATION

[A Unique Research and Development Centre for Society Improvement]
An ISO/IEC 17020:2012 Accredited Type 'A' Inspection Body [Reg. No. IB 121] by NABCB, QCI, Ministry of Commerce and Industry, Government of India
No. 2669, LIG-II, Gandhi Managar, Peelamedu
Coimbatore 641 004, Tamil Nadu, India.
Phone: 0422 4917999, Mobile: 9566777255, 9566777258
Email: director@nsfonline.org.in, Website : www.nsfonline.org.in

Report of Green, Environment, Energy, Waste Management, Soil &Water, Air Quality and Hygiene Audits

Submitted to

VINAYAKA MISSION'S KIRUPANANDA VARIYAR ENGINEERING COLLEGE, PERIYA SEERAGAPADI, SALEM-636 308, TAMIL NADU, INDIA

Cross Reference & Traceability - File No:48

- **Certificate No: NSF/PR/7.4.2. /01**
- **Datasheet No: NSF/PR/F/7.1.7/01 – 07**
- **Non-Conformities Sheet No: NSF/PR/7.8**
- **Report No: NSF/PR/7.5 /02**
- **Checklist No: NS/PR/F/7.1.7**
- **Date of Audit: 05.03.2025**
- **Date of Issue: 14.03.2025**
- **Date of Validity: 04.03.2027**

Regd. No. 114 / 2017

IB 121

Submitted by

NATURE SCIENCE FOUNDATION

[A Unique Research and Development Centre for Society Improvement]
An ISO/IEC 17020:2012 Accredited Type 'A' Inspection Body [Reg. No. IB 121]
by NABCB, QCI, Ministry of Commerce and Industry, Government of India
No. 2669, LIG-II, Gandhi Managar, Peelamedu
Coimbatore 641 004, Tamil Nadu, India.
Phone: 0422 4917999, Mobile: 9566777255, 956677725
Email: director@nsfonline.org.in, Website : www.nsfonline.org.in

NATURE SCIENCE FOUNDATION

(A Unique Research and Development Centre for Society Improvement)
ISO 9001:2015, 14001:2015 & 50001:2018 Certified and ISO/IEC 17020:2012 Accredited
Type 'A' Inspection Body by NABCB [Reg. No. IB 121], QCI, Ministry of Commerce and Industry
Regd. No. 114/2017
No. 2669, LIG-II, Gandhi Managar, Peelamedu, Coimbatore - 641 004, Tamil Nadu, India.
95667 77255, 95667 77258 director@nsfonline.org.in www.nsfonline.org.in

Dr. S. RAJALAKSHMI, M.B.A., Ph.D., FNSF.,
Chairman

Mr. P. KANAGARAJ, FNSF.,
Secretary

Certificate of Declaration

The **Office of Nature Science Foundation**, Coimbatore, Tamil Nadu declare that

1. Nature Science Foundation has conducted onsite green audit at ***Vinayaka Mission's Kirupananda Variyar Engineering College, Periya Seeragapadi, Salem -636 308, Tamil Nadu, India*** by deputing certified Lead Auditors and Technical Experts.
2. On the basis of audit observations by the auditors and pertinent data collected from the Auditee, the Technical Report has been prepared and being submitted.
3. Data presented in the Technical Report are verified and to best of our knowledge, the data are authentic and reliable.
4. Nature Science Foundation declares that data generated were not shared with any third parties and the soft copy of the report is available with Nature Science Foundation's Office.
5. Provided the Auditee desired to publish or share the data with other agencies, Nature Science Foundation has no conflict of interest.
6. We at Nature Science Foundation express our deep sense of gratitude to the Management for given an opportunity to conduct green audit at their premises in compliance with NAAC criteria in line with ISO/IEC 17020:2012 standards and NABCB guidelines and for whole hearted support extended at the time of onsite audit. Our sincere thanks to NAAC, IQAC Coordinators and Head of the Departments of the Organization for their intangible assistance and cooperation extended to the audit team at the time of physical facility verification.
7. Reports and Certificates are valid till 04.03.2027

Date: 14.03.2025
Place: Coimbatore

Authorized Signatory
Nature Science Foundation

Signature of the Director
NSF Audit Processes

National Accreditation Board for Certification Bodies

Accreditation Certificate

NABCB

hereby confirms that

Nature Science Foundation

No. 2669, LIG-II,Gandhi Managar,
Peelamedu, Coimbatore – 641004,
Tamil Nadu, India

complies with

NABCB Accreditation Criteria for Inspection Bodies

(ISO/IEC 17020:2012)
as Type 'A' Inspection Body

to carry out

Inspection

as per accompanying

Schedule I : Scope of Accreditation
Schedule II : Office(s) under Accreditation

Accreditation Certificate No.:		**IB 121**
Date of Initial Accreditation	:	January 10,2024
Validity of Accreditation	:	January 09, 2027

January 10, 2024
Issue Date

(RajeshMaheshwari)
Chief Executive Officer

(Please refer **http://nabcb.qci.org.in** for validity of the certificate or contact NABCB for any related queries)

National Accreditation Board for Certification Bodies

Schedule I

(Scope of Accreditation)

Nature Science Foundation

Type 'A' Inspection Body

IAF Scope / Field of Inspection and Specific Item(s)	Stage and Range of Inspection(s)	Inspection Requirement(s) Standards / Regulations / Methods / Procedures	
		Number identification with year of publication	Title
IAF Scope 28 Buildings and Associated Infrastructure Green Audit	Green audit of educational institutions as per NBC2016 Part 11	NBC 2016 (Part-11) 14-29/2022 dated 26.05.2022	National Building Code Part 11: Approach to Sustainability NAAC Advisory Client Requirements in the form of QAP mentioning required specification and scope mentioned in this scope. However, the applicable National & International Codes and Standards shall be among those which are either referred in the scope statement or shall be equivalent to the standards described above for the relevant scope category

January 10, 2024
Issue Date

(Rajesh Maheshwari)
Chief Executive Officer

(The schedule must be accompanied by the Accreditation Certificate No. **IB 121** valid upto January 09, 2027)

National Accreditation Board for Certification Bodies

Schedule II

(Office(s) under Accreditation)

Nature Science Foundation

Location	Address	Key activities performed
Coimbatore Tamil Nadu (Main Office)	No. 2669, LIG-II, Gandhi Managar, Peelamedu, Coimbatore – 641004, Tamil Nadu, India	Top Management functions, Quality Management System functions, administration & accounts, other key activities. Inspection contract review, Inspection planning & execution, Inspection personnel authorization & assignment, Issue of inspection reports / certificates.

January 10, 2024
Issue Date

(Rajesh Maheshwari)
Chief Executive Officer

(The schedule must be accompanied by the Accreditation Certificate No. **IB 121** valid upto 09 January 2027)

NATURE SCIENCE FOUNDATION

[A Unique Research and Development Centre for Society Improvement]
An ISO/IEC 17020:2012 Accredited Type 'A' Inspection Body [Reg. No. IB 121]
by National Accreditation Board for Certification Bodies (NABCB),
QCI, An Autonomous body under Ministry of Commerce & Industry, India.

Regd. No. 114/2017

Inspection Certificate

This is to certify that Vinayaka Mission's Kirupananda Variyar Engineering College, Periya Seeragapadi, Salem - 636 308, Tamil Nadu, India has implemented ecofriendly sustainability practices in line with National Building Code of India, Part 11 (Approach to Sustainability) which covers the following areas,

1. Green Audit
2. Environment Audit
3. Energy Audit
4. Waste Management Audit
5. Soil and Water Audit
6. Air Quality Audit
7. Hygiene Audit

NABCB
IB 121

ilac-MRA

Date of Inspection: 05.03.2025
Date of Issue: 14.03.2025
Date of Validity: 04.03.2027

Cross Reference & Traceability - File No: 48
Certificate No: NSF/PR/7.4.2 /01
Datasheet No: NSF/PR/F/7.1.7/01 – 07
Non-Conformities Sheet No: NSF/PR/7.8
Report No: NSF/PR/7.5 /02
Checklist No: NS/PR/F/7.1.7

Dr. D. Vinoth Kumar
Director (Audits)

SALAYARAJ RAJALAKSHMI
Digitally signed by SALAYARAJ RAJALAKSHMI
Date: 2025.03.14 14:19:49 +05'30'

Dr. S. Rajalakshmi
Chairman

No. 2669, LIG-II, Gandhi Managar, Peelamedu, Coimbatore - 641 004, Tamil Nadu, India.
Phone: 0422 4917999; Mobile: 95667 77255; 95667 77258
Email: director@nsfonline.org.in, Website: www.nsfonline.org.in

Note: Organization management is responsible for the validated not meeting the requirements during the Inspection Process.

CONTENTS

S.No.	Details of Reports	Page No
1.	General Introduction	9
1.1.	Introduction	9
1.2.	Importance of National Building Code	9
1.3.	Environment Friendly Campus	10
1.4.	About Nature Science Foundation (NSF)	10
1.5.	About the organization	11
1.6.	Audit Team Details	12
1.7.	List of Instruments used in the Inspection Process	14
1.8.	Use of Personal Protective Equipment (PPE)	18
2.	Green Audit	20
2.1.	Introduction	20
2.2.	Importance of green audit	20
2.3.	Green audit observations	20
2.3.1.	Facilities for Human Comforts (NBC checkpoint 3.2. and 3.9.)	21
2.3.2.	Natural topography, vegetation and monitoring (NBC checkpoint 6.2.4.)	21
2.3.3.	Landscape design and soil erosion control (NBC Checkpoint 7.1.1. – 7.1.3.)	22
2.3.4.	Establishment of different gardens, vertical landscaping and roof gardens (NBC Checkpoint 7.1.1. – 7.1.3.)	22
2.3.5.	Survey of Flora and Fauna (NBC Checkpoint 12.4.5. and 12.4.6.)	23
3.	Environment Audit	24
3.1.	Introduction	24
3.2.	Organization Details	25
3.3.	Environment audit observations	25
3.3.1.	Integrated Water Management System (NBC Checkpoint 3.7. and 7.2.1.)	26
3.3.2.	Corporate Governance (NBC Checkpoint 3.10.)	26
3.3.3.	Safety measures and green building conservation code (NBC Checkpoint 3.11.)	26
3.3.4.	Applicability and Implementation (NBC checkpoint 4 and 5)	27
3.3.5.	Parking facilities to reduce Heat Island Effect (NBC checkpoint 7.4.1.)	27
3.3.6.	Public transport, low emitting vehicles and control of car smokes (NBC Checkpoint 7.4.1. – 7.4.7)	27
3.3.7.	Pedestrian path facility at the campus (NBC Checkpoint 7.4.3.)	28
3.3.8.	Carbon footprint	29
3.3.9.	Selection of Building Material (NBC checkpoint 9.1. – 9.3.)	29
3.3.10.	Waste and Water management activities (NBC Checkpoint 10.1.)	29
3.3.11.	Post Occupancy maintenance	29
4.	Energy Audit	31
4.1.	Introduction	31
4.2.	Energy audit observations	31
4.2.1.	Energy Efficient Design and Process (NBC Checkpoint 3.5, 3.6 & 3.8.)	32
4.2.2.	Lighting facilities (NBC Checkpoint 6.2.2 – 6.2.10, 7.1.1.2 and 7.5)	33

4.2.3.	Building Service Optimization (NBC Checkpoint 11)	33
4.2.4.	Energy consumption and cost profile (NBC Checkpoint 12.3.4.)	34
4.2.5.	Power consuming equipment and electrical appliances	35
4.2.6.	Carbon footprint	36
4.2.7.	Calculation of carbon footprint	36
4.2.8.	Noise level measurements (NBC Checkpoint 12.4.4.)	37
4.2.8.1.	Light intensity measurement at the campus	39
4.2.8.2.	Voltage Measurement at the Campus	40
4.2.9.	Operation and Maintenance (NBC Checkpoint 13)	41
5.	Waste Management Audit	42
5.1.	Introduction	42
5.2.	Observations of the waste management audit	42
5.2.1.	Technology Options (NBC Checkpoint 3.3 and 3.4.)	43
5.2.2.	Waste Management Practices (NBC Checkpoint 10.6, 10.7 and 12)	43
6.	Soil and Water Audit	46
6.1.	Introduction	46
6.2.	Soil and Water audit observations	46
6.2.1	Geology, topography and soil condition (NBC Checkpoint 12.4.1)	47
6.2.2.	Assessment of Physico-chemical property of Soil samples	47
6.3.	Water management activities (NBC Checkpoint 7.3, 10.2 – 10.5 and 12.4.2.)	49
6.3.1.	Operational water supply thro' drip and sprinkler systems	49
6.3.2.	Rainwater harvesting system and percolation pond	50
6.3.3.	Water quality	50
6.3.4.	Standards for physico-chemical properties of water	50
6.3.5.	Water consumption rate	51
7.	Air Quality Audit	53
7.1.	Introduction	53
7.2.	Measurement of carbon dioxide level in the campus	53
7.3.	Air quality audit observations (NBC Checkpoint 12.4.3.)	53
7.4.	Atmospheric oxygen level measurements analysis and interpretation	54
8.	Hygiene Audit	56
8.1.	Introduction	56
8.2.	Hygiene audit observations	57
8.2.1.	Observation on Personal Hygiene and Safety measures (NBC Checkpoint 12.3.6 and 12.3.7.)	57
8.2.2.	Napkin disposal facility	58
8.3.	Legal compliances	59
9.	Conclusion	60
10.	References	61

1. GENERAL INTRODUCTION

1.1. Introduction

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

1.2. Importance of National Building Code (NBC)

National Building Code (NBC) of India has a set of rules and guidelines that regulates construction of buildings and as well as ecofriendly activities of the campus without harming the environment. In order to achieve the minimum standards of welfare and safety of stakeholders of a campus, the Governing body of Central and State Governments lays down a set of guidelines to offer sustainable environment. In 1970, the National Building Code (NBC) was first published in India and the significant provisions of the Indian Building Code involve: 1. Structural safety of the building, 2. Earthquake-resistant building design, 3. Fire and life safety, 4. Solid waste management, 5. Accessibility for differently-abled and senior citizens, 6. Use of alternative building techniques and 7. Environmentally compatible building construction techniques like the use of solar power, rainwater harvesting, etc.

NBC is not only offer a standard uniform benchmark that constructors and environmentalists must meet, but they also establish safety standards along with ecofriendly atmosphere of a campus for years to come. As extreme weather conditions and fires are growing rapidly in the country, it becomes vital that buildings and structures be built and designed using the current building codes to allow for maximum safety sustainability and resilience to the stakeholders. For instance, new and updated building codes put much emphasis on conservation as energy and the degradable and non-degradable wastes are the most expensive byproduct of older regions. This will not only offer environmental benefits to future generations but will also regulate indoor air pollution and greenhouse gas emissions to protect the health of human beings.

Before the introduction of NBC in the construction industry, building commercial and residential properties used a lot of energy which adversely affected the sustainable environment. Thus, enforcing building codes to create low-energy buildings offers a tangible way for the company to help decrease the greenhouse gas emissions of the nation. While safety is the primary objective, new building codes are making significant contributions toward solving energy issues relating to the use of environmentally compatible construction techniques like planting trees, landscaping, rainwater harvesting and renewable and non-renewable energy sources.

1.3. Environment Friendly Campus

As stated earlier, Organization is liable to provide an eco-friendly atmosphere along with good quality of drinking water facility to all the stakeholders. Manuring the cultivated plants/grown within the campus may applied with organic manure, cow dung, farmyard manure and vermicompost instead of using chemical fertilizers. All non-compostable and single-use disposable plastic items, plastic utensils, plastic straws and stirrers should be avoided. Demonstration / awareness programme on establishing plastic-free environment and utility of organic alternatives for all incoming and current students, staff and faculty should be organized. Reduction of use of papers alternated with e-services, e-circulars, etc., and proper disposal of wastes, recycling and suitable waste management system should be considered to establish environment friendly campus.

The term 'auditing' is to examine the management practices and to evaluate performance of an organization in relation to environmental issues. World along with Associated Chambers of Commerce and Industry of India (ASSOCHAM), Green Building Council (IGBC) 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 & OccupationalSafety & 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.

Green Audit (ISO/IEC 17020:2012) comprised green campus, environment, energy, waste management (solid, liquid, municipal sewage, biomedical, plastic and electronic wastes), water, soil, air quality and hygienic audits are playing important role in 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 Government Law and Environmental and the concept of Swachh Bharath Abhiyan under Clean India Mission.

1.4. About Nature Science Foundation (NSF)

NSF is the ISO QMS (9001:2015), EMS (14001:2015), OHSMS (45001:2018) & EnMS (50001:2018) and ISO/IEC 17020:2012 Accredited Type 'A' Inspection Body [Reg. No. IB 121] by NABCB, QCI, Ministry of Commerce and Industry, Government of India. NSF is managed by a Board of Trustees which is a Public Charitable Trust registered under the TN Societies registration Act 1975 (TN Act 27 of 1975) on 29th November, 2017 at Peelamedu, Coimbatore 641 004, Tamil Nadu, India with Certificate of Registration No. 114 / 2017. In addition, NSF has 12AA, 80G and Form 10AC certificates for income tax exemption and implanting various Government schemes. The main motto of the NSF is 'Save the Nature to Save the Future' and 'Go Green to Save the Planet'.

1.5. About the Organization

Vinayaka Mission's Kirupananda Variyar Engineering College (VMKVEC)

Established in 1987 with just three branches approved by AICTE, Vinayaka Mission's Kirupananda Variyar Engineering College (VMKVEC) has grown into a premier institution dedicated to shaping the future of aspiring engineers and technologists. Initially affiliated with the University of Madras and Periyar University, and later with Anna University, VMKVEC became a constituent college of Vinayaka Mission's Research Foundation (Deemed to be University) in 2004.

Vinayaka Mission's Research Foundation (Deemed to be University), founded in 2001, was conferred its status by the Ministry of Human Resource Development, Government of India, based on UGC recommendations (under Section 3 of the UGC Act 1956). Accredited with an 'A' grade by NAAC, the university is recognized for maintaining the highest academic standards and providing world-class infrastructure to foster excellence in education.

Currently, VMKVEC offers 10 undergraduate (UG) and 8 postgraduate (PG) programs, along with an MBA in various specializations, catering to over 2,500 students pursuing careers in Engineering, Technology, and Management. Our faculty comprises experienced, dedicated professionals committed to imparting knowledge that bridges the gap between academia and industry.

Accredited by the National Board of Accreditation (NBA) - AICTE from 2009 to 2012.Collaborations with renowned international universities, providing students with global exposure. Strong industry partnerships ensure our students receive hands-on training and real-world learning experiences.

Our institution takes pride in fostering industry-academia collaboration to equip students with cutting-edge skills and make them industry-ready engineers. We have established a state-of-the-art Joint Training Centre in collaboration with Bosch Ltd., Bangalore, offering hands-on training and real-world exposure to emerging technologies. Additionally, we have signed Memorandums of Understanding (MoUs) with leading multinational companies and premier research institutions, including Infosys, Intel Technology India Pvt. Ltd., Bangalore, NIT Trichy, IISc Bangalore, and various renowned research laboratories.

Our faculty and students are actively engaged in innovation through the "Vinayaka Mission's Kirupananda Variyar Engineering College Business Incubator," established in 2015. This incubator plays a vital role in encouraging students to submit their ideas, incubate them, and further develop them into working prototypes, which are then presented to MSME and other financial agencies for funding. Additionally, the incubator facilitates technology transfer, ensuring that innovative solutions reach real-world applications.

The Institution Innovation Council (IIC) has consistently achieved a 4-star rating, recognizing its excellence in fostering student-driven innovations and transforming ideas into impactful technologies.

1.6. Audit Team Details

1.	**Date of Audit**	: **05.03.2025**
2.	**Audit Site**	: **Vinayaka Mission's Kirupananda Variyar Engineering College,** Periya Seeragapadi, Salem-636 308, Tamil Nadu, India
3.	**Inspection Body**	: **Nature Science Foundation** Coimbatore, Tamil Nadu, India.
4.	**Audit Scope**	: **Green, Environment, Energy, Waste Management, Soil & Water, Air Quality and Hygiene Audits as per ISO/IEC 17020:2012**
5.	**Name of the Auditing Chairman**	: **Dr. S. Rajalakshmi** ISO QMS, EMS and EnMS Certified Lead Auditor ISO 17020:2012 (Green Audit), Founder & Chairman of NSF.
6.	**Name of the Auditing Team Leader**	: **Ms. M. Nithya** ISO QMS, EMS and ISO 17020:2012 (Green Audit) Deputy Director (Audits), NSF.
7.	**Name of the Lead Auditor for Green Audit + Environment Audit + Air Quality Audit**	: **Ms. M. Nithya** ISO QMS, EMS and ISO 17020:2012 (Green Audit) Deputy Director (Audits), NSF.
8.	**Name of the Lead Auditor for Soil & Water Audit + Hygiene Audit + Waste Management Audit**	: **Ar. N.M. Pradeep Kumar** ISO QMS, EMS and IGBC Certified Lead Auditor.
9.	**Name of the Lead Auditor for Energy Audit**	: **Er. A. Karthik** Bureau of Energy Efficiency Certified Auditor.
10.	**List of Auditees**	: **1.Dr.R.Sasi Kumar,** Principal **2.Dr.M.Nithya,** Vice Principal **3.Dr.N.Rajan,** Staff Coordinator **4.Dr. Muthumanickam,** Staff Coordinator **5.Dr.R.Devarajan,** Staff Coordinator **6.Mr.A.Mani,** Staff Coordinator **7.Dr.A.R.Sasieekhumar,** Staff Coordinator

1.6.1. Audit Scope and Criteria

Green audits are conducted in line with National Building Code (NBC) Part 11 Approach to Sustainability as per the NAAC and NABCB advisory. NBC part 11 consists of 11 different types of clauses. In this report the eleven clauses of sustainability are differentiated into Green, Environment, Energy, Waste Management, Soil & Water, Air Quality and Hygiene audits.

S.No.	Name of the Audits	NBC covered clauses
1.	Green Audit	3. Approach to Sustainability (3.2 & 3.9), 6. Siting, Form and Design (6.2.4.), 7. External Development and Landscape (7.1.1.), 12. Constructional Practices (12.4.5. & 12.4.6.)
2.	Environment Audit	3. Approach to Sustainability (3.2, 3.7, 3.10 & 3.11), 4. Applicability of this part (4.1 and 4.2), 5. Implementation of this part (5), 6. Siting, Form and Design (6.2.1.), 7. External Development and Landscape (7.1.2, 7.2, 7.3, 7.4.), 9. Materials (9.1, 9.2, 9.3), 10. Water and Waste Management (10.1.), 12. Construction Practices (12.8. and 12.11.)
3.	Energy Audit	3. Approach to Sustainability (3.2, 3.5, 3.6 & 3.8), 6. Siting, Form and Design (6.2.2, 6.2.3, 6.2.5, 6.2.6, 6.2.7, 6.2.8, 6.2.9 & 6.2.10), 7. External Development and Landscape (7.5.), 8. Envelope Optimization (8.1, 8.2. & 8.3), 11. Building service Optimization (11.1 – 11.16), 12. Constructional Practices (12.3.4, 12.4.4 & 12.9.), 13. Commissioning, Operation, Maintenance and Building Performance Tracking (13.1, 13.2, 13.3, 13.4, 13.5 & 13.6.)
4.	Waste Management Audit	3. Approach to Sustainability (3.3 & 3.4), 10. Water and Waste Management (10.6.1. – 10.6.5.), 12. Construction Practices (12.1, 12.2, 12.3, 12.5, 12.7, 12.10.)
5.	Soil & Water Audit	7. External Development and Landscape (7.3.2), 10. Water and Waste Management (10.2. – 10.5.), 12. Construction Practices (12.4.1. and 12.4.2.)
6.	Air Quality Audit	12. Construction Practices (12.4.3.)
7.	Hygiene Audit	12. Construction Practices (12.3.6 & 12.3.7.)

1.6.2. Audit Checklist Observations

The audit checklist in line with National Building Code (NBC) Part 11 – Approach to Sustainability covers 163 checkpoints. During the onsite visit, respective auditors marks not applicable and write the reason for non-applicability and wherever its applicable, auditors verifies the records / practice / documents and physical observation to confirm the same.

There are two parameters such as meeting the requirements and not meeting the requirements. Marking as meeting the requirements for the specific checkpoint reveals that the physical observation and documents are up to the mark. For some checkpoints OFI – Opportunity for Improvements will be given by the auditors. The physical observations and documents which are not up to the mark will be given as not meeting the requirements. The checkpoints under not meeting the requirements are up to the Management of the Organization to develop further.

1.7. List of Instruments used in the Inspection Process

During the on-site visit the below listed instruments are used by the Lead Auditors and Technical experts to check the specific parameters in the view of maintaining sustainability. All the instruments are calibrated by ISO 17025 accredited labs (JRTS Technical Services, Chennai, Tamil Nadu and Instruments Calibration and Test Centre, Coimbatore, TN). The frequency of calibration is six months once or 20 times after its use.

1.7.1. Oxygen Meter



Oxygen meter is used in the audit process to measure the oxygen level in the organization. The instrument is calibrated after using 20 times. Suitability of the instrument are range between 0 to 30% O_2, resolution of 0.1%, accuracy is ± (1% reading + 0.2% O_2), response time is ≤ 15 seconds, environment pressure range is 0.9 to 1.1 atmosphere, temperature range is 0 °C to 50°C, 32°F to 122°F, temperature resolution is 0.1°C, temperature accuracy is 25°C.

1.7.2. Carbon dioxide meter



Carbon dioxide meter is to measure the carbon level in the organization. The instrument is calibrated after using 20 times. Suitability of the instrument are range between 0 ~ 4000 ppm, resolution of CO_2 Meter is 1 ppm, accuracy is ≤ 1,000 ppm, repeatability is ± 20 ppm, temperature range between 0°C to 50°C, 32°F to 122°F, temperature resolution is 0.1°C, temperature accuracy is at 25°C.

1.7.3. Light (LUX) Meter



Light meter is to calculate the light intensity in the organization. Suitability of the instruments are, 5 ranges. ie., 40.00, 400.0, 4,000, 40,000, 400,000 Lux, operating temperature is 0 to 50°C, Operating humidity is less than 80% RH, Power consumption is DC 8 mA approximately. This Instrument will be calibrated yearly once or during non-functioning.

1.7.4. Sound Level Meter



Sound level meter is to measure the noise level in the organization. This instrument is calibrated yearly once or after using 20 times. Suitability of the instruments are measurement range is 30 – 130 dB, resolution is 0.1 dB, accuracy is (23±5 °C), Frequency of the instrument is 31.5 to 8,000 Hz, Operating temperature is 0 to 50 °C (32 to 122 °F), Operating humidity is less than 80% RH, Power consumption is DC 6 mA approximately.

1.7.5. pH Meter



pH meter is generally used to measure the pH level in water. It is calibrated 6 months once or after 20 times of its use. Suitability of the instrument are range of the pH meter is 0 – 14, accuracy is ± 2%, resolution of the instrument is 0.1 pH, operating temperature is 0 to 50 °C (32 to 122 °F).

1.7.6. TDS Meter



TDS meter is generally used to measure the TDS level in water. Suitability of the meter are range of TDS meter is 0 – 9990 ppm (mg/L), operating temperature is 0 to 80 °C (32 to 176 °F) and accuracy is ± 2 %. This meter is calibrated six months once or 20 times after its use.

1.7.7. GPS Meter



GPS meter is subjected to know the latitude and altitude, location, etc., Suitability of the GPS meter are, dimension is 2.1" x 4.0" x 1.3" (5.4 x 10.3 x 3.3 cm), Display resolution is 128 x 160 pixels an GPS Map features included in Continental Europe. It is calibrated six months once or after 20 times of the usage.

1.7.8. Deluxe Water and Soil Analysis Kit



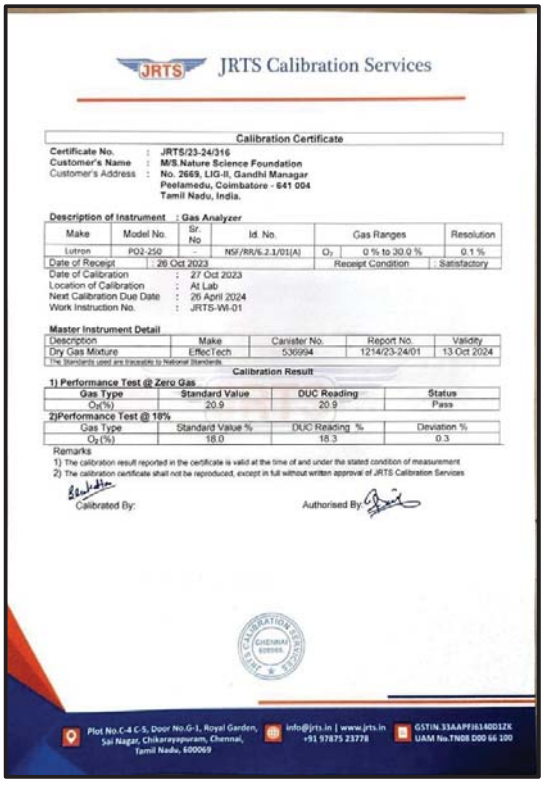
Deluxe water and soil analysis kit is used to analyze the pH, TDS, salinity, turbidity, alkalinity dissolved oxygen of water.

1.7.9. Digital Clamp (Voltage) Meter



It is used to check the input and output voltage between two points of an electrical circuit of Alternating Current (AC) and Direct Current (DC) by means of the high resistance of the voltage that impede the flow of current.

1.7.10. Calibration Certificates of Instruments used for the conduct of audits



JRTS Calibration Services

Calibration Certificate

Certificate No. : JRTS/23-24/316
Customer's Name : M/S.Nature Science Foundation
Customer's Address : No. 2669, LIG-II, Gandhi Managar Peelamedu, Coimbatore - 641 004 Tamil Nadu, India.

Description of Instrument : Gas Analyzer

Make	Model No.	Sr. No	Id. No.	Gas Ranges	Resolution
Lutron	PO2-250	--	NSF/RR/6.2.1/01(A)	O_2 0 % to 30.0 %	0.1 %

Date of Receipt : 26 Oct 2023 Receipt Condition : Satisfactory
Date of Calibration : 27 Oct 2023
Location of Calibration : At Lab
Next Calibration Due Date : 26 April 2024
Work Instruction No. : JRTS-WI-01

Master Instrument Detail

Description	Make	Canister No.	Report No.	Validity
Dry Gas Mixture	EffecTech	536994	1214/23-24/01	13 Oct 2024

The Standards used are traceable to National Standards

Calibration Result

1) Performance Test @ Zero Gas

Gas Type	Standard Value	DUC Reading	Status
O_2(%)	20.9	20.9	Pass

2)Performance Test @ 18%

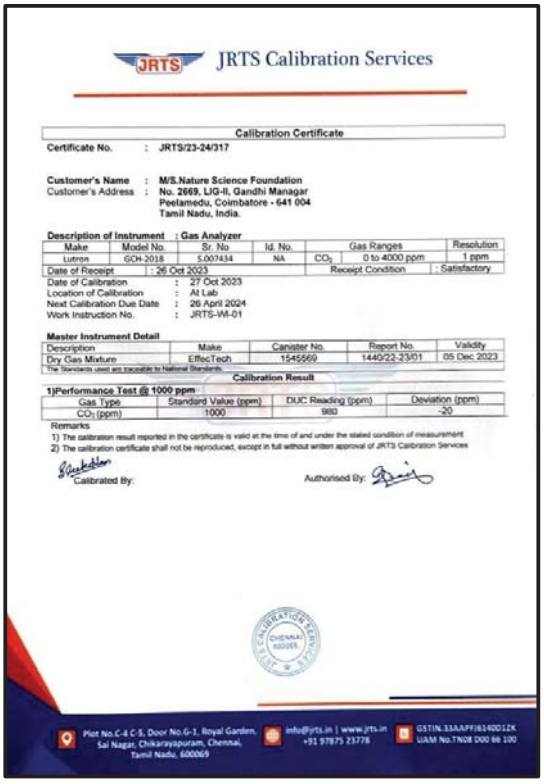
Gas Type	Standard Value %	DUC Reading %	Deviation %
O_2(%)	18.0	18.3	0.3

Remarks
1) The calibration result reported in the certificate is valid at the time of and under the stated condition of measurement
2) The calibration certificate shall not be reproduced, except in full without written approval of JRTS Calibration Services

Calibrated By: Authorised By:

Plot No.C-4 C-5, Door No.G-1, Royal Garden, Sai Nagar, Chikarayapuram, Chennai, Tamil Nadu, 600069 | info@jrts.in | www.jrts.in +91 97875 23778 | GSTIN.33AAPFJ6140D1ZK UAM No.TN08 000 66 100

Calibration Certificate of O_2 Meter



JRTS Calibration Services

Calibration Certificate

Certificate No. : JRTS/23-24/317

Customer's Name : M/S.Nature Science Foundation
Customer's Address : No. 2669, LIG-II, Gandhi Managar Peelamedu, Coimbatore - 641 004 Tamil Nadu, India.

Description of Instrument : Gas Analyzer

Make	Model No.	Sr. No	Id. No.	Gas Ranges	Resolution
Lutron	GCH-2018	5.007434	NA	CO_2 0 to 4000 ppm	1 ppm

Date of Receipt : 26 Oct 2023 Receipt Condition : Satisfactory
Date of Calibration : 27 Oct 2023
Location of Calibration : At Lab
Next Calibration Due Date : 26 April 2024
Work Instruction No. : JRTS-WI-01

Master Instrument Detail

Description	Make	Canister No.	Report No.	Validity
Dry Gas Mixture	EffecTech	1545569	1440/22-23/01	05 Dec 2023

The Standards used are traceable to National Standards

Calibration Result

1)Performance Test @ 1000 ppm

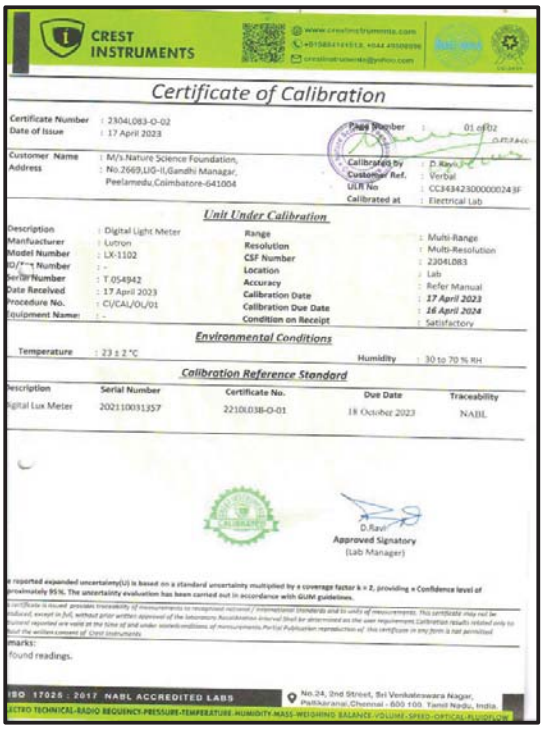
Gas Type	Standard Value (ppm)	DUC Reading (ppm)	Deviation (ppm)
CO_2 (ppm)	1000	980	-20

Remarks
1) The calibration result reported in the certificate is valid at the time of and under the stated condition of measurement
2) The calibration certificate shall not be reproduced, except in full without written approval of JRTS Calibration Services

Calibrated By: Authorised By:

Plot No.C-4 C-5, Door No.G-1, Royal Garden, Sai Nagar, Chikarayapuram, Chennai, Tamil Nadu, 600069 | info@jrts.in | www.jrts.in +91 97875 23778 | GSTIN.33AAPFJ6140D1ZK UAM No.TN08 000 66 100

Calibration Certificate of CO_2 Meter



CREST INSTRUMENTS

Certificate of Calibration

Certificate Number : 2304L083-O-02
Date of Issue : 17 April 2023
Page Number : 01 of 02
Customer Name & Address : M/s.Nature Science Foundation, No.2669,LIG-II,Gandhi Managar, Peelamedu,Coimbatore-641004
Calibrated By : D.Ravi
Customer Ref. : Verbal
ULR No : CC343423000000243F
Calibrated at : Electrical Lab

Unit Under Calibration

Description	: Digital Light Meter	Range	: Multi-Range
Manfuacturer	: Lutron	Resolution	: Multi-Resolution
Model Number	: LX-1102	CSF Number	: 2304L083
ID/ Number	: -	Location	: Lab
Serial Number	: T.054942	Accuracy	: Refer Manual
Date Received	: 17 April 2023	Calibration Date	: 17 April 2023
Procedure No.	: CI/CAL/OL/01	Calibration Due Date	: 16 April 2024
Equipment Name	: -	Condition on Receipt	: Satisfactory

Environmental Conditions

Temperature : 23 ± 2 °C Humidity : 30 to 70 % RH

Calibration Reference Standard

Description	Serial Number	Certificate No.	Due Date	Traceability
Digital Lux Meter	20211003135?	2210L038-O-01	18 October 2023	NABL

D.Ravi
Approved Signatory
(Lab Manager)

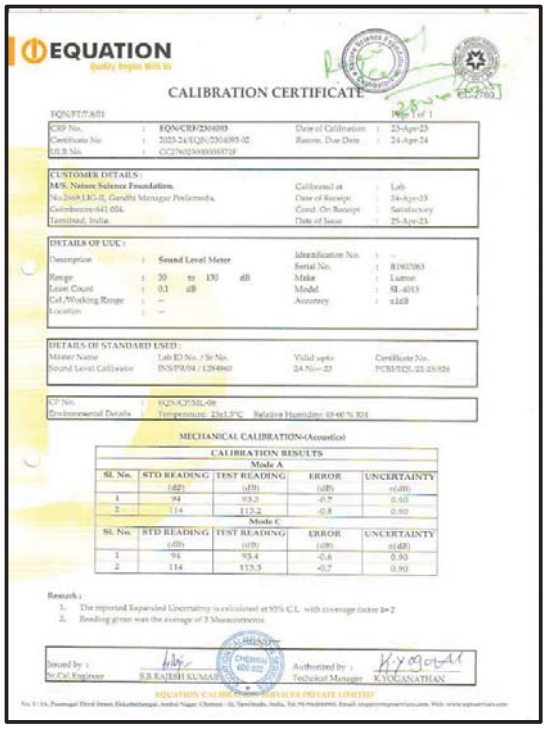
Remarks:
Found readings.

ISO 17025 : 2017 NABL ACCREDITED LABS

No.24, 2nd Street, Sri Venkateswara Nagar, Pallikaranai, Chennai - 600 100. Tamil Nadu, India.

ELECTRO TECHNICAL-RADIO FREQUENCY-PRESSURE-TEMPERATURE-HUMIDITY-MASS-WEIGHING BALANCE-VOLUME-SPEED-OPTICAL-FLUID FLOW

Calibration Certificate of LUX Meter



EQUATION

CALIBRATION CERTIFICATE

CC-2760

CRF No.	: EQN/CRF/2304093	Date of Calibration	: 23-Apr-23
Certificate No	: 2023-24/EQN/2304093-02	Recom. Due Date	: 24-Apr-24
ULR No.	: CC276023000000573F		

CUSTOMER DETAILS :
M/S. Nature Science Foundation, No.2669,LIG-II, Gandhi Managar Peelamedu, Coimbatore-641 004, Tamilnadu, India.
Calibrated at : Lab
Date of Receipt : 24-Apr-23
Cond. On Receipt : Satisfactory
Date of Issue : 25-Apr-23

DETAILS OF UUC :

Description	: Sound Level Meter	Identification No.	: --
Range	: 30 to 130 dB	Serial No.	: B1907063
Least Count	: 0.1 dB	Make	: Lutron
Cal./Working Range	: --	Model	: SL-4013
Location	: --	Accuracy	: ±1dB

DETAILS OF STANDARD USED :

Master Name	Lab ID No. / Sr No.	Valid upto	Certificate No.
Sound Level Calibrator	INS/PR/04 / 1284960	24-Nov-23	TCRI/TCL/22-23/026

CP No. : EQN/CP/SL-09
Environmental Details : Temperature: 23±1.3°C Relative Humidity: 63-66 % RH

MECHANICAL CALIBRATION-(Acoustics)

CALIBRATION RESULTS

Mode A

Sl. No.	STD READING (dB)	TEST READING (dB)	ERROR (dB)	UNCERTAINTY ±(dB)
1	94	93.2	-0.7	0.60
2	114	113.2	-0.8	0.90

Mode C

Sl. No.	STD READING (dB)	TEST READING (dB)	ERROR (dB)	UNCERTAINTY ±(dB)
1	94	93.4	-0.6	0.90
2	114	113.3	-0.7	0.90

Remarks :
1. The reported Expanded Uncertainty is calculated at 95% C.L. with coverage factor k=2
2. Reading given was the average of 3 Measurements

Issued by : Sr.Cal. Engineer B.B.RAJESH KUMAR
Authorised by : Technical Manager K.YOGANATHAN

EQUATION CALIBRATION SERVICES PRIVATE LIMITED

Calibration Certificate of Sound Level Meter



JRTS Calibration Services

Calibration Certificate

Certificate No. : JRTS/23-24/NN-001

Customer's Name : M/s.Nature Science Foundation,
Customer's Address : No.2669,LIG-II,Gandhi Managar,
Peelamedu, Coimbatore-641 004.

Description of Instrument : pH Meter

Make	Model No.	Sr. No. / Id No.	Range	Resolution
HM Digital	PH-80	HTHXD00150	0.0 to 14.0 pH	0.1 pH
Date of Receipt	06 May 2023		Receipt Condition	: Satisfactory

Due Condition : Good
Date of Calibration : 06 May 2023
Location of Calibration : Lab
Next Calibration Due Date : 05 May 2024
Date of Issue : 06 May 2023
Work Instruction No : JRTS-WI-01

Master Instrument Details

Description	Make	Product Code	Lot No.	Validity
4.01 Buffer Solution	Hanna Instruments	HI7004L	8179	Feb 2029
7.01 Buffer Solution	Hanna Instruments	HI7007L	8093	Jan 2026

The Standards used are traceable to National Standards.

Calibration Result

Standard Value	DUC Reading	Deviation
	pH	
4.01	4.1	0.09
7.01	7.1	0.09

Remarks
1. The calibration result reported in the certificate is valid at the time of and under the stated condition of measurement
2. The calibration certificate shall not be reproduced, except in full without written approval of JRTS Technical Services

Calibrated By: Authorised By:

Plot No.C-4 C-5, Door No.G-1, Royal Garden, Sai Nagar, Chikarayapuram, Chennai, Tamil Nadu, 600069 | info@jrts.in | www.jrts.in +91 97875 23778 | GSTIN.33AAPFI6140D1ZK UAM No.TN08 D00 66 100

Calibration Certificate of pH Meter



JRTS Calibration Services

Calibration Certificate

Certificate No. : JRTS/23-24/NN-002

Customer's Name : M/s.Nature Science Foundation,
Customer's Address : No.2669,LIG-II,Gandhi Managar,
Peelamedu, Coimbatore-641 004.

Description of Instrument : TDS Meter

Make	Model No.	Sr. No.	Range	Resolution
HM Digital	TDS-3	NSF-TDS-1	0 to 9990 ppm	1 / 10 ppm
Date of Receipt	06 May 2023		Receipt Condition	: Satisfactory

Due Condition : Good
Date of Calibration : 06 May 2023
Location of Calibration : Lab
Next Calibration Due Date : 05 May 2024
Date of Issue : 06 May 2023
Work Instruction No : JRTS-WI-01

Master Instrument Details

Description	Make	Product Code	Lot No.	Validity
Conductivity Solution	ThermoFisher Scientific	EC442100CBT	221/01	Jun 2025

The Standards used are traceable to National Standards.

Calibration Result

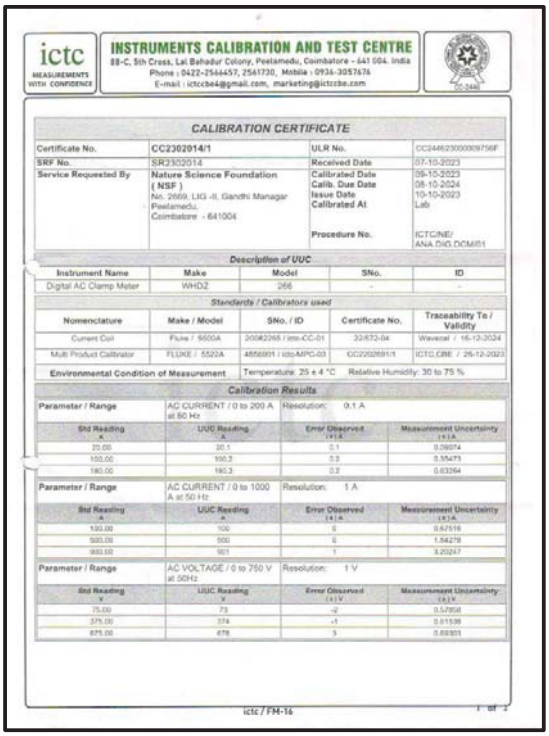
Standard Value	DUC Reading	Deviation
	ppm	
1000	989	11

Remarks
1. The calibration result reported in the certificate is valid at the time of and under the stated condition of measurement
2. The calibration certificate shall not be reproduced, except in full without written approval of JRTS Technical Services

Calibrated By: Authorised By:

Plot No.C-4 C-5, Door No.G-1, Royal Garden, Sai Nagar, Chikarayapuram, Chennai, Tamil Nadu, 600069 | info@jrts.in | www.jrts.in +91 97875 23778 | GSTIN.33AAPFI6140D1ZK UAM No.TN08 D00 66 100

Calibration Certificate of TDS Meter



ictc MEASUREMENTS WITH CONFIDENCE

INSTRUMENTS CALIBRATION AND TEST CENTRE
88-C, 5th Cross, Lal Bahadur Colony, Peelamedu, Coimbatore - 641 004. India
Phone : 0422-2544457, 2541730, Mobile : 0934-3057676
E-mail : ictccbe4@gmail.com, marketing@ictccbe.com

CALIBRATION CERTIFICATE

Certificate No.	CC2302014/1	ULR No.	CC244623000009756F
SRF No.	SR2302014	Received Date	07-10-2023
Service Requested By	Nature Science Foundation (NSF) No. 2669, LIG -II, Gandhi Managar Peelamedu, Coimbatore - 641004	Calibrated Date Calib. Due Date Issue Date Calibrated At	09-10-2023 08-10-2024 10-10-2023 Lab
		Procedure No.	ICTC/NE/ANA.DIG.DCM/01

Description of UUC

Instrument Name	Make	Model	SNo.	ID
Digital AC Clamp Meter	WHDZ	266	-	-

Standards / Calibrators used

Nomenclature	Make / Model	SNo. / ID	Certificate No.	Traceability To / Validity
Current Coil	Fluke / 5500A	20082268 / ete-CC-01	22/872-04	Wavetal / 16-12-2024
Multi Product Calibrator	FLUKE / 5522A	4856001 / ete-MPC-03	CC2202691/1	ICTC,CBE / 26-12-2023
Environmental Condition of Measurement		Temperature: 25 ± 4 °C	Relative Humidity: 30 to 75 %	

Calibration Results

Parameter / Range: AC CURRENT / 0 to 200 A at 50 Hz — Resolution: 0.1 A

Std Reading A	UUC Reading A	Error Observed (±) A	Measurement Uncertainty (±) A
20.00	20.1	0.1	0.09074
100.00	100.3	0.3	0.35473
180.00	180.3	0.3	0.63264

Parameter / Range: AC CURRENT / 0 to 1000 A at 50 Hz — Resolution: 1 A

Std Reading A	UUC Reading A	Error Observed (±) A	Measurement Uncertainty (±) A
100.00	100	0	0.67516
500.00	500	0	1.64278
900.00	901	1	3.20247

Parameter / Range: AC VOLTAGE / 0 to 750 V at 50Hz — Resolution: 1 V

Std Reading V	UUC Reading V	Error Observed (±) V	Measurement Uncertainty (±) V
75.00	73	-2	0.57858
375.00	374	-1	0.61538
675.00	678	3	0.69303

ictc / FM-16 1 of 2

Calibration Certificate of Digital Clamp Meter



GPS Calibration at North Railway Station
Coimbatore - 641012, Tamil Nadu

GPS Calibration at North Railway Station
Coimbatore, Tamil Nadu - 641012

In-service check of GPS Meter

1.8. Use of Personal Protective Equipment (PPE)

Personal Protective Equipment (PPE) refers to protective clothing for the eyes, head, ears, hands, respiratory system, body, and feet. It is utilized to protect individuals from the risks of injury while minimizing exposure to chemical, biological, and physical hazards. PPE serves as the final line of defense when engineering and administrative controls are insufficient in reducing risks. Nature Science Foundation safeguards all the auditors by supplying PPE during the conduct of audits. PPE used are safety jackets, ear plugs, googles, face shield, hand gloves, shoes, etc.,

1.8.1. Safety jackets:



PPE includes safety vests and suits that can be used for inspection process which will protect body injuries from extreme temperatures, flames and sparks, toxic chemicals, insect bites and radiation.

1.8.2. Goggles and Face shield:



Goggles and face shield are used in the inspection process while inspecting items which would cause eye damage or loss of vision, spray or toxic liquids especially in chemistry labs, nearing the electric and electronic item.

1.8.3. Helmet:



PPE includes hard hats and headgears which will be required for tasks that can cause any force or object falling to the head. It also helps to resist penetration.

1.8.4. Hand gloves:



PPE includes safety gloves and should be used for tasks that can cause hand and skin burns, absorption of harmful substances, cuts, fractures or amputations**.** Selection of hand gloves is based on the application of use.

1.8.5. Safety Boots:

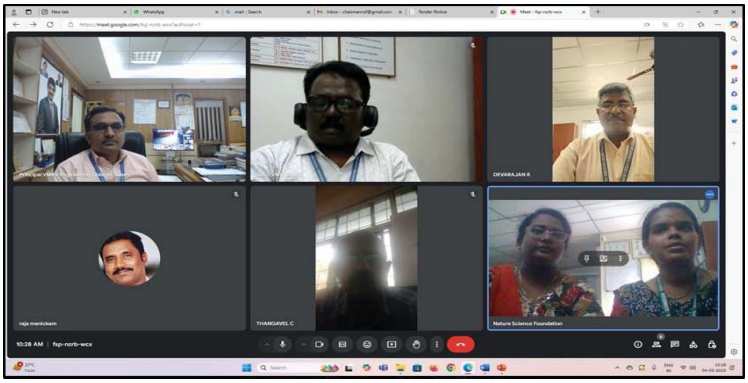


Foot protection is one of the most commonly used PPE and can differ depending upon the environment. Safety boots are used for tasks that can cause serious foot and leg injuries from falling or rolling objects, hot substances, electrical hazards, and slippery surfaces.

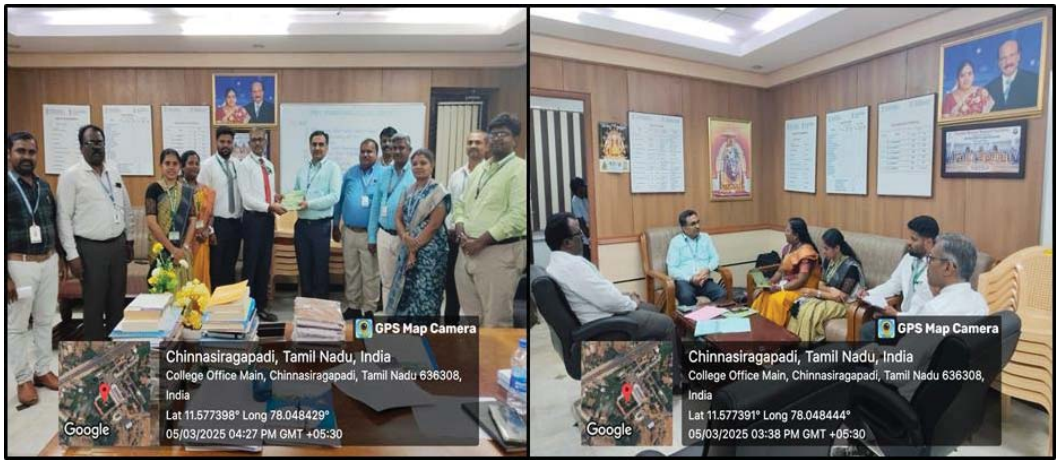
1.8.6. Ear Plug:



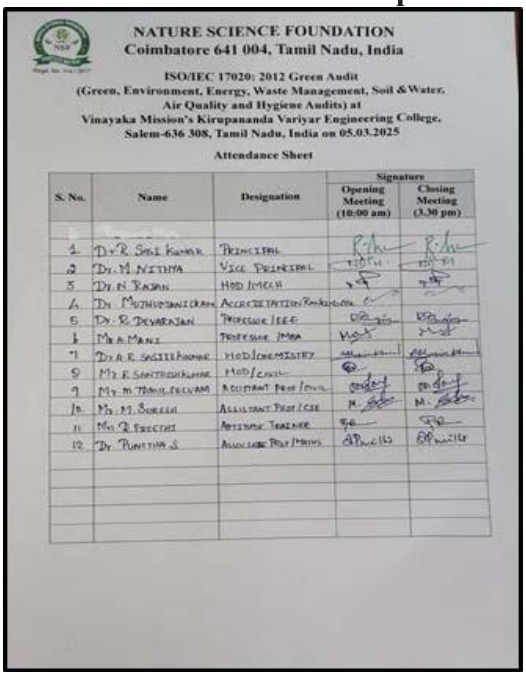
Ear plugs are used for tasks that can cause hearing problems and loss of hearing. Hearing protection devices reduces the noise energy reducing reaching and causing damage to the inner ear. This ear plug is mostly used near sound producing devices like power motors, genets, generators, etc.,



Online meet with the Principal and Coordinator of Vinayaka Mission's Kirupananda Variyar Engineering College to explain the importance and document preparation for Green audit in line with National Building Code Part 11 (Approach to Sustainability)



Opening and closing meetings with the Head of the Organization, NAAC / IQAC Coordinators and NSF Inspection Team



NATURE SCIENCE FOUNDATION
Coimbatore 641 004, Tamil Nadu, India

ISO/IEC 17020: 2012 Green Audit
(Green, Environment, Energy, Waste Management, Soil & Water, Air Quality and Hygiene Audits) at
Vinayaka Mission's Kirupananda Variyar Engineering College, Salem-636 308, Tamil Nadu, India on 05.03.2025

Attendance Sheet

S. No.	Name	Designation	Signature: Opening Meeting (10:00 am)	Signature: Closing Meeting (3.30 pm)
1	Dr.R. Sasi Kumar	Principal		
2	Dr.M.Nithya	Vice Principal		
3	Dr.N.Rajan	HOD/MECH		
4	Dr. Muthuswamy Ram	Accreditation/Ranking		
5	Dr.R.Devarajan	Professor/EEE		
6	Mr.A.Mani	Professor/MBA		
7	Dr.A.R.Sasikumar	HOD/Chemistry		
8	Mr.R.Santhoshkumar	HOD/Civil		
9	Mr.M.Tamilselvan	Assistant Prof/Civil		
10	Mr.M.Suresh	Assistant Prof/CSE		
11	Mrs.R.Preethi	Assistant Librarian		
12	Dr.Punitha.S	Associate Prof/Maths		

Opening and closing meeting attendance sheet

2. GREEN AUDIT

2.1. Introduction

Green audit ensures the Organization's campus should have greenish with large diversity of trees, herbs, shrubs, climbers and lawns to reduce the environmental pollution and soil erosion; it is also useful in relation to biodiversity conservation, landscape management, irrigation/economic water utilization and maintenance of natural topography besides vegetation. For the benefit of stakeholders, solid waste management, recycling of water, disposal of sewage and waste materials (electronic and biomedical wastes), 'zero' use of plastics, single use plastic items, etc. should be followed consistently in the organization campus. Green Audit procedures includes the definition of green audit, methodology on how to conduct green audit at Educational Institutions and Industrial sectors as per the checklist based on National Building Code (NBC) Part 11 - Approach to sustainability and assessment of risk at 360^{o} view.

2.2. Importance of green audit

The Management of the Organization (Auditee) should be exposed their inherent commitment towards making ecofriendly atmosphere through the green auditing and ready to encourage/follow all types of green activities. A clean and healthy environment will enhance an effective teaching/learning process. They shouldcreate the awareness on the importance of greenish initiatives through environmental education among the student members and research scholars. Green audit is the most effective, ecological approach to manage environmental complications (Rajalakshmi *et al*., 2023). Green audit is a kind of professional care and a simple indigenized system about the environment monitoring in terms of planting more number of trees which is a duty of each and every individual who are the part of economical, financial, social and environmental factors. Green audit is a professional and useful measure for an Organization to determine how and where they are retaining the campus eco-friendly manner. It can also be used to implement the alleviation measures at win-win situation for the stakeholders and the planet. It provides an opportunity to the stakeholders for the development of ownership, personal and social responsibility.

2.3. Green audit observations

- It is observed that the Organization has wheelchair, Ramp walk facilities for disabled and different age group people. Lift facility is under process.
- Monitoring plan is available for the periodic checking at proper time interval to maintain sustainability.
- Adequate training and awareness programmes are conducted to the Stakeholders for sustainable development at all stages of building life cycle.
- More than 30% of open space is maintained as soft scapes (vegetation) to lower the energy conservation in the campus.
- Land scape design are planned to maintain the natural capacity of the site.
- Vegetation are available around the building to reduce energy consumption and maintain indoor climates.
- Soil health is maintained well without using any chemical fertilizers.
- Ecological design / conserving biodiversity such as Transplantation, climate

and design in accordance with bio diversity, reduced pesticides and other activities are applicable because new construction is planned and raised.

- Herbal garden are available in the campus to maintain sustainability.
- Plant and animal species are monitored by conducting the periodic survey in the Organization.
- Traffic survey is conducted to measure the number and type of vehicles passing on the existing main roads giving access to the campus.
- Garden need to be strengthen with Name Boards for Plants.
- Irrigation system strengthening is essential for sustainable development.

2.3.1. Facilities for Human Comforts (NBC checkpoint 3.2. and 3.9.)

As per the National Building Code part 11 (Approach to Sustainability) under elements of sustainability quality of plumbing services and buildings are maintained in line with the standard. Wheel chair and ramp walk facilities are implemented for the benefit of disabled and different age group people. As no blind persons are observed in the campus divyang (blind) reading software, signages are not available. Water management, waste management, operation and maintenance plan are not followed to maintain sustainability as per the standard.



Wheel Chair observed for the comfort of person with disability.

2.3.2. Natural topography, vegetation and monitoring (NBC checkpoint 6.2.4.)

Natural topography means the original geographical features and natural resources of the Site. It is observed that the organization has the natural features like rocks, water resources, slopes, landscape, pathways, etc. Vegetation is the cultivation of a bunch of plants irrespective of the plant *taxa* for the covering of the area or ground topography. The observation at the campus indicated that there are more than 40% natural topography and vegetation. Monitoring plan for maintaining the vegetation and sustainability are evident through separate operation and maintenance team & their records for regular watering as per the micro climatic condition through irrigation.



Natural Topography and Vegetation at the Campus

2.3.3. Landscape design and soil erosion control (NBC Checkpoint 7.1.1. – 7.1.3.)

Landscape design is an important feature for any disasters to control especially with respect to the soil erosion. In general, soil erosion occurs if the design of the land is not altered so as to prevent the slope features by strong vegetation and use of a plant buffer zone as safe for escape of nutrients or fertilizers entering the streams. Observation revealed that the audited site has very good landscape design without disturbing the natural vegetation. Contour ploughing is being done at right angles to the slope wherever possible and ridges and furrows are properly maintained to break the flow of water down to the empty land. These activities are widely adopted to control soil erosion in the campus. Microclimatic conditions are considered, during winter season irrigation and watering to plants are controlled as per the water management plan. External landscapes are designed based on the shading pattern of the building. Green vegetation are available around the building to reduce the energy consumption.

2.3.4. Establishment of different gardens, vertical landscaping and roof gardens (NBC Checkpoint 7.1.1. – 7.1.3.)

It is observed that Organization has implemented and maintaining gardens to lower the energy consumption. To maintain certain biomass critical for human health and also to reduce the bio-retention through water flow rates different types of gardens like Herbal & Medicinal Garden is implemented in the campus.



Herbal & Medicinal Garden observed in the Campus

2.3.5. Survey of Flora and Fauna (NBC Checkpoint 12.4.5. and 12.4.6.)

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

3. ENVIRONMENT AUDIT

3.1. Introduction

Environmental (Eco) audit is quantitative and qualitative data to track air, soil and water and to gain actionable insights to improve the operational performance in the atmosphere. It provides a 360˚ view of a surrounding campus and makes it easy for Owners / Managers / Environmentalists to collaborate, measure, control and reduce environmental negative impacts. Finally, it leads to enhance the quality of life of all living organisms. Eco audit initiatives are the need of the hour across the world due to changing environmental conditions and global warming besides ever-increasing human population and anthropogenic activities (NCP, 2016). Eco audit aims to make a sustainable and friendly environment for the stakeholders. 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 (Gnanamangai *et al*., 2021).

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 Rules and Regulations laid by Government, the environmental legislations should be followed by all the Institutions and Organizations and make sure that their activities should not degrade the environment. The environmental 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. In general, environmental audit is planned to achieve an optimum resource utilization 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. 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.

Purpose of the audit is to determine performance of the environmental management systems and equipmentrelated to environmental safety. Audit reports can provide key information to the management in relation to risk areas, progress towards strategic objectives and targets. 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 the quality of environment.

An environmental auditor will study an organization's performance towards the environmental sustainability in a systematic manner where environmental management systems and equipment are performing with the aims of a) facilitating management control of environmental practices, b) assessing compliance with company policies, c) facilitating professional competence, d) sustenance activities without harming the environment and e) practicing the environmental conservation.

3.2. Organization Details

Table 1. Campus details

S.No.	Details / Descriptions	Quantity
1.	Total strength of Students	2097
2.	Total strength of Employees	301
3.	Total number of Buses in the campus	04
4.	Number of Cars entering in the campus	102
5.	Number of Motorcycles entering in the campus	100
6.	Number of other vehicles (Lorry, Ambulance, Jeep, Trucks, Cranes, Poclain, and etc. entering in the campus)	80
7.	Number of E-Vehicles	05
8.	Number of RO Water Plants	01
9.	Number of Borewells	05
10.	Number of Open wells	01
11.	Number of Water reservoirs	01
12.	Number of Wastewater treatment facility	01
13.	Number of Rain harvesting system	06
14.	Number of Composting pits and Vermicompost units	02

3.3. Environment audit observations

- The construction is proposed based on the applicable climatic zone and geological conditions.
- Human comforts are implemented and observed like wheel chair, fire safety, etc.,
- To reduce the demand of water, rain water harvesting system is implemented.
- Training and awareness programmes records are available to maintain sustainability.
- Fire extinguishers are available in the building to consider the safety of all the Stakeholders.
- AMC for fire extinguishers are not available.
- It is observed that the mock drills and awareness programmes are conducted for disaster management but need more training programmes for safety measures.
- Parking is provided under the tree shade to reduce the Heat Island effect (Temperature).
- Use of potable and non-potable waters are identified and differentiated to conserve water.
- Public transport facilities are available in the campus to control air pollution.
- E-vehicle are available in the campus.
- Zebra crossing may be implemented in the campus.
- Sign boards regarding eco-friendly campus need to be initiated.
- Biogas Plant, Sewage treatment plant and Vermicomposting units are not available in the campus.

3.3.1. Integrated Water Management System (NBC Checkpoint 3.7. and 7.2.1.)

Water is one of the major source of living. Per captia water consumption in the building is calculated as per the water management plan (litres / person/ day). To reduce the demand of water consumption rain water harvesting unit is implemented and practiced.

3.3.2. Corporate Governance (NBC Checkpoint 3.10.)

Training and awareness programmes are conducted to the stake holders to maintain sustainability. Some of the programmes conducted by the Organization are child safety awareness program and Medical camp.



Awareness programmes organized by the Campus

3.3.3. Safety measures and green building conservation code (NBC Checkpoint 3.11.)

Environmental safety measures are very important in the buildings as far as students, staff members and other stakeholders are concerned and it requires vigilance and awareness. Management should extend by issuing guidance and the best safety tools. The organization has have a police force, escort services, call boxes, first aid box, fire extinguishers, fire alarms, security systems and staffs towards the safety measures. Organization has very good safety measures as per the green building conservation code such as fire extinguisher and fire bell and alarms in all the place. In addition, in all the place, ‘Exit’, ‘Entry’ and other sign boards kept across the place to give safety to the stakeholder. Regular mock drill and awareness programmes are conducted at regular intervals considering the safety of stake holders. Disaster management plan and emergency preparedness are not available as the safety of the stakeholders.



Fire extinguisher , Fire Hose Reels and first aid kit observed inside the campus

3.3.4. Applicability and Implementation (NBC checkpoint 4 and 5)

Guidelines of Architect, Designer and Civil contractor for the existing building addresses the choice of material, design methodology, operation and maintenance related options, etc., and also addresses the applicability of National Building Code.



Guidelines of Architect, Designer and Civil contractor for the existing building available in the campus

3.3.5. Parking facilities to reduce Heat Island Effect (NBC checkpoint 7.4.1.)

Heat island effect denotes the temperature level. It is observed that the vehicles are parked under the Tree shade to reduce the heat island effect for the benefit of stakeholders and to maintain sustainability. To reduce the heat island effect parking areas are made up of high albedo materials with light coloured paints observed in the organization.



Vehicles parked under the tree shades to reduce the carbon emission

3.3.6. Public transport, low emitting vehicles and control of car smokes (NBC Checkpoint 7.4.1. – 7.4.7)

The audited Organization is provided E- Vehicles to maintain eco-friendly environment in the campus and to reduce carbon dioxide emissions. Apart from the e-vehicles, students are encouraged to use bicycles. The tree species are planted abundantly to provide shade to the pedestrian.



E-Vehicles observed inside the campus

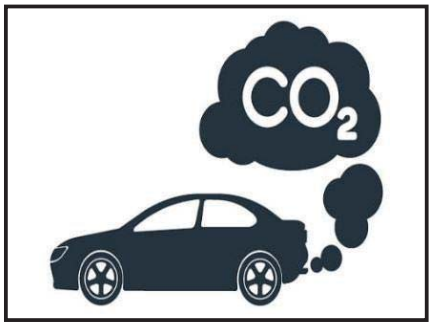
3.3.7. Pedestrian path facility at the campus (NBC Checkpoint 7.4.3.)

The concept of pedestrian path is to give safe space to walk freely by the pedestrian. It is very important in the green campus in terms of freely walk pedestrians or people going on foot without any obstacles. The pedestrian path is otherwise called as zebra crossing by the combination of black and white stripes remained to characterize the zebra. In addition, pedestrian path is created in the green campus along with road side which meant for walking only using special cement bricks and stones. The pedestrian path aims to end circulation not only cars, buses, vans, trucks and other vehicles but also giving safe space to the pedestrians, where cross and pass through blocks and also forcing vehicles to comply with it. The audited organization is having very good facility in creating pedestrian path for stakeholders with all the facilities such as accessible public toilets, barrier free environment, dustbins, stone benches, etc. Use of bicycles are encouraged in the Campus to control carbon emission and air pollution.



Stone benches available in the campus

3.3.8. Carbon footprint



Carbon footprint means measuring/recording the greenhouse gases (GHG) emissions of an organization within its defined boundary. Observations on carbon dioxide and oxygen levels monitored in different parts of the campus are presented under Air Quality Audit section while observation on carbon footprint due to electricity usage per year at the Organization along with other fossil fuel utility are presented under Energy Audit portion of this Technical Report.

3.3.9. Selection of Building Material (NBC checkpoint 9.1. – 9.3.)

Building materials are selected as per the Guidelines to Architect, Designer and Civil contractors. Low carbon emitting cements, bricks, etc., are used for the construction and recycled glass materials are used for windows. Construction material are not stored in the campus. Existing building service life plan is not available and all are as per the National Building Code.

3.3.10. Waste and Water management activities (NBC Checkpoint 10.1.)

Management of water and waste are the two important parameters which plays a vital role to maintain sustainability. Rainwater harvesting is implemented and not maintained properly for water conservation. It is observed that colored dustbins are used in the Organization to segregate the waste at the source of generation.



Waste management activities in the Campus

3.3.11. Post Occupancy maintenance

Post occupancy maintenance is the activities performed after the completion of construction work and handed over to the owner for further maintenance. The following activities are observed during the onsite visit as post occupancy maintenance

- Vegetation and plants are maintained properly with regular watering.
- Soil is maintained well without adding any chemical fertilizers and pesticides.

- Rainwater harvesting is available to meet the demand of water consumption.
- To reduce the energy consumption HVAC system are maintained properly.
- Considering the safety of the stakeholders ambulance, health care room facilities are available.



Ambulance and Health care room observed in the campus

4. ENERGY AUDIT

4.1. Introduction

An energy audit is a survey in which the study of energy flows for the purpose of conservation is examined at an organization. It refers to a technique or system that seeks to reduce the amount of energy used in the Organization without impacting the output. The audit includes suggestions of alternative means and methods for achieving energy savings to a greater extend. Conventionally, electrical energy is generated by means of fossil fuels, hydraulic and wind energy. The availability of fossil fuels and their depletion rate, insist the need for alternate energy systems and conservation of conventional electricenergy. In general, the primary objective of an energy auditing and management of energy consumption is to offer goods or services at the lowest possible cost and with the least amount of environmental impact.

Energy Conservation Building Code (ECBC) is established in the year 2017, which provides minimum requirements for the energy-efficient design and construction of buildings across India. It also provides two additional sets of incremental requirements for buildings to achieve enhanced levels of energy efficiency that go beyond the minimum requirements. Bureau of Energy Efficiency (BEE) came into force in 2002 towards implementation of energy saving practices in an organization. Energy-efficiency labels are information affixed to manufactured products and usually communicate the product energy performance.

BEE Star Rating Scheme is based on actual performance of the building as well as equipment in terms of specific energy usage termed as 'Energy Performance Indicator' by means of star ratings labelled items used which will be useful for energy savings in a sustainable manner (Mishra and Patel, 2016). Energy audit programme provide aid in maintaining a focus on energy price variations, energy supply availability and efficiency, determining an appropriate energy mix, identifying energy-saving technology, retrofitting for energy-saving equipment and so on (Gnanamangai *et al*., 2021). In general, an energy audit process dealt with the driving energy conservation concepts into reality by giving technically possible solutions within a specified time limit while considering the economic and other organizational issues. It also dealt with the uncover ways to cut operating expenses or reduce energy use per unit of production interms of savings. It serves as a "benchmark" for managing energy in the organization for planning more energy-efficient use across the board.

4.2. Energy audit observations

During onsite audit following departments were verified for physical facility availability.

- Adequate awareness programmes are organized and conducted to the stakeholders for the proper handling and maintenance of the appliances.
- Adequate external and vertical shading are provided to conserve energy.
- Natural ventilation through windows and shading is available adequately to reduce the energy consumption.
- It is observed that large foliage trees are planted inside the campus to reduce noise pollution.

- Low emitting lights are fixed as per the LPD mentioned in National Building Code (NBC) Part -11(Approach to Sustainability) for safety and comfort.
- External and internal signage lifts are differentiated to conserve energy.
- 'Danger' and 'warning boards' are available near generator and UPS.
- Building Integrated Photovoltaic system like power storage system, backup power supplies, wiring and safety disconnects are available.
- Adequate HVAC and day lighting facilities are observed.
- Outside air is introduced through windows for ventilation in the conditioned spaces.
- The sub metering system need to be install in more places of campus.
- Three star rated appliances (AC, Air cooler, Refrigerator, etc.,) are procured to conserve energy.
- The fluorescent (tube) lights are replaced with LED lights to conserve energy is under progress.
- Awareness posters like 'Turn off when not in use', 'Save Energy', etc., to be place to promote awareness for conserving energy in the campus.
- Sensors need to be implement to conserve energy.
- Operation and maintenance manual are observed in the on-site.
- No emissions and leaks are observed
- Instruments and equipment are properly calibrated and maintained.
- Noise level observed in the different location resulted in normal range.
- Adequate training and awareness programmes are conducted to the stakeholders for energy conservation.
- To optimize the energy campus has implemented solar panel, operation and maintenance, etc.
- Standard Operating Procedure for electrical instruments are not available in the campus.

4.2.1. Energy Efficient Design and Process (NBC Checkpoint 3.5, 3.6 & 3.8.)

In the campus, it is observed that for lighting, cooling and ventilation renewable sources of energy like solar panel, water heater, etc., are used. Local resources are made available in post occupant stage as per the operation and maintenance plan. Standard Operating Procedures for UPS, AC are available to conserve energy and to avoid damages.



Solar panel observed in the campus

4.2.2. Lighting facilities (NBC Checkpoint 6.2.2 – 6.2.10, 7.1.1.2 and 7.5)

External shading facilities are made based on the sun path to reduce the energy consumption. Day light integration is implemented in the building by placing adequate number of windows. Electrical lighting facilities during day time increases the energy consumption, it is observed that sufficient day lighting facilities are available through windows which in turn reduce the energy consumption bill of the Organization. Artificial lighting facilities are regularly monitored and maintained. In some areas sensor lights are implemented to save energy. External and internal signage lifts are made up of recycled material with maximum light intensity. In the buildings windows head are higher to penetrate day light.



Natural Lighting facilities observed during day time

4.2.3. Building Service Optimization (NBC Checkpoint 11)

To save energy in the buildings there should be a proper plan for HVAC system. In the organization it is observed that adequate natural ventilation is implemented and practices. In some places exhaust fans are used for ventilation especially in the canteen and laboratories. To reduce the heat inside the building shading patterns are maintained by planting trees in and around the campus. Solar panels are implemented at the roof top to reduce the heat and to save energy. Air conditioning are provided at specific areas. Energy conservation plays an vital role in maintaining the sustainability. It is observed that the Organization has replaced all the tube light with CFL / LED lamps, has proper metering and submetering facilities, availability of BEE star rated appliances in Air cooler, lift, AC, generator, etc., Solar water heater and panels are implemented to conserve energy. Instruments and meters are properly maintained and calibrated at regular intervals or annual maintenance plan is observed as one of the energy saving opportunity. Adequate energy saving awareness programmes are conducted to the stakeholders. Emissions and leaks are monitored through operation and maintenance manual.



Energy conservation facilities observed in the Campus

4.2.4. Energy consumption and cost profile (NBC Checkpoint 12.3.4.)

The following chart shows the profile of energy consumed and the cost for one year by the auditee (Figures 1 & 2; Table 2).

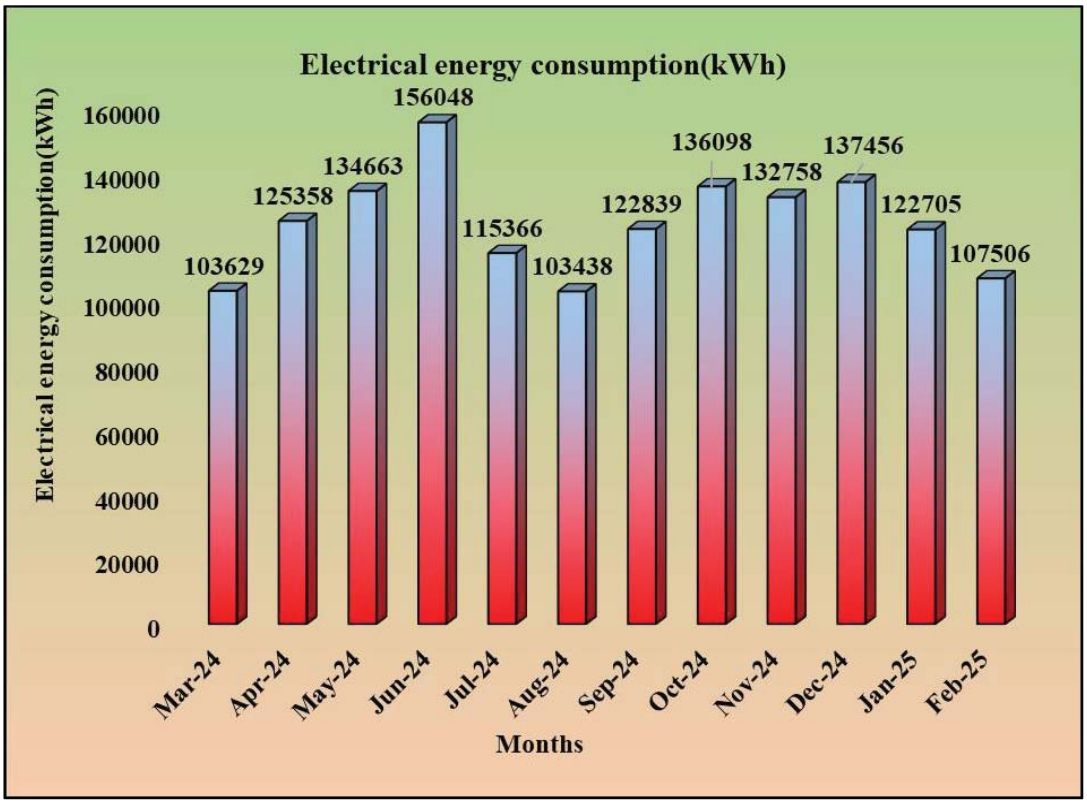


Figure 1. Electrical energy consumption profile

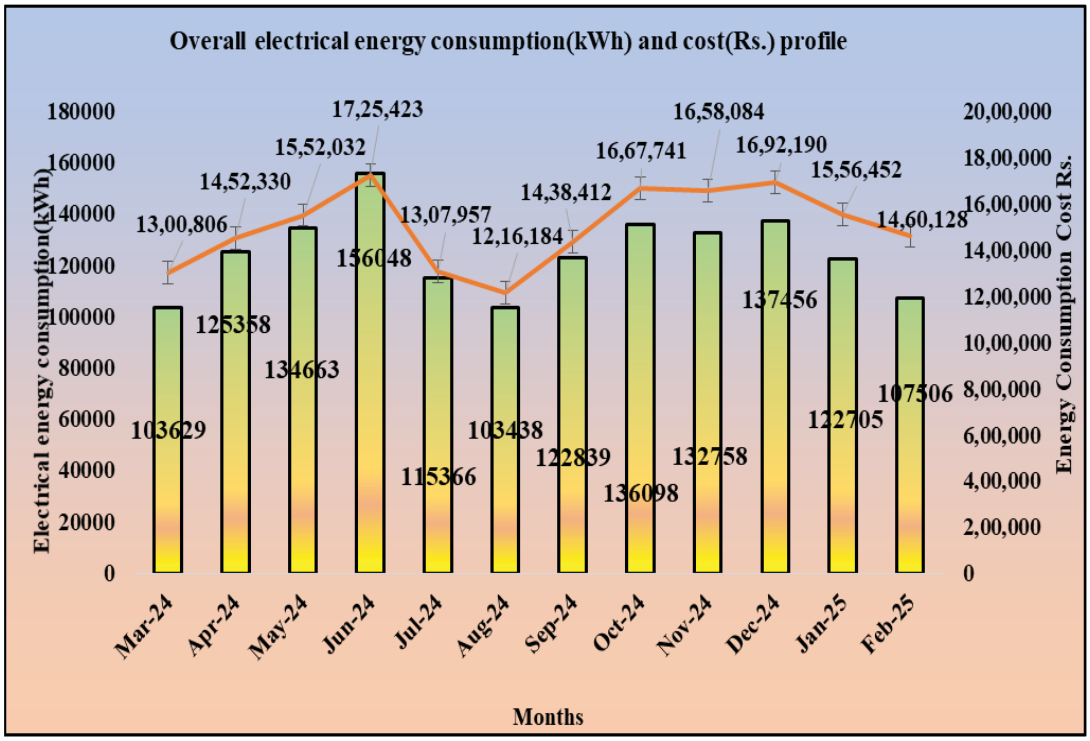


Figure 2. Overall electrical energy consumption and cost profile

Table 2. Electrical energy consumption and cost profile in the Institution

S. No	Months	Rating / Capacity units in kWh	Cost in Rs.
1.	March 2024	103629	13,00,806
2.	April 2024	125358	14,52,330
3.	May 2024	134663	15,52,032
4.	June 2024	156048	17,25,423
5.	July 2024	115366	13,07,957
6.	August 2024	103438	12,16,184
7.	September 2024	122839	14,38,412
8.	October 2024	136098	16,67,741
9.	November 2024	132758	16,58,084
10	December 2024	137456	16,92,190
11.	January 2025	122705	15,56,452
12.	February 2025	107506	14,60,128

4.2.5. Power consuming equipment and electrical appliances

Other than electrical energy from grid, energy generated using fossil fuels for the year are presented in the Table 3.

Table 3. Annual Energy Consumption of Fuels in the College

S. No	Month	Diesel consumption (Liters)	Petrol consumption (Liters)	LPG consumption (kg)
1	March 2024	605.95	250.57	3705
2	April 2024	666.53	209.67	4066
3	May 2024	727.67	242.99	4370
4	June 2024	624.27	199.56	3952
5	July 2024	660.01	246.02	3420
6	August 2024	532.33	155.64	2831
7	September 2024	578.33	205.85	3800
8	October 2024	675.87	190.79	4237
9	November 2024	722.96	169.64	4256
10	December 2024	839.06	180.75	4560
11	January 2025	797.04	145.67	4370
12	February 2025	792.73	134.85	3705

4.2.6. Carbon footprint

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

4.2.7. Calculation of carbon footprint

The carbon footprint analysis can be calculated based on the earlier reports as stated in www.carbonfootprint.com which is the sum of electricity usage per year. According to the data provided by the Management, carbon emission due to electricity consumption and fossil fuels are presented hereunder.

The CO_2 emission from electricity

= (electricity usage per year in kWh/1000) x 0.84, where 0.84 is the coefficient to convert kWh to metric tons

= (1497864 kWh/1000) x 0.84

= 1258.20 metric tons

According to the above calculations, carbon emission due to electricity usage per year accounts for 1258.20 metric tons.

Transportation per year (Shuttle)

= (Number of the shuttle vehicle in the campus x (2) x total trips for shuttle bus service each dayx approximate travel distance of a vehicle each day inside campus only (20 km)x 365/100) x 0.01

= ((4 x 20 x 1 x 365)/100)) x 0.01

= 2.92 metric tons

365 is the number of days per year
0.01 is the coefficient to calculate the emission in metric tons per 100 km for bus

a. Transportation per year (Car)

= (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
= ((102 x 20 x 1 x 365)/100)) x 0.02
= 148.92 metric tons

365 is the number of days per year
0.02 is the coefficient to calculate the emission in metric tons per 100 km car

b. Transportation per year (Motorcycles)

= (Number of motorcycles entering the campus x 2 x approximate travel distance of avehicle each day inside campus only (in kilometers) x 365/100) x 0.01
= ((100 x 20 x 1 x 365)/100)) x 0.01
= 73 metric tons

365 is the number of days per year
0.01 is the coefficient to calculate the emission in metric tons per 100 km for motorcycles.

c. Total Carbon emission per year

= total emission from electricity usage + transportation (bus, car, motorcycle)
= (1258.20 + 2.92 + 148.92 + 73)
= 1483.04 metric tons

4.2.8. Noise level measurements (NBC Checkpoint 12.4.4.)

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). The body can also respond to lower noise levels. Level of noise are expected tobe within 55 dB in residential areas, including institutions. Class room noise levels aresupposed to be around 50 db. 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. Noise level prescribed by Central Pollution Control Board was presented in the Table 4.

Table 4. Noise level standard prescribed by Central Pollution Control Board, Government of India

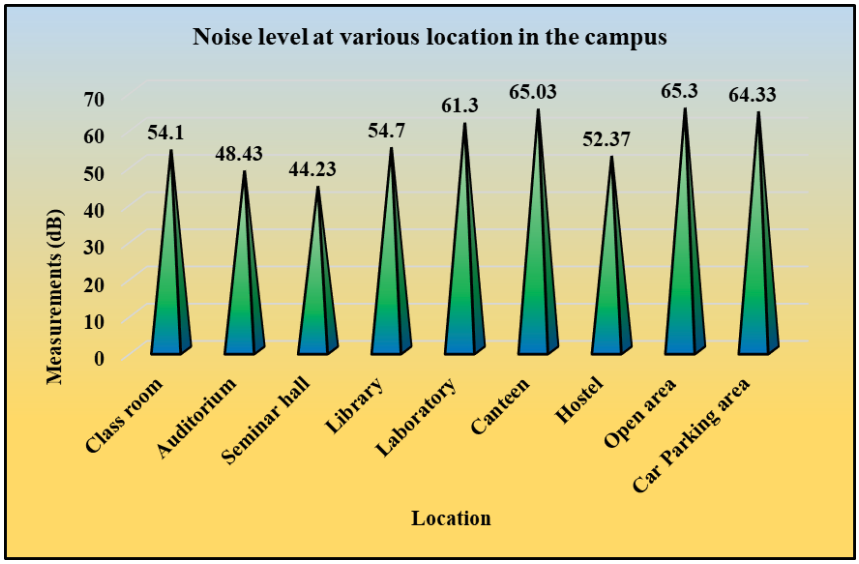
Area Code	Zone	Limits in dB (A) Leq	
		Day Time	Night Time
A	Industrial	75	70
B	Commercial	65	55
C	Residential	55	45
D	Silence	50	40

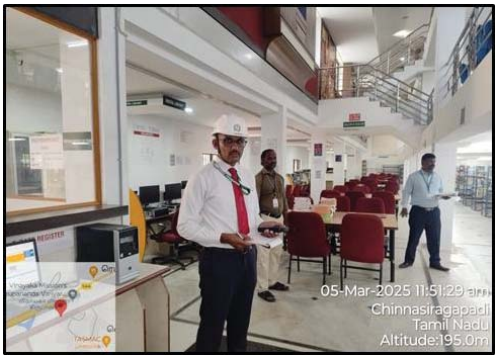
Source: IS : 12065 - 1987

Table 5. Noise level at various location in the campus

S. No	Locations	Measurements (dB)	Major noise sources	Remarks
1.	Class room	54.10	Students and Staff	No Noise Pollution
2.	Auditorium	48.43	Students	No Noise Pollution
3.	Seminar hall	44.23	Students	No Noise Pollution
4.	Library	54.70	Staff members	No Noise Pollution
5.	Laboratory	61.30	Students	No Noise Pollution
6.	Canteen	65.03	Students and Staff	No Noise Pollution
7.	Hostel	52.37	Students	No Noise Pollution
8.	Open area	65.30	Students and staff	No Noise Pollution
9.	Car Parking area	64.33	Vehicles	No Noise Pollution
	Mean	56.64%		
	SE	2.82		
	CD	5.03		

Figure 3. Noise level at various location in the campus





Noise level measured in various locations at the College Campus

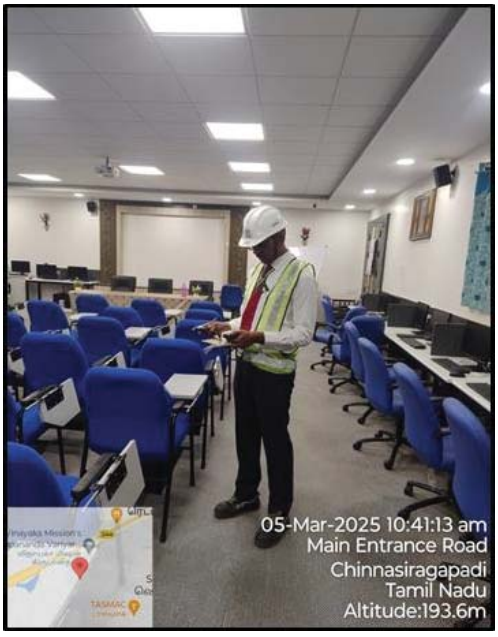
4.2.8.1. Light intensity measurement at the campus

Light intensity or light output is used to measure whether a particular light source provides enough light for an application needed. There is a well-established light level recommendation for a wide range of applications in lighting industry and also for the type of space. Light intensity is measured in terms of lumens per square foot (foot-candles) or lumens per square meter (lux). A light meter (lux meter) is used to measure the amount of light in a space/on a particular work surface. The light meter consists of a sensor that measures the light falling on it and provides the user with a measurable illuminance reading. Light meters are an especially useful tool for measuring light for safety or over-illumination.

Table 6. Light intensity measured at various locations in the College

S. No	Type of Spaces	Illuminances (LUX)
1.	Class room	126
2.	Auditorium	137.3
3.	Seminar hall	291
4.	Library	373.3
5.	Laboratory	467.6
6.	Canteen	220.6
7.	Hostel	161
8.	Open area	471
9.	Car Parking area	587.6
	Mean	315.07%
	SE	25.81
	CD	45.99

Source: IS: 6665-1972



Light intensity analysis in the Campus

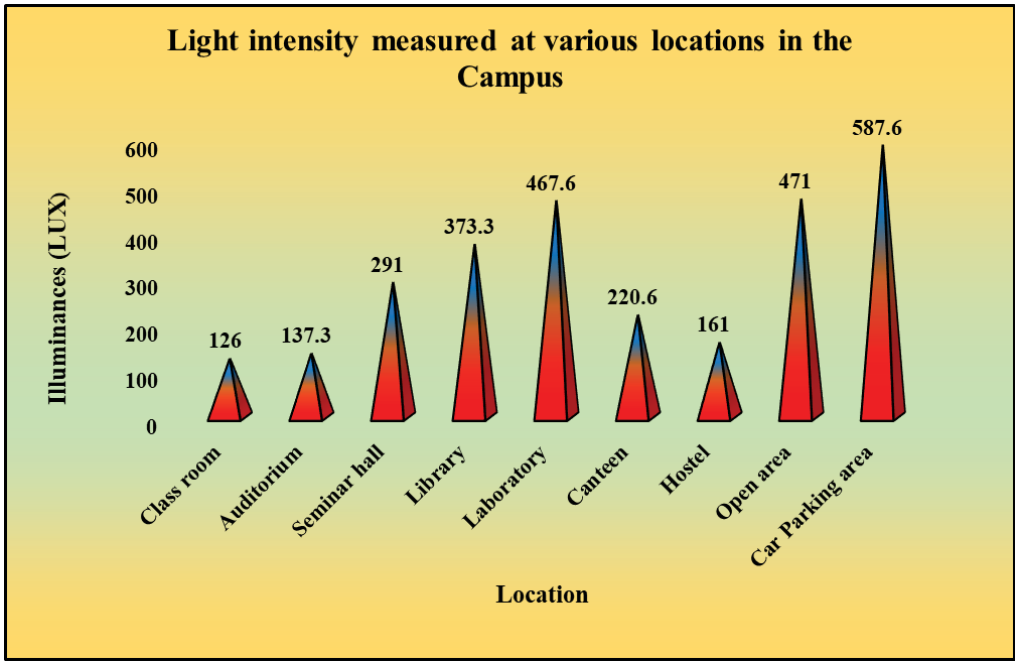


Figure 4. Light intensity Measured at the campus

4.2.8.2. Voltage Measurement at the Campus

Voltage measurement in AC & DC at different places in the campus is measured using the clamp (voltage) meter to reduce the energy consumption.

Table 7. Voltage measured at various locations in the College

S.No	Name of the Place	AC & DC Voltage Measurement [Volt (v)]
1.	Class Room (AC)	208.9
2.	Auditorium (AC)	212.8
3.	Seminar Hall (AC)	212.6
4.	Library (AC)	218.1
5.	Laboratory (AC)	209.8
6.	Canteen (AC)	212.5
7.	Power Room (AC)	211.4
8.	Generator Area (AC)	208.1
9.	Battery (DC)	13.3
SD±		1.26

Source: BEE, 2015, Bureau of Energy Efficiency



Voltage intensity measured at the College

4.2.9. Operation and Maintenance (NBC Checkpoint 13)

During commissioning and handover, operation and maintenance plan is under process to implement.

5. WASTE MANAGEMENT AUDIT

5.1. Introduction

Waste management is a global environmental task but has always been neglected by the public. Improper waste management will create environmental issues *viz*., soil, water- and air-pollution which lead to health problems. Main reason for polluted environment is unawareness of consumers and improper or poor legitimate initiatives. Ever increasing population rate and the improved life style of the people results in generation of amplified amount of solid wastes, irrespective of urban and rural areas. Solid waste is defined as the unwanted substance which is generated by the society that does not have any economic value from the point of view of the user. Waste management is defined as the discipline associated with control of generation, storage, collection, transport/transfer, processing and disposal of solid waste materials in aesthetic way.

There is a daunting need of effective waste management in India as 62 million tons of municipal solid waste and 38 billion liters of sewage is generated annually only from urban areas. The solid waste increases at the rate of 1.0 - 1.3% annually and the maximum amount of municipal waste is left untreated (Rajalakshmi *et al*., 2023). Primary reason for unclean surroundings in the nation is unawareness of individuals, in general, deprived institutional initiatives. While educating the environmental health and security, it has to be initiate from grass root level, primarily, educational institutions are the right forum to start with. Prior to teaching the students on waste management practices and prepare them to adopt strategic plan of waste management to material management, educational institutions should establish the physical facilities and follow the fundamental guidelines. The physical facilities established in the higher educational institutions and their utility through onsite auditing and to assess the implemented waste management practices with particular reference to recycling and generation of value added products.

5.2. Observations of the Waste Management Audit

- Recycling and reuse of waste materials through composting activities need to be initiated.
- Waste management practices need segregation and proper disposal in the campus.
- Different coloured closed dustbins for the collection of waste at various locations are not observed in the campus.
- Incinerator facilities for the disposal of napkins are not functioning in the campus.
- No usage of radioactive elements observed in the campus.
- Chemical wastes like acids, solvents and salts are dissolved properly before the disposal.
- Electrical and electronic wastes are collected and segregated properly.
- Records are not available for e-waste disposal by the authorized agency.
- MoU signed with the authorized waste disposal agency as an effective practice of waste management.
- STP and purchase policy need to be implement in the campus.

- Observed the allotment of separate team to perform environmental impact assessment and environmental management plan.
- Training needs are identified and workforce training is carried out in regular basis.
- Top soils are preserved and reused in the same site are observed.
- Some of the construction waste are reused for constructing cement roads inside the campus.

5.2.1. Technology Options (NBC Checkpoint 3.3 and 3.4.)

As per the guidelines to Architect and Civil contractors for existing buildings, traditional materials are used in the construction, environment friendly and cost-effective technologies are made available in the campus as per the building code.

5.2.2. Waste Management Practices (NBC Checkpoint 10.6, 10.7 and 12)

Waste Management has a common mandate that the 'Producer Owns the Responsibility'. The solid wastes are collected from different places of campus and segregated based on biodegradable and non-degradable materials subsequently subjected for recycling and degradation processes like composting. Details of the waste management practices in the Organization are 1) bio-degradable waste handling, 2) disposal of e-waste.

i) Solid waste management practices at the campus

The term, solid waste control refers to the method of accumulating and treating solid wastes by following ecofriendly methods. It is also a solution for recycling objects that do not belong to garbage. In the solid waste management, the wastes are accumulated from different parts and are disposed based on degradability materials like paper and non- degradability materials like glasses, plastics and metals. Organization 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 canteens, stationary shops and hostels and disposed through the Corporation facility.

ii) Bio-degradable and non-degradable waste materials management practice

For 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 Campus *viz*. Students Hostels 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.



Waste management activities observed in the campus

iii) Use of biofertilizers, 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. The plant waste such as fallen leaves, stems, fruits, nuts, seeds and other plant parts are used to make green manures. Minimal use of chemical fertilizers as part of integrated nutrient management system is acceptable but 'zero use' of chemical fertilizers is highly appreciable. Biofertilizers, farm yard manure and dried cow dung manure are extensively used in the audited organization to cultivate plants ensured to keep the campus organic. 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.

iv) Disposal of E-Waste

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. The e-waste materials were collected from the Organization are being segregated and then given to authorized agencies for handling e-waste. Due to this e-waste activity disposal, the e-waste pollution is significantly reduced in the Campus. Organization has produced lesser quantity of e-waste and the same has been disposed through the Corporation facilities.



Disposal of e-waste observed inside the campus

v) Construction and Demolition 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. One of the best waste management practices is rebuilding of construction waste into pillars, pathway road and etc. The construction waste inside the campus is found to be very low.

vi) Hazardous and biomedical wastes management

The Organization have taken pioneering efforts to dispose the hazardous as well as biomedical wastes properly that are generated from various Department laboratories. Acids, solvents, salts, reagents and cancer-causing substances (carcinogens) will cause cancer to the stakeholders those who doing research and/or experiments. Most of these kinds of wastes are disposed of safely without affecting the environment, soil health and water quality as per the directions of World Hazardous Waste Programme. Napkins

are incinerated onsite while agricultural wastes are recycled within the campus. Hazardous chemical and biomedical wastes are not abundantly used in the campus. Bio medical wastes are segregated at the source of generation using different coloured dustbin and acid neutralization chamber is available to collect the concentrated chemicals in the separate pipeline,

vii) Recycling of wastewaters

The main feature of the treated water should not be harmful to the biodiversity, resources and the environment especially in soil ecosystem. 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.

6. SOIL AND WATER AUDIT

6.1. Introduction

Soil and water are inequitable natural resources of India at global level. Soil are naturally occurring loose covering on the earth's surface. Weathering altered the rock particles of soil into mixtures of mineral and organic constituents. Soil is rich in microorganisms such as bacteria, fungi, actinomycetes, algae, protozoa and nematodes. The microorganism of the soil helps in enzymatic degradation of organic matter, energy storage and conversion of nutrients in available form in their biomass. Water the other natural resource constituting with 97% of salt water and 3% of fresh water. The use of water is inevitable in our daily needs. Water is used in agriculture, industrial, household, recreational and environmental activities. The natural source of fresh water are surface water and ground water.

Soil and water are natural resources of the organization that has to be structured, planned and developed from the point of entry to end users the stakeholders in such a way with contamination free soil and water, sustainable use of land and water and suitable measures for their conservation. Soil and water audit is a tool to improve the quality of the land and water to provide a healthy environment for the stakeholder directly and indirectly of the campus. It creates awareness on environmental ethics, resolves environmental issues and offers solutions to various social and economic needs. It strengthens the concept of 'Jal Jeevan Mission' and 'Sustainable Land Management' among stakeholders of India for the protection of natural ecosystems for future prospects.

Soil and water audit helps the educational institutions/ industries to maintain eco-friendly environment, assures personal hygiene to various stakeholders and supports the nation; on the whole for the noble cause of environmental protection and nature conservation which in turn enhances the quality of life of all living beings. Most of the soil in India are well drained, deep, fairly loamy, slightly acidic to alkaline and lime-free soils and they are ideal for variety of plant cultivation. The Indian soils are mainly derived from gneissic rock containing large amount of mica with good behaviour of water holding capacity with abundance of micro and macro elements. Some of the soils are characterized by clay loam type, classified as latosols with good organic matter contents along with sufficient amount of nitrogen, potassium and phosphorous contents all tea soils are distinctly acidic, rich in nitrogen content.

6.2. Soil and Water audit observations

1. The campus has well established rainwater harvesting models to recharge the bore wells by collecting rainwaters from the building roofs, open areas and playgrounds including unexplored areas which are not maintained properly.
2. The physic-chemical properties of soils revealed that the soil health is good towards the construction of building and the cultivation of various native and wild type plant species.
3. The water quality parameters revealed that the quality of water is good in terms of domestic purposes.
4. A well-established rainwater harvesting system to recharge water ground status

by collecting rainwaters from the campus coinciding with the contour of the terrain and natural drains.

5. Solar water heater available to serve hot water for domestic purpose.
6. Low flow fittings, low cisterns and bath faucet are available to conserve water.
7. Drip /Sprinkler Irrigations need to be strengthen for Conservation of Water
8. TDS need to be calibrate and soil testing may be done six months once by the ISO 17025:2025 Standard.

6.2.1. Geology, topography and soil condition (NBC Checkpoint 12.4.1)

The geology of Salem, Tamil Nadu is characterized by undulating terrain, crystalline formations, and alluvial deposits. The city is surrounded by hills, and the Thirumanimutharu River runs through it. Salem is located at11.67°N 78.14°E, at an average elevation of 278 m (912 ft.). The city is surrounded by hills: Nagaramalai on the north, Jarugumalai on the south, Kanjamalai on the west, Godumalai on the east and the Shevaroy Hills on the northeast. Kariyaperumal Hill is in southwestern Salem. The district is also home to the Shevroy Hills, which are a mountain range near Salem. The district has weathered and fractured crystalline rocks and recent colluvial deposits. The district has granite gneiss, charnockite, granites and other hard consolidated crystalline rocks. The soil conditions in Salem, Tamil Nadu include red, brown, black, alluvial, and loamy soils. The soil in Salem is predominantly alkaline and non-saline.

6.2.2. Assessment of Physico-chemical property of Soil samples

Soil physic-chemical properties influence the behaviour of soil and hence, knowledge of soil property is important. Soil testing is the only way to understand the soil health and to determine the available nutrient status in soil. The fertility of the soil depends on the concentration of N, P, K, organic and inorganic materials, conductivity. The results on soil samples analysis revealed that the pH, Electrical conductivity, total organic carbon, total nitrogen, available phosphorous and exchangeable potassium were found to be within the range and suitable for building constructions and cultivating the plants corresponding to the soil health. The soil samples were analysed with the help of ISO 17020 Accredited lab and correlated with the standard values referred from 'Soil Testing Methods in India' published by the Ministry of Agriculture, January 2011 Edition, Government of India.

Soil Sample Test Result:

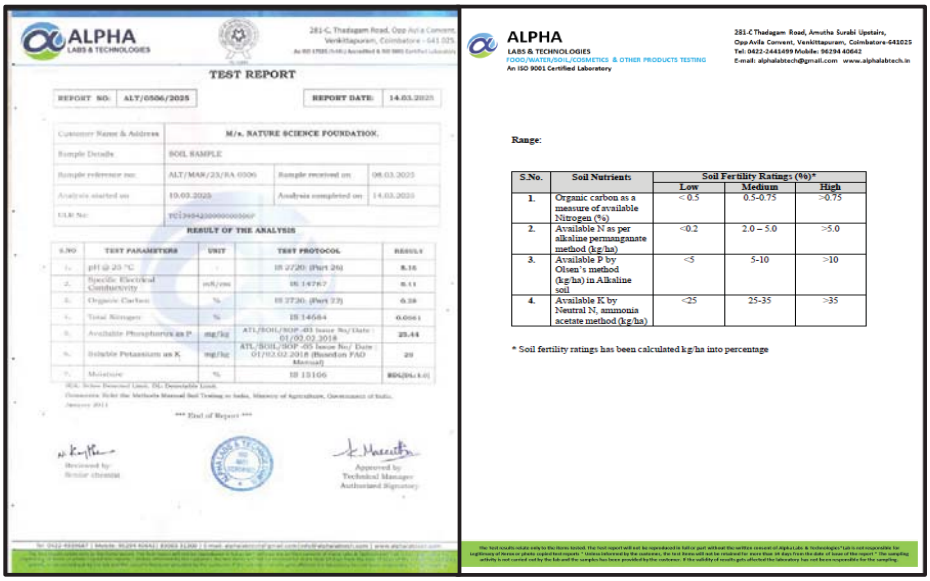
S.No	Test Parameters	Value	Unit	Test Protocols	Comments
1.	pH @ 25 ºC	8.16	-	IS 2720: (Part 26)	Sufficient
2.	Specific Electrical Conductivity	0.11	ms / cm	IS 14767	Sufficient
3.	Organic Carbon	0.28	%	IS 2720: (PART 22)	High
4.	Total Nitrogen	0.0561	%	IS 14684	Sufficient
5.	Available	25.44	mg /	ATL/SOIL/SOP –	Sufficient

	Phosphorus as P		kg	03 Issue No / Date: 01/ 02.02.2018	
6.	Soluble Potassium as K	20	mg / kg	ATL/SOIL/SOP – 05 Issue No / Date: 01/ 02.02.2018 (Based on FAO Manual)	Sufficient
7.	Moisture	BDL(DL:1.0)	%	IS 15106	Sufficient

Range:

S.No.	Soil Nutrients	Soil Fertility Ratings (%) *		
		Low	Medium	High
1.	Organic carbon as a measure of available Nitrogen (%)	< 0.5	0.5-0.75	>0.75
2.	Available N as per alkaline permanganate method (kg/ha)	<0.2	2.0 – 5.0	>5.0
3.	Available P by Olsen's method (kg/ha) in Alkaline soil	<5	5-10	>10
4.	Available K by Neutral N, ammonia acetate method (kg/ha)	<25	25-35	>35

Standards referred from 'Soil Testing Methods in India' published by the Ministry of Agriculture, Government of India and Methods of Analysis of Soils, Plants, Waters and Fertilizers by Fertilizer Development and Consultation Organization.


ALPHA
LABS & TECHNOLOGIES

TEST REPORT

REPORT NO: ALT/0506/2025 REPORT DATE: 14.03.2025

M/s. NATURE SCIENCE FOUNDATION.

SOIL SAMPLE

ALT/MAR/25/RA 0506 Sample received on 08.03.2025

10.03.2025 Analysis completed on 14.03.2025

RESULT OF THE ANALYSIS

S.NO	TEST PARAMETERS	UNIT	TEST PROTOCOL	RESULT
1.	pH @ 25 °C	-	IS 2720: (Part 26)	8.16
2.	Specific Electrical Conductivity	mS/cm	IS 14767	0.11
3.	Organic Carbon	%	IS 2720: (Part 22)	0.38
4.	Total Nitrogen	%	IS 14684	0.0061
5.	Available Phosphorus as P	mg/kg	ATL/SOIL/SOP -05 Issue No/ Date : 01/02.02.2018	25.44
6.	Soluble Potassium as K	mg/kg	ATL/SOIL/SOP -05 Issue No/ Date : 01/02.02.2018 (Based on FAO Manual)	28
7.	Moisture	%	IS 15106	BDL(DL:1.0)

*** End of Report ***

Reviewed by: Senior chemist

Approved by: Technical Manager / Authorised Signatory

ALPHA
LABS & TECHNOLOGIES
FOOD/WATER/SOIL/COSMETICS & OTHER PRODUCTS TESTING
An ISO 9001 Certified Laboratory

281-C Thadagam Road, Amutha Surabi Upstairs, Opp Avila Convent, Venkittapuram, Coimbatore-641025
Tel: 0422-2441499 Mobile: 96294 40642
E-mail: alphalabtech@gmail.com www.alphalabtech.in

Range:

S.No.	Soil Nutrients	Soil Fertility Ratings (%)*		
		Low	Medium	High
1.	Organic carbon as a measure of available Nitrogen (%)	< 0.5	0.5-0.75	>0.75
2.	Available N as per alkaline permanganate method (kg/ha)	<0.2	2.0 – 5.0	>5.0
3.	Available P by Olsen's method (kg/ha) in Alkaline soil	<5	5-10	>10
4.	Available K by Neutral N, ammonia acetate method (kg/ha)	<25	25-35	>35

* Soil fertility ratings has been calculated kg/ha into percentage

The test results relate only to the items tested. The test report will not be reproduced in full or part without the written consent of Alpha Labs & Technologies. Lab is not responsible for legitimacy of terms or photo copied test reports. Unless informed by the customer, the test items will not be retained for more than 30 days from the date of issue of the report. The sampling activity is not carried out by the lab and the samples has been provided by the customer. If the validity of results gets affected the laboratory has not been responsible for the sampling.

Soil Sample Test Report obtained from ISO 17025 certified lab



Soil Sample Collection in the Campus

6.3. Water management activities (NBC Checkpoint 7.3, 10.2 – 10.5 and 12.4.2.)

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. The Organization is taking enough attempt to manage wastewater that are coming out from various Department laboratories, hostels and canteens as per the water management plan. Solar water heaters are available for the domestic use of water. Chemicals like bromine and chlorine are avoided to maintain the water quality and to maintain hygienic environment to the stakeholders. Low flow fitting are implemented in the recently constructed building to conserve water.

6.3.1. Operational water supply systems

Maintaining the green campus, water conservation mechanisms should be applied efficiently in the campus. Well planned water irrigation systems like sprinkler and drip should be implemented in the entire green area of the campus for an effective water management system. This can be implemented only when the plantations are well planned. Vegetative area of the audited organization has taken sufficient efforts to maintain the plants greenish and frequency of watering to the plants.



Drinking Water Units were observed in the Campus

6.3.2. Rainwater harvesting system and percolation pond

Rainwater harvesting system is a traditional old practice not only in drought prone areas and also in areas having seasonal rainfall. Indian traditional rainwater harvesting systems are constructed based on three modes either direct pumped, indirect pumped or by both modes. In addition, lakes, ponds, water channels and any other water reservoir methods are considered as the rainwater harvesting system. During the audit it has been observed that the organization has developed rain water harvesting system and not properly maintained.



Rainwater harvesting pit observed in the campus

6.3.3. Water quality

After air, water is the second most critical element for life to exist. As a result, the scientific literature has numerous descriptions of water quality. It is the physical, chemical and biological characteristics of water, is the most frequently used definition of water quality. Water quality is a measurement of the state of water in relation to the needs of one or more biotic species and/or to any human need or purpose.

- One of the most crucial aspects of water quality is pH. It is described as the hydrogen ion concentration's negative logarithm. It is an arbitrary number that expresses how acidic or basic a solution is. Actually, water's pH is a gauge of how acidic or basic it is. Both basic and acidic water have more hydrogen (H+) and hydroxyl (OH) ions than usual.
- Total dissolved solids is referred to as TDS. It calculates the overall concentration of soluble salts and minerals in water. One mg/L of dissolved minerals, for instance, means that the water pitcher contains one mg/L of TDS.
- The salinity of a body of water, commonly known as saline water (also see soil salinity), is the degree to which salt is present. It is often measured in grams per litre (g/L).,Water that is cloudy is referred to as turbid. It gauges how well light can travel through water. It is brought on by particulate matter suspended in water, including clay, silt, organic matter, plankton and other particles.
- One of the most crucial indicators of the water quality in streams, rivers and lakes is dissolved oxygen (DO) which is regarded as one of the factors. It is an important indicator of water pollution. The water quality improves as the dissolved oxygen concentration does.

6.3.4. Standards for physico-chemical properties of water

The water samples collected from various sources, i.e., RO water, tap water, bore well water, wastewater and treated water samples were subjected to analyze for its

physico-chemical parameters. The results showed that all the parameters were found to be appreciable and no harmful effect was recorded (Table 8). These parameters were observed to be within the limit of Indian Standards of drinking water quality. The observed pH values were found to be 6.5 - 8.5 ranges. Similarly, observed TDS and salinity were 0 - 900 mg/L and 300 - 380 mg/L, respectively. Turbidity and dissolved oxygen were 4.5 – 5.5 NTU and 6.5 - 8.0 mg/L, respectively which are compliance with ISI standards.

Table 8. Physico-chemical properties of various water sources

S.No.	Water source	pH	TDS (mg/L)	Salinity (mg/L)	Turbidity (NTU)	Dissolved Oxygen (mg/L)
1.	RO water	5.5	74.4	270	4.3	7.4
2.	Tap water	7.2	131	434	4.8	6.9
3.	Well water	7.4	239.3	544	5.5	6.8
4.	Waste water	7.6	206	342	4.8	5.3
5.	Treated water	8.4	438	503	4.5	3.6
Mean		4.01%	132.09%	232.78%	2.67%	3.36%
SEC ±		0.12	59.71	10.60	0.15	0.28
CD at P = 0.05:		0.21	96.41	18.89	0.26	0.49

Source: IS 10500: 2012



Water analysis by using pH and TDS Meters

6.3.5. 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 is an immense requirement of any living organism. Though it is a natural resource,we are exploiting water for various purposes in day-to-day activities. As an educationalinstitution, water requirement for various activities may differ. Per capita Domestic Consumption in Hostels combined with Canteen ranges between 90 - 125 litres. Industrial or laboratory demand for water is estimated ranges between 100 - 300 litres. Losses as leakages and routine consumption accounts approximately 30 - 50 litres (per capita) and other uses daily usage uses accounts another 50 litres.

Table 9. Water consumption for various purposes

S. No.	Types of consumption	Normal range (L/capita/day)	Average
1.	Per capita domestic consumption at hostel and canteen	93-126	118
2.	Industrial and commercial demand at laboratories	124 - 255	199
3.	Public uses including fire demand, transport washes	2378-3345	2750
4.	Losses and waste as routine consumption	37-53	37
5.	Daily use (day-to-day use)	64	45

7. Air Quality Audit

7.1. Introduction

When the air is clear and contains only small amounts of solid particles and pollutant then the air quality is determined as good. Air is the mixture of gases, as air is moving its quality can be changed day to day. Temperature, wind movements are also major reason for air quality.

7.2. 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. Global warming is driven by human-induced emissions of greenhouse gases which resulted in paramount shifts in weather patterns. 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.

7.3. Air quality audit observations (NBC Checkpoint 12.4.3.)

It is observed that carbon dioxide and oxygen values are acceptable range. The air circulation is very good in all the places which in turn useful to give pure air to the stakeholders. The observation showed that the concentration of CO_2 in the atmosphere is found to be optimal 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 Canteen and Class Roomsare recorded with high level of carbon dioxide level due to student mobilization and themaximum number of electrical items fixed from which the carbon dioxide emission were observed followed by all laboratories and seminar and auditorium halls (Table 10).

Table 10. Measurement of CO_2 concentration in the Organization

S. No.	Different locations of the Organization's Campus	Carbon dioxide level (ppm)*	Remarks
1.	Classroom	423	Within permissible limits
2.	Auditorium	434	Within permissible limits
3.	Seminar Hall	425	Within permissible limits
4.	Library	431	Within permissible limits
5.	Laboratory	441	Within permissible limits
6.	Canteen	427	Within permissible limits
7.	Hostel	422	Within permissible limits
8.	Open Area	420	Within permissible limits
9.	Car Parking area	434	Within permissible limits
Mean		428.70%	
SEC ±		1.40	
CD at P=0.05%		2.49	

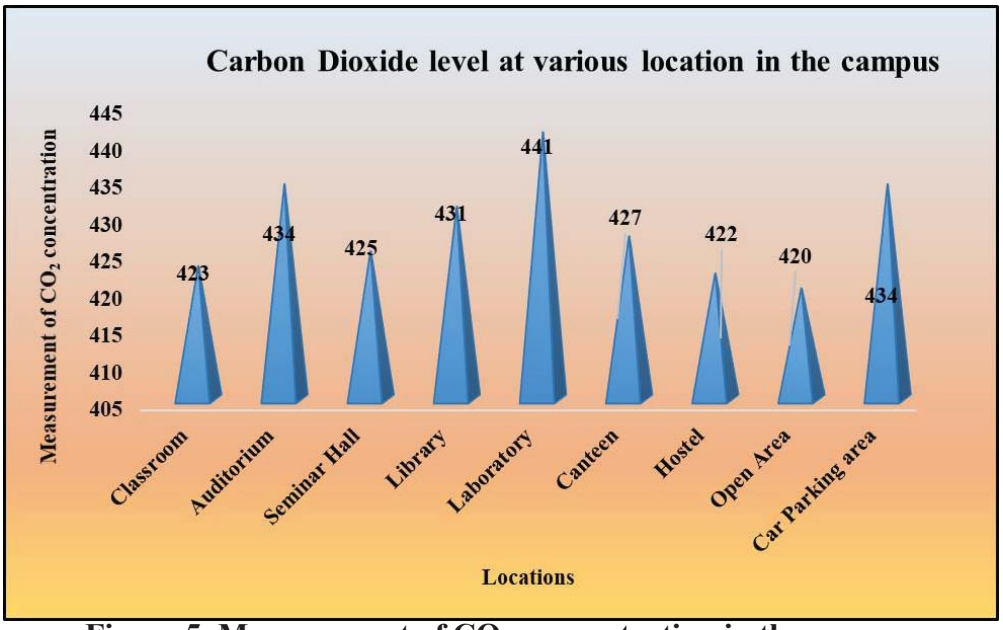


Figure 5. Measurement of CO_2 concentration in the campus



Analysis of CO_2 concentration in the campus

7.4. 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. 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. 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 it excess, it causes oxygen toxicity and oxygen poisoning by creating coughing, breathing trouble and damage the lungs to human beings. The oxygen level of different places at the campus are monitored and presented (Table 11).

Table 11. The oxygen concentration at different places of audited organization

S. No	Location	Oxygen Level (%)*	Remarks
1.	Classroom	19.23	O_2 level is good
2.	Auditorium	19.17	O_2 level is good
3.	Seminar Hall	19.33	O_2 level is good
4.	Library	19.40	O_2 level is good
5.	Laboratory	19.20	O_2 level is good
6.	Canteen	19.40	O_2 level is good
7.	Hostel	19.43	O_2 level is good
8.	Open Area	19.53	O_2 level is good
9.	Car Parking area	19.37	O_2 level is good
Mean		19.34%	
SEC ±		0.10	
CD at P=0.05%		0.18	

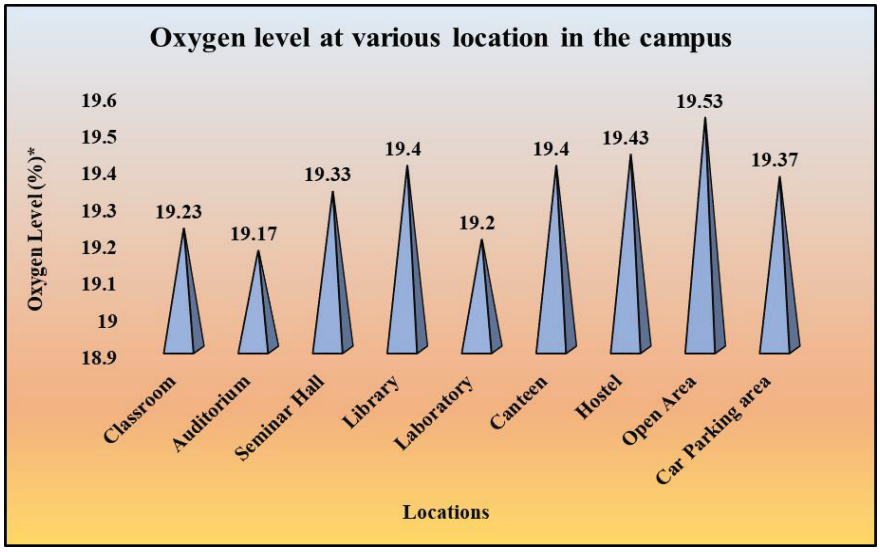


Figure 6. The oxygen concentration in the campus



Measurement of O_2 level at the Campus

8. HYGIENE AUDIT

8.1. Introduction

A hygiene audit will provide an insight into how an organization operates in a sustainable manner in terms of hygiene environment to the stakeholders as per the International Standard for Occupational Health and Safety Management Systems (ISO HSMS). If an organization has a hygiene auditing process implemented already, then it should apply environmental context into a clean environment. Environmental audit is a natural management tool and it will become more effective when hygiene audit is added to it. It is an essential requirement to adopt an audit process for a sustained utilization of resources in a hygienic way in both developed and developing countries like India. Hygiene will be of different types such as personal hygiene, environmental hygiene, medical hygiene and public hygiene which are all interrelated between each other in terms of maintaining a hygienic atmosphere to the stakeholders.

To ensure that the hygienic environmental management system, maintenance of environmental and personal hygiene, availability of clean resources, maintenance of water supply and hygiene, cleanliness ensured at the site of disposal of human waste materials and personal safety in the campus should be implemented effectively. Each year a plan for the hygiene audit should be prepared by the management of an organization. A committee of faculties and student representatives and social aware members appointed to take this plan forward in the beginning of every year will ensure that the entire hygienic environmental management system is implemented in the organization without any hindrance. An effective hygiene practice should be followed among the stakeholders which in turn useful to control a wide variety of disease outbreaks. Every organization should have applicable regulations, policies and standards with respect to hygienic environment.

A healthy population is the essential component of a country's wealth in terms of political, economic and environmental sustainability. In terms of population growth statistics, India is the fastest populating country to strike the second position in total population cover which is about 138 million and constitutes 17.25% of the total global population. Demographic status of India revealed that if the population increase continues to be at this rate, India is expected to be the most populated country by 2050. Along with the birth rate, social and environmental issues are also increasing and alarming now-a-days. As consequences of over population, social well-being of man and status of quality environment of the country get affected by the developing pressure on food, clothes, housing and other basic necessities, unemployment, loss of standard of living, decrease of forest cover, environmental pollution, energy crisis, ecological degradation and lack of hygienic condition-resulting in the distortion of well-being of a country. The hygiene audit is playing important role for both people and the environment of any organization in terms of safety. In order to achieve an effective ecofriendly hygiene by promoting the hygiene management practices and sanitization standards in the enterprise.

8.2. Hygiene audit observations

- No person is suffering from a disease or illness or with open wounds or burns among the students, teaching and non-teaching staff members including supportive staff and management people across the campuses observed during the hygiene audit which indicated the campus is very keen interest in providing good hygiene atmosphere to the stakeholders.
- The sanitizing materials such as soap, liquid detergent, tissue paper role, hand gloves, hand towels, etc. are made available nearby the washbasins and restrooms focusing towards the personal hygiene and sanitation related concerns to the stakeholders.
- Appropriate dustbins and eco-friendly covers are made available at laboratories, canteens, food courts, cafeteria and hostels across the campuses to control the spread of wastes and contaminants from one place to another place and without harming the environmental health.
- The pest management strategies adopted (cockroach traps, rodents control measures, insect repellents and other control facilities) at the campus is very good. The laboratories, classrooms, hostels, canteens, foot courts and toilets / restrooms are very neat and clean with proper ventilation and exhaust system.
- Food and Waste handlers are equipped with suitable personal safety materials like disposable hand gloves, full cover aprons and caps to minimize contamination and fire hazards at hostel dining halls and canteens to minimize contamination and fire hazards.
- Maintenance of equipment and machinery items are very good and being carried out regularly as per the instructions of the manufacturer. They are neatly maintained without any dusts and covered with the appropriate covers. They college management has signed a MoU to maintain Hygienic environment.
- Pest control programmes for cockroach, house flies, mosquitos, rodents etc. are effectively implemented and pest control activities (eggs, larvae, pupa, faeces, etc.) are carried out by trained and experienced personnel and no signs of pest activity or infestation in the Organization premises is noticed.
- Medical facilities are available for the laborers with physician to diagnose.

8.2.1. Observation on Personal Hygiene and Safety measures (NBC Checkpoint 12.3.6 and 12.3.7.)

As far as the stakeholders and employees are concerned, the safety and convenience of everyone working/access to the organization, the following safety rules should be observed at all times. Wearing a laboratory coat or apron along with hand gloves and caps before entering a working environment for protecting clothes from contamination or accidental discoloration by staining solutions are always mandatory in Organization's hygiene. The observation on providing hygiene environment to the stakeholders at campus revealed that sanitizing materials such as soap, liquid detergent, tissue paper role, hand gloves, hand towels are made available nearby washbasins and restrooms focusing towards personal hygiene and sanitation related concerns. It is observed that working tables and benches are kept clean at laboratories across the Departments. Appropriate dustbins and eco-friendly covers are made available at

laboratories, canteens, food courts, cafeteria and hostels across the campuses. At hostel dining halls and canteens, food suppliers are tied their long hairs properly and wear disposable hand gloves, full cover aprons and caps to minimize contamination and fire hazards. Canteen is functioning hygienically and authorized by the management.

Details of pest management strategies adopted (cockroach traps, rodents control measures, insect repellents and other control facilities) at the campus is very good. Food preparation (kitchen) area at hostels and canteen is very clean, free of insect pests and in good state of ventilation and exhaust system along with proper water supply and drainage. It is observed that waste disposal area and waste disposal collection center are neat and regularly cleaned, free of insect pests and free of spillage with no stagnation of water in food zones.



Pest control facility observed inside the campus

8.2.2. Napkin disposal facility

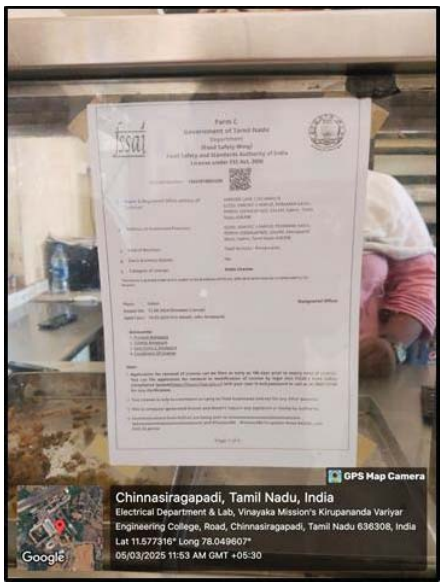
The Campus is implementing the safe practices of disposing of napkins using small scale incinerators in campus. However, it has come to our attention that the incinerator facility is currently non-functional. This situation temporarily limits the campus's ability to properly process and dispose of napkins and similar waste materials in an environmentally-friendly manner. The management are working diligently to ensure that the incinerator system is up and running as quickly as possible.



Napkin Incinerator facility in the campus

8.3. Legal compliances

In this campus, they following legal appliances are verified as per the National Building Code (Part 11 – Approach to Sustainability). Some of the documents are verified in onsite inspection are Building approval plan, canteen approval license to procure FSSAI certified food products and personal hygiene is evident from the management maintenance record.



FSSAI certificate observed in the campus

9. Conclusion

Considering the fact that the organization is a well-established academic institution and there is significant scope for conserving green, environment, energy, waste management, soil & water management, air quality and hygiene which in turn make the campus as self-sustained. The organization has taken enormous efforts to maintain green campus in a sustainable manner. It has conducting a large number of activities for the benefit of rural and tribal community people without disturbing the natural environment. The installation of a rainwater harvesting system and irrigation system to conserve rainwater and improve the ground water levels are noteworthy. The Organization has created medicinal, herbal and ornamental gardens at small scale level for establishing a massive reforestation / afforestation programme in which a large number of trees and shrubs species were planted together for providing an eco-friendly atmosphere to the stakeholders in a sustainable manner.

The energy conservation initiatives taken by the organization are substantial. Water and Soil conservation activities are also implemented and practiced. Proper facilities and procedures are followed for waste collection, segregation, disposal, recycle and reuse. Quality of soil and water observed to be good. Hygienic practices are monitored and maintained considering the health and sustainability of the stakeholders at canteen and hostel premises. Tree plantation at appropriate locations are maintained to resist the indoor climate and conserve energy as per the National Building Code (Part 11 – Approach to Sustainability). The organization has made significant progressive contributions with respect to teaching learning, research and consultancy, innovation and transfer of technology, community service and value education, in toto. It imparts quality education to rural, tribal and urban people across the nation which is excellent in terms of academic activities and providing an eco-friendly atmosphere to the stakeholders.

10. References

BIS, Code for Practice of Industrial Lighting (IS: 6665-1972). Bureau of Indian Standards, New Delhi, India.

BEE, 2015. Bureau of Energy Efficiency, A statutory Body Under Ministry of Power, Government of India.

Carbon footprint calculation. www.carbonfootprint.com.

Code for Practice of Industrial Lighting (IS: 6665-1972). Bureau of Indian Standards, New Delhi, India.

Gnanamangai, B.M., Murugananth, G. and Rajalakshmi, S. 2021. *A Manual on Environmental Management Audits to Educational Institutions and Industrial Sectors*. Laser Park Publishing House, Coimbatore, Tamil Nadu, India. 366 p.

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

NBC, 2016. National Building Code of India 2016, Volume 2. Bureau of Indian Standards, New Delhi, India

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

Permissible Limits of Noise Levels for Rotating Electrical Machines (IS: 12065 - 1987). Bureau of Indian Standards, New Delhi, India.

Rajalakshmi, S., Amzad Basha, K. and Asif Jamal, G.A. 2023. *A Manual on Waste Management Audit*. Laser Park Publish House, Coimbatore, Tamil Nadu, India. 163p.

Soil Test Methods, 2011. Methods Manual - Soil Testing in India, Department of Agriculture & Co- operation. January 2011 Edition, Ministry of Agriculture Govt. of India. New Delhi.

Soil Test Methods, 2016. Methods of Test for soils (IS 1270-1984). Indian Standards Institution, New Delhi, India.

Water Test Methods 2016. Drinking Water – Specification (IS 10500: 2012). Bureau of Indian Standards. New Delhi, India.

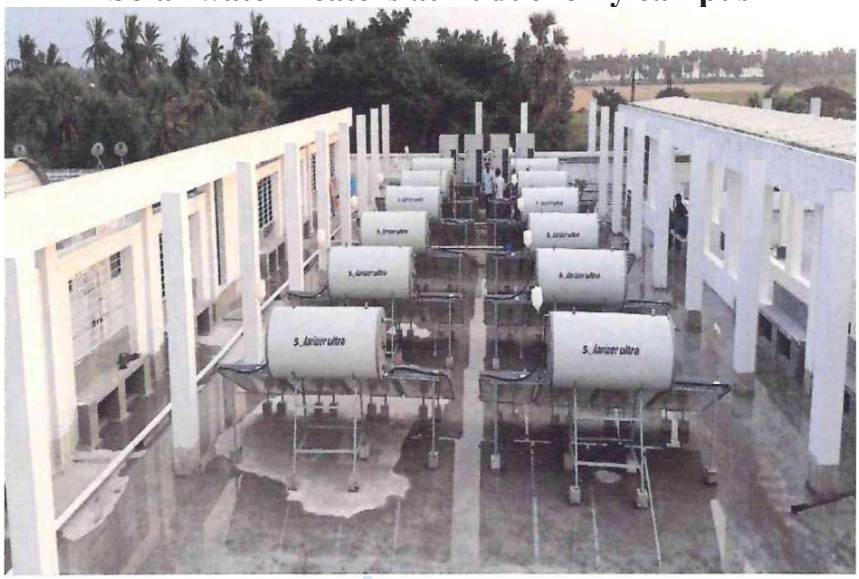
Solar Panels at Puducherry campus







Solar water heaters at Puducherry campus







Solar Panels at Karaikal campus



Solar Panels at Chennai campus



Solar Panels at Salem campus





AVIT
AARUPADAI VEEDU INSTITUTE OF TECHNOLOGY

VINAYAKA MISSION'S
RESEARCH FOUNDATION
(Deemed to be University Under Section 3 of the UGC Act 1956)

SOLAR ENERGY GENERATION & CONSUMPTION DETAILS FROM JAN 2025 TO DEC 2025

SL.NO	MONTH	GENERATION	CONSUMPTION	REMARK
1	JANUARY	5193	5193	
2	FEBRUARY	5814	5814	
3	MARCH	6362	6362	
4	APRIL	5428	5428	
5	MAY	3960	3960	
6	JUNE	3630	3630	
7	JULY	4107	4107	
8	AUGUST	4075	4075	
9	SEPTEMBER	3903	3903	
10	OCTOBER	3357	3357	
11	NOVEMBER	2526	2526	
12	DECEMBER	2852	2852	
TOTAL UNITS		**51207**	**51207**	

ASST. ENGINEER - ELECTRICAL

GENERAL MANAGER - FACILITIES

AARUPADAI VEEDU INSTITUTE OF TECHNOLOGY
PAIYANOOR
603 104.

Electrical Department | VMMC | KKL

Hospital - 100 kW PV Rooftop Solar Plant

Units Generated for the Year 2025

Sl. No.	Month (2025)	Units
1	January	7150
2	February	8550
3	March	7250
4	April	3250
5	May	3120
6	June	4650
7	July	3650
8	August	4250
9	September	3100
10	October	4350
11	November	9925
12	December	11865
	Total	**71110**

Electrical Department | AVMC | PDY

Hospital - 1306.8 kW PV Rooftop Solar Plant

Units Generated for the Year 2025

Sl. No.	Month	Solar Unit
1	Mar-25	5330
2	Apr-25	76523
3	May-25	116920
4	Jun-25	178434
5	Jul-25	211328
6	Aug-25	161650
7	Sep-25	155550.7
8	Oct-25	137398
9	Nov-25	125022.5
10	Dec-25	111407.4
	Total	1279564

List of VMRF (DU) Publications Made on SDG-7 in the Year 2025

S.No	Authors	Title	Year	Source title	DOI	Source
1	Chitra L.; Niramalkumar V.; Muthumani G.; Gunasankar R.	Enhanced Energy Harvesting and Efficient Power Management for Grid-Connected DC Microgrid Using Landsman Converter and Modified MPPT	2025	2025 8th International Conference on Circuit, Power and Computing Technologies, ICCPCT 2025	10.1109/ICCPCT65132.2025.11176539	Scopus
2	Baskaran D.; Nagarajan L.; Saravanan P.; Byun H.-S.	Understanding the characteristics of SO2 capture: Effect of solar-assisted adsorbent, isotherms, kinetics, thermodynamics, and mechanism	2025	Alexandria Engineering Journal	10.1016/j.aej.2025.05.031	Scopus
3	Loganathan P.; Devika S.V.; Trivedi L.M.; Devi S.R.; Malik N.; Jayakumar D.	Optimizing Urban Solid Waste-to-Energy Production Systems with Backpropagation Neural Network Model	2025	3rd International Conference on Integrated Circuits and Communication Systems, ICICACS 2025	10.1109/ICICACS65178.2025.10967692	Scopus
4	Jose C.; Prakash S.	Advanced Solar PV System with Battery Storage and Grid Integration Using Optimized ANFIS-Based MPPT and Self-Lift Luo Converter	2025	2025 International Conference on Engineering Innovations and Technologies, ICoEIT 2025	10.1109/ICoEIT63558.2025.11211798	Scopus
5	Chitra L.; Anbarasu P.; Anthony Fernandans G.; Kalaimani S.	Hybrid PV-Fuel Cell Powered EV Charging System With Intelligent State-Of-Charge Monitoring And Control Using RNN	2025	2025 8th International Conference on Circuit, Power and Computing Technologies, ICCPCT 2025	10.1109/ICCPCT65132.2025.11176611	Scopus
6	Rajesh M.; Pitchumani Angayarkanni S.; Viswanathan R.; Karthik K.; France K.	A Harmonic Optical System with Reduced Computing Performance by the Use of Non-Numerical Excessive Sampling Processing of Digital Signals	2025	5th IEEE International Conference on Innovations in Power and Advanced Computing Technologies, i-PACT 2025	10.1109/i-PACT65952.2025.11308021	Scopus
7	Boopathy K.; Venketesan P.P.; Venkatesan S.P.; Karthik K.	A Novel Firefly Optimized P&O Based MPPT Controller for Single Phase Grid Connected PV System	2025	2025 8th International Conference on Circuit, Power and Computing Technologies, ICCPCT 2025	10.1109/ICCPCT65132.2025.11176520	Scopus
8	Devarajan R.; Selvam P.	Design and Implementation of Solar Powered Induction Heater	2025	Proceedings of 5th International Conference on Trends in Material Science and Inventive Materials, ICTMIM 2025	10.1109/ICTMIM65579.2025.10988003	Scopus
9	Venkatesan R.K.; Lakshmikanthan C.	A quadruple-boost nine-level common-ground inverter with reduced voltage stress for grid-connected PV systems	2025	Results in Engineering	10.1016/j.rineng.2025.107883	Scopus

List of VMRF (DU) Publications Made on SDG-7 in the Year 2025

S.No	Authors	Title	Year	Source title	DOI	Source
10	Selvaraj Y.; Eswaramoorthy N.; Elayappan V.; Muthusamy P.K.; Venkattappan A.; Paramasivam K.; Mtangi M.M.; Sangaraju S.	2D/2D N-doped reduced graphene oxide/hexagonal boron nitride composites from recycled batteries for high-performance symmetric coil cell supercapacitors	2025	Results in Engineering	10.1016/j.rineng.2025.107619	Scopus
11	Saranya R.; Jansi K.R.; Gowthami M.; Priya N.; GaneshBabu T.R.; Murugan S.	Autonomous Voltage Stabilization in Hybrid Energy Grids with Reinforcement Learning	2025	Proceedings of 5th International Conference on Trends in Material Science and Inventive Materials, ICTMIM 2025	10.1109/ICTMIM65579.2025.10988209	Scopus
12	Arathi B.N.; Suresh G.B.; Karthikeyan M.; Bandlamudi S.; Sankarganesh R.; Manimaran M.	Applications of Green Renewable Energy in E-Vehicle Integrated Charging Systems	2025	Proceedings of 3rd IEEE International Conference on Knowledge Engineering and Communication Systems, ICKECS 2025	10.1109/ICKECS65700.2025.11035331	Scopus
13	Krishnamoorthi S.; Prabhu L.; Prabhahar M.; Abdulla A.; Mehaboob A.	Optimization of biodiesel production from jatropha oil and its impact on engine performance and emissions using response surface methodology	2025	Environmental Research and Technology	10.35208/ert.1485673	Scopus
14	Gowrishankar R.; Sithar Selvam P.M.; Narayana K.S.; Raja T.; Gokul R.; Mayakannan S.	Design and Optimization of a Biocompatible Polyethylene Composite with Nelumbo Nucifera Fiber and Nano-banana Peel Filler for Sustainable Environmental Applications	2025	Journal of Environmental Nanotechnology	10.13074/jent.2025.03.244410	Scopus
15	Ranganathan C.S.; Arokiaraj Jovith A.; Selvarani P.; Saravana Kumar S.; Sujatha S.; Niranjan Kumar K.A.	IoT-Driven Green Building Materials and Life Cycle Assessment with Gradient Boosting Machines	2025	2024 International Conference on Smart Technologies for Sustainable Development Goals, ICSTSDG 2024	10.1109/ICSTSDG61998.2024.11026661	Scopus
16	Pothula N.; Sunkara N.; Vanitha R.; Thiyagesan M.; Aancy H.M.; Mallala B.	Beluga Whale Optimization for Effective Energy Management in Microgrids with Electric Vehicle Charging in Smart Distribution Networks	2025	Proceedings of the International Conference on Multi-Agent Systems for Collaborative Intelligence, ICMSCI 2025	10.1109/ICMSCI62561.2025.10894279	Scopus
17	Gowri N.V.; Lodhi E.; Loganathan P.; Kondoju S.K.; Kansal V.; Saritha G.; Sandiri R.; Prakash K.B.	LSTM-ANN Controllers for Grid Integrated DFIG Driven Wind Power Production System	2025	2025 International Conference on Computing Technologies, ICOCT 2025	10.1109/ICOCT64433.2025.11118831	Scopus
18	Prakash S.; Kumar J.R.; Manikandan P.; Siva B.	RNN-Based Control Strategy for Grid Connected Hybrid Systems Integrating Renewable Energy Sources	2025	2025 8th International Conference on Circuit, Power and Computing Technologies, ICCPCT 2025	10.1109/ICCPCT65132.2025.11176650	Scopus

List of VMRF (DU) Publications Made on SDG-7 in the Year 2025

S.No	Authors	Title	Year	Source title	DOI	Source
19	Selvakumar R.A.K.; Devaraj V.M.; Lenin R.A.; Sandran N.; Chang J.-H.; Gali Anthoni S.J.	Impact of WO3:CeO2@MXene/gC3N4 nano disk on sunlight-driven photocatalytic removal of fluoroquinolone antibiotic and high-performance supercapacitor application	2025	Carbon Letters	10.1007/s42823-025-00951-1	Scopus
20	Ramu K.; Sreenivasulu G.; Sharma Dixit R.; Lohmor Choudhary S.; Venkateswara Rao K.; Kumar Suman S.; shuaib M.; Rajaram A.	Smart solar power Conversion: Leveraging Deep learning MPPT and hybrid cascaded h-bridge multilevel inverters for optimal efficiency	2025	Biomedical Signal Processing and Control	10.1016/j.bspc.2025.107582	Scopus
21	Rattan Kumar V.; Das S.; Sasidharan B.; Vasu K.	Interleaved PFC-SEPIC Converter Based Wireless Power Transfer For EV Charging System	2025	2025 8th International Conference on Circuit, Power and Computing Technologies, ICCPCT 2025	10.1109/ICCPCT65132.2025.11176760	Scopus
22	Chitra L.; Manigandan G.; Nagapravin N.; Muthuvel S.	Integrated DC to DC Converter for Renewable Energy Applications	2025	2025 8th International Conference on Circuit, Power and Computing Technologies, ICCPCT 2025	10.1109/ICCPCT65132.2025.11176689	Scopus
23	Murugan S.K.; Kumari P.; Baskaran T.L.; Dimen L.; Nuta A.C.	Comparative Economic Impact of Green Energy Investments: Evidence from India, USA, Germany, and Denmark	2025	Energies	10.3390/en18143626	Scopus
24	Sathiyaraj S.; Venkatesan S.; Meena R.L.; Sahoo S.S.R.	Development of a Hydrogen-Fueled Transit Vehicle	2025	Springer Proceedings in Materials	10.1007/978-981-96-7380-3_21	Scopus
25	Chitra L.; Geethi P.; Ramya L.N.	A Comprehensive Analysis on the Advances in Battery Modeling, Intelligent Management Systems, and Digital Twin Integration	2025	3rd International Conference on Emerging Applications of Material Science and Technology, ICEAMST 2025	10.1109/ICEAMST67459.2025.11335645	Scopus
26	Palraj K.; Ravi D.; Sreekumar Prabha S.	Sustainable Green Phase Change Materials: A Comprehensive Review of Thermal Energy Storage	2025	Lecture Notes in Civil Engineering	10.1007/978-981-95-2266-8_62	Scopus
27	Boopathy K.; Manikandan K.; Gokulraj V.; Rafik M.	Hysteresis Controller Based PFC Controlled Three Phase Vienna Rectifier for PMSG Fed Wind Energy Conversion Systems	2025	2025 8th International Conference on Circuit, Power and Computing Technologies, ICCPCT 2025	10.1109/ICCPCT65132.2025.11176755	Scopus
28	Pulatovich K.S.; Sodikov K.; Bexruz G.; Sobirova S.; Berdieva D.; Vaishnodevi S.; Sathish R.	Smart Sensor-Embedded Textile Antenna System for Real-Time Tracking of Respiratory and Musculoskeletal Disorders Using IoT-based Remote Healthcare Networks	2025	National Journal of Antennas and Propagation	10.31838/NJAP/07.03.32	Scopus

List of VMRF (DU) Publications Made on SDG-7 in the Year 2025

S.No	Authors	Title	Year	Source title	DOI	Source
29	Dhas Bensam S.; Kavitha Kumari K.S.; Alluri A.; Rajesh P.	Fuel cell EV for smart charging with stochastic network planning using hybrid EOO-SNN approach	2025	Analog Integrated Circuits and Signal Processing	10.1007/s10470-025-02429-6	Scopus
30	Favas C.S.A.; Ramarao M.; Prakash S.; Nallusamy S.	Nanotechnology-Assisted Performance, Combustion and Emission Control: A Study on Al2O3-Enriched GABME B20 in CI Engines	2025	International Journal of Engineering Trends and Technology	10.14445/22315381/IJETT-V73I11P109	Scopus
31	Prakash S.; Javith N.; Jayanthinathan G.; Karthisan S.	Coupled Inductor Based Three Port High Gain DC to DC Converter for Renewable Energy Systems	2025	2025 8th International Conference on Circuit, Power and Computing Technologies, ICCPCT 2025	10.1109/ICCPCT65132.2025.11176544	Scopus
32	Keren Persis P.; Rekha E.; Basha I.A.; Geetha R.; Sudhakar R.; Kishore Y.R.	Exploring Cycle and Calendar Life in Lithium Ion Batteries with an Emphasis on Degradation Assessment	2025	3rd International Conference on Electronics and Renewable Systems, ICEARS 2025 - Proceedings	10.1109/ICEARS64219.2025.10940623	Scopus
33	Marappan M.; Mahendran A.; Ravivarman G.; Suresh Kumar K.; Elango M.; Kesavan S.P.; Devarajan R.	Optimized Cooling Solutions for Lithium-Ion Batteries in Electric Vehicles using PCM Composites	2025	E3S Web of Conferences	10.1051/e3sconf/202561902011	Scopus
34	Venkatachalam R.; Supriya S.; Deshpande M.R.; Vaidevi C.; Bhattacharya S.	Implementing Zero Liquid Discharge Systems to Minimize Industrial Wastewater Residues in Mechanical Manufacturing Processes	2025	Springer Water	10.1007/978-3-031-84909-1_3	Scopus
35	Palraj K.; Divahar R.; Sangeetha S.P.	Green phase change materials for sustainable buildings: A pathway to low-carbon thermal management	2025	Journal of Energy Storage	10.1016/j.est.2025.118953	Scopus
36	Subathra M.; Devika R.	Conversion of Citrus Fruit Peel into a Value-Added Product, Bio-Oil	2025	Nature Environment and Pollution Technology	10.46488/NEPT.2025.v24i01.B4207	Scopus
37	Lakshmi T.R.V.; Singh A.; Li W.; Rajasekaran P.; Gupta S.; Premchandh M.; Kurulekar M.	Plasmonic Nanostructures for Enhanced Solar Energy Harvesting in Thin-Film Photovoltaic Devices	2025	International Academic Journal of Science and Engineering	10.71086/IAJSE/V12I3/IAJSE1228	Scopus
38	Balasubramaniam A.; Baskar V.V.; Jawahar Rani K.; Bhuvaanesh Ravikaruna Moorthy B.S.; Suresh M.; Murugan S.	Feedforward Neural Network for Temperature Forecasting in Smart Agriculture and Energy Planning	2025	2025 3rd World Conference on Communication and Computing, WCONF 2025	10.1109/WCONF64849.2025.11233741	Scopus
39	Prabhahar M.; Prakash S.; Dharsan P.; Elumalai P.V.; Xueyi F.; Hasan N.	Optimization of thermal barrier coating with induced copper oxide nanoparticles in CI engine using algae methyl ester as fuel	2025	Scientific Reports	10.1038/s41598-025-02711-7	Scopus

List of VMRF (DU) Publications Made on SDG-7 in the Year 2025

S.No	Authors	Title	Year	Source title	DOI	Source
40	Maniraj S.P.; Monisha J.; Amutha R.; Kavitha R.; Shriidhar P.J.; Srinivasan C.	Agricultural Water Conservation through AI-Enhanced Solar IoT Networks	2025	3rd International Conference on Electronics and Renewable Systems, ICEARS 2025 - Proceedings	10.1109/ICEARS64219.2025.10940116	Scopus
41	Antony Casmir Jayaseelan G.; Samuvel Michael B.; Subathra M.; Vinoth K.; Babu T.	Effect of Dual Biodiesel Blends with Ethanol as Additives in CI Engine	2025	Springer Proceedings in Materials	10.1007/978-981-96-7380-3_15	Scopus
42	Selvan G.; Krishna V.A.; Thiyagesan M.; Venkatasubramanian R.; Vanitha R.; Sarojwal A.; Sivaramkumar M.	IoT-Enabled Predictive Maintenance for Renewable Energy Systems	2025	Proceedings of the International Conference on Multi-Agent Systems for Collaborative Intelligence, ICMSCI 2025	10.1109/ICMSCI62561.2025.10894630	Scopus
43	Lakshmi D.; Yuvaraj T.; Devabalaji K.R.; Thanikanti S.B.; Mahmud P.	Optimizing Hybrid Renewable Energy Sources and Grid Integration for Economic Analysis Using the Hunter-Prey Optimization Algorithm	2025	2025 8th International Conference on Circuit, Power and Computing Technologies, ICCPCT 2025	10.1109/ICCPCT65132.2025.11176764	Scopus
44	Rajasekaran M.; Krishnamoorthi S.; Vijayaragavan M.	An experimental investigation of the effects of blending camphor oil infused with jack fruit biodiesel and nanoparticles on the performance, combustion, and exhaust emissions of a compression ignition engine	2025	Proceedings of the Institution of Mechanical Engineers, Part E: Journal of Process Mechanical Engineering	10.1177/09544089231225750	Scopus
45	Sree S.S.; Muthalakshmi M.; Surendhar S P.A.; Kumar A.S.S.; Panigrahi B.S.; Gomalavalli R.; Vinodhini R.	Designing an empirical grid-connected PV system based on FLC-MPPT approach for local community use	2025	International Journal of Information Technology (Singapore)	10.1007/s41870-025-02631-9	Scopus
46	Kumar I.; Tamilselvam M.; Vijayakumar G.N.S.; Singh V.; Pandey R.K.; Shivanand C.G.; Rajendiran M.; Prasad A.R.	Redefining Concrete Sustainability: The Potential of Nano-Materials in Green Construction	2025	AIP Conference Proceedings	10.1063/5.0263877	Scopus
47	Nangan S.; Joseph A.M.; Kuppusamy K.	Recent Advances in Photo-Fermentative Biohydrogen Production: Substrate Pretreatment, Strain Improvement, Bioreactor Optimization	2025	Biohydrogen Production: An Overview of Diverse Feedstock and Modern Technologies	10.1201/9781003568612-7	Scopus
48	Soni N.; Gupta P.; Singh S.D.K.; Velramar B.; Agrawal N.; Selvan S.T.; Pamidimarri S.D.V.N.; Singh R.K.	Conversion of Plastic Waste to Chemicals and Biofuels	2025	Valorization of Solid Wastes to Biofuels and Chemical Products for Sustainable World	10.1007/978-981-96-8594-3_4	Scopus

List of VMRF (DU) Publications Made on SDG-7 in the Year 2025

S.No	Authors	Title	Year	Source title	DOI	Source
49	Yuvaraj T.; Sengolrajan T.; Prabaharan N.; Devabalaji K.R.; Uehara A.; Senjyu T.	Enhancing Smart Microgrid Resilience and Virtual Power Plant Profitability Through Hybrid IGWO-PSO Optimization With a Three-Phase Bidding Strategy	2025	IEEE Access	10.1109/ACCESS.2025.3565460	Scopus
50	Sainaath R.; Thiyagesan M.; Isabella L.A.; Vanitha R.; Akash G.; Sourav Krishna R.	Multimodal Data Fusion using EKF and Deep Learning for Battery Fault Prediction	2025	Proceedings of the 6th International Conference on Electronics and Sustainable Communication Systems, ICESC 2025	10.1109/ICESC65114.2025.11212370	Scopus
51	Manoharan L.; Kumar V.V.; Dwibedi R.K.; Lahari A.; Kumar K.P.; Kumar J.S.	Optimized Clustering in WSN using Fuzzy Logic Techniques	2025	Proceedings of 7th International Conference on Inventive Material Science and Applications, ICIMA 2025	10.1109/ICIMA64861.2025.11073843	Scopus
52	Ismail R.; Loganathan P.; Bhaskar K.B.; Al-Mattarneh H.; Kansal V.; Venkatasubramanian R.; Kumar G.A.E.S.; Prakash K.B.	Enhancement of Power Quality Improvement in Standalone Microgrid with 2DOF-PID Controllers based DSTATCOM under Various Faults	2025	5th IEEE International Conference on Sustainable Energy and Future Electric Transportation, SeFeT 2025	10.1109/SEFET65155.2025.11255359	Scopus
53	Jeffrey J.A.; Govindraj S.; Mahesh R.; Bhaskar A.; Arunkumar K.; Joseph R.E.; Hariram V.; Punitharaj V.; Sarathipriyan S.	Influence of Fe2O3 Nanoparticle-infused Waste Cooking Oil Biodiesel on the Emission, Performance, and Combustion Aspects towards a Cleaner Environment	2025	Journal of Environmental Nanotechnology	10.13074/jent.2025.09.2531638	Scopus
54	Kanagaraj K.; Karuppanan K.; Nangan S.	Carbon-based nanomaterials from plant extracts and other bioresources in hydrogen storage applications	2025	Nanostructured Carbon Materials from Plant Extracts: Synthesis, Characterization, and Applications	10.1016/B978-0-323-95126-5.00009-3	Scopus
55	Sitharthan R.; Rajesh M.; Kumar R.S.; Dhanabalan S.S.	Real-time data fetching approach for performance evaluation of a DFIG wind power generation system using an IoT-enabled wind emulator	2025	Scientific Reports	10.1038/s41598-025-24234-x	Scopus
56	Kumar S.; Karthika M.; Ramkumar S.; Matyakubova J.; Isakov A.; Mathankumar S.; Selvam P.	Energy-efficient Battery-less Wearable Antenna Integrated with RF Energy Harvesting Modules for Long-term Health Monitoring in IoT Healthcare Ecosystems	2025	National Journal of Antennas and Propagation	10.31838/NJAP/07.03.25	Scopus
57	Samuvel Michael B.; Krishnamoorthi S.; Senthilkumar A.; Raj Kumar G.; Praveen Kumar C.	Exploring the Impact of Varied Injection Angle on the Performance of a Variable Compression Ratio (VCR) Engine Fueled by Biodiesel from Plastic Waste	2025	Springer Proceedings in Materials	10.1007/978-981-96-7380-3_12	Scopus

List of VMRF (DU) Publications Made on SDG-7 in the Year 2025

S.No	Authors	Title	Year	Source title	DOI	Source
58	Senthil J.; Prabhahar M.; Thiagarajan C.; Nallusamy S.; Prakash S.	Effect of Metal Oxide Nano Liquid on Diesel/Plastic Oil Mixture Diesel Engine Performance	2025	International Journal of Engineering Trends and Technology	10.14445/22315381/IJETT-V73I2P114	Scopus
59	Chitra L.; Selvakumar G.; Prakash S.	Flywheel Energy Storage System Based Grid Integration With PMSM and SVPWM Control	2025	2025 IEEE 1st International Conference on Recent Trends in Computing and Smart Mobility, RCSM 2025	10.1109/RCSM67767.2025.11508020	Scopus
60	Murugan S.K.; Rede G.D.; Baskaran T.L.; Kumari P.; Nuta A.C.	DETERMINANTS OF SOLAR WATER PUMPING SYSTEM ADOPTION AMONG FARMERS: A FACTOR ANALYSIS APPROACH	2025	Journal Of Economic Sciences: Theory And Practice	10.30546/jestp.2025.82.02.2016	Scopus
61	Vijayan D.S.; Devarajan P.; Mohanavel V.; Sankaran N.; Kannan S.; Ahsan M.S.	A Review of Sustainable Implications of Energy-Efficient Buildings in the Environment	2025	Advances in Civil Engineering	10.1155/adce/9584777	Scopus
62	Poornima P.; Boopathy K.	Experimental Investigation and Development of Fuzzy Logic-Based MPPT for Photovoltaic Systems Across Varied Climatic Conditions	2025	Engineering Access	10.14456/mijet.2025.23	Scopus
63	Jeevitha N.; Mouleswararao B.; Mohankumar N.; GnanaPrakash L.; Mahalakshmi R.; Pachiyappan R.	AI and IoT-Driven Optimization of Solar Thermal Collectors for Industrial Heat Applications	2025	Proceedings of the 2025 11th International Conference on Communication and Signal Processing, ICCSP 2025	10.1109/ICCSP64183.2025.11089246	Scopus
64	Krishnamoorthi S.; Prabhu L.; Rahil M.; Nagasai K.; Faim M.	Experimental Investigation of Diesel Engine Using Chlorella Algae-Acetylene by Dual Fuel Mode	2025	Springer Proceedings in Materials	10.1007/978-981-96-7380-3_7	Scopus
65	Kumaran P.; Sathiyaraj S.; Mahesh R.; Vignesh V.; Vineeth A.	Assessment of Kusum Biodiesel and Octanol Blends on Diesel Engine Performance and Emissions: A Comprehensive Study of Efficiency Trade-offs and Environmental Benefits	2025	El-Cezeri Journal of Science and Engineering	10.31202/ecjse.1590321	Scopus
66	Prakash S.; Jose C.	Solar Energy Integration with Landsman Converter and RBFNN MPPT for Three-Phase Grid Applications	2025	2025 International Conference on Engineering Innovations and Technologies, ICoEIT 2025	10.1109/ICoEIT63558.2025.11211806	Scopus
67	Helenprabha K.; Amarnath R.N.; Mohankumar N.; Gopi B.; Aishwarya N.; Murugan S.	IoT-Enabled Reinforcement Learning for Autonomous Robotic Lawn Mowers in Residential Gardens	2025	3rd International Conference on Intelligent Data Communication Technologies and Internet of Things, IDCIoT 2025	10.1109/IDCIOT64235.2025.10915139	Scopus

List of VMRF (DU) Publications Made on SDG-7 in the Year 2025

S.No	Authors	Title	Year	Source title	DOI	Source
68	Srinivasan S.A.; Musthafa B.; Vardhana Naidu B.V.; Kumar M.S.	Optimization and experimental investigation on CI engine characteristics fuelled with low carbon alcohols and juliflora biodiesel blends: A RSM approach	2025	Fuel	10.1016/j.fuel.2025.134542	Scopus
69	Nageswari C.S.; Pandey P.; Sujitha R.; Sujatha M.; Senthilkumar S.; Sujatha S.	Adaptive Solar Energy Storage with Deep Learning for Improved Grid Resilience	2025	Proceedings of 5th International Conference on Trends in Material Science and Inventive Materials, ICTMIM 2025	10.1109/ICTMIM65579.2025.10988013	Scopus
70	Venkatesh R.; Singh P.K.; Narendrudu T.; Mohanavel V.; Vijayan D.S.; Kedia A.; Soudagar M.E.M.; Fouly A.; Seikh A.H.	Effect of copper back contact and varied ZnO layer thickness on functional properties of Cadmium telluride solar cell	2025	Indian Journal of Physics	10.1007/s12648-025-03718-6	Scopus
71	Parameswari R.; Madhan Kumar P.; Azhagu P.S.; Yogesh T.; Janani I.; Ganesamoorthy R.; Babujanarthanam R.	Materials for Microbial Fuel Cells: Harnessing Bio Electrochemical Systems	2025	Sustainable Materials for Fuel Cell Technologies	10.1002/9781394247806.ch8	Scopus
72	Sengodan N.; Mayakannan S.; Venugopal K.; Raja T.	Performance and Analysis of RCCI Combustion using Gasoline and Jatropha Curcas Biodiesel for Enhanced Efficiency and Reduced Emissions in CI Engines	2025	International Journal of Vehicle Structures and Systems	10.4273/ijvss.17.3.20	Scopus
73	Hariram V.; Sathishbabu R.; John J.G.; Kailiappan N.; Vijayakumar K.; Kumar E.S.; Priya K.K.	Maximizing the combustion phenomenon with reduced emission of a compression ignition engine fulled with Dunaliella salina biodiesel and hydrogen blends	2025	Scientific Reports	10.1038/s41598-025-16285-x	Scopus
74	Jayaseelan G.A.C.; Ashim M.A.P.; Srinivas S.; Rajendran P.	Experimental Investigation and Central Composite Design Modeling Optimization of Dual Biodiesel Mixture in CI Engine Parameters	2025	Russian Journal of Physical Chemistry B	10.1134/S1990793125700666	Scopus
75	Hussain K.; Selvi K.; Murugesan G.; Govindasamy S.; Ramachandran G.; Nirmal Raj A.	Internet of Things Based Agriculture Crop Cutting Mechanism Using Green Energy and its Applications	2025	2025 IEEE 14th International Conference on Communication Systems and Network Technologies, CSNT 2025	10.1109/CSNT64827.2025.10967666	Scopus
76	Rao V.C.S.; Shanmathi M.; Rajkumar M.; Haleem S.L.A.; Amirthalingam V.; Vanathi A.	Maximizing network efficiency by optimizing channel allocation in wireless body area networks using machine learning techniques	2025	Internet Technology Letters	10.1002/itl2.458	Scopus

List of VMRF (DU) Publications Made on SDG-7 in the Year 2025

S.No	Authors	Title	Year	Source title	DOI	Source
77	Regilan S.; Hema L.K.; Jenitha J.	ReLeC-MEO: Reinforcement Learning-Based Clustering With Multi-Objective Efficient Optimization for Energy-Efficient IoT Networks	2025	International Journal of Communication Systems	10.1002/dac.70239	Scopus
78	Peethambaram G.; Sankaranarayanan M.; Ruthrakotti S.; Selvam M.	Energy Management in PV Grid Systems with Whale Optimized PI Controller and IoT Monitoring	2025	2025 8th International Conference on Circuit, Power and Computing Technologies, ICCPCT 2025	10.1109/ICCPCT65132.2025.11176465	Scopus
79	Muruhan S.; Nirmala C.; Gnanamathy G.; Roopa N.; Jayakumar M.	An overview of water quality, water pollutants, and the importance of nanomaterials in water remediation	2025	Current Advancements in Nanomaterials for Wastewater Remediation: Challenges and Mitigation Strategies	10.1016/B978-0-443-16112-4.00002-5	Scopus
80	Shyamalagowri M.; Prabhakaran P.; Vairavel K.S.; Devarajan R.; Hussaini M.M.; Padmavathi M.	AI-Integrated Solar Powered Autonomous Electric Vehicle and a Zero Tailpipe Emission Analysis	2025	2025 International Conference on Computational Innovations and Engineering Sustainability, ICCIES 2025	10.1109/ICCIES63851.2025.11032742	Scopus
81	Nangan S.; Selvaraj Y.; Okhawilai M.; Venkattappan A.; Kumar A.; Ubaidullah M.	Integrating experimental validation, density functional theory insights, and AI perspectives to develop an efficient electrocatalyst for sustainable electricity generation	2025	Microchemical Journal	10.1016/j.microc.2025.115770	Scopus
82	Essaki Raj R.; Thiyagesan M.; Saradha Devi A.; Suresh T.D.; Sankara Kumar S.; Vanitha R.	MISO SEPIC for Enhanced Efficiency in Renewable Energy Systems Using AIML Algorithms	2025	Proceedings of the 2025 11th International Conference on Communication and Signal Processing, ICCSP 2025	10.1109/ICCSP64183.2025.11088465	Scopus
83	Antony Casmir Jayaseelan G.; Samuvel Michael B.; Elanthiraiyan A.; Arun Kumar M.N.; Mohammed Iqbal N.	Effect oF Cu2O Nanoparticle in Candlenut Biodiesel Blends in CI Engine	2025	Springer Proceedings in Materials	10.1007/978-981-96-7380-3_34	Scopus
84	Subathra M.; Devika R.	A Comparative Study on Hydrothermal Liquefied Biochar as Biofertilizer for Increased Plant Yield	2025	Agricultural Science Digest	10.18805/ag.D-6047	Scopus
85	Ashok Kumar R.; Ganesh Babu L.; Magesh Babu D.; Sellamuthu P.; Sivaraman G.; Karthikeyan R.	Enhancing Renewable Energy Penetration with Combined Heat and Power Units and Cryogenic Energy Storage	2025	E3S Web of Conferences	10.1051/e3sconf/202564803012	Scopus
86	Basivi P.K.; Selvaraj Y.; Perumal S.; Bojarajan A.K.; Lin X.; Girirajan M.; Kim C.W.; Sangaraju S.	Graphitic carbon nitride (g–C3N4)–Based Z-scheme photocatalysts: Innovations for energy and environmental applications	2025	Materials Today Sustainability	10.1016/j.mtsust.2024.101069	Scopus

List of VMRF (DU) Publications Made on SDG-7 in the Year 2025

S.No	Authors	Title	Year	Source title	DOI	Source
87	Rajesh M.; Sitharthan R.	Enhanced Edge Computing for Digital Twin Applications in Energy-Intensive Industrial Systems	2025	IEEE Power Electronics Magazine	10.1109/MPEL.2025.3624984	Scopus
88	Antony Casmir Jayaseelan G.; Musthafa B.; Anderson A.; Abishek J.A.; Bhuvaneshwaran K.	Exploring the Impact of Titanium Dioxide Nanoparticles as Fuel Additives in Candlenut Biodiesel–diesel Blends in a CI Engine	2025	Journal of Environmental Nanotechnology	10.13074/jent.2025.03.2511244	Scopus
89	Shivakumar G.S.; Vijayan D.S.	Exploring the Potential of Sea Shell Powder as a Phase Change Material	2025	Lecture Notes in Civil Engineering	10.1007/978-981-95-2266-8_20	Scopus
90	Thirugnanam B.; Mani P.; Settu M.; Venkattappan A.	Unlocking the potential of photocatalysts: Recent advances in layered double hydroxide and future outlook	2025	Journal of Environmental Sciences (China)	10.1016/j.jes.2025.02.040	Scopus
91	Musthafa B.; Prabhahar M.	Numerical and experimental investigation of CI engine parameters using palm biodiesel with diesel blends	2025	Scientific Reports	10.1038/s41598-025-00170-8	Scopus
92	Rajeshwaran R.; Logeshwari J.; Abirami R.	Effect of EPS Concrete: Balancing Construction Efficiency and Environmental Sustainability	2025	Nature Environment and Pollution Technology	10.46488/NEPT.2025.v24i02.B4268	Scopus
93	Parameshwar S.; Verma D.; Nangan S.; Jain S.; Varshney D.; Singh S.	Pine Needle–Derived Nanocatalysts via Sequential Pyrolysis–Microwave Synthesis: Applications in Waste Cooking Oil Biodiesel Production	2025	Journal of Nanotechnology	10.1155/jnt/2060809	Scopus
94	Krishnamoorthi S.; Thiagarajan C.; Prabhahar M.; Raghunathan A.K.; Deepak P.V.	Performance and Emission Characteristics of Soapnut Methyl Esters-Diesel Blends Between VCR and Tata Zip XL Engine	2025	Springer Proceedings in Materials	10.1007/978-981-96-7380-3_24	Scopus
95	Gobinath H.; Saivarshini R.; Gopinath N.P.; Manickam K.; Shunmugam P.	Design and Analysis of a Boost Type Nine-Level Inverter with Reduced Switch and Capacitor Voltage Stress	2025	2025 5th International Conference on Advances in Electrical, Computing, Communication and Sustainable Technologies, ICAECT 2025	10.1109/ICAECT63952.2025.10958934	Scopus
96	Sharmila C.; Baiju B.V.; Gino Sophia S.G.; Saranya S.; Suresh P.; Kirubha D.	Artificial intelligence framework for ISTAR missions in tactical networks using autonomous vehicles	2025	Battery-Free Sensor Networks for Sustainable Next-Generation IoT Connectivity	10.4018/979-8-3693-7600-3.ch013	Scopus
97	Thiyagesan M.; Magesh T.; Annie Isabella L.; Vanitha R.; Hemalatha S.; Geethaavarshni S.; Preethi K.	Wireless Electric Vehicle Charging Station using Solar Energy	2025	2025 International Conference on Emerging Technologies in Engineering Applications, ICETEA 2025 - Proceedings	10.1109/ICETEA64585.2025.11099878	Scopus
98	Gowda V.D.; Annepu A.; Arun G.; Gayathri K.M.; Thangadurai N.	Optimization of Solar Energy Systems Using Deep Learning	2025	AI-Driven Solutions for Solar Energy Efficiency, Irradiance Modeling, and PV Forecasting	10.4018/979-8-3373-1434-1.ch011	Scopus

List of VMRF (DU) Publications Made on SDG-7 in the Year 2025

S.No	Authors	Title	Year	Source title	DOI	Source
99	Thiagarajan C.; Prabhahar M.; Senthil J.; Vignesh G.; Kumar S.	Efficient Biodiesel Production from Mahua Seed Oil Using Acid and Base-Catalysed Transesterification: Process Optimization and Quality Assessment	2025	Springer Proceedings in Materials	10.1007/978-981-96-7380-3_20	Scopus
100	Joseph A.M.; Nangan S.; Kuppusamy K.	Recent Membrane-Based Technologies for Biohydrogen Production: Types of Bioreactors, Materials, Techno-Economic Analyses, and Its Future Prospects	2025	Biohydrogen Production: An Overview of Diverse Feedstock and Modern Technologies	10.1201/9781003568612-4	Scopus
101	Rajesh M.; Dhanasekaran K.; Kalivara Prasad B.; Moorthy U.; Easwaramoorthy S.V.	Energy harvesting techniques for self-sustaining wearables in remote environments	2025	Discover Internet of Things	10.1007/s43926-025-00210-9	Scopus
102	Rajasekaran M.; Krishnamoorthi S.; Ganesh P.R.; Vijayakumar A.; Yugendran S.	Synergistic Enhancement of Diesel Engine Performance and Emissions through Jackfruit Peel Biodiesel Blends: An Experimental Investigation	2025	International Journal of Vehicle Structures and Systems	10.4273/ijvss.17.1.12	Scopus
103	Karthick L.; Muthusamy P.; Manju J.; Bhat S.S.; Nagarajan L.; Venkatesh R.P.	Development of eco-friendly FRP rebar building material with chopped pineapple fiber and Si3N4 bioceramic vinyl ester	2025	Biomass Conversion and Biorefinery	10.1007/s13399-024-06269-8	Scopus
104	Gomathi S.; Tamilvani P.; Loganathan P.; Shyamalagowri M.	Optimized Bi-Directional Buck-Boost Converter for Hybrid V2G Storage	2025	Proceedings of International Conference on Modern Sustainable Systems, CMSS 2025	10.1109/CMSS66566.2025.11182374	Scopus
105	Raj R.S.; Hema L.K.	Dynamic clustering optimization for energy efficient IoT Network: A simple constrastive graph approach	2025	Expert Systems with Applications	10.1016/j.eswa.2024.125875	Scopus
106	Saravana Kumar M.; Prabhahar M.; Prakash S.; Hari Krishnan H.R.; Vijay B.	Improvement of a Battery Pack Enclosure Fabricated from a Polymer Composite Material for Electric Vehicles	2025	Springer Proceedings in Materials	10.1007/978-981-96-7380-3_27	Scopus
107	Balakrishnan S.; Simonthomas S.; Kumar S.S.; Rao K.S.; Kannan M.M.	Optimizing Smart Grid Performance through Real-Time State Estimation and Forecasting using Deep Learning based LSTM Models	2025	2025 IEEE 2nd International Conference on Green Industrial Electronics and Sustainable Technologies, GIEST 2025	10.1109/GIEST66547.2025.11387390	Scopus
108	Rajendran M.P.; Ramaswamy K.; Varadharajan V.; Rajendran J.; Thangavel M.; Kumar V.; Govindaraj J.	Bluetooth controlled robot with ultrasonic object detection using Arduino and L293d driver	2025	AIP Conference Proceedings	10.1063/5.0275769	Scopus

List of VMRF (DU) Publications Made on SDG-7 in the Year 2025

S.No	Authors	Title	Year	Source title	DOI	Source
109	Rajesh M.; Rajalingam B.	A modified sol-gel synthesis protocol for high-quality $ZnSnO_3$ thin films with enhanced electrical and optical properties for energy and sensor applications	2025	MethodsX	10.1016/j.mex.2025.103629	Scopus
110	Ramakrishnan R.; Jambunathan L.; Rajendran A.	Effect of EPS concrete: "structural performance and environmental impact on pollution control: an assessment of expanded polystyrene (EPS) concrete for sustainable construction"	2025	Environmental Science and Pollution Research	10.1007/s11356-025-36785-7	Scopus
111	Nallusamy S.; Devabalaji K.R.; Yuvaraj T.; Zneid B.A.; Zaitsev I.	A Four-Port Arduino-Controlled Nonisolated Bidirectional DC-DC Converter for Enhanced Solar-PV and Grid-Integrated Energy Systems	2025	International Transactions on Electrical Energy Systems	10.1155/etep/9067501	Scopus
112	Ramachandram V.; Ramani R.; Durga Pavani A.D.; Giji Kiruba D.G.; Meenatchiammai N.; Amirthalingam V.	Sustainable IoT Networks: An Energy-Efficient, Anomaly-Resilient Routing Framework	2025	2025 10th International Conference on Research in Intelligent Computing in Engineering, RICE 2025	10.1109/RICE67503.2025.11439919	Scopus
113	Balsingh S.M.; Krishnamoorthi S.; Prakash S.; Babu J.M.	Analysis of Performance, Combustion Dynamics and Emission Profiles of a VCR Multi-Fuel Engine with Ethanol-Plastic Oil Blend	2025	International Journal of Vehicle Structures and Systems	10.4273/ijvss.17.1.01	Scopus
114	Prakash S.; Arunraj A.; Paranthaman A.; Kishore R.	Wind Based DFIG Integrated Grid System Using Adaptive P&O Based MPPT Controller	2025	2025 8th International Conference on Circuit, Power and Computing Technologies, ICCPCT 2025	10.1109/ICCPCT65132.2025.11176765	Scopus
115	Prabhahar M.; Prakash S.; Boobesh Kumar P.; Kalidhasan B.	Enhanced Performance and Emission Characteristics of Soybean Biodiesel using TiO2 Nanoparticles in CRDI Engines: A Comprehensive Analysis	2025	International Research Journal of Multidisciplinary Technovation	10.54392/irjmt25114	Scopus
116	Shyamalagowri M.; Sarathkumar P.; Jeevakumar P.; Logasuriyaa C.; Sathish R.	Optimizing Electric Vehicle Efficiency: Customizable Driving Cycles for Energy Savings	2025	AIP Conference Proceedings	10.1063/5.0246683	Scopus
117	Eswaramoorthy N.; Harikrishnan L.; Selvaraj Y.; Shyma A.P.; Lakshmanan K.; Rajesh P.; Raguram T.	Eco-friendly carbon quantum dots from coffee waste: Improving charge transfer in solid-state perovskite solar cells	2025	Diamond and Related Materials	10.1016/j.diamond.2025.112386	Scopus
118	V H.; R S.; J G.J.; Kailiappan N.; K V.; E S.K.; K K.P.	Enhanced combustion and emission characteristics of diesel-algae biodiesel-hydrogen blends in a single-cylinder diesel engine	2025	Results in Engineering	10.1016/j.rineng.2025.104676	Scopus

List of VMRF (DU) Publications Made on SDG-7 in the Year 2025

S.No	Authors	Title	Year	Source title	DOI	Source
119	Shyamalagowri M.; Navin N.; Rubasree D.; Navaneetha Krishnan T.; Devarajan R.	Improved Power Factor Performance in Electric Vehicle Battery Charging via Modified Bridgeless Landsmans Converter	2025	Lecture Notes in Electrical Engineering	10.1007/978-981-96-1587-2_24	Scopus
120	Musthafa B.; Prabhahar M.	Experimental and numerical analysis of performance and emission characteristics of CI engine using Juliflora-Gulmohar biodiesel/blends and ANN prediction using MATLAB	2025	Case Studies in Thermal Engineering	10.1016/j.csite.2025.106338	Scopus
121	Prakash S.; Perumal M.; Kamali H.; Lokesh Kumar K.	Design and Control of a Z-Source-Based 7-Level Inverter for High-Performance Grid Applications	2025	2025 8th International Conference on Circuit, Power and Computing Technologies, ICCPCT 2025	10.1109/ICCPCT65132.2025.11176570	Scopus
122	Monisha S.; Suriya P.; Johny S.; Biju A.; Scaria N.M.	Sustainable Civil Engineering Practices: Implementing Green Building Technologies with AI Assistance	2025	1st International Conference on Advances in Computer Science, Electrical, Electronics, and Communication Technologies, CE2CT 2025	10.1109/CE2CT64011.2025.10939206	Scopus