Green Audit

Consultation Report

Shivajirao Kadam Institute of Technology & Management Near Ralamandal Sanctuary, Tillore Khurd, Indore (M.P.)

PREPARED BY

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(Academic Year 2020-21)

CONTENT

ACKNOWLEDGEMENT

Empirical Exergy Private Limited (EEPL), Indore takes this opportunity to appreciate & thank the management of **Shivajirao Kadam Institute of Technology & Management Near Ralamandal Sanctuary, Tillore Khurd, Indore (M.P.)** for giving us an opportunity to conduct green audit for the college.

We are indeed touched by the helpful attitude and co-operation of all faculties and technical staff, who rendered their valuable assistance and co-operation the course of study.

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(Director)

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Certificate of Accreditation

ENERGY IS LIFE
BEE
CONSERVE IT

BUREAU OF ENERGY EFFICIENCY

Examination Registration No.: EA- 7271
Accreditation Registration No.: AEA-284

Certificate of Accreditation

This is to certify that Mr./Ms. Shri. Rajesh Kumar Singadiya having its trade/registered office at ..... has been given accreditation as accredited energy auditor. The certificate shall be effective from 9th day of May, 2018

The certificate is subject to the provisions of the Bureau of Energy Efficiency (Qualifications for Accredited Energy Auditors and Maintenance of their List) Regulations, 2010.

This certificate shall be valid until it is cancelled under regulation 9 of the Bureau of Energy Efficiency (Qualifications for Accredited Energy Auditors and Maintenance of their List) Regulations, 2010.

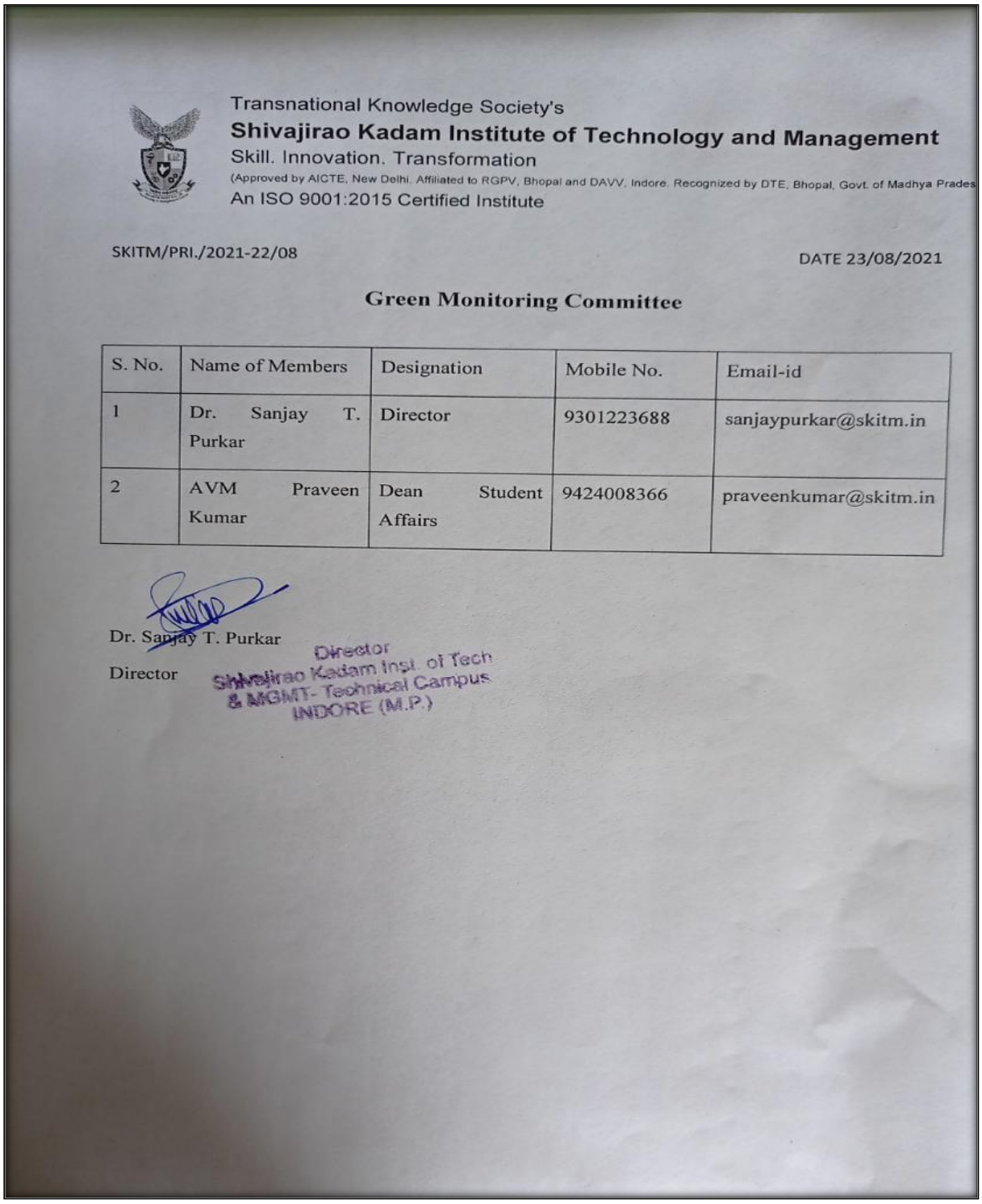
On cancellation, the certificate of accreditation shall be surrendered to the Bureau within fifteen days from the date of receipt of order of cancellation.

Your name has been entered at AEA No. 284 in the register of list of accredited energy auditors. Your name shall be liable to be struck out on the grounds specified in regulation 8 of the Bureau of Energy Efficiency (Qualifications for Accredited Energy Auditors and Maintenance of their List) Regulations, 2010.

Given under the seal of the Bureau of Energy Efficiency, Ministry of Power, this 5th day of October, 2018

Secretary,
Bureau of Energy Efficiency
New Delhi

Green Monitoring Committee



Transnational Knowledge Society's
Shivajirao Kadam Institute of Technology and Management
Skill. Innovation. Transformation
(Approved by AICTE, New Delhi. Affiliated to RGPV, Bhopal and DAVV, Indore. Recognized by DTE, Bhopal, Govt. of Madhya Prades
An ISO 9001:2015 Certified Institute

SKITM/PRI./2021-22/08 DATE 23/08/2021

Green Monitoring Committee

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1	Dr. Sanjay T. Purkar	Director	9301223688	sanjaypurkar@skitm.in
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Audit Team

The study team constituted of the following senior technical executives from **Empirical Exergy Private Limited,**

- **Mr. Rakesh Pathak**, [Director & Electrical Expert]
- **Mr. Rajesh Kumar Singadiya** [Director & Accredited Energy Auditor AEA-0284]
- **Mrs. Laxmi Raikwar Singadiya** [Energy & Chemical Engineer]
- **Mr. Sachin Kumawat** [Sr. Project Engineer]
- **Mr. Ajay Nahra** [Engineer]
- **Mr. Charchit Pathak** [Mechanical Engineer]
- **Mr. Aakash Kumawat** [Assistant Jr. Engineer]

EXECUTIVE SUMMARY

Green Initiative Taken by College

- *CAMPAIGN OF PLANTATION AND GREEN CAMPUS:*

  College has around **105** trees in the campus. Its good initiative taken by management for green campus under the campaign of plantation, **It's APPRECIABLE.**

RECOMMENDATION: -

- It is recommended to adopt 4 bin Waste collection system for collect different type of waste generated in college premises.

- It is recommended to prepare and install QR code system on plant and trees of the institution campus

CHAPTER-1
INTRODUCTION

1.1 About College

Shivajirao Kadam Institute of Technology and Management (SKITM) was founded in the year 2019, with its first intake as SKITM in 2020, after taking over the Erstwhile Acropolis Technical Campus. SKITM is under the aegis of Transnational Knowledge Society, which was founded in the year 2008. Under the visionary leadership of renowned academician Prof. Shivajirao Kadam, the institution aims to transform the lives of its students and establish itself as the center of excellence in the state of Madhya Pradesh. The institute works on three key principles – Skill, Innovate and Transform. Our unique methodology distinguishes us from the rest of the institutions. We are highly focused on practical aspects of education, we aim to make our students ready to take up the real world challenges which the industry poses at them. We currently have 4 schools which offer B.TECH (CSE, MECH, CIVIL, EC), B.COM, BBA, Integrated BBA-MBA, B.Pharma, MBA as well as Diploma in Mechanical, Civil and Pharmacy. With the unrivalled leadership and the guidance of our Mentors, SKITM is changing the design and nature of education. SKITM will be recognized for the impact its teachings will have on its students and the community at large. Our Extensive Training Sessions, Unique Teaching Methodology, Strong Collaborations, Impactful Certifications and Partnerships make us the up and coming institute in Central India.

Vision

Holistic development of the learner through excellence in education, innovation & research.

Mission

1. To create competitive and technically empowered environment which enable students to develop and discover their potential and become competent to address industrial, societal and global challenges.

2. To achieve academic excellence in application-oriented research, novelty and creativity leading to emergence of technocrats, leaders, innovators and renowned entrepreneurs.
3. To become a top school in country where students are raised with Holistic learning for inculcating core values of professionalism, gender equality, transparency and ethics.
4. To establish partnership with globally recognized institutions and organizations to foster students with industrial exposure through extensive hands-on training.
5. To ensure overall nurturing and all-round personality development of students by continues monitoring and guidance.

1.2 About Green Auditing

Eco campus is a concept implemented in many educational institutions, all over the world to make them sustainable because of their mass resource utilization and waste discharge into theenvironment.

Green audit means to identify opportunities for sustainable development practices, enhance environmental quality, improve health, hygiene, and safety, reduce liabilities achieve values of virtue. A green audit also provides a basis for calculating the economic benefits ofresource conservation projects by establishing the current rates of resource use and their associated costs.

Green auditing of **"Shivajirao Kadam Institute of Technology & Management"** enables assessment of the lifestyle, action, and its impact on the environment. This green audit was mainly focused on greening indicators like utilization of green energy (solar energy) and optimum use of secondary energy sources (petrol and diesel) in the University campus, vegetation, carbon footprint of the campus, etc. Green auditing aims to help the institution to apply sustainable development practices and to set examples before the community and young learners.

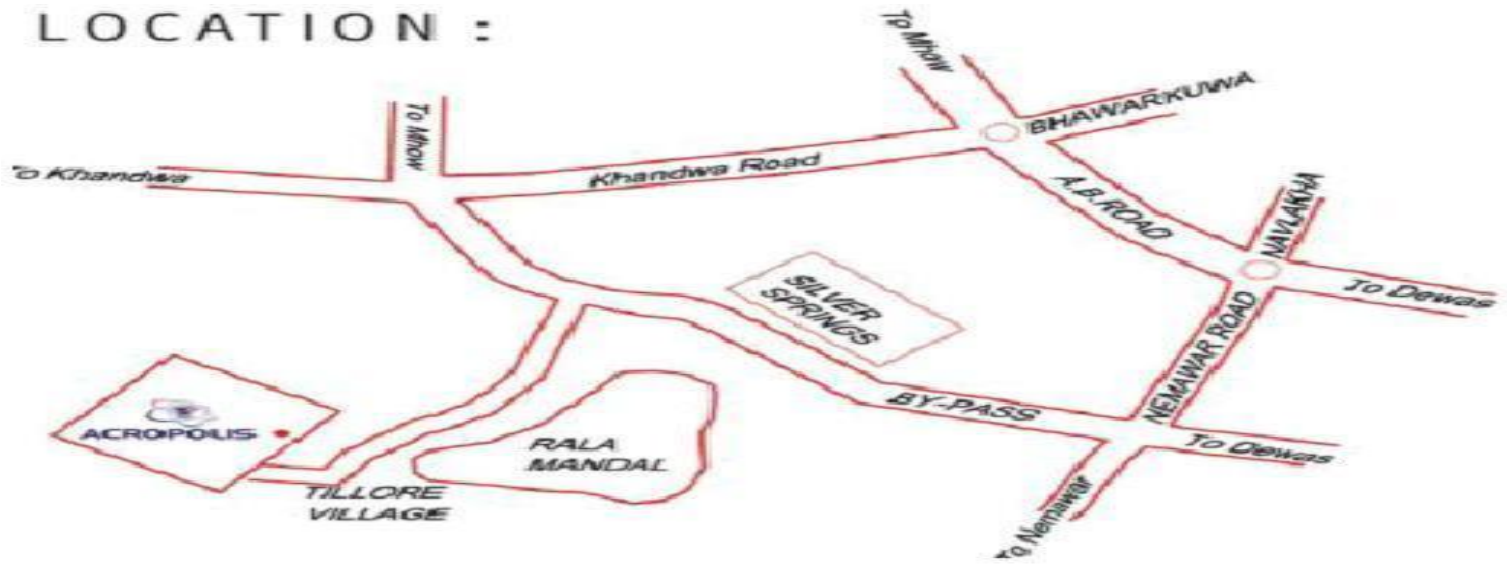
1.2 Objectives of Green Auditing

The general objective of green audit is to prepare a baseline report on "Green campus" and alternative energy sources (solar energy), measures to mitigate resource wastage and improvesustainable practices.

The specific objectives

- To inculcate values of sustainable development practices through green audit mechanism
- Providing a database for corrective actions and future plans.
- To identify the gap areas and suggest recommendations to improve the green campus status of the college.

Satellite Map



Longitude & Latitude : 75° 50' E & 22° 44' N

Chapter – 2

Green Campus and Sustainable Development

2.1 Green Audit

In the survey, focus has been given on assessment of present status of plants and tree in the college campus and efforts made by the college authorities for nature conservation. Campusis in the vicinity of approximately more than 793 trees/ medicinal herbs/ ornamental plants. The detail is given below:

2.2 List of plants in college campus.

Sr. No.	Name of Tree	Qty.
1	Champa	95
2	Gulmohar	90
3	Neem	125
4	Termillia	50
5	Ashoka	10
6	Kaner	125
7	Aanwala	57
8	Imli	5
9	Peepal	2
10	Bargad	1
11	Mango	35
12	Bottle Pam	13
13	Amca Pam	10
14	Sagwan	110
15	Pump	15
16	Gulab	35
	Total	**778**

College has778 **trees** in the campus. This is good initiative taken by management for green campus under the campaign of plantation. **It's APPRECIABLE.**

2.3 Green Campus Photograph

Chapter-03
Carbon Foot print

3.1 About carbon foot print.

Climate change is one of the biggest challenges facing by world, nations, governments, institutions, business and mankind today.

Carbon footprint is a measure of the impact of your activities have on the amount of carbon dioxide (CO_2) produced through the burning of fossil fuels and is expressed as a weight of CO_2 emissions produced in tones.

We focus on consumption in each of our five major categories: housing, travel, food, products and services. In addition to these we also estimate the share of national emissions over which we have little control, government purchases and capital investment.

For simplicity and clarity all our calculations follow one basic method. We multiply a use input by an emissions factor to calculate each footprint. All use inputs are per individual and include things like fuel use, distance, calorie consumption and expenditure. Working out your inputs is a matter of estimating them from your home, travel, diet and spending behaviour.

Although working out inputs can take some investigation on part the much more challenging aspect of carbon calculations is estimating the appropriate emissions factor to use in calculation. Where possible you want this emissions factor to account for as much of the relevant life cycle as possible.

We all have a carbon footprint…

3.2 Methodology and Scope

The carbon footprint gives a general overview of the institute greenhouse gas emissions, converted into CO_2 - equivalents and it is based on reported data from internal and external systems. The purposes of the carbon indicators are to measure the carbon intensity per unit of product, in addition to showing environmental transparency towards external stakeholders. The carbon footprint reporting approach undertaken in this study follows the guidelines and principles set out in the "Greenhouse Gas Protocol Corporate Accounting and Reporting Standard" (hereafter referred to as the GHG Protocol) developed by the Greenhouse Gas Protocol Initiative and international standard for the quantification and reporting of greenhouse gas emissions - ISO 14064. This is the most widely used and accepted methodology for conducting corporate carbon footprints. The study has assessed carbon emissions from the institute campus. This involves accounting for, and reporting on, the GHG emissions from all those activities for which the company is directly responsible. The items quantified in this study are as classified under the ISO 14064 standards: The report calculates the greenhouse gas emissions from the institute. This includes electricity, as well as emission associated with diesel consumption in the Institute vehicle. The emission associated with air travel, waste generation, administration, and marketing related activities has been excluded from the current study. Emissions from business activities are generally classified as scope 1, 2 or 3 areas classified under the - ISO 14064 standards.

3.3 Carbon emission from electricity

Direct emissions factors are widely published and show the amount of emissions produced by power stations in order to produce an average kilowatt-hour within that grid region

Unlike with other energy sources the carbon intensity of electricity varies greatly depending on how it is produced and transmitted. For most of us, the electricity we use comes from the grid and is produced from a wide variety of sources. Although

working out the carbon intensity of this mix is difficult, most of the work is generally done for us.

Electricity used in the site is the significant contributors towards HGs emission from the unit. Electricity used onsite is the most direct, and typically the most significant, a contributor to a unit's carbon footprint. Thus, using an average fuel mix of generating electricity, carbon dioxide intensity of electricity for national grid is assumed to be 0.9613 KgCO2/Kwh.

(Reference: Central Electricity Authority (CEA) Baseline Carbon Dioxide Emission data http://cea.nic.in/reports/others/thermal/tpece/cdm_co2/database_11.zip).

Electricity is purchased from the grid

Table 3.1 Electricity purchased from the grid and Emissions from the electricity Import

Sr. no	Year	Total unit Consumption by AVVNL	Unit	Emission Factor kg CO^2e/kWh	Emission ton CO^2e/year
1	2020-21	1,12,332	kWh	0.9613	107.98
	Total			**Total**	107.98

Observation :-

Total Co2 Emission by indirectly from electricity is 107.98Ton CO^2e/year in 2020-21.

Calculation of Carbon footprint analysis: -

As per discussion by the concerned department in the Institute and data provided bymanagement.

The following details are given in the table: -

Month & Year	Diseal QTY	Distance Traveling per Month (KM)	Petrol Qty	Distance Traveling per Month (KM)
Jul-20	269.78	1099	1.13	67.8
Aug-20	277.18	1940.76	56.35	845.27
Sep-20	868.74	6081.81	55.98	839.7
Oct-20	932.81	6531.67	116.34	1745.1
Nov-20	903.07	6321	56.34	845.1
Dec-20	1015.84	7110.88	273.3	4099.5
Jan-21	1534.84	10743.88	5	300
Feb-21	4054.97	28384.79	35.42	531.3
Mar-21	2401.08	16807.56	79.7	1195.5

Apr-21	274.74	1923.18	29.4	441
May-21	0	0	0	0
Jun-21	317.98	2225.86	154.31	2314.56

- CO_2 Emissions from a gallon of gasoline: 8,887 grams CO_2/ gallon
- CO_2 Emissions from a gallon of diesel: 10,180 grams CO_2/ gallon

(1 US Gallon = 3.7854 liters)

- CO_2 Emissions from a Litre of gasoline: 2347.95 grams CO_2/ Litre.
- CO_2 Emissions from a Litre of diesel: 2689.56 grams CO_2/ litre.

$$\text{Total } CO_2 \text{ Emissions} = \frac{CO_2 \text{ Per litre}}{\text{Avg. Mileage (Km/Litre)}} \times \text{Distance (in km)}$$

$$= \frac{2689.56}{7} \times 89170 = 342511 \text{ gram or } 342.511 \text{ Kg/day}$$

When Vehicle traveling in 320 Days in Year = 342.511x 320

= 10960 Kg/year or 109.60 **ton/year**

$$\text{Total } CO_2 \text{ Emissions} = \frac{CO_2 \text{ Per litre}}{\text{Average Mileage (Km/Litre)}} \times \text{Distance (in km)}$$

$$= \frac{2347.95}{15} \times 13224 = 206995 \text{gram or } 206.99 \text{ Kg/day}$$

When Vehicle traveling in 320 Days in Year = 206.99x 320

= 66236 Kg/year or 66.23 **ton/year**

3.4 Biomass Calculation and CO^2 Sequestration of the Trees: -

1. Estimation of above ground biomass (AGB)

$$K= 34.4703 – 8.0671D + 0.6589 D^2$$

Where = K is above ground biomass.
D is Breast height diameter in (cm)

2. Estimation of below ground biomass (BGD)
   BGB = AGB x 0.15

3. Total Biomass (TB)
   TB = AGB + BGB

4. Calculation of carbon dioxide Weight sequestered in the tree in kg.
   C = W x 0.50

5. Calculate the weight of Co2 Sequestered in the tree per year in kg.Co2 = C x 3.666

3.5 Biomass Calculation of Trees

Sr. no.	Tree Name	Botanical and family Name	Average Daimeter CM (25 to 100)	AGB	BGB	Total	Carbon Storage	Amount of Co2 Sequestered	Total	Total Amount of Co2 Sequestered	Annually Co2 Sequestered amount (Ton/year)
1	Gulmohar	Delonix regia	40	798.0	119.7	917.7	458.9	1682.2	95	159810	2.18
2	Champa	Plumeria alba	20	144.7	21.7	166.4	83.2	305.0	90	27450	0.37
3	Termillia	Terminalia chebula	20	144.7	21.7	166.4	83.2	305.0	125	38125	0.52
4	Neem	Azadirachta indcia	45	1046.2	156.9	1203.2	601.6	2205.4	50	110270	1.50
5	Ashoka	Saraca Asoca	50	1328.4	199.3	1527.6	763.8	2800.1	10	28001	0.38
6	Kaner	Nerium indicum	15	66.2	9.9	76.2	38.1	139.6	125	17448	0.24
7	Aanwala	Phyllanthus Emblica	25	257.1	38.6	295.7	147.8	542.0	57	30892	0.42
8	Imli	Tamarindus indica	35	583.8	87.6	671.3	335.7	1230.6	5	6153	0.08
9	Peepal	Ficus religiosa	50	1328.4	199.3	1527.6	763.8	2800.1	2	5600	0.08
10	Bargad	Ficus benghalensis	78	3535.7	530.4	4066.0	2033.0	7453.0	1	7453	0.10
11	Mango	Mangifera indica	52	1450.7	217.6	1668.3	834.2	3058.1	35	107032	1.46
12	Bottle Pam	Hyophorbe lagenicaulis	84	4147.2	622.1	4769.2	2384.6	8742.0	13	113646	1.55
13	Amca Pam	Achyranthes aspera	86	4361.9	654.3	5016.1	2508.1	9194.6	10	91946	1.25
14	Sagwan	Tectona grandis	50	1328.4	199.3	1527.6	763.8	2800.1	110	308015	4.20
15	Pump	Hyophorbe lagenicaulis	75	3248.3	487.2	3735.5	1867.7	6847.2	15	102707	1.40
16	Gulab	Rosa damascena	10	21.7	3.3	24.9	12.5	45.7	35	1600	0.02
17	Total Co2 Emission Neutralize by Trees										15.77

Total Carbon Footprint generated = Carbon footprint by electricity

By the campus +

Carbon footprint by Vehicles

+

Carbon footprint by DG Sets.

-

Carbon Neutralize by tree

-

Carbon Neutralize by solar

Total Carbon Foot

print by campus: 107.98 + 109.60+66.23 – 15.77 = 268.04 tons/year

Recommendation: -

There are required for more plantation and installation of solar energy to reduce carbon emission share by institute.

CHAPTER- 4

WASTE MANAGEMENT

4.1 About Waste:

Human activities create waste, and it is the way these wastes are handled, stored, collectedand disposed of, which can pose risks to the environment and to public health waste management is important for an eco-friendly campus. In college different types of wastes are generated, its collection and management are very challenging.

Solid waste can be divided into three categories: bio-degradable, non-biodegradable and hazardous waste. A bio-degradable waste includes food wastes, canteen waste, wastes from toilets etc. Non-biodegradable wastes include what is usually thrown away in homes and schools such as plastic, tins and glass bottles etc. Hazardous waste is waste that is likely to bea threat to health or the environment like cleaning chemicals, acids and petrol.

Unscientific management of these wastes such as dumping in pits or burning them may cause harmful discharge of contaminants into soil and water supplies, and produce greenhousegases contributing to global climate change respectively. Special attention should be given to the handling and management of hazardous waste generated in the college. Bio-degradable waste can be effectively utilized for energy generation purposes through anaerobic digestion or can be converted to fertilizer by composting technology. Non-biodegradable waste can be utilized through recycling and reuse. Thus the minimization of solid waste is essential to a sustainable college. The auditor diagnoses the prevailing waste disposal policies and suggeststhe best way to combat the problems.

Table 4.1 Different types of waste generated in the College Campus.

Sr. No.	Types of Waste	Particulars
1	Solid wastes	Damaged furniture, paper waste, paper plates, food wastes etc.
2	Plastic waste	Pen, Refill, Plastic water bottles and other plastic containers,wrappers etc.
3	E-Waste	Computers, electrical and electronic parts etc.

4	Glass waste	Broken glass wares from the labs etc.
5	Chemical wastes	Laboratory waste etc.
6	Bio-medical Waste	Sanitary Napkin etc.

4.2 Waste management Practices adopted by the college

College has a different type of waste generated like paper, Plastic, dust and wet waste. The college provided small dustbin to every classroom, office, laboratories, staff room, andcollect the waste material at the end of the day. The waste (Especially dry material) is collected in a big dustbin which are provided at every floor and the next day collected municipal corporation for further processing.

wet waste generated in home economics laboratory as well as waste from agriculture (Tree and plants waste) used in vermicompost unit is one of the best tools to decompose wet waste by earthworm. It will provide several social economics of environmental benefits to the society by way of producing chemical free. safe nutritive and healthy protective (rich in minerals and antioxidants) food for people.

Vermicompost is a sustainable tool for environment, equilibria vermicompost significantly affect the plant growth and hence vermicompost generated from this unit is used in botanical garden and ornamental garden as additional food.

Figure 4.1 Dustbin in college campus

4.3 Waste Collection Points:

Audit team also visited various department in old and new building of the college to find out waste generation area and waste collection points for further improvement. Details are given in the table.

Table 4.2 Detailed of Waste collection Dust bin system

Pharmacy Block		
Sr. No.	**Location**	**Dustbin**
1	Ground floor	1
2	First floor	2
3	Canteen	3
Engg. Block		
Sr. No.	**Location**	**Dustbin**
1	Ground floor	3
2	First floor	2
3	Second floor	2
4	Third floor	2

Observation :- Total 15 no of dustbin in the college.

Recommendation:

Adopted 4 bin Waste collection system for collect different type of waste generated in college premises.

Figure 4.2 :- 4 Dust Bin waste collection system

CHAPTER- 5
RECOMMENDATIONS AND SUGGESTIONS

5.1 QR Code System and Biodiversity:

While the world seems to be going digital, people lack the time to read books and process the information they contain. Hence, Institute can be provided QR codes on the trees for its information and to exploit the rapidly growing platform for a unique purpose.

Figure 5.1:- QR Code System for plants

These codes can give students all the information they need to know about the tree — from its scientific name to its medicinal value. They only need to put their smart-phones to use. QR codes to them, making it easier for everybody to learn about a plant or a tree at the tip of their fingers," If any app generating a QR code, which is available for free on the online stores, can be used to avail the information of the trees.

Eco-restoration programmes

- Frame long-term eco-restoration programmes for replacing exotic Acacia plantations with indigenous trees and need of the hour is to frame a holistic campus development plan.

End of The Report

Thank you