

Gopalan College of Engineering and Management

(ISO 9001:2015 certified)

Approved by All India Council for Technical Education (AICTE), New Delhi

Affiliated to Visvesvaraya Technological University (VTU), Belagavi, Karnataka,

Recognised by Govt. of Karnataka



Green Campus Audit Report 2023-24



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Internal green audit of the institution is to be carried out to ensure that the institution takes maximum effort towards conservation of resources, management and disposal of waste and contributes towards green environment.

The following members are appointed to conduct the internal green audit of the institution during the month of May 2023 and submit a detailed report of the green initiatives taken by the intuition.

The Green Audit Members:

Sl.No.	Members
1	Dr.S.N.Rajashekhar, GM
2	Mr. Shreyas, AP, Dept. of Civil Engineering
3	Ms.S.K.Gousia Tehaseen, AP, Dept. of Civil Engineering
4	Ms. Spurthi, AP, Dept. of Chemistry
5	Mr.Shivanand Hirekurabar, Electrician

Introduction

“Green audit” is a concept or principle introduced to make the educational institute environmentally sustainable. The purpose of the green audit is to ensure that the Green Policy is followed and implemented in the campus. GCEM has implemented green-friendly practices to manage the available resources and has taken steps in environmental conservation and protection. As a part of such practice, internal environmental audit (Green Audit) is conducted to evaluate the actual scenario towards green initiatives on the campus.

Management is focusing on maintaining a green campus and improving it by appointing gardeners in the campus and also taking all the effort to contribute towards green initiatives in the campus. The college also motivates students actively involved in various pollution awareness programmes in and around the college and help in maintaining a green campus. It encourages college students to care about the treatment of trees and shrubs as well as environmental issues within their campus community. Different plantation programs are happening in college to create environment consciousness amongst students.

The green initiatives of the campus can be broadly classified into the following heads:

1. Waste Management
2. Energy Conservation
3. Green Plantation

1. Waste Management:

The members of Green Audit Committee have done a detailed study of solid, liquid and e-waste generation in the campus and how these wastes has been managed.

a. Solid Waste Management:

The institution takes utmost care in the waste management of solid. The solid waste is segregated as:

- Bio-degradable
- Non-biodegradable

These are then collected in the respective bins (green and blue bins), that are kept at different solid waste collection points.

The potential areas of wet waste disposal in the college

- i. Hostel Mess
- ii. College Canteen
- iii. College Building

The bio-degradable food wastes are collected in the green bins and then they are transferred to the **“Three phase RNATURA 100kg Organic Waste converter”** machine, which is fully automatic. The waste is converted to compost and they are used as manure for garden in the campus.

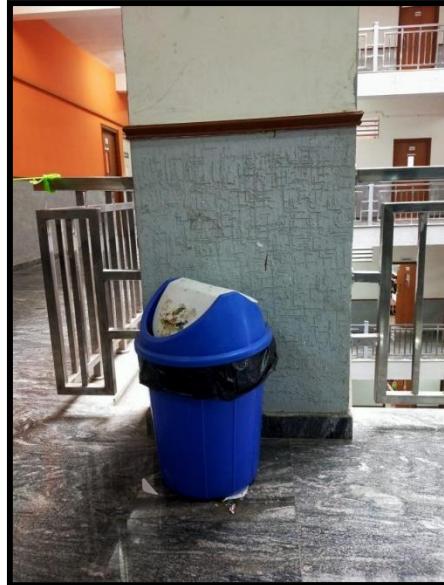


Fig: Bins for collecting waste



Fig: Three phase RNATURA 100kg Organic Waste converter

The non-biodegradable waste, that includes the dry waste like papers, covers etc., are segregated. The blue bins are kept at every floor and the students are educated to use these bins to keep the environment clean.



The non-biodegradable waste is treated in two different methods:

- Disposed to BBMP
- Incineration

The BBMP(Bruhat Bengaluru Mahanagara Palike) collects these waste from the college every day in their vehicle. Incineration is the process in which waste materials are converted into ash. There is an incinerator fixed in the wash room, to burn the sanitary napkins waste into ashes.



Fig: Incinerator to burn to ashes

b. Liquid Waste Management:

The campus is housed with a Sewage Treatment Plant (STP) to treat the waste water from bathrooms, mess etc., and use them for watering the plants. The waste water from all the sources are directed to the STP through proper drainage pipes and transferred to the STP and the water is treated, where the toxins are removed and made suitable for other usage. The treated water is used to water the plants in the garden and in flushes in bathrooms.



Fig: Sewage Treatment Plant (STP)

The maximum capacity of the STP is 30 (kLD) Kilo Liter per day. The actual influent to plant is 1kLD. Treated effluent is 85 to 90kLD. Using a filter press, the liquid and solids are separated once in 15 to 20 days and they are dried and the sludge is used as manure for gardening. The final treated water is kept in holding tanks and used for watering the plants in the garden.

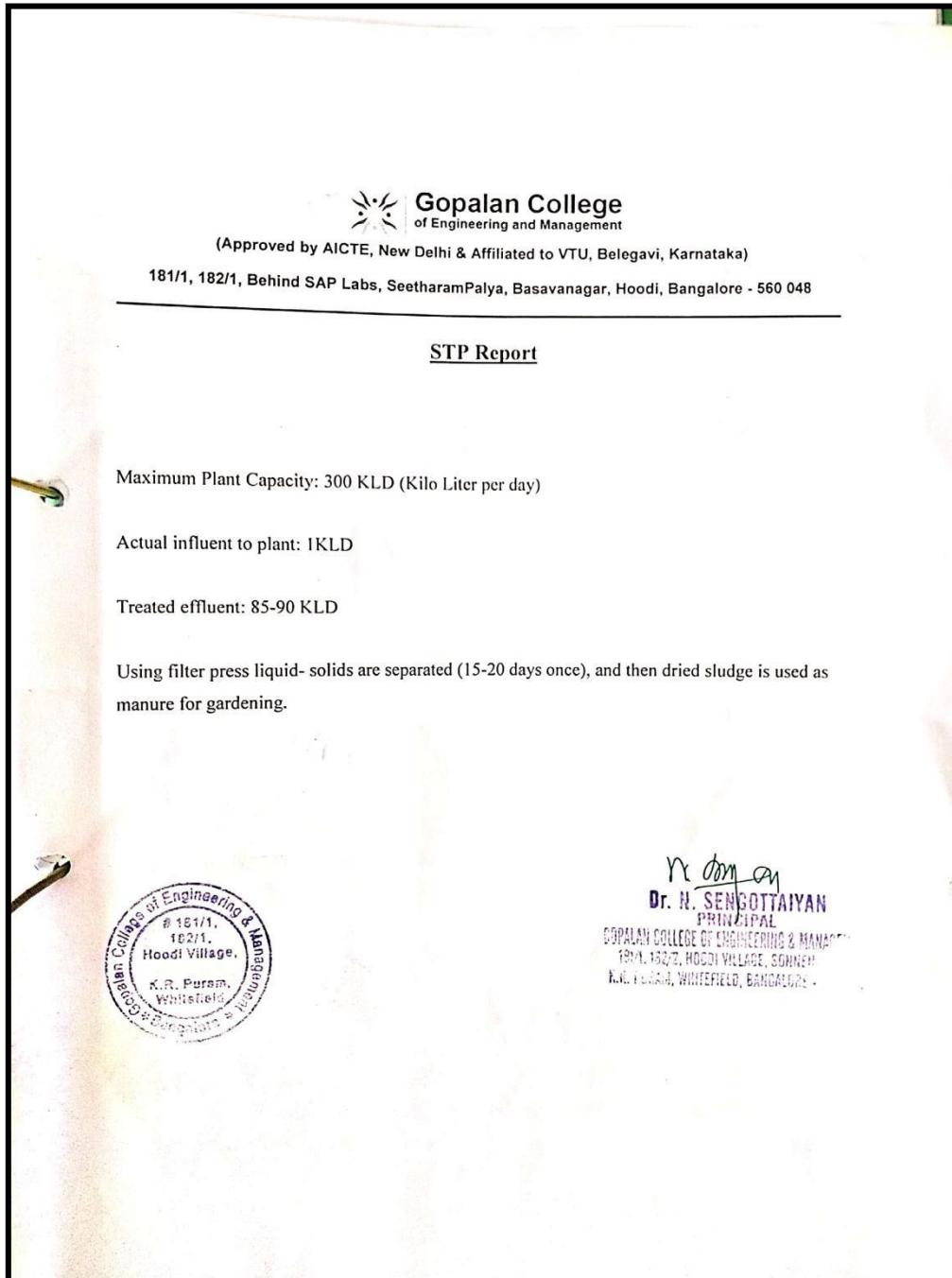


Fig: STP functioning Report

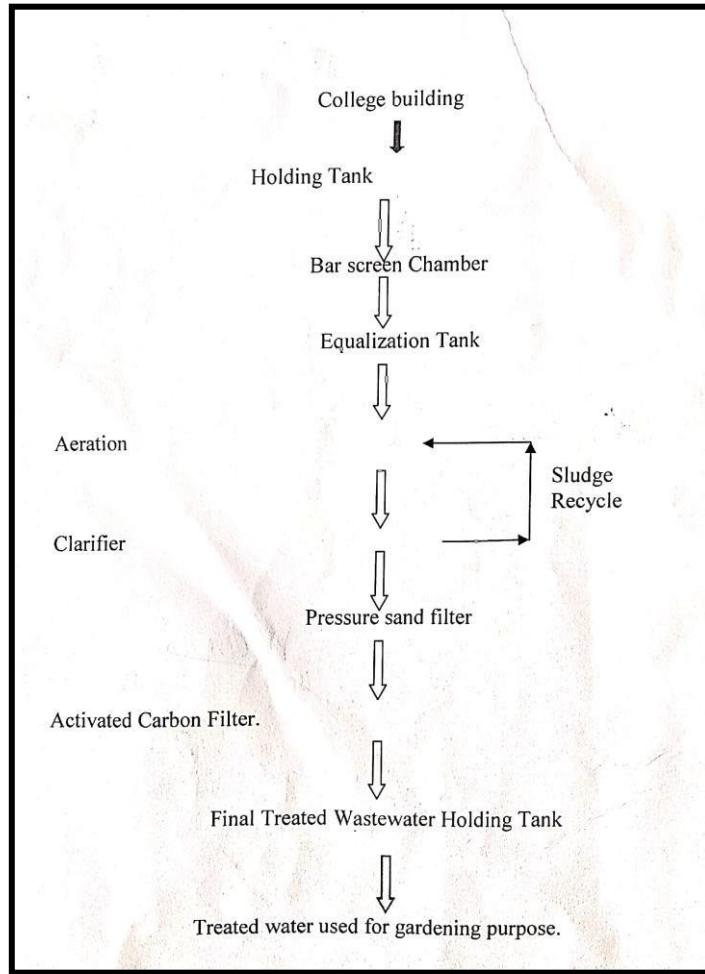


Fig: Flow chart of treating water



Fig: Treated water used for watering plants

c. E-waste Management:

The e-waste like discarded electrical or electronic devices. Used electronics which are destined for refurbishment, reuse, resale, salvage recycling through material recovery, or disposal are considered e-waste.

The e-waste is collected in bins specific for the purpose; these are then sold to junkyards dealers.

The overall waste management of GCEM can be pictured as follows:

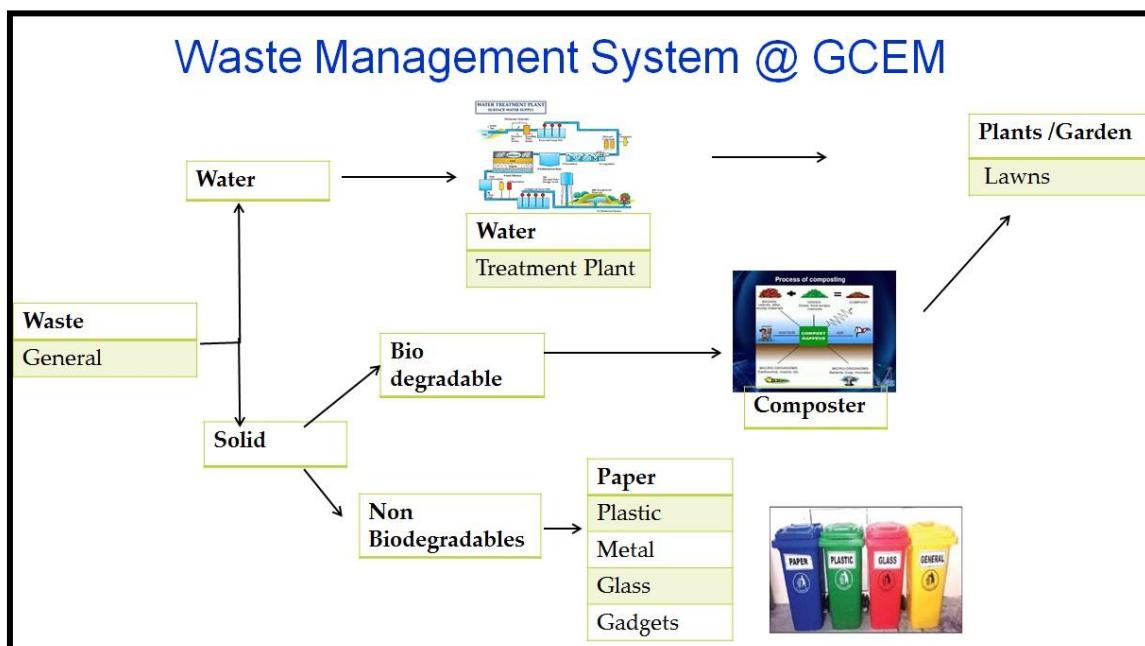


Fig: Waste Management at GCEM

2. Energy Conservation:

Energy conservation is the effort made to reduce the consumption of energy by using less of an energy service. This can be achieved either by using energy more efficiently (using less energy for a constant service) or by reducing the amount of service used. The energy conservation in the college is done as follows:

- i. Solar Panels are used in hostel geysers
- ii. LED bulbs are used
- iii. Rain Water Harvest

- i. **Solar Panels:** The College takes immense effort in alternative energy initiatives. The geysers of the hostel use the solar energy. It conserves about 33.46% of the energy requirement of the college. There are 8 250 LPD used in the college. A major requirement of power is conserved through this means.



Fig: Evacuated Tube Collector (ETC) Stainless Steel 250 LPD

The specification of the ETC installed can be given



250 LPD ETC *x 6*

Specification:

01.	Capacity of Tanks	250 LPD.
02.	Material	Stainless Steel /GRP/Boiler grade steel.
03.	Type	Cylindrical – horizontally assembled.
05.	Insulation	P U F.40-50mm.
06.	Outer Cladding	Pre coated galvanized sheet/Aluminum.
07.	Outer Cladding Finishing	Pure Polyester Powder Coating.
08.	Outer Finish Color	White.& Black combination or similar colour.
09.	Back up Heater	2 KW With thermostat control 230V AC per 750LPD or As per the final design specification.
10.	Tank Supports	Fabricated Stainless steel section.
11.	Tank Testing	Factory pressure tested for normal systems is at 1 Kg/cm ² .
12.	Normal Working pressure of the system	Less than 0.3 Kg/cm ² .
13.	Number of Tubes.	25 No's
14.	Evacuated Tube Dimensions.	Outer Diameter - 58± 0.7.mm, Inner Diameter- 48±0.7.mm
15.	Total Tube length.	1500.±5mm.
16.	Type of tube selective coating.	Graded Al-N with Copper under Coating.
17.	Construction of Glass Tubes.	Two Concentric Borosilicate Glass Tubes.
18.	Solar absorbance.	>0.93.
19.	Solar Emmitance. (at 80.Deg.c.0	<. 0.06.
20.	Evacuation between Outer &Inner Tubes.	5 X 10-3 Pa.
21.	Rated Pressure.	0.1. Mpa. (1.Kg/Cm2).
22.	Stagnation Temperature.	< 300.Deg.C.

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Fig: Specification of Evacuated Tube Collector (ETC) Stainless Steel 250 LPD

ii. **LED Bulbs:**

The institution is making every effort to minimize the usage of electric power. The institution is replacing the bulbs with LED bulbs, which reduces the power requirement.

At present the LED bulbs are used in hostel room, corridors and few other places. It is advised by the audit team to use Led bulbs at most of the place. The institution uses only LED bulbs, where ever new bulbs are required.

iii. **Rain water harvesting:**

Rain water harvest tanks are constructed to harvest rain water to prevent soil erosion and increase the underground water level. Rainwater harvesting technology collects, convey and store rain water for later use from relatively clean surfaces such as a terrace and from the flowing water in the land. The collected water from roof, is filtered and stored for further uses.

Rainwater Harvesting is a simple technique of catching and holding rainwater where its falls. Either, we can store it in tanks for further use or we can use it to recharge groundwater depending upon the situation. RWH system provides sources of soft, high quality water reduces dependence on well and other sources and in many contexts are cost effective. RWH system is economically cheaper in construction compared to other sources, i.e. well, canal, dam, diversion, etc.

The rain water is channelized towards bore wells to raise the ground water level. Since the college well is much below the road level, water level rises in rainy season. Water collected from terrace by PVC pipe outlet depends upon the area and number of pipes provided. Water is flowing through the chamber and drainage. The drain wells are constructed for water collection & recharge of surrounding ground. Drain connected from all the building flow towards lower level through external drain. Rain water pit is filled with gravels and sand for percolation of water for recharging the



Fig: Rain Water Harvesting Pits

3. Green plantation:

The college campus is surrounded with green landscaping, ornamental plants, and trees of various varieties to neutralize the carbon dioxide. The college gives a green serene environment.



Fig: GCETM Campus



Fig: Plantation at GCEM



Students are also encouraged to plant at least one plant. As an initiative, “One Student One Tree” was started and it was a source of encouragement to the students to plant plants (Banyan, Mango, Punga, Neem etc). They were also encouraged to plant in their neighborhood also.



Fig: One student One Tree initiative



Fig: One Student One tree Initiative

Recommendation by the Audit Team

The internal green audit was conducted by the faculties and facility managers of the institution with the objective of identifying the efforts taken towards the various green initiatives. A careful study of the green initiatives were made and analyzed. The strength and weakness were identified. A list of recommendations was submitted by the audit team to the management to improve the effectiveness of the green initiatives.

The strengths were the organic solid and the water waste management carried out by the institution. The effort the institution takes in maintain a green and serene environment with green landscaping and planting of plants and trees. The institution lacks in utilizing the renewable resources in power generation.

The following are the observations made and recommendations of the audit team:

1. To use more of renewable resources, and use the power generated for
 - i. Cooking in hostels
 - ii. Other power appliance like fans, bulbs etc.,
2. To replace the bulbs with LED bulbs.
3. To take more effort in reuse and recycle of e-waste.
4. To take effort in the disposal of chemicals in the chemistry lab.
5. To take effort to certify the institution as plastic free.

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