



Rajarajeswari College of Engineering

(Approved by AICTE, New Delhi, Govt. of Karnataka, Affiliated to Visvesvaraya Technological University, Belagavi)
Sponsored by: MOOGAMBIGAI CHARITABLE AND EDUCATIONAL TRUST



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AY 2023-24

7.1.3. Describe the facilities in the Institution for the management of the following types of degradable and non-degradable waste.

Relevant documents like agreements like agreements / MoUs with Government and other approved agencies.

Sl. No.	Description	Agency Name & Address
1.	Relevant document like agreement with approved agencies.	M/s Manjunatha Enterprises No.22/2/1, Seehapathi agrahara, Near Raghavendra temple, New Tharagupet, Bengaluru-560 002

Principal
Principal

RAJARAJESWARI
COLLEGE OF ENGINEERING
Ramohalli Cross, Bengaluru-74



सत्यमेव जयते

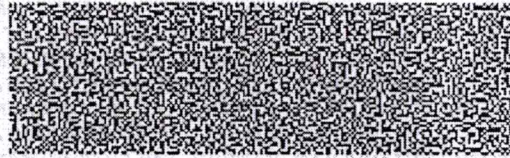
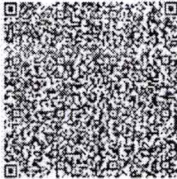
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Government of Karnataka

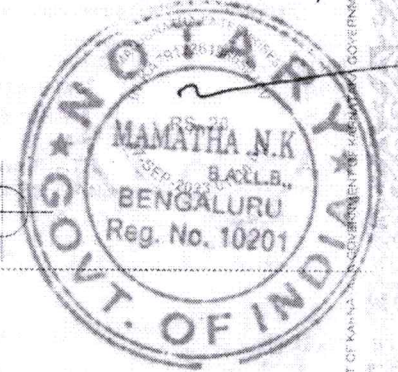
Rs. 20

e-Stamp

Certificate No. : IN-KA79122619665270V
 Certificate Issued Date : 07-Sep-2023 01:30 PM
 Account Reference : NONACC (BK)/ kakscub08/ CHAMRAJPET 1/ KA-BV
 Unique Doc. Reference : SUBIN-KAKAKSCUB0831678666575564V
 Purchased by : MANJUNATHA ENTERPRISES
 Description of Document : Article 4 Affidavit
 Description : AFFIDAVIT
 Consideration Price (Rs.) : 0
 (Zero)
 First Party : MANJUNATHA ENTERPRISES
 Second Party : NA
 Stamp Duty Paid By : MANJUNATHA ENTERPRISES
 Stamp Duty Amount(Rs.) : 20
 (Twenty only)



THE HOTEL INDUSTRIALISTS
CO-OPERATIVE BANK LTD.,



Please write or type below this line

AFFIDAVIT

I, **MANJUNATHA ENTERPRISES**, No.22/2/1, Seethapathi Agrahara, Near Rahgavendra Temple, New Tharagupet, Bangalore-560 002, Rep. by its Proprietor Sri. PANDIAN, do hereby solemnly affirm and state on oath as follows:

Statutory Alert:

1. The authenticity of this Stamp certificate should be verified at 'www.sholestamp.com' or using e-Stamp Mobile App of Stock Holding. Any discrepancy in the details on this Certificate and as available on the website / Mobile App renders it invalid.
2. The onus of checking the legitimacy is on the users of the certificate.
3. In case of any discrepancy please inform the Competent Authority.

C-S Parth

1. I am the sole proprietor of M/s Manjunath Enterprises Company. I am in the business from past 10 years.
2. I submitted officer to the Rajarajeshwari College of Engineering, Ramohalli gate, Mysore Road, Bangalore.
3. I will abide by the rules of secrecy and I will send the waster papers & Blue Books directly to the paper mill for pulverization.
4. I shall not sell any of the received papers to other than pulverize units as above and in the event of any deviations and dereliction. I will be liable to be used and suitable legal action against me.

What is stated above is true and correct

Witnesses:

1) *Devaraj*

2) *Rajesh*

Date: 07-09-2023

Place: Bangalore

C.S. Poo
DEPONENT

Sworn to before me

SWORN TO BEFORE ME
Mamatha
MAMATHA N K., B.A.L.L.B.,
ADVOCATE & NOTARY PUBLIC
GOVT. OF INDIA
#131 Thimmaiah Road, Kadrenahalli Circle,
Padmanabha Nagar, Bengaluru-560 070
Mob : 99453 14288



07 SEP 2023

Rajesh
Principal
RAJARAJESWARI
COLLEGE OF ENGINEERING
Ramohalli Cross, Bengaluru-74



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Criterion: 7.1 Institution Values and Social Responsibilities.

7.1.3. Describe the facilities in the Institution for the management of the following types of degradable and non-degradable wastes

1. Solid waste management

Primary sources of solid waste on campus encompass canteen waste, hostel kitchen refuse, and institutional waste. The generated solid waste within the institution comprises materials such as waste papers, answer sheets, and domestic waste like kitchen refuse. To manage this waste effectively, the institution has established protocols for its proper disposal.

Implementing a robust solid waste management system, the institution enforces stringent waste segregation rules. For the convenience of the campus community, designated dustbins are strategically positioned in every classroom, laboratory, restroom, and mess at various locations across the campus. This proactive approach ensures that waste is sorted appropriately, promoting an environmentally responsible and sustainable waste disposal process within the institution. The bins are as follows:

1. The Green-colour bins are meant for wet and biodegradable wastes. For Ex: Kitchen wastes including vegetables and fruits skins.
2. The Blue bins are meant for disposal of plastic wrappers and non-biodegradable wastes.
3. The Yellow bins are meant for papers and glass bottles.
4. The Red bins are meant to segregate domestic hazardous waste, which consists of bio-medical waste like cotton bandage or anything with human fluids.

To streamline waste management across the campus, dedicated sweepers are assigned to each floor, responsible for overseeing the disposal of all generated waste. A systematic approach is employed where waste and garbage from both the college and hostel are sorted at the source, ensuring a methodical and efficient waste disposal process. Specifically, the segregation process involves categorizing wet waste from hostels and canteens, which is then directed to the bio-gas plant. This sustainable practice not only contributes to the effective management of organic waste but also supports the generation of bio-gas, aligning with the institution's commitment to environmentally friendly initiatives. Moreover, non-biodegradable items such as newspapers and stationery are handled responsibly. Instead of being discarded, these materials are sold to appropriate recycling agencies or vendors. This not only promotes the recycling industry but also adds a layer of financial sustainability to the waste management process, as these materials find new life through the recycling process.



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Photo.1: Waste segregation system



Photo.2: Centralized Bio-gas plant at RajaRajeswari Medical College and Hospital (RRMCH)



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Table.1: Specifications of Bio gas plant

Sl. No.	Specifications	Descriptions
1	Type of digester	Floating drum
2	Diameter of digester	5.5 m
3	Depth of Digester	2.75 m
4	Material of floating gas holder	Steel with FRP coating
5	Digester Capacity	70-80 m ³ / day

Amount of Biogas produced using bio gas plant

Number of students in boys hostel=130

Number of students in boys hostel=130

Walk through students in the college campus= 3000

Number of teaching staff and supporting staff in the campus=200

Average amount of wet waste collecting per day= 65 kg / day

Amount of Gas produced in the digester= 14 m³ / day

Amount of gas equivalent to LPG Gas = 1/3 of domestic LPG cylinder

Application of Biogas produced=Gas produced is supplied to bio gas stove for cooking.

2. Liquid waste management

A sewage treatment plant with a capacity of 100 KLD is operational at the premises of RajaRajeswari Dental College and Hospital, a sister organization. This STP facility plays a pivotal role in treating waste waters from RRCE, RRDCH, and the hostels. Typically operated at 80% capacity, the STP manages influent fluctuations during semester breaks to ensure operational efficiency. On average, approximately 70 KLD of treated waste water is available for reuse.

The biologically treated waste water undergoes disinfection using liquid chlorine before being pumped for various purposes within the campus. In accordance with Karnataka State Pollution Control Board (KSPCB) regulations, the treated waste waters are reused on the campus, following a systematic procedure for proper management and disposal of liquid waste.

The collection process involves gathering waste water from both the college and hostels, directing it into the under drainage system leading to the STP. The treatment process employs the Activated Sludge Process (ASP) system, a biological treatment method where aerobic bacteria stabilize



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organic matter and neutralize microbial populations. The STP consistently delivers effluents with Biochemical Oxygen Demand (BOD) values below 10 mg/l. Further, the aerobic treatment, coupled with disinfection, ensures microbe concentrations below 100 units, adhering to consent stipulations. Regular analysis reports are submitted to the KSPCB to demonstrate compliance with all specified parameters. This underscores the institution's commitment to environmentally responsible practices and regulatory compliance in the management of liquid waste.



Photo.3: Sewage Treatment Plant of 100 KLD in operation at RajaRajeswari Dental College and Hospital (RRDCH)

WATER REUSE PLAN

The total water requirement for the institution is 55 KLD. Borewell and rain water are being used in the campus. A total of 18,463 sq m Green zone has been developed with short, medium and tall trees along with other horticultural development and vacant areas in the campus. This also requires regular watering for the survival. Through the hydrant systems network, the treated water is pumped from the STP to utilize for the following purposes.

The treated waste water from STP is utilized for the following purposes:

- i) Gardening and maintaining greenery within the campus.



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- ii) Secondary flushing in toilets in the hostel buildings.
- iii) Buses and other vehicles washing within the campus.
- iv) Kitchen gardening near boy's hostel
- v) Cleaning of paved surfaces
- vi) Cleaning of solar water heating collector panels

Table.2: Total requirement of water

Sl. No.	Total requirement of water	
1	Fresh	80 KLD
2	Recycled	20 KLD
3	Total	100 KLD
4	Source of water	Bore well and Rainwater
5	Whether canteen facility provided for day students etc.	Yes
6	Waste water generation in KLD	100 KLD
7	STP capacity	100 KLD (Located in the premises of RajaRajeswari Dental College and Hospital)
8	Technology employed for Treatment and mode of disposal of treated sewage	Activated Sludge Process
9	Scheme of disposal of excess treated water if any	Gardening, Lawns, Toilet and Flush out
10	No. of ponds, wells, taps, toilets, waterless urinal	500 Taps 32 Toilets
11	No. and capacity of water tanks for storage 3 number	Each 40,000 litres storage capacity

i) Gardening and maintaining greenery within the campus

The institute is committed to preserving a lush and vibrant environment within its campus, dedicating a substantial area measuring 4,450 square meters to greenery. This green space is adorned with an array of small gardening plants and trees, and the maintenance of this natural landscape is given top priority throughout the year. The foliage, including plants and trees with small and shallow roots, requires consistent attention, with watering being a critical aspect to ensure the sustained health and survival of these green elements.

Due to the nature of the vegetation, characterized by small and shallow roots, the water demand is relatively high. Therefore, a meticulous and frequent watering regimen is implemented to meet the specific needs of these plants. On any given non-monsoon day, the total water requirement for this purpose amounts to 35 thousand liters per day (KLD).



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Photo.4 Green Belt Development at RRCE

ii) Secondary flushing in toilets in the hostel buildings.

Dual plumbing system has been provided in Boys Hostel, Girls Hostel .In general a sum total of 20 KLD is required for the flushing purpose.



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Phor.5 Duel Plumbing for Secondary Flushing

iii) Buses and other vehicles washing within the campus.

Vehicle washing activities are prevalent within the campus, involving buses and other vehicles. The institute manages a fleet of buses, cars, and various other vehicles. Moreover, students residing on the premises utilize the treated water for washing their cars and two-wheelers. The institution has allocated a provision of 5 KLD (kilo liters per day) specifically for this purpose, ensuring an organized and sustainable approach to vehicle maintenance.



Photo.6 College bus fleet and washing area

iv) Kitchen gardening near boy's hostel

Kitchen gardening is undertaken near the boy's hostel, utilizing specific patches within the premises. These areas are dedicated to growing vegetables on a trial basis, and the irrigation for these plants is typically carried out using treated water. The estimated water demand for this purpose is approximately 2 KLD during non-monsoon periods.



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Photo.7 Gardening near mess area

v) Cleaning of paved surfaces

Cleaning of paved surfaces, particularly concrete, is performed occasionally on campus. In such instances, treated water is utilized for the cleaning process. While the exact quantity is not precisely measured, it can be estimated to be approximately 4 KLD.



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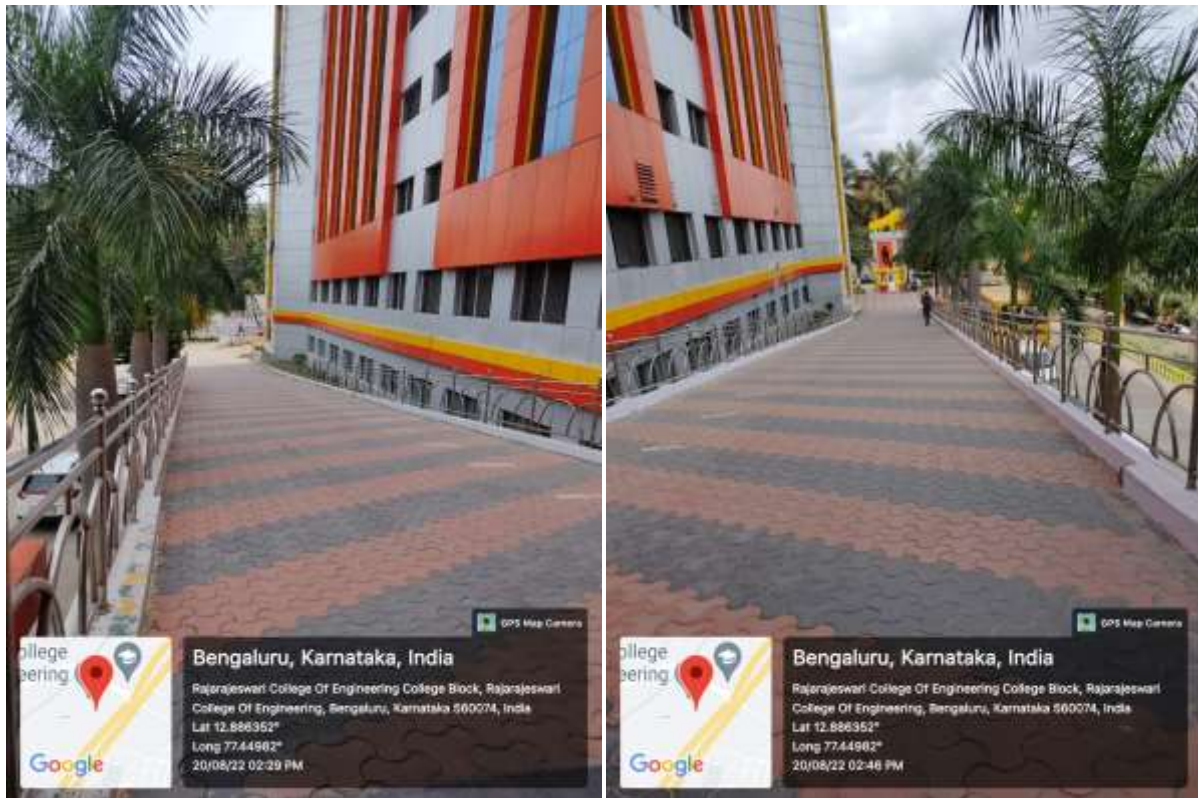


Photo 8. Paved Roads and Surface

vi) Cleaning of solar water heating collector panels:

Regular cleaning of solar thermal panels and four storage tanks is conducted using treated water. Although the consumption for this purpose fluctuates, it is typically estimated to be around 4 KLD.

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Photo.9: Cleaning solar water heating system collector panels on roof tops

Summary:

In the light of ample land area availability with minimal building construction, entire treated water is being reused within the campus, although during peak summer months the demand exceeds the supply and vice versa during the rainy season. KSPCB may consider the release of excess treated water into the storm water drains specifically during heavy and continuous rainfall when ample dilution is available. The reuse of the treated water can be summarized in the following table:

Sl. No.	Used for	Area/ No.s	Quantity of treated water used KLD
1	Green Belt	4,450 sq m	35
2	Secondary Flushing	25	20
3	Bus and Car Washing	10	5
4	Kitchen gardening	200 sq. m	2
5	Cleaning of Paved Surfaces	3	4
6	Cleaning of Solar Panels	4	4
Total			70



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3. Biomedical waste management

The quantity of red category municipal solid waste generated by the Engineering College is relatively minimal. To mitigate any adverse effects on human and animal health as well as the aesthetics of the surroundings, the institution employs a secure disposal method. The gathered waste is transported to RajaRajeswari Dental College and Hospital (RRDCH) for subsequent incineration, a process that also includes the disposal of biomedical waste.

4. E-Waste management

Obsolete computers and other electronic equipment waste are auctioned to authorized e-waste dealers by the institution. The hazardous materials present in these devices are meticulously removed and disposed of in accordance with established norms. Additionally, a sustainable approach is adopted where old computers are exchanged for new ones. To enhance the educational experience, electronic waste components such as computer system components, CPUs, and ICs are utilized in practical demonstrations for students.

Moreover, the institution promotes a culture of reuse by extracting reusable electronic components like resistors, capacitors, inductors, diodes, transistors, thermistors, etc., from the gadgets. These components find a new purpose in student projects, fostering hands-on learning and resourcefulness.

To ensure responsible waste management, the segregated waste is transferred to RajaRajeswari Medical College and Hospital (RRMCH) for further disposal in collaboration with recycling agencies. This comprehensive approach reflects the institution's commitment to environmental sustainability, responsible e-waste management, and the integration of reusable components into educational activities.

5. Waste recycling system

The institution adopts various sustainable practices for waste management. Paper waste is sold to the paper industry for recycling, contributing to the reduction of environmental impact. Waste generated in the Concrete Lab, such as cement concrete cubes, is repurposed for routine concrete works within the campus, promoting resource efficiency.

Horticulture waste undergoes vermicomposting, providing a sustainable solution for recycling and enriching the soil. Liquid waste, following proper treatment, is utilized in watering and nurturing gardening plants, ensuring a responsible and eco-friendly approach.



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6. Hazardous chemicals and radioactive waste management



Photo.10. Acid store room in chemistry lab to store hazardous chemicals

Typically, the campus does not generate any hazardous waste from its various departments. When batteries reach the end of their life cycle, they are exchanged for new ones to ensure proper disposal. To maintain safety standards, specific precautions are implemented, particularly in chemistry laboratories where concentrated acids and chemicals are stored. These hazardous materials are securely housed in a designated room, minimizing potential risks and ensuring a safe working environment.

Principl
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