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

#### **Solid Waste Management:**

Proper Cleanliness and Hygiene is maintained in the College Premises, Mess and Canteen. Generated compost using the canteen & mess waste food annually =3 tons of manure.

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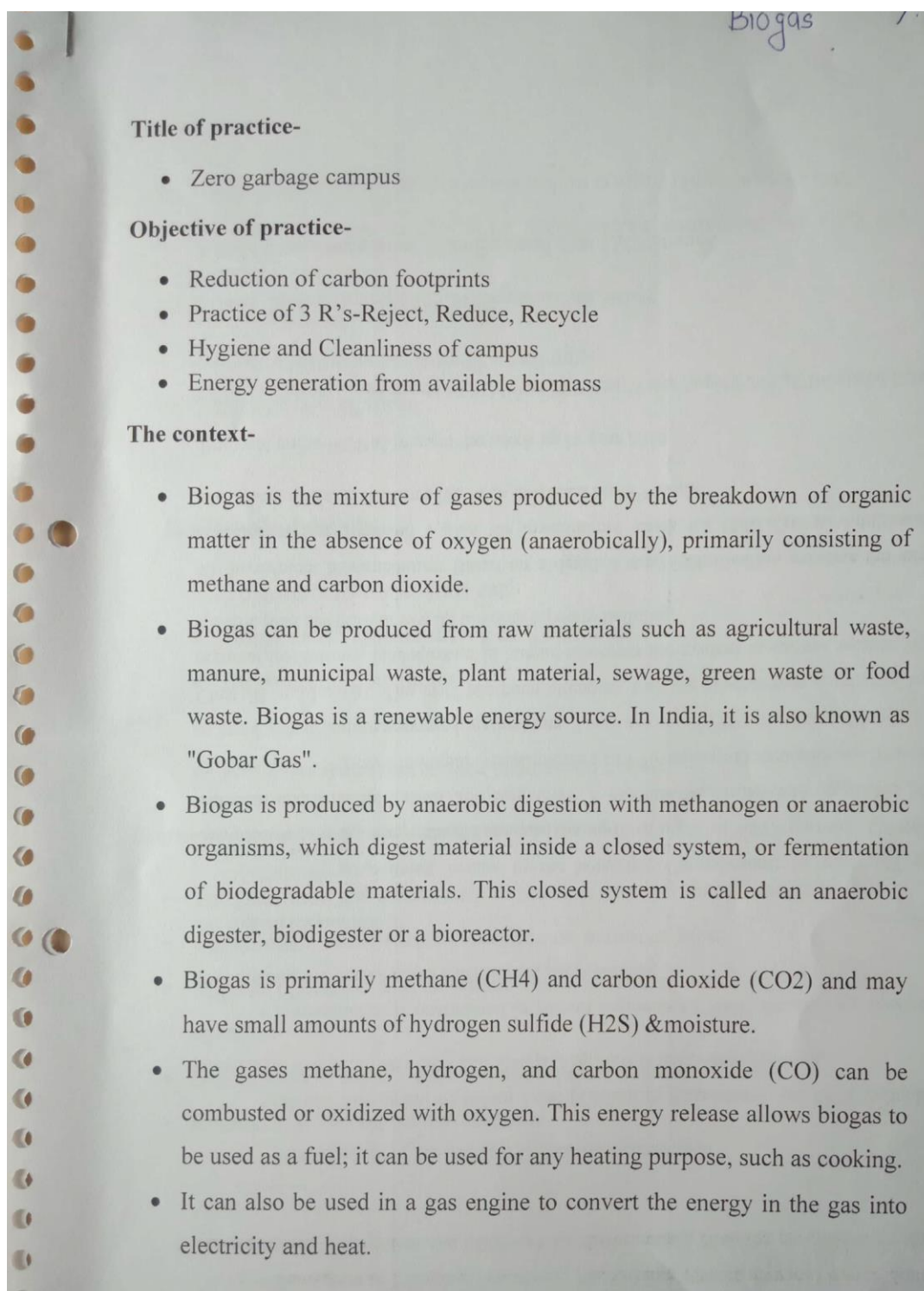


## 1. Solid Waste Management

Proper Cleanliness and Hygiene is maintained in the College Premises, Mess and Canteen. Generated compost using the canteen & mess waste food annually = 3 tons of manure.

### 1.1 Biogas Plant: Information

Generated compost using the canteen & mess waste food annually = 3 tons of manure.





### The practice-

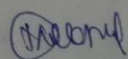
- The generated gas is used for cooking, in college ladies hostel mess.
- The generated gas is 20-25 kg daily output equivalent to 1 LPG gas cylinders
- Present daily input 250-300 kg
- Organic manure as by product 15 kg daily
- Capacity 1000 kg input

### The technical details-

- 2 digesters 20 meter cube each
- Hopper with crusher driven on 2 hp motor.
- Blower with 2 hp motor
- Gas storage balloon 30 meter cube
- All safety measures to face unforeseen events

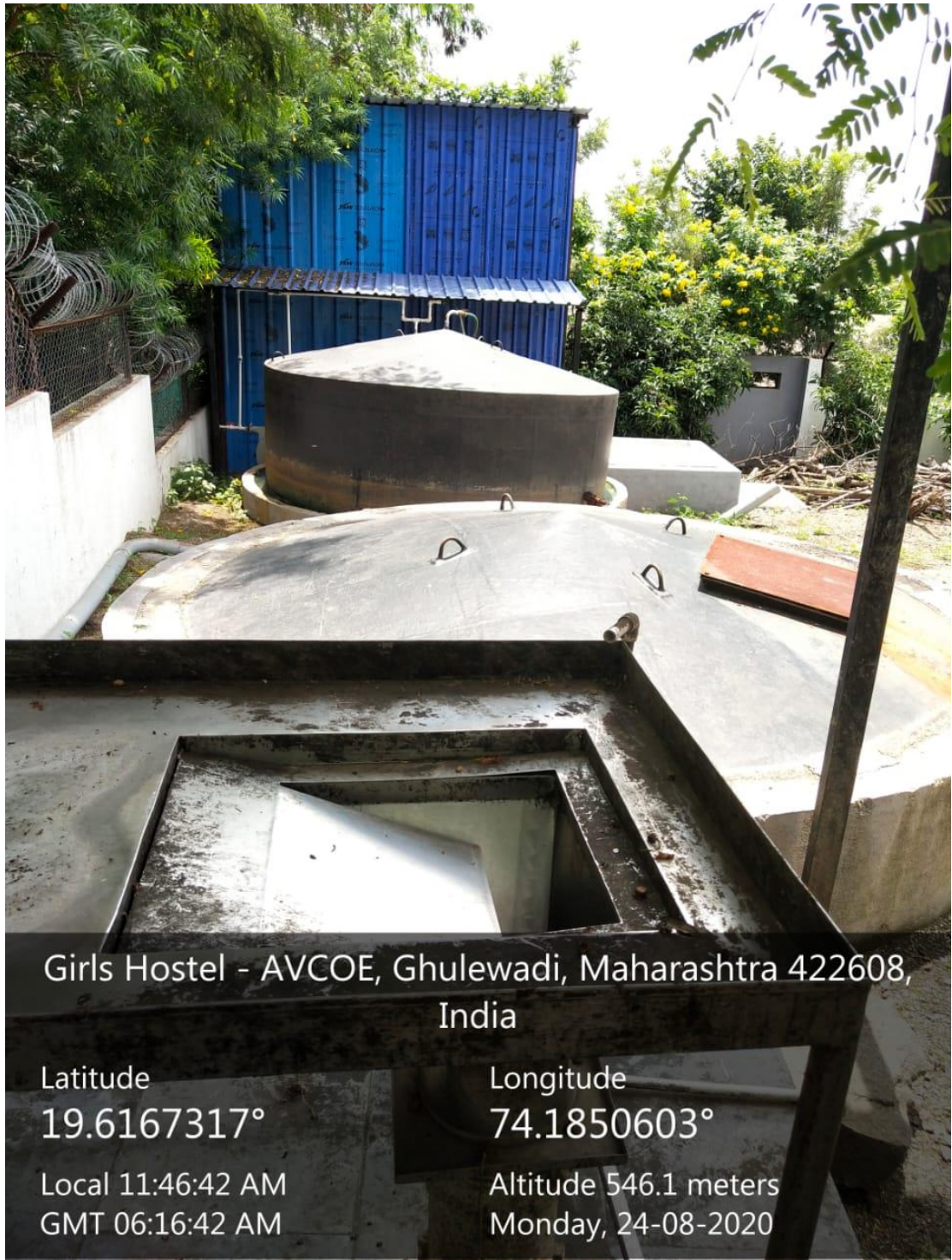
### Problems encountered and resources required-

- The generated gas output vary depending upon ambient conditions
- The calorific value varies depending on nature of input
- Regular operation and maintain chain if broken needs repeated seeding operation
- Segregation of input waste and appropriate quantity of water
- Regular and trained human resource

  
Head of the Dept. (Civil)  
Amrutvahini College of Engineering  
Sangamner 422605



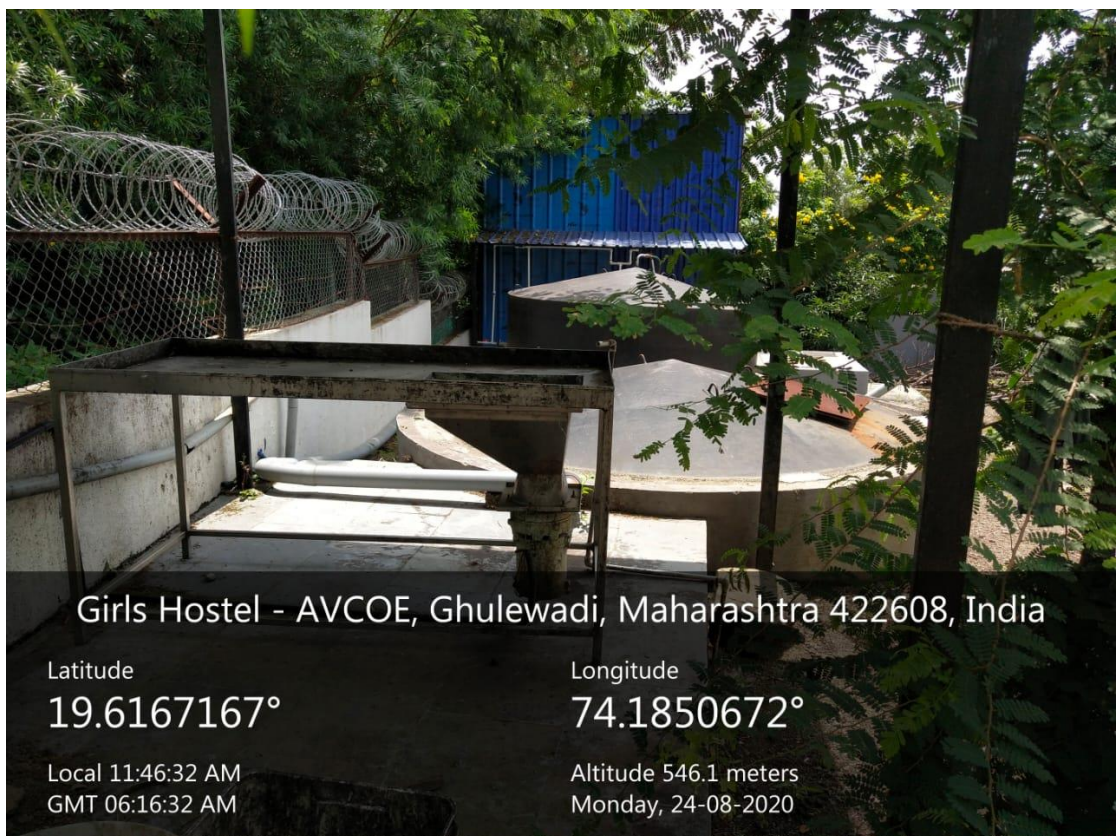
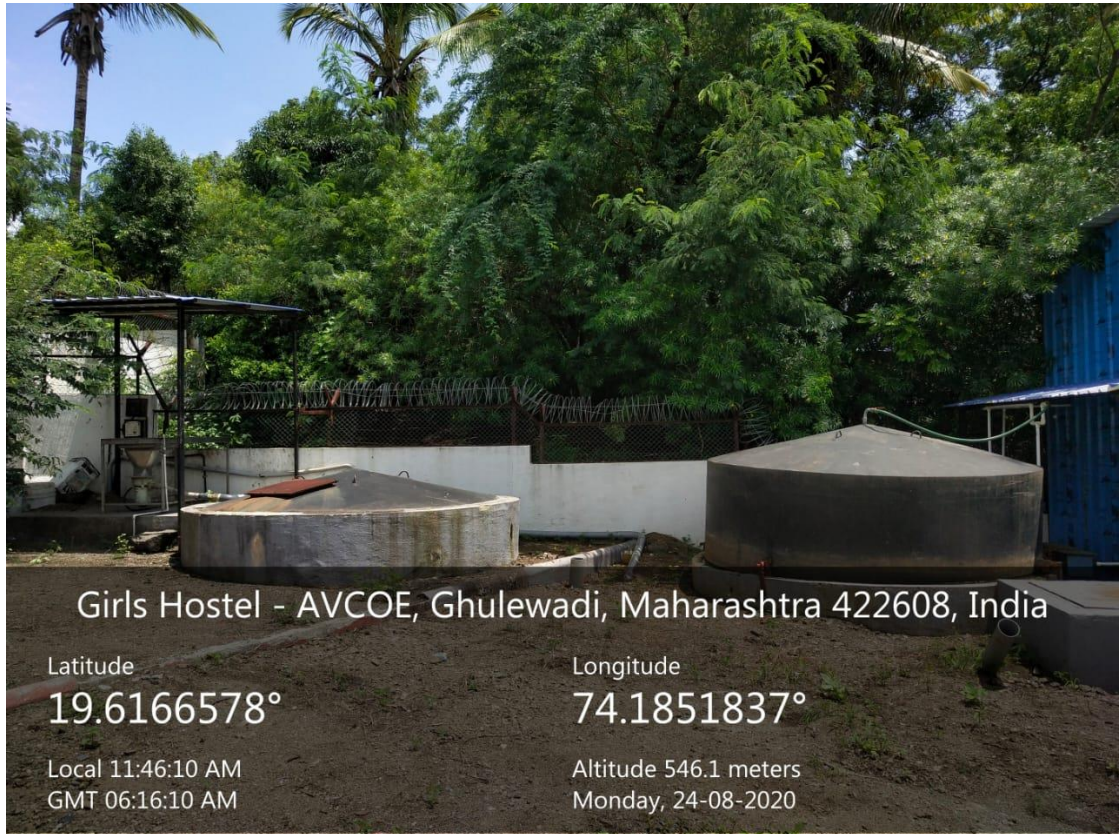
## 1.2 Biogas Plant Photos:







## Amrutvahini College of Engineering, Sangamner







# Amrutvahini College of Engineering, Sangamner

## 1.3 Biogas: Purchase Order

Amrutvahini Sheti and Shikshan Vikas Sanstha's

**Amrutvahini College of Engineering Amrutnagar, Sangamner.**

P.O.Sangamner S.K. Tal-Sangamner, Dist-A.Nagar. (422 608) Ph.No:-02425-259016

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:- PURCHASE ORDER:-

Order No:-AE/Purchase/Civil Dept/ 3 /2018-2019

Date:- 10 / 04 / 2018

To,

M/S:- Morale Technology and Services,

Shri Dhananjay Gajanan Thite,

902 A Canosa, Hiranandani Estate,

G B Road, Thane (West), Mumbai-400607.

Ref: - Your Quotation No. By mail & Date 10 / 04 / 2018

Ref: - Our Quotation No-- & Date 10 / 04 / 2018.

Dear Sirs,

With reference to your above cited quotation. We are pleased to place our order for supplying the following goods as per the terms and conditions mentioned below. Please acknowledge receipt of the order.

| Sr.No. | Particulars                                                                                                                                                                                                                                                                                                                                     | Quantity                   | Rate                    | Total Rs.               |
|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|-------------------------|-------------------------|
|        | Biogas Plant Erection Implementation, Monitoring and Functioning you supply digester package of biogas systems. Biogas purification unit, Capacity 10m <sup>3</sup> / hr. as per aforesaid scope of supply. Storage Tank- Capacity 100m <sup>3</sup> - 200m <sup>3</sup> B-CNG Filling Station (Optional). Other specification as per followse- | 01 No.<br>01 No.<br>01 No. | Total Set.<br>400000=00 | Total Set.<br>400000=00 |
| 01     | Metalic Dome container- water tight, faced RCC, specific dimension as per structural engineer, ca.1m in ground.                                                                                                                                                                                                                                 | 01 No.                     |                         |                         |
| 02     | Turbo mixer 5kw- submersible Mixer for biogas application, 5kw, 3 phase motor 400V, 50Hz, 1450rpm.                                                                                                                                                                                                                                              | 01 No.                     |                         |                         |
| 03     | Mast for Turbo mixer in pit- Lifting gear & orientation device in mixing / fertilizer pit, direction.(if required)                                                                                                                                                                                                                              | 02 Nos.                    |                         |                         |
| 04     | Automatic Starter 5kw or submersible Mixer / Pump 5kw with motor protection switch, hand/ automatic switch, ON /OFF switch, time delay switch, incl. CEE- connector 32A, installed in plastic housing.                                                                                                                                          | 02 Nos.                    |                         |                         |
| 05     | Gas Storage safety package Gas Balloon- Over / Under pressure sensor for membrane gas roof, Liquid level alarm sensor.                                                                                                                                                                                                                          | 01 No.                     |                         |                         |
| 06     | Rs- Four Lack only.                                                                                                                                                                                                                                                                                                                             |                            | Total Rs-               | 400000=00               |

**Terms And Conditions:-**

01) Delivery: - our college site at your cost.

02) Delivery Period: - Before 20 / 05 / 2018.

03) Sales tax: - GST extra at actual.

(P.T.O)



- Witzhinde

Copy to; - 1)A/C Dept 2)H.O.D. 3) Stores Dept. 4) O.C.



## 1.4 Composting -Photo









## 2. Liquid Waste Management/ Waste Recycling System:

Waste water generated from Amrutvahini Campus includes sewage from the educational buildings, boy's hostels, girl's hostel and staff quarters etc. It needs treatment before discharging it as effluent into natural stream/river etc. and same treated waste water can be utilized for various purposes like gardening and irrigation. To treat waste water, innovative 3E (Eco-friendly, Economical, and Efficient) microbial technology has adopted by the institute. In 2019, Sewage Treatment Plant (STP) having capacity of 0.4MLD is started.

Sewage Treatment Plant Installation cost (INR In lakhs) = 35.5

### 2.1 Sewage Treatment Plant: Photos







## Amrutvahini College of Engineering, Sangamner







## Amrutvahini College of Engineering, Sangamner



Ghulewadi, Maharashtra, India

AVCOE, Ghulewadi, Sangamner, Maharashtra 422608, India

Lat N 19° 36' 50.8284" Long E 74° 11' 4.3692"

29/10/20 01:41 PM

☀️ 28.43° C

🌐 241° SW





## 2.2 Sewage Treatment Plant: Information

7.1.3  
STP

**Amrutvahini Sheti and Shikshan Vikas Sanstha's**  
Amrutvahini College of Engineering, Sangamner

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**Sewage Treatment Plant at AVCOE Campus**

➤ **Objective:**  
To treat 0.4 MLD of wastewater generated from campus and its reuse for Gardening and Irrigation Purpose.

➤ **Context:**  
Wastewater generated from Amrutvahini Campus is about 0.4 MLD, which includes sewage from the educational buildings (Day scholar students, Teaching, Non-Teaching staff, office staff etc.), Boys Hostel, Girl hostel and staff Quarters etc.  
  
It needs treatment before discharging it as effluent into natural stream/river, etc., and same treated wastewater can be utilized for various purposes like gardening and irrigation. To treat wastewater, 3E Technology is adopted by the institution (Eco-Friendly, Economical, Efficient).

➤ **Practice:**  
Treatment plant contains 3 Major Tanks.

- a) Collection Tank
- b) Bio Tower
- c) Bio Filter

Functioning of these three tanks is as follows:

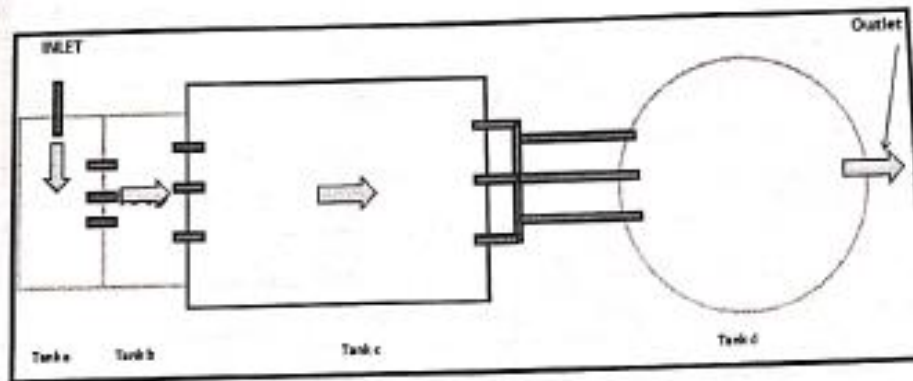
a) **Collection Tank:**  
Control the velocity of wastewater, and it gets collected into a collection tank. Heavier material/particles settle down by its weight, and floating material can be taken out with the help of net.

b) **Bio Tower:**  
Bio tower contains 20mm aggregates and coating of bio-film around it, which reduces colour, odour and approximately 40% of BOD.

Scanned with CamScanner

## c) Bio Filter :

This Unit maintains the pH of water, and it reduces the BOD to 30 mg/l, reduction in colour and E-Coli count. Growth of Bacteria in this filter is in multiples of  $10^{10}$ . Bio filter contains black cotton soil and the addition of bacteria which decompose and degrade the wastewater and make it useable for agriculture and irrigation purpose.



Tank a: Collection Tank

Tank b : Bio Tower

Tank c: Bio Filter

Tank d: Temporary storage tank

Figure: 1 Showing the layout of the plant

### ➤ Practice adopted for Testing of sewage samples

The Sewage Treatment Plant at A.V.C.O.E. campus is capable of treating around 0.4 MLD, i.e. four lacs litres of wastewater per day generated from student's hostels, staff-quarters, and academic buildings etc. To meet the quality, i.e. effluents discharge standards as per CPCB (Central Pollution Control Board) and MPCB (Maharashtra Pollution Control Board) norms and evaluation of overall working efficiency of the plant, several physical and chemical characteristics needs to be tested on a regular basis.

The parameters like pH, colour, odour, total dissolved solids (TDS), total suspended solids (TSS), are analyzed daily while on priority biochemical oxygen demand (BOD), and chemical oxygen demand (COD) are analyzed every week. The samples are being collected from the inlet and outlet chamber of STP.

All these tests are carried out in Environmental Engineering Laboratory of Department of Civil Engineering of the institute with the required precision and utmost care. However, it is the policy of institute to send the samples to NABL (National Accreditation Board for Testing's and Calibration Laboratories), and MoEFCC (Ministry of Environment, Forest and Climate Change) certified laboratory once in a month. The report of the same is regularly



submitted to CEO of the AS&SV Sanstha through Chief coordinator of the sewage treatment plant.

In case of any inconsistency related with working of the STP, field expert's opinion is advisable.

**Ashwamedh Engineers & Consultants**  
Survey No 102, Plot No 28, Western Park Road,  
Indus Nagar, Sangamner-422009, Maharashtra, India  
Mob: 98220 22222, 98220 22223, 98220 22224  
Email: ashwamedh@ashwamedh.com, ashwamedh@ashwamedh.com



**Ashwamedh**  
Engineers & Consultants  
Laboratory Services Division

**TEST REPORT**

|                             |                                                                                   |                                |                                                                                |
|-----------------------------|-----------------------------------------------------------------------------------|--------------------------------|--------------------------------------------------------------------------------|
| Sample Report No:           | E-10-20-2019                                                                      | Report Date:                   | 20/10/2019                                                                     |
| Name and address of Client: | Shri. Nandashree Mahane<br>At Post: Sangamner,<br>Dist: Sangamner,<br>Maharashtra |                                |                                                                                |
| Sample Submitted to:        | Customer                                                                          | Sample Description: Type       | Sample Description: Other<br>Effluent / Sewage<br>Industrial &<br>Domestic WWT |
| Sampling Location:          | STP Outfall                                                                       | Date - Receipt of Sample:      | 19/10/2019                                                                     |
| Sample Quantity: Packaging  | 1 L & 2 Ls (Sterile) 100                                                          | Date - Start of Analysis:      | 19/10/2019                                                                     |
| Order Reference:            | Verbal Discussion                                                                 | Date - Completion of Analysis: | 20/10/2019                                                                     |

| Sl. No.                   | Parameter                                | Result       | Unit      | Method           |
|---------------------------|------------------------------------------|--------------|-----------|------------------|
| <b>CHEMICAL TESTING</b>   |                                          |              |           |                  |
| 1                         | pH                                       | 7            | None      | 1.15, 1.16, 1.17 |
| 2                         | Total Solids                             | Dispersible  | mg/L      | 5.20, 5.21, 5.22 |
| 3                         | SS                                       | 7.27         | mg/L      | 5.20, 5.21, 5.22 |
| 4                         | Total Suspended Solids                   | 12           | mg/L      | 5.20, 5.21, 5.22 |
| 5                         | Biochemical Oxygen Demand (5 Days, 20°C) | 41           | mg/L      | 5.20, 5.21, 5.22 |
| 6                         | Chemical Oxygen Demand                   | 120          | mg/L      | 5.20, 5.21, 5.22 |
| 7                         | Total Dissolved Solids                   | 604          | mg/L      | 5.20, 5.21, 5.22 |
| 8                         | Phosphate (as P)                         | BDL (BL-0.2) | mg/L      | 5.20, 5.21, 5.22 |
| 9                         | Total Nitrogen (as N)                    | 44.3         | mg/L      | 5.20, 5.21, 5.22 |
| <b>BIOLOGICAL TESTING</b> |                                          |              |           |                  |
| 10                        | Total Coliforms                          | 33           | MPN/100ml | 5.20, 5.21, 5.22 |
| 11                        | Fecal Coliforms                          | 9.3          | MPN/100ml | 5.20, 5.21, 5.22 |

**KABU**  
K. B. B. B.  
Sangamner, Maharashtra  
AUTHORIZED SIGNATORY



(In Report)

**Ashwamedh**  
Engineers & Consultants  
Sangamner  
AUTHORIZED SIGNATORY

**Note:**

- The result listed refers only to the tested samples and applicable parameters.
- This report is not to be reproduced except in full without written approval of the laboratory.
- \* Not included in our HMBI Scope.

Page 2 of 2

Figure: 2 Test Report of Sewage Sample

➤ Advantages of 3E Technology are listed below:

- Less Mechanical Machinery,
- Savings in Electricity Bills,
- Very Less Sludge Generation,
- No Odour Problem,
- Area requirement is also less,
- Skilled supervision is not required,
- Eco-Friendly

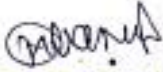
➤ Benefits of the Project:

- Earlier well water/river water was utilized for gardening purpose, but after installation of plant treated wastewater is being used for gardening and irrigation purpose which saves natural water.
- As mechanical parts are negligible, so there is saving of electricity which strengthen green campus motto.
- Students gets aware of Environment and understand the concept of Save Water and Save Energy, which leads to the sustainable development of the campus.
- **Durability** : More Durable as compare to MBBR and Other Technologies as less machinery and its components parts and very less electric equipment's involved in the treatment process.
- **Maintenance**: After 2 to 2.5 years, additional bacteria are required to add in the Bio Filter, and the top layer of sand in the bio filter have to replace.
- **Annual Maintenance Cost**: It is 10% of the actual cost of plant for one year approximately. After 2 to 2.5 years, around 30% of the total cost of the plant will be the actual cost of bacteria for the symbiotic process.





Figure: 3 Photograph showing Sewage Treatment Plant

  
Head of The Dept. (Civil)  
Amrutvahini College of Engg.  
Sangamner 431608

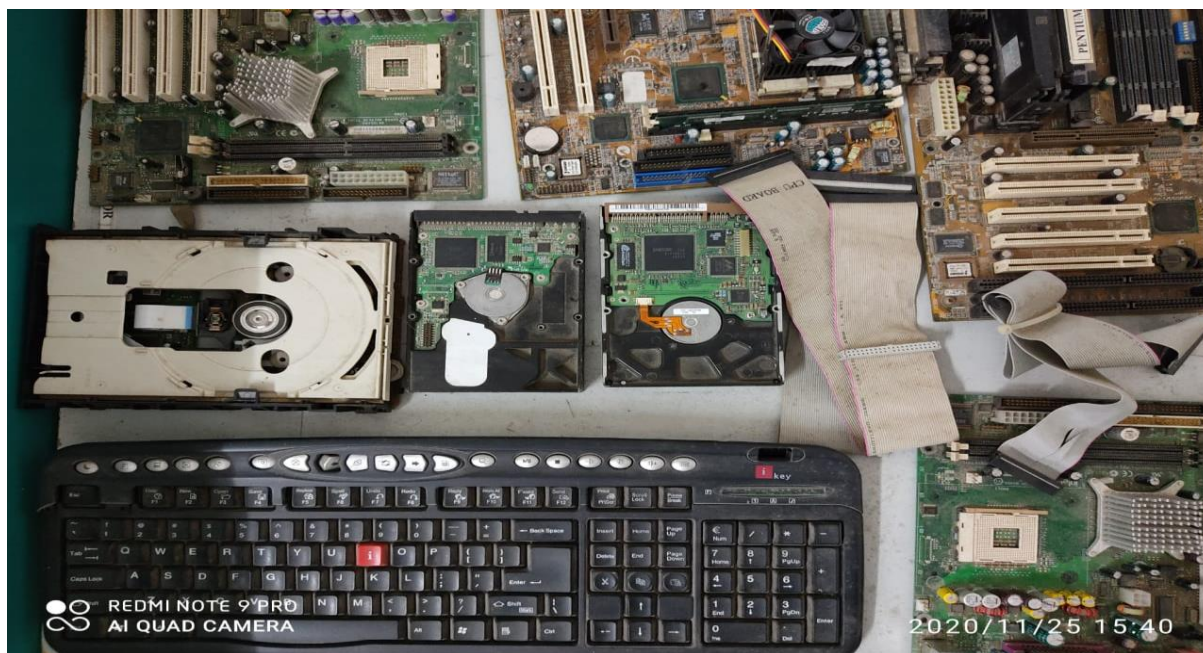
### 3. Biomedical waste management: Not Applicable

### 4. E-waste management

- Out-dated and low-end e-components are being used for demonstration. e.g. CRO, Function Generator like these electronics equipments have been used as demonstration models in respective laboratories.
- The major e-waste such as out of use instruments / equipment, CRTs, Printers, Computers, Electronics gadgets, circuits, kits have been written off and then it is sold out to buyers by auctioning.
- All the miscellaneous e-waste such as CDs, batteries, fluorescent bulbs, PCBs and electronic items are collected from every department and office, and delivered to third party for safe disposal.
- Useful parts of electronic gadgets like resistors, capacitors, inductors, diodes, transistors, thyristors etc. have been removed from the gadgets for reuse purpose in students practical /projects

### E-Waste Management: Photos

#### Used for demonstration

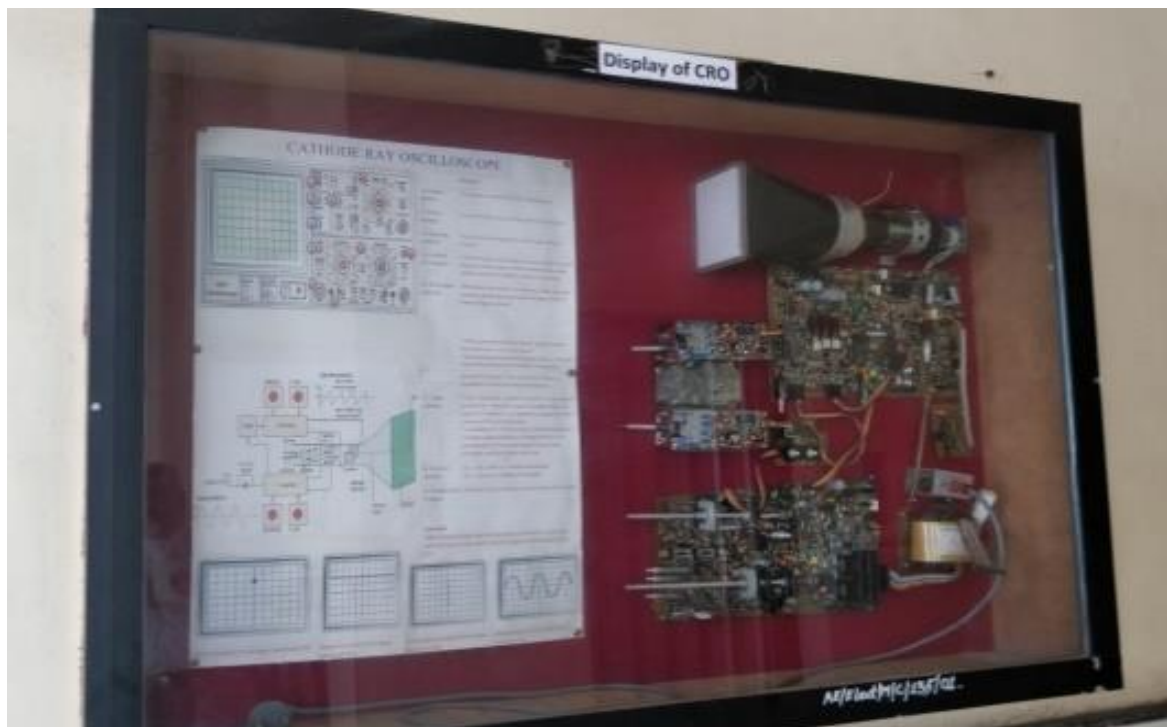




**Used as demonstration models in respective laboratories**



**Used for demonstration**



**Used for demonstration**



**5. Waste recycling system: Sewage Treatment Plant: (pg. No. 10)**

**6. Hazardous chemicals and radioactive waste management**

In chemistry lab much diluted chemicals are used for practicals and no hazardous waste is generated.