**SARDAR VALLABHBHAI NATIONAL INSTITUTE OF TECHNOLOGY, SURAT**

**DEPARTMENT OF CIVIL ENGINEERING**

**ENVIRONMENTAL ENGINEERING SECTION**

**ENVIRONMENTAL ENGINEERING LABORATORY**

Environmental Engineering Laboratory (EE Lab) was established in the year 1961 during the inception of the Department. The laboratory is located in the Department of Civil Engineering, wing A. The laboratory facilities are mainly utilized by undergraduate and postgraduate students for their UG and PG curriculum laboratory work. Students pursuing research under Ph. D. program also utilize it for conducting various treatability studies under their study. The laboratory set up is also used to carry out various testing of water and wastewater parameters. The laboratory facility has good potential to carry out consultancy work generating revenue using the expertise of learned faculty members in the area of wastewater treatment, air pollution, solid and hazardous waste management, and noise pollution.

Environmental Engineering Section is having three (3) laboratories

1. Environmental Engineering Basic Laboratory
2. Solid Waste Management Laboratory
3. Environmental Audit Laboratory

**List of equipment available in the laboratory is given below:**

|  |  |
| --- | --- |
| **Sr. No.** | **Equipment Name** |
|  | **MAJOR EQUIPMENT** |
| 1. | Atomic Absorption Spectrophotometer |
| 2. | TKN Analyzer |
| 3. | Sound Level Meter |
| 4. | Spectrophotometer (Thermo Fisher) |
| 5. | 10-micron fine particulate sampler with accessories |
| 6. | 2.5-micron fine particulate sampler with accessories |
| 7. | CO2 Analyzer  |
| 8. | Visible Spectrophotometer |
|  |  |
|  | **MINOR EQUIPMENT** |
|  | Platinum crucible capacity with purity of the platinum |
|  | Phase contrast Microscope |
|  | Jar test apparatus |
|  | i)Digital colony counter 3 digit ii) Autoclave Horizontal (cylindrical) 35x55cmiii)Filtration Assembly |
|  | Digital Turbidity meter |
|  | Magnetic Stirrer |
|  | Remi Centrifuge |
|  | Vacuum Pump |
|  | Orbital Shaker |
|  | Peristaltic Pump |
|  | Glass Distillation Unit |
|  | Electrical Conductivity Meter |
|  | pH Meter |
|  | Turbidity Meter |
|  | Hot Plate Magnetic Stirrer |
|  | Vortex Mixture |
|  | Wrist Shaker |
|  | Portable Colorimeter |
|  | Filter assembly with air compressor  |
|  | Rotary drum reactor  |
|  | Muffle furnace |
|  | Handheld VOC Meter |
|  | Water purification system for distillation |
|  | Distillation Assembly  |
|  | Analytical Balance (Simadzu) |
|  | BOD Incubator (Cherish Scientific) |
|  | Computers  |
|  | Gray water treatment reactor- setup |
|  | Green waste processing machine |
|  | Kitchen waste processing machine |
|  | Analytical Digital Balance |
|  | Cycle trolley |
|  | Portable Turbidity meter |
|  | Conductivity meter |
|  | Benchtop DO Meter |
|  |  |

**LIST OF EXPERIMENTS**

**CE 202 Environmental Engineering I at B Tech II year**

|  |  |
| --- | --- |
| **Sr. No.** | **Title of Experiment**  |
| 1 | Determination of Turbidity |
| 2 | Determination of Chloride. |
| 3 | Determination of Hardness |
| 4 | Determination of pH, Carbonate, Bicarbonate and Hydroxide Alkalinity |
| 5 | Determination of Chlorine Demand and Chlorine Residual |
| 6 | Determination of Fluorides |
| 7 | Determination of optimum coagulant dosage |
| 8 | Bacteriological Analysis of water |
| 9 | Demonstration of air pollution monitoring equipment. |
| 10 | Demonstration of noise level meter |

**LIST OF EXPERIMENTS**

**CE 303 Environmental Engineering II at B Tech III year**

|  |  |
| --- | --- |
| **Sr. No.** | **Title of Experiment**  |
| 1 | Determination of solids in wastewater |
| 2 | Determination of pH of water and wastewater |
| 3 | Measurement of colour. |
| 4 | Determination of carbonate, bi-carbonate and hydroxide alkalinity. |
| 5 | Determination of oil and grease in water |
| 6 | Determination of phosphorus as PO4-3. |
| 7 | Determination of sulphate |
| 8 | Determination of Biochemical Oxygen Demand of wastewater. |
| 9 | Determination of Chemical Oxygen Demand of a given sample. |
| 10 | Determine MLSS and MLVSS. |

The section also has a Clean Environment Research Center (CERC), a virtual center which is attached to the environmental engineering laboratory. Through CERC EE lab is recognized by GPCB, Gujarat as Schedule – I auditor. Environmental Audit work of Industries assigned by GPCB is effectively carried out every year.

**LIST OF EXPERIMENTS**

**CE 609 Environmental Engineering Laboratory I at M Tech (I) Env. Engg.**

|  |  |
| --- | --- |
| **Sr. No.** | **Title of Experiment**  |
|  | **CHEMISTRY PRACTICALS**  |
| 1 | Water & wastewater sampling and preservation techniques |
| 2 | Determination of physical characteristics of water and waste water like pH, Turbidity, electrical conductivity, Solids. |
| 3 | Determination of Total Hardness, Calcium Hardness, Magnesium Hardness of water sample |
| 4 | Determination of Chlorides, Nitrates, Phosphate and Sulphate of water sample. |
| 5 | Determination of Residual chlorine of water sample |
| 6 | Study of Jar test for different coagulant dose |
| 7 | Determination of DO, BOD and COD of waste water sample |
| 8 | Determination of oil and grease of waste water sample |
| 9 | Determination of Ammonical Nitrogen, Nitrates and Sulphates of waste water sample |
| 10 | Determination of Heavy metals from industrial waste  |
|  | **MICROBIOLOGY PRACTICALS**  |
| 1 | Determination of Residual chlorine of water sample. |
| 2 | Study of Compound and Phase Microscope. |
| 3 | Study of staining technique. |
| 4 | Study of isolation techniques for bacteria. |
| 5 | Study of MPN test and multiple tube technique |
| 6 | Application of Plate count method for bacterial growth. |
| 7 | Effects of pH on growth of bacteria. |
| 8 | Effects of Osmotic Pressure on growth of bacteria.  |

**CE 606 Advanced Environmental Engineering laboratory at M Tech (I) Env. Engg.**

|  |  |
| --- | --- |
| **Sr. No.** | **Title of Experiment**  |
| 1 | Determination of coagulant dosage. |
| 2 | Determination of BOD rate constant |
| 3 | Filtration Performance Studies |
| 4 | Adsorption kinetics and equilibrium |
| 5 | Settling characteristics of solids |
| 6 | Removal of heavy metals by precipitation |
| 7 | pH Buffers and Buffering capacity |
| 8 | Study of Wastewater Disinfection |
| 9 | Study of Water Softening Process |
| 10 | Aeration and Coefficient of Aeration |
| 11 | Determination of MLSS and MLVSS |
| 12 | Study of Activated Sludge Process |
| 13 | Analysis of solid wastes – Proximate and ultimate analysis |
| 14 | Characterization of wastes from different industries |
| 15 | Demonstration of Stack monitoring kit. |
| 16 | Analysis and calculation of SPM, RSPM, SO 2 and NO X for ambient air quality. |
| 17 | Demonstration and application of sound level meter |

**Research facilities in Environmental Engineering:**

It is known that various anthropogenic activities result in complex set of environmental issues especially in urban centers. These activities are known to cause considerable health impacts and developing research approaches to deal with multipollutant exposure is badly needed. Urban centres in India act as centres of growth and development which draws rural population to these centres. The impact of rapid rise in urban population is significantly seen in urban cities in the form of various environmental degradation. With urbanization, the problems of sustainable water and sanitation services becomes a major challenge for cities. Further, the cities are finding it difficult to source, segregate different kinds of waste and make use of a product which can be potentially brought back into consumer life cycle. Urban air pollution and related problems and illness are also on rapid rise in all Indian cities.

The P G section in Environmental Engineering has developed the Centre for Clean Environment Research with industrial support of surrounding area. This Centre is providing a platform to carry out the research activity and to address the issues of environmental pollution and to suggest its mitigation measures.

The goal of the Center for Clean Environment Research (CERC) is to address the environmental pollution issues in the following major thrust areas:

1) Water and Wastewater quality and treatment

2) Air quality and pollution control

3) Sustainable solid waste management and

4) Noise pollution.

Environmental Engineering Section of Civil Engineering Department of SVNIT has been engaged in addressing various aspects of these problems for many decades. The section has been working on water and wastewater characteristics and treatment, urban air pollution sources and its inventory, identification, characterization and development of proper use for urban solid wastes among other topics. These studies are done through various laboratory scale studies carried out in the department. Industry are also discussing / giving their live problem with centers and section. Researchers are also trying to develop or to find out the solution of the same. For typical industrial problem the financial help is given by industry in terms of man power, instrumental and transportation facility.

The experimental and observational findings developed by researchers enable us to develop a better understanding of the environmental pollution issues and take the next significant step forward in addressing this multi-pollutant degradation of environment and provide useful directives for mitigating measures. Finally, the research carried out by students and faculty will be helpful to:

1. Develop Research design in the thrust areas.
2. Identifying problem priorities for solution.
3. Developing solutions with a working protocol for policy makers.