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|  | **National Institute of Technology Meghalaya**An Institute of National Importance | **CURRICULUM** |
| Programme | **Master of Technology**  | Year of Regulation |  **2018-19** |
| Department | **Civil Engineering** | Semester | **II** |
| Course Code | Course Name | Pre-requisite | Credit Structure | Marks Distribution |
| L | T | P | C | INT | MID | END | Total |
| **CE 584** | **Industrial Wastewater Pollution Control** | **NIL** | **3** | **0** | **0** | **3** | **50** | **50** | **100** | **200** |
| Course Objectives | 1. Distinguish between the quality of domestic and industrial water requirements and Wastewater quantity generation
2. Understand the industrial process, water utilization and wastewater generation**.**
3. **Impart knowledge on selection of treatment methods for industrial wastewater**
4. Acquire the knowledge on operational problems of common effluent treatment plants**.**
5. **Gain knowledge on different techniques and approaches for minimizing the generation and application of Physio chemical and biological treatment methods for recovery, reuse and disposal of industrial wastewater.**
 | Course Outcomes | CO1 | Able to recognize the properties of the basic industries and the environmental impact of water and wastewater generated. |
| CO2 | Able to determine the appropriate treatment methods for textile industry wastewater |
| CO3 | Able to make the selection process for high organic load of wastewater treatment needed. |
| CO4 | Able to compare the methods used in wastewater treatment and waste containing heavy metals such as metal plating and refinery. |
| CO5 | Be able to design different treatment methods, pharmaceutical industry and the chemical industries which produces of wastewater properties of, operational problems. |
| SYLLABUS |
| No. | Content | Hours | COs |
| I | **Introduction:**Industrial Wastewater Characteristics, Toxic chemicals from industry, Preliminary and Primary Treatment, Unit Operations and Unit processes, Biological Treatment Processes | 8 | CO1, CO 2 |
| II | **Advanced wastewater treatment:** Advanced wastewater treatment, Attached & Suspended Growth systems, Sludge Treatment and Disposal,  | 8 | CO2, CO3, CO4 |
| III | **Industrial wastewater versus municipal wastewater** Industrial wastewater versus municipal wastewater; Effects of industrial wastewater on receiving water bodies and municipal wastewater treatment plant; Bioassay test; Sampling techniques; Stream protection measures; Volume reduction, strength reduction, Neutralization, Equalization, Proportioning; | 10 | CO2, CO3, CO4 |
| IV | **Combined treatment of industrial wastewater with domestic sewage:** Combined treatment of raw industrial wastewater with domestic sewage; Zero discharge concepts; Removal of specific pollutants in industrial effluents, e.g. oil & grease, phenol, cyanide, toxic organics, heavy metals; Characteristics and treatment of various industrial effluents.  | 10 | CO4, CO5,  |
| Total Hours | **36** |  |
| **Essential Readings** |
| 1. Nemerow, N. L and Dasgupta, A., Industrial and Hazardous Waste Treatment, Van Nostarnd Reinhold (New York), 1988.
 |
| 1. Eckenfelder, W. W., Industrial Water Pollution Control, McGraw-Hill, 2000.
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| **Supplementary Readings** |
| 1. Metcalf and Eddy Inc, Wastewater Engineering: Treatment and Reuse, TMH publication, 4th Edition, 2003.
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| 1. Clesceri, L. S., Greenberg, A. E. and Eaton, A. D., Standard Methods for the Examination of Water and Wastewater, Washington, D.C., 20th Ed., 1998.
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