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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. | | | | | | | | | | | | | | | |
| **Supplementary Readings** | | | | | | | | | | | | | | | |
| 1. Metcalf and Eddy Inc, Wastewater Engineering: Treatment and Reuse, TMH publication, 4th Edition, 2003. | | | | | | | | | | | | | | | |
| 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. | | | | | | | | | | | | | | | |