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| Image result for nit meghalaya logo | | | | **National Institute of Technology Meghalaya**  An Institute of National Importance | | | | | | | | | | | | | | | | | | | | | | | **CURRICULUM** | | | | | | |
| Programme | | | | **Bachelor of Technology in Civil Engineering** | | | | | | | | | | | | | Year of Regulation | | | | | | | | | | **2019-20** | | | | | | |
| Department | | | | **Civil Engineering** | | | | | | | | | | | | | Semester | | | | | | | | | | **IV** | | | | | | |
| Course  Code | | Course Name | | | | | | | | **Pre requisite** | | | | Credit Structure | | | | | | | | Marks Distribution | | | | | | | | | | | |
| L | | T | | | P | C | | INT | | | MID | | | END | | | | Total | |
| **CE 202** | | **Environmental Engineering – I** | | | | | | | | **Nil** | | | | **3** | | **0** | | | **0** | **3** | | **50** | | | **50** | | | **100** | | | | **200** | |
| Course  Objectives | | 1. To emphasize on the importance of Public water supply scheme. | | | | | | | | | | Course Outcomes | | | | CO1 | | | Able to Identify environmental problems arising due to engineering and technological activities and the science behind those problems. | | | | | | | | | | | | | | |
| 1. To elucidate about Population forecasting and estimation of water demand. | | | | | | | | | | CO2 | | | Able to Estimate the population - economic growth, energy requirement and demand. | | | | | | | | | | | | | | |
| 1. To compute water quality parameters. | | | | | | | | | | CO3 | | | Able to Analyse material balance for different environmental systems. | | | | | | | | | | | | | | |
| 1. To familiarize students about Water Purification systems. | | | | | | | | | | CO4 | | | Able to understand the importance of ecosystem and biodiversity for maintaining ecological balance. | | | | | | | | | | | | | | |
| 1. To analysis and design water distribution systems. | | | | | | | | | | CO5 | | | Able to Identify the major pollutants and abatement devices for environmental management and sustainable development | | | | | | | | | | | | | | |
| No. | COs | | Mapping with Program Outcomes (POs) | | | | | | | | | | | | | | | | | | | | | | | Mapping with PSOs | | | | | | | |
| PO1 | | PO2 | PO3 | PO4 | PO5 | PO6 | | PO7 | | PO8 | | PO9 | | | PO10 | | | PO11 | | PO12 | | | PSO1 | | | PSO2 | | | | PSO3 |
| 1 | CO1 | | 3 | | 0 | 0 | 0 | 0 | 0 | | 0 | | 0 | | 0 | | | 0 | | | 0 | | 0 | | | 0 | | | 3 | | | | 0 |
| 2 | CO2 | | 3 | | 0 | 0 | 0 | 0 | 0 | | 0 | | 0 | | 0 | | | 0 | | | 0 | | 0 | | | 0 | | | 3 | | | | 0 |
| 3 | CO3 | | 3 | | 0 | 0 | 0 | 0 | 0 | | 0 | | 0 | | 0 | | | 0 | | | 0 | | 0 | | | 0 | | | 3 | | | | 0 |
| 4 | CO4 | | 3 | | 0 | 0 | 0 | 0 | 0 | | 0 | | 0 | | 0 | | | 0 | | | 0 | | 0 | | | 0 | | | 3 | | | | 0 |
| 5 | CO5 | | 3 | | 0 | 1 | 0 | 0 | 0 | | 0 | | 0 | | 0 | | | 0 | | | 0 | | 0 | | | 0 | | | 3 | | | | 0 |
| SYLLABUS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| No. | Content | | | | | | | | | | | | | | | | | | | | | | | Hours | | | | | | | COs | | |
| I | **Water Supply System and Sources**  Public water supply system, Planning and Components; Surface and Groundwater; Reservoir; Surface and Sub-surface sources - types, selection, storage reservoir – yield and capacity estimation. | | | | | | | | | | | | | | | | | | | | | | | **06** | | | | | | | **CO1, CO2, CO3** | | |
| II | **Distribution System**  Requirements, Classification, Analysis and Design of distribution systems, Detection and Prevention of leakage | | | | | | | | | | | | | | | | | | | | | | | **05** | | | | | | | **CO3** | | |
| III | **Water Demand**  Population forecasting, Design period, estimation of water demand for various uses, factors affecting consumption | | | | | | | | | | | | | | | | | | | | | | | **05** | | | | | | | **CO3, CO4** | | |
| IV | **Water Quality**  The hydrologic cycle and water quality parameters: physical, chemical and biological; water quality standards for chemical, physical and microbiological parameters; Drinking Water quality standards. | | | | | | | | | | | | | | | | | | | | | | | **06** | | | | | | | **CO4, CO5** | | |
| V | **Basic microbiology and chemistry**  Microorganisms in natural water systems, development of dissolved oxygen (DO) sag model, introduction to environmental chemistry | | | | | | | | | | | | | | | | | | | | | | | **04** | | | | | | | **CO2, CO3** | | |
| VI | **Water Treatment**  Screening, Design and operation of sedimentation and settling tanks, Theory of settling, types of settling (Type – I and Type – II Settling) and Coagulation and flocculation, Design of flocculation process, Aeration, Disinfection process-theory, Chlorination, Hardness Removal, Fluoride and Arsenic Removal, Household Water Treatment Systems; Flow-sheets for treatment of surface and sub-surface waters; Types of filtration, Mechanism of filtration, Design of Considerations, Filter design criteria, operation and maintenance. | | | | | | | | | | | | | | | | | | | | | | | **10** | | | | | | | **CO5** | | |
| **Total Hours** | | | | | | | | | | | | | | | | | | | | | | | | **36** | | | | | |  | | | |
| **Essential Readings** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. Environmental Engineering, Peavy H. S., Rowe D. R. and George Tchobanoglous, McGraw-Hill International, First Edition, 2017 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. Water Supply and Sewerage, McGhee T. J ., McGraw-Hill Inc., Sixth Edition, 2007 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. Sawyer, C.N., McCarty, P.L., Parkin, G.F., Chemistry for Environmental Engineering, Tata McGraw-Hill, 2000. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Supplementary Readings** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. Wastewater Engineering- Treatment and Reuse, Metcalf & Eddy (Revised by G. Tchobanoglous, F. L. Burton and H. D. Stensel), Tata McGraw Hill, Fourth Edition, 2010 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. Introduction to Environmental Engineering, Davis M. L and Cornwell D. A McGraw-Hill, Inc.,5th Edition, 2012 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. Manual for Sewer and Sewerage, Central Public Health & Environmental Engineering Organization, Ministry of Housing and Urban Development, Govt. of India, 2013. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. APHA, Standard Methods Examination of Water and Wastewater, American Public Health Association, Washington DC, 1995, 22nd Edition, 2012 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. Manual for water supply and treatment, Central Public Health & Environmental Engineering Organization, Ministry of Housing and Urban Development, Govt. of India, 1999. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |