|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | **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 | | | | | | | **V** | | | | |
| Course Code | | Course Name | | | | | | | | Pre-Requisite | | | | Credit Structure | | | | | | Marks Distribution | | | | | | | | |
| **CE 355** | | **Hydrology and Water Resources Engineering Laboratory** | | | | | | | | **NIL** | | | | L | | T | | P | C | Continuous Assessment | | | | | | | Total | |
| **0** | | **0** | | **2** | **1** | **01 Experiment** | | | | **10** | | | **100** | |
| Course Objectives | | To develop the student’s knowledge on various processes of  hydrologic cycle with detail understanding of its components. | | | | | | | | | | Course Outcomes | | | | CO1 | | Student will be able to understand the various components ofhydrologic cycle that affect the movement of water in the earth. | | | | | | | | | | |
| To provide some knowledge about various forms of precipitations  and representation of hydrological data. | | | | | | | | | | CO2 | | Student will demonstrate the ability to perform analysis andrepresentation of hydrological data. | | | | | | | | | | |
| To develop understanding of surface yield and rainfall-runoff  model. | | | | | | | | | | CO3 | | Student will be able to understand various techniques for measurementof precipitation and estimate abstractions from precipitation. | | | | | | | | | | |
| To make the student understand hydrologic flood routing. | | | | | | | | | | CO4 | | Student will be able to compute yield from a catchment anddevelop rainfall-runoff model. | | | | | | | | | | |
| To provide knowledge about ground water flow and ground water  storage. | | | | | | | | | | CO5 | | Student will be able to formulate and solve hydrologic floodrouting model. | | | | | | | | | | |
|  | | | | | | | | | | CO6 | | Student will be able to understand the concept of occurrence ofground water, and its movement and storage beneath the earth | | | | | | | | | | |
| 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** | | **3** | **0** | **0** | **0** | **0** | | **0** | | **0** | | **0** | | | **0** | **0** | | **0** | | **0** | | **0** | | | **3** |
| 2 | CO2 | | **3** | | **3** | **0** | **0** | **0** | **0** | | **0** | | **0** | | **0** | | | **0** | **0** | | **0** | | **0** | | **0** | | | **3** |
| 3 | CO3 | | **3** | | **3** | **0** | **0** | **0** | **0** | | **0** | | **0** | | **0** | | | **0** | **0** | | **0** | | **0** | | **0** | | | **3** |
| 4 | CO4 | | **3** | | **3** | **0** | **0** | **0** | **0** | | **0** | | **0** | | **0** | | | **0** | **0** | | **0** | | **0** | | **0** | | | **3** |
| 5 | CO5 | | **3** | | **3** | **0** | **0** | **0** | **0** | | **3** | | **0** | | **0** | | | **0** | **0** | | **0** | | **0** | | **0** | | | **3** |
| 6 | CO6 | | **3** | | **3** | **0** | **0** | **0** | **0** | | **3** | | **0** | | **0** | | | **0** | **0** | | **0** | | **0** | | **0** | | | **3** |
| SYLLABUS | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| No. | Content | | | | | | | | | | | | | | | | | | | | | Hours | | | | COs | | |
| 1 | **Introduction to Darcy’s law** | | | | | | | | | | | | | | | | | | | | | 02 | | | | **CO1 CO2 CO3 CO4 CO5**  **CO6** | | |
| 2 | **Determination of hydraulic conductivity** | | | | | | | | | | | | | | | | | | | | | 01 | | | |
| 3 | **Steady flow into a well in unconfined aquifer** | | | | | | | | | | | | | | | | | | | | | 01 | | | |
| 4 | **Steady flow into a well in confined aquifer** | | | | | | | | | | | | | | | | | | | | | 01 | | | |
| 5 | **Measurement of infiltration using double ring infiltrometer** | | | | | | | | | | | | | | | | | | | | | 01 | | | |
| 6 | **Rainfall measurement using rain gauge** | | | | | | | | | | | | | | | | | | | | | 01 | | | |
| 7 | **Evaporation measurement using evaporimeter** | | | | | | | | | | | | | | | | | | | | | 01 | | | |
| 8 | **Analysis of rainfall data** | | | | | | | | | | | | | | | | | | | | | 01 | | | |
| 9 | **Analysis of evaporation data** | | | | | | | | | | | | | | | | | | | | | 01 | | | |
| 10 | **Viva-voce and exam** | | | | | | | | | | | | | | | | | | | | | 02 | | | |
| Total Hours | | | | | | | | | | | | | | | | | | | | | | **12** | | | |  | | |
| **Essential Readings** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. V. T. Chow, D. R. Maidment and L. W. Mays, “Applied Hydrology”, McGraw Hill, 1st Edition, 1988. | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. K. Subramanya, “Engineering hydrology”, McGraw Hill, 2nd Edition, 1994. | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Supplementary Readings** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. V. P. Singh, “Elementary Hydrology”, Englewood Cliffs, NJ : Prentice Hall, 1st Edition, 1992. | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. D. K. Tood and L. W. Mays, “Ground Water Hydrology”, Wiley India Pvt. Ltd, 3rd Edition, 2004. | | | | | | | | | | | | | | | | | | | | | | | | | | | | |