|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Image result for nit meghalaya logo | | | | **National Institute of Technology Meghalaya**  An Institute of National Importance | | | | | | | | | | | | | | | | | | | | | | | **CURRICULUM** | | | | | | |
| Programme | | | | **Bachelor of Technology** | | | | | | | | | | | | | Year of Regulation | | | | | | | | | | **2019-20** | | | | | | |
| Department | | | | **Civil Engineering** | | | | | | | | | | | | | Semester | | | | | | | | | | **VII** | | | | | | |
| Course  Code | | Course Name | | | | | | | | **Pre requisite** | | | | Credit Structure | | | | | | | | Marks Distribution | | | | | | | | | | | |
| L | | T | | | P | C | | INT | | | MID | | | END | | | | Total | |
| **CE422** | | **Irrigation Engineering** | | | | | | | | **Nil** | | | | **3** | | **0** | | | **0** | **3** | | **50** | | | **50** | | | **100** | | | | **200** | |
| Course  Objectives | | To develop the student’s knowledge on basics of irrigation engineering science. | | | | | | | | | | Course Outcomes | | | | CO1 | | | Student will be able to interpret the need, benefits and ill effects of irrigation process. | | | | | | | | | | | | | | |
| To provide some knowledge about various water application methods in farms. | | | | | | | | | | CO2 | | | Student will be able to interpret the various types of water application methods in farms along with their advantages and disadvantages. | | | | | | | | | | | | | | |
| To develop understanding of duty, delta and all related terminologies of soil moisture relationship. | | | | | | | | | | CO3 | | | Student will be able to apply soil-moisture-irrigation relationships to find irrigation requirement. | | | | | | | | | | | | | | |
| To make the student understand about canal irrigation system. | | | | | | | | | | CO4 | | | Student will be able to design canal irrigation system. | | | | | | | | | | | | | | |
| To provide knowledge about various hydraulic structures. | | | | | | | | | | CO5 | | | Student will be able to interpret functions of various hydraulic structures. | | | | | | | | | | | | | | |
|  | | | | | | | | | | CO6 | | |  | | | | | | | | | | | | | | |
| 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** | | | **0** | | | | **0** |
| 2 | CO2 | | **3** | | **2** | **0** | **2** | **0** | **0** | | **0** | | **0** | | **0** | | | **0** | | | **0** | | **0** | | | **0** | | | **0** | | | | **0** |
| 3 | CO3 | | **3** | | **2** | **0** | **2** | **0** | **0** | | **0** | | **0** | | **0** | | | **0** | | | **0** | | **0** | | | **0** | | | **0** | | | | **0** |
| 4 | CO4 | | **3** | | **2** | **3** | **2** | **0** | **0** | | **0** | | **0** | | **0** | | | **0** | | | **0** | | **0** | | | **0** | | | **3** | | | | **2** |
| 5 | CO5 | | **3** | | **2** | **0** | **2** | **0** | **0** | | **0** | | **0** | | **0** | | | **0** | | | **0** | | **0** | | | **0** | | | **0** | | | | **2** |
| 6 | CO6 | |  | |  |  |  |  |  | |  | |  | |  | | |  | | |  | |  | | |  | | |  | | | |  |
| SYLLABUS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| No. | Content | | | | | | | | | | | | | | | | | | | | | | | Hours | | | | | | | COs | | |
| I | **Introduction**  Definition and aim of irrigation, Necessity, Benefits and ill effects of irrigation, Types of irrigation. | | | | | | | | | | | | | | | | | | | | | | | **02** | | | | | | | **CO1** | | |
| II | **Water Application Methods**  Definition, Surface and subsurface irrigations, Free flooding, Border flooding, Check flooding, Basin flooding, Furrow irrigation method, Sprinkler irrigation method, Drip irrigation method, Advantages and disadvantages of various types. | | | | | | | | | | | | | | | | | | | | | | | **04** | | | | | | | **CO2** | | |
| III | **Water Requirement of Crops**  Crop period, Base period, Duty, Delta, Relationship between duty and delta, Irrigation requirements, Irrigation efficiencies, Soil-moisture-irrigation relationship, Depth and frequency of irrigations. | | | | | | | | | | | | | | | | | | | | | | | **08** | | | | | | | **CO3** | | |
| IV | **Lift Irrigation**  Definition, Types, Sources, Advantages and disadvantages, Comparison of well irrigation with canal irrigation. | | | | | | | | | | | | | | | | | | | | | | | **02** | | | | | | | **CO2** | | |
| V | **Canal Irrigation System**  Introduction, Alluvial and non-alluvial canal, Alignment of canals, Curves in canals, Design capacity of an irrigation canal, Canal losses, Canal linings, Advantage of linings, Different types of linings. | | | | | | | | | | | | | | | | | | | | | | | **08** | | | | | | | **CO4** | | |
| VI | **Canal Headworks**  Definition, Types of different headworks, Layout and components of storage and diversion head works, Weir and barrage, Head regulator, Silt excluder. | | | | | | | | | | | | | | | | | | | | | | | **10** | | | | | | | **CO5** | | |
| VII | **Regulation Works**  Canal falls: Necessity, Location and various types. | | | | | | | | | | | | | | | | | | | | | | | **01** | | | | | | | **CO5** | | |
| VIII | **Water Logging**  Causes of water logging, Ill effects and preventive measure of water loggings, Surface and sub surface drains. | | | | | | | | | | | | | | | | | | | | | | | **01** | | | | | | | **CO1** | | |
| Total Hours | | | | | | | | | | | | | | | | | | | | | | | | **36** | | | | | |  | | | |
| **Essential Readings** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. G. L. Asawa, “Irrigation and Water Resources Engineering”, New Age Internationals, 2nd edition, 2005. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. S. K. Garg, “Irrigation Engineering and Hydraulic Structures”, Khanna Publishers, 35th edition, 2019. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Supplementary Readings** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. N. N. Basak, “Irrigation Engineering”, McGraw Hill Education, 4th edition, 2013. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. M. M. Das and M. D. Saikia, “Irrigation and Water Power Engineering”, PHI Learning, 6th edition, 2016. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |