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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** | Year of Regulation | **2019-20** |
| Department | **Civil Engineering** | Semester | **VI** |
| CourseCode | Course Name | **Pre requisite** | Credit Structure | Marks Distribution |
| L | T | P | C | INT | MID | END | Total |
| **CE302** | **Hydraulics and Hydraulic structures** | **CE 305** | **3** | **1** | **0** | **4** | **50** | **50** | **100** | **200** |
| CourseObjectives | To develop the student’s knowledge on basics of open channel flow. | Course Outcomes | CO1 | Student will be able to understand the basics of open channel flow including types, velocity distribution and pressure distribution. |
| To provide some knowledge about various methods for calculating critical flow depths in open channel flow. | CO2 | Student will demonstrate the ability to perform analysis of critical flow. |
| To develop understanding of uniform flow concept in hydraulics. | CO3 | Student will be able to understand the concept the uniformflow. |
| To make the student understand about the practical problems related with gradually varied flow. | CO4 | Student will be able to compute gradually varied flow. |
| To provide knowledge about rapidly varied flow problems and hydraulic structures. | CO5 | Student will be able to formulate and solve rapidly varied flow problems. |
|  | CO6 | Student will be able to understand the concept of working and design principles of various hydraulic structures. |
| 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** | **0** |
| 2 | CO2 | **3** | **3** | **3** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **3** |
| 3 | CO3 | **3** | **3** | **3** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **3** |
| 4 | CO4 | **3** | **3** | **3** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **3** |
| 5 | CO5 | **3** | **3** | **3** | **0** | **0** | **0** | **3** | **0** | **0** | **0** | **0** | **0** | **0** | **3** | **3** |
| 6 | CO6 | **3** | **3** | **3** | **0** | **0** | **0** | **3** | **0** | **0** | **0** | **0** | **0** | **0** | **3** | **3** |
| SYLLABUS |
| No. | Content | Hours | COs |
| I | **Introduction** Definition and classification of open channel flows, velocity and pressure distributions, energy and momentum coefficients in open channel flow and their needs. | 04 | CO1 |
| II | **Critical flow** Conservation of mass, conservation of momentum and conservation of energy, specific energy and specific force concepts, introduction to critical flow and computation, various methods for critical depth estimation. | 08 | CO2 |
| III | **Uniform flow** Introduction to uniform flow, flow resistance formulas, roughness coefficient, computation of uniform flow using different methods, hydraulically most efficient channel sections, most economical channel design. | 10 | CO3 |
| IV | **Gradually varied flow** Introduction to gradually varied flow, governing equation of gradually varied flow, classification and characteristics of water-surface profiles, sketching of water-surface profiles, computation of gradually varied flow: direct-step method and standard step method, numerical methods for calculation of gradually varied flow. | 10 | CO4 |
| V | **Rapidly varied flow** Introduction to rapidly varied flow, hydraulic jump, classification and practical application of hydraulic jump, ratio of sequent depths, height and length of jump, energy loss and jump location.  | 06 | CO5 |
| VI | **Channel design** Erodible and non-erodible channels, their design principles and various design methods. | 06 | CO6 |
| VII | **Hydraulic structures** Introduction to hydraulic structures, different types of hydraulic structures, dam engineering, classification of dams, design of spillway, cross drainage structures. | 04 | CO6 |
| Total Hours | **48** |  |
| **Essential Readings** |
| 1. M. H. Chaudhry, “Open Channel Flow”, Prentice Hall, 2nd Edition, 2008
 |
| 1. K.G., RangaRaju, “Flow Through Open Channels”, Tata McGraw Hill, 2nd Edition 1993.
 |
| 1. K Subramanya, Flow in open channels, McGraw Hill, 3rd edition, 2009
 |
| **Supplementary Readings** |
| 1. F. M. Henderson, “Open Channel Flow”, Tata McGraw Hill, 1st Edition, 1992.
 |
| 1. V.T. Chow, “Open Channel Hydraulics”, Tata McGraw Hill, 3rdEdition, 2009.
 |
| 1. M M Das, Open channel flow, PHI, 3rd edition, 2011
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