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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 204** | | **Fluid Mechanics** | | | | | | | | **Nil** | | | | **3** | | **0** | | | **0** | **3** | | **50** | | | **50** | | | **100** | | | | **200** | |
| Course  Objectives | | To familiarize with the properties of fluids and to understand the concept of fluid measurement, types of flows, stability and dimensional analysis. | | | | | | | | | | Course Outcomes | | | | CO1 | | | Student will be able to describe the various physical properties of fluids. | | | | | | | | | | | | | | |
| To develop understanding about hydrostatic law, principle of buoyancy and stability of a floating body and application of mass, momentum and energy equation in fluid flow. | | | | | | | | | | CO2 | | | Student will be able to explain the fluid behaviour at rest. | | | | | | | | | | | | | | |
| To give fundamental knowledge of fluid, its properties and behaviour under various conditions of internal and external flows. | | | | | | | | | | CO3 | | | Student will be able to understand the concepts of fluid behaviour in motion. | | | | | | | | | | | | | | |
| To inculcate the importance of fluid flow measurement and its applications in Industries. | | | | | | | | | | CO4 | | | Student will be able to understand the applications of various flow measuring devices to measure the flow. | | | | | | | | | | | | | | |
| CO5 | | | Student will be able to calculate and analyze the flow through pipes. | | | | | | | | | | | | | | |
| CO6 | | | Student will be able to apply dimensional analysis to predict physical parameters that influence the flow in fluid mechanics. | | | | | | | | | | | | | | |
| 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 | 3 | 0 | 0 | 0 | | 0 | | 0 | | 0 | | | 0 | | | 0 | | 0 | | | 0 | | | 3 | | | | 0 |
| 2 | CO2 | | 3 | | 3 | 3 | 0 | 0 | 0 | | 0 | | 0 | | 0 | | | 0 | | | 0 | | 0 | | | 3 | | | 3 | | | | 3 |
| 3 | CO3 | | 3 | | 3 | 3 | 0 | 0 | 0 | | 0 | | 0 | | 0 | | | 0 | | | 0 | | 0 | | | 3 | | | 3 | | | | 3 |
| 4 | CO4 | | 3 | | 3 | 3 | 0 | 0 | 0 | | 0 | | 0 | | 0 | | | 0 | | | 0 | | 0 | | | 3 | | | 3 | | | | 3 |
| 5 | CO5 | | 3 | | 3 | 3 | 0 | 0 | 0 | | 0 | | 0 | | 0 | | | 0 | | | 0 | | 0 | | | 3 | | | 3 | | | | 3 |
| 6 | CO6 | | 3 | | 3 | 3 | 0 | 0 | 0 | | 0 | | 0 | | 0 | | | 0 | | | 0 | | 0 | | | 3 | | | 3 | | | | 3 |
| SYLLABUS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| No. | Content | | | | | | | | | | | | | | | | | | | | | | | Hours | | | | | | | COs | | |
| I | **BasicConcepts**Continuum Approach, Important physical properties: density, specific weight, viscosity, surface tension, capillarity, compressibility, vapor pressure, Classification of fluids-ideal and real fluid, non-Newtonian fluids. | | | | | | | | | | | | | | | | | | | | | | | **04** | | | | | | | **CO1** | | |
| II | **Fluid Statics**  Pressure at a point-Pascal’s Law, pressure variation in a static fluid. Scales of Pressure-absolute and gauge pressure, Measurement of pressure-manometers, Forces on submerged plane and curved surfaces, Buoyant Force centre of buoyancy, metacentre, determination of metacentric height, Equilibrium of floating and submerged bodies, relative equilibrium-translation and rotation of fluid masses. | | | | | | | | | | | | | | | | | | | | | | | **08** | | | | | | | **CO2** | | |
| III | **Dynamics of Fluid Flow**  Euler’s equation of motion, Bernoulli’s equation and its application-venturi-meter, orifice meter, pitot tube, Momentum equation and its application to simple problems. | | | | | | | | | | | | | | | | | | | | | | | **07** | | | | | | | **CO3** | | |
| IV | **Orifice; Mouthpiece; Notches and Weirs**  Classification, discharge through a free orifice, orifice coefficients-experimental determination, External and internal mouthpiece, mouthpiece running full and free; Classification, Velocity of Approach, Broad crested weir | | | | | | | | | | | | | | | | | | | | | | | **06** | | | | | | | **CO4** | | |
| V | **Flow through Pipes**  Losses in pipe flow-major loss (Loss due to friction)-Darcy Weisbach equation, minor losses, Hydraulic gradient lines, Total Energy lines. Pipes in series, pipes in parallel, equivalent pipe, Siphon. | | | | | | | | | | | | | | | | | | | | | | | **05** | | | | | | | **CO5** | | |
| VI | **Dimensional Analysis**  Dimensions-fundamental and derived qualities, dimensional homogeneity, methods of dimensional analysis Rayleigh’s method and Buckingham’s π theorem. | | | | | | | | | | | | | | | | | | | | | | | **06** | | | | | | | **CO6** | | |
| **Total Hours** | | | | | | | | | | | | | | | | | | | | | | | | **36** | | | | | |  | | | |
| **Essential Readings** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. SK Som, Gautam Biswas, Suman Chakraborty, :Introduction to Fluid Mechanics and FluidMachines” McGraw Hill Publications, Third Edition, 2010 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. Dr. R K Bansal, “A text book of Fluid mechanics & Hydraulics machines”, Laxmi Publications,Revised Ninth Edition, 2010 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. Modi P.N. and Seth S.M., “Hydraulics and Fluid Mechanics”, Standard Book House, 21st Edition,2017 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. Er. R K Rajput, “A text book of Fluid Mechanics”, S Chand publications, 9th Edition, 2017 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Supplementary Readings** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. Kumar K.L., “Fluid Mechanics”, S. Chand & Co., 22nd Edition, 2016 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. Jain A.K., “Fluid Mechanics”, Khanna Publisher, 23rd Edition, 2010 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. White B.F., “Fluid Mechanics”, McGraw Hill.,7th Edition, 2010 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. Frabzini J., “Fluid Mechanics with Engineering Applications”, McGraw Hill.,10th Edition, 2001 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |