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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 | | | | | | | | | | **2020-2021** | | | | | | |
| Department | | | | **Civil Engineering** | | | | | | | | | | | | | Semester | | | | | | | | | | **V** | | | | | | |
| Course  Code | | Course Name | | | | | | | | **Pre requisite** | | | | Credit Structure | | | | | | | | Marks Distribution | | | | | | | | | | | |
| L | | T | | | P | C | | INT | | | MID | | | END | | | | Total | |
| **CE 301** | | **Geotechnical Engineering- I** | | | | | | | | **Nil** | | | | **3** | | **0** | | | **0** | **3** | | **50** | | | **50** | | | **100** | | | | **200** | |
| Course  Objectives | | 1. To introduce basic assumptions in soil mechanics and application of the principles of hydraulics and mechanics in soil mechanics | | | | | | | | | | Course Outcomes | | | | CO1 | | | Able to understand origin of soil, basic soil terminology andsimple tests | | | | | | | | | | | | | | |
| 1. To introduce Soil classification, their origin and properties | | | | | | | | | | CO2 | | | Able to classify various soil types, clay minerology and soil structure | | | | | | | | | | | | | | |
| 1. To introduce different geotechnical engineering structures and their design | | | | | | | | | | CO3 | | | Able to compute the index properties (such as grain size distribution, Atterberg limits etc.) and engineering properties (such as permeability, compressibility, shear strength) of soil for geotechnical site investigation. | | | | | | | | | | | | | | |
|  | | | | | | | | | | CO4 | | | Able to understand compaction and consolidation of soil | | | | | | | | | | | | | | |
|  | | | | | | | | | | CO5 | | | Able to apply the knowledge of soil mechanics to design safe geotechnical structures such as slope, retaining structure etc. | | | | | | | | | | | | | | |
| 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 | **Introduction**  Origin and types, Identification and classification of soils, Index properties, phase relationship, consistency, sensitivity, clay mineralogy. | | | | | | | | | | | | | | | | | | | | | | | **6** | | | | | | | **CO1, CO2, CO3** | | |
| II | **Permeability and Seepage**  Darcy’s law of permeability, Determination of Coefficient of permeability, Equivalent permeability for stratified soil, Flow nets – principles, construction and application, Effective stress analysis, quick sand condition, piping, filtration criteria. | | | | | | | | | | | | | | | | | | | | | | | **06** | | | | | | | **CO3** | | |
| III | **Shear Strength of Soil**  Strength envelope, total and effective stress paths, pore pressure, evaluation of shear strength parameters, direct shear, triaxial shear, vane shear, unconfined compression test. | | | | | | | | | | | | | | | | | | | | | | | **06** | | | | | | | **CO3** | | |
| IV | **Compaction and Consolidation**  Principle of compaction, Light and heavy compaction, field compaction control, factors affecting compaction. Compressibility and Consolidation: Terzagli’s theory of one-dimensional consolidation, Secondary Consolidation, estimation of consolidation settlement. | | | | | | | | | | | | | | | | | | | | | | | **06** | | | | | | | **CO4** | | |
| V | **Lateral Earth Pressure**  Earth pressure at rest, active and passive earth pressure, Rankine and Coulomb’s earth pressure theories, Graphical Solutions. | | | | | | | | | | | | | | | | | | | | | | | **06** | | | | | | | **CO5** | | |
| VI | **Stability of Slope**  Stability of infinite slope, stability of finite slope, slope protection. | | | | | | | | | | | | | | | | | | | | | | | **06** | | | | | | | **CO5** | | |
| Total Hours | | | | | | | | | | | | | | | | | | | | | | | | **36** | | | | | |  | | | |
| **Essential Readings** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **1.** Ranjan Gopal and Rao, A.S.R., “Basic and Applied Soil Mechanics”, New Age International. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **2.** Terzaghi K., Peck R. B. and Mesri G., “Soil Mechanics in Engineering Practice”, John Wiley & Sons | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **3.**[Arora](https://www.amazon.in/s/ref=dp_byline_sr_book_1?ie=UTF8&field-author=K+R+Arora&search-alias=stripbooks) K. R., "Soil Mechanics And Foundation Engineering", Standard Publishers Distributors. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **4.** Murthy [V. N. S.](https://www.google.co.in/search?tbo=p&tbm=bks&q=inauthor:%22V.+N.+S.+Murthy%22), "Textbook of Soil Mechanics and Foundation Engineering", CBS Publishers & Distributors/Alkem Company (S). | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Supplementary Readings** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. Kaniraj S.R., “Design Aids in Soil Mechanics & Foundation Engineering”, Tata McGraw Hill. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2. Lambe T.W. and Whitman R.V., “Soil Mechanics”, John Wiley & Sons. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3.Punmia B.C., “Soil Mechanic and Foundation Engineering”, Laxmi Publication Pvt. Ltd. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4. Braja M. Das., “Fundamental of Foundation Engineering”, Thomson Asia Pvt. Ltd, Singapore | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |