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|  | **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 | **III** |
| Course Code |  Course Name | Pre-Requisite | Credit Structure | Marks Distribution |
| **CE 255** | **Civil Engineering Materials Lab** | **NIL** | L | T | P | C | Continuous Assessment | Total |
| **0** | **0** | **2** | **1** | **Experiment** | **10** | **100** |
| Course Objectives | To develop the student’s knowledge on basics of civil engineering materials and its relevant testing methodology | Course Outcomes | CO1 | Student will be able to understand the basics civil engineering materials which are relevant in engineering applications. |
| To provide some knowledge about various methods for design of concrete mix. | CO2 | Student will be able to evaluate the impact of engineering solutions on the society and also will be aware of contemporary issues regarding failure of structures due to unsuitable materials. |
| To provide some knowledge on quality control for obtaining good fresh and hardened concrete | CO3 | Student will be able to understand the various factors affecting in producing a suitable fresh and hardened concrete. |
| To provide knowledge about causes of deterioration of buildings. | CO4 | Student will be able to perform a suitable concrete design mix for various grades. |
| To provide knowledge on quality assessment of existing concrete structures through non destructive testing | CO4 | Student will be able to understand the basics civil engineering materials which are relevant in engineering applications. |
|  | 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** | **3** | **3** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **3** | **3** | **3** |
| 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** | **3** | **0** | **0** | **0** | **0** | **0** | **3** | **3** | **3** |
| 6 | CO6 | **3** | **3** | **3** | **0** | **0** | **0** | **3** | **0** | **0** | **0** | **0** | **0** | **3** | **3** | **3** |
| SYLLABUS |
| No. | Content | Hours | COs |
| 1 |  Determination of standard consistency, initial and final setting time of cement sample using Vicat’s apparatus. | 01 | CO1 CO2 CO3 CO4 CO5 |
| 2 |  Determination of soundness of cement, compressive & tensile strength | 01 |
| 3 |  To determine the fineness modulus and particle size distribution of coarse, fine, and all in aggregates | 01 |
| 4 | To determine the specific gravity, water absorption, bulking of fine aggregates and impact & crushing strength of coarse aggregates | 01 |
| 5 |  To conduct design concrete mix using IS Method and determine the strength of concrete (cube, cylinder & beam)  | 01 |
| 6 |  To conduct workability comparison of concrete by slump test, compaction factor test, flow table test | 01 |
| 7 |  To determine cement and concrete permeability of a given mix. | 01 |
| 8 |  To determine the water absorption, compressive strength & efflorescence of burnt clay bricks. | 01 |
| 9 |  To determine the tensile and elongation of reinforcing steel bar | 01 |
|  10 |  To conduct non destructive test of concrete using rebound hammer & UPV | 01 |
|  11 | Viva-voce and exam | 02 |
| **Total Hours** | **12** |  |
| **Essential Readings** |
| 1. M. Neville M and J.J Brooks, “Concrete Technology”, Pearson Education, Twelfth impression, 2014
 |
| 1. A.R Santhakumar, “Concrete Technology”, Oxford Higher Education, Ninth impression, 2012
 |
| 1. M.S. Shetty, “Concrete Technology (Theory & Practice)”, S.Chand and Co, Revised edition, 2015
 |
|  4. Relevant Indian Standards codes  |
| **Supplementary Readings** |
| 1. M. S. Mamlouk, and J. P. Zaniewski, Materials for Civil and Construction Engineers, Pearson, Prentice Hall, 2nd Edn., 2006.
 |
| 1. J. F. Shackelford and M. K. Muralidhara, Introduction to Material science for Engineers, Pearson Education, 6th Edn., 2007
 |
| 1. M.L. Gambhir, “Concrete Technology”, Tata McGraw Hill, fifth edition, 2013.
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