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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 | **III** |
| CourseCode | Course Name | **Pre requisite** | Credit Structure | Marks Distribution |
| L | T | P | C | INT | MID | END | Total |
| **CE 205** | **Civil Engineering Materials** | **Nil** | **3** | **0** | **0** | **3** | **50** | **50** | **100** | **200** |
| CourseObjectives | To develop the student’s knowledge on basics of civil engineering materials  | 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 about various types of special concrete used in construction. | 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. |
|  | CO5 | Student will be able to understand the concept of application of special concretes in construction. |
|  | CO6 | Able to understand the various factors cause the deterioration of buildings and its possible solution. |
| 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** | **3** | **0** | **0** | **0** | **0** | **0** | **0** | **3** | **3** | **3** |
| 2 | CO2 | **3** | **3** | **3** | **0** | **0** | **3** | **0** | **0** | **0** | **0** | **0** | **0** | **3** | **3** | **3** |
| 3 | CO3 | **3** | **3** | **3** | **0** | **0** | **3** | **0** | **0** | **0** | **0** | **0** | **0** | **3** | **3** | **3** |
| 4 | CO4 | **3** | **3** | **3** | **0** | **0** | **3** | **0** | **0** | **0** | **0** | **0** | **0** | **3** | **3** | **3** |
| 5 | CO5 | **3** | **3** | **3** | **0** | **0** | **3** | **3** | **0** | **0** | **0** | **0** | **0** | **3** | **3** | **3** |
| 6 | CO6 | **3** | **3** | **3** | **0** | **0** | **3** | **3** | **0** | **0** | **0** | **0** | **0** | **3** | **3** | **3** |
| SYLLABUS |
| No. | Content | Hours | COs |
| I | **Introduction on characteristic of building materials**Structures of solids, ductility, brittleness, strength, stiffness, durability, hardness, toughness; Weakness of materials | 02 | CO1 |
| II | **Building materials (cement and aggregates)**Chemical composition of cement, manufacturing of cement , physical characteristics, hydration, properties of cement compounds, different types of cements, coarse and fine aggregates, Influence of aggregate on the properties of concrete, aggregate selection, | 08 | CO1, CO2 |
| III | **Building materials (bricks)**Raw materials, drying and burning, strength and durability, mortar for masonry and strength of masonry | 04 | CO1, CO2 |
| IV | **Building materials (timber)**Seasoning and conversions, properties, tests, defects in timbers. | 02 | CO1, CO2 |
| V | **Building materials (glass)**Chemical compositions, mechanical and optical properties, Various types of glasses, Strengthening of glasses. | 02 | CO1, CO2 |
| VI | **Metal and Steel**Steel for reinforced concrete and pre-stressed concrete construction, structural steel sections. | 02 | CO1, CO2 |
| VII | **Fresh and Hardened Concrete** Batching, Mixing, workability, effect of admixture, mechanical properties of hardened concrete, Water cement ratio, Porosity, Curing of concrete, High performance concrete. | 05 | CO1, CO3 |
| VIII | **Design of concrete mix** IS code recommendation, British code and ACI code | 04 | CO3, CO4 |
| IX | **Special concrete**Light weight concrete, Fibre reinforced concrete; Polymer modified concrete, Ferro cement, Self-compacting concrete  | 04 | CO5 |
| X | **Deterioration of building materials** Corrosion, chloride and sulphate attack on concrete, alkali-aggregate reaction, acid aggregate reactions. | 03 | CO6 |
| Total Hours | **36** |  |
| **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
 |
| **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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