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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** | | | | | | | |
| Course  Code | | 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** | |
| Course  Objectives | | 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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