|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 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 | | | | | | | | | | **VI** | | | | | | |
| Course  Code | | Course Name | | | | | | | | **Pre requisite** | | | Credit Structure | | | | | | | | Marks Distribution | | | | | | | | | | | |
| L | | T | | | P | C | | INT | | | MID | | | END | | | | Total | |
| **CE 312** | | **Reinforced Concrete Design** | | | | | | | | **Nil** | | | **3** | | **0** | | | **0** | **3** | | **50** | | | **50** | | | **100** | | | | **200** | |
| Course  Objectives | | **To introduce the design philosophies of various methods of design.** | | | | | | | | | Course Outcomes | | | | CO1 | | | **Able to understand design and analysis of reinforced concrete structures and use Working Stress Method (WSM) in the design andanalysis of RCC beams in bending.** | | | | | | | | | | | | | | |
| **To carry out the analysis of reinforced concrete elements.** | | | | | | | | | CO2 | | | **Able to analyse differentiate between WSM and LSM and Apply Limit State Method (LSM) in the design and analysis of**  **RCC beams in bending.** | | | | | | | | | | | | | | |
| **To undertake design of various reinforced concrete elements by working stress and limit state method.** | | | | | | | | | CO3 | | | **Able to examine the behavior of RCC beams in shear and torsion and their design using LSM.** | | | | | | | | | | | | | | |
| **To introduce to codal provisions of IS 456, SP 16, SP 34 and IS:13920.** | | | | | | | | | CO4 | | | **Able to design one-way and two-way slab and Use LSM in Design of one-way and two-way slab in shear, bending and torsion.** | | | | | | | | | | | | | | |
|  | | | | | | | | | CO5 | | | **Able to understand various assumptions used in design of columns, evaluate effective length and slenderness ratio of column and analyze and design a short column under axial load, and uni-axial and bi-axialbending.** | | | | | | | | | | | | | | |
|  | | | | | | | | | CO6 | | | **Able to design rectangular and square footing.** | | | | | | | | | | | | | | |
| 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** | **0** | **1** | **0** | **0** | **0** | | **0** | | **2** | | | **0** | | | **0** | | **0** | | | **3** | | | **0** | | | | **3** |
| 2 | CO2 | | **3** | | **3** | **0** | **1** | **0** | **0** | **0** | | **0** | | **2** | | | **0** | | | **0** | | **0** | | | **1** | | | **0** | | | | **2** |
| 3 | CO3 | | **2** | | **3** | **2** | **1** | **2** | **1** | **0** | | **0** | | **0** | | | **0** | | | **0** | | **0** | | | **2** | | | **3** | | | | **2** |
| 4 | CO4 | | **2** | | **2** | **3** | **0** | **2** | **2** | **3** | | **0** | | **2** | | | **0** | | | **0** | | **1** | | | **2** | | | **3** | | | | **2** |
| 5 | CO5 | | **2** | | **2** | **2** | **0** | **2** | **2** | **3** | | **0** | | **2** | | | **0** | | | **0** | | **1** | | | **3** | | | **3** | | | | **3** |
| 6 | CO6 | | **0** | | **0** | **0** | **0** | **0** | **0** | **0** | | **0** | | **0** | | | **0** | | | **0** | | **0** | | | **0** | | | **0** | | | | **0** |
| SYLLABUS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| No. | Content | | | | | | | | | | | | | | | | | | | | | | Hours | | | | | | | COs | | |
| I | Introduction To Various Design Philosophies: Design of Rectangular  Singly and Doubly Reinforced Sections by Working Stress Method,  Limit State Method, Design and analysis of T- Beams, L-Beams by Limit State Design Method. | | | | | | | | | | | | | | | | | | | | | | **4** | | | | | | | **CO1** | | |
|  | | |
|  | | |
|  | | |
| II | Behavior Of RC Beam In Shear: Shear Strength of Beams with and without Shear Reinforcement, Minimum and Maximum Shear Reinforcement, Design of Beam in Shear, Development Length, Anchorage Bond, Flexural Bond, Failure of Beam Under Shear, Concept of Equivalent Shear and Moments. | | | | | | | | | | | | | | | | | | | | | | **10** | | | | | | | **CO2** | | |
| **CO3** | | |
|  | | |
|  | | |
| III | Design Of Slab: Design of One Way and Two Way Solid Slabs, Circular Slab by Limit State Design Method, Serviceability, Control of Deflection, Cracking and Vibrations. Introduction to Flat Slabs | | | | | | | | | | | | | | | | | | | | | | **05** | | | | | | | **CO3** | | |
| **CO4** | | |
|  | | |
|  | | |
| IV | Design Of Columns: Limit State Design Method, Effective Height of Columns, Minimum Eccentricity, Short Column Under Axial Compression, Requirements for Reinforcement, Column with Helical Reinforcement,  Short Column Under Axial Load and Uni-Axial Bending, Design of Columns Under Bi-Axial Loading by Design Charts. | | | | | | | | | | | | | | | | | | | | | | **12** | | | | | | | **CO** | | |
| **CO4** | | |
| **CO5** | | |
|  | | |
|  | | |
|  | | |
|  | | |
|  | | |
| VI | Design Of Footing: Rectangular and square isolated and combined footing. | | | | | | | | | | | | | | | | | | | | | | **5** | | | | | | | **CO5** | | |
| **CO6** | | |
|  | | |
|  | | |
| Total Hours | | | | | | | | | | | | | | | | | | | | | | | **36** | | | | | |  | | | |
| **Essential Readings** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. Dayaratnam P. Limit State Design of Reinforced Concrete Structures New Delhi: Oxford Publishers;2008 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. GambhirM.L Fundamentals of Reinforced Concrete Design New Delhi: PHI Publisher; 2009. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Supplementary Readings** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. IS: 456:2000 Plain and Reinforced Concrete - Code of Practice New Delhi: Bureau of Indian Standards. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. Krishna Jai Plain and Reinforced Concrete Vol.1 Roorkee: Nem Chand Brothers;2007. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. Jain A.K. Reinforced Concrete: Limit State Design Roorkee: Nem Chand and Brothers; 2007. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |