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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** | | | | | | |
| Department | | | | **Civil Engineering** | | | | | | | | | | | | | Semester | | | | | | | | | | **IV** | | | | | | |
| Course  Code | | Course Name | | | | | | | | **Pre requisite** | | | | Credit Structure | | | | | | | | Marks Distribution | | | | | | | | | | | |
| L | | T | | | P | C | | INT | | | MID | | | END | | | | Total | |
| **CE 206** | | **Structural Analysis-I** | | | | | | | | **CE 201** | | | | **3** | | **1** | | | **0** | **4** | | **50** | | | **50** | | | **100** | | | | **200** | |
| Course  Objectives | | 1. To analyze and study the response of structures subjected to various types of loading. | | | | | | | | | | Course Outcomes | | | | CO1 | | | Able to use the concept of structural analysis and thus able to solve different critical analytical problems in the civil engineering field. | | | | | | | | | | | | | | |
| 1. To apply the equation of equilibrium to structures and compute the reactions. | | | | | | | | | | CO2 | | | Able to analyze statically determinate trusses, beams, and frames and obtain internal loading. | | | | | | | | | | | | | | |
| 1. To acquire the knowledge to solve statically determinate structures by different methods | | | | | | | | | | CO3 | | | Able to obtain the influence lines for statically determinate and indeterminate structures. | | | | | | | | | | | | | | |
|  | | | | | | | | | | CO4 | | | Able to Determine the deflections of beams and frames using classical methods and energy methods. | | | | | | | | | | | | | | |
|  | | | | | | | | | | CO5 | | | Able to introduce the analysis of the indeterminate structures by force and flexibility coefficient method. | | | | | | | | | | | | | | |
| 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 | 3 | 3 | 0 | | 0 | | 0 | | 2 | | | 1 | | | 0 | | 0 | | | 1 | | | 1 | | | | 1 |
| 2 | CO2 | | 3 | | 3 | 3 | 3 | 3 | 0 | | 0 | | 0 | | 2 | | | 1 | | | 0 | | 0 | | | 1 | | | 1 | | | | 1 |
| 3 | CO3 | | 3 | | 3 | 3 | 3 | 3 | 0 | | 0 | | 0 | | 2 | | | 1 | | | 0 | | 0 | | | 1 | | | 1 | | | | 1 |
| 4 | CO4 | | 3 | | 3 | 3 | 3 | 3 | 0 | | 0 | | 0 | | 2 | | | 1 | | | 0 | | 0 | | | 1 | | | 1 | | | | 1 |
| 5 | CO5 | | 3 | | 3 | 3 | 3 | 3 | 0 | | 0 | | 0 | | 2 | | | 1 | | | 0 | | 0 | | | 1 | | | 1 | | | | 1 |
| SYLLABUS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| No. | Content | | | | | | | | | | | | | | | | | | | | | | | Hours | | | | | | | COs | | |
| I | **Introduction to Structural analysis**  Forms of structures, Loads and Forces on the structural system, Free body diagram, conditions of equilibrium of forces, support and connections – reactions, Difference between determinate and indeterminate structures, static and kinematic indeterminacy. | | | | | | | | | | | | | | | | | | | | | | | **05** | | | | | | | **CO1** | | |
| II | **Methods of Analysis**  Equilibrium equations, compatibility requirements, Introduction to force and displacement methods. | | | | | | | | | | | | | | | | | | | | | | | **06** | | | | | | | **CO1** | | |
| III | **Analysis of trusses**  Plane truss, compound truss, complex truss and space truss, Arches and suspension cables, three-hinged arches, and suspension cables. | | | | | | | | | | | | | | | | | | | | | | | **05** | | | | | | | **CO2** | | |
| IV | **Deflection in Beams**  Computation of slope and deflection by double integration, moment area method, conjugate beam method, applications to simply supported, overhang and cantilever beams. | | | | | | | | | | | | | | | | | | | | | | | **08** | | | | | | | **CO4** | | |
| VI | **Energy methods**  Principle of minimum potential energy, principle of virtual work, Castigliano’s theorems, Reciprocal theorem and their applications to find deflection and redundant forces in simple cases. | | | | | | | | | | | | | | | | | | | | | | | **10** | | | | | | | **CO4** | | |
| VII | **Moving loads and influence lines**  Unit load method, Influence line and Rolling loads, beam, frames and arches, Muller- Breslau Principles and its applications to determinate and indeterminate structures. | | | | | | | | | | | | | | | | | | | | | | | **09** | | | | | | | **CO3** | | |
| V | **Introduction of the analysis of indeterminate structures**  Force methods, flexibility coefficients methods | | | | | | | | | | | | | | | | | | | | | | | **05** | | | | | | | **CO5** | | |
| Total Hours | | | | | | | | | | | | | | | | | | | | | | | | **48** | | | | | |  | | | |
| **Essential Readings** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **1.**Hibbeler R.C., “Structural Analysis”, Pearson, 9th Edition, 2017 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2. Kassimali A., “Structural Analysis,” Cengage. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3. Reddy C.S., “Basic Structural Analysis,” Tata McGraw Hill, 3rd Edition, 2011 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Supplementary Readings** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. Prakash Rao, D.S., “Structural Analysis: Unified approach”, Universities Press., 1st Edition,1996 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2. Norris C.H., Wilbur J.B. and Utku S., “Elementary Structural Analysis”, Tata McGraw Hill, 6th Edition, 2003 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3. Negi L.S and Jangjid R.S., “Structural Analysis”, Tata McGraw Hill, 6th Edition, 2003 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4. Punmia B. C., “Theory of Structures” Laxmi Publication house, 16th Edition, 2017 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5. Ramamrutham S., “Theory of Structures”, Dhanpat Rai Publications, 9th Edition, 2014 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |