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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** |
| CourseCode | 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** |
| CourseObjectives | 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 |