|  |  |  |
| --- | --- | --- |
| 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 | **VIII** |
| CourseCode | Course Name | **Pre requisite** | Credit Structure | Marks Distribution |
| L | T | P | C | INT | MID | END | Total |
| **CE418** | **Dynamics of Structure** | **Nil** | **3** | **0** | **0** | **3** | **50** | **50** | **100** | **200** |
| CourseObjectives | Study the various types as well as characteristics of loading and formulate the equations of motion. | Course Outcomes | CO1 | Know the fundamental theory of dynamic equation of motions and analysis methods for dynamic systems |
| Learn the response of un-damped and damped SDOF and MDOF systems under various loadings. | CO2 | Understood various type degree of freedom systems in structures. |
| Employ the approximate and iterative methods to model continuous vibratory systems. | CO3 | Understand the modeling approach of dynamic response in civil engineering applications. |
| Use the seismic codes in analysis and design of civil engineering structures. | CO4 | Interpret the dynamic analysis results for design of civil engineering structures |
| Evaluate dynamic response using numerical methods | CO5 | Apply the structural dynamics theory to earthquake analysis, response, and design of structures. |
| Learn the response of continuous system under dynamics loading and formulate the equations of motion. |  |  |
| 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 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3 |
| 2 | CO2 | 3 | 3 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3 |
| 3 | CO3 | 3 | 3 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3 |
| 4 | CO4 | 3 | 3 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3 |
| 5 | CO5 | 3 | 3 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 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**Importance of structural dynamics for civil engineers, types of dynamic loads, effect of dynamic load on structure, background of the available methods. | 04 | CO1 |
| II | **Single Degree-of-Freedom System** Degrees of freedom, equation of motion; free vibration of single degree of freedom systems; forced vibration: harmonic and periodic loadings; frequency response functions, force transmission and vibration isolation; response to arbitrary excitation. | 08 | CO1CO2 |
| III | **Earthquake Response of SDOF Systems** Earthquake excitation, response time history, construction of response spectra; response spectrum characteristics, tripartite plot, and design spectrum. | 06 | CO2 |
| IV | **Two Degree Freedom System** Dynamic equations of equilibrium, free vibration of undamped system, natural modes, coordinate transformation, orthogonality conditions, response to initial condition, harmonic loading. | 06 | CO1CO2CO3 |
| V | **MDOF Systems** Equation of motions, matrix formulation, natural modes of undamped system, numerical solution for the eigenvalue problems; solution of free vibration response for undamped systems; concept of proportional damping, free vibration analysis of systems with damping. | 06 | CO1CO2CO4 |
| VI | **Introduction to Dynamics of Continuous Systems** Equations of motions for axial vibration of a beam; equations of motion for flexural vibration of a beam; free vibration analysis- boundary value problems, natural frequencies, mode shapes, orthogonality conditions, forced vibration analysis using modal superposition method. | 06 | CO1CO3CO4 |
| Total Hours | 36 |  |
| **Essential Readings** |
| 1. A. K. Chopra, “Dynamics of Structures: Theory and Applications to Earthquake Engineering”, PHI Ltd.
 |
| 1. P. Mario, “Structural Dynamics”, CBS Publishers.
 |
| 1. R. W. Clough and J. Penzien, “Dynamics of Structures”, McGraw-Hill International Edition.
 |
|  |
| **Supplementary Readings** |
| 1. K. Rao, “Vibration Analysis and Foundation Dynamics”, Wheeler.
 |
| 1. J. Biggs and J. M. Biggs, “Introduction to Structural Dynamics”, McGraw-Hill.
 |
| 1. L. Meirovitch, “Elements of Vibration Analysis”, McGraw-Hill.
 |