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|  | | | **National Institute of Technology Meghalaya**  An Institute of National Importance | | | | | | | | | | **CURRICULUM** | | |
| Programme | | | **Master of Technology (Structural Engineering)** | | | | | Year of Regulation | | | | | **2018** | | |
| Department | | | **Civil Engineering** | | | | | Semester | | | | | **I** | | |
| Course Code | | Course Name | | Pre-requisite | | Credit Structure | | | | Marks Distribution | | | | | |
| L | T | P | C | INT | | MID | END | | Total |
| **CE 557** | | **Earthquake Engineering** | | **NIL** | | **3** | **0** | **0** | **3** | **50** | | **50** | **100** | | **200** |
| Course Objectives | | 1. To impart knowledge about Earthquake Engineering. 2. To understand the mechanism of earthquake wave propagation. 3. To introduce the fundamental concepts relevant to application of structural dynamics in Earthquake Engineering 4. To enable the students understand the factors that make the structures Earthquake Resistant 5. To explain about various seismic protection methods | | | Course Outcomes | | CO1 | Able to understand the basics of Earthquake Engineering | | | | | | | |
| CO2 | Able to develop the equations of motion for vibratory systems and solving them for the free and forced response | | | | | | | |
| CO3 | Able to understand the earthquake wave generation and its propagation mechanism | | | | | | | |
| CO4 | Able to Interpret the dynamic analysis results for design of civil engineering structures. | | | | | | | |
| CO5 | knowledge on earthquake measuring scales and instruments | | | | | | | |
|  | |  | | |  | | CO6 | Able to Identify different method of Earthquake analysis | | | | | | | |
| SYLLABUS | | | | | | | | | | | | | | | |
| No. | Content | | | | | | | | | | Hours | | | COs | |
| I | **Introduction**  Importance of earthquake engineering, Causes, Magnitude and Intensity, Ground Motions, plate tectonics, faults, earthquake generation mechanism, terminologies, Sensors. | | | | | | | | | | 04 | | | **CO1** | |
| II | **Earthquake propagation**  Seismic waves in earthquake shaking, body waves and surface waves, attenuation of wave amplitudes, local site effects, Indian seismicity, seismic zones of India | | | | | | | | | | 04 | | | **CO1, CO2** | |
| III | **Measurement of earthquakes**  Intensity scales, seismographs and seismograms, magnitude scales, seismic moment and moment magnitude, accelerographs and accelerograms | | | | | | | | | | 04 | | | **CO3** | |
| IV | **Linear Earthquake analysis**  Idealization of structures, modal, response spectrum analysis, capacity-based design, time history analysis | | | | | | | | | | 04 | | | **CO4** | |
| V | **Nonlinear Earthquake analysis**  Force‐deformation relationships, equation of motion, ductility, pushover analysis | | | | | | | | | | 05 | | | **CO4** | |
| VI | **Earthquake resistance design**  Identification of seismic damages in reinforced concrete building, structural irregularity effect on the performance of RC buildings, seismo-resistant building architecture, ductility considerations in earthquake resistant design of reinforced concrete building., reinforced concrete frame, shear wall, codal and detailing provisions w.r.t IS:1893 and IS:13920. | | | | | | | | | | 10 | | | **CO5** | |
| VII | **Seismic protection methods**  Base isolation, energy dissipating devices, codal provisions | | | | | | | | | | 05 | | | **CO6** | |
| Total Hours | | | | | | | | | | | 36 | | |  | |
| **Essential Readings** | | | | | | | | | | | | | | | |
| 1. 1. Chopra, A. K. “Dynamics of structures: Theory and applications to earthquake engineering”, PHI Ltd., 4th edition 2011. | | | | | | | | | | | | | | | |
| 1. 2. Agarwal, P,, & Shrikhande, M., “Earthquake resistant design of structures” Prentice-Hall, New Delhi. | | | | | | | | | | | | | | | |
| 1. 3. Duggal, S.K., “Earthquake Resistant Design of Structures”, Oxford University Press | | | | | | | | | | | | | | | |
| 4. Dowrick, D.J., “Earthquake resistant design: for engineers and architects”, John Wiley and sons. | | | | | | | | | | | | | | | |
| 1. **Supplementary Readings** | | | | | | | | | | | | | | | |
| 1. 1. Rao, K. “ Vibration analysis and foundation dynamics”, Wheeler, 1st edition 1998. | | | | | | | | | | | | | | | |
| 1. 2. Wilson, E. L. “Static and Dynamic Analysis of Structures”, Computers and Structures, Inc., Berkeley, CA, 4th edition 2004. | | | | | | | | | | | | | | | |