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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 | | | | | | | | | | **2019-20** | | | | | | |
| Department | | | | **Civil Engineering** | | | | | | | | | | | | | Semester | | | | | | | | | | **IV** | | | | | | |
| Course  Code | | Course Name | | | | | | | | **Pre requisite** | | | | Credit Structure | | | | | | | | Marks Distribution | | | | | | | | | | | |
| L | | T | | | P | C | | INT | | | MID | | | END | | | | Total | |
| **CE216** | | **Earthquake Engineering** | | | | | | | | **Nil** | | | | **3** | | **0** | | | **0** | **3** | | **50** | | | **50** | | | **100** | | | | **200** | |
| Course  Objectives | | To introduce the basics of Earthquake Engineering | | | | | | | | | | Course Outcomes | | | | CO1 | | | Able to apply the basics of Earthquake Engineering | | | | | | | | | | | | | | |
| To understand the mechanism of earthquake wave propagation | | | | | | | | | | CO2 | | | Able to understand the earthquake wave generation and its propagation mechanism | | | | | | | | | | | | | | |
| To explain about seismic measuring devices and scales | | | | | | | | | | CO3 | | | knowledge on earthquake measuring scales and instruments | | | | | | | | | | | | | | |
| To explain how to do hazard assessment and mitigation and explain how do prepare a risk and microzonation mapping | | | | | | | | | | CO4 | | | Able to understand the quantification of earthquake intensity and ground motion. | | | | | | | | | | | | | | |
| To explain about various seismic protection methods | | | | | | | | | | CO5 | | | Able to identify the method to protect the structure from seismic forces. | | | | | | | | | | | | | | |
|  | | | | | | | | | |  | | |  | | | | | | | | | | | | | | |
| 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 | 2 | 1 | 3 | | 0 | | 0 | | 0 | | | 0 | | | 0 | | 0 | | | 3 | | | 3 | | | | 3 |
| 2 | CO2 | | 3 | | 3 | 2 | 0 | 0 | 0 | | 0 | | 0 | | 0 | | | 0 | | | 0 | | 0 | | | 3 | | | 3 | | | | 3 |
| 3 | CO3 | | 3 | | 3 | 3 | 0 | 0 | 0 | | 0 | | 0 | | 0 | | | 0 | | | 0 | | 0 | | | 3 | | | 3 | | | | 3 |
| 4 | CO4 | | 3 | | 3 | 3 | 0 | 0 | 0 | | 0 | | 0 | | 0 | | | 0 | | | 0 | | 0 | | | 3 | | | 3 | | | | 3 |
| 5 | CO5 | | 3 | | 3 | 3 | 0 | 0 | 0 | | 0 | | 0 | | 0 | | | 0 | | | 0 | | 0 | | | 0 | | | 0 | | | | 0 |
| 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 earthquake engineering, earth structure, plate tectonics, faults, earthquake generation mechanism, terminologies | | | | | | | | | | | | | | | | | | | | | | | 06 | | | | | | | 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 | | | | | | | | | | | | | | | | | | | | | | | 08 | | | | | | | CO1, CO2 | | |
| III | **Measurement of earthquakes**  Intensity scales, seismographs and seismograms, magnitude scales, seismic moment and moment magnitude, accelerographs and accelerograms | | | | | | | | | | | | | | | | | | | | | | | 08 | | | | | | | CO1, CO3 | | |
| IV | **Seismic hazard assessment**  Ground motion intensity at given site and in given time interval, probabilistic and semi-probabilistic approaches, seismic zonation and microzonation maps | | | | | | | | | | | | | | | | | | | | | | | 08 | | | | | | | CO3, CO4 | | |
| V | **Seismic protection methods**  Base isolation, energy dissipating devices, codal provisions | | | | | | | | | | | | | | | | | | | | | | | 06 | | | | | | | CO5 | | |
| **Total Hours** | | | | | | | | | | | | | | | | | | | | | | | | **36** | | | | | |  | | | |
| **Essential Readings** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. R. Villaverde, “Fundamental Concepts of Earthquake Engineering”, 1st Edition, CRC Press, 2009 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. S. Elnashai and L. Di Sarno, “Fundamentals of Earthquake Engineering”, 1st Edition, John Wiley and Sons, 2008 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. P. Agarwal and M. Shrikhande, “Earthquake Resistant Design of Structures”, Prentice- Hall of India, New Delhi, 2003. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Supplementary Readings** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. K.E. Bullen K.E, “Introduction to the Theory of Seismology”, Great Britain at the University Printing houses, Cambridge University Press 1996. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. Krammer S.L., Geotechnical Earthquake Engineering, Prentice Hall, International Series, Pearson Education (Singapore) Pvt. Ltd., 2004. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. S K Duggal, “Earthquake Resistant Design of Structures”, Oxford University Press, 2007. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. IS-1893 (part-1), “Criteria for earthquake resistant design of structures” - general provision of buildings, 2016 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |