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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 | **II** |
| Course Code | Course Name | Pre-requisite | Credit Structure | Marks Distribution |
| L | T | P | C | INT | MID | END | Total |
| **CE 556** | **ADVANCED STEEL AND CONCRETE COMPOSITE STRUCTURES** | **NIL** | **3** | **0** | **0** | **3** | **50** | **50** | **100** | **200** |
| CourseObjectives | To develop the student’s knowledge on in-depth understanding of the behavior and design of steel structures in seismic regions. It builds on previous steel design classes which cover steel material behavior, steel member behavior in tension, compression and flexure, and bolted and welded connection behavior. Gives a knowledge of calculus and matrix methods for structures from previous undergraduate or graduate classes will be assumed.The first part of the class deals with shear connectors in the connection design of composite beams, slabs and columns. The second part of the course deals with composite steel-concrete structures, stability issues, fatigue and other seismic systems such as base isolation and supplemental damping. | Course Outcomes | CO1 | Understanding the theoretical basis of steel-composite concrete structures. |
| CO2 | Become familiar with the issues related to the performance of steel frames in seismic regions. |
| CO3 | Understanding on design of such composite structures followed in various codal specifications. |
| SYLLABUS |
| No. | Content | Hours | COs |
| I  | **Introduction**Introduction on composite structures, Limit states of composite section. | **6** | CO1 |
| II | **Shear Connectors**Shear connectors, types of shear connectors, degree of shear connection, partial and complete shear connections, strength of shear connectors | **6** | CO2 |
| III | **Composite Beam**Analysis and design of composite beams without profile sheet, Design of composite beam with propped condition and un-propped condition, deflection of composite beams – beam with profile sheeted deck slab and design of partial shear connection. | **6** | CO3 |
| IV | **Composite slab**Composite slabs, Profiled sheeting with sheeting parallel to span and sheeting perpendicular to span, analysis and design of composite floor system. | **6** | CO2 |
| V | **Composite columns**Design of encased columns, design of in-filled columns under axial, uni-axial and bi-axially loaded columns. | **6** | CO3 |
| VI | **Behaviour of Composite Beams to**Temperature, shrinkage and creep, vibration of composite beams, Cyclic behavior of composite section and case studies on composite structures. | **6** | CO2 |
| Total Hours | **36** |  |
| **Essential Readings** |
| 1. Johnson R. P.,“*Composite Structures of Steel and Concrete*”, Volume –I, Black Well Scientific Publication, U.K., 1994.
 |
| 1. INSDAG, “Teaching Resources for Structural Steel Desgin” Volume 2 to 3, Institute of Steel Development and Growth (INSDAG), 2000.
 |
| 1. Narayanan,R., “*Composite Steel Structures – Advances, Design and construction*”, Elsevier, Applied Science, U.K., 1987.
 |
| **Supplementary Readings** |
| 1. Owens, G. W. and Knowels, P., “Steel Designers Manual (fifth edition)”, Steel Concrete Institute (U.K), Oxford Blackwell Scientific Publication, 1992. |