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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 562** | **Theory of Plates and Shells** | **NIL** | **3** | **0** | **0** | **3** | **50** | **50** | **100** | **200** |
| CourseObjectives | To achieve fundamental understanding of the classical and refined theories of elastic plates and shells, address limitations and challenges, and present analytical and numerical solution techniques. | Course Outcomes | CO1 | Understanding the action of plate and shell components in structures  |
| CO2 | Understanding of the fundamentals of plate and shell theories, |
| CO3 | Analyz ing plate and shell structures by using analytical and numerical methods |
| SYLLABUS |
| No. | Content | Hours | COs |
| I  | **Introduction to Elastic Plates**Review of Concepts of Elasticity, Classical Plate Theory: Basic Assumptions, For- mulations, Boundary Conditions, Governing Equations | 6 | CO1 |
| II | **Bending of Plates**Pure Bending, Plates with Various Loadings and Boundary Conditions, Navier’s Solution for Rectangular Plates, Levy’s Solution | 7 | CO2 |
| III | **Solutions by Numerical Methods**Potential Energy Minimization, Energy Principles and Rayleigh-Ritz Methods, Nu- merical Integration Method, Finite Element Analysis of Plates | 7 |  CO2 |
| IV | **Refined Plate Theories**Large Deflections of Plates, Plates with Shear Deformation, Higher Order Plate Bending Theory, Thermal Stresses in Plates | 8 | CO3 |
| V | **Introduction to Elastic Shells**Basics of Differential Geometry, Space Curves, Surfaces, Theory of Surfaces, Coordinates Systems | 8 | CO2 |
| VI | **Thin Elastic Shells**Different Shell Forms, Basic Assumptions, Strain-Displacement Relations, Love Shell Theory, Axisymmetric Shells And Cylindrical Shells, Membrane Theory of Shells, Solution of Cylindrical Shells |  |  |
| Total Hours | 36 |  |
| **Essential Readings** |
| 1. Timoshenko, S. P. and Krieger, S. W., *“Theory of Plates and Shells”*, McGraw- Hill. |
| 2. Szilard, R.,*“Theory and Analysis of Plates: Classical and Numerical Methods”*, Prentice Hall, New York |
| 3. Gould, P. L., *“Analysis of Shells and Plates”*, Springer-Verlag |
| **Supplementary Readings** |
| 1. Bairagi, N. K., *“Shell Analysis”*, Khanna Publishers, New Delhi |
| 2. Timishenko, S.P. and Goodier, J. N., *“Theory of Elasticity”*, McGraw-Hill |