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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** |
| Course  Objectives | | 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 | | | | | | | | | | | | | | | |