THEORY OF RECTANGULAR PLATES-PART 1

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PREREQUISITES: Advanced Solid Mechanics or Theory of Elasticity.
INTENDED AUDIENCE: Final year B.Tech, M.Tech and Pre-Ph.D students in Mechanical Engineering, Civil Engineering, Aerospace Engineering and Applied Mechanics departments, Faculties who work in solid Mechanics/Continuum Mechanics
INDUSTRY SUPPORT: ABAQUS, ANSYS, ISRO

COURSE OUTLINE :
Beams, plates and shells are fundamental structural elements in the field of mechanical engineering, civil structures, automobile and aerospace engineering. Therefore analysis of these basic structural elements are required for design and development. This course presents systematic development of plate governing equations using the variational calculus. Basic analytical solutions techniques are discussed for bending, free vibration and buckling cases. Further this approach can be applied to develop governing equation and solutions for functionally graded plate, piezoelectric plates (current research topics).

ABOUT INSTRUCTOR :
Prof.Poonam Kumari is currently an Associate Professor in the Department of Mechanical Engineering of the Indian Institute of Technology Guwahati.She received her Ph.D. degree from Indian Institute of Technology Delhi in 2012.She did her Post-Doctoral Fellowship at Simon Fraser University.She works in the area of Continuum Mechanics and Smart Material and structures.She has developed three-dimensional as well as two-dimensional solution for composite and piezolaminated plates.She has 29 International Journal publications and 29 International Conference publications.She is teaching course of Theory of plates and Shells since 2014 at IIT Guwahati.She has also conducted an online course on theory of rectangular plate under MOOCs.Her course was selected for faculty development programme course by AICTE.She received Young Engineer Award in 2017 from Indian National Academy of Engineers very recently, she also received approval for SERB women excellence award,2019.

COURSE PLAN :
Week 1: Basics of Elasticity,Energy Principals,Classification of various plate theories
Week 2: Kinematic assumptions for various theories,Development of governing equations,Boundary conditions and plate constitutive relations
Week 3: Navier Solution for bending,Levy solution,Approximate solutions
Week 4: Navier solution for free vibration and bucking cases,Levy solution for free vibrations case,Development of 3D solution in mixed form