Theory of Rectangular Plates-Part1

Mechanical Engineering

Instructor Name: Dr. Poonam Kumari
Institute: IIT Guwahati
Department: Mechanical Engineering

Course Intro: : 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).

Pre Requisites: : Advanced Solid Mechanics or Theory of Elasticity.
Core/Elective: : Elective
UG/PG: : PG
Industry Support : ABAQUS, ANSYS, ISRO

Reference : [1] J. N. Reddy, â€œTheory and Analysis of Elastic Plates and Shellsâ€•, CRC Press, 2006. [2] K. Bhaskar and T.K. Varadan, â€œPlates: Theories and Applicationsâ€•, Wiley, 2014. [3] K. Chandrashekhara, â€œTheory of Platesâ€•, University Press (India) Limited, 2001

About Instructor: Poonam Kumari is currently an Assistant 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, Canada from July 2012 - June 2013. She works in the area of Continuum Mechanics and Smart Material and structures. Recently, she received Young Engineer Award-2017 from Indian National Academy of Engineers. She has developed three-dimensional as well as two-dimensional solutions for composite and piezolaminated plates. She has 22 International Journal publications and 26 International Conference publications. She is teaching course of Theory of plates and Shells since 2014 at IIT Guwahati (Every year July-Dec Session)

COURSE PLAN

SL.NO	Week	Module Name
1	1	Basics of Elasticity, Energy Principals, Classification of various plate theories
2	2	Kinematic assumptions for various theories, Development of governing equations, Boundary conditions and plate constitutive relations
3	3	Navier Solution for bending , Levy solution,Approximate solutions
4	4	Navier solution for free vibration and bucking cases,Levy solution for free vibrations case, Development of 3D solution in mixed form