

### **ME 541 Continuum Mechanics (3-0-0-6)**

Introduction to continuum mechanics: Cartesian tensors, state of stress, kinematics of deformation and general principles of mechanics; Analysis of stresses and strains; Cauchy's formula; Principal stresses and principal strains; Mohr's Circle; Octahedral Stresses; Hydrostatic and deviatoric stress; Differential equations of equilibrium; Plane stress and plane strain; Compatibility conditions; Generalized Hooke's law and theories of failure; Energy Methods; Bending and torsion of thin walled sections; Euler's buckling load; Beam Column equations. Introduction to fluid kinematics; Integral and differential forms of governing equations; Conservation equations; Navier-Stokes equations and its applications; Potential flow; Laminar boundary-layer; Introduction to Free-shear flows and instabilities; Basics of compressible flow.

#### *Texts/References:*

- [1] R.L. Panton, Incompressible Flow, Second Edition, Wiley, 1996.
- [2] F.M. White, Fluid Mechanics, Seventh Edition, McGraw-Hill international editions, 2010
- [3] H. Schlichting, K. Gersten, Boundary Layer Theory, Eighth Edition, Springer, 2000.
- [4] J.N. Reddy, Principles of Continuum Mechanics, Cambridge University Press, 2010.
- [5] S.P. Timoshenko, J.N. Goodier, Theory of Elasticity, 3rd Edition, McGraw Hill Publishing Co. 1970
- [6] L.S. Srinath, Advanced Mechanics of Solids, 2nd Ed., TMH Publishing Co. Ltd., New Delhi, 2003.
- [7] D. S. Chandrasekharaiah, Lokenath Debnath, Continuum Mechanics, Academic Press, 1994.