MECHANICS OF SOLIDS

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T. J. Prabhu, the former Dean of Mechanical Engineering, Bharath University, Chennai — 73, has more than 40 years of varied experience — Industrial, Research and Teaching. He took his B.E (Mech.) degree from the erstwhile College of Engineering, Guindy and M.S (Mech.) and Ph.D (Appl. Meeh.) degrees from IIT, Madras. During his stay in industries , he has designed and developed Industrial Process Cameras (Standard Printing M/C Co),Acoustic Enclosures and Silencers, and Solar Flat Plate Collectors (Southern Power Systems (P) Ltd), and Low Cost Automatic Machines (W.S. Insulators) . Dr. Prabhu has published 18 Research papers of which 10 are in the International Journal "WEAR".

Dr. Prabhu has written six Engineering Textbooks.

1. Design of Transmission Elements
2. Fundamentals of Machine Design
3. Mechanics of Solids
4. Basic Mechanical Engineering and History of Mechanical Engineering
5. Engineering Mechanics
6. Projects in FEM using MATLAB

His areas of interest are Machine Tools, Vibrations, Stress Analysis and Finite Element Method.

Mechanics of Solids

Structures and machines are subjected to external loads (forces, moments). For example, a railway bridge structure carries the weight of a moving train, a connecting rod of an automobile engine is subjected to gas pressure in the cylinder. In order to carry this external loads without *fracture* or *appreciable deformation*, the structure and machine members must be made of *proper material* and they must have the *necessary dimensions*. The dimensions are determined by design calculations. The development of *the fundamentals* for evolving design formulas is the subject matter of **Mechanics of Solids.**

In Mechanics of Rigid Bodies we determine the forces and motions associated with rigid bodies; in Mechanics of Solids (Materials) we determine the stresses and strains that occur inside the bodies and the deformations under the loads.

The basic types of deformation are elongation, compression, shear, twisting and bending.

The topics covered in this book are :

1. Tension, Compression,and Shear
2. Shearing Force and Bending Moment Diagrams
3. Bending Stresses in Beams
4. Deflection of Beams
5. Torsion
6. Principal of Stresses
7. Cylinders and Spheres
8. Columns and Struts
9. Experimental Stress Analysis
10. Moment of Inertia (Second moment of Area)
11. Plane Frames
12. Energy Methods