

ME120 Engineering Mechanics: Statics

Textbook: Anthony Bedford and Wallace Fowler
"Engineering Mechanics: Statics" 3rd Edition, Prentice-Hall, 2002

Contents:

- I. Introduction
 - 1.1 Engineering and mechanics
 - 1.2 Learning mechanics
 - 1.3 Fundamental concepts
 - 1.4 Units
 - 1.5 Newtonian gravitation
- II. Vectors
 - 2.1 Scalars and vectors
 - 2.2 Rules for manipulating vectors
 - 2.3 Components in 2-D
 - 2.4 Components in 3-D
 - 2.5 Dot products
 - 2.6 Cross products
 - 2.7 Mixed triple products
- III. Forces
 - 3.1 Types of forces
 - 3.2 Equilibrium and free-body diagrams
 - 3.3 2-D force systems
 - 3.4 3-D force systems
- IV. Systems of forces and moments
 - 4.1 2-D description of the moment
 - 4.2 The moment vector
 - 4.3 Moment of a force about a line
 - 4.4 Couples
 - 4.5 Equivalent systems
 - 4.6 Representing systems by equivalent systems
- V. Objects in equilibrium
 - 5.1 The equilibrium equations
 - 5.2 2-D applications
 - 5.3 Statically indeterminate objects
 - 5.4 3-D applications
 - 5.5 Two-force and three-force members
- VI. Structures in equilibrium
 - 6.1 Trusses
 - 6.2 The method of joints
 - 6.3 The method of sections
 - 6.4 Space trusses
 - 6.5 Frames and machines
- VII. Centroids and center of mass
 - 7.1 Centroids of areas
 - 7.2 Centroids of composite areas
 - 7.3 Distributed loads

- 7.4 Centroids of volumes and lines
- 7.5 The Pappus-Guldinus Theorems
- 7.6 Definition of the center of mass
- 7.7 Centers of mass of objects
- 7.8 Centers of mass of composite objects
- VIII. Moments of Inertia
 - 8.1 Definitions
 - 8.2 Parallel-axis theorems
 - 8.3 Rotated and principal axes
 - 8.4 Simple objects
- IX. Friction
 - 9.1 Theory of dry friction
 - 9.2 Applications
- X. Internal forces and moments
 - 10.1 Axial force, shear force and bending moment
 - 10.2 Shear force and bending moment diagrams
 - 10.3 Relations between distributed load, shear force and bending moment
 - 10.4 Loads distributed uniformly along straight lines
 - 10.5 Loads distributed uniformly along cables
 - 10.6 Discrete loads
 - 10.7 Pressure and center of pressure
 - 10.8 Pressure in a stationary liquid
- XI. Virtual work and potential energy
 - 11.1 Virtual work
 - 11.2 Potential energy