

Engineering Mechanics



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CHARULATHA PUBLICATIONS

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UNIT - I BASICS AND STATICS OF PARTICLES

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BASICS AND STATICS OF PARTICLES

What is Engineering Mechanics?

Mechanics is the study of forces that act on bodies and the resultant motion that those bodies experience. With roots in physics and mathematics, Engineering Mechanics is the basis of all the mechanical sciences: civil engineering, materials science and engineering, mechanical engineering and aeronautical and aerospace engineering. Engineering Mechanics provides the "building blocks" of statics, dynamics, strength of materials, and fluid dynamics. Engineering mechanics is the discipline devoted to the solution of mechanics problems through the integrated application of mathematical, scientific, and engineering principles. Special emphasis is placed on the physical principles underlying modern engineering design.

Engineering Mechanics students are also encouraged to engage in undergraduate research with a faculty member. As a result, Engineering Mechanics students are prepared for careers at the forefront of a wide variety of fields, including the aerospace, electronics, automotive, manufacturing, software, and computer industries. The curriculum also provides excellent preparation for graduate school in many different engineering disciplines.

1.1 Introduction to Mechanics

Continuum mechanics is concerned with motion and deformation of material objects, called bodies, under the action of forces. If these objects are solid bodies, the respective subject area is termed solid mechanics, if they are fluids; it is fluid mechanics or fluid dynamics. The mathematical equations describing the fundamental physical laws for both solids and fluids are alike, so the different characteristics of solids and fluids have to be expressed by constitutive equations. Obviously, the number of different constitutive equations is huge considering the large number of materials. All of this can be written using a unified mathematical framework and common tools. In the following we concentrate on solids. Continuum mechanics is a phenomenological field theory based on a fundamental hypothesis