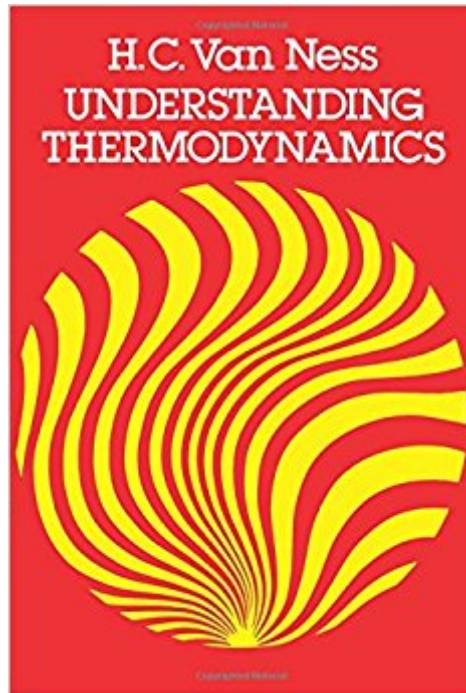




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Understanding Thermodynamics (Dover Books On Physics)



Synopsis

Grappling with the first and second laws of thermodynamics can test the intellectual mettle of even the most dedicated student of the physical sciences. Approaching the subject for the first time may raise more queries and doubts than are usually handled in the basic, straightforward textbook. Based on a series of lectures delivered to 500 sophomore engineering students at Rensselaer Polytechnic Institute, Dr. Van Neer's clear, lucid treatment is readily comprehensible by undergraduate-level science and engineering students. His language is informal, his examples are vivid and lively, his perspective is fresh. This book, a companion to a basic textbook, discusses thermodynamics, a topic of profound importance in the study of physics, in a manner which elucidates fundamental concepts and demonstrates their practical applicability. In these increasingly energy-conscious and costly times, as traditional energy sources are being depleted and revolutionary new sources are contemplated, appreciating the consequences of the laws of thermodynamics is more than a fascinating avenue of intellectual inquiry: it is a pragmatic concern imperative to all — students, scientists, engineers, technicians, politicians, businessmen, and anyone facing the energy challenges of the future. Here is help understanding concepts which will prove all-important in the next century. Dr. H. C. Van Ness is a distinguished professor of chemical engineering at Rensselaer Polytechnic Institute and co-author of several textbooks on thermodynamics. He is unsurpassed as an expert in the field.

Book Information

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Understanding Thermodynamics is an exceptional introduction to a subtle and complex topic. The First and Second Law of Thermodynamics are seemingly trivial, and yet an understanding of theoretical and applied thermodynamics often eludes even the best of students. This 100-page overview is much better than the chapter or two on thermodynamics in a first year physics text. It is a more lucid and interesting discussion than is even found in Feynman's Lectures in Physics, Volume 1. H. C. Van Ness, a professor of chemical engineering at Rensselaer Polytechnic Institute and expert in thermodynamics, approaches his subject in a uniquely interesting fashion, stressing that the First and Second Law are assumptions based on empirical data. They are fundamental statements that cannot be derived from other principles. In chapter 1 Van Ness borrows a humorous analogy from Feynman to explain the reasonableness of the abstract concept of internal energy and the relationship between internal energy, heat, and work. Chapter 2 introduces the concept of reversibility, and explains its fundamental importance to thermodynamics. In doing so he carefully exposes our underlying assumptions. In chapter 3, titled Heat Engines, Van Ness emphasizes that the reversible process represents the limiting behavior of actual systems, the best that we can hope for. Also, in most cases we are not even able to make calculations unless we simplify our problem by assuming that our system exhibits reversibility. Van Ness carefully explains the basic engineering calculations for both the Otto engine cycle and the Carnot theoretical heat engine. In chapter 4 Van Ness guides the reader carefully through detailed thermodynamic analysis of a large scale power plant.

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